KEYENCE

911GB

Ladder Support Software

KV STUDIO Ver.11

User's Manual

Read this manual before using the product.
Keep this manual in a safe place for later reference.

Supported CPU Units
- KV-8000
- KV-7500
- KV-7300
- KV-5500
- KV-5000
- KV-3000
- KV Nano Series
- KV-1000
- KV-700
- KV-10/16/24/40
- KV-P16

Frequently Asked Questions

?FAQ

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Preface

"KV STUDIO" is software for creating ladder programs that combines ease of use and powerful programming processing capabilities.

This manual provides an overview of KV STUDIO as well as describing the functions of and how to use KV STUDIO.

Be sure to carefully read and fully understand this manual before you use the product. In addition, store this manual in a safe place so that you can retrieve it whenever necessary.

■ KV STUDIO related manuals

When you use KV STUDIO, read the following manuals together with this one.

To request these manuals, consult the appropriate KEYENCE agent as listed on the back of this manual.

Name	Description
KV-8000 Series User's Manual	This manual describes the system configuration and specifications of the KV-8000 Series. It also describes the CPU built-in functions and how to create ladder programs.
KV-7000 Series User's Manual	This manual describes the system configuration and specifications of the KV-7000 Series. It also describes the CPU built-in functions and how to create ladder programs.
KV-5500/5000/3000 Series User's Manual	This manual describes the system configuration and specifications of the KV-5500/5000/3000 Series. It also describes the CPU built-in functions and how to create ladder programs.
KV-8000/7000/5000/3000/1000 Series and KV Nano Series Instruction Reference Manual	This manual describes the instructions that are available in ladder programming.
KV-8000/7000/5000/3000/1000 Series and KV Nano Series Script Programming Manual	This manual describes how to create script programs and the available operators, control sentences, and functions.
KV-7000 Series Application Package User's Manual	This manual describes the application packages that can be used with the KV-7000 Series and how to use them.
KV STUDIO User's Manual	This manual, which describes how to operate KV STUDIO.
KV-5500/5000/3000/1000 Series System Macro Manual	This manual describes the system macros that are available for the KV-5500/5000/3000/1000 Series.
KV Nano Series User's Manual	This manual describes the system configuration and specifications of the KV Nano Series. It also describes the CPU built-in functions and how to create ladder programs.
KV-1000 Series PLC Guide Manual	This manual gives instructions on how to easily install the KV-1000. Be sure to read this manual the first time that you use the product.
KV-1000 Series User's Manual	This manual describes the specifications and built-in functions of the KV-1000 as well as how to use the KV-1000.
KV-1000 Series Programming Manual	This manual describes how to use the KV-1000 to make ladder programs. It also describes modules, macros, and local devices.
KV-700 Series User's Manual	This manual describes the specifications and built-in functions of the KV-700 as well as how to use the KV-700.
KV-700 Series Instruction Reference Manual	This manual describes the instructions that can be used with the KV-700.
KV Series User's Manual	This manual describes the specifications and built-in functions of the KV-10/16/24/40 as well as how to use the KV-10/16/24/40.
KV-P Series User's Manual	This manual describes the specifications and built-in functions of the KV-P16 as well as how to use the KV-P16.

Safety Precautions

This Manual details how to use KV STUDIO and warnings that you should pay attention to. To ensure proper use of KV STUDIO, read this manual carefully and fully understand this manual before you use the product.

Store this manual in a safe place so that you can retrieve it whenever necessary.
Provide this manual to the end users of the product.

■ Symbols

This document contains notices that you should observe to ensure your own personal safety, as well as to protect the product and connected equipment. These notices are marked according to the level of danger as shown below.

⚠ DANGER	**It indicates a hazardous situation which, if not avoided, will result in death or serious injury.**
⚠ WARNING	**It indicates a hazardous situation which, if not avoided, could result in death or serious injury.**
⚠ CAUTION	**It indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.**
NOTICE	**It indicates a situation which, if not avoided, could result in product damage as well as property damage.**

▶ Important	**It indicates cautions and limitations that must be followed during operation.**

✎ Point	**It indicates additional information on proper operation.**

Reference	**It indicates tips for better understanding or useful information.**

📖 Indicates a page to be referred to in this manual or other manuals.

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■ General precautions

⚠ WARNING	• **Ensure that the KV Series functions correctly before using KV STUDIO.** • **Before you use this product, verify its functionality and performance at startup and during operation.** • **Provide a safety circuit that bypasses the PLC to enable failsafe operation of the entire system in the event that the PLC fails.** • **Output circuit or internal circuit malfunctions sometimes prevent control from being performed normally. Be sure to provide a safety circuit in control systems where circuit malfunction may lead to fire or other serious accidents.** • **Do not use the product with the purpose of protecting human beings.**
⚠ CAUTION	**If used these products in any methods other than those specified in this instruction manual, the provided protection in these products may be compromised.**
NOTICE	• **Proceed with care when modifying the product or when using it in a manner that falls outside of the ranges indicated in its specifications since KEYENCE is unable to guarantee product functionality or performance in such situations.** • **Use this product in combination with other products only after careful consideration since the product may fail to satisfy its functionality and performance capabilities as a result of factors such as its usage conditions and the environment in which it is used.**

Software License Agreement

NOTICE TO USER: PLEASE READ THIS SOFTWARE LICENSE AGREEMENT (THIS "AGREEMENT") CAREFULLY. BY USING ALL OR ANY PORTION OF THE [KV STUDIO] (THIS "SOFTWARE"), YOU ARE AGREEING TO BE BOUND BY ALL THE TERMS AND CONDITONS OF THIS AGREEMENT. IF YOU DO NOT AGREE TO ANY TERMS OF THIS AGREEMENT, DO NOT USE THIS SOFTWARE.

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*   This product contains open source software components.
    For details of the open source software components, refer to the text file located in the ""license"" folder in the installation folder.

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MEMO

Manual Organization

Chapter 1	**BEFORE USING THE PRODUCT**	This chapter describes how to check the package contents, an overview of the product, how to connect to a PC, and common operating methods.
Chapter 2	**PROJECT MANAGEMENT**	This chapter describes project management.
Chapter 3	**UNIT EDITOR**	This chapter describes the Unit Editor, which is used to select connected units and create and transfer unit configurations.
Chapter 4	**FILE AND PRINT**	This chapter describes the file management and print functions.
Chapter 5	**EDIT**	This chapter describes the functions for editing ladder programs using the editor.
Chapter 6	**VIEW**	This chapter describes how to display the windows of the various functions and how to enter instructions using the instruction/macro/pack pallet.
Chapter 7	**Programs**	This chapter describes the windows for editing Program.
Chapter 8	**CONVERT**	This chapter describes functions such as the ladder conversion function and invalid operand and duplicate coil check functions.
Chapter 9	**MONITOR/ SIMULATOR**	This chapter describes how to use the monitor and simulator functions.
Chapter 10	**OPERATION RECORD/REPLAY**	This chapter describes the operation record / replay function and its usage.
Chapter 11	**DEBUG**	This chapter describes functions for debugging programs using the monitor and simulator.
Chapter 12	**TOOL**	This chapter describes how to call tools such as the Unit Editor, logging settings, and positioning parameter setting function.
Chapter 13	**SCRIPT**	This chapter describes how to enter and edit scripts.
	APPENDICES	The appendices include information such as lists of error codes, error remedies, and lists of shortcut keys.

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APPENDICES

Conventions Used In This Manual

Terminology

This manual uses the following terminology excluding some instances.

Terminology	Description
"KV-8000"	This refers to KEYENCE KV-8000 Series programmable controllers.
"KV-7500"	This refers to KEYENCE KV-7500 Series programmable controllers.
"KV-7300"	This refers to KEYENCE KV-7300 Series programmable controllers.
"KV-5500"	This refers to KEYENCE KV-5500 Series programmable controllers.
"KV-5000"	This refers to KEYENCE KV-5000 Series programmable controllers.
"KV-3000"	This refers to KEYENCE KV-3000 Series programmable controllers.
"KV Nano Series"	This refers to KEYENCE KV Nano Series programmable controllers. Relevant model names are: KV-N14**, KV-N24**, KV-N40**, KV-N60** and KV-NC32T.
"KV-1000"	This refers to KEYENCE KV-1000 Series programmable controllers.
"KV-700/700+M"	This refers to KEYENCE KV-700 Series programmable controllers.
"KV-10 (16)/24 (40)"	This refers to KEYENCE KV-10/16/24/40 Series programmable controllers.
"KV-P16"	This refers to KEYENCE KV-P16 Series programmable controllers.
PLC	An electrical device that can control instruments freely by changing the program. PLC stands for Programmable Logic Controller.
PC	This is an abbreviation of Personal Computer.
"KV STUDIO"	This refers to the KV STUDIO ladder support software.
Ladder program	This refers to programs that are created with the KV STUDIO ladder support software.
CPU function version	This refers to the version of the function added to the CPU. For details, see 📖 the KV-8000 Series User's Manual and 📖 the KV-7000 Series User's Manual and 📖 the KV-5500/5000/3000 Series User's Manual.
"KV-8000 Ver.**"	KV-8000 in CPU function version **. This designation is used to distinguish it from KV-8000 in CPU function versions prior to **.
"KV-7500 Ver.**" "KV-7300 Ver.**"	KV-7500/7300 in CPU function version **. This designation is used to distinguish it from KV-7500/7300 in CPU function versions prior to **.
"KV-5000 Ver.**" "KV-3000 Ver.**"	KV-5000/3000 in CPU function version **. This designation is used to distinguish it from KV-5000/3000 in CPU function versions prior to **.

About Symbols

Menus and buttons in this manual are indicated using the following symbols.

Terminology	Description
"　"	Menu items, which can be selected from the menu bar.
[ ]	Names of dialog boxes and items.
"　"	Buttons with text descriptions in dialog boxes for various operations, such as executing and canceling.
Ctrl	Keys on the keyboard.

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BEFORE USING THE PRODUCT

The chapter describes how to check the package contents, an overview of the product, how to connect to a PC, how to install the software, and common operating methods.

Checking the Package Contents

The package contains the following items. Before using the product, make sure that the package contains everything that it is supposed to contain.

■ **KV STUDIO Ver.11G CD-ROM**

This DVD-ROM contains the KV STUDIO Ver.11G installer. Keep it in a safe place after installation.

Point	**We recommend that you make a backup of this DVD-ROM to safeguard against accidental damage.**

This section describes information such as the operating environment, system configuration, features, and functions of KV STUDIO.
Be sure to read this section before you start to use the product.

Operating Environment and System Configuration

The following environment is required to operate KV STUDIO.
Make sure that the system you are using meets the following conditions and is equipped with the required devices.

Supported PC

A PC installed with Windows 10, Windows 8 or Windows 7 and equipped with USB and RS-232C or Ethernet interface.

DVD-ROM drive

CPU

Windows 10/8/7:

    A processor recommended by Microsoft Corporation

Memory capacity

Windows 10/8/7:   Memory capacity recommended by Microsoft Corporation

Applicable OS

- Windows 10 / Windows 8 (including 8.1) / Windows 7 (SP1 or later)

Free space available on hard disk

    3000MB or more

* If you want to install the manual help files in several languages, an additional 700 MB of space is required for each language.

* An additional 1000 MB of free space is temporarily required during installation.

Display unit
Resolution: 1024 × 768,
High Color (16 bits) or higher

Printer

Printer
Windows-compliant printer that can be connected to the PC (300 dpi or higher)

KV Series

PLC

KV STUDIO Ver.11 supports the following PLC models.

- KV-8000
- KV-7500
- KV-7300
- KV-5500
- KV-5000
- KV-3000
- KV-1000
- KV-700/700+M
- KV Nano Series*
- KV-P16
- KV-10/16/24/40
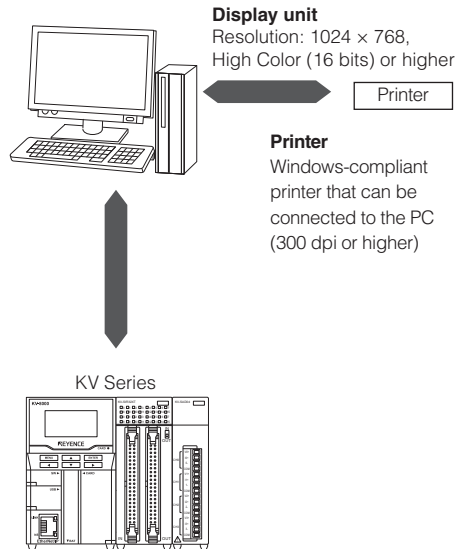
```
*  KV Nano Series
   KV-N14AR/KV-N14DR/KV-N14AT(P)/KV-N14DT(P)
   KV-N24AR/KV-N24DR/KV-N24AT(P)/KV-N24DT(P)
   KV-N40AR/KV-N40DR/KV-N40AT(P)/KV-N40DT(P)
   KV-N60AR/KV-N60AT(P)
   KV-NC32T
```

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KV STUDIO Functions

KV STUDIO has the following functions.

■ Unit Editor function

- This function is provided for building a system for the KV-8000/ 7500/7300/5500/5000/3000/1000/700 Series and KV Nano Series.
- It is used to configure unit settings and assign relays and DM entries on KV-8000/7500/7300/5500/5000/3000/1000/700 Series and KV Nano Series units.
- You can print unit structure diagrams and lists of settings.
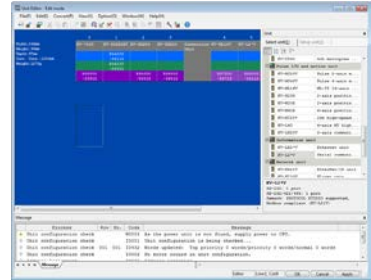
■ Editor function

- You can use various instructions in the ladder language to create ladder programs.
- You can use module, function block, macro, and local device to create a program structure.
- You can register comments and labels on devices and transfer these comments and labels to PLCS.
- You can convert the ladder program that you have created into a code that can be read by all KV Series units.
- You can display on the screen and print lists of the ladder programs that you have created, mnemonics lists, comments and labels, and the use status of devices.
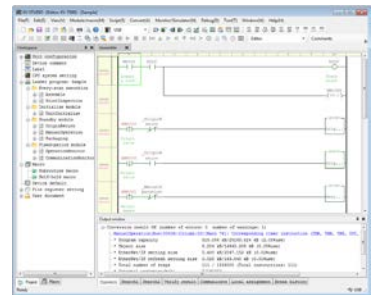
■ Simulator function

- You can simulate the operation of the ladder program you have created without connecting any KV Series units. This enables you to debug the program you have created.
- You can easily perform troubleshooting by conducting continuous scan execution, single scan execution, and single step execution.
- Reversed step execution is also possible.
- Ladder programs can be edited while simulating operation (simulator edit).
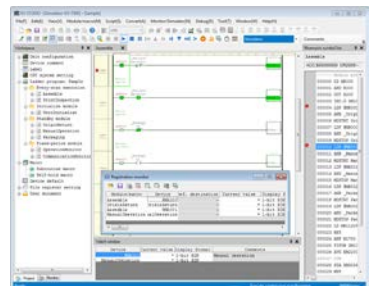
> **Reference** The simulator edit function can only be used when the selected PLC model is the KV-8000/7500/7300.

■ **Monitor function**

- You can use the ladder program that you have created to perform online monitoring of the ON/OFF status of contacts in real time.
- You can display time charts.
- You can perform online editing.
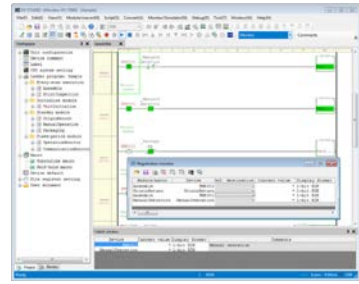
■ **Replay function**

- The status of the ladder program when a fault occurs can be played back along with the video shot by the camera.
- In addition to rewinding and frame advance functions, the playback position can be changed from the event or error history, so the status when a problem occurs can be mastered.
- The device data when a fault occurs can be displayed in the time chart format in conjunction with the real-time chart monitor.
- The device data when a fault occurs can be replayed and checked on the Replay VT Viewer in conjunction with VT STUDIO.
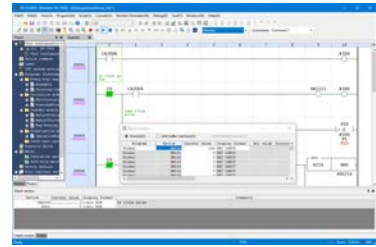
<div style="border:1px solid">Reference</div> The replay function can be used only when the PLC model is KV-8000.

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MEMO

KV STUDIO Ver.11 supports the KV series CPU units.[*]

Because the software has a function that automatically converts previously created ladder programs when they are read, you can smoothly migrate to the new programming environment.

* The supported PLC models are the KV-8000, KV-7500, KV-7300, KV-5500, KV-5000, KV-3000, KV-1000, KV-700/700+M, KV Nano Series, KV-10/16/24/40 and KV-P16.

Ladder Programs Created with KV BUILDER

■ Precautions when reading data

Note the following when using KV STUDIO Ver.11 to read ladder program files (*.ldc), which have been created with KV BUILDER, intended for the KV-700/700+M, KV-10/16/24/40, KV-P16, and KZ-300/350.

- When KV STUDIO Ver.11 reads a ladder program file (*.ldc) for the KV-700/700+M, KV-10/16/24/40 and KV-P16, the file is converted into the KV STUDIO file format (*.kpr).
  If such a converted file (*.kpr) is then saved to the original folder (the folder in which the *.ldc files are saved), you will no longer be able to open the project in KV BUILDER. Save the converted files in a different folder.
- When KV STUDIO Ver.11 reads a ladder program intended for the KZ-300/350 (*.ldc), the PLC model is considered to be the KV-700.
- "Comment 1," "Comment 2," and "label" can be read, but not "Comment 3."
- The circuit library is not supported.
- When you are using labels, check that the following character strings are not used.

  Character strings that cannot be used as label names
- ! " # $ % & ' ( ) * + , - . / : ; < = > ? @ [¥] ^ ` { |} ~ (space)
- Characters that cannot be used at the beginning of a label name: _0123456789
- Character strings that cannot be used: Global,[*1] (a name identical to an instruction), (a device name)
- One alphabetic character + R, or M + a number
- One alphabetic character + a number
- X + (A to F)
- Y + (A to F)
- The following key words specified in KV script
  IF, THEN, ELSE, END, SELECT, CASE, IS, TO, MC, MCR, FOR, NEXT, WHILE, DO, UNTIL, TYPE
- The following key words specified in IEC61131-3
  TRUE, FALSE,
  TIME, DATE, TIME_OF_DAY, TOD, DATE_AND_TIME, DT,
  BOOL, SINT, INT, DINT, LINT, USINT, UINT, UDINT, ULINT, REAL, LREAL, STRING, WSTRING,
  BYTE, WORD,
  DWORD, LWORD,
  ANY, ANY_DERIVED, ANY_ELEMENTARY, ANY_MAGNITUDE, ANY_NUM, ANY_REAL, ANY_INT,
  ANY_BIT, ANY_STRING,
  ANY_DATE,
  ACTION, END_ACTION,

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BEFORE USING THE PRODUCT

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ARRAY, OF,

AT,

CASE, END_CASE,

CONFIGURATION, END_CONFIGURATION,

CONSTANT,

EN, ENO,

EXIT,

F_EDGE,

FOR, TO, BY, DO, END_FOR,

FUNCTION, END_FUNCTION,

FUNCTION_BLOCK, END_FUNCTION_BLOCK,

IF, THEN, ELSIF, ELSE, END_IF,

INITIAL_STEP, END_STEP,

NOT, MOD, AND, XOR, OR,

PROGRAM, WITH, END_PROGRAM, R_EDGE,

READ_ONLY, READ_WRITE,

REPEAT, UNTIL, END_REPEAT,

RESOURCE, END_RESOURCE,

RETAIN, NON_RETAIN,

RETURN,

STEP,

STRUCT, END_STRUCT,

TASK,

TRANSITION, FROM, END_TRANSITION,

TYPE, END_TYPE,

VAR, VAR_INPUT, VAR_OUTPUT, VAR_IN_OUT, VAR_TEMP, VAR_EXTERNAL, VAR_ACCESS,

VAR_CONFIG, VAR_GLOBAL,

END_VAR,

WHILE, DO, END_WHILE

- Other character strings (IEC61131-3 standard)
- Two or more continuous "_" are not allowed in a label name. For example, "a_b_c" can be used, but "a__bc" is forbidden.
- Character strings are not case-sensitive. For example, "aBc" and "abC" are treated as the same label name.

✎ **Point**
- **Some character strings can be used when KV-1000, KV-700/700+M, KV-10 (16), KV-24 (40), or KV-P16 is selected for the PLC model.**
- **When KV STUDIO reads a ladder program that contains label names with character strings that cannot be used, the labels that use the illegal character strings are not read, and the device names are displayed in place of these labels.**
- **When a ladder program is transferred to a KV-700/700+M, KV-10/16/24/40, or KV-P16, the label information in use is not transferred (because these units do not have label information storage areas).**
  Consequently, when KV STUDIO Ver.11G is used to read a ladder program from a KV-700/700+M, KV-10/16/24/40, or KV-P16, device names are displayed instead of labels.

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> ▶ **Important**

- **Depending on the function, some settings that were previously configured from ladder programs are now instructions and some settings that were previously configured from ladder programs are now configured from KV STUDIO.**
  In addition, there are additions and changes to the external I/O relays (R), control relays (CR), and control memory (CM) entries, so check this information with the manual of the CPU that you are using.
  Key points
  •Logging function . .Changed from being set from a ladder program to the logging setting in KV STUDIO.
  •High-speed counter, frequency counter, and cam switch functions
  . . . . Changes have been made to the external input relays.
- **The KV-L20 cannot be used with the KV-8000/7500/7300/5500/5000/3000/1000. Use the Unit Editor to specify KV-L2*V. The KV-L21V does not support VT multi-link mode. Use VT2 multi-link. In addition, recreate any ladder programs that have been created for the KV-L20 so that they are created for the KV-L21V.**
- **The QL cannot be used with the KV-8000/7500/7300/5500/5000/3000/1000 Series and KV Nano Series. Delete any ladder programs that have been created for the QL.**
- **KV-H20 cannot be used with the KV-8000/7500/7300.**

■ **Model change**

KV STUDIO Ver.11 has a function to change the ladder program's PLC model.
For details, see 📖 "Changing the Model" (page 4-20).

KZ Ladder Programs

KV STUDIO Ver.11 can read the ladder programs for the KZ-300/350 and KZ-A500. When KV STUDIO Ver.10 reads a ladder program file for the KZ-300/350 (*.ldc) or KZ-A500 (*.ldx), the file is converted into the KV STUDIO file format (*.kpr).

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1-4 Installing the Software

This section briefly describes how to install KV STUDIO on the PC's hard disk.

Preparing for Installation

Check the following before you start to install the software.

> ✎ **Point** | **We recommend that you make a backup of the DVD-ROM to safeguard against accidental damage.**

■ Free space available on hard disk

KV STUDIO can only be installed on a hard disk. 3000MB or more of free space is required on the hard disk. If there is not enough free space, clean up the hard disk so that there is enough space.
📖 "Operating Environment and System Configuration" (page 1-3)

■ Windows environment and installation directory

KV STUDIO is software that runs in Windows, so be sure to carry out the installation in Windows as well. Make sure that Windows 10/8/7 is installed and is operating normally on the PC that you are using.

■ USB (USB port)

To use a PC's USB port to transfer programs to the KV-8000/7500/7300/5500/5000/3000/1000/700 or KV Nano Series, or to use the monitor function, enable the USB port on the PC in advance. For details on how to configure the settings, see the manual of the PC that you are using.

■ Ethernet (Ethernet port)

To use a PC's Ethernet port to transfer programs to the KV-8000/7500/5500/5000 or KV Nano Series or to use the monitor function, enable the Ethernet port (LAN function) on the PC in advance. For details on how to configure the settings, see the manual of the PC that you are using.

■ RS-232C (serial port)

To use a PC's RS-232C port to transfer programs to the KV Series or to use the monitor function, enable the RS-232C port (serial port) on the PC in advance. For details on how to configure the settings, see the manual of the PC that you are using.

■ Bluetooth communication

To use the Bluetooth unit KV-BT1 to transfer programs from a PC to the KV-5500/5000/3000 or to use the monitor function, attach the USB adapter for Bluetooth connections (sold separately) to the PC, and enable Bluetooth communication in advance. For details on how to configure the settings, see the user's manual of the USB adapter for Bluetooth connections.

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Installing the USB Driver

The USB driver is automatically installed during the installation of KV STUDIO. If you need to manually reinstall the USB driver, the USB driver file can be found in "C:\Program Files\KEYENCE\KVS11E\KVS".

Precautions in Windows 10/8/7

■ User rights

When KV STUDIO is installed in the standard folder (C:\Program files\KEYENCE\KVS11\), set the following access rights.
• Assign "Standard User" rights or higher to the users who will use KV STUDIO.

Installation

This section describes how to install the software on a PC with the following drive configuration as an example.
C　　: Hard drive
E　　: DVD-ROM drive

1 **Start Windows, and insert the KV-STUDIO DVD-ROM into the CR-ROM drive of the PC.**
• The PC's autorun function will start the installer.
If the installer does not start, select "Run" from the Start menu, type "e:\setup" in the "Run" dialog box, and then click "OK."
• Follow the installer's instructions to install the software.

✎ Point	**When installing KV STUDIO on Windows 10/8/7, log in as a user with "Administrator" rights.**

Uninstalling KV STUDIO

You can uninstall KV STUDIO when it is no longer necessary.
In the Windows Control Panel, use "Add or Remove Programs" to uninstall KV STUDIO.

✎ Point	**When uninstalling KV STUDIO on Windows 10/8/7, log in as a user with "Administrator" rights.**

This section describes the precautions for using KV STUDIO. Be sure to read this section carefully.

Checking PC settings

Before using the product, check that the settings have been configured to enable USB, RS-232C and Ehernet.

If these settings have not been configured, a communication error will occur during monitor operation, and you will not be able to operate the monitor correctly.

For details on how to configure the settings, see the manual of the PC you are using.

During monitor operation

A communication error will occur if you turn off the KV Series or disconnect the connection cable during monitoring. Do not perform these operations until you have stopped monitoring.

Monitoring after a ladder program is changed

To perform monitoring after changing a ladder program, select "PLC transfer → Monitor mode" from the menu to transfer the program to the PLC.

Display resolution

Be sure to set the display resolution to 1024 × 768 pixels, High Color (16 bits) or higher, small fonts. To make operations more comfortable, use a display that has as large a resolution as possible. (We recommend a resolution of 1280 × 1024 or higher.)

Precautions when using USB

For USB connections, do not use a USB hub but connect the USB cable directly to the USB port of the PC. Communication may be disrupted if noise or other factors cause unstable communication. If communication is disrupted, unplug the USB cable once and then plug it again.

In situations where communication is unstable, such as in environments with a high level of noise, pass the cable through a ferrite core.

1-6 About Basic Operation

This section describes information that you need to know before you begin programming with KV STUDIO, such as the programming flow and how to start and exit each mode and the software.

Program Creation Flow and Modes

KV STUDIO has six modes: "editor", "monitor", "online edit", "simulator", "simulator edit" and "Replay". The procedure to follow when performing actual programming, the modes that are used in each step of the procedure, and the main settings of each mode are shown below.

---

1 System configuration
Create the system configuration according to the design drawing.
Use the Unit Editor to configure the following.

Unit Editor

- Unit configuration information of the KV-8000/7500/7300/5500/5000/3000/1000/700 system
- Unit relay and DM assignments
- Unit functions
- KL system settings

---

2 Ladder diagram creation
Create a ladder program according to the processing details to be controlled by the PLC.

Editor

- Creation of modules ....Create a ladder program for each module.
- Creation of macros ....Create macros as required.
- Setting of the module execution sequence

---

3 Ladder program conversion and transfer

Editor

Convert the created ladder program into code that can be read by the KV Series.
After the conversion, transfer the code to the KV Series.

---

4 Program debugging

Check the operating status such as device changes.
You can correct ladder programs by detecting locations in which errors occur.
- To perform debugging by simulating an environment in which KV Series units are connected, use the "Simulator."
- To perform debugging by actually connecting KV Series units and writing a program to it, use the "Monitor."
- "Replay" is used to play back the operation record for debugging while checking the status when a fault occurs.

Debugging without the CPU unit connected	Debugging with the CPU unit connected	Debugging of replay operation record
Simulator	Monitor	Replay

---

5 Ladder program correction and program transfer

Editor

In addition to using the Monitor and Simulator to perform debugging, you can use the Editor to correct and change the ladder program.
Finally, when you have finished debugging and you have created a program that operates correctly, transfer and write the completed program to the KV Series.

About the Screens

About the screens of each mode

The screens of the modes of KV STUDIO are related as shown below.

Monitor ⇄ Online Edit

Editor ⇄ Replay

* Replay function
It can only be used by the KV-8000 series.

Simulator ⇄ Simulator Edit

* The simulator edit function can only be used with the KV-8000/7000 Series.
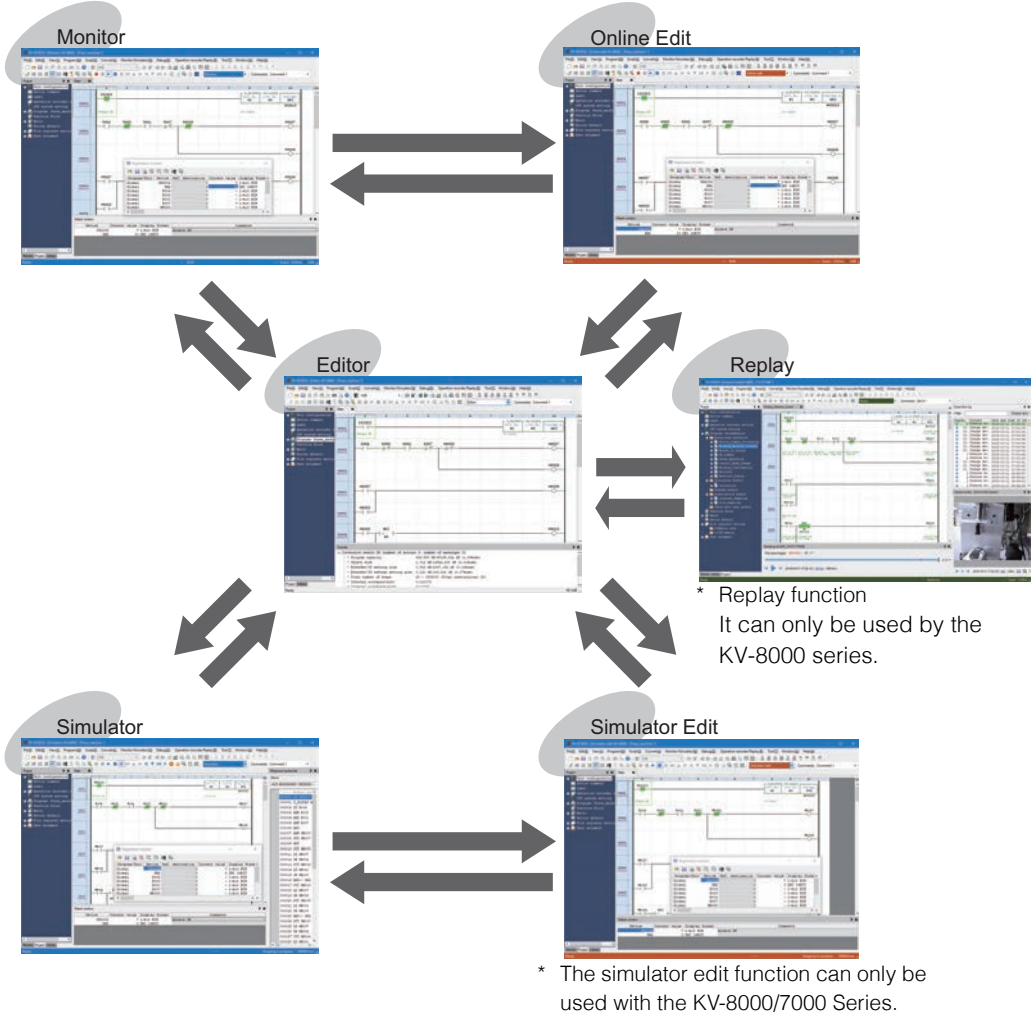
The names and functions of the parts of each screen are described on the following pages.

　　 "About the Editor" (page 1-25)
　　 "9-2 Monitor Function" (page 9-48)
　　 "9-10 Online Edit Function" (page 9-118)
　　 "9-11 Simulator Function" (page 9-122)
　　 "9-12 Simulator Edit Function" (page 9-130)
　　 "10-2 Replay function" (page 10-8)

About the current window

The currently selected active window is called the "current window."
When multiple windows of the various mode screens are displayed, to select the window that you want to operate, click the title bar of the window that you want to use as the current window.
(Normally, the color of the title bar of the current window is different from that of the other windows.)

1

About Help

In addition to the printed manual, online help and a PDF manual are also available in KV STUDIO. When you have a problem, such as not understanding the operations, click 🉂 on the toolbar. Alternatively, click the "Help (H)" menu, and then select either HTML help or the PDF manual.

You can select HTML help or the PDF manual from the pulldown menu displayed when you click "Help (H)" on the menu bar.
The items displayed in the pulldown menu vary depending on the model of the PLC being edited.

1

■ **Menu when a KV-8000 is selected**

Name			Format	Description
KV STUDIO User's Manual			PDF	This is an electronic manual in PDF format converted from the "KV STUDIO User's Manual" (this manual).
Instruction Reference Manual			PDF	This is an electronic manual in PDF format converted from the "KV-8000/7000/5000/3000/1000 Series and KV Nano Series Instruction Reference Manual."
Script Programming Manual			PDF	This is an electronic manual in PDF format converted from the "KV-8000/7000/5000/3000/1000 Series and KV Nano Series Script Programming Manual."
Related Manuals	CPU unit	CPU Unit User's Manual	PDF	This is an electronic manual in PDF format converted from "KV-8000/7000 Series User's Manual".
		Ethernet/IP function Manual	PDF	This is an electronic manual in PDF format converted from "KV Series EtherNet/IP Function User 's Manual".
	Camera input unit	KV-CA02	PDF	These are electronic manuals in PDF format converted from the "KV-CA02 User's Manual".
	Analog/ temperature unit	KV-SAD04/SDA04	PDF	These are electronic manuals in PDF format converted from the user's manual of each unit.
		KV-TF40	PDF	
		KV-TP40	PDF	
		KV-AD/DA	PDF	
	Positioning/ motion unit	KV-XH16ML/XH04ML/XH16EC	PDF	
		KV-XH device map	XLS	An XLS file that contains a list of KV-XH16ML/XH04ML/XH16EC device maps.
		KV-SH04PL	PDF	
		KV-LH20V	PDF	
	High-speed counter unit	KV-SSC02	PDF	
		KV-SC20V	PDF	
	Information/ network unit	KV-XLE02	PDF	These are electronic manuals in PDF format converted from the user's manual of each unit.
		KV-XL202/XL402	PDF	
		Ethernet/IP function Manual	PDF	
		KV-FL20V	PDF	
		KV-LE21V	PDF	
		KV-LE20V	PDF	
		KV-L21V	PDF	
		KV-L20V	PDF	
		KV-LM21V	PDF	
		KV-CL20	PDF	
		KV-DN20	PDF	
		Remote	KV-EP02	PDF	
			KV Nano series basic unit (terminal block type)	PDF	
			KV Nano series basic unit (connector type)	PDF	
	System Macro Manual		PDF	

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Name		Format	Description
Related Manuals	Manual List	-	This is an HTML file that contains a list of manuals for each model.
Handy Nav. (reference programs/tech materials)		-	This is an HTML file that contains a list of manuals of various models and reference materials.
Instruction help		Help	This is HTML help that describes the KV-8000 instructions used in "KV STUDIO."
Script function help		Help	This is HTML help that describes the script functions used in "KV STUDIO."
Shortcut Key List		PDF	This is a PDF file that lists the KV-8000 shortcut keys used in "KV STUDIO."

■ Menu when a KV-7500/7300 is selected

Name	Format	Description
KV STUDIO User's Manual	PDF	This is an electronic manual in PDF format converted from the "KV STUDIO User's Manual" (this manual).
Instruction Reference Manual	PDF	This is an electronic manual in PDF format converted from the "KV-8000/7000/5000/3000/1000 Series and KV Nano Series Instruction Reference Manual."
Script Programming Manual	PDF	This is an electronic manual in PDF format converted from the "KV-8000/7000/5000/3000/1000 Series and KV Nano Series Script Programming Manual."

1

Name			Format	Description
Related Manuals	CPU unit	CPU Unit User's Manual	PDF	This is an electronic manual in PDF format converted from "KV-7000 Series User's Manual".
		Ethernet/IP function Manual	PDF	This is an electronic manual in PDF format converted from "KV Series EtherNet/IP Function User 's Manual".
	Analog/ temperature unit	KV-SAD04/SDA04	PDF	These are electronic manuals in PDF format converted from the user's manual of each unit.
		KV-TF40	PDF	
		KV-TP40	PDF	
		KV-AD/DA	PDF	
	Positioning/ motion unit	KV-XH16ML/XH04ML/ XH16EC	PDF	
		KV-XH device map	XLS	An XLS file that contains a list of KV-XH16ML/ XH04ML/XH16EC device maps.
		KV-SH04PL	PDF	These are electronic manuals in PDF format converted from the user's manual of each unit.
		KV-LH20V	PDF	
	High-speed counter unit	KV-SSC02	PDF	
		KV-SC20V	PDF	
	Information/ network unit	KV-XLE02	PDF	
		KV-XL202/XL402	PDF	
		Ethernet/IP function Manual	PDF	
		KV-FL20V	PDF	
		KV-LE21V	PDF	
		KV-LE20V	PDF	
		KV-L21V	PDF	
		KV-L20V	PDF	
		KV-LM21V	PDF	
		KV-CL20	PDF	
		KV-DN20	PDF	
		Remote	KV-EP02	PDF	
			KV Nano series basic unit (terminal block type)	PDF	
			KV Nano series basic unit (connector type)	PDF	
	System Macro Manual		PDF	
	Manual List		-	This is an HTML file that contains a list of manuals for each model.
Handy Nav. (reference programs/tech materials)			-	This is an HTML file that contains a list of manuals of various models and reference materials.
Instruction help			Help	This is HTML help that describes the KV-7500/ 7300 instructions used in "KV STUDIO."
Script function help			Help	This is HTML help that describes the script functions used in "KV STUDIO."
Shortcut Key List			PDF	This is a PDF file that lists the KV-7500/7300 shortcut keys used in "KV STUDIO."

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■ **Menu when a KV-5500/5000/3000 is selected**

Name			Format	Description
KV STUDIO User's Manual			PDF	This is an electronic manual in PDF format converted from the "KV STUDIO User's Manual" (this manual).
Instruction Reference Manual			PDF	This is an electronic manual in PDF format converted from the "KV-8000/7000/5000/3000/1000 Series and KV Nano Series Instruction Reference Manual."
Script Programming Manual			PDF	This is an electronic manual in PDF format converted from the "KV-8000/7000/5000/3000/1000 Series and KV Nano Series Script Programming Manual."
Related Manuals	CPU unit	CPU Unit User's Manual	PDF	This is an electronic manual in PDF format converted from "KV-5500/5000/3000 Series User's Manual".
		Ethernet/IP function Manual	PDF	This is an electronic manual in PDF format converted from "KV Series EtherNet/IP Function User 's Manual".
	Analog/ temperature unit	KV-TF40	PDF	These are electronic manuals in PDF format converted from the user's manual of each unit.
		KV-TP40	PDF	
		KV-AD/DA	PDF	
	Positioning/ motion unit	KV-LH20V	PDF	
	High-speed counter unit	KV-SC20V	PDF	
Related Manuals	Information/ network unit	Ethernet/IP function Manual	PDF	These are electronic manuals in PDF format converted from the user's manual of each unit.
		KV-FL20V	PDF	
		KV-LE21V	PDF	
		KV-LE20V	PDF	
		KV-L21V	PDF	
		KV-L20V	PDF	
		KV-LM21V	PDF	
		KV-CL20	PDF	
		KV-DN20	PDF	
		Remote	KV-EP02	PDF
			KV Nano series basic unit (terminal block type)	PDF
			KV Nano series basic unit (connector type)	PDF
			KV-N3AM/ NC4AD/ NC2DA/NC4TP	PDF
	System Macro Manual		PDF	
	Manual List		-	This is an HTML file that contains a list of manuals for each model.

Name	Format	Description
Handy Nav. (reference programs/tech materials)	-	This is an HTML file that contains a list of manuals of various models and reference materials.
Instruction help	Help	This is HTML help that describes the KV-5500/5000/3000 instructions used in "KV STUDIO."
Script function help	Help	This is HTML help that describes the script functions used in "KV STUDIO."
Shortcut Key List	PDF	This is a PDF file that lists the KV-5500/5000/3000 shortcut keys used in "KV STUDIO."

■ **Menu when a KV-1000 is selected**

Name			Format	Explanation
KV STUDIO User's Manual			PDF	This is an electronic manual in PDF format converted from the "KV STUDIO User's Manual" (this manual).
Programming Manual			PDF	This is an electronic manual in PDF format converted from the "KV-1000 Series Programming Manual."
Instruction Reference Manual			PDF	This is an electronic manual in PDF format converted from the "KV-8000/7000/5000/3000/1000 Series and KV Nano Series Instruction Reference Manual."
Instruction Manual			PDF	This is an electronic manual in PDF format converted from the "KV-1000 Series PLC Guide Manual."
Script Programming Manual			PDF	This is an electronic manual in PDF format converted from the "KV-8000/7000/5000/3000/1000 Series and KV Nano Series Script Programming Manual."
Related Manuals	CPU unit	CPU Unit User's Manual	PDF	This is an electronic manual in PDF format converted from "KV-1000 Series User's Manual".
	Analog/ temperature unit	KV-TF40	PDF	These are electronic manuals in PDF format converted from the user's manual of each unit.
		KV-TP40	PDF	
		KV-AD/DA	PDF	
	High-speed counter unit	KV-SC20V	PDF	
	Information/ network unit	KV-FL20V	PDF	
		KV-LE21V	PDF	
		KV-LE20V	PDF	
		KV-L21V	PDF	
		KV-L20V	PDF	
		KV-LM21V	PDF	
		KV-CL20	PDF	
		KV-DN20	PDF	
	System Macro Manual		PDF	
	Manual List		-	This is an HTML file that contains a list of manuals for each model.
Handy Nav. (reference programs/tech materials)			-	This is an HTML file that contains a list of manuals of various models and reference materials.
Instruction help			Help	This is HTML help that describes the KV-1000 instructions used in "KV STUDIO."
Script function help			Help	This is HTML help that describes the script functions used in "KV STUDIO."
Shortcut Key List			PDF	This is a PDF file that lists the KV-1000 shortcut keys used in "KV STUDIO."

1

BEFORE USING THE PRODUCT

1

■ **Menu when a KV-700/KV-700+M is selected**

Name			Format	Explanation
KV STUDIO User's Manual			PDF	This is an electronic manual in PDF format converted from the "KV STUDIO User's Manual" (this manual).
Related Manuals	Analog/ temperature unit	KV-TF40	PDF	These are electronic manuals in PDF format converted from the user's manual of each unit.
		KV-TP40	PDF	
		KV-AD/DA	PDF	
	High-speed counter unit	KV-SC20V	PDF	
	Information/ network unit	KV-FL20V	PDF	
		KV-LE21V	PDF	
		KV-LE20V	PDF	
		KV-L21V	PDF	
		KV-L20V	PDF	
		KV-LM21V	PDF	
		KV-CL20	PDF	
		KV-DN20	PDF	
	Manual List		-	This is an HTML file that contains a list of manuals for each model.
Handy Nav. (reference programs/tech materials)			-	This is an HTML file that contains a list of manuals of various models and reference materials.
Instruction help			Help	This is HTML help that describes the KV-700 instructions used in "KV STUDIO."
Shortcut Key List			PDF	This is a PDF file that lists the KV-700 shortcut keys used in "KV STUDIO."

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■ **Menu when the KV Nano Series is selected**

Name			Format	Explanation
KV STUDIO User's Manual			PDF	This is an electronic manual in PDF format converted from the "KV STUDIO User's Manual" (this manual).
Instruction Reference Manual			PDF	This is an electronic manual in PDF format converted from the "KV-8000/7000/5000/3000/1000 Series and KV Nano Series Instruction Reference Manual."
Script Programming Manual			PDF	This is an electronic manual in PDF format converted from the "KV-8000/7000/5000/3000/1000 Series and KV Nano Series Script Programming Manual."
Related Manuals	CPU unit	Basic Unit User's Manual	PDF	This is an electronic manual in PDF format converted from "KV Nano Series User's Manual", and also for describing the added access window cassette and expansion I/O unit.
	Analog/temperature unit	KV-N3AM/NC4AD/NC2DA/NC4TP	PDF	These are electronic manuals in PDF format converted from the user's manual of each unit.
	Information/network unit	Ethernet/IP function Manual	PDF	
		Serial Communication Function User's Manual	PDF	
		Remote — KV-EP02	PDF	
		Remote — KV Nano series basic unit (terminal block type)	PDF	
		Remote — KV Nano series basic unit (connector type)	PDF	
		Remote — KV-N3AM/NC4AD/NC2DA/NC4TP	PDF	
	System Macro Manual		PDF	
	Manual List		-	This is an HTML file that contains a list of manuals for each model.
Handy Nav. (reference programs/tech materials)			-	This is an HTML file that contains a list of manuals of various models and reference materials.
Instruction help			Help	This is HTML help that describes the KV Nano Series instructions used in "KV STUDIO."
Script function help			Help	This is HTML help that describes the script functions used in "KV STUDIO."
Shortcut Key List			PDF	This is a PDF file that lists the KV Nano Series shortcut keys used in "KV STUDIO."

■ **Menu when a KV-10 (16)/KV-24 (40) is selected**

Name		Format	Description
KV STUDIO User's Manual		PDF	This is an electronic manual in PDF format converted from the "KV STUDIO User's Manual" (this manual).
Related Manuals	Manual List	-	This is an HTML file that contains a list of manuals for each model.
Handy Nav. (reference programs/ tech materials)		-	This is an HTML file that contains a list of manuals of various models and reference materials.
Instruction help		Help	This is HTML help that describes the KV-10 (16)/KV-24 (40) instructions used in "KV STUDIO."
Shortcut Key List		PDF	This is a PDF file that lists the KV-10 (16)/KV-24 (40) shortcut keys used in "KV STUDIO."

■ **Menu when a KV-P16 is selected**

Name		Format	Description
KV STUDIO User's Manual		PDF	This is an electronic manual in PDF format converted from the "KV STUDIO User's Manual" (this manual).
Related Manuals	Manual List	-	This is an HTML file that contains a list of manuals for each model.
Handy Nav. (reference programs/tech materials)		-	This is an HTML file that contains a list of manuals of various models and reference materials.
Instruction help		Help	This is HTML help that describes the KV-P16 instructions used in "KV STUDIO."
Shortcut Key List		PDF	This is a PDF file that lists the KV-P16 shortcut keys used in "KV STUDIO."

1-7 About the Editor

This section gives an overview of the functions that can be used in the editor and describes information such as how to view the screens displayed in the editor.

Editor Function Overview

The editor is used to create ladder programs. In addition to instruction entry and comment registration, you can also use the editor to perform various editing operations.
You can use the editor to:

• Use various ladder language instructions to create ladder programs.
• Structure ladder programs so that they can be reused by other projects.
• Perform editing operations such as copying and moving.
• Register comments to devices and transfer these comments to a PLC.
• Convert created ladder programs and then transfer them to a PLC.
• Print lists of information such as the created ladder programs, mnemonic lists, comments and labels, and the status devices.

■ Precautions when editing ladder programs

Limitations when editing

	KV-8000	KV-7500 KV-7300	KV-5500 KV-5000 KV-3000	KV-1000	KV Nano Series	KV-700 KV-700+M	KV-10 (16) KV-24 (40) KV-P16
Maximum number of programs (maximum number of modules only)	4000 (4000)			950 (750)		1	
Maximum number of rungs per program	40000 rungs					29998 rungs	
Size of one program block	100 rungs						

> **Point** In some cases, even though a program could be edited with KV STUDIO, it cannot be transferred to a PLC due to the CPU unit or base unit restrictions on the program capacity or number of steps.
> For example, it is not possible to transfer 4,000 programs each containing 40,000 lines of code to the KV-8000/7500/7300.
> Eventually, it depends on the size restriction of data after conversion. Check the size that you can use to perform "Convert" and then transfer the data.
> 📖 "Convert" (page 8-2)
> For details on the restrictions of the CPU unit and base unit, see 📖 "4-3 Project" in the KV-8000 Series User's Manual, 📖 "4-3 Project" in the KV-7000 Series User's Manual, 📖 "3-3 Project" in the KV-5500/5000/3000 Series User's Manual and 📖 "4-3 Projects" in the KV Nano Series User's Manual.

When the operating speed of KV STUDIO is slow

If you use KV STUDIO while other application software is running, the system memory and resources on the computer may become insufficient. As a result, frequent hard disk access will occur, which decreases the operating speed.
Provide KV STUDIO with system memory and resources by exiting the other application software, increasing the PC's system memory, or a similar method.

Names and Functions of the Parts of the Editor Screen

When the KV STUDIO starts, the ladder edit window does not appears. Instead, only the main window appears. The ladder edit window opens when you create a new program or when you open a program created previously.

You can also display windows and toolbars containing a variety of functions. See the following example.

"6-1 About View Functions" (page 6-2)

Title bar
The project name is displayed here.

Mode bar
This displays the current mode of KV STUDIO.

Ladder edit window
This is the window that is used to edit ladder programs and macros.
One window is displayed for each module and each macro.

Menu bar
This displays a menu for executing different functions.

Toolbar
This displays buttons for executing different functions.

Workspace
This displays buttons for executing different functions.

Output window
This displays the search result or messages such as errors.

Status bar
This displays information such as a description of the currently selected function or the status of a key.

Comment edit window
This window is used to edit comments.
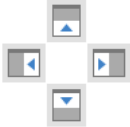
Instruction/macro/pack pallet
This window is used to enter instruction, function block, macro, or pack instruction into the ladder edit window. You can use drag-and-drop operation to enter instructions into the ladder edit window.

● **Docking navigator**

When you customize the edit screen by dragging a window such as the workspace, ladder edit window, output window, or watch window or a dialog box, the docking navigator is displayed so that you can specify the destination of the screen element.

Drop the window on the docking navigator to dock the window in the specified location.

In addition, the docking positions are displayed as a grid on the screen.

Docking Navigator Type	Explanation
	Displays the top, bottom, left, and right parts of the edit screen. Drop the window on one of these marks to dock the window in the specified location.
	When multiple documents are displayed in the window, this is displayed when the mouse pointer is located on the ladder edit window. Drop the window on one of these marks to dock the window above, below, to the left, or to the right of the ladder edit window.
	This is displayed when the mouse pointer is located on a window. • Drop the window on one of these marks to dock the window above, below, to the left, or to the right of the window that you want to dock to. • Drop the window on ▢ in the center of the docking navigator to display the window as a tab in the target window.

● **Auto-hide function**

This function displays the workspace, output window, and watch window only when necessary.

Click the pin icon displayed in the upper-right corner of the workspace, output window, or watch window docked in the top, bottom, left, or right of the edit screen.

If the window cannot be automatically hidden or if it is displayed as a tab, it will not be hidden.

Icon	Explanation
	The workspace, output window, or observation window is displayed.
	The workspace, output window, or watch window is displayed as a tab shown at the top, bottom, left, or right of the edit screen. This is displayed when you move the mouse pointer over the tab or when you click the tab.

About the Ladder Edit Window

A separate ladder edit window can be displayed for each program.
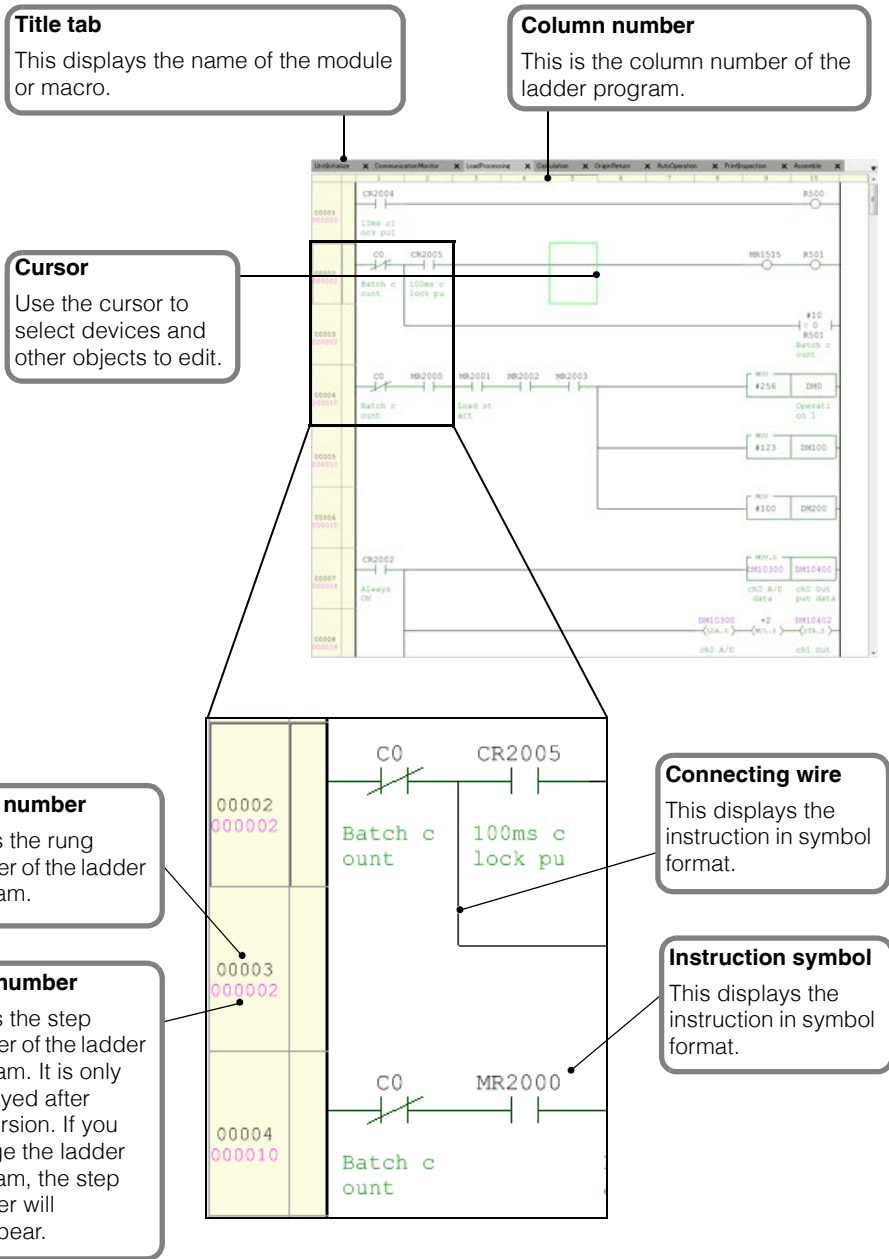
Title tab

This displays the name of the module or macro.

Column number

This is the column number of the ladder program.

Cursor

Use the cursor to select devices and other objects to edit.

Rung number

This is the rung number of the ladder program.

Connecting wire

This displays the instruction in symbol format.

Step number

This is the step number of the ladder program. It is only displayed after conversion. If you change the ladder program, the step number will disappear.

Instruction symbol

This displays the instruction in symbol format.

2

PROJECT MANAGEMENT

This chapter describes project management.

This section describes project management.

About the Project Folder

KV STUDIO processes various data files. Data files are managed in batches per project folder.

The following support tool data exists in a project folder.

- KV STUDIO data
- CPU positioning parameter setting data
- KV MOTION+ data
- KV-SH setting data
- PROTOCOL STUDIO data
- KV-XLE setting data
- KV-DN20 setting data
- KV-CA setting data
- Mail setting data
- Simple PLC link setting data
- File register setting data
- High-speed time chart monitor data
- Logging/tracing data
- KV DATALINK+ setting data

- Unit Editor data
- KV-XH setting data
- MOTION BUILDER/positioning unit simple setting data
- Communication positioning parameter setting data
- MV LINK STUDIO data
- KV-XL setting data
- KV-CL20 setting data
- FTP client setting data
- Device default value data
- Real-time chart monitor data
- Panel setting data
- FL setting tool data
- Serial PLC link setting data

Project folder

KV STUDIO data	**Unit Editor data**	**CPU positioning parameter setting data**	**KV MOTION+ data**	**MOTION BUILDER data**	**PROTOCOL STUDIO data**	
Ladder diagrams, comments, etc.	Connection unit settings, relay assignments, KL slave settings, etc.	KV-5500/5000/3000/ 1000/700 or KV Nano CPU unit Simple positioning function parameters	KV-ML16V/ MC40V/MC20V positioning and motion unit parameters	KV-H20S/ H40S/H20G Positioning unit parameters	KV-L21V or KV-L20V/R PROTOCOL STUDIO parameters	...

When you create a project in KV STUDIO, a project folder and a KV STUDIO data file are automatically created. Support tool data for the Unit Editor, CPU positioning parameter setting, MOTION BUILDER, PROTOCOL STUDIO, MV LINK STUDIO, and KV MOTION+ tools is created when each tool is started.

Creating Project Folders

By default, project folders are created at the following location.

Project folders are created within the "PROJECT" folder of the KV STUDIO.

If KV STUDIO is installed to its default installation folder:

Windows 10/8/7:　　　　　C:\Users\<UserName>\Documents\KEYENCE\KVS□□\KVS\PROJECT

| Example |

If you create a project folder called "USER" within the "PROJECT" subfolder in the KV STUDIO installation folder, the folder path will be:

For Windows 10:　　　　C:\Users\<UserName>\Documents\KEYENCE\KVS□□\ KVS\PROJECT\USER

User data files such as KV STUDIO data files are stored in the "USER" folder.

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PROJECT MANAGEMENT

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PROJECT MANAGEMENT

About User Data Files

A project folder stores user data files such as KV STUDIO data files.[*]

Item		Description
File Name	**Extension**	
KV STUDIO data files		
Project name	.kpr	Project file
Module name	.mod	Module file
Function block name	.kfb	Function block file
Macro name	.mcr	Macro file
Structure name	.kst	Structure file
ProjectName_UnitNumber	.kup	Unit program file
Project name	.cm1 to .cm8	Comments file (1 to 8 for the KV-8000/7000 Series, 1 or 2 for other devices)
Project name	.lbl	Variable / label file
Project name	.acw	Access window setting file
Project name	.klg	Logging setting file
Project name	.mil	Mail setting file
DevInit	.dvi	Device default value setting file
Project name	.ftc	FTP client setting file
Project name	.spl	Simple PLC link setting file
Project name	.srl	Serial PLC Link setting file
SerialPos	.sup	KV-LH20V setting data file
FR folder		Stores file register setting files
FR***	.fru	File register setting file (for the KV-8000/7000 Series)
	.frb	File register setting file (for the KV-5000/3000 Series)
CpuMb	.inf	CPU positioning parameter setting file (for the KV-5500/5000/3000/1000/700 Series)
CpuMb2	.inf	CPU positioning parameter setting file (for the KV Nano Series)
MonEnv	.kmu	File for monitoring (KV STUDIO version 8 or later)
	.kem	Monitor file
WsTreeEnv	.xml	File for saving the workspace layout
Project name	.cde	Program file for conversion
Project name	.dcm	Comments file for conversion
UnitSet	.ue2	Unit setting file (files with the .ue2.old extension are backup files)
UnitSet	.ue1	Unit setting files for KV STUDIO Ver. 3.07 and later
UnitSet2	.ue1	
UnitSet3	.ue1	
Program name	.mnm	Mnemonics list output file
(User input)	.csv/.txt	Unit specification output file
(User input)	.csv/.txt	Reference information output file (cross reference)
(User input)	.csv/.txt	Batch change output file
component folder		Holds unit configuration switch information
operand-history	.txt	Holds imput completion candidates
Project name [model change result]	.txt	Outputs the model change result
Project name	.pnl	Holds panel information (KV-P16 only)
PlcSended	.dky	Project verification data file
TransInfo	.tif	Saves the check status of the transfer dialog
sample	.al2	Communication connection destination list file

Note: "Can be saved outside of the project folder" applies to the Mnemonics list output file, Unit specification output file, Reference information output file (cross reference), and Batch change output file rows.

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Item		Description
File Name	**Extension**	
KV-CA02 setting data file		
UnitCamera	.ca	KV-CA02 setting data file
KV-XLE setting data file		
UnitComm	.xle	KV-XLE02 setting data file
KV-XL setting data file		
UnitComm	.xl	KV-XL402/XL202 setting data file
KV-XH setting data file		
UnitPos	.xh	KV-XH04ML/XH16ML setting data file
UnitPos	.xhec	KV-XH16EC setting data file
KV-SH setting data file		
UnitPos	.sh4	KV-SH04PL setting data file
KV DATA LINK+ setting file		
(User input)	.eid	EtherNet/IP KV DATALINK+ setting file
Data file for positioning unit simple setting and MOTION BUILDER		
(User input)	.mb2	Positioning unit file
Simple PLC link data file		
(user input)	.spb	Simple PLC link setting file
Serial PLC Link data file		
(User input)	.srb	Serial PLC Link setting file
PROTOCOL STUDIO data file		
(User input)	.psm	PROTOCOL STUDIO communication macro file
MV LINK STUDIO data file		
(User input)	.mls	MV LINK STUDIO MV-L40 parameter file
KV-DN20 setting data file		
(User input)	.d20	DeviceNet connection setting file
KV-CL20 setting data file		
(User input)	.c20	CC-Link connection setting file
KV MOTION+ data file		
(User input)	.mul	KV-ML16V setting data file
(User input)	.muc	KV-MC40V/MC20V setting data file
(User input)	.mvl	SV series MECHATROLINK-II setting data
(User input)	.mvp	SV series analog/pulse input setting data

* If you select "Save compact project," you can save all user data files in the project folder as one "Project compression file (*.kpz)."

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Project Folder File Operations

■ Creating projects

Create a new project, and then create the ladder program.

For details on how to create a new project, see 📖 "About File Functions" (page 4-2).

■ Changing project folder names

1 **Click the "File (F)" menu ▶ "Open project (O)."**

(**Alternative procedure**) • Click 📁 .

  • Press ⎡Ctrl⎤ + ⎡O⎤ .

2 **Right-click the folder whose project name is to be changed, click "name change" in the menu that is displayed, and then enter the folder name.**

The folder name is changed.

> ✎ **Point** **You can only use "changing Project names" to change the names of project folders. Even if you change the name of the project folder, the data in the folder will not be changed. To change the file names of the data in the folder as well, use "Save project as" in the edit screen.**
> 📖 **"Saving Projects with a New Name" (page 4-3)**

■ Deleting projects

To delete a project, select the folder whose project name is to be deleted, and then press ⎡Delete⎤ or right-click the folder and click "delete" from menu that appears.

> ✎ **Point** **When you delete a project folder, all the data in the project folder is also deleted.**

■ Copying projects

To copy a project, select the folder of the project name that you want to copy, and then press ⎡Ctrl⎤ + ⎡C⎤ to copy the project, then press ⎡Ctrl⎤ + ⎡V⎤ to paste the project. Alternatively, right-click the folder, and then click "Copy" and "Paste" in that order in the menu that appears.

■ Setting passwords

The password setting function is intended to inhibit the reading of unit setup information, programs, comments and logging settings stored in the KV-8000/7500/7300/5500/5000/3000/1000/700 and KV Nano Series.

Once a password is set, data cannot be read unless the correct password is entered.

Setting passwords can prevent programs from being read from the KV-8000/7500/7300/5500/5000/3000/1000/700 or KV Nano Series by unauthorized personnel.

For details on setting passwords, see 📖 "Set password" (page 4-5).

> ✎ **Point** • **Passwords cannot be set when the KV-P16, KV-10 (16) or KV-24 (40) is selected for the PLC model.**
> • **When read protection is set, the password confirmation dialog is not displayed.**

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UNIT EDITOR

This chapter describes the functions of the Unit Editor and how to use the
Unit Editor.

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Unit Editor Overview

This section gives an overview of the functions of the Unit Editor and the precautions to follow when using the Unit Editor.

> **Reference** The Unit Editor cannot be used when the KV-10 (16), KV-24 (40), or KV-P16 is selected for the PLC model.

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UNIT EDITOR

Overview of Functions

When the KV-8000/7500/7300/5500/5000/3000/1000/700 is used, you have to register the units to be connected to the CPU before you execute ladder programs.

Use the Unit Editor to select the connected units to create a unit configuration, then, transfer the created unit configuration to the PLC. In addition, set each unit's function settings and the KL slave settings.

On conventional PLC models, hardware settings have to be made on each unit by setting the DIP switches. With the KV-8000/7500/7300/5500/5000/3000/1000/700, however, hardware settings are basically no longer required, and units can be set easily in Unit Editor. After you have built your system, you can change settings without having to remove units.

Setting information of each unit

Unit Editor

KV STUDIO

Ladder program

KV-8000/7500/7300/ 5500/5000/3000/1000/ 700
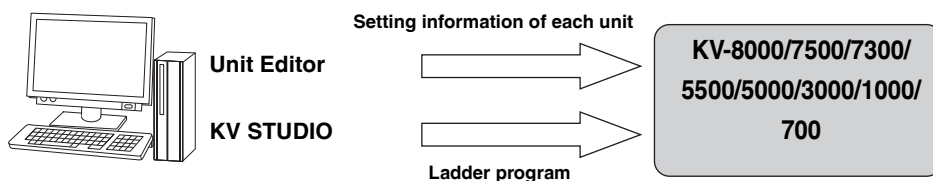
> **Point**
> • **You cannot start Unit Editor in a standalone fashion. Be sure to open a ladder file, and then start Unit Editor from KV STUDIO.**
> • **With the KV Nano Series, when you are not using any special units, you do not have to register units with the CPU.**

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Unit Editor Settings

Use the Unit Editor to set the following details.

■ **Create the unit configuration information of the KV-8000/7500/7300/5500/ 5000/3000/1000/700/KV Nano Series system**

Create a list of units connected to the KV-8000/7500/7300/5500/5000/3000/1000/700/KV Nano Series system and create a unit configuration table used to check that the actually connected units operate properly during system operation.

The "Auto-replace Devices" function is also available to change the relay and DM numbers in the ladder program automatically according to the changes to the relay and DM numbers of each unit in the Unit Editor. Because unit configuration information is integrated with the ladder program, device assignment errors are avoided.

| **Ladder file** | **Unit Editor** |
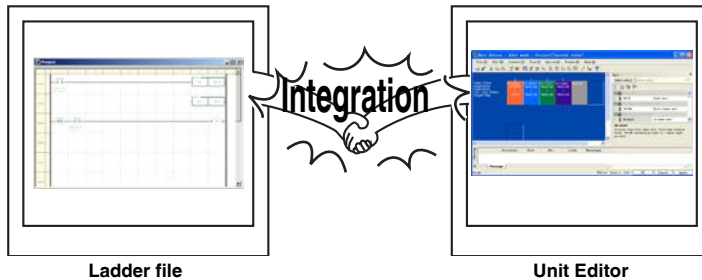
■ **Unit relay and DM assignments**

For the KV-8000/7500/7300/5500/5000/3000/1000/700/KV Nano Series, the setting range for non-CPU unit relays and DM entries is shown below.

Relays and DM entries can be assigned manually and automatically.

	Relay Number	**DM Number**
KV-8000	R000 to R199915	DM0 to DM65534
KV-7500	R000 to R199915*	DM0 to DM65534
KV-7300	R000 to R199915*	DM0 to DM65534
KV-5500	R1000 to R99915	DM0 to DM65534
KV-5000	R1000 to R99915	DM0 to DM65534
KV-3000	R1000 to R99915	DM0 to DM65534
KV-1000	R1000 to R59915	DM0 to DM65534
KV-700+M	R1000 to R59915	DM0 to DM39999
KV-700	R1000 to R59915	DM0 to DM19999
KV Nano Series	R1000 to R59915	DM0 to DM32767

* For KV-7500/7300 with the CPU function version 2.2 or earlier, it will be up to R99915.

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UNIT EDITOR

■ **Unit function settings**

You can set the functions of each unit.

Mistakes occur because you configure settings while reading the manual.
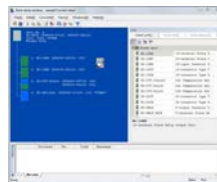
You can make selections by following the menus, so it is easy to configure settings.

■ **Building and setting KL systems from the Unit Editor**

You can set KL link systems that use the KL Master Unit KL-N20V from the Unit Editor.

Switch settings have traditionally been very tedious.
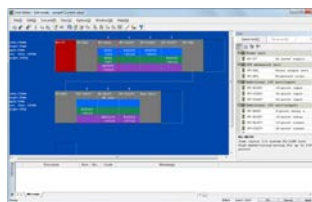
You can use the Unit Editor to transfer master unit settings as-is!

| Reference | The KL-N20V cannot be connected to the KV Nano Series. |

3-2 **List of Unit Editor Menus**

The section describes Unit Editor menus and icons. For detailed explanations of each function, see the respective pages.

File

This menu contains the commands for file operation and printing.

Item	Icon	Model	See Page
Import		Read unit setting information and unit comments from other projects.	3-28
Read unit configuration from PLC		Read unit configuration information from a PLC.	3-29
Close		Exit the Unit Editor and return to the ladder edit screen.	3-17

Edit

This menu contains the commands for editing the unit information.

Item		Icon	Model	See Page
Cut			Cut the selected area.	3-20
Copy			Copy the selected area.	3-20
Paste			Paste the cut data at the cursor position.	3-20
Delete		-	Delete the selected area.	3-20
Edit comments	Unit comments		Display the "Unit comments" dialog box to enter unit comments.	3-29
	Block comment		Display the "Block comments" dialog box to enter block comments.	3-29
	System comments		Display the "System comments" dialog box to enter system comments.	3-30
Unit preset			Reserve a unit or cancel a unit reservation.	3-30
Batch input relay No.			Manually set the relay numbers of the listed connected units.	3-23
Batch input of inter-unit synchronization refresh		-	Display the "Batch input of inter-unit synchronization refresh" dialog box to make batch setting for devices to apply inter-unit synchronization refresh.	3-23

Convert

This menu contains the commands for the relay and DM assignment function.

Item	Icon	Model	See Page
Jump to error rung		Jump to the unit position that corresponds to the error displayed in the message window.	3-31
Auto-assign relay/DM		Automatically assign relays and DM entries.	3-21
Device check		Check whether relay and DM assignments are duplicated between units.	3-24

3

Setup Slave

This menu contains the commands for the KL slave settings.

> **Point** **The menu is displayed only when the KL-N20V unit is selected in the unit configuration area.**

Item	Icon	Model	See Page
Setup slave		Open the slave setup window.	3-31
Import slave information		Read the slave unit setting information and comments from another project.	3-32
KL Unit information copy		Copy unit information created with the KL address setup software.	3-32
Paste KL unit information		Paste KL unit information.	3-33
KL-N20V setup (KL address setup)		Start the KL address setup software.	3-33

View

This menu contains the commands related to switching the display of the window.

Item	Icon	Model	See Page
Toolbar	-	Select whether to show or hide the toolbar.	-
Status bar	-	Select whether to show or hide the status bar.	-
Message area	-	Select whether to show or hide the message area.	3-14
Display unit setting	-	Display the unit setting window of the unit that is currently selected with the cursor.	3-25
Display bitmap/with box		Switch between the bitmap display and box display of the units in the unit configuration area.	3-33
Unit Monitor	-	When KV STUDIO is in monitor or online edit mode, the Unit Monitor of the unit selected in the unit configuration area is displayed.	3-26
Built-in Function Monitor	-	When KV STUDIO is in monitor or online edit mode, the built-in function monitor is displayed.	3-26
Buffer memory monitor	-	When KV STUDIO is in monitor or online edit mode, the expanded buffer memory of the unit selected in the unit configuration area is monitored in the batch monitor window.	3-27

Options

This menu contains the commands related to the environmental settings of the Unit Editor.

Item	Icon	Model	See Page
Setup options		Configure the environment settings of the Unit Editor.	3-42

Window

This menu contains the commands related to switching the display of the window.

Item	Icon	Model	See Page
Unit configuration area	-	Select the unit configuration area.	3-11
Select unit	-	Select the select unit tab.	3-12
Setup unit	-	Select the setup unit tab.	3-12
Update setting	-	Select the update setting tab.	3-13
Message area	-	Select the message area.	3-14
Inter-unit synchronization refresh	-	Select an inter-unit synchronization refreshing tab.	3-14

Help

This menu is used to display help information.

Item	Icon	Model	See Page
How to use Unit Editor	❓	Display the help that includes information on the operations of the Unit Editor.	3-33

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UNIT EDITOR

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3-3 List of Slave Setup Screen Menus

The section describes the slave setup menus and icons. For detailed explanations of each function, see the respective pages.

File

This menu contains the commands for file operation and printing.

Item	Icon	Model	See Page
Import slave information		Copy the slave setup information from another project.	3-39
Close slave setup window		Close the slave setup window that is currently being edited.	3-36

Edit

This menu contains the commands for editing the unit information.

Item	Icon	Model	See Page
Cut		Cut the selected area.	3-38
Copy		Copy the selected area.	3-38
Paste		Paste the cut data at the cursor position.	3-38
Delete	-	Delete the selected area.	3-37
Edit unit/slave comments		Display the "Unit comments" dialog box to edit unit and slave comments.	3-40
Reserve unit/slave		Reserve a unit (slave) or cancel a unit (slave) reservation.	3-40

Convert

This menu contains the commands related to slave address assignments.

Item	Icon	Model	See Page
Jump to error rung		Jump to the unit position that corresponds to the error displayed in the message window.	3-40
Auto Address Assignment		Assign slave addresses automatically.	3-38
Check addresses		Check whether slave addresses are duplicated between units.	3-24

View

This menu contains the commands related to switching the display of the window.

Item	Icon	Model	See Page
Toolbar	-	Select whether to show or hide the toolbar.	-
Status bar	-	Select whether to show or hide the status bar.	-
Message area	-	Select whether to show or hide the message area.	-
Setup unit/slave property	-	Open the unit setting window of the slave that is currently selected with the cursor.	-

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Window

This menu contains the commands related to switching the display of the window.

Item	Icon	Model	See Page
Slave Configuration Area	-	Select the slave configuration area.	3-34
Select unit	-	Select the select unit tab.	3-35
Setup unit	-	Select the setup unit tab.	3-35
Setup address	-	Select the address setting tab.	3-36
Message area	-	Select the message area.	3-14

Help

This menu is used to display help information.

Item	Icon	Model	See Page
How to use Unit Editor		Display the help that includes information on the operations of the Unit Editor.	3-41

3

UNIT EDITOR

This section describes the screens displayed in the Unit Editor.

Names and Functions of Parts of the Unit Editor

3

Select unit tab
Setup unit tab
Refresh setting tab[*1]
Inter-unit synchronization refreshing tab[*2]
These are used to select the unit to configure and to display the information and change the settings of the configured units.

Unit configuration area
This displays the unit configuration.
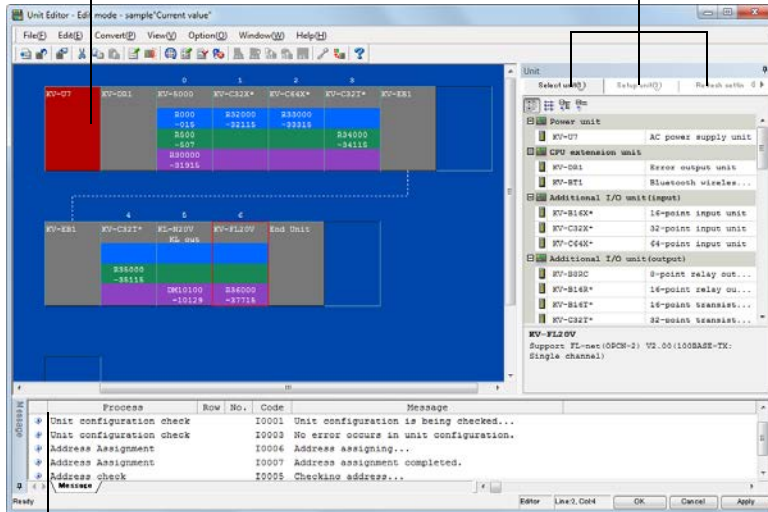
Message area
This displays errors and operating information during the operation of the Unit Editor.

---

*1   It appears when the model is the KV-8000/7500/7300/5500/5000/3000, and the KVFL20V (KV-FL20V mode) or the KV-5000 (FL-net mode) is selected in the unit configuration area.
*2   It is displayed when selecting X-Unit, S-Unit supported by Inter-unit synchronous refresh in the unit arrangement area and setting Inter-unit synchronization function to "To use".

Unit configuration area

This displays the unit configuration that is set in the Unit Editor.

In the unit configuration area, you can:

- Configure, delete, and change the connection positions of units.
- Select the unit to configure detailed settings of.
- Display the current consumption, weight, and dimensions of the entire system.
- Display the relay addresses assigned to each unit.
- Display an image of the unit configuration.

System information*

The following information is displayed for each level of the connected units:

- Model (KV Nano Series only, excluding KV-NC32T)
- Width (mm)
- Height (mm)
- Depth (mm)
- Current consumption (mA)
- Weight (g)
- Service power supply (mA; AC power supply type KV Nano Series only)
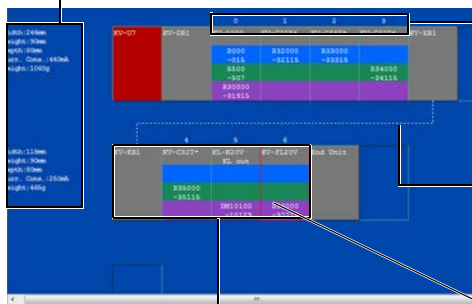
Unit number

This displays the connection number of the unit assigned as 0, 1, 2, 3, 4 and so on starting from the CPU.

Extension cable

Extension cables are displayed as broken lines when the Extension Unit KV-EB1 is used in a multi-level

Unit information

This displays the model numbers and assigned relay numbers of the configured units.

Unit cursor (red frame)

This indicates the currently selected cursor position.

* For the KV Nano Series, this information is not displayed unless "Model" is selected in the "Setup unit" tab.

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UNIT EDITOR

Select unit tab

Use this tab when you are configuring units on the edit screen. Select a unit to be configured from the Unit Selection window.
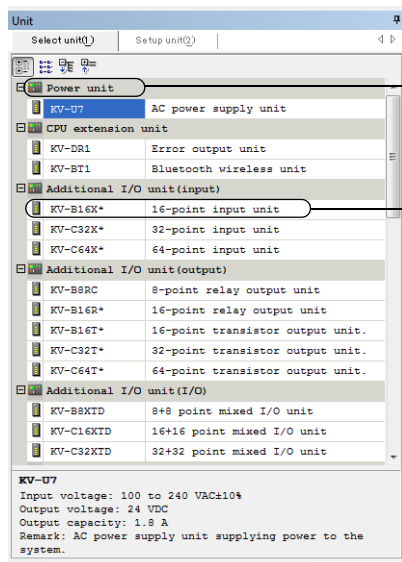
This displays the unit type.

This displays the unit model.

Reference Selectable unit models vary depending on the model being used.

Setup unit tab

Use this tab to display detailed settings such as the mode and assigned relay numbers of the unit configured in the unit configuration area as well as to change these settings.
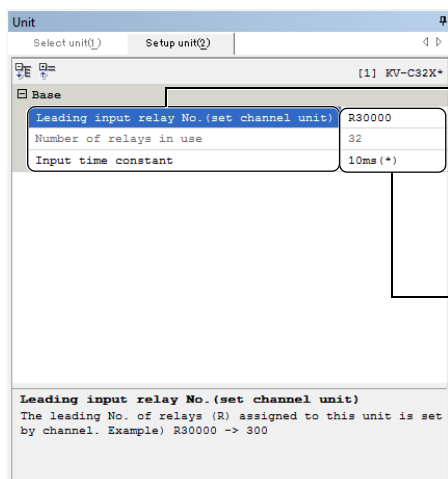
This indicates the setting item. Items whose settings cannot be changed are displayed in gray.

This indicates the setting details of the selected item.
An asterisk ("*") is displayed for the default value of the selected item.
"Setting Configured Units" (page 3-25)

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UNIT EDITOR

Refresh setting tab

Set up for Auto refresh settings.

It is displayed in the following cases.

- In the case of supported model is KV-8000/7500/7300/5500/5000/3000, and KV-FL 20 V (KV-FL 20V mode) or KV-5000 (FL-net mode) is selected in the unit arrangement area.

  For details, see 📖 KV-FL20V User's Manual.

- In the case of supported model is KV-8000/7500/7300, K -XLE 02 is selected in the unit arrangement area and a function (eg PROFINET) supports Auto refresh is used.

  For details, see 📖 KV-XLE02 User's Manual.

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UNIT EDITOR
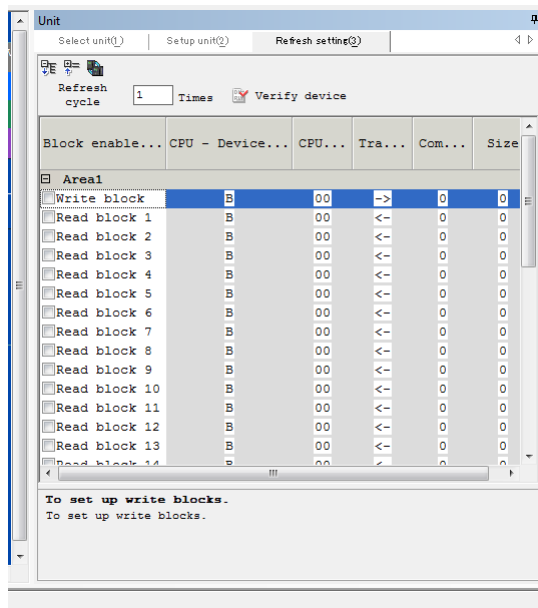
Refreshing tab for inter-unit synchronization

It appears only when the model is the KV-8000/7500/7300, and you select the KV-XH16ML/XH04ML/XH16EC/SH04PL in the unit configuration area and set the inter-unit synchronization function to "use". The buffer memory and the device can be specified which will be refreshed in addition to the standard assignment device when refreshing each unit.
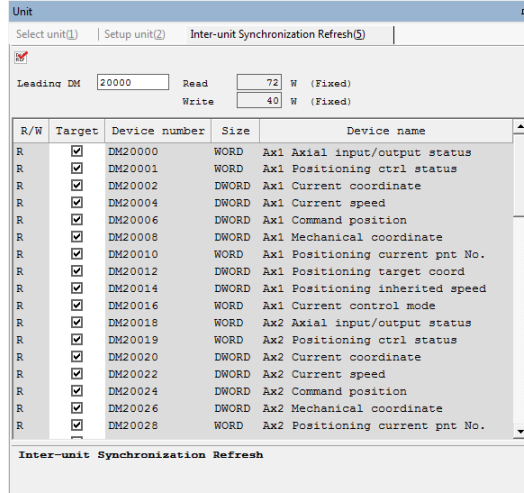
For details, refer to 📖 the "KV-SH04PL User' Manual" and 📖 the "KV-XH16ML/XH04ML User's Manual"

Message area

This displays errors and conversion results during the operation of the Unit Editor.
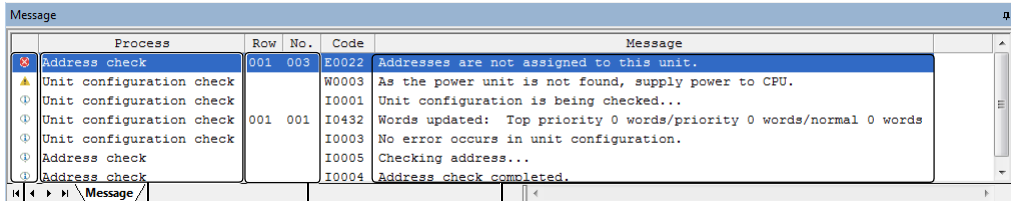
This displays conversion results and processing content messages.

This displays the unit position that corresponds to the message.

This displays the processing of the Unit Editor.

This displays the processing results using icons.
Messages are sorted in the following order.

❌ : Error message

⚠ : Alarm message

ⓘ : Normal processing message

3-5 Basic Operation of the Unit Editor

This section describes how to use the Unit Editor.

System Configuration Procedure

As an example, this section describes the procedure for using the Unit Editor to create a new system with the following unit configuration.

KV-IPU1	KV-I8000	KV-ISIR32XT	KV-ISAD04	Bus connection unit	KV-IL21V	KV-IH20S	KV-IAD40V	End unit
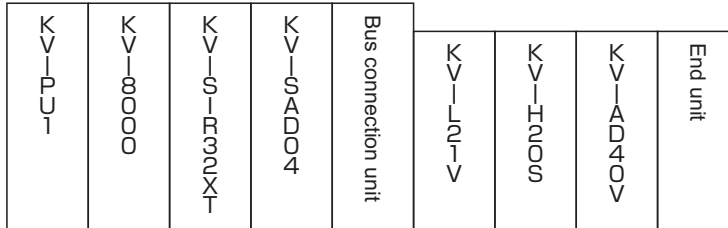
1 In the KV STUDIO edit screen, click the "File (F)" menu ▶ "New project (N)."

The "New project" dialog box is displayed.

2 Enter the name of a new project, select the PLC model, and then click "OK." To change the location to save the project, click "Refer.," select the location, and then click "OK."

The "Confirm unit setting information" dialog box is displayed.

Click "Yes" to start the Unit Editor.

Confirm unit setting information

Setup unit setting info now?

* [Yes]---Start Unit Editor.
* [No]---Close this dialog.
* [Read unit setting]---Read unit setting information from PLC.

Yes(Y)   No(N)   Read unit setting(U)
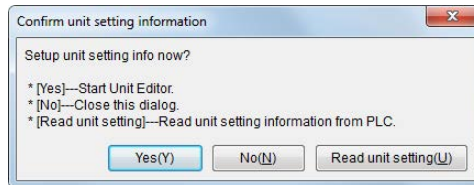
Item	Explanation
Yes	The Unit Editor starts. Set the unit configuration.
No	The KV STUDIO edit screen is displayed. To set the unit configuration, start the Unit Editor separately.
Read unit setting	The unit configuration information is read from the CPU unit. Configure the PC and the CPU unit so that they can communicate with each other in advance.

Reference When the selected PLC model is the KV Nano Series, the "Confirm unit setting information" dialog box is not displayed. When you are only using the base unit and expansion I/O units, the occupied devices are assigned automatically, so you can skip the procedure shown below.

3 Click the "Select unit(1)" tab.

Unit

Select unit(1)   Setup unit(2)

☐ ▦ **Power unit**
   KV-PU1   AC power unit ...
   KV-U7   AC power suppl...
☐ ▦ **Additional I/O unit(input)**
   KV-B16X*   16-point input...
   KV-C32X*   32-point input...
   KV-C64X*   64-point input...
☐ ▦ **Additional I/O unit(output)**
   KV-B8RC   8-point relay ...
   KV-B16R*   16-point relay...
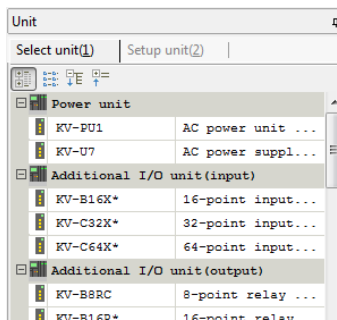
4 **From the unit selection window, select the unit to connect, and then drag it to unit configuration area.**

The unit is displayed in the edit screen.

This procedure uses the unit configuration shown above as an example. Drag the units in the following order: KV-PU1, KV-SIR32XT, ... KV-AD40.
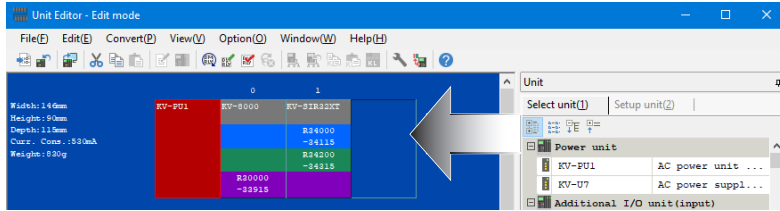
| Reference | The CPU unit, bus connection unit and end unit are automatically configured in the configuration area. |

(If only KV-8000 and KV-8000/7000 Series expansion units are used, a bus connection unit and end unit are not required.)

(If only KV-7500/7300 and KV-7000 Series expansion units are used, a bus connection unit and end unit are not required.)

(There is no end unit when you are using the KV Nano Series.)

5 **Click the "Convert (P)" menu ▶ "Auto assign relay/DM (A)."**

Relay numbers are automatically assigned and the result is displayed in the message window.

| Reference | In the procedure described here, relays and DM entries are automatically assigned. To assign relay numbers manually, see 📖 "Manually Assigning Relays and DM Entries of Configured Units" (page 3-22). |

6 **In the unit configuration area, double-click the unit that you want to set the details of, and then use the "Setup unit" tab to configure the settings.**
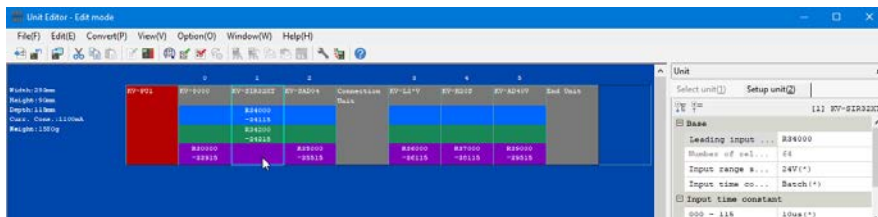
| Reference | For details on how to set each unit and details on the setting contents, see the manual of each unit. |

7 **After you have finished configuring the settings of all the units, click "OK."**

The created system is saved and the KV STUDIO editor screen is displayed.

www.PLC1.ir
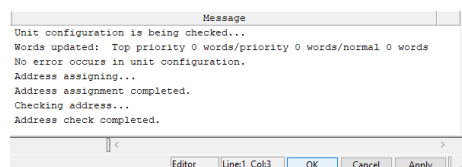
Unit Editor Operations

This section describes how to operate the unit configuration area and each window.

Starting the Unit Editor

"Tool(T)" ▶ **"Unit Editor(U)"** [Ctrl] + [U]

In the KV STUDIO editor screen, click the "Tool (T)" menu ▶ "Unit Editor (U)."
The Unit Editor starts.

> **Reference** The Unit Editor cannot start if no projects exist.
> 📖 "About File Functions" (page 4-2)

Exiting the Unit Editor

"File(F)" ▶ **"Close(S)"**

Click the "File (F)" menu ▶ "Close (S)." A confirmation dialog box appears.

Item	Explanation
Yes	The unit configuration settings will be saved, and you will exit the Unit Editor.
No	The unit configuration settings will be discarded, and you will exit the Unit Editor.
Cancel	You will return to the Unit Editor.
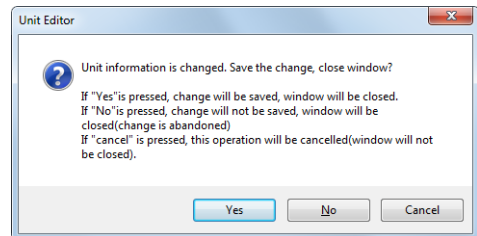
> **Point** • **KV-8000/7500/7300/5500/5000/3000/1000/700**
> **To enable operation, the unit setting information must be set. If you exit the Unit Editor without saving the settings, you will need to create the unit setting information again when you transfer the project to the CPU unit.**
> • **KV Nano Series**
> **Operation is possible without setting the unit setting information in the Unit Editor. However, you need to use the Unit Editor to set the unit setting information when you are using a special unit such as the analog unit or when you are using functions such as Modbus serial communication.**

> **Reference** If you click "OK" in the Unit Editor, the unit configuration will be saved and you will then exit the Unit Editor without the confirmation dialog box being displayed.

3

UNIT EDITOR

Displaying Windows

"Window(W)"	▶ **"Select unit(1)"**	Alt + 1
	▶ **"Setup unit(2)"**	Alt + 2
	▶ **"Refresh setting(3)"**	Alt + 3

Three types of windows are displayed on the right side of the Unit Editor: the Select unit tab, Setup unit tab, and Update setting tab. You can switch between which window is displayed.

📖 "Select unit tab" (page 3-12)
📖 "Setup unit tab" (page 3-12)
📖 "Refresh setting tab" (page 3-13)

> **Reference** The first time that the Unit Editor starts, the Select unit window is displayed. The next time that the Unit Editor starts, the window that was displayed when the Unit Editor exited previously is displayed.

Configuring Units

Select the unit to be connected from the Select unit window, and drag it to the edit window.
The unit is configured at the position that you dropped it.

| Point | The KV-8000/7000 Series operates as shown below. |
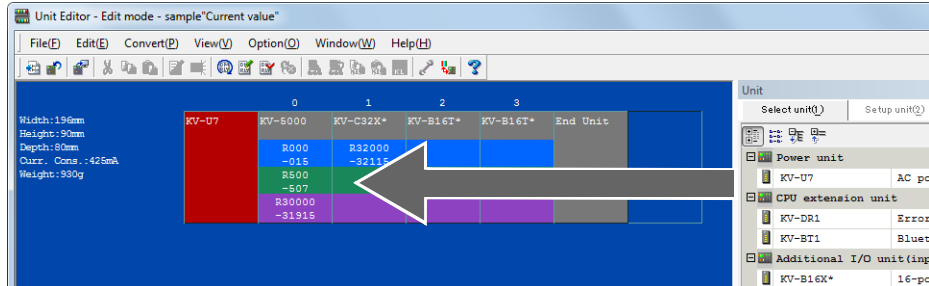
> **The KV-8000/7000 Series operates as shown below.**
> - **The CPU unit is already configured in the unit configuration area when the Unit Editor starts.**
> - **The power supply unit can only be installed on the left side.**
> - **Only one CPU unit is allowed per system. It can be configured at the leftmost position of the top level or next to the power supply unit.**
> - **The expansion unit for KV-8000/7000 Series should be configured between the KV-8000/7500/7300 and bus connection unit (or the right edge).**
> - **The bus connection unit is automatically inserted when the expansion unit for the KV-5000/3000 Series is configured. *The bus connection unit is not counted to the unit number.**
> - **The expansion unit for KV-8000/7000 Series can be configured at the top level only and maximum 16 units.**
> - **Even if you do not configure extension unit KV-EB1, one will be configured automatically when you configure a unit on the lower level.**
> - **The maximum number of units that can be connected in a single system is 16 (excluding power supply, CPU, extension and bus connection units) per level of horizontal connection. Up to three levels can be used.**
>
> **The KV-5000/3000/1000/700 Series operates as shown below.**
> - **The CPU unit and end unit are configured in the unit configuration area when the Unit Editor starts.**
> - **The power supply unit, error output unit, and Bluetooth unit can only be installed on the left side.**
> - **Only one CPU unit is allowed per system, and it can be configured at the leftmost position of the top level or next to the power supply unit or error output unit.**
> - **Even if you do not configure an Extension Unit KV-EB1, one will be configured automatically when you configure a unit on the lower level.**
> - **The maximum number of units that can be connected in a single system is 16 (excluding power supply, CPU, and extension units) per level of horizontal connection. Up to three levels can be used.**
>
> **The KV Nano Series operates as shown below.**
> - **Only the base unit is configured in the unit configuration area when the Unit Editor starts.**
> - **The extension cassette/extension adapter can be set on the "Setup unit" tab of the base unit.**
> - **The units can be configured only in one horizontal level. Even when the units are used in two levels through the use of the bus extension cable, they are displayed as one level in the Unit Editor settings.**
> - **The maximum number of units that can be connected in a single system is 8 (3 when the KV-N14** is used).**

Deleting a Configured Unit

<div align="right">

"Edit(E)" ▶ **"Delete(D)"** [Delete]

</div>

Select the unit to be deleted, and then click the "Edit (E)" menu ▶ "Delete (D)" or right-click the unit, and then select "Delete" from the menu that appears.

Reference

- The CPU unit and end unit cannot be deleted.
- To delete multiple units, select the units with the mouse and then delete the units.
- The deleted section is displayed shaded in.

Point

If you delete a unit of a system whose relays and DM entries have already been assigned, the relay and DM numbers of the deleted unit are displayed in red as invalid operands in the ladder program, and the program can no longer be transferred to the PLC.

Use the ladder edit screen to clear the invalid operands or edit the ladder program again. Also, if you clear the "Device auto-convert mode by changes to unit config" checkbox in the "system settings" tab that is displayed when you click the "Tool (T)" menu ▶ "Option (O)" in the ladder edit screen, these relay and DM numbers will not become invalid operands.

📖 **"Clearing Invalid Operands" (page 8-4)**

Copying and Moving Configured Units

<div align="right">

✂ **"Edit(E)"** ▶ **"Cut(T)"** [Ctrl] + [X]

📋 ▶ **"Copy(C)"** [Ctrl] + [C]

📋 ▶ **"Paste(P)"** [Ctrl] + [V]

</div>

1 To copy a selected unit, click the "Edit (E)" menu ▶ "Copy (C)." To move a unit, click the "Edit (E)" menu ▶ "Cut (T)."

Alternative procedure

Copy

Right-click a unit, and then select "Copy" from the menu that appears.

Move

Right-click a unit, and then select "Cut" from the menu that appears.

Reference

The moved part is displayed shaded in.

When a unit is moved to a lower level for the first time, the extension unit KV-EB1 is automatically configured.

With the KV Nano Series, units cannot be configured on the lower level.

3

UNIT EDITOR

> ✏ **Point**
>
> **If you cut a unit of a system whose relays and DM entries have already been assigned, the relay and DM numbers of the cut unit are displayed in red as invalid operands in the ladder program, and the program can no longer be transferred to the PLC.**
>
> **Even if you paste the unit, the relay and DM numbers will not be inherited. Use the ladder edit screen to clear the invalid operands or edit the ladder program again.**
>
> 📖 **"Clearing Invalid Operands" (page 8-4)**
>
> **Also, if you clear the "Device auto-convert mode by changes to unit config" checkbox in the "system settings" tab that is displayed when you click the "Tool (T)" menu ▶ "Option (O)" in the ladder edit screen, these relay and DM numbers will not become invalid operands.**

2 **Move the unit cursor to position that you want to paste the unit, right-click the mouse button, and then select "Paste" from the menu that appears.**

(**Alternative procedure**) Click the "Edit (E)" menu ▶ "Paste (P)."

■ **Moving a unit together with its assigned relay and DM entries**

Select the unit, and drag it to the desired position. When you do this, the relay numbers do not change even if the unit is moved after relays have been assigned.

Automatically Assigning Relays and DM Entries of Configured Units

🔧 **"Convert(P)" ▶ "Auto assign relay/DM(A)"** [F5]

Click the "Convert (P)" menu ▶ "Auto assign relay/DM (A)."
Relays and DM entries are assigned automatically.

> Reference When you are using the KV-8000/7500/7300/5500/5000/3000/1000/700, you can use the option settings to set the automatic assignment rules.
> In the default settings, relays are assigned in 10-channel units from the leading number of 30000 and DM entries are assigned in 100-entry units from the leading number of 10000. Both relay and DM entry assignments start from the position neighboring the CPU unit.
> 📖 "Setup device assignment" (page 3-44)
> For the KV Nano Series, the assignment is set to "unit number × 1000" (for input units and I/O units) or "unit number × 1000 + 500" (for output units). (The assignment may be shifted when a special unit is used.)

3

UNIT EDITOR

Manually Assigning Relays and DM Entries of Configured Units

3

UNIT EDITOR

"View(V)" ▶ "Display unit setting(R)" ↵

Follow the procedure below to manually assign relay and DM numbers.

1 **Select the unit to be set, and then click the "View (V)" menu** ▶ **"Display unit setting (R)."**

The settings of the unit selected in the unit configuration area are displayed in the Setup unit window.

2 **Select "leading DM" of "Item" and "Setting value" of "Leading input (Output) relay No.," and then enter the value to set.**

Reference

- The Unit Editor has an "auto-convert function" that automatically changes the relay and DM numbers in the ladder program when you change relay or DM numbers in a system in which relay and DM assignment has already been performed.
- In the default settings, automatic conversion is enabled. When the automatic conversion function is not required, click the "Tool (T)" menu ▶ "Option (O)" in the ladder edit screen, and then clear the "Device auto-convert mode by changes to unit config" checkbox in the "system settings" tab to change the setting.

  📖 "Setup device assignment" (page 3-44)

Point

- **Enter the leading relay number by specifying a channel. Channel numbers refer to relay numbers without the last two digits. For example, R10000 is channel 100.**
- **The relays and DM entries that can be assigned to all the units are those relays and DM entries that are within the global device range.**
  If you specify a device outside of this range, an error will occur during conversion. Check the global device range.

  📖 **"Overall Local Device Assignment Settings" (page 8-6)**
- **You can only enter even numbers for the leading DM numbers.**

Assigning Relay Numbers of Configured Units in Batches

"Edit(E)" ▶ "Batch input relay No.(A)"

1 Click the "Edit (E)" menu ▶ "Batch input relay No. (A)."

2 Click the "Relay no." column, enter the relay number to assign in units of channels, and then click "OK."

Batch input relay No.				
Specify leading relay No. by CH				
Unit name	Pos.	Relay no.	Count	Comments
KV-5000	01,02	R30000	320	
KV-C32X*	01,03	320	32	
KV-B16T*	01,04	R33000	16	
KV-B16T*	01,05	R34000	16	
KV-L2*V	01,06	R35000	32	
KV-H20S	01,07	R36000	192	
KV-AD40	01,08	R38000	32	

[OK] [Cancel]

> **Reference**
> - The Unit Editor has an "auto-convert function" that automatically changes the relay and DM numbers in the ladder program when you change relay or DM numbers in a system in which relay and DM assignment has already been performed.
> - In the default settings, automatic conversion is enabled. When the automatic conversion function is not required, click the "Tool (T)" menu ▶ "Option (O)" in the ladder edit screen, and then clear the "Device auto-convert mode by changes to unit config" checkbox in the "system settings" tab to change the setting.
> 📖 "Setup device assignment" (page 3-44)

> **Point**
> **Enter the leading relay number by specifying a channel. Channel numbers refer to relay numbers without the last two digits. For example, R10000 is channel 100.**

Assigning Inter-unit Synchronization Refresh DM of Installed Units in Batch

Edit(E) ▶ Batch input of inter-unit synchronization refresh(H)

1 From the Edit(E) menu, ▶ select "Bath input of inter-unit synchronization refresh(H)".

2 Click the "Leading DM number" field, enter a DM number for assignment, and then click the "OK" button.

Inter-unit Synchronization Refresh Batch Entry					
Select the unit for the inter-unit synchronization, and set the DM address assigned to the buffer memory synchronization refresh.					
ON	Unit name	No.	Leading DM No.	Size	S..
✓	KV-SH04PL	1	20000	112	14
✓	KV-SH04PL	2	20200	112	16
✓	KV-XH04ML	3	20400	24	12
✓	KV-XH16ML	4	20500	32	17

[OK] [Cancel]

3

UNIT EDITOR

3

UNIT EDITOR
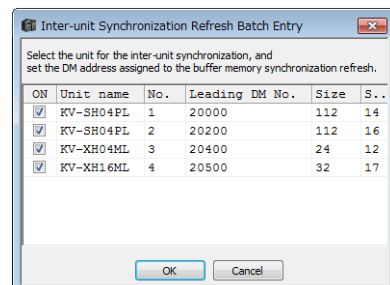
> Reference
> - For a system with relay/DM assigned, when its relay/DM number is changed, the "Automatic conversion function" automatically changes the relay/DM number on the ladder program.
> - By default, automatic conversion is in effect. If you don't want to use the automatic conversion function, from the ladder edit screen, select "Tool(T)" ▶ "Options"(O). Then, on the "System settings" tab, clear the "Ladder device automatic conversion mode using unit configuration change" check box to change this setting.
>   📖 "Setup device assignment" (page 3-44)

> **Point**
> - **Only the units whose "Inter-unit synchronization function" is set to "To use" will be displayed.**
> - **DM can be assigned within the range of a global device.**
>   **If you specify it to be out of the range, then an error occurs during conversion.**
>   **Check the range of the global device.**
>   📖 **"Setting Local Devices for Each Program" (page 8-6)**
> - **For a leading DM number, you can enter only an even number.**

Checking the System's Relay and DM Assignments

🔳 **"Convert(P)"** ▶ **"Check device(C)"** F6

Check that the unit configuration and the relay and DM assignments of each unit that you set in the Unit Editor are correct.

> Reference
> When you exit the Unit Editor, the devices are automatically checked. If there is an error, a message indicating the error will be displayed.

1 **Click the "Convert (P)" menu** ▶ **"Check device (C)."**

The check of the unit configuration and the relay and DM assignments starts.

2 **The result of the check is displayed in the message area.**

If there is an error, the details of the error are displayed in the message area. If there are no errors, a message stating this is displayed in the message area.

	Process	Row	No.	Code	Message
🔴	Address check	001	002	E0022	Addresses are not assigned to this unit.
🔴	Address check	001	003	E0022	Addresses are not assigned to this unit.
🔴	Address check	001	004	E0022	Addresses are not assigned to this unit.
⚠	Unit configuration check			W0003	As the power unit is not found, supply power to CPU.
ℹ	Unit configuration check			I0001	Check unit configuration.
ℹ	Unit configuration check			I0003	No error occurs in unit configuration.
ℹ	Address check			I0005	Address not detected...
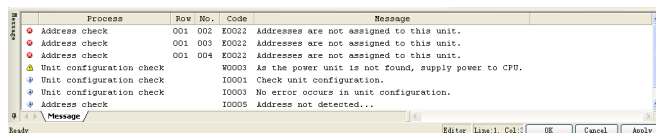
📖 "Jumping to the Error Rung" (page 3-40)

Displaying the Detailed Unit Settings

"View(V)" ▶ **"Display unit setting(R)"** ⏎

Select the unit to be set, and then click the "View (V)" menu ▶ "Display unit setting (R)."
The settings of the unit selected in the unit configuration area are displayed in the Setup unit window.

The Setup unit window of the selected unit is displayed.

Follow the procedure below to display the Setup unit tab of the unit selected in the unit configuration area.

Setting Configured Units

"View(V)" ▶ **"Display unit setting(R)"** ⏎

Configure the detailed settings of the units in the unit configuration area. For details on how to set each unit and details on the setting contents, see the manual of each unit.

1 **Select the unit to be set, and then click the "View (V)" menu ▶ "Display unit setting (R)".**

The Setup unit tab of the unit selected in the unit configuration area is displayed.

2 **Click the item whose setting is to be changed, and enter the new value.**

Using a text box to enter a value
Enter the value in the displayed text box.
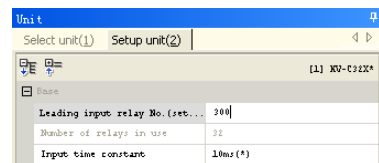
Using a pulldown list to enter a value
Select the item from the displayed pulldown list.

3

UNIT EDITOR

3
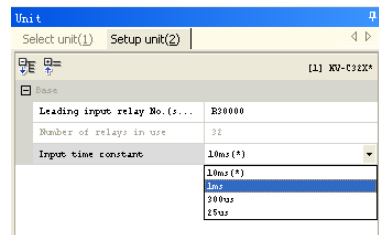
Displaying the Unit Monitor

"View(V)" ▶ **"Unit monitor(U)"** Ctrl + Alt + U

When KV STUDIO is in monitor mode, you can display the unit monitor from the Unit Editor.
Select the unit whose unit monitor you want to display, and then click the "View (V)" menu ▶ "Unit monitor (U)" or right-click the unit, and then select "Unit monitor" from the menu that appears.
For details on the unit monitor, see the user's manual of each unit.
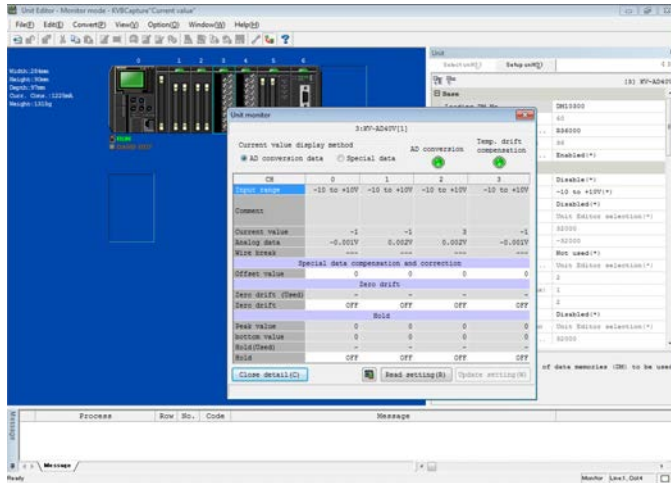
Displaying the Built-In Function Monitor

"View(V)" ▶ **"Built-in Function Monitor(M)"** Ctrl + Alt + M

When KV STUDIO is in monitor mode, you can display the built-in function monitor from the Unit Editor.
Select the CPU unit, and then click the "View (V)" menu ▶ "Built-in Function Monitor (M)" or right-click the unit, and then select "Built-in Function Monitor" from the menu that appears.
For details on the built-in function monitor, see 📖 "9-5 Built-In Function Monitor" (page 9-63).
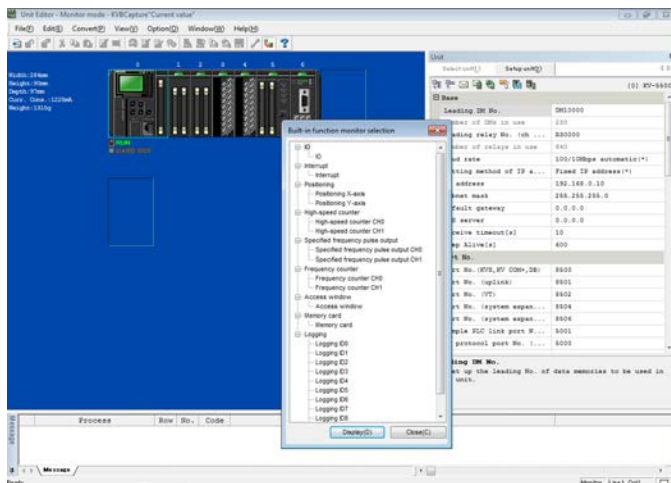
Displaying the Buffer Memory Monitor

"View(V)" ▶ "Buffer memory monitor(B)" Ctrl + Alt + R

When KV STUDIO is in monitor mode, you can display the buffer memory monitor from the Unit Editor. Select the unit whose buffer memory monitor you want to display, and then click the "View (V)" menu

▶ "Buffer memory monitor (B)" or right-click the unit, and then select "Buffer memory monitor" from the menu that appears.

For details on the buffer memory monitor, see 📖 "9-4 Batch Monitor" (page 9-60).
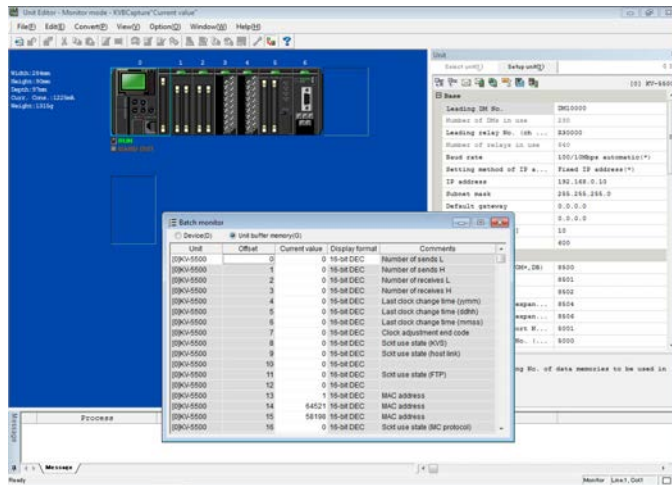
Importing Unit Setting Information and Unit Comments

Follow the procedure below to read the unit setting information and unit comments that were created for another project.

1 Click the "File (F)" menu ▶ "Import (I)."

The "Import Unit" dialog box is displayed.

2 **Specify the location of the unit setting information file and the unit comments that you want to import.**
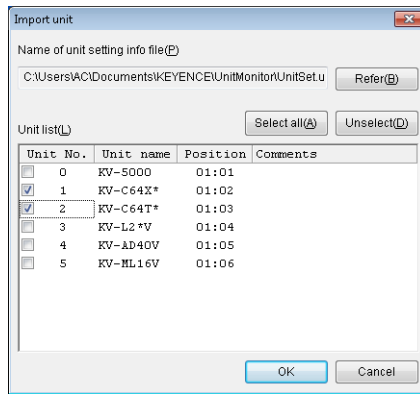
Item	Explanation
Name of unit setting info file	This displays the storage location of the unit setting information file and the unit comments that you want to import. You can click "Refer" to display the "Open" dialog box, and you can then use this dialog box to select a unit setting information file.
Unit list	This displays as a list the information related to the unit configuration of the file to be imported.
Unit No.	This displays the unit number of the unit setting information. The units whose checkboxes are selected will be imported.
Unit name	This displays the unit name.
Position	This displays the number of unit levels and the unit connection position (number).
Comments	This displays unit comments.
Select all	Click this to select all the unit number checkboxes.
Unselect	Click this to clear all the unit number checkboxes.

3 **Select the units to import, and then click "OK."**

The unit setting information and the unit comments are imported.

Reading Unit Configurations from PLCs

🖳 **"File(F)"** ▶ **"Read unit config from PLC(G)"**

Read unit configuration information from a PLC.

Click the "File (F)" menu ▶ "Read unit composition from PLC (G)."

✎ **Point**
- **Configure KV STUDIO and the PLC so that they can communicate with each other in advance.**
  📖 **"Communication Settings" (page 9-5)**
- **The settings of all the units of the read unit configuration are initialized (not set).**
  You cannot use the unit configuration reading function to read unit setting information.

Entering Comments

📝 **"Edit(E)"** ▶ **"Edit cmnts(O)"** ▶ **"Unit cmnts(U)"** [Ctrl] + [Shift] + [U]

▶ **"Block cmnts(B)"** [Ctrl] + [Shift] + [B]

▶ **"System cmnts(S)"** [Ctrl] + [Shift] + [S]

Enter comments in the unit configuration area.

✎ **Point**
- **You can enter up to 80 half-width characters (40 full-width characters) in unit comments, block comments and system comments.**
- **Unit comments, block comments and system comments cannot be set for the KV-8000/7000 Series.**

■ Unit comments

Add a comment to the unit selected in the unit configuration area.
Click the "Edit (E)" menu ▶ "Edit cmnts (O)" ▶ "Unit cmnt (U)."
The "Unit comments" dialog box is displayed. Enter the unit comment.
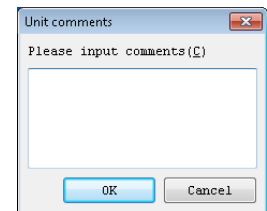
Reference The entered unit comment is displayed as a hint (tool tip) for the unit in the unit configuration area.

■ Block comments

Add a comment to the block that includes the unit selected in the unit configuration area.
Click the "Edit (E)" menu ▶ "Edit cmnts (O)" ▶ "Block cmnt (B)."
The "Block comments" dialog box is displayed. Enter the block comment.
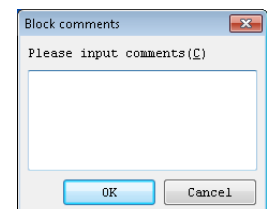
Reference The entered block comment is displayed under the system information of the unit configuration area.

■ **System comments**

Add a comment to the set system configuration.

Click the "Edit (E)" menu ▶ "Edit cmnts (O)" ▶ "System cmnts (S)."

The "System comments" dialog box is displayed. Enter the system comment.
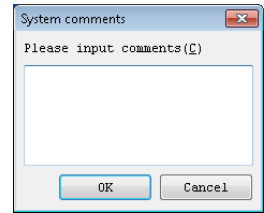
> | Reference | The entered system comment is displayed in the upper-left part of the unit configuration area.

Reserving Units and Canceling Unit Reservations

🔳 **"Edit(E)"** ▶ **"Reserve unit(R)"** [Ctrl] + [R]

　　　　 ▶ **"Unreserve unit(R)"** [Ctrl] + [R]

- Select the unit to be reserved, and then click the "Edit (E)" menu ▶ "Reserve unit(R)" or right-click the unit, and then select "Reserve unit(R)" from the menu that appears.
- If you plan to add a unit in the future, or when you have a unit to be attached or removed in the same ladder program depending on the type of the equipment, you can "reserve" the unit.
- To cancel the reservation, select a reserved unit, and then click the "Edit (E)" menu ▶ "Unreserve unit(R)" or right-click the unit, and then select "Unreserve unit(R)" from menu that appears.

> | Reference | The unit reservation function works differently depending on the unit.

	KV-8000/7500/7300, KV Nano Series	KV-5500/5000/3000/1000/700
When a unit is reserved	Unit numbers are assigned to reserved units.	Unit numbers are not assigned to reserved units.
When the reserved unit does not exist in the actual configuration	Normal operation[*]	Normal operation
When the reserved unit exists in the actual configuration	Normal operation	Unit configuration error

* Although it is possible to write a macro instruction that specifies a non-existent reserved unit, a calculation error (49: UR, UM, or UV unit not connected) will occur when an attempt is made to execute the macro.

Jumping to the Error Rung

🔴 **"Convert(P)"** ▶ **"Jump to error rung(E)"** F4

This function displays the unit that corresponds to the error messages displayed during operations such as relay and DM assignment and unit addition and deletion.

1 **Click the error message in the message area of Unit Editor.**

The selected message is highlighted.

	Process	Row	No.	Code	Message
✗	Address check	001	005	E0022	Addresses are not assigned to this unit.
⚠	Unit configuration check			W0003	As the power unit is not found, supply power to CPU.
ⓘ	Unit configuration check			I0001	Unit configuration is being checked...
ⓘ	Unit configuration check			I0003	No error occurs in unit configuration.
ⓘ	Address check			I0005	Checking address...
ⓘ	Address check			I0004	Address check completed.
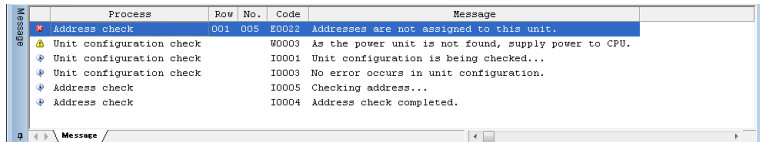
◀ ▶ \\ **Message** /

2 **Click the "Convert (P)" menu** ▶ **"Jump to error rung (E)."**

> **Alternative procedure** Double-click the selected message.

The cursor in the unit configuration area moves to the unit on which the error is occurring.
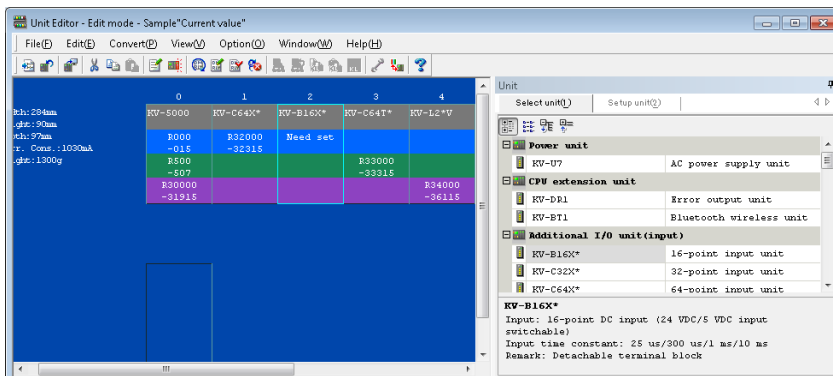
Displaying the Slave Setup Screen

🖥 **"Setup slave(K)"** ▶ **"Setup slave(N)"** Ctrl + N

When a KL-N20V is selected, set the KL slave to be connected.

1 **Select the KL-N20V whose slave you want to set, and then click the "Setup slave (K)" menu** ▶ **"Setup slave (N)."**

The slave setup screen is displayed.

> **Alternative procedure** Right-click the KL-N20V whose slave you want to set, and then select "Setup slave" from the menu that appears.

> **Reference** For details on how to set the KL slave units, see the manual of each unit.

<div style="float:right">**3**

UNIT EDITOR</div>

Importing Slave Information

 "Setup slave(K)" ▶ **"Import slave info(I)"** `Ctrl` + `K`

Read slave setting information that was created for another project. When you are creating a system that has the same slave configuration as that of a previously created system, you can use the "Import slave info" function to acquire previously created system information as-is, which eliminates the work that is required to configure the settings.

Follow the procedure below to read slave setting information.

1 Select the KL-N20V whose slave setting information you will read, and then click the "Setup slave (K)" menu ▶ "Import slave info (I)" or right-click the KL-N20V, and then select "Import slave info" from the menu that appears.

2 Specify the location of the slave setting information file to import.
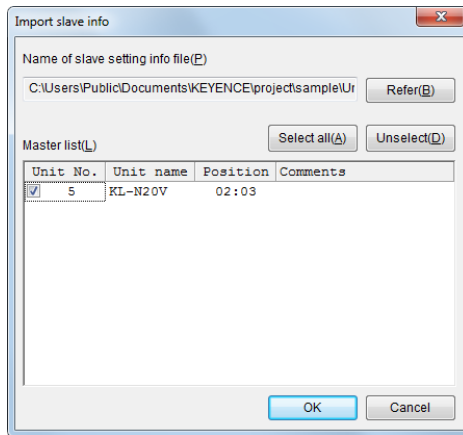
Item	Explanation
Name of slave setting info file	This displays the location where the slave setting information file to import is saved. You can click "Refer" to display the "Open" dialog box, and you can then use this dialog box to select a unit setting information file.
Master list	This displays the units (master) list.
Select all	Click this to select all the units (masters).
Unselect	Click this to clear all the selected units.

3 Select the unit (master) whose slave information you will import, and then click "OK."

The slave setting information is imported.

Copying KL Unit Information

 "Setup slave(K)" ▶ **"Copy KL info(K)"** `Ctrl` + `Alt` + `C`

Copy the KL unit information created with the KL address setup software to the clipboard. For details on how to operate this function, see the KL-N20V User's Manual.

Pasting KL Unit Information

🔖 **"Setup slave(K)"** ▶ **"Paste KL info(L)"** Ctrl + Alt + V

Import to the Unit Editor the KL unit information that was copied to the clipboard with "Copy KL info." For details on how to operate this function, see the KL-N20V User's Manual.

Starting the KL-N20V Setup (KL Address Setup) Software

🔖 **"Setup slave(K)"** ▶ **"KL-N20V setup(KL address setup)(E)"** Ctrl + E

Start the KL address setup software, and then configure the KL-N20V address settings. For details on how to operate this function, see the KL-N20V User's Manual.

> **Reference** When you are using the KL address setup software to set addresses, "Communications with other KL master units" in the KL-N20V Setup unit window is automatically set to "TRUE."

Changing How Unit Illustrations Are Displayed

🔖 **"View(V)"** ▶ **"Display bitmap(D)"**

You can change the way that the configured unit illustrations are displayed in the unit configuration area and the slave configuration area. You can use the bitmap display to display an image of the units in the manner that they are actually connected. You can use the box display to display the assigned relay numbers.

> **Reference** This setting is saved by the system. The next time that you start the Unit Editor, the same setting will be used.

Displaying Help

❓ **"Help(H)"** ▶ **"How to use Unit Editor(H)"** F1

Display the Unit Editor help information.

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UNIT EDITOR

This section describes the slave setup screen and how to operate each of the windows.
For details on how to set the KL slaves, see KL-N20V User's Manual.

Names and Functions of Parts of the Slave Setup Screen

When you are using the KL Series, you have to use the slave setup screen to set the slaves to connect.
In the Unit Editor, select the "Setup slave" menu to display the slave setup screen.
You can only select the "Setup slave" menu when a KL-N20V is selected.
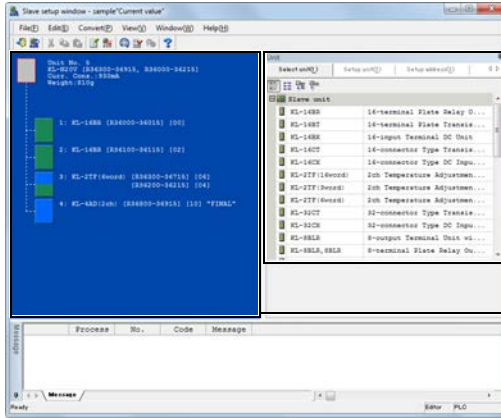
Select unit tab
Setup unit tab
Setup address tab
These are used to select the slave to configure and to display the information and change the settings of the configured slaves.

Slave configuration area
This displays the slave configuration.

📖 "Displaying the Slave Setup Screen" (page 3-31)

Slave configuration area

This displays the slave configuration that has been set in the slave setup screen.
In the slave configuration area, you can:
• Configure, delete, and change the connection positions of slaves.
• Select the slave to configure detailed settings of.
• Display the current consumption and weight of the entire slave system.
• Display the relay addresses assigned to each slave.
• Display an image of the unit configuration.
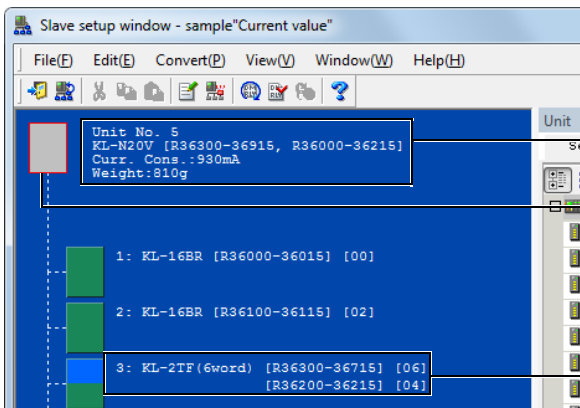
System information
This displays the current consumption (mA) and weight (g) of the entire slave system.

Unit cursor (red frame)
This indicates the currently selected cursor position.

Unit information
This displays the model numbers and assigned relay numbers and addresses of the configured slaves.

Select unit tab

Use this tab when you are configuring slave units in the slave configuration area.

Select the slave unit to configure from the Select unit window.

This displays the slave type.

This displays the slave model.
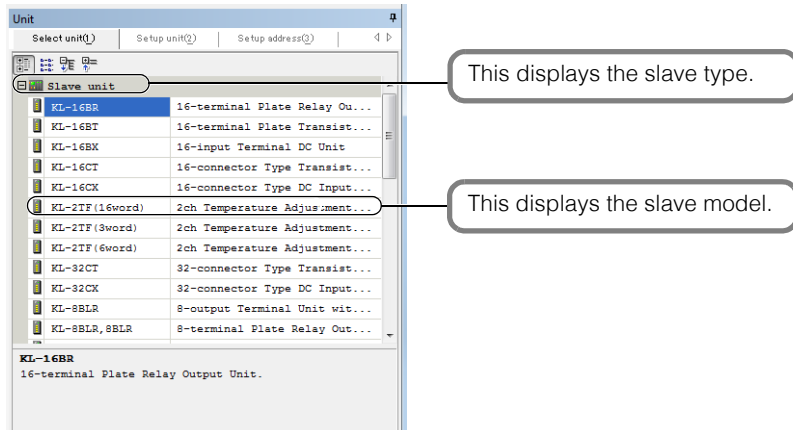
Setup unit tab

Use this tab to display detailed settings such as the mode of the master unit configured in the slave configuration area as well as to change these settings.

This indicates the setting item. Items whose settings cannot be changed are displayed in gray.

This indicates the setting details of the selected item.

An asterisk ("*") is displayed for the default value of the selected item.

📖 "Setting Configured Units" (page 3-25)

3

UNIT EDITOR
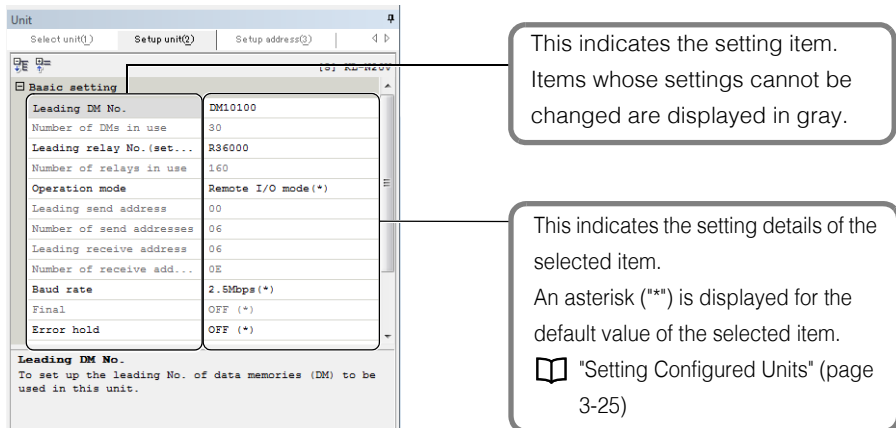
Setup address tab

Use this tab to display the table of detailed address assignments of the slave unit configured in the slave configuration area, to manually assign addresses, and to change settings.
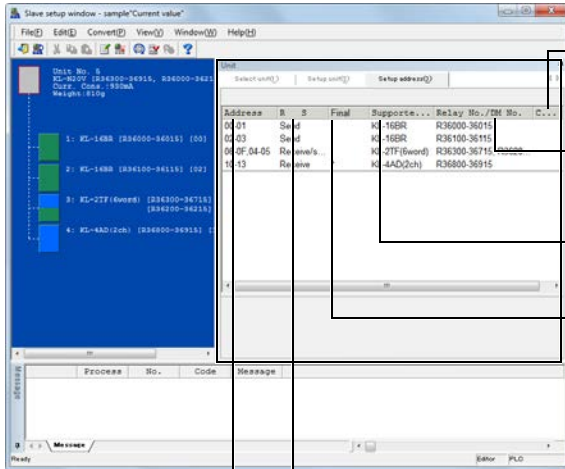
When slave comments have been entered, they are displayed here.

This displays the assigned relay and DM numbers.

This indicates which slave is assigned to each address.

An asterisk ("*") is displayed for the slaves that require final settings.

This displays the addresses assigned to each slave. Addresses can be set and changed manually.

This indicates whether the assigned address is a receiving address or a sending address.

Displaying the Slave Setup Screen

When a KL-N20V is selected, set the KL slaves to be connected.

📖 "Displaying the Slave Setup Screen" (page 3-31)

Exiting the Slave Setup Screen

🔹 **"File(F)"** ▶ **"Close Slave Setup Window(C)"**

Click the "File (F)" menu ▶ "Close Slave Setup window (C)." When the slave setup information has been updated but not saved, a confirmation dialog box will appear.
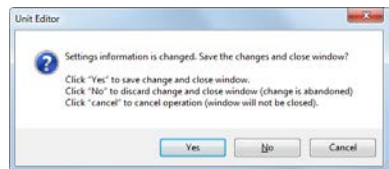
| Reference | When "Auto-assign Address" or "Address Check" is executed, the slave setup information at that time is automatically saved. The above confirmation dialog box will not be displayed when you exit without saving changes to the slave setup information after you have executed "Auto-assign Address" or "Address Check." |

| ✎ Point | **The relays and DM entries of the KL Master Unit KL-N20V are assigned according to the slave information set in the Slave setup screen. When the Slave setup screen was closed without the slave setup information saved, either create the slave setup information again or manually set the addresses of the KL-N20V when transferring the ladder program to the CPU unit.** |

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Switching the Cursor Position

"Window(W)" ▶	**"Slave config area(U)"**	Alt +	C
	"Select unit(1)"	Alt +	1
	"Select unit(2)"	Alt +	2
	"Setup address(3)"	Alt +	3
	"Message area(4)"	Alt +	4

You can use the menu to switch the cursor position (the area or tab that is active).

Configuring Slaves

From the unit selection window, select the slave to be connected, and then drag it to the edit screen.
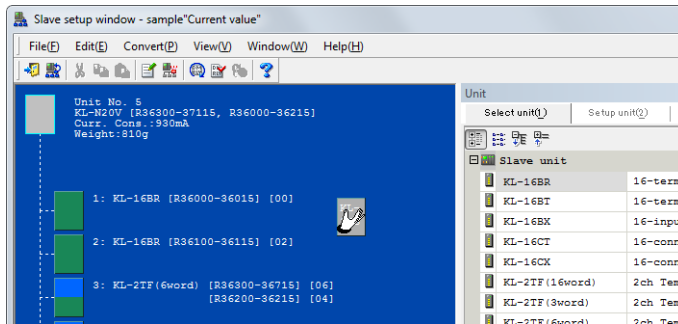
Deleting a Configured Slave

"Edit(E)" ▶ **"Delete(D)"** [Delete]

Select the slave to be deleted, and then click the "Edit (E)" menu ▶ "Delete (D)" or right-click the slave, and then select "Delete" from the menu that appears.

> **Reference**
> - The deleted section is displayed shaded in.
> - If you delete a slave whose address has been assigned, the address will become blank. When you want to set all the addresses, set this address again.
>   📖 "Automatically Assigning Addresses of Configured Slaves" (page 3-38)

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UNIT EDITOR

Copying and Moving Configured Slaves

✂	"Edit(E)"	▶ "Cut(T)"	Ctrl + X
📋		▶ "Copy(C)"	Ctrl + C
📋		▶ "Paste(P)"	Ctrl + V

These commands copy, move, and paste the selected slave station.

You can also use the menu that appears when you right-click a slave to perform these operations.

> **Reference** The moved part is displayed shaded in.

> **Point** **If you cut a slave whose address has already been assigned, even if you paste the slave, the pasted slave will not have the assigned address number.**

■ Moving a slave together with its address setting

Select the slave, and drag it to the desired position. When you do this, the relay and address numbers do not change even if the slave is moved after its address has been assigned.

Automatically Assigning Addresses of Configured Slaves

📝	"Convert(P)"	▶ "Auto assign address(A)"	F5

Click the "Convert (P)" menu ▶ "Auto assign address (A)."

The address is assigned automatically.

> **Point** **Even if you change the address of a slave whose relay and DM assignment has already been performed, the relay and DM numbers in the ladder program are not changed.**

> **Reference** The rule for automatic assignment of addresses is to assign addresses in the order that slaves are configured.

Manually Assigning Addresses of Configured Slaves
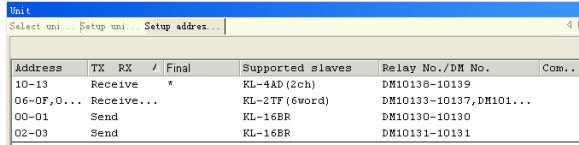
"Window(W)"	▶ "Setup address(3)"	Alt + 3

1 **Select the unit to be set, and then select the "Setup address" tab.**

The address setting of the unit selected in the slave setup screen is displayed in the setup address window.

2 **Select the address of the slave that you want to change, and then enter the new address number.**

Address	TX RX	/	Final	Supported slaves	Relay No./DM No.	Com...
10-13	Receive		*	KL-4AD (2ch)	DM10138-10139	
06-0F,0...	Receive...			KL-2TF (6word)	DM10133-10137,DM101...	
00-01	Send			KL-16BR	DM10130-10130	
02-03	Send			KL-16BR	DM10131-10131	

> **Point**
> • **Be sure to set a unique address for each slave.**
> • **Even if you change the address of a slave whose relay and DM assignment has already been performed, the relay and DM numbers in the ladder program are not changed.**

Checking the System's Address Assignments

"Convert(P)" ▶ **"Check address(C)"** `F6`

Check that the unit configuration and the address assignments of each unit that you set in the slave setup screen are correct.
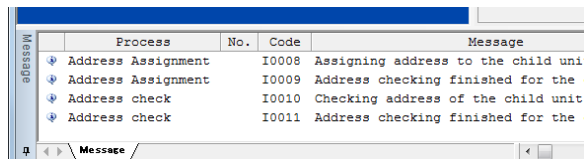
> **Reference** When you exit the slave setup screen, the addresses are automatically checked. If there is an error, a message indicating the error will be displayed in the message area of the Unit Editor.

1 **Click the "Convert (P)" menu** ▶ **"Check address (C)."**

The check of the unit configuration and the address assignments starts.

2 **The result of the check is displayed in the message area of the Unit Editor.**

If there is an error, the details of the error are displayed in the message area. If there are no errors, a message stating this is displayed in the message area.

|	Process	No.	Code	Message
	Address Assignment		I0008	Assigning address to the child uni
	Address Assignment		I0009	Address checking finished for the
	Address check		I0010	Checking address of the child unit
	Address check		I0011	Address checking finished for the

📖

Importing Slave Information

"File(F)" ▶ **"Import slave info(I)"** `Ctrl` + `K`

Read slave setting information that was created for another project. When you are creating a system that has the same slave configuration as that of a previously created system, you can use the "Import slave info" function to acquire previously created system information as-is, which makes it possible to configure settings easily.

📖

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UNIT EDITOR

Entering Comments

📝 **"Edit(E)"** ▶ **"Edit Unit/slave cmnts(U)"** `Ctrl` + `Shift` + `U`

1 **Select the unit or slave whose comment you want to enter, and then click the "Edit (E)" menu** ▶ **"Edit Unit/slave cmnts (U)" or right-click the unit or slave, and then select "Edit Unit/slave cmnts" from the menu that appears.**

When you select a slave, the "slave comment (slave station comment)" dialog box is displayed. When you select a unit, the "Unit comments" dialog box is displayed.

2 **Enter the comment, and then click "OK."**

The comment is entered.

> | Reference | • The entered comment is displayed in the slave configuration area and the setup address window.
> • You can enter up to 80 half-width characters (40 full-width characters) for each comment.
> • Comments cannot be set for the KV-8000/7000 Series.
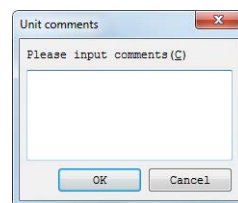
Reserving Units and Slaves and Canceling Unit and Slave Reservations

🖧 **"Edit(E)"** ▶ **"Reserve Unit/slave(R)"** `Ctrl` + `R`

▶ **"Unreserve unit/slave(R)"**

• Select the unit or slave to be reserved, and then click the "Edit (E)" menu ▶ "Reserve unit / slave (R)" or right-click the unit or slave, and then select "Reserve unit / slave" from the menu that appears.

• If you plan to add a unit or slave in the future, or when you have a unit or slave to be attached or removed in the same ladder program depending on the type of the equipment, you can "reserve" the unit or slave, which will set it as a dummy unit or slave in the configuration.

• To cancel the reservation, select a reserved unit or slave, and then click the "Edit (E)" menu ▶ "Unreserve unit/slave(R)" or right-click the unit or slave, and then select "Unreserve unit / slave" from the menu that appears.

Jumping to the Error Rung

🔴 **"Convert(P)"** ▶ **"Jump to error rung(E)"** `F4`

This function displays the slave that corresponds to the error messages displayed during operations such as address assignment and slave addition and deletion.

1 **Click the error message in the message area of Unit Editor.**

The selected message is highlighted.

2 **In the Unit Editor, click the "Convert (P)" menu ▶ "Jump to error rung (E)."**

(Alternative procedure) Double-click the selected message.

The cursor in the slave configuration area moves to the slave on which the error is occurring.
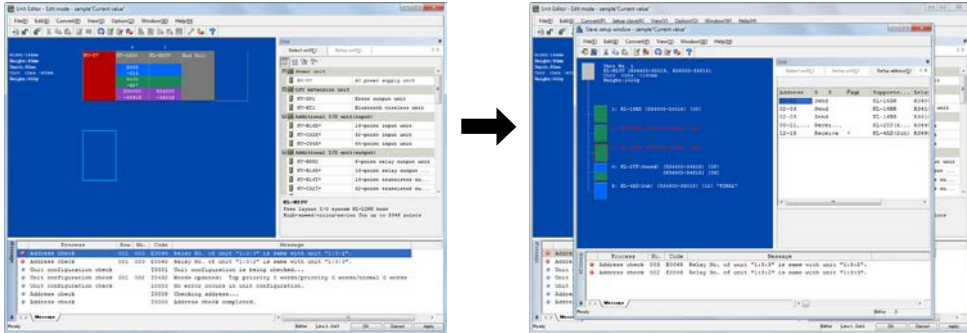
Displaying Help

? **"Help(H)" ▶ "How to use Unit Editor(H)"** ⎡F1⎤

Display the Unit Editor help information.

This section describes how to change the environment settings of the Unit Editor.

About the Unit Editor Environment Settings

🔧 **"Option(O)"** ▶ **"Setup option(S)"**

Display the "Setup option" dialog box, and then configure the Unit Editor environment settings.
Click the "Option (O)" menu ▶ "Setup option (S)" to display the "Setup option" dialog box.

You can set the following content.

Tab Type	Description
Setup display	Use this tab to set the display magnification, font size, and cursor movement unit of the units that are displayed in the unit configuration area and the slave configuration area.
Setup color	Use this tab to set the font color and background color of the Unit Editor.
Setup device assignment	Use this tab to set the automatic assignment rules for relays and DM entries.
EtherNet/IP Setting	Use this tab to set the leading device and the device assignments as well as to configure the settings for automatic registration to the list of units of the sensor setting file.
Set unit color	Use this tab to set the color of each unit displayed in the unit configuration area and the slave configuration area.
Other Settings	Use this tab to configure settings such as enabling manual address setting of the KL Master Station unit, KL-N20V.
Inter-unit synchronization refresh setting	Use this tab to select devices to apply inter-unit synchronization refresh.

Changed settings are saved to KV STUDIO and are applied immediately after you make the changes.

Setup display
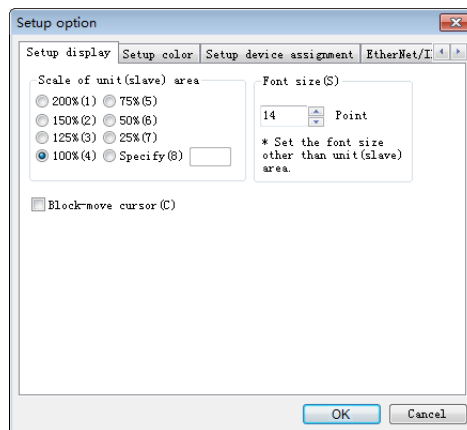
Item	Explanation	Default
Scale of unit (slave) area	Change the display magnification of the units displayed in the unit configuration area and the slave configuration area.	100%
Font size	Change the font size used in windows other than the unit configuration area and the slave configuration area.	12
Block-move cursor [*1]	Set how the cursor moves in the unit configuration area and the slave configuration area when you press a cursor key.	Cleared

*1 This is the cursor movement unit.

Block-wise cursor movement

You cannot move the cursor past the edges of the block.

System-wise cursor movement

When you move the cursor past the edge of the block, the cursor moves to the opposite side of the lower (or upper) block.
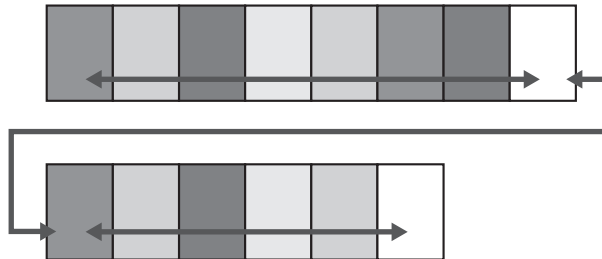
> Reference   With the KV Nano Series, the lower level block cannot be used.

Setup color

To change the color of an item, click the color button next to it.
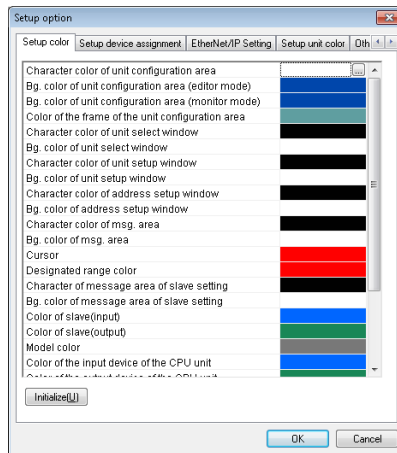
> Reference   • The colors that you set here are saved to KV STUDIO, and they are also enabled the next time that you start KV STUDIO.
> • To return the saved colors to their defaults, click "Initialize."

Setup device assignment

Set the automatic assignment rule of the relay devices on the KV-8000/7500/7300/5500/5000/3000/ 1000/700 and KV Nano Series. If you want to change the leading relay number and leading DM number that can be assigned, change the settings again.
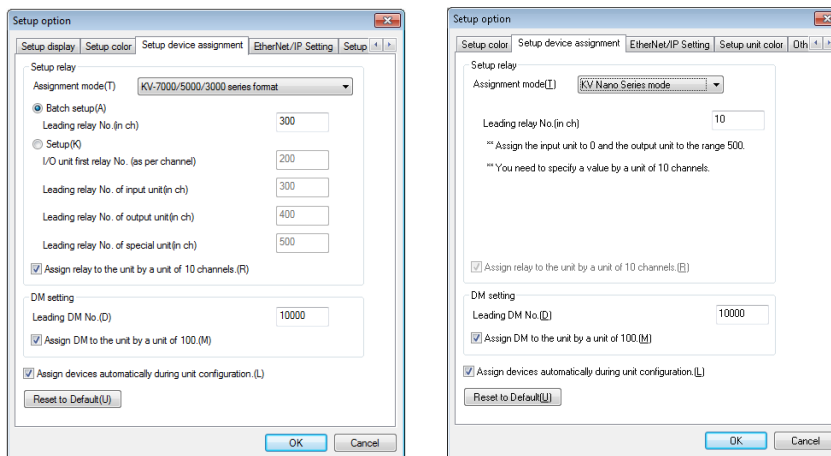
Item			Explanation	Default
Setup relay (KV-8000/7000/5000/ 3000 Series)*	Assignment mode		You can set the mode to KV-8000/7000/5000/3000 Series format or KV Nano Series format.	-*
	Batch setup	Leading relay No. (in ch)	Enter the leading relay number.	300
	Setup	I/O unit first relay No. (as per channel)	Enter the I/O unit leading relay number.	200
		Leading relay No. of input unit (in ch)	Enter the input unit leading relay number.	300
		Leading relay No. of output unit (in ch)	Enter the output unit leading relay number.	400
		Leading relay No. of special unit (in ch)	Enter the special unit leading relay number.	500
Setup relay (KV Nano Series)	Assignment mode		You can set the mode to KV-8000/7000/5000/3000 Series format or KV Nano Series format.	-*
	Leading relay No. (in ch)		Enter the leading relay number.	10
DM setting	Leading DM No.		Enter the leading DM number.	10000
	Assign DM to the unit by a unit of 100.		When you select this checkbox, DM entries are assigned to units in 100-entry units.	Selected
Assign devices automatically during unit configuration.			When you select this checkbox, the leading device number is automatically assigned when a unit is configured.	Selected

* The initial display varies depending on whether the PLC model is the KV-8000/7000/5000/3000 Series or KV Nano Series.

EtherNet/IP Setting

Set the device assignment rule used by an EtherNet/IP-ready unit for cyclic communication and configure the settings for automatic registration to the list of units of the sensor setting file.
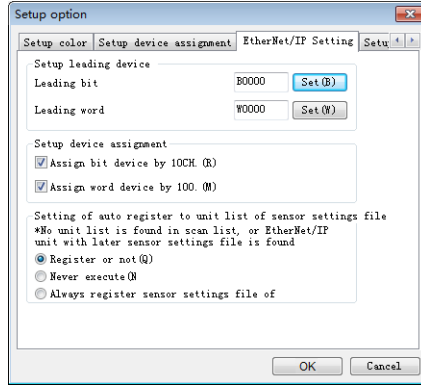
Item		Explanation	Default
Setup leading device	Leading bit	Enter the leading bit device.	B00
	Leading word	Enter the leading word device.	W00
Setup device assignment	Assign bit device by 10CH.	When this checkbox is selected, bit devices are assigned in 10-channel units to the devices assigned to the EtherNet/IP unit.	Selected
	Assign word device by 100.	When this checkbox is selected, word devices are assigned in 10-device units to the devices assigned to the EtherNet/IP unit.	Selected
Setting of auto register to unit list of sensor settings file	Register or not	A dialog box will be displayed to check whether to perform registration.	Register or not
	Never execute	Registration will not be performed.	
	Always register sensor settings file of scan list	The KV STUDIO sensor setting file will be updated automatically.	

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Setup unit color

The colors set in this tab will be used to display units in the box display of the unit configuration area. The colors will also be the character color for the unit's relay and DM numbers that are displayed in the ladder diagram.

To change the color of an item, click the color button next to it.
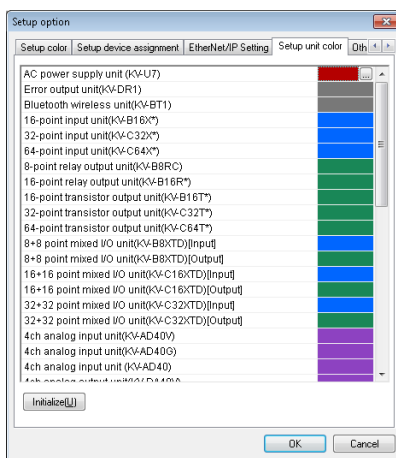
| Reference | • The colors that you set here are saved to KV STUDIO, and they are also enabled the next time that you start KV STUDIO. |
| | • To return the saved colors to their defaults, click "Initialize." |

Other Settings

Item		Explanation	Default
Window	Display slave setting, EtherNet/IP setting in front of Unit Editor.	When this checkbox is selected, the slave setting and EtherNet/IP setting screens are displayed in front of the Unit Editor window. By default, the slave setting and EtherNet/IP setting screens are always displayed in front of the Unit Editor window.[*]	Selected
Other	Pop up confirmation message when auto assign address	When this checkbox is selected, a confirmation message is displayed when relay and DM numbers and addresses are automatically assigned. By default, the confirmation message is displayed.	Selected
	Allow manual setup of KL-N20V address	When this checkbox is selected, the address of the KL Master unit KL-N20V can be set manually. The KL-N20V normally uses the address setting specified in the slave setting screen or the "KL address setup software." When you want to manually assign addresses, select this checkbox to enable manual input on the unit setting screen.	Selected
	Display comments in unit configuration window.	When this checkbox is selected, unit comments, block comments, and system comments are displayed in the unit configuration area. When this checkbox is cleared, all comments will be hidden.	Selected

* The "Window" setting is applied after the Unit Editor is restarted.

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UNIT EDITOR

MEMO

4

FILE AND PRINT

This chapter describes file functions and how to print.

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This section describes the functions contained in the "File (F)" menu.

For details on project, module, function block, and macro, refer to the CPU Unit User's Manual of the KV-8000/7000/5000/3000 series and KV Nano series.

Creating New Projects

| KV-8000 | KV-7000 | KV-5000/3000 | KV Nano |
| KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40 |

📄 **"File(F)"** ▶ **"New project(N)"** ⌐Ctrl⌐ + ⌐N⌐

Click the "File (F)" menu ▶ "New project (N)" to create a new project.
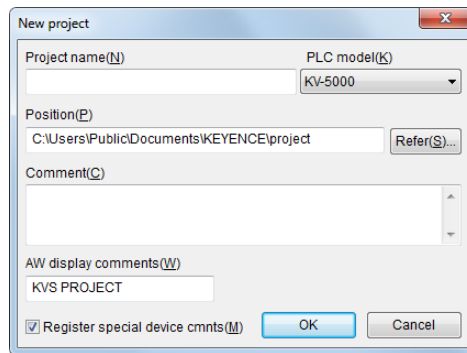
Item	Explanation
Project name	Enter the project name.[*1]
PLC model	Select the PLC type.
Position	Specify the location to save the project in.
Comment	Enter a comment.[*2]
AW display comments[*3]	Enter the project name to display in the access window. (You can enter up to 12 half-width alphanumeric characters.)
Register special device cmnts	When this checkbox is selected, special device comments will be registered.

*1 If the model is the KV-8000 and KV-7500/7300 with CPU function version 2.0 or later, then 64 characters (no distinction between half-width and full-width characters) can be entered. If the model is the KV-7500/7300 with CPU function version earlier than 1.1, then 32 characters (no distinction between half-width and full-width characters) can be entered. If the model is the KV-700/700+M/24(40)/10(16)/P16, then 60 half-width characters or 30 full-width characters can be entered. For other models, 32 half-width characters or 16 full-width characters can be entered.

*2 The module name can be set up to 64 characters (no distinction between half-width and full-width) when the selected PLC model is KV-8000/7500/7300, and up to 64 half-width characters/32 full-width characters for the other PLC models.

*3 Due to the restrictions on the characters that can be displayed by the access window, enter values between the following ASCII code ranges: 20 to 7E (hexadecimal) and A1 to DF (hexadecimal). KV-5000/3000/1000 Series or KV Nano Series can olny be set.

> **Reference**
> • The CPU function version of the KV-8000/7500/7300 can be upgraded by using KV STUDIO.
>   📖 " Checking the Function Version" (page 12-23)
> • For details on the characters that cannot be used in project names, see 📖 "App 2 List of Characters That Cannot Be Used" (page A-40).

Opening Projects

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

📭 **"File(F)"** ▶ **"Open project(O)"** ⌨ Ctrl + O

Click the "File (F)" menu ▶ "Open project (O)," and then specify an existing project.
The "Open project" dialog box is displayed.

Reference	To open files that have an extension different from "*.kpr," use the "Save as type" list to specify the extension.

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Closing Projects

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Close project(C)"**

Click the "File (F)" menu ▶ "Close project (C)" to close the open project.

Saving Projects

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

💾 **"File(F)"** ▶ **"Save project(S)"** ⌨ Ctrl + S
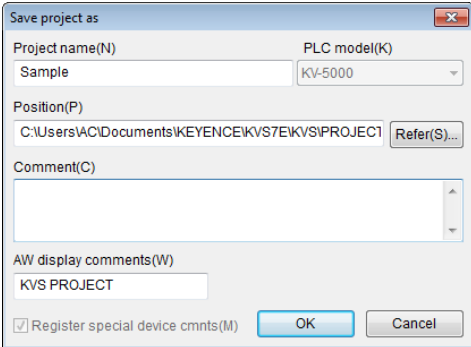
Click the "File (F)" menu ▶ "Save project (S)" to save the project being edited.

Saving Projects with a New Name

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Save project as(A)"**

Click the "File (F)" menu ▶ "Save project as (A)" to save the open project under a new name.

Compressing and Saving Projects

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

"File(F)" ▶ **"Save compact project(J)"**

Click the "File (F)" menu ▶ "Save compact project (J)," and then specify the save location and file name.

| Reference | • The compressed project file is saved in .kpz format.
• Use this function in situations such as when you are using e-mail to transfer the project. |

Verifying Projects

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

"File(F)" ▶ **"Verify project(B)"**

Verify the open project against other projects.

Click the "File (F)" menu ▶ "Verify project (B)," and then specify the project file to verify against.

The result of the verification is displayed in the "Verify result" dialog box.
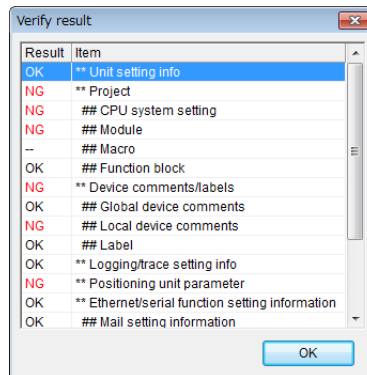
Project Properties

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Project property(F)"**

Click the "File (F)" menu ▶ "Project property (F)."
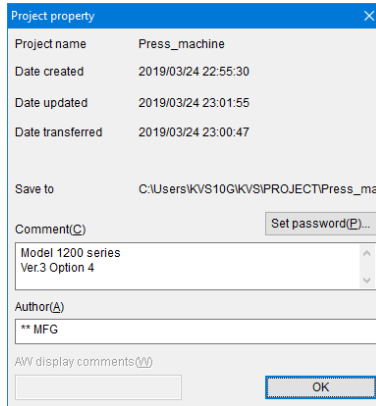
Item	Explanation
Project name	This displays the project name.
Date created	This displays the creation date and time.
Date updated	This displays the date and time of the last update.
Date transferred	This displays the date and time that the project was last transferred to a PLC.
Project ID	This is the ID for the project. The project ID is automatically assigned by KV STUDIO when the project is created.
Set password[*1]	You can set a password to prevent unauthorized reading of the program from a PLC.
Save to	This displays the project's save destination.
Comment	Enter a comment.[*3]
Author	Enter the name of the author here.[*3]
AW display comments[*2]	Enter the project name to display in the access window. (You can enter up to 12 half-width alphanumeric characters.)

*1 This cannot be set for the KV-10(16), KV-24(40), and KV-P16.
*2 This cannot be set for the KV-8000/7500/7300, KV-700/700+M, KV-10(16), KV-24(40), and KV-P16.
   Due to the restrictions on the characters that can be displayed by the access window, enter values between the following ASCII code ranges: 20 to 7E (hexadecimal) and A1 to DF (hexadecimal).
*3 For the KV-8000/7500/7300, 64 half-width or full-width characters can be entered, and for other devices 64 half-width characters or 32 full-width characters can be entered.

■ Set password

By setting a password, you can prevent the reading of the unit setting information, programs, comments and labels, logging settings, mail settings (KV-8000/7500/7300/5500/5000/3000 and KV Nano Series only), and device default settings (KV-8000/7500/7300/5500/5000/3000 and KV Nano Series only) stored in the KV-8000/7500/7300/5500/5000/3000/1000/700 or KV Nano Series.
Once a password is set, data cannot be read unless the correct password is entered. Setting a password can prevent programs from being read from the KV-8000/7500/7300/5500/5000/3000/1000/700 or KV Nano Series by unauthorized personnel.

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1 **Click the "File (F)" menu ▶ "Project property (F)," and then click "Set password (P)" in the "Project attribute" dialog box.**

The "Set password" dialog box appears.

2 **Enter the password, and then click "OK." To delete an already registered password, delete the currently displayed password, and then click "OK."**

You can set passwords that are up to 6 half-width alphanumeric characters long (32 characters long with the KV-8000/7500/7300 and KV Nano Series).

NOTICE	**If you forget the registered password, you can clear the password by executing a clear all operation in the KV-8000/7500/7300/5500/5000/3000/1000/700 or KV Nano Series access window or by overwriting the project. Note that doing so will clear all settings and user programs.** **Be sure to back up the data of projects that you set passwords on to prevent data loss in case you forget the password.**

The protection ranges of projects on which a password has been set and that have been transferred to the KV-8000/7500/7300/5500/5000/3000/1000/700 or KV Nano Series are shown below.

KV-8000/7500/7300/5500/5000/3000/1000/700 or KV-NC32T

Operation	Protection Range
PC to PLC	Overwriting is possible.
PLC to PC	Password protection.
Memory card to PLC	Overwriting is possible.
PLC to memory card	Reading is possible. (KV-8000/7500/7300/5500/5000/3000/1000/700) Password protection. (KV-NC32T)
PC to memory card	Overwriting is possible.
Memory card to PC	Password protection.
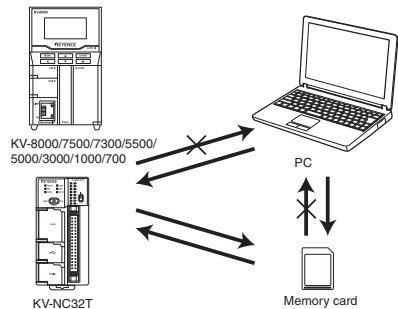
KV-N14**/N24**/N40**/N60**

Operation	Protection Range
PC to PLC	Overwriting is possible.
PLC to PC	Password protection.
Extension access window cassette to PLC	Overwriting is possible.
PLC to extension access window cassette	Reading is not possible. (Reading is possible within one minute after a project is transferred when the "Clear programs in PLC" check box is selected.) Only device values can be read.
PC to extension access window cassette	-
Extension access window cassette to PC	-
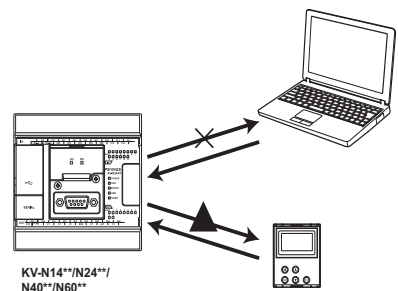
Registering Sensor Setting Files

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Register sensor setting file(E)"**

Click the "File (F)" menu ▶ "Register sensor setting file (E)," and then specify the sensor setting file - EDS file (*.eds or *.ez1) - that you want to register.
The "Open File" dialog box is displayed.

> **Reference**
> - Normally, EDS files are saved with the extension "*.eds," but KEYENCE EtherNet/IP unit sensor setting files are saved with the extension "*.ez1."
> - You can download KEYENCE EtherNet/IP unit sensor setting files from the KEYENCE website.

Importing Programs

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Import(I)"** ▶ **"Import program(M)"**

Click the "File (F)" menu ▶ "Import (I)" ▶ "Import program(M)", and then specify a program to import.
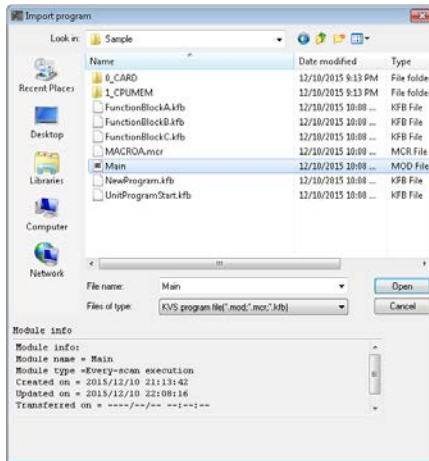
Item	Description
Import CPU positioning info	When this checkbox is selected, CPU positioning information is imported from other projects.

* You can only select this when the PLC model is the KV-8000/7500/7300/5500/5000/3000.

> **Reference**
> Module file extension: .mod
> Macro file extension: .mcr
> Function block's file extension .kfb

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✎ **Point**	**You can import *.ldc files from projects for the KV-700 created in KV BUILDER.** **(Use the "Save as type" list to select KVB ladder diagram files, *.ldc.)** **For details on importing projects for the KV-700 created in KV BUILDER, see** 📖 **"5-6 Fully Utilizing KV-700 Data" in the KV-1000 Series Programming Manual.**

Importing Comments and Variable

KV-8000　KV-7000　KV-5000/3000　KV Nano
KV-1000　KV-700　KV-P16　KV-10/16/24/40

"File(F)" ▶ **"Import(I)"** ▶ **"Import cmnt/label(C)"**

Click the "File (F)" menu ▶ "Import (I)" ▶ "Import cmnt/variable (C)," and then specify the file to import.
The comments or variable of the file that you specified are imported.

　　　*.cm1 to *.cm8:　　Comment files 1 to 8
　　　*.lbl:　　　　　　　Variable file

✎ **Point**	• **"Import comment / variable" is a menu displayed only in KV-8000 with CPU** **function version 2.0 or later.** **The menu "Import comment / label" is displayed instead in other models. For** **the contents, replace "variable" in the above description with "label".** • **KV-8000/7500/3000 supports comment files 1~8, while other models support** **comment files 1~2.**

Importing Logging Information

KV-8000　KV-7000　KV-5000/3000　KV Nano
KV-1000　KV-700　KV-P16　KV-10/16/24/40

"File(F)" ▶ **"Import(I)"** ▶ **"Import log info(L)"**

Click the "File (F)" menu ▶ "Import (I)" ▶ "Import log info (L),"and then specify the file to import.
The logging information of the project file that you specified is imported.

　　　*.kpr: KVS project file

Reference	When a setting cannot be executed because the required device is unavailable for the PLC model, the setting is removed from the information to import.

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Importing Device Defaults

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Import(I)"** ▶ **"Import device default(D)"**

Click the "File (F)" menu ▶ "Import (I)" ▶ "Import device default (D)," and then specify the file whose device defaults you want to import.
The specified device default information is imported.

(**Alternative procedure**) Right-click "device default" in the "project" tab of the workspace, and then select "import" from the menu that appears.

DevInit.dvi: Device defaults file

| Reference | • Device defaults files are generated when you set defaults in the "device default setting" dialog box.
• When the device default values of the KV-8000/7000/5000/3000 Series are imported into the KV Nano Series, devices out of the available range will be deleted.

Importing File Register Settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Import(I)"** ▶ **"Import file register setting(F)"**

Click the "File (F)" menu ▶ "Import (I)" ▶ "Import File Register setting (F)," and then specify the file register settings file to import.
The specified file register setting information is imported.

(**Alternative procedure**) Right-click "file register setting" in the "project" tab of the workspace, and then select "import" from the menu that appears.

FR***.fru (KV-8000/7500/7300)   :File register settings file (*** indicates the file register settings number)
FR***.frb (KV-5500/5000/3000)

| Reference | File register settings files are generated when you configure settings in the "file register setting" dialog box.

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Importing CPU Positioning Parameters

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ "Import(I)" ▶ "Import CPU positioning parameters(P)"

Click the "File (F)" menu ▶ "Import (I)" ▶ "Import CPU positioning parameters (P)," and then specify the file to import.
The CPU positioning parameters of the specified project file are imported.

CpuMb.inf: CPU positioning file (KV-5500/5000/3000/1000/700)
CpuMb2.inf: CPU positioning file (KV Nano Series)
CpuMbPrm.inf: CPU positioning file (KVB)

> **Reference** When importing CPU positioning parameters between the KV-5500/5000/3000/1000/700 and the KV Nano Series, convert the file type to match the model that you are importing the positioning parameters to.

Saving Data to and Reading Data from Memory Cards

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ "Memory card(M)" ▶ "Write(W)"
"Memory card(M)" ▶ "Read(R)"

1 **Connect the memory card to the PC.**

📖 "5-2 Memory Card" in the KV-8000 Series User's Manual
📖 "5-2 Memory Card" in the KV-7000 Series User's Manual
📖 "2-2 Memory Card" in the KV-5500/5000/3000 Series User's Manual
📖 "5-1 Memory Card" in the KV Nano Series Base Unit (connector type) User's Manual

2 **Click the "File (F)" menu ▶ "Memory card (M)" ▶ "Write (W)" or "Read (R)."**

When you are using KV STUDIO to save a new file on the memory card, be sure to create a new folder by selecting "Make New Folder" in the "Browse For Folder" dialog box, and then save the file.
When reading data from the memory card, select the folder containing the data and then read the data.

■ **KV-5500/5000/3000/1000/700**

When saving data   **When reading data**

Click this button to create a new folder.   Select the folder to save data in, and then click this button to save the data.   Click this button to cancel the saving of data.   Click this button to read the data in the selected folder.   Click this button to cancel the reading of data.
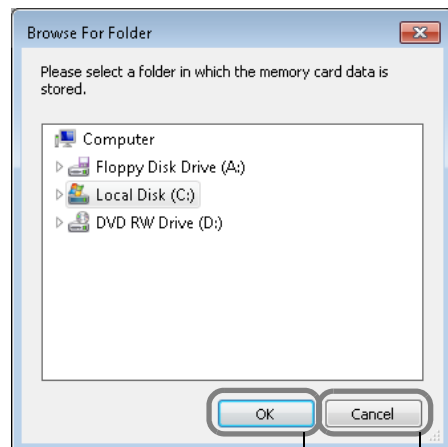
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NOTICE	**When you select an existing folder to save to, the data will be overwritten, and you will lose the previous data.**

Note that when you save KV-5000/3000 data to a memory card and a function that is only supported by CPU function version 2.0 or later is used in the data, you cannot load this data with a CPU unit with a CPU function version earlier than 2.0. To load such data, create memory card data so that it is supported by CPU function version 1. When you select data CPU function version 1 data, the memory card data is created after the functions supported only by CPU function version 2.0 or later are deleted.
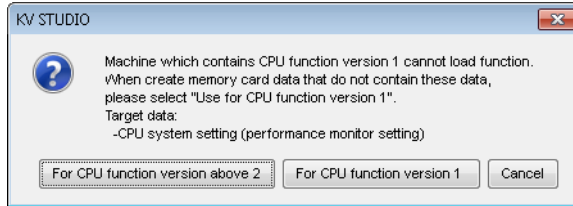
Point	**Memory card data for CPU function version 1 cannot be created in the following situations.**

- **When instructions or script functions supported only by CPU function version 2.0 or later are used.**
- **When the unit configuration includes the KV-5500 or KV-EP21V.**
- **When double precision floating point real numbers are used in instructions, macro arguments, or labels.**

Reference	• To create a new folder and save data to it, click "Make New Folder" and then enter the folder name. The project folder will be created.
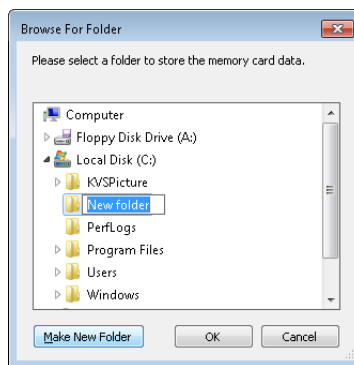
- Data management in memory cards is performed in units of project folders.
- If you are using the autoloading function on the KV-5500/5000/3000/1000/700, name the project folder "autoload" when you save data.
  With the KV-5500/5000/3000, you can use the auto loading function with the project folder named "AtLoad**" (**: 01 to 99). By saving data with the project folder named "RunLoad" or "RnLoad**" (**: 01 to 99), you can read the program automatically when the mode is changed from PROG to RUN.
  For details on the autoloading function, see the user's manual of each CPU unit.

■ **KV-8000/7500/7300/NC32T**

When saving data
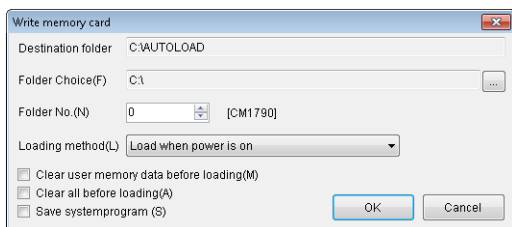
When reading data
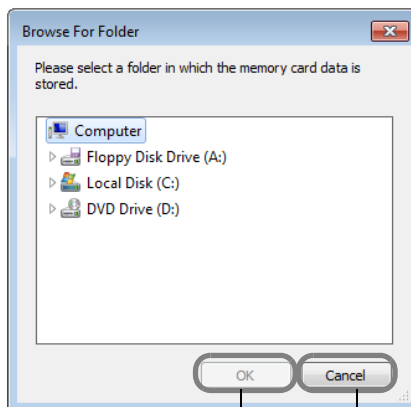
Read the data from the selected folder.

Stop reading data.

Saving to a memory card

Item	Explanation
Output target folder	Displays the folder name where output will be saved. The folder name changes according to the load method and folder number.
Select folder	Select the folder to save in.
Folder No.	Specify a folder number.
Load method	

	Load from the access window[*1]	Save the project folder name as KVSAVE. Loads when the folder is specified in the access window load menu.
	Load when power is turned on	Save the project folder name as AUTOLOAD or AtLoad** (**: 01 to 99). Loads the project in the folder number stored in CM1790 (or CM1700 for KV-NC32T) when mode is changed from PROG to RUN. (When 0 is stored, the project of the RUNLOAD folder is loaded.)
Load method	Load when mode is changed from PROG to RUN	Save the project folder name as Runload or RnLoad** (**: 01 to 99). Loads the project in the folder number stored in CM1794 (or CM1701 for KV-NC32T) (the RUNLOAD folder when 0 is stored) when mode is changed from PROG to RUN.
	Load when CR5500 (or CR3000 for KV-NC32T) changes from OFF to ON	Save the project folder name as KVSAVE** (**: 01 to 99). Loads the project in the folder number stored in CM1881 (or CM1702 for KV-NC32T) when CR5500 (or CR3000 for KV-NC32T) changes from OFF to ON.
	Load when CR5508 turns from OFF to ON (when loading a recipe)[*2]	Create the folder KVRCP*** (***: 000~999), and save the recipe data in the folder. Load the item with the folder number stored in CM1871 when CR5508 turns from OFF to ON.

Load after the user memory is cleared[*1]	Select whether to load the project after the user memory is cleared when loading.
Load after all data is cleaned[*1]	Select whether to load the project after CPU is all cleared.
Save system program	Save unit's system program together with the project. When loaded, the system program is updated. 📖 "Updating the system program" (page 12-23)

*1 Can only be selected if the model is the KV-8000/7500/7300.

*2 This can be selected only when the compatible model is KV-8000 with CPU function version 2.0 or later and started from the menu in the "Change / read device values" dialog.

NOTICE	When you select an existing folder to save to, the data will be overwritten, and you will lose the previous data.

Outputting VT Ladder Monitor Files

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Output VT ladder monitor file"**

Output files for the ladder monitor of the VT3 Series (VTLDR00.vlr).

1 **Click the "File (F)" menu** ▶ **"Output VT ladder monitor file (D)," and then select the output folder for ladder monitor data.**
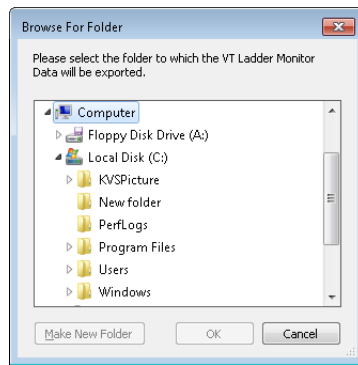
2 **Click "OK" to display the "Output Setting" dialog box. Select the data to save, and then click "Execute."**

When the VT ladder monitor file output is complete, the output size is displayed and the "Execute" button is disabled.

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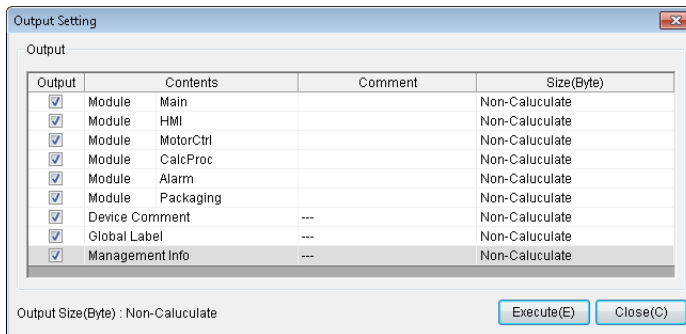
Saving Device Comments in CSV/TXT Format [KV-8000] [KV-7000] [KV-5000/3000] [KV Nano] [KV-1000] [KV-700] [KV-P16] [KV-10/16/24/40]

"File(F)" ▶ **"Save device comments in CSV/TXT format(K)"**

Save the comments of the open ladder program as a file in CSV format (MBCS) (*.csv) or TXT format (Unicode) (*.txt).

Click the "File (F)" menu ▶ "Save device comments in CSV/TXT format (K)," and then specify the location to save the comments.
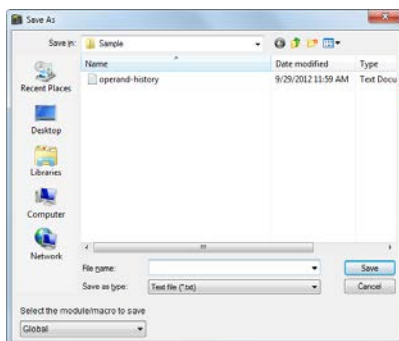
Item	Explanation
Save in	Specify the position where the TXT file or CSV file will be saved.
File name	Enter the name of the file to save.
Save as type	Specify CSV file (MBCS) (*.csv) or TXT file (Unicode) (*.txt).
Select a program to save.	Specify a program to save.

Reading Device Comments in CSV/TXT Format

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Read device comments in CSV/TXT format(Q)"**

Read comments saved in a CSV format file (MBCS) (*.csv) or TXT format file (Unicode) (*.txt) into the open ladder program.

Click the "File (F)" menu ▶ "Read device comments in CSV/TXT format (Q)," and then specify the comments to read.
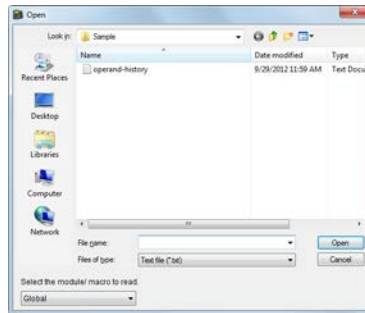
Item	Explanation
Look in	Specify the location where the comments are saved.
File name	Enter the name of the file to open.
Files of type	Specify CSV file (MBCS) (*.csv) or TXT file (Unicode) (*.txt).
Select a program to load.	Specify a program to load.

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Saving Mnemonics Lists

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Mnemonics list(R)"** ▶ **"Save(S)"**

Save the ladder program that you are creating to a mnemonics list. A mnemonics list is a regular text format file with the ".mnm" extension.

> **Point**
> • **This menu is only available when a project is open.**
> • **You can save script, module including pack instruction, function block, and macro's ladder program to a mnemonics list. However, you cannot read the mnemonics list.**

1 **Click the "File (F)" menu** ▶ **"Mnemonics list (R)"** ▶ **"Save (S)."**

The "Select comment type" dialog box is displayed. Select the comment to add to the list.
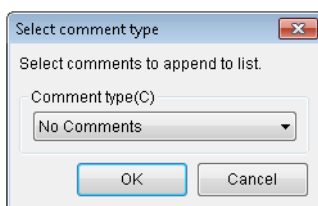
2 **Click "OK" to display the "Browse For Folder" dialog box. Specify the location to save the mnemonics list.**
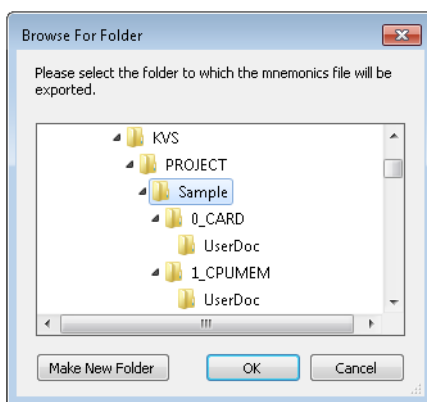
> **Reference** Each program is saved in its own file in the form of FileName(program name).mmm.

Reading Mnemonics Lists

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Mnemonics list(R)"** ▶ **"Read(R)"**

Read a ladder program into a mnemonics list. A mnemonics list is a regular text format file with the
".mnm" extension.

> ✏ **Point**
> - **This menu is only available when a project is open.**
> - **You can save script, module including pack instruction, function block, and macro's ladder program to a mnemonics list. However, you cannot read the mnemonics list.**
> - **Comments 1~8 are not reflected in the read item even if they are selected when saving the mnemonic list.**

Click the "File (F)" menu ▶ "Mnemonics list (R)" ▶ "Read (R)," and then specify the file of the
mnemonics list to read.
A program with the same name as the file name is added to the project.

If the project already contains a file with the same name, the "Input program name" dialog box
appears.
Enter a name for the program, and then click "OK".

```
Input program name                              [x]
The specified program already exists or name is illegal. Please
input program name.

   Program name(M)   [              ]

                        [   OK   ]   [ Cancel ]
```

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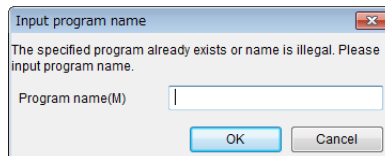
HTML file output

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

File(F) ▶ **HTML file output(T)** ▶ **Ladder(L)**

Output the ladder as an HTML file.

Select "File(F)" ▶ "HTML File Output(T)" ▶ "Ladder(L)", and specify the save location of the HTML file. "HTML Output" dialog will be displayed. Select the module to be output as HTML file.
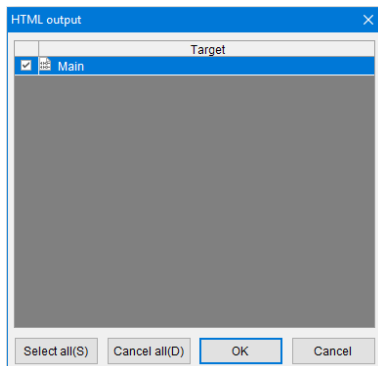
The following folders and html files are output to the specified folder. When a file with the extension (.html) is opened with a browser that supports HTML files, the ladder is displayed as shown below.
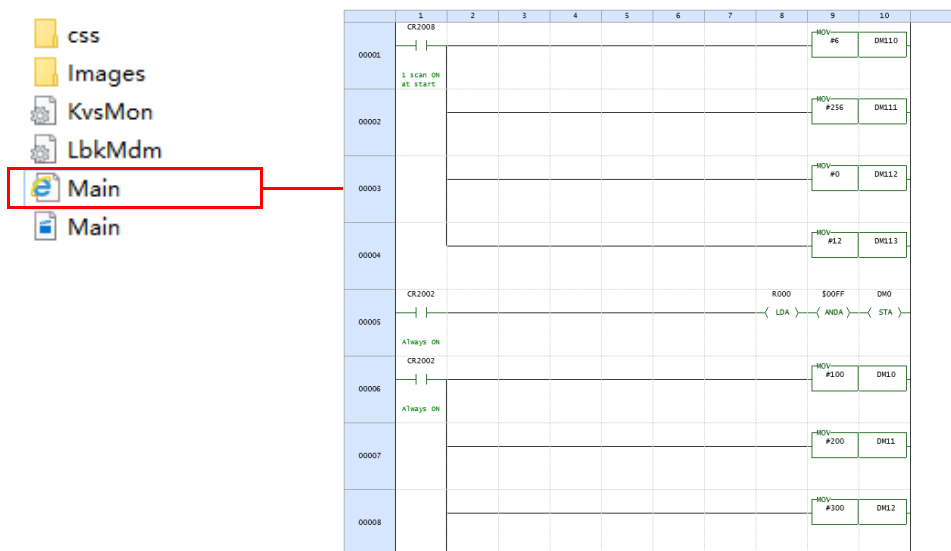
✎ **Point**

- **HTML file output function is a function that can be used by KV STUDIO Ver.9.44 or later.**
- **The flow program does not support HTML file output.**
- **When copying the output files, copy all the files in the output folder. The ladder cannot be displayed correctly if all the output files are not complete.**

Outputting CSV/TXT Files (Unit Specifications)

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Output CSV/TXT file(U)"** ▶ **"Unit specifications(U)"**

Save the pin assignments and the list of comments of a connected unit as a CSV format file or TXT format file.

Click the "File (F)" menu ▶ "Output CSV/TXT file (U)" ▶ "Unit specifications (U)," and then specify the location to save the CSV file or TXT file.

Output file example

Outputting CSV/TXT Files (Cross Reference Information)

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Output CSV/TXT file(U)"** ▶ **"Cross ref info(C)"**

Save reference information (cross references) in a CSV format file or a TXT format file.

Click the "File (F)" menu ▶ "Output CSV/TXT file (U)" ▶ " Cross ref info (C)," and then specify the location to save the CSV file or TXT file.

Output file example

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FILE AND PRINT
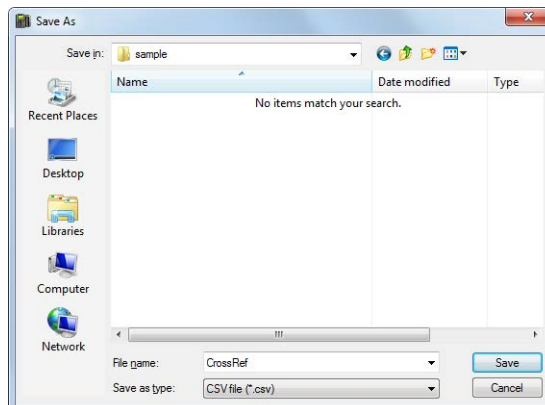
Changing the Model

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ► **"Change model(L)"**

Click the "File (F)" menu ► "Change model (L)" to display the "Change model" dialog box, which you can use to change the model.

The convertible PLC models are shown below.

Model Being Edited	Convertible Model										
	KV-P16	**KV-10/ 16/24/40**	**KV Nano**	**KV-700 (M)**	**KV-1000**	**KV-3000**	**KV-5000**	**KV-5500**	**KV-7300**	**KV-7500**	**KV-8000**
KV-P16		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
KV-10/16/24/40	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
KV Nano	No	No	Yes	No	No	Yes	Yes	Yes	No	No	No
KV-700 (M)	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
KV-1000	No	No	Yes	No		Yes	Yes	Yes	Yes	Yes	Yes
KV-3000	No	No	Yes	No	No		Yes	Yes	Yes	Yes	Yes
KV-5000	No	No	Yes	No	No	Yes		Yes	Yes	Yes	Yes
KV-5500	No	No	Yes	No	No	Yes	Yes		Yes	Yes	Yes
KV-7300	No	No	No	No	No	No	No	No		Yes	Yes
KV-7500	No	No	No	No	No	No	No	No	Yes		Yes
KV-8000	No	No	No	No	No	No	No	No	No	No	

> **Reference**
>
> Click "Open file" to select the file format to read the ladder programs for the KZ-300/350 and the KZ-A500. The ladder program for the KZ-300/350 is read as for the KV-700, and the ladder program for the KZ-A500 is read as for the KV-1000.
>
> 📖 "1-3 About Data Compatibility" (page 1-7)
>
> When you change the model, not only is the model of the CPU or base unit changed, but also the control relays and control memory entries being used are automatically replaced within the available range. Devices and instructions that cannot be replaced are replaced with unregistered labels. The result of the replacement is displayed in the output window.
>
> For the differences between model devices and instructions, see the user's manuals and instruction reference manuals of the corresponding units.

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FILE AND PRINT

Checking and Changing Function Version

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

From the menu, select [File (F)] --> [Check/change function version (G)] to open the [Check/change function version] dialog box. Use this function to check and change the function version used by project units.

Change to the version that supports the functions you are using.
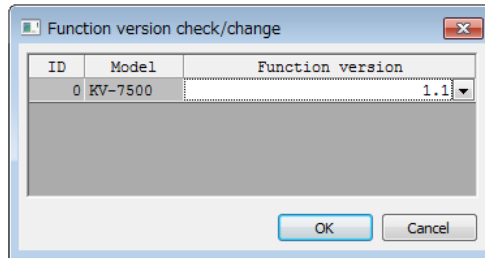
Point	• **If the function version of the units is in a version earlier than the function version set in the project, update the system project for each unit before use.** • **In the KV-8000/7500/7300, if the function version of the saved project is different from the major version of the newly saved CPU function, then all must be cleared.** 📖 **"Checking the Function Version" (page 12-23)**

4

FILE AND PRINT

Saving Data Automatically

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ "Auto-save(Z)"

If you set the auto-save function, file backups will be automatically created at preset time intervals.

✎ Point	• **In the case of KV-8000/7500/7300, the user documents will not be automatically saved.**
	• **When KV STUDIO is started after the program exits due to an error, the file that was backed up by the auto-save function will be automatically loaded. If you exit KV STUDIO without saving this automatically loaded backup file by selecting "Save project as," the backup file will be lost.**

Reference The mechanism of the auto-save function is shown below.

At preset time intervals

Ladder file ➤ Back up
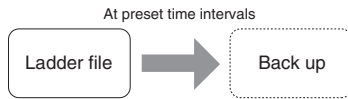
A backup file is automatically made in the AutoSave folder in the BackUp folder at preset time intervals.

• When KV STUDIO is exited normally

Ladder file   Back up

Automatically deleted
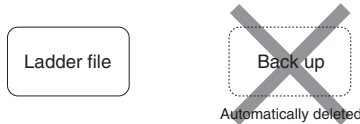
The backup file is automatically deleted.

• When KV STUDIO exits due to an error

Ladder file   Back up

automatically loaded
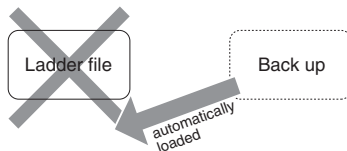
The backup file is automatically loaded the next time that KV STUDIO starts.

1 **Click the "File (F)" menu ▶ "Auto-save (Z)."**

The "Setup auto-save" dialog box appears.

2 **Select the "Auto-save" checkbox, and then enter the auto-save interval.**

3 **Click "OK."**

Setup auto-save
☑ Auto-save(C) 5 Execute period (min)
OK   Cancel
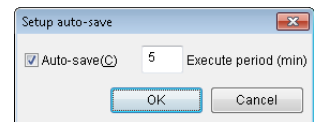
The auto-save setting is enabled.

■ To cancel the auto-save function

1 **Click the "File (F)" menu ▶ "Auto-save (Z)."**

The "Setup auto-save" dialog box appears.

2 **Clear the "Auto-save" checkbox, and then click "OK."**

The auto-save setting is disabled.

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Exiting

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Exit(X)"**

Save the project that you are editing, and then exit KV STUDIO.

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FILE AND PRINT

4-2 Printing

This section describes the print functions contained in the "File (F)" menu.

Printing

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

🖨 **"File(F)"** ▶ **"Print(P)"**   Ctrl + P

To print data, an environment in which data can be printed from the PC is required. See information such as the PC's user's manual to enable printing from the PC.
The following details can be printed.

Yes: Can be printed
-: Cannot be printed

Item to print	KV-8000	KV-7500	KV-7300	KV-5500	KV-5000 /3000	KV-1000	KV-700 /700+M	KV-NC32T /N60□□ /N40□□ /N24□□	KV-N14 □□	KV-24(40) /10(16)	KV-P16
Front cover	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Logging and tracing settings	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	-
CPU positioning parameters	-	-	-	Yes	Yes	Yes	Yes	Yes	Yes	-	-
Unit pin configurations	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	-
Unit settings	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	-
Lists of relays and DM entries for each unit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	-
Email settings	Yes	Yes	Yes	Yes	Yes	-	-	Yes	-	-	-
Simple PLC link settings	-	Yes	Yes	Yes	Yes	-	-	Yes	-	-	-
FTP client settings	Yes	Yes	Yes	Yes	Yes	-	-	Yes	-	-	-
Serial PLC link settings	Yes	Yes	Yes	Yes	Yes	-	-	Yes	Yes	-	-
Ethernet serial information setting	Yes	Yes	Yes	-	-	-	-	-	-	-	-
Positioning unit parameters	Yes	Yes	Yes	Yes	Yes	-	-	-	-	-	-
EtherNet/IP settings	Yes	Yes	Yes	Yes	Yes	-	-	Yes	-	-	-
Operation recorder setting	Yes	-	-	-	-	-	-	-	-	-	-
CPU system settings	Yes	Yes	Yes	Yes	Yes	-	-	Yes	Yes	-	-
Module configurations	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Default settings	Yes	Yes	Yes	Yes	Yes	-	-	Yes	Yes	-	-
Ladder diagrams	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mnemonics lists	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Comments	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Variable	Yes[*1]	-	-	-	-	-	-	-	-	-	-
Structure	Yes[*1]	-	-	-	-	-	-	-	-	-	-
Labels	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Device use status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Line comments	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel settings	-	-	-	-	-	-	-	-	-	-	Yes

*1 Only KV-8000 with CPU function version 2.0 or later can print.

Reference If you write the <print-break> (half-width) character in a rung comment, when the ladder diagram is printed, the following rung starts on a new page.

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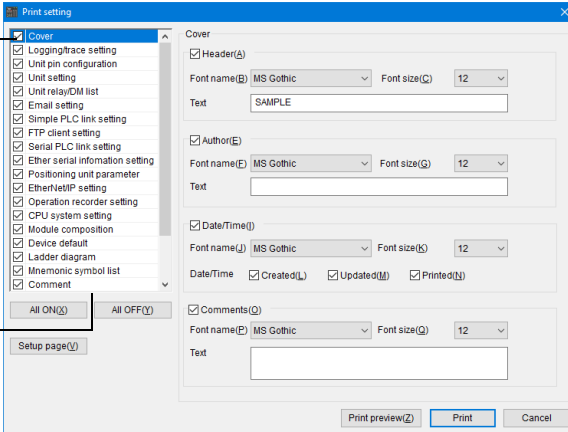
Set the content to print before you start printing.

1 **Click the "File (F)" menu ▶ "Print (P)."**

The "Print setting" dialog box is displayed.

2 **Set the content to print. Select the checkboxes of the items that you want to print.**

Select the checkboxes of the items that you want to print.

For items whose settings can be changed, click the item to specify the settings.

> **Reference** ── The font and font size to be used for printing can be specified. Click the item, and then use the dropdown list that is displayed to specify the setting.

3 **Click "Setup page" to display the "Setup page" dialog box.**
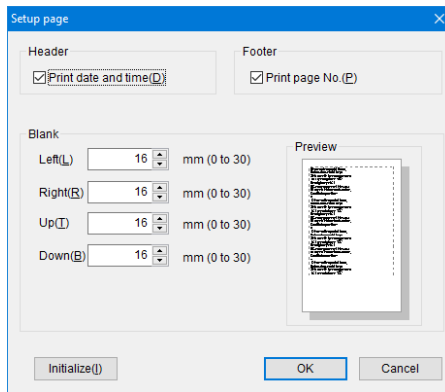
Item	Explanation
Header	When this checkbox is selected, the date and time that the project was printed is printed in the upper left of each page.
Footer	When this checkbox is selected, "printed page number/total number of pages" is printed at the bottom of each page.
Blank	Set the margins of the printed pages.
Preview	This displays the print position after the margins are changed.
Initialize	Click this to return all settings in the "Setup page" dialog box to their default values.

4 **Click "Print" to display the "Print" dialog box.**

Click "OK" in the "Print" dialog box to start printing.

> **Reference** ── Click "Print preview" to display the "Print preview" window.

> **✔ Point** **If you change a setting and then click "Cancel," the changes will be discarded.**

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FILE AND PRINT

Print Preview

"File(F)" ▶ **"Print Preview(V)"**

Display an image of what will be printed.

1 **Click the "File (F)" menu** ▶ **"Print Preview (V)."**

The "Print setting" dialog box is displayed.

2 **Set the content to print. Select the checkboxes of the items that you want to print, and then click "Print preview" to display the preview.**

Select the checkboxes of the items that you want to print.

For items whose settings can be changed, click the item to specify the settings.
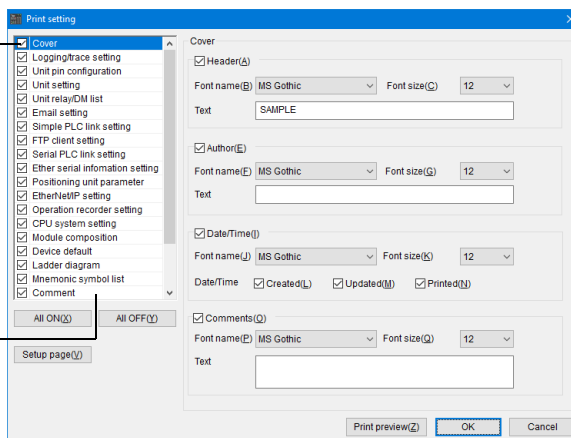
| Reference | The font and font size to be used for printing can be specified. Click the item, and then use the dropdown list that is displayed to specify the setting. |

Printer Settings

"File(F)" ▶ **"Printer setup(W)"**

Configure settings such as the size of the paper to print on and the printing direction (portrait or landscape).

| Point | **The content that is displayed varies depending on the printer that you are using.** |

| Reference | For details on how to configure these settings, see the user's manual of the printer. |

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5

EDIT

This chapter describes the various editing functions and how to input and delete instructions.

5-1 About Editing Functions

This section describes the functions contained in the "Edit(E)" menu.

Undo

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

↩ **"Edit(E)"** ▶ **"Undo(U)"** [Ctrl] + [Z]

Cancel the previous operation and restore the previous state.

Point | **The following operations can be undone.**

• **Entry of instructions**	• **Deletion of instructions**	• **Editing of operands**
• **Cut**	• **Paste**	• **Multiple paste**
• **Replacement of operands**	• **Replacement of text**	• **NO/NC contact conversion**
• **Insertion of empty rungs**	• **Deletion of rungs**	• **Insertion of rung comments**
• **Editing of rung comments**	• **Disabling of rungs**	• **Setting of rungs**
• **Editing of connection lines**	• **Insertion of loopback ladders**	• **Conversion of unit devices**
• **Insertion of area scripts**	• **Insertion of box scripts**	• **Conversion of scripts**
• **Insertion of PACK instructions**	• **Ladder arrangement**	• **Setting of bookmarks**
• **Setting of hyperlinks**		

Reference • When an operation cannot be undone, the button is displayed in gray and cannot be selected.
• You can only undo device comment changes when you made the changes in the device comment edit window.

Redo

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

↪ **"Edit(E)"** ▶ **"Redo(R)"** [Ctrl] + [Y]

Redoes an operation that was undone by "Undo (U)."

Reference When an operation cannot be redone, the button is displayed in gray and cannot be selected.

Cut, Copy, and Paste

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

✂ **"Edit(E)"** ▶ **"Cut(T)"** [Ctrl] + [X]
📄 **"Edit(E)"** ▶ **"Copy(C)"** [Ctrl] + [C]
📋 **"Edit(E)"** ▶ **"Paste(P)"** [Ctrl] + [V]

Select the range, and then cut, copy or paste the selected range.

You can cut, copy, and paste ladder symbols in:
• Cell units.
• Rung units.

Selecting the range

Select a range for cutting, copying, and pasting.
There are two ways to select a range.

■ Using the mouse to select the range

Use the mouse to select the range.

1 **Click the first cell that you want to select.**

The cursor is displayed.

2 **Drag the cursor to the last position that you want to select.**

The selected range is displayed in a different color.

• Selecting the range in cell units

Drag the mouse pointer to select the cells. You can select any number of cells.

To select all the cells, click the upper-left corner of the ladder edit window screen.

Drag the mouse pointer to select the cells.
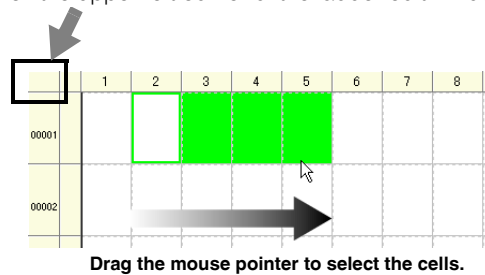
• Selecting the range in rung units

Click the number of the rung that you want to select. Hold down ⎡Shift⎤ while you perform this
operation to select multiple rungs.
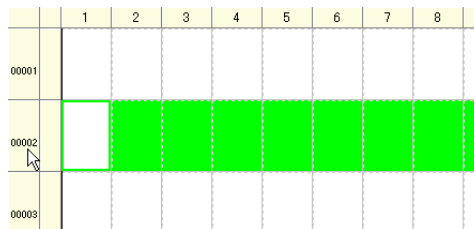
Alternative procedure
- In the first cell, press ⎡Shift⎤ + ⎡←⎤ .
- In the tenth cell, press ⎡Shift⎤ + ⎡→⎤ .
- Press ⎡Ctrl⎤ + ⎡→⎤ .

Reference
- You can drag the mouse pointer over multiple rung numbers to select multiple rungs.
- To cancel the selection, click anywhere in the ladder diagram.

5

EDIT

■ **Using keys to select the range**

1 **Use the arrow keys to move the cursor to the first cell to select.**

2 **Hold down** [Shift] **and press the arrow keys,** [←] [→] [↑] [↓] **, to move the cursor to the last cell to select.**

The selected part is displayed in a different color.

> Reference
> • To cancel the selection, press an arrow key again.
> • To select cells in rung units, move the cursor to the leading cell of the desired rung, and then press [Shift] + [End] , [Ctrl] + [Shift] + [→] , or [Ctrl] + [→] .
> • To select all the cells, move the cursor to the leading cell (rung number 00001 and column number 1), and then press [Ctrl] + [Shift] + [End] .

Cut

Cut the selected range of cells.

Copy

Copy the selected range of cells.

Paste

Paste the cut or copied cells to the specified position.

Multiple paste

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Edit(E)" ▶ **"Multiple paste(D)"** [Ctrl] **+** [Shift] **+** [V]

You can use multiple paste to paste multiple copies of the ladder program that you have copied in rung units with the device numbers shifted by an offset amount.
This function is useful when creating multiple ladder programs which only differ only their device number.

1 **Select the rungs to copy, and then click the "Edit (E)" menu** ▶ **"Copy (C)."**

📖 "Selecting the range" (page 5-3)

Alternative procedure
- Click 📋 .
- Press ⌈Ctrl⌉ + ⌈→⌉ .
- Right-click, and then select "Copy (C)" from the menu that appears.

2 **Move the cursor to the position that you want to paste the data, and then click the "Edit (E)" menu** ▶ **"Multi paste (D)."**
The "Paste selected" dialog box appears.

Alternative procedure   Right-click, and then select "Multiple paste(D)" from the menu that appears.

Item	Explanation
The offset specified target	Select the range to specify offset in batch. Type: Specify the same offset to the same type device. Devices: Specify the same offset to the same device. Individual: Specify the offset to each device.
Paste number	Specify the number of times to paste the data.
Clear offset	Click this to clear all offsets to 0.
Type[*1]	This displays the device type that you want to paste.
Device[*2]	This displays the device number that you want to paste.
Row offset[*3]	This displays the rung position of the corresponding device within the copy range.
Column[*3]	This displays the column position of the corresponding device within the copy range.
Offset	Specify the offset to shift the device number on each offset paste.
Device comment	This displays comments of the device. [*4]

*1 It is displayed only when "type" is selected to the offset specified target.
*2 It is displayed only when "device" and "individual" is selected to the offset specified target.
*3 It is displayed only when "individual" is selected to the offset specified target.
*4 The comment is not displayed when "type" is selected to the offset specified target.

✎ **Point**
- **You can only use the multiple paste function when you copied data in units of rungs.**
- **You cannot use the multiple paste function when the data contains script rungs or PACK instructions (KV-700).**

Example

The R1000 offset is 5, the DM1000 and DM0001 offsets are 10, and the number of pastes is 2
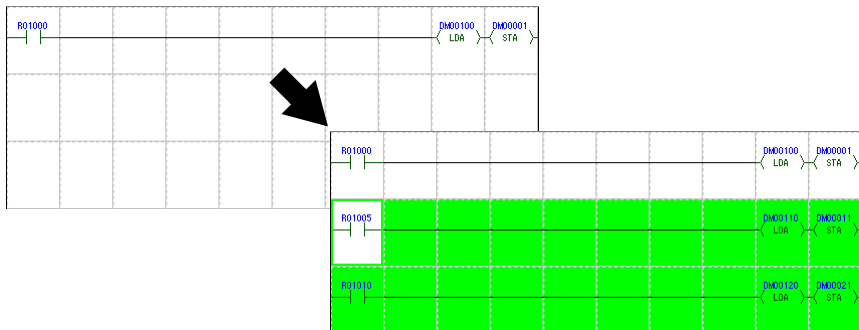
Device Search

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Edit(E)" ▶ **"Search device(S)"** Ctrl + F

Click the "Edit (E)" menu ▶ "Search device(S)" to display the "Search/replace" dialog box.
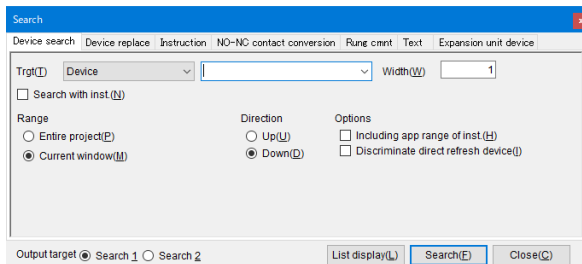
Item		Explanation
Target	Device	Enter an operand or program to search. Clicking displays a pull-down menu with a list of the last 10 selected items.
	Variable / label[6]	
	Constant	
	Program	
	Device Comment	
	Reserve/Disable	
	Invalid line	
(Search) Width[2]		Specify a number of devices. Starting from the entered device number, this number of devices will be searched.
Search with instruction[1]		Specify the instruction to be searched for at the same time as items specified.
Range	Entire project	Search will be performed in all programs.
	Current window [4]	Search will be performed on the current program.
Direction	Up	Searching will be executed up from the current cursor position.
	Down	Searching will be executed down from the current cursor position.
Options	Case sensitive[3]	When this checkbox is selected, a case-sensitive search will be executed.
	Search 100% match[3]	When this checkbox is selected, only items that exactly match the entered characters will be found as a result of the search.
	Including applicable range of instruction[2]	In addition to the devices used as operands, all devices with instructions assigned will also be searched. However, index-specified devices and indirectly referenced devices will be excluded from the search.
	Differentiate between direct devices[2, 5]	When this checkbox is selected direct I/O devices (DR) and I/O devices (R) will be differentiated between.
Output target		Select which output window to output the search/replace result to, Search1 or Search2.
List display		Click this to conduct the search according to the specified conditions and list the result in the output window.
Search		Click this to start the search according to the specified conditions.
Close		Click this to close the "Search/replace" dialog box.

*1 This item is not displayed when "Program" is selected as the target.
*2 This item is displayed only when "Device" is selected as the target.
*3 This item is displayed only when "Variable", "Label", "Program", "Device comment", or "Label comment"
   isselected as the target.
*4 This item is enabled only when "KV-8000/7500/7300/5500/5000/3000/1000" or "KV Nano Series" is
   selected for the PLC model.
*5 This item is enabled only when "KV-8000/7500/7300/5500/5000/3000" or "KV Nano Series" is selected for
   the PLC model.
*6 Variables can be selected for KV-8000 with CPU function version 2.0 or later, and labels can be selected
   for other models.

Device Replacement

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Edit(E)" ▶ **"Replace device(I)"** [Ctrl] + [H]

Click the "Edit (E)" menu ▶ "Replace device(I)" to display the "Search/replace" dialog box.

Item		Explanation
Operand	Before	Enter the operand before the replacement is executed. Click ▼ to display a pulldown menu with a list of the last 10 selected items.
	After	Enter the operand after the replacement is executed. Click ▼ to display a pulldown menu with a list of the last 10 selected items.
	Width	Enter the replacement width (the range of the replacement as specified by the number of operands starting with the operand before the replacement is executed).
Range	Entire project	Replace will be performed in all programs.
	Current window [2]	Replacement will be performed on the current program.
	Selected range	The replacement will be performed within the range selected in the editor.
Direction	Up	The replacement will be executed up from the current cursor position.
	Down	The replacement will be executed down from the current cursor position.
Options	Move device comments[4]	When this checkbox is selected, comments will also be moved together with the replaced operands.
	Left source comments	When this checkbox is selected, the source comments will be retained.
	Differentiate between direct devices[3]	When this checkbox is selected direct I/O devices (DR) and I/O devices (R) will be differentiated between.
Output target		Select which output window to output the search/replace result to, Search1 or Search2.
Replace all		Click this to replace all the applicable devices in the specified range.
Search		Click this to search according to the specified condition. Replacements will not be made.
Replace		Click this to replace the applicable devices in the specified range individually.[1]
Close		Click this to close the "Search/replace" dialog box.

*1 If you do not want to replace an item, click "Search" to move the cursor to the next instruction.

*2 This item is enabled only when "KV-8000/7500/7300/5500/5000/3000/1000" or "KV Nano Series" is selected for the PLC model.

*3 This item is enabled only when "KV-8000/7500/7300/5500/5000/3000" or "KV Nano Series" is selected for the PLC model.

*4 You can click the "Edit (E)" menu > "Undo (U)" to return the operands to their original state, but the moved device comments will not return to their original location.

5

EDIT

Instruction Search and Replace

"Edit(E)" ▶ **"Search / Replace Instruction(E)"**

Search for the specified instruction and display all the found results or replace the instruction with a different instruction.

Click the "Edit (E)" menu ▶ "Search /Replace Instruction (E)," and then enter the necessary items.

5

EDIT

■ Search

Search for an instruction that is being used in a ladder program.

Item	Explanation
Search instruction	Enter the instruction to search for.[1] Click 🔽 to display a pulldown menu with a list of the last 10 selected items. • " │ " can be used to specify multiple items for the search using the OR condition. Example) "LD │ LDB" • You can attach a suffix when you specify the instruction. Example) "ADD.F"
Replace with	When you want to perform a search, clear this checkbox.
Range — Entire project	Search will be performed on all programs.
Range — Current window [2]	Search will be performed on the current program.
Direction — Up	Searching will be executed up from the current cursor position.
Direction — Down	Searching will be executed down from the current cursor position.
Output target	Select which output window to output the search/replace result to, Search1 or Search2.
List display	Click this to conduct the search according to the specified conditions and list the result in the output window.
Search	Click this to start the search according to the specified conditions.
Close	Click this to close the "Search/replace" dialog box.

[1] You cannot use wildcard characters in the instruction input. In addition, you cannot perform partial searches (a search in which you only enter a part of the instruction). Use the input assistance to enter a correct instruction.

[2] This item is enabled only when "KV-8000/7500/7300/5500/5000/3000/1000" or "KV Nano Series" is selected for the PLC model.

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■ **Replace**

Replace an instruction that is being used in a ladder program.

When you select the "Replace with" checkbox, the items that are necessary to perform the replacement are displayed.

Item		Explanation
Search instruction		Enter the instruction to search for.[1] Click ▼ to display a pulldown menu with a list of the last 10 selected items. " │ " can be used to specify multiple instructions for the search using the OR condition. Example) "LD │ LDB"
Replace with		When this checkbox is selected, an entry box is displayed, so enter the instruction to replace.
Range	Entire project	Replacement will be performed on all programs.
	Current window[3]	Replacement will be performed on the current program.
	Selected range	The replacement will be performed within the range selected in the editor.
Direction	Up	The replacement will be executed up from the current cursor position.
	Down	The replacement will be executed down from the current cursor position.
Options	Replace suffix/ differential	When you clear this checkbox, suffixes and differentials will be ignored, and only instructions will be replaced.
Output target		Select which output window to output the search/replace result to, Search1 or Search2.
Replace all		Click this to replace all the applicable instructions in the specified range.
Search		Click this to search according to the specified condition. Replacements will not be made.
Replace		Click this to replace the applicable instructions in the specified range individually.[2]
Close		Click this to close the "Search/replace" dialog box.

*1 You cannot use wildcard characters in the instruction input. In addition, you cannot perform partial searches (a search in which you only enter a part of the instruction). Use the input assistance to enter a correct instruction.

*2 If you do not want to replace an item, click "Search" to move the cursor to the next instruction.

*3 This item is enabled only when "KV-8000/7500/7300/5500/5000/3000/1000" or "KV Nano Series" is selected for the PLC model.

Convert NO/NC Contacts

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Edit(E)" ▶ **"Convert NO/NC contacts(A)"**

Click the "Edit (E)" menu ▶ "Convert NO/NC contacts (A)" to display the "Search/replace" dialog box.
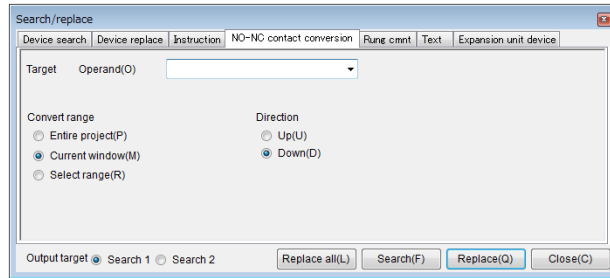
Item		Explanation
Target operand		Enter the operand to convert. Click ▼ to display a pulldown menu with a list of the last 10 selected items.
Conversion range	Entire project	Conversion will be performed on all programs.
	Current window *1	Conversion will be performed on the current program.
	Selected range	The conversion will be performed within the range selected in the editor.
Direction	Up	The conversion will be executed up from the current cursor position.
	Down	The conversion will be executed down from the current cursor position.
Output target		Select which output window to output the search/replace result to, Search1 or Search2.
Replace all		Click this to convert all the applicable devices in the specified range.
Search		Click this to search according to the specified condition. Conversions will not be made.
Replace		Click this to convert the applicable devices in the specified range individually.
Close		Click this to close the "Search/replace" dialog box.

*1 This item is enabled only when "KV-8000/7500/7300/5500/5000/3000/1000" or "KV Nano Series" is selected for the PLC model.
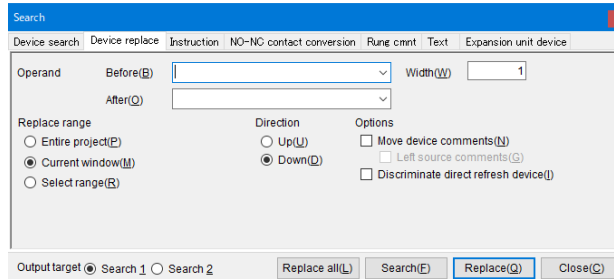
Search Rung Comments

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Edit(E)" ▶ **"Search rung comments(M)"**

Click the "Edit (E)" menu ▶ "Search rung comments (M)" to display the "Search/Replace" dialog box.

Item		Explanation
Only display leading rung of comments		When this checkbox is selected, if rung comments that span multiple ladder rungs are contained within the rung comments in the search range, only the leading one rung of each rung comment will be displayed.
Search range	Entire project	The entire project will be searched.
	Current window [*1]	Search will be performed on the current program.
Output target		Select which output window to output the search/replace result to, Search1 or Search2.
List display		Click this to conduct the search according to the specified conditions and list the result in the output window.[*2]
Close		Click this to close the "Search/replace" dialog box.

*1 This item is enabled only when "KV-8000/7500/7300/5500/5000/3000/1000" or "KV Nano Series" is selected for the PLC model.
*2 Double-click a rung comment listed in the output window to move the cursor to that rung comment.

Reference Set the program that you want to search as active, before using "Search range" to specify "Program".

Text Search and Replace

| KV-8000 | KV-7000 | KV-5000/3000 | KV Nano |
| KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40 |

"Edit(E)" ▶ **"Search/Replace text(K)"**

Click the "Edit (E)" menu ▶ "Search/Replace Text (K)" to display the "Search/replace" dialog box.

Item	Explanation
Search string	Enter the character string to search for. Click ▼ to display a pulldown menu with a list of the last 10 selected items.
Replace with	Select this checkbox when you want to replace the character string. After you select this checkbox, an entry box is displayed, so enter the replacement character string.
Range — Entire project	Replacement will be performed on all programs.
Range — Current window [*3]	Replacement will be performed on the current program.
Range — Selected range[*1]	The search and replacement will be performed within the cells currently selected in the editor.
Direction — Up	The search and replacement will be executed up from the current cursor position.
Direction — Down	The search and replacement will be executed down from the current cursor position.
Objects[*3] — Rung comment	Select this checkbox to set rung comments as the search object.
Objects[*3] — Script	Select this checkbox to set scripts as the search object.
Objects[*3] — Program name	Search the program name.
Objects[*3] — String value	Select this checkbox to set character strings as the search object. The in operation bit is included.
Options — Case-sensitive	When this checkbox is selected, case-sensitive searches and replacements will be executed.
Options — 100% match	When this checkbox is selected, only items that exactly match the entered characters will be found as a result of searches and replacements.
Options — Regular expression	When checked, the search / replacement can be performed using regular expressions.
Output target	Select which output window to output the search/replace result to, Search1 or Search2.
Replace all[*1]	Click this to replace all the applicable character strings in the specified range.
List display[*2]	Click this to conduct the search according to the specified conditions and list the result in the output window.
Search	Click this to search according to the specified condition. Replacements will not be made.
Replace[*1]	Click this to replace the applicable character strings in the specified range individually.
Close	Click this to close the "Search/replace" dialog box.

*1 This is only displayed when the "replaced to the next character string" checkbox is selected.
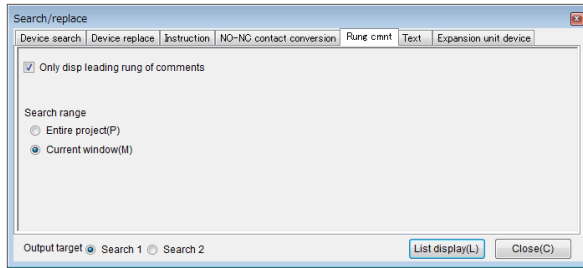*2 This is only displayed when the "replaced to the next character string" checkbox is cleared.
*3 This item is enabled only when "KV-8000/7500/7300/5500/5000/3000/1000" or "KV Nano Series" is selected for the PLC model.

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Search/Replace Expansion Unit Devices

`KV-8000` `KV-7000` `KV-5000/3000` `KV Nano`
`KV-1000` `KV-700` `KV-P16` `KV-10/16/24/40`

<div align="right">

Edit (E) ▶ **Search device (S)** `Ctrl` + `F`

Edit (E) ▶ **Replace device (I)** `Ctrl` + `H`

</div>

Search for the specified device and display all the found results, or replace with another device. This can also be done with expansion unit devices (UG/UD).

> **Point** **When the flow edit screen is not displayed, the normal device search/replace is displayed. To search for or replace an expansion unit device, execute the device search/replace when editing flow.**

Item			Explanation
Device for search			Enter the expansion device to search for. Expansion unit devices (UG/UD) can also be used. Click this to display a pulldown menu with a list of the last 10 selected items.
Replace to next device			Check the checkbox to replace the device. After checking the checkbox enter the device to replace in the box. Expansion unit devices (UG/UD) can also be entered.
Search width/replace width			The specified number of devices from the device number entered will be the targets for search/replace.
Range	Entire project	Ladder	Search/replace in the whole ladder program.
		Flow	Search/replace in the whole flow. You can also select the target unit.
	Current window		Search/replace in the program currently being displayed.
	Selected range[*1]		The cells currently selected in editor will be the targets for search/replace.
Direction	Up		Search/replace will be executed up from the current cursor position.
	Down		Search/replace will be executed down from the current cursor position.
Options	Specify unit of expansion unit device		Select to specify the target unit when you have entered an expansion unit device (UG/UD).
	Including app range of inst.[*2]		In addition to the devices used as operands, all devices with instructions assigned will also be searched. However, index-specified devices and indirectly referenced devices will be excluded from the search.
Output target			Select whether to output the search/replace result to the Search1 or Search2 output window.
Replace all[*1]			Click this to replace all the target character strings in the specified range.
List display[*2]			Click this to conduct the search according to the specified conditions and list the result in the output window.
Search			Click this to search according to the specified condition. Replacements will not be made.
Replace[*1]			Click this to replace the target devices in the specified range individually. [*3]
Close			Click this to close the "Search/replace" dialog box.

*1 This is only displayed when the "Replace with the next device" checkbox is checked.
*2 This is only displayed when the "Replace with the next device" checkbox is not checked.
*3 If you do not want to replace the target, click the "Search" button to move to the next device.

<div align="right">

5

EDIT

</div>

Batch Replace

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Edit(E)" ▶ **"Batch replace(G)"**

Specify the range, and replace the specified device.

Click the "Edit (E)" menu ▶ "Batch replace (G)," and then enter the necessary items.
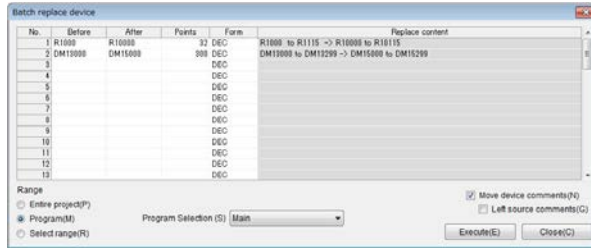
Item	Explanation
No.	This is the batch replacement rung number (number 1 to number 32).
Before	Specify the number of the replacement source device.[*1]
After	Specify the number of the replacement destination device.[*1]
Points	Specify the replacement range as a value.[*2]
Form	Select the format for entering items in "Point form" from decimal and hexadecimal.
Replace content	This displays a preview of the replacement details.
Range	Entire project		Search will be performed on all programs.
	Current window[*3]		Replacement will be performed on the current program.
		Select module	Use the pull-down menu to switch the current program.
	Selected range		The replacement will be performed within the range selected in the editor.
Move device comment[*4]			When this checkbox is selected, the comments of the replacement source devices will also be moved into the replacement destination devices when the replacement is executed.
	Keep source comments		When this checkbox is selected, the source comments will be retained.
Execute			Click this to execute the batch replacement.
Close			Click this to close the "Batch replace device" dialog box.

*1 If you specify an illegal device number, "-" will be displayed in "Replacement content" to indicate that the device cannot be replaced.
*2 If you specify a number of devices such that a range of devices that do not exist are included, "-" will be displayed in "Replacement content" to indicate that the range is illegal.
*3 This item is enabled only when "KV-8000/7500/7300/5500/5000/3000/1000" or "KV Nano Series" is selected for the PLC model.
*4 You can click the "Edit (E)" menu > "Undo (U)" to return the operands to their original state, but the moved device comments will not return to their original location.

> **Reference** • If you click "Execute" while devices or ranges that cannot be replaced are specified, a dialog box informing you that the replacement could not be performed is displayed, and then the cursor is moved to the input box in which the illegal entry is present.
> • You can copy and paste data between KV STUDIO and Microsoft Excel.
> (Ctrl + C and Ctrl + V)

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Online edit Editing Search

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

"Edit(E)" ▶ **Online edit Editing Search(3)**   [Ctrl] + [.] , [Ctrl] + [O]

During online editing, display the block (with a light blue background color) list added and edited after the last transfer in the "Search" window of the output window.
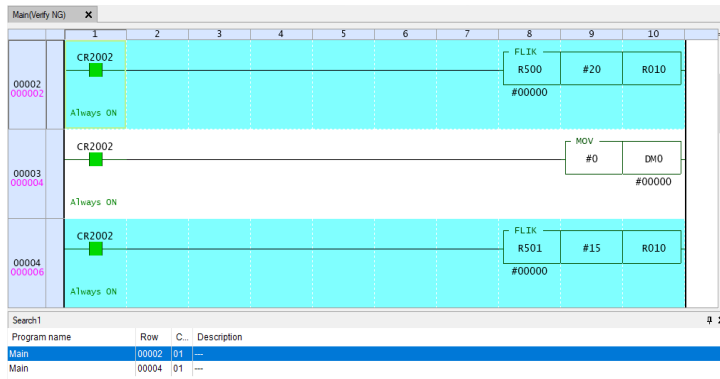
Cross References

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Edit(E)" ▶ **"Cross reference(X)"** ▶ **"Create operand list(O)"**   (Space)

▶ **"Create rung cmnts list(L)"** Ctrl + L

▶ **"Previous(A)"** Shift + F3

▶ **"Next(B)"** F3

The positions in which the specified operand is used are listed in the output window.

5

EDIT

■ Making a cross reference

Select the operand that you want to make a cross reference to, and then double-click the displayed item to move the cursor to the corresponding editor operand.
Click the "Edit (E)" menu ▶ "Cross reference (X)" ▶ "Create operand list (O)."
The cross reference is created, and the positions where the specified operand is used are listed in the output window.
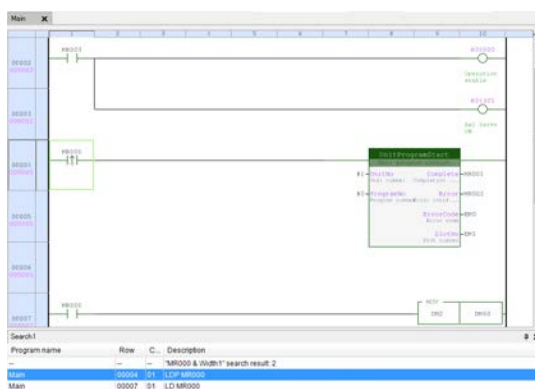
> ✎ **Point**   **If you select script, cross references will not be created.**

■ Making a list of rung comments

Click the "Edit (E)" menu ▶ "Cross reference (X)" ▶ "Create rung cmnts list (L)" to display the list of the project's rung comments in the output window.

■ Selecting the previous cross reference

Click the "Edit (E)" menu ▶ "Cross reference (X)" ▶ "Previous (A)" to select the previous cross reference.

■ Selecting the next cross reference

Click the "Edit (E)" menu ▶ "Cross reference (X)" ▶ "Next (B)" to select the next cross reference.

Jump

Jump to any specified position such as a rung number or step in a program, or jump to the top rung or the bottom rung.

Rung or step number

"Edit(E)" ▶ "Jump(J)" ▶ "Rung /step No.(L)" Ctrl + Shift + G

Follow the procedure below to jump to any specified position such as a rung number or step number in a program.

1 **Click the "Edit (E)" menu ▶ "Jump (J)" ▶ "Rung / step No. (L)."**

The "Jump to specified line" dialog box is displayed.

```
Jump to specified line

Rung No.(N)        1

        □ Jump to step No.(J)

    OK          Cancel
```
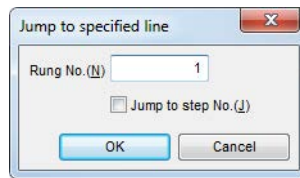
(**Alternative procedure**) Right-click, and then select "Jump (J)" ▶ "Rung /step No. (L)" from the menu that appears.

2 **Enter the jump destination rung number or step number. To jump to a specified step number, select the "Jump to step No." checkbox.**

The specified rung or step is displayed. The cursor is also moved to the specified rung.

Reference
- To cancel a jump, click "Cancel."
- If you specify a number that is greater than the last rung number or step number, the last rung or step is displayed.

Point **If you want to jump to a step number, you have to convert the program in advance.**

5

EDIT

Top or bottom

"Edit(E)" ▶	**"Jump(J)"** ▶	**"Top(T)"**	Ctrl + Home
		▶ **"Bottom(B)"**	Ctrl + End

■ Jumping to the top rung

Click the "Edit (E)" menu ▶ "Jump (J)" ▶ "Top (T)."
The cursor jumps to the top of the ladder diagram.

■ Jumping to the bottom rung

Click the "Edit (E)" menu ▶ "Jump (J)" ▶ "Bottom (B)."
The cursor jumps to the bottom of the ladder diagram.

Previous or next block

"Edit(E)" ▶	**"Jump(J)"** ▶	**"Prev. block(P)"**	Ctrl + ↑
		▶ **"Next block(N)"**	Ctrl + ↓

■ Jumping to the previous circuit block

Click the "Edit (E)" menu ▶ "Jump (J)" ▶ "Prev. block (P)."

■ Jumping to the next circuit block

Click the "Edit (E)" menu ▶ "Jump (J)" ▶ "Next block (N)."

Previous or next symbol

"Edit(E)" ▶	**"Jump(J)"** ▶	**"Prev. symbol(W)"**	Shift + Tab
		▶ **"Next symbol(F)"**	Tab

■ Jumping to the previous symbol

Click the "Edit (E)" menu ▶ "Jump (J)" ▶ "Prev. symbol (W)."

■ Jumping to the next symbol

Click the "Edit (E)" menu ▶ "Jump (J)" ▶ "Next symbol (F)."

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Home or end

<div style="text-align: right">

"Edit(E)" ▶ **"Jump(J)"** ▶ **"Home(H)"** `Home`

▶ **"End(E)"** `End`

</div>

■ Jumping to the start of a rung

Click the "Edit (E)" menu ▶ "Jump (J)" ▶ "Home (H)."

■ Jumping to the end of a rung

Click the "Edit (E)" menu ▶ "Jump (J)" ▶ "End (E)."

Previous changed block or next changed block

<div style="text-align: right">

"Edit(E)" ▶ **"Jump(J)"** ▶ **"Prev. changed block(O)"** `Ctrl` + `Alt` + `←`

▶ **"Next changed block(Q)"** `Ctrl` + `Alt` + `→`

</div>

■ Jumping to the previous changed program block

Click the "Edit (E)" menu ▶ "Jump (J)" ▶ "Prev. changed block (O)."

■ Jumping to the next changed program block

Click the "Edit (E)" menu ▶ "Jump (J)" ▶ "Next changed block (Q)."

Open target program

<div style="text-align: right">

"Edit(E)" ▶ **"Jump(J)"** ▶ **"Open target program(M)"**

</div>

Open the programs where targets are the instructions and functions of MDSTRT, MDSTOP, MCALL, MSTRT, ECALL, FB, and FUN.
Select the instruction and function of MDSTRT, MDSTOP, MCALL, MSTRT, ECALL, FBCALL, FBSTRT, FB, and FUN, and then click the "Edit (E)" menu ▶ "Jump (J)" ▶ "Open target program(M)".

Contacts and coils

<div style="text-align: right">

"Edit(E)" ▶ **"Jump(J)"** ▶ **"Contact/Coil(R)"** `F12`

</div>

When a contact instruction such as LD or LDP is selected, jump to the corresponding output instruction.
When an output instruction such as OUT or SET is selected, jump to the first corresponding contact instruction. When you execute this function again, focus will jump to the next contact instruction. If you execute this function after the last contact instruction has been reached, focus will return to the output instruction.
Select a contact or output instruction, and then click the "Edit (E)" menu ▶ "Jump (J)" ▶ "Contact/Coil (R)."

> ✎ **Point** | **The commands that support jumping to contacts and coils are shown below.**
> **Contact commands: LD, LDB, LDP, LDF, LDPB, LDFB, STP, and STG**
> **Output commands: OUT, OUB, SET, RES, KEEP, DIFU, DIFD, ONDL, OFDL, SHOT, FLIK, ALT, TMR, TMS, TMH, TMU, C, RFSX, RFSY, SFT, JMP, W-ON, W-OFF, W-UE, W-DE, FRSTM, FRLDM, PMOV, BSR, BSL, RCOM, and CTC**

Insert

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Insert empty rungs and rung comments in a ladder diagram.

Cells

"Edit(E)" ▶ "Insert(W)" ▶ "Cell(C)" [Ins]

1 **Move the cursor to the rung where the cell will be inserted.**

2 **Click the "Edit (E)" menu** ▶ **"Insert (W)"** ▶ **"Cell (C)."**

A cell is inserted at the cursor position.

(**Alternative procedure**) Right-click, and then select "Insert cell (V)" from menu that appears.

Empty rungs

"Edit(E)" ▶ "Insert(W)" ▶ "Empty rung(E)" [Shift] **+** [↵]

[Shift] **+** [Ins]

1 **Move the cursor to the rung where the empty rung will be inserted.**

> [Reference] To insert multiple empty rungs as a group, select the group of rungs where the empty rungs will be inserted.
> 📖 "Selecting the range" (page 5-3)

2 **Click the "Edit (E)" menu** ▶ **"Insert (W)"** ▶ **"Empty rung (E)."**

An empty rung is inserted at the selected rung.

(**Alternative procedure**) Right-click, and then select "Insert empty rung (E)" from the menu that appears.

Rung comments

"Edit(E)" ▶ "Insert(W)" ▶ "Rung cmnt(H)" [Ctrl] **+** [↵]

Insert a rung comment in a ladder diagram.
Rung comments are placed to make it easier to understand the content of each circuit block when editing ladder diagrams.

> ❭ **Point** **Rung comments are transferred to the KV-8000/7500/7300/5500/5000/3000/1000/700 and KV Nano Series.**
> **They are not transferred to the KV-P16 and KV-10 (16)/KV-24 (40).**

1 **Move the cursor to the rung where the rung comment will be inserted.**

2 **Click the "Edit (E)" menu** ▶ **"Insert (W)"** ▶ **"Rung cmnt (H)."**

A new rung is added and is displayed in the ladder diagram.

(**Alternative procedure**) Right-click, and then select "Insert rung comment (H)" from the menu that appears.

5

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3 **Use the keyboard to enter the comment.**

Press ⌈Ctrl⌉ + ⌈↵⌉ to confirm the comment.

You can also confirm the comment by pressing ⌈Esc⌉ .

> **Reference** To edit a rung comment that has already been entered, double-click the rung comment or press ⌈↵⌉ and ⌈F2⌉ .

Loopback ladders

"Edit(E)" ▶ **"Insert(W)"** ▶ **"Loopback Ladder(K)"** ⌈Ctrl⌉ + ⌈Shift⌉ + ⌈F8⌉

<div style="text-align:right">**5**
EDIT</div>

You can easily create loopback ladders. This is useful when you want to create a long ladder program from the power rail to the output line.
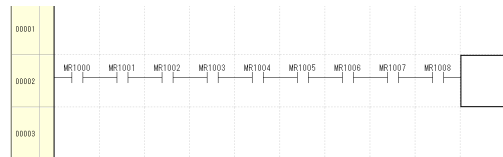
Click the "Edit (E)" menu ▶ "Insert (W)" ▶ "Loopback ladder (K)" to display the connection line for the loopback ladder.
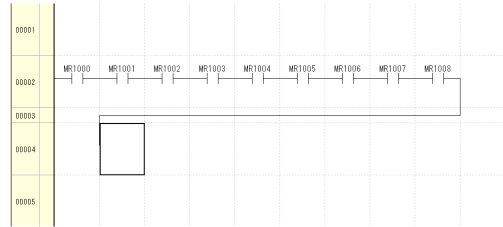
> **Reference** Loopback ladders in which loopback symbols are used can be inserted when "KV-8000/ 7500/7300/5500/5000/3000/1000" or "KV Nano Series" is selected for the PLC model.
> 📖 "System settings" (page 12-37)
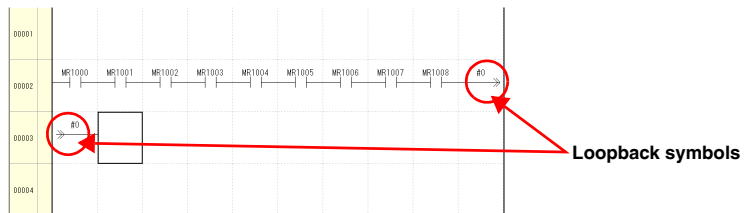
Loopback symbols

When "Enable folding symbol of ladder" is set to ON in the option settings, the insertion of loopback ladder sets the relationship to the return symbol, enabling continuous insertion of instructions. (This is only supported by KV STUDIO Ver. 4.11 or later.)

> ✎ **Point** **The insertion of loopback ladders can be selected from the menu when you select the third row or later.**

Deleting Rungs

"Edit(E)" ▶ **"Delete rung(Y)"** [Shift] **+** [Delete]

1 **Move the cursor to the rung to be deleted.**

| Reference | To delete multiple rungs at the same time, select all the rungs to be deleted.
"Selecting the range" (page 5-3)

2 **Click the "Edit (E)" menu** ▶ **"Delete rung (Y)."**

The selected rung is deleted.

(Alternative procedure) Right-click, and then select "Delete Rung (Y)" from the menu that appears.

Disabling Rungs and Canceling the Disabling of Rungs

"Edit(E)" ▶ **"Disable rung(Q)"** ▶ **"Setup(Q)"** [Ctrl] **+** [Q]

"Edit(E)" ▶ **"Disable rung(Q)"** ▶ **"Cancel(W)"** [Ctrl] **+** [W]

If you set parts of a ladder to be handled as rung comments, these parts will be ignored in terms of ladder operations when the conversion is performed. You can set parts of a ladder to be ignored in this manner temporarily, such as when you do not want certain parts to be executed during debugging.

1 **Select a rung that you want to set to disabled or a rung whose disabling you want to cancel.**

"Selecting the range" (page 5-3)

2 **Set or cancel the disabling of the rung.**

When you disable a rung, it is changed into a comment. When you cancel the disabling of a rung, the rung is returned to its state from before the ladder program was converted.
To disable a rung: Click the "Edit (E)" menu ▶ "Disable rung (Q)" ▶ "Setup (Q)."
To cancel the disabling of a rung: Click the "Edit (E)" menu ▶ "Disable rung (Q)" ▶ "Cancel (W)."
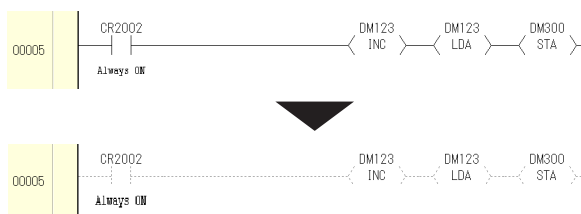
(Alternative procedure) **Disabling rungs**

Right-click, and then select "Set rung disable (Q)" from the menu that appears.

Canceling the disabling of rungs

Right-click, and then select "Cancel rung disable (W)" from the menu that appears.

✎ **Point**　**Ladders in which rungs have been disabled will not be transferred to the PLC.**

Configuring Rung Settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Adjust the column width and rung height of the selected range.

Width

"Edit(E)" ▶ "Rung setup(N)" ▶ "Width(W)"

Adjust the column width of the selected range.

1 **Click the "Edit (E)" menu ▶ "Rung setup (N)" ▶ "Width (W)."**

The "Column width" dialog box is displayed.
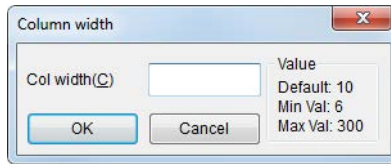
(Alternative procedure) Right-click, and then select "Rung setup (N)" ▶ "Width (W)" from the menu that appears.

2 **Enter the value.**

The column width is adjusted to the specified width.

Height

"Edit(E)" ▶ "Rung setup(N)" ▶ "Height(H)"

Adjust the rung height of the selected range.

1 **Click the "Edit (E)" menu ▶ "Rung setup (N)" ▶ "Height (H)."**

The "Rung height" dialog box is displayed.
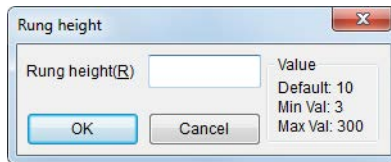
(Alternative procedure) Right-click, and then select "Rung setup (N)" ▶ "Height (H)" from the menu that appears.

2 **Enter the value.**

The rung height is adjusted to the specified height.

Auto-adjust

"Edit(E)" ▶ "Rung setup(N)" ▶ "Auto-adjust(D)"

Automatically adjust the column widths and row heights of the ladder program that you are editing.

1 **Click the "Edit (E)" menu ▶ "Rung setup (N)" ▶ "Auto-adjust (D)."**

The widths and heights are automatically adjusted to the optimum values.

(Alternative procedure) • Right-click, and then select "Rung setting (N)" ▶ "Auto-adjust (D)" from the menu that appears.
• Select the range, and then double-click the boundary line between a pair of cells.

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Bookmarks

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

If you set a bookmark in a rung comment, the rung comment will be displayed in the workspace.
If you double-click a bookmark displayed in the workspace, the corresponding bookmarked rung comment will be displayed.

> ✎ **Point**   **You cannot set bookmarks on script rung comments.**

Insert

5

EDIT

"Edit(E)" ▶ "Bookmark(H)" ▶ "Insert(I)" ⎡Ctrl⎤ + ⎡Shift⎤ + ⎡Ins⎤

Insert a rung comment with a bookmark into the ladder diagram.
When you write the rung comment, the bookmark will be automatically registered in the workspace.

1 **Move the cursor to the rung where the rung comment will be inserted.**

2 **Click the "Edit (E)" menu ▶ "Bookmark (H)" ▶ "Insert (I)."**

A new rung is added and is displayed in the ladder diagram.

> **Alternative procedure**   Right-click, and then select "Bookmark (H)" ▶ "Insert (I)" from the menu that appears.

3 **Use the keyboard to enter the comment.**

Press ⎡Ctrl⎤ + ⎡↵⎤ to confirm the comment.
You can also confirm the comment by pressing ⎡Esc⎤ .

After the comment is confirmed, the bookmark is registered in the workspace.
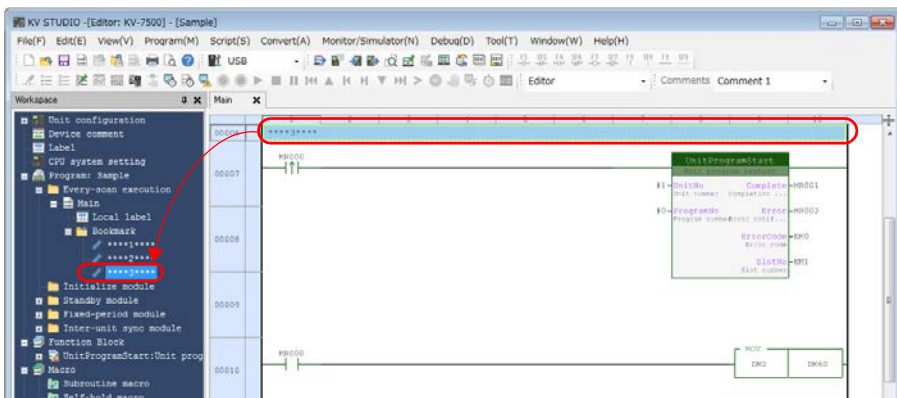
Set

"Edit(E)" ▶ "Bookmark(H)" ▶ "Set(S)" `Ctrl` + `Shift` + `↵`

Set a bookmark on a rung comment in the ladder diagram.

1 **Select the rung comment to which the bookmark will be set.**

2 **Click the "Edit (E)" menu ▶ "Bookmark (H)" ▶ "Set (S)."**

The bookmark is registered in the workspace.

(**Alternative procedure**) Right-click, and then select "Bookmark (H)" ▶ "Set (S)" from the menu that appears.

5

EDIT

Remove

"Edit(E)" ▶ "Bookmark(H)" ▶ "Remove(D)" `Ctrl` + `Shift` + `Delete`

Remove a rung comment bookmark.

1 **Select a rung comment to which a bookmark has been set.**

2 **Click the "Edit (E)" menu ▶ "Bookmark (H)" ▶ "Remove (D)."**

The bookmark is removed.

(**Alternative procedure**)
- Right-click, and then select "Bookmark (H)" ▶ "Remove (D)" from the menu that appears.
- Right-click a bookmark in the workspace, and then select "Remove the selected bookmark (D)" from the menu that appears.

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Hyperlinks

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

You can set hyperlinks on text written in rung comments and within scripts to folders or files on a PC. If you click text to which a hyperlink has been set, you will jump to the linked folder or file.

Setting and editing

"Edit(E)" ▶ **"Hyperlink(Z)"** ▶ **"Set/edit(A)"**

1 **Select the text to be hyperlinked in a rung comment or script.**

```
Select the text to be hyperlinked in line comments or script
```
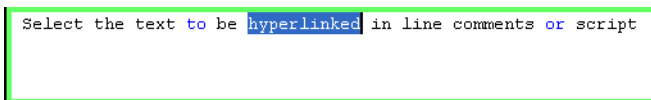
2 **Click the "Edit (E)" menu ▶ "Hyperlink (Z)" ▶ "Set/edit (A)."**

(**Alternative procedure**)   Right-click, and then select "Set/edit hyperlink (A)" from the menu that appears.

Use the "Setup hyperlink" dialog box to set the file or folder to link to.
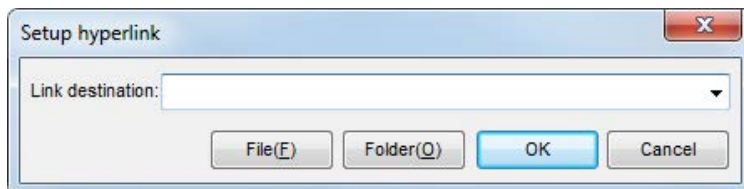
Set the link destination, and then click "OK" to set a hyperlink in the selected text.

```
Select the text to be hyperlinked in line comm
```
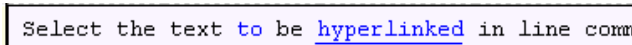
● **Relative path specification**

You can use relative paths to specify link destinations. The relative path starts from the project folder being edited. When a file or folder in the project folder being edited is specified using the "File" or "Folder" button, the link destination automatically becomes a relative path.

Example: Specifying "Sample1.csv" in the "Project 1" project folder and "Sample2.csv" in user documents* in the memory card as link destinations

Link destination

. . . —— PROJECT —— Project1 ┬─ Sample1.csv   .\Sample1.csv

                             └─ 0_CARD ── UserDoc ── Sample2.csv   .\0_CARD\UserDoc\Sample2.csv

5

EDIT

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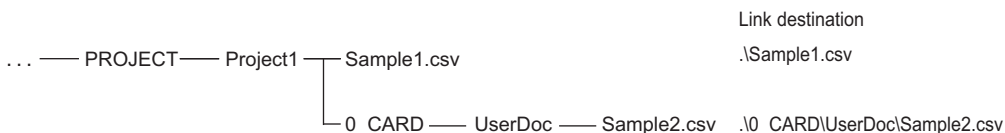
When a file or folder in a project folder is specified using a relative path, the following are possible.

- When the link destination file or folder is also compressed and saved as a compact project, the folder structure will be kept when it is decompressed, and hyperlinks can be used.

  📖 "Compressing and Saving Projects" (page 4-4)

- When the link destination specifies a user document* file or folder and is transferred to the PLC, the folder structure will be kept when it is read on another computer, and hyperlinks can be used.

* User documents can only be used with the KV-8000/7000 Series.

  📖 "User documents" (page 6-13)

Delete

"Edit(E)" ▶ **"Hyperlink(Z)"** ▶ **"Delete(B)"**

1 **Select some text to which a hyperlink has been set.**

2 **Click the "Edit (E)" menu** ▶ **"Hyperlink (Z)"** ▶ **"Delete (B)."**

Alternative procedure Right-click, and then select "Delete hyperlink (B)" from the menu that appears.

List

"Edit(E)" ▶ **"Hyperlink(Z)"** ▶ **"List(L)"**

List the character strings to which hyperlinks have been set in the project.

1 **Click the "Edit (E)" menu** ▶ **"Hyperlink (Z)"** ▶ **"List (L)."**
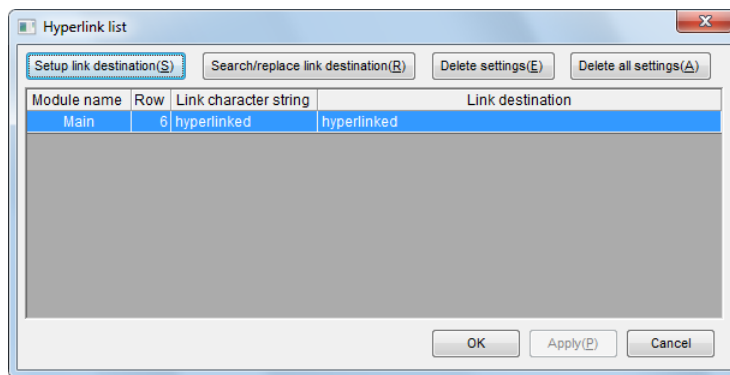
Item	Explanation
Setup link destination	Click this to use the "Hyperlink setting" dialog box to edit the selected hyperlink.
Search/replace link destination	Click this to use the "Search/replace" dialog box to search for and replace the file name or folder name used for the hyperlink's link destination.
Delete settings	Click this to delete the selected hyperlink.
Delete all settings	Click this to delete all the set hyperlinks.

Reference Even if the project is edited with a different PC, you can use the link destination search/replacement function to replace batches of hyperlink destination folder names, so this is a useful function.

Edit Mode

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

You can switch to expanded ladder mode or connection line edit mode.

Expanded ladder mode

🔲 **"Edit(E)"** ▶ **"Edit mode(B)"** ▶ **"Expanded ladder mode(G)"**

In the normal ladder notation, only one output instruction such as OUT or TMR can be written to one rung of the ladder. However, you can reduce the number of rungs in the program and make the processing sequence clearer by using the expanded ladder mode.
For example, you can write an ON delay timer as shown below.

Normal ladder notation   **Expanded ladder notation**
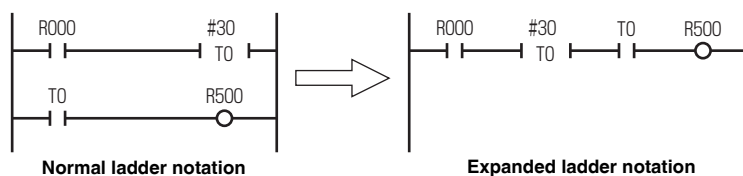
When you select the expanded ladder mode and enter an output instruction, the cursor is not moved automatically to the right edge of the rung, and you can continue entering instructions. In a mode other than expanded ladder mode, the cursor is moved automatically to the right edge of the rung when you enter an output instruction.
For example, the entry of an OUT instruction is performed as shown below.

- **When the expanded ladder mode is selected**
  When the OUT instruction is entered, the cursor moves to the next cell.
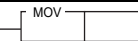
> **Reference** The expanded ladder mode setting is automatically saved in KV STUDIO, so this mode will be enabled the next time that KV STUDIO starts.

Click the "Edit (E)" menu ▶ "Edit mode (B)" ▶ "Expanded ladder mode (G)" to enable expanded ladder mode (a checkmark is displayed next to the setting).
To disable the expanded ladder mode (to clear the checkmark from the setting), repeat the above procedure.

> ✎ **Point** **Box-type instructions such as (⌐ MOV ⌐) are connected to the right power rail even in the expanded ladder mode.**

Connection line edit mode

<div align="right">**"Edit(E)"** ▶ **"Connection line edit mode(B)"**</div>

In connection line edit mode, you can use the mouse and arrow keys to draw and delete connection lines.

To return to the normal edit mode from the connection line edit mode, perform the same operations as those to switch to connection line edit mode.

1 **Click the "Edit (E)" menu** ▶ **"Edit mode (B)"** ▶ **"Connection line edit mode (B)."**

> **Alternative procedure**   Right-click, and then select "Edit connection line (F)" ▶ "Connection line edit mode (B)" from the menu that appears.

> **Reference**   In connection line edit mode, a check mark is displayed next to "Connection line edit mode (B)" in the Edit menu.

2 **To draw a connection line, move the mouse pointer to the starting position of the connection line.**

3 **Click the mouse to change the mouse pointer to a "pencil holding hand," and then drag the mouse from the starting position of the connection line to the final position of the connection line.**
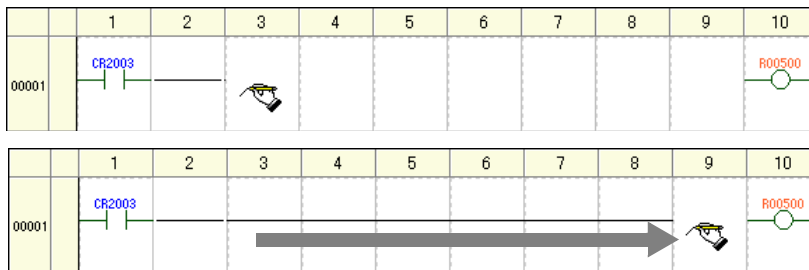
To delete a connection line, hold down [Shift] and drag the mouse from the starting position to the final position of the connection line.

> **Alternative procedure**
> - To draw a connection line by using the arrow keys, hold down [Alt] and use the arrow keys to move the cursor in the direction that you want to draw the connection line.
> - To delete a connection line by using the arrow keys, hold down [Alt] and use the arrow key to move the cursor.

5

EDIT

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Editing Connection Lines

Right-click menu ▶ **"Edit connection line(F)"**

      ▶ **"Enter vert. connection line(V)"**   [F8]

      ▶ **"Enter horiz. connection line(H)"**   [F9]

      ▶ **"Horizontal connection rung to end of line(-)"**   [Alt] **+** [↵] **or** [Ctrl] **+** [Tab]

      ▶ **"Delete vert. connection line(X)"**   [Shift] **+** [F8]

      ▶ **"Delete horiz. connection line(Y)"**   [Shift] **+** [F9]

5

EDIT

Entering connection lines

There are three ways to enter connection lines:

■ By pressing keys

[F8] :   A vertical connection line will be drawn down from the cursor position.

[F9] :   A horizontal connection line will be drawn to the right from the cursor position.

[Alt] + [↑] [↓] [←] [→] :   A connection line will be drawn in the direction corresponding to the arrow key that you press (up, down, left, or right).

[Alt] + [↵] or [Ctrl] + [Tab] :   A connection line will be drawn from the cursor position to the end of the rung.

■ By clicking icons

[F8] : A vertical connection line will be drawn down from the cursor position.

[F9] : A horizontal connection line will be drawn to the right from the cursor position.

■ By using the mouse and arrow keys in connection line edit mode

📖 "Connection line edit mode" (page 5-29)

Deleting connection lines

There are three ways to delete connection lines:

■ By pressing keys

[Shift] + [F8] :   The vertical connection line to the left of the cursor position will be deleted.

[Delete] :   The horizontal connection line at the cursor position will be deleted.

[Alt] + [↑] [↓] [←] [→] :   The connection line in the direction corresponding to the arrow key that you press (up, down, left, or right) will be deleted.

■ By clicking icons

[SF8] : The vertical connection line to the left of the cursor position will be deleted.

[SF9] : The horizontal connection line at the cursor position will be deleted.

■ By using the mouse and arrow keys in connection line edit mode

📖 "Connection line edit mode" (page 5-29)

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Arranging Ladders

"Edit(E)" ▶ **"Clean up ladder(V)"** [Ctrl] + [Shift] + [F]

To make a ladder diagram easier to understand, follow the procedure below to arrange the positions of the symbols in the ladder diagram.

1 **Click the "Edit (E)" menu** ▶ **"Ladder arrangement (V)."**

Ladder diagram before arrangement

```
         MR1000   DM0     DM1000
00003     ┤├    ─⟨ LDA ⟩─⟨ STA ⟩
```

Ladder diagram after arrangement

```
         MR1000                                      DM0      DM1000
00003     ┤├                                       ⟨ LDA ⟩─⟨ STA ⟩
```

Excluding the locations of conversion errors, the entire ladder project is arranged.

Editing Lists

[LD OUT] **"Edit(E)"** ▶ **"Edit list(L)"** [Ctrl] + [D]

Displaying and editing mnemonics lists

Follow the procedure below to display the mnemonics list for the specified block and to enter instructions by editing the mnemonics list.

1 **Move the cursor to the block whose mnemonics list is to be displayed or to the cell in which edited mnemonics list details are to be inserted or replaced.**

```
[Main]
              1          2          3
           CR2008
00001       ┤├
         1 scan ON
         at start


00002
```

5
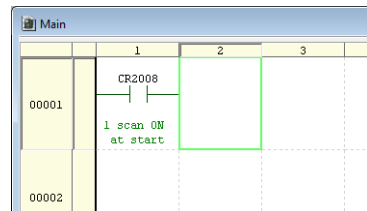
EDIT

2 Click the "Edit (E)" menu ▶ "Edit list (L)."

The "List edit" window is displayed.
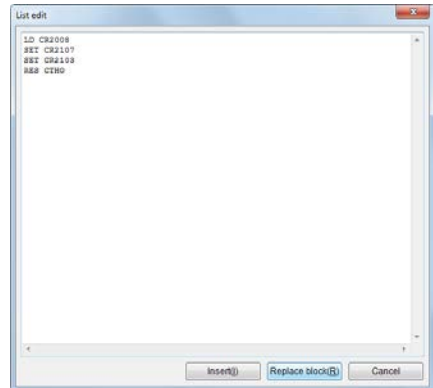
3 Edit the mnemonics in the "List edit" window.

Mnemonics list format

Mnemonics lists are formatted as shown below.
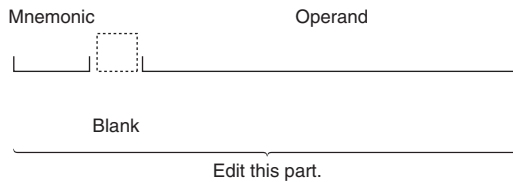
Point	• **Comments cannot be edited in mnemonics lists.** • **The text between a semicolon (";") and a new rung is not read.** • **When the first character of a rung is a semicolon (";"), the rung is read as a rung comment.** • **The ladder program cannot be converted if the mnemonics list is in a different format.**

Changing Operands

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Edit(E)" ▶ "Change operand(O)" ⏎

1 **Select the cell containing the instruction whose operand you want to change.**

2 **Click the "Edit (E)" menu ▶ "Change operand (O)."**

The "Operand" dialog box is displayed.

(Alternative procedure)
- Select the cell containing the instruction for changing its operand, and then press the ⏎ key.
- Select the cell containing the instruction for changing its operand, and then double-click it.

Reference If you select a cell with instruction already entered, and then use the number keys to enter a number, then direct change can be used only for the device number of the same device type.

3 **Specify an operand, and then click the "Overwrite" button.**
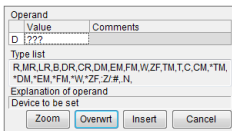
Item		Description
Operand	Value	Enter a device number.
	Comment	Enter a comment here.
Type list		Display the types of devices that can be used for the selected operand.
Operand explanation		Display explanation of the selected operand.

Reference If you click the "Overwrite" button without specifying an operand, the unspecified operand appears as pending "???". If relay assignment etc. is undecided yet, you may find it convenient to create just the ladder circuit in advance.

Editing Device Comments

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Edit device comments.

Changing device comments

"Edit(E)" ▶ "Edit device cmnts(F)" ▶ "Change device cmnt(F)" ⌈Ctrl⌋ + ⌈M⌋

1 **Select the cell containing the instruction whose device comment you want to change.**

2 **Click the "Edit (E)" menu** ▶ **"Edit device cmnts (F)"** ▶ **"Change device cmnts (F)."**
The "Operand" dialog box is displayed.

> (**Alternative procedure**) Right-click, and then select "Change device comment (G)" from the menu that
> appears.

3 **Change the device comment.**
For details of the "Operand" dialog box, see 📖 "Changing Operands" (page 5-33).

> | Reference | A list of devices can be displayed and comments can be edited in the device comment
> edit window.
> 📖 "Displaying the Device Comment Edit Window" (page 6-23)

Deleting all device comments

"Edit(E)" ▶ "Edit device cmnts(F)" ▶ "Delete all device cmnts(A)"

Click the "Edit (E)" menu ▶ "Edit device cmnts (F)" ▶ "Delete all device comments (A)" to
delete all the device comments in the project that is being edited.

5

EDIT

Relation mapping

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Edit(E) ▶ **Relation Mapping(9)** Ctrl + Shift + R

This is the function to search and display the circuit blocks that cause changes in the selected device / variable, settings of KV STUDIO and device rewrite events from the human machine interface. Select "Edit (E)" ▶ "Relation Mapping (9)" in the menu.

> ✎ **Point**
>
> **It can be used only when the PLC model is KV-8000. When another model is selected, the "Relation Mapping" item is not displayed.**

(Alternative procedure) • With the object device / variable selected in the ladder edit window, select "Relation Mapping (9)" in the right-click menu
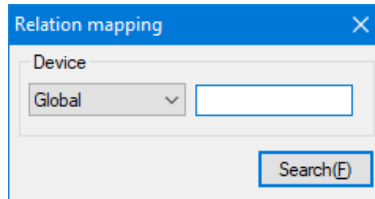
After entering the object device / variable and clicking "Search (F)", the "Relation Mapping" window will be displayed with the input device / variable as the object. The information on the ladder programs / functions with status change or the causes for status change can be displayed in the "Relation Mapping" window.

● **Relation mapping window**

● **Ladder**

5

EDIT

5

EDIT
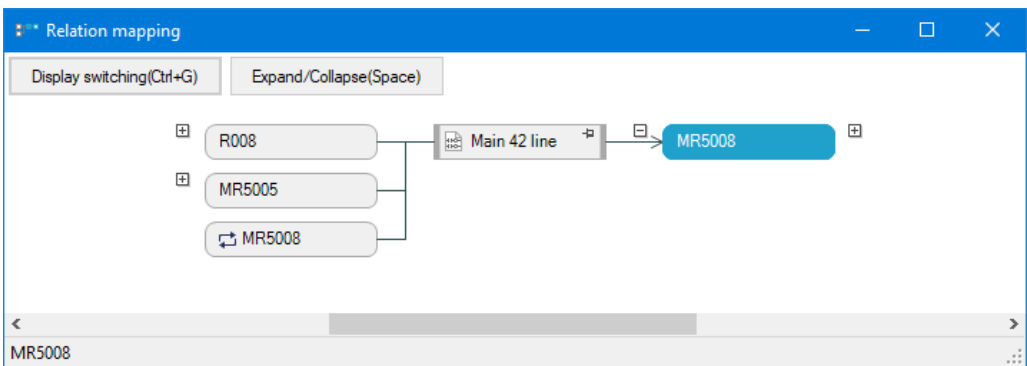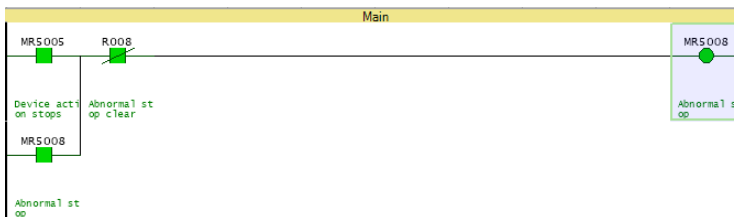
■ Description of blocks

● Device block

| Abnormal stop cle ar | | R008 |

Display the device / variable used in the ladder block diagram. Click the "Display/switching" button on the upper left of the "Relation Mapping" window, and then press Ctrl + G to switch between the device comment display and device display.

● Ladder block

| Main 42 line |
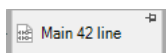
Display the module name and line number used by the searched device / variable. When selected, the ladder program object is displayed in the selected ladder display window.

> ✎ **Point**
>
> • **The ladder programs cannot be edited in the selected ladder edit window. To edit the ladder program object, right-click in the selected ladder edit window, select "Jump", and then edit the original ladder program.**
> • **The scripts cannot be expanded.**

● Flow block

| [3]Flow |
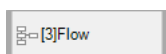
Display the unit number of the object unit when the searched device / variable is used in the unit program (flow).

● Setting block
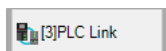
| [3]PLC Link |

Display the unit setting name and unit number where the searched device / variable is used. The unit settings displayed in the setting block are as follows.

- PLC link
- PROTOCOL STUDIO
- Industrial Ethernet (EtherNet/IP (Adapter), PROFINET, CC-Link IE Field, EtherCAT)
- Simple PLC link
- FL refresh setting
- Serial PLC link
- Device initial value setting
- Inter-unit synchronous refresh

● Device value change block

| [0]Device value change |
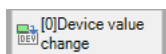
Displayed when the device / variable value is changed for the searched device from the human machine interface or access window.

> ✎ **Point**
>
> **The device value change block can be displayed only in the monitor / online edit / replay mode.**

■ Relation mapping operation

● Additional search

Click the "+" button displayed in the device block to perform additional search and display for the cause that has changed the status of the device / variable.
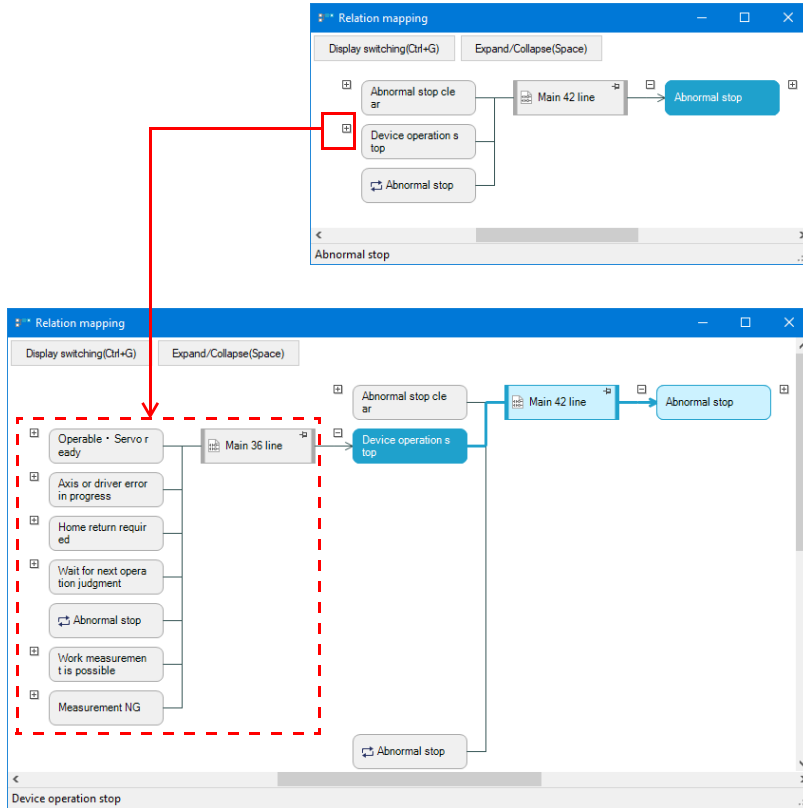
● Pinning

Click the 📌 icon displayed in the ladder block to always display the related ladder block diagram.

● Jump

It can only be used in ladder blocks, flow blocks and setting blocks. Right-click the block and click "Jump (J)" to display the following contents.

Item	Description
Ladder block	Move to the line of the object ladder.
Flow block	Display the object flow.
Setting block	Display the object setting screen.

MEMO

5

EDIT

This section describes how to enter instructions in and delete instructions from ladder diagrams.

Entering Instructions

Ladder symbols are automatically entered when an instruction is specified.

There are three ways to enter instructions.

- **From the "Instruction/Macro/Pack Pallet" window, select a symbol to enter the instruction.**

  "Input from Instruction/Macro/Pack Pallet" (page 5-40)
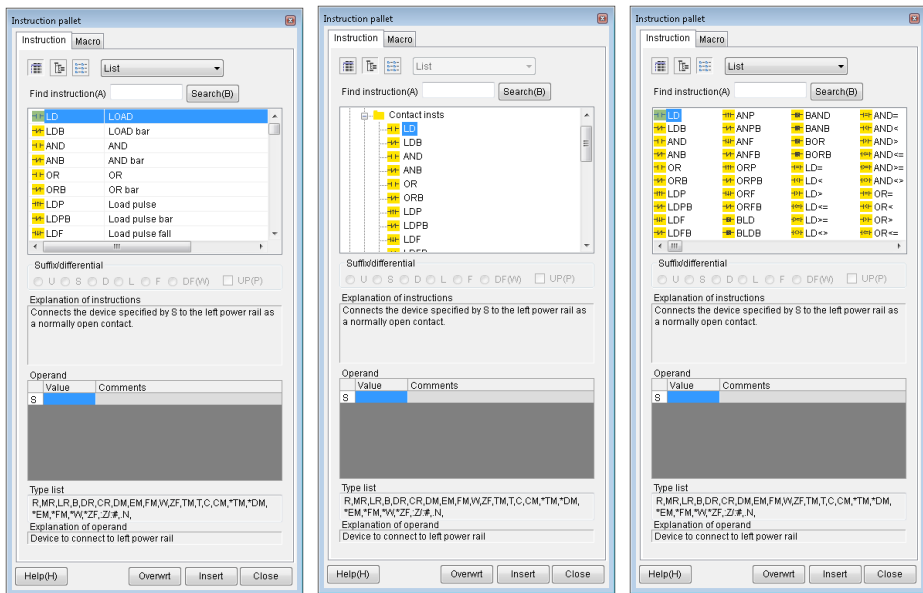
- **Entering the leading character of the instruction, and then directly entering the instruction as a mnemonic from the dialog box that is displayed**

  "Directly entering instructions using mnemonics" (page 5-42)
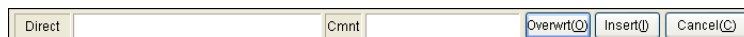
- **Directly entering the instruction from the toolbar (some instructions only)**

  "Entering instructions from the toolbar (edit symbol 1)" (page 5-43)
  "Entering instructions from the toolbar (edit symbol 2)" (page 5-44)
  "Entering instructions from the toolbar (edit symbol 3)" (page 5-45)
  "Entering instructions from the toolbar (symbols for CPU positioning)" (page 5-46)

Input from Instruction/Macro/Pack Pallet

This section describes how to input from instruction, macro, or pack pallet.

Because it is possible to drag a symbol from the "Instruction/Macro/Pack Pallet" window and drop it to the ladder edit window, you can input instruction like you are drawing a ladder diagram.

1 **Align the pointer with a cell you want to input instruction on the ladder diagram, and then double-click it.**

> **Alternative procedure**
>
> - Select "View(V)" ▶ "Instruction/Macro/Pack Pallet(I)" in that order.
> - Click the 📙 button.
> - Select a cell with no instruction entered on the ladder edit window, and then press the ⏎ key.
> - Ctrl + Shift + P

> **Reference**
>
> - With the instruction/macro/pack pallet constantly displayed, you can create ladder programs.
> - Select a cell with instruction entered, and then press the ⏎ key to display the "Operand edit" dialog box.
>   📖 "Changing operands" (page 5-41)
> - If you are not familiar with creating ladder program and instruction, you can use the "Instruction/macro/pack pallet" window to input accurately.

2 **Specify an instruction.**

You can start from groups and zero in to find an instruction, or enter an instruction to search for it.
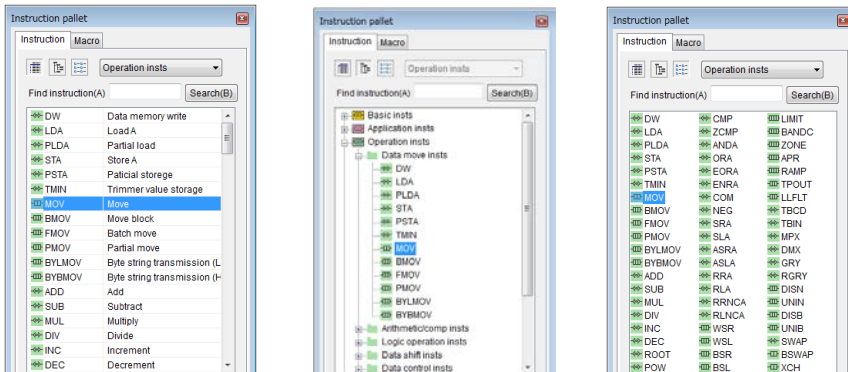
3 **Specify operands.**

Enter valid operands for the specified instruction.

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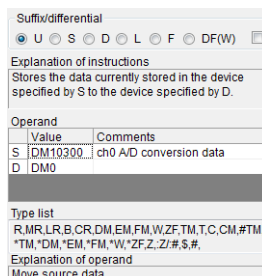
4 **Use drag&drop to place the symbol selected in step 2 to the location where you want to input the instruction.**

The symbol is input.
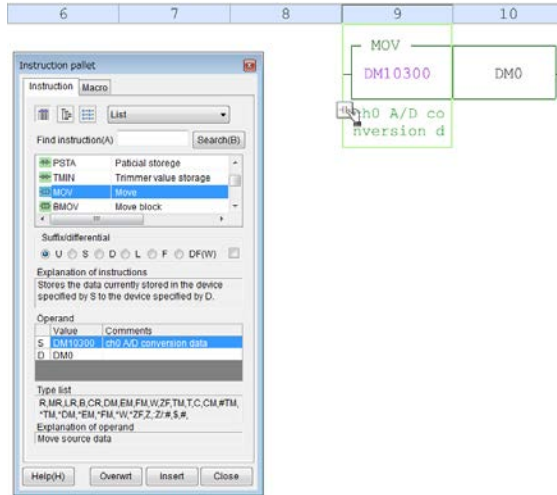
Alternative procedure Click the "Overwrite" or "Insert" button.

■ **Changing operands**

Select a cell with instruction input, and then press the ⏎ key to display the "Operand edit" dialog box.

Alternative procedure Select the "Edit" menu ▶ "Change operand (O)".
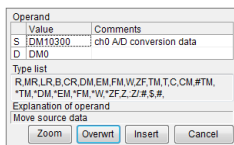
Item		Description
Operand	Value	Enter a device number.
	Comment	Enter a comment here.
Type list		Display the types of devices that can be used for the selected operand.
Operand explanation		Display explanation of the selected operand.

For details on instruction/macro/pack pallet, see 📖 "Instruction/Macro/Pack Pallet" (page 6-19).

Reference
• For details on characters that cannot be used in comment, see 📖 "App 2 List of Characters That Cannot Be Used" (page A-40).
• When you enter a number on the instruction symbol, only device number can be changed.

Directly entering instructions using mnemonics

Use mnemonics to directly enter instructions.
When you enter an instruction in the displayed dialog box, a symbol appears in the ladder program.

> **Reference** This method enables you to enter instructions faster than by using the "Instruction/ macro/pack palette" window.

1 **Select the cell in the ladder edit window in which you want to enter the instruction, and then enter the leading character of the instruction that you want to enter to display the direct entry dialog box.**

(Alternative procedure) Press ⌷Esc⌷ or ⌷F2⌷ .

Direct		Cmnt		Overwrt(O)	Insert(I)	Cancel(C)

2 **Use the keyboard to enter the instruction.**

> ✎ **Point** **Enter instructions in mnemonic format, and leave half-width or full-width spaces between the instruction and the device names (the operands).**

Contact input LD R1	Counter input C 0 #3 R0	Timer input T 0 #10
↑	↑ ↑	↑ ↑
Space	Space Space	Space

> **Reference**
> • You can enter abbreviated forms of some instructions. For details, see 📖 the KV-8000/7000/5000/3000/1000 Series and KV Nano Series Instruction Reference Manual.
> • You can also use function keys to enter instructions in the direct entry dialog box. For details on the instructions assigned to the function keys, see 📖 "Shortcut keys that are valid in editor mode" (page A-45).
> • When you entering an instruction, you can display the help for the instruction by pressing ⌷F1⌷ .

3 **After you finish entering the instruction and the operands, click "Overwrite" or "Insert."**

When you click "Overwrite," the instruction overwrites the existing one at the cursor position. When you click "Insert," the instruction is inserted at the cursor position.

> **Reference** If you click the "Overwrite" or "Insert" button without specifying an operand, the unspecified operand appears as "???".

■ Correcting and changing entered instructions

1 **Move the cursor to the instruction to change, and then press ⌷Esc⌷ or ⌷F2⌷ to display the direct entry dialog box. Correct the instruction.**

2 **Click "Overwrite" or "Insert."**

Entering instructions from the toolbar (edit symbol 1)

"View(V)" ▶ "Toolbar(T)" ▶ "Edit symbol 1(Y)"

F5	**Enter NO contact** [F5]	─┤├─
SF5	**Enter NC contact** [Shift] + [F5]	─┤/├─
F4	**OR enter of NO contacts** [F4]	─┘├─
SF4	**OR enter of NC contacts** [Shift] + [F4]	─┘/├─
F7	**Enter coil** [F7]	─○─
SF7	**Enter NC contact coil** [Shift] + [F7]	─⊘─

Enter NO contacts, NC contacts, the logical OR of NO contacts, the logical OR of NC contacts, coils, and NC contact coils.

1 **Select the cell in which you want to enter the instruction, and then select the type of contact to enter from the toolbar (edit symbol 1).**

The "Operand" dialog box is displayed.

2 **Specify an operand, and then click the "Overwrite" button.**

Item		Description
Operand	Value	Enter a device number.
	Comment	Enter a comment here.
Type list		Display the types of devices that can be used for the selected operand.
Operand explanation		Display explanation of the selected operand.

Reference
- For details on the characters that cannot be used in comments, see 📖 "App 2 List of Characters That Cannot Be Used" (page A-40).
- If you click the "OK" button without specifying an operand, the unspecified operand appears as "???".

```
        ???
────┤   ├────      When the first operand is not specified for an LD instruction

        ???
──────○──────      When the first operand is not specified for an OUT instruction
```

Entering instructions from the toolbar (edit symbol 2)

"View(V)" ▶ **"Toolbar(T)"** ▶ **"Edit symbol 2(M)"**

Icon	Instruction	Shortcut	Symbol
AF1 SET	**SET**	Alt + F1	—(SET)—
AF2 RES	**RES**	Alt + F2	—(RES)—
AF3 TMR	**TMR**	Alt + F3	—| T 0 |—
AF5 TMS	**TMS**	Alt + F5	—| T S 0 |—
Alt 0 C	**C**	Alt + 0	—| C 0 |—
AF8 DIFU	**DIFU**	Alt + F8	—| DIFU |—
AF9 DIFD	**DIFD**	Alt + F9	—| DIFD |—
AF10 MOV	**MOV**	Alt + F10	MOV
AF11 LDA	**LDA**	Alt + F11	—(LDA)—
AF12 STA	**STA**	Alt + F12	—(STA)—

Enter instructions such as set, reset, timer, counter, differential output, and data transfer instructions.

Reference ⧓ Some icons may not be displayed depending on the selected PLC model. The entry of shortcut keys for the instructions that are not displayed is not valid.

1 **Select the cell in which you want to enter the instruction, and then select the instruction to enter from the toolbar (edit symbol 2).**

The "Operand" dialog box is displayed.

2 **Specify an operand, and then click the "Overwrite" button.**

Item		Description
Operand	Value	Enter a device number.
	Comment	Enter a comment here.
Type list		Display the types of devices that can be used for the selected operand.
Operand explanation		Display explanation of the selected operand.

Reference ⧓ • For details on the characters that cannot be used in comments, see 📖 "App 2 List of Characters That Cannot Be Used" (page A-40).

• If you click the "OK" button without specifying an operand, the unspecified operand appears as "???".

```
      ???
—( SET )——      When the first operand is not specified for a SET instruction

   MOV
  DM0    ???       When the second operand is not specified for a MOV instruction
```

Entering instructions from the toolbar (edit symbol 3)

<div align="right">

"View(V)" ▶ "Toolbar(T)" ▶ "Edit symbol 3(N)"

</div>

⌐ASF5	**MEP** [Alt] + [Shift] + [F5]	——┤———
⌐ACF5	**MEF** [Alt] + [Ctrl] + [F5]	——┤———
⌐AF7	**LDP** [Alt] + [F7]	——┤↑├——
⌐ASF7	**LDF** [Alt] + [Shift] + [F7]	——┤↓├——
⌐ASF8	**ORP** [Alt] + [Shift] + [F8]	└—┤↑├—┘
⌐ASF9	**ORF** [Alt] + [Shift] + [F9]	└—┤↓├—┘
⌐ACF10	**INV** [Alt] + [Ctrl] + [F10]	——/———

Enter instructions such as differential contact instructions.

> **Reference**
> - When the KV-P16, KV-10 (16), or KV-24 (40) is selected for the PLC model, edit symbol 3 cannot be displayed.
> - Some icons may not be displayed depending on the selected PLC model. The entry of shortcut keys for the instructions that are not displayed is not valid.

1 **Select the cell in which you want to enter the instruction, and then select the instruction to enter from the toolbar (edit symbol 3).**

The "Operand" dialog box is displayed.

2 **Specify an operand, and then click the "Overwrite" button.**

Item		Description
Operand	Value	Enter a device number.
	Comment	Enter a comment here.
Type list		Display the types of devices that can be used for the selected operand.
Operand explanation		Display explanation of the selected operand.

> **Reference**
> - For details on the characters that cannot be used in comments, see 📖 "App 2 List of Characters That Cannot Be Used" (page A-40).
> - If you click the "OK" button without specifying an operand, the unspecified operand appears as "???".

```
         ???
——┤ ↑ ├——   When the first operand is not specified for an LDP instruction
```

Entering instructions from the toolbar (symbols for CPU positioning)

PLSX	**PLSX**	─[PLSX]─
PLSY	**PLSY**	─[PLSY]─
JOGX	**JOGX**	JOGX CW / CCW / HIGH
JOGY	**JOGY**	JOGY CW / CCW / HIGH
ORGX	**ORGX**	─[ORGX]─
ORGY	**ORGY**	─[ORGY]─
TCHX	**TCHX**	─[TCHX]─
TCHY	**TCHY**	─[TCHY]─
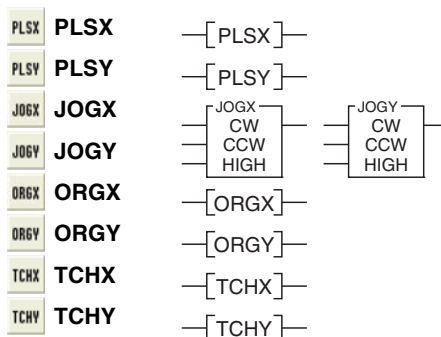
Enter instructions for the CPU positioning function.

> ✎ **Point**
>
> - **This is only valid when "KV-5500," "KV-5000," "KV-3000," "KV-1000," or "KV-700/700+M" is selected for the PLC model.**
> - **To use the CPU built-in positioning function, you not only have to enter instructions, but you also have to set the positioning parameters separately.**
>   📖 **"CPU Positioning Parameter Settings" (page 12-10)**

1 Select the cell in which you want to enter the instruction, and then select the instruction to enter from the toolbar (symbols for CPU positioning).

The "Operand" dialog box is displayed.

> **Reference** Since JOGX, JOGY, ORGX, ORGY, TCHX, and TCHY instructions do not have operands, the symbols are displayed for these instructions without the "Operand" dialog box being displayed.

2 Specify an operand, and then click the "Overwrite" button.

Item		Description
Operand	Value	Enter a device number.
	Comment	Enter a comment here.
Type list		Display the types of devices that can be used for the selected operand.
Operand explanation		Display explanation of the selected operand.

> **Reference**
> - For details on the characters that cannot be used in comments, see 📖 "App 2 List of Characters That Cannot Be Used" (page A-40).
> - If you click the "OK" button without specifying an operand, the unspecified operand appears as "???".

???
─[PLSX]─   When the first operand is not specified for a PLSX instruction

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Entering instructions from a source such as the device comment edit window

Enter an instruction (a contact or coil) by dragging it from the device comment edit window or the "Device use list" dialog box.

> **Reference** You can only enter bit devices (including bit device specifications of word devices) from the device comment edit window or the "Device use list" dialog box.

■ Clicking and dragging devices to enter them in ladder programs

Click the number of the device in the device comment edit window or "Device use list" dialog box that you want to enter in the ladder program, and then drag the device to the desired cell in the ladder edit window.
An LD instruction is entered in the cell that you drop the device.

Click a device, and then drag it to the ladder program.
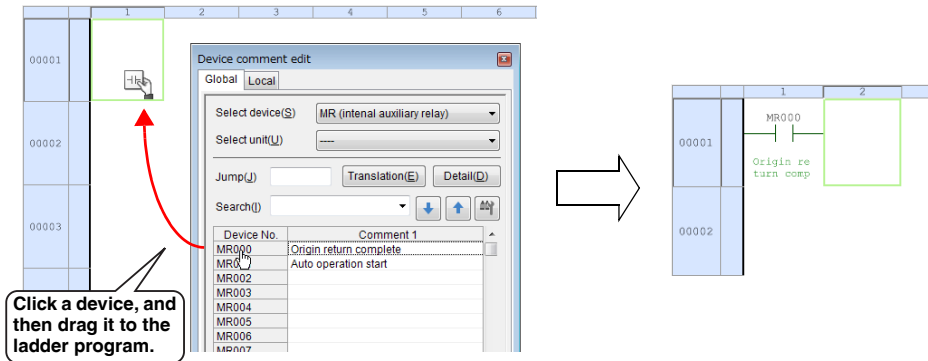
> **Reference** When a device is dragged from a ladder program to the device comment edit dialog box, the cursor moves to the device.

■ Right-clicking and dragging devices to enter them in ladder programs

When you click a device and then drag it to the ladder program, an LD instruction is inserted, but you can select the instruction by right-clicking a device and then dragging it to the ladder program.

1 **Right-click the number of the device in the device comment edit window or "Device use list" dialog box that you want to enter in the ladder program, and then drag the device to the desired cell in the ladder edit window.**

Right-click a device, and then drag it to the ladder program.

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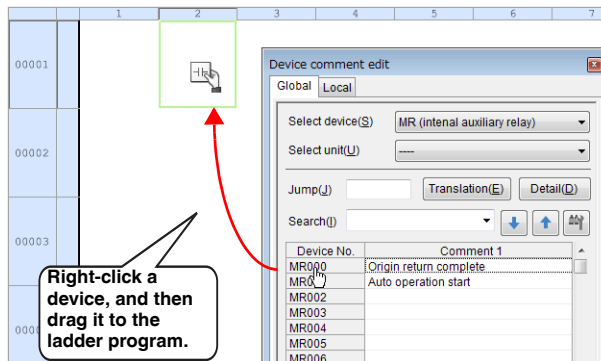
2 Select the instruction from the menu that appears.

The selected instruction is entered.
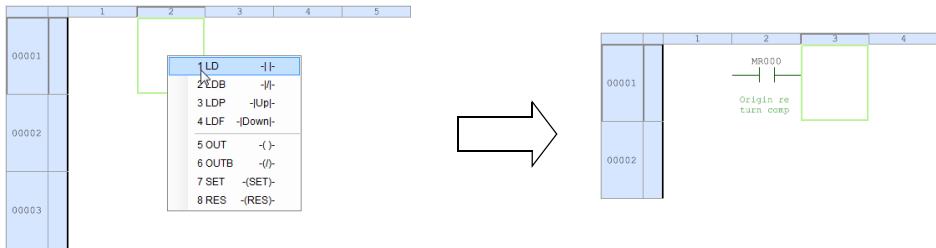
| Reference | Instructions that cannot be entered in the cell are disabled in the menu. |

Deleting Instructions

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Select the cell in the ladder edit window containing the instruction that you want to delete, and then press [Delete] .

Specifying the Default Suffix

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"View(V)" ▶ "Toolbar(T)" ▶ Suffix(F)

You can omit the entry of suffixes by specifying the default suffix before you enter instructions. In the initial settings, the default suffix is set to "U" (no suffix).
For details on suffixes, see the 📖 KV-8000/7000/5000/3000/1000 Series and KV Nano Series Instruction Reference Manual.

Select a suffix from the "Suffix" list to set the default suffix.
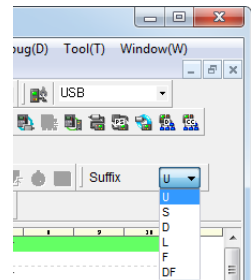
| Reference | Even if a default suffix has been set, you can use direct entry to specify a suffix and ignore the default suffix that has been set. |

6

VIEW

This chapter describes the various display functions.

This section describes the functions contained in the "View (V)" menu.

Toolbar and Status Bar

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"View(V)" ▶ **"Toolbar(T)"**

▶ **"Status bar(S)"**

Click the "View (V)" menu ▶ "Toolbar (T)" or "Status bar (S)" to display or hide the toolbar or status bar.

When a check mark is displayed:　　Displayed

When a check mark is not displayed: Hidden

6

VIEW

Toolbar

Status bar
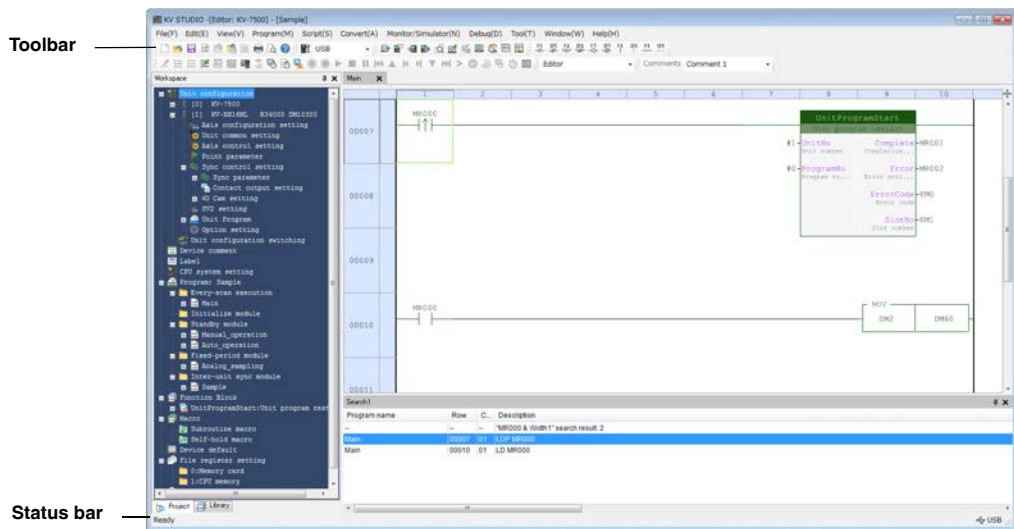
| Reference | • Click "Toolbar (T)" to display a sub-menu with the types of available toolbars.
• Each time that you click these menu items, the corresponding item toggles between being displayed and being hidden. |

Workspace

"View(V)" ▶ **"Workspace(K)"** Alt + 1

Click the "View (V)" menu ▶ "Workspace (K)" to display or hide the workspace.

■ Using tabs to switch the display

● In the editor mode

If the KV STUDIO editing mode is "Editor", the "Project" tab (which shows the unit configuration and module configuration of ladder program) and the "Library" tab (which shows the system function block and system macro) can be selected [*].
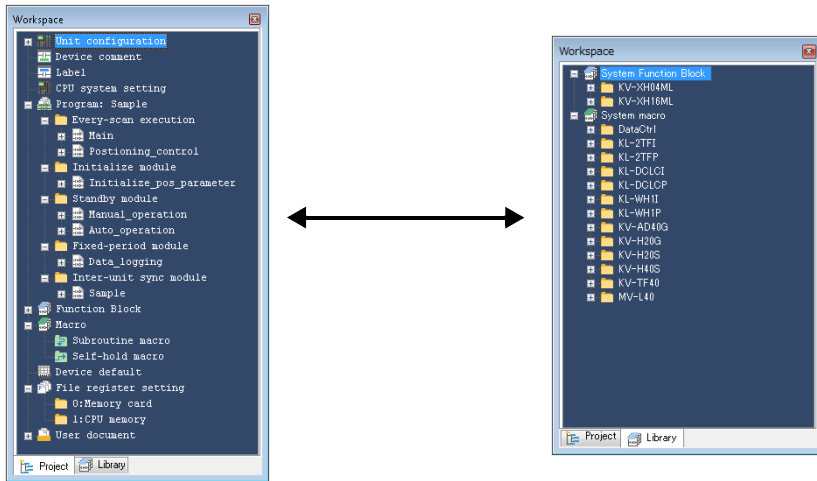
Selecting "Project" tab

Selecting "Library" tab

* The library tab is enabled only if the selected model is "KV-8000/7500/7300/5500/5000/3000/1000".

6

VIEW

● **Monitor, online edit, simulator, or simulator edit[*1]/Replay[*2] mode**

When the KV STUDIO edit mode is "Monitor", "Online edit", "Simulator", "Simulator edit[*1]",or "Replay [*2]" the "Project" tab (which shows the unit configuration and module configuration of ladder program) and the "Monitor" tab (which shows the operation status of program) are enabled.[*3]
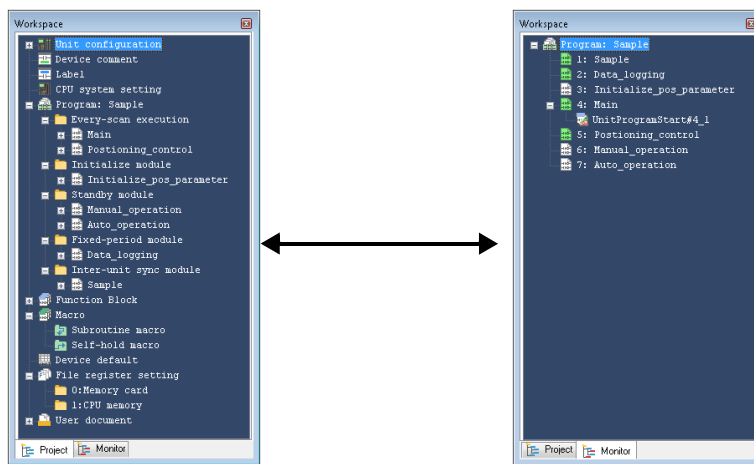
"Project" tab selected   "Monitor" tab selected

*1 Simulator edit can be used only when the selected PLC model is "KV-8000/7500/7300".
*2 Replay can be used only when "KV-8000" is selected as the PLC model.
*3 The "Monitor" tab can be selected only when "KV-8000/7500/7300/5500/5000/3000/1000", or "KV Nano Series" is selected for the PLC model.

"Project" tab

This section describes the items that are displayed when you select the "Project" tab in the workspace.

■ Unit configuration

The units set with and relays and DM entries assigned with the Unit Editor are displayed.
In addition, you can display the built-in function monitor and unit monitor.

> Reference The unit configuration is displayed only when "KV-8000/7500/7300/5500/5000/3000/1000/700/700+M", or "KV Nano Series" is selected for the PLC model.

● Right-click menu for unit configuration

The following menu is displayed when you right-click "Unit configuration" or one of the units that has been set.

Item	Explanation
Unit Editor	The Unit Editor starts. 📖 "Chapter 3 UNIT EDITOR" (page 3-1)
Display device assignment	The relay display method is changed to display device assignments.
CPU positioning parameter setting	The "CPU positioning parameter setting" dialog box is displayed when the KV-5500/5000/3000/1000 or KV Nano Series is connected. 📖 "2-12 Motor (positioning) control" in the KV-5500/5000/3000 Series User's Manual 📖 "5-2 Motor (Positioning) Control" in the KV Nano Series User's Manual.
CPU High-speed counter setup wizard	The high-speed counter setting wizard starts when the KV-5500/5000/3000/1000 or KV Nano Series is connected. 📖 "2-8 High-speed counter" in the KV-5500/5000/3000 Series User's Manual 📖 "5-4 High-Speed Counter" in the KV Nano Series User's Manual.
Logging/trace setting	The "Logging settings list" dialog box is displayed when the KV-8000/7500/7300/5500/5000/3000/1000/NC32T is connected. 📖 "5-4 Logging/tracing" in the KV-8000 Series User's Manual 📖 "5-4 Logging/tracing" in the KV-7000 Series User's Manual 📖 "2-3 Logging/tracing" in the KV-5500/5000/3000 Series User's Manual 📖 "5-7 Tracing" in the KV Nano Series Base Unit (terminal block type) User's Manual 📖 "5-7 Logging/tracing" in the KV Nano Series Base Unit (connector type) User's Manual.
Built-in Function Monitor	The Built-in Function Monitor is displayed when CPU unit is connected. See 📖 "9-5 Built-In Function Monitor" (page 9-63).
Unit Monitor	The monitor for each unit is displayed. See 📖 "9-8 Unit Monitor" (page 9-106).
Unit trace	It is displayed for KV-8000/7000 series expansion unit (X-Unit).
Camera monitor	Displayed for KV-CA02.
Communication test	It is displayed for KV - XLE 02 and KV - X L 402 / X L 202.
Communication monitor	
Trial run	This is displayed when the KV-XH16ML/XH04MLL/XH16EC is used.
Synchronization control	
Servo monitor	This is displayed when the KV-XH16ML/XH04ML is used.
Servo trace	
Tuning	
Initialization and setting adjustment	
Restart slave device	
MOTION BUILDER	This is displayed when the KV-H20/H20S/H40S/H20G is used.
KV-LH20V setting (Communication positioning parameter setting)	This is displayed when the KV-LH20V is connected.
PROTOCOL STUDIO	This is displayed when the KV-L21V/L20V/L20R is connected.

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VIEW

Item	Explanation
Mail setting	This is displayed when the KV-8000, KV-7500, KV-5500, KV-5000, KV-XLE02, KV-EP21V, KV-LE21V, KV-LE20V, or KV-NC1EP is connected.
Mail communication instruction Maker	📖 KV-XLE02 User's Manual 📖 KV-LE21V User's Manual 📖 KV Series Ethernet/IP Function User's Manual.
EtherNet/IP setting	This is displayed when the KV-8000, KV-7500, KV-5500, KV-XLE02, KV-EP21V, or KV-NC1EP is connected. 📖 KV Series Ethernet/IP Function User's Manual. 📖 KV-XLE02 User's Manual
Sensor application	
KV DATALINK+ for EtherNet/IP	
Sensor I/O monitor	
Cyclic (I/O) messages communication error monitor	
Start connection	
Stop connection	
Simple PLC link setting	Displayed in KV-8000, KV-7500, KV-5500, KV-5000 Ver.1.1 or later, KV-XLE 02 (only for FTP client setting), KV-EP 21 V, KV-LE 21 V (only when the expansion function is set to "Used"), KV- NC1EP.
FTP client setting	📖 KV-LE21V User's Manual 📖 KV Series Ethernet/IP Function User's Manual. 📖 KV-XLE02 User's Manual
KV-DN20 Setup	This is displayed when the KV-DN20 is connected. 📖 KV-DN20 User's Manual
KV-CL20 Setup	This is displayed when the KV-CL20 is connected. 📖 KV-CL20 User's Manual
MV LINK STUDIO	MV LINK STUDIO starts. 📖 MV LINK STUDIO User's Manual
KV-ML/MC setup (KV MOTION+)	This is displayed when the KV-ML16V/MC40V/MC20V is connected.
Error monitor window	This is displayed when the KV-7500/7300/5500/5000/3000 or KV Nano Series is connected. 📖 "Error Monitor" (page 11-16)
Event/error monitor	Supported by the KV-8000 series. 📖 "Event/Error Monitor" (page 11-13)
Scan time monitor	This is displayed when the KV-8000/7500/7300/5500/5000/3000 or KV Nano Series is connected. 📖 "Scan Time Monitor" (page 11-19)
Performance monitor	This is displayed when the KV-5000/3000 Series with CPU function version 2.0 or later, KV-8000/7000 Series or KV Nano Series is connected. 📖 "Performance Monitor" (page 11-21)
Change Model	The "Change model" dialog box is displayed. 📖 "Changing the Model" (page 4-20)
Serial PLC Link setting	This is displayed when the Serial PLC Link function is set to be used for the KV-LM21V or KV Nano Series.

● Switching the unit configuration

Double-click "Unit configuration switching," which is displayed at the bottom of the unit configuration, to display the "Unit configuration switching" dialog box.

📖 "Switching the Unit Configuration" (page 12-3)

Reference	Use unit configuration switching for equipment such as that in which the project details, such as the ladder program, are the same and only the unit configurations are different. You can use this function to centrally manage according to projects the projects that have traditionally been managed according to equipment.

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■ **Device comments**

Double-click "Device Comment" to display the "Device Comment Edit" window.

📖 "Displaying the Device Comment Edit Window" (page 6-23)

■ **Variable**

Double-click "Variable" to display "Variable Edit Window".

📖 "Variable Edit Window" (page 6-29)

■ **Structure**

Double-click "Structure" to display the "New Structure" dialog.

📖 "Structure" (page 6-32)

■ **Labels**

Double-click "Edit labels" to display the "Edit labels" window.

📖 "Displaying the Label Edit Window" (page 6-33)

■ **Operation recorder setting**

Display the operation recorder settings in the project being edited by ID, and perform management related to operation recorder settings such as creation or deletion.

For details on the operation recorder settings, refer to 📖 "KV-8000 Series User's Manual".

> Reference⌐ The operation recorder setting is displayed only when "KV-8000" is selected as the PLC model.

● **Right-click menu during the operation recorder setting**

Right-click the set ID to display the following menu.

Item	Explanation
Copy	Copy the operation recorder setting of the selected ID.
Paste	Paste the copied operation recorder setting.
New	Perform new operation recorder setting.
Delete	Delete the operation recorder setting of the selected ID.
Set	Change the operation recorder setting of the selected ID.

■ CPU system settings

Set various parameters related to the program and system.

> **Reference** This setting is displayed only when "KV-8000/7500/7300/5500/5000/3000/1000", or "KV Nano Series" is selected for the PLC model.

● Program settings

Module execution sequence setting

Set the module execution sequence.

　　📖 "Module execution sequence settings" (page 6-49)

Fixed period execution and user interrupt settings

Set the period of fixed period modules and the interrupt priority order.

　　📖 "Fixed-period execution and user interrupt settings (KV-8000/7000 Series)" (page 6-50)
　　📖 "Fixed-period execution and user interrupt settings (KV-5000/3000 Series)" (page 6-52)

Scan time related settings

Set the fixed scan time operation and the END processing time.

　　📖 "Scan time related settings" (page 6-56)

Protection settings

Configure the settings related to CPU protection.

　　📖 "Protection settings" (page 6-57)

Other settings

Configure other program related settings.

　　📖 "Other Settings" (page 6-58)

● System settings

Overall local device assignment settings

Set the assignments of global devices, local devices, and workspace devices for local labels and scripts.

　　📖 "Overall local device assignment settings" (page 6-59)

Device settings for each program

Set the number of local devices to use for each program.

　　📖 "Device setting for each program" (page 6-63)

CPU unit buffer capacity setting

Set the buffer capacity on the CPU unit for logging and tracing.

　　📖 "CPU unit buffer capacity setting" (page 6-64)

Device recorder buffer capacity setting

Set the device recorder buffer capacity of the CPU itself.

　　📖 "System Settings" (page 6-59)

> **Reference** The device recorder buffer capacity setting is displayed only when "KV-8000" is selected as the PLC model.

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Power off holding

Configure the settings related to power off holding for each device.

With the KV-8000/7000/5000/3000 Series, the devices that you can set power off holding for are R (relay), B (Link relay), DM (data memory), EM (expanded data memory), ZF (file register, consecutive number method), W (link register), and C (Counter).

With the KV-1000 Series, the MEMSW instruction is used to set the power off holding of devices.

With the KV Nano Series, the power off holding can be set to a total of 3072 words for DM (data memory), W (link register), and C (counter) only.

📖 "Power off holding settings" (page 6-66)

Actions when errors occur

Configure the settings related to the CPU unit's operating status and the error history when various errors occur.

📖 "Setting actions when errors occur" (page 6-69)

Event / error setting

Perform settings related to the operating status of the CPU unit and event / error log when various events or errors occur.

📖 "Event/error setting" (page 6-71)

> Reference ┐ The event/error setting is displayed only when "KV-8000" is selected as the PLC model.

Upper limit of digital trimmer

Set the upper limit of the digital trimmer.

📖 "Setting the upper limits of the digital trimmers" (page 6-72)

Access window settings

Configure other access window settings.

📖 "Access Window Settings" (page 6-73)

Other settings

Perform the settings related to the transfer of data used by the ladder monitor function of the VT5-WX series.

📖 "Other Settings" (page 6-75)

■ **Programs**

This section describes how to manage modules, such as creating a new one or deleting an existing one.
Also, types of modules can be displayed.
For details on module, refer to the User's Manual of the CPU unit used.

● **Right-click menu of program**

When you right-click "Program" or a registered module, the following menu appears.

Item	Explanation
Copy program list to clipboard.	Copy all program names to the clipboard. It appears only when you right-click a program. Module names are copied in their execution order.
Copy	Copy the selected program.
Paste[*1]	Paste the copied program.
Rename	Change the name of the selected program.
Set password	Display the "Setting password" dialog box.
Remove password	Display the "Removing password" dialog box.
New[*1]	Create a new program.[*4]
Open	Open the selected program.[*4]
Delete[*1]	Delete the selected program.[*4]
Disable/enable program[*1]	Disable the selected program. Selecting it again enables the program. Disabled programs are not transferred to the CPU unit.[*4]
Device settings for each program[*1]	Set the maximum number of local devices to use for each program. 📖 "Setting Local Devices for Each Program" (page 8-6)
Module Execution Sequence Settings[*1]	Display "Module execution sequence" in the "CPU system setting" dialog box.[*4]
Fixed-period execution and user interrupt setting[*2,*3]	Display "Fixed-period execution and user interrupt setting" in the "CPU system setting" dialog box.[*4] 📖 "Fixed-period execution and user interrupt settings (KV-8000/7000 Series)" (page 6-50) 📖 "Fixed-period execution and user interrupt settings (KV-5000/3000 Series)" (page 6-52)
Import programs[*1]	Import programs from another project. 📖 "Importing Programs" (page 4-7)
Start module[*2]	Start a module that has stopped (standby).[*4]
Stop module[*2]	Stop a running module.[*4]
Properties	Display properties of a program.[*4]

*1 Available only if the selected model is "KV-8000/7500/7300/5500/5000/3000/1000" or "KV Nano Series".
*2 Available only if the selected model is "KV-8000/7500/7300/5500/5000/3000" or "KV Nano Series".
*3 If a KV Nano Series model is selected, "User interrupt setting" is not displayed.
*4 For details on menu, see 📖 "About Programs" (page 7-2).

■ Function block

You can display, by type, function blocks registered in the project being edited, and manage function blocks such as creating or deleting them.

For detail on function block, refer to 📖 "KV-8000 Series User's Manual" and 📖 "KV-7000 Series User's Manual".

> | Reference | Function blocks are displayed only if the selected model is "KV-8000/7500/7300".

● Right-click menu of function block

When you right-click a registered function block, the following menu appears.

Item	Description
Copy	Copy the selected program.
Paste	Paste the copied program.
Rename	Change the name of the selected program.
Set password	Set a password to the selected program.
Remove password	Remove the password of the selected program.
New	Create a new program. [*1]
Open	Open the selected program. [*1]
Delete	Delete the selected program. [*1]
Disable/enable program	Disable the selected program. Selecting it again enables the program. Disabled programs are not transferred to the CPU unit. [*1]
Device settings for each program	Set the maximum number of local devices to use for each program. 📖 "Setting Local Devices for Each Program" (page 8-6)
Arguments	Set arguments to the selected program. [*1]
Import programs	Import programs from another project. 📖 "Importing Programs" (page 4-7)
Library registration	Register the selected program as a user function block in the library. 📖 ""Library" tab" (page 6-15)
Cross reference	Create a cross reference for the selected program. 📖 "Cross References" (page 5-16)
Program properties	Display properties of a program. [*1]

*1 For details on menu, see 📖 "About Programs" (page 7-2).

■ Macros

Display the macros registered to the project being edited with the macros categorized by type, and perform macro management such as the creation of new macros and the deletion of existing ones. For details on each macro, see the User's Manual of the CPU unit used.

> **Reference** Macros is displayed only when "KV-8000/7500/7300/5500/5000/3000/1000" or "KV Nano Series" is selected for the PLC model.

● Right-click menu for macros

When you right-click a registered macro, the following menu appears.

Item	Description
Copy	Copy the selected program.
Paste	Paste the copied program.
Rename	Change the name of the selected program.
Set password	Set a password to the selected program.
Remove password	Remove the password of the selected program.
New	Create a new program.[*1]
Open	Open the selected program.[*1]
Delete	Delete the selected program.[*1]
Disable/enable program	Disable the selected program. Selecting it again enables the program. Disabled programs are not transferred to the CPU unit.[*1]
Device settings for each program	Set the maximum number of local devices to use for each program. 📖 "Setting Local Devices for Each Program" (page 8-6)
Arguments	Set arguments to the selected program.[*1]
Import programs	Import programs from another project. 📖 "Importing Programs" (page 4-7)
Program properties	Display properties of a program.[*1]

*1 For details on menu, see 📖 "About Programs" (page 7-2).

■ Device default values

This is used to set the default device values that are read when the CPU unit turns on.
The devices that you can set default values for are R (relay), MR (internal auxiliary relay), B (link relay), DM (data memory), EM (expanded data memory)[*], W (link register), and ZF (file register, consecutive number method).[*]

* This option is not available for the KV Nano Series.
📖 "Setting Device Default Values" (page 12-5)

> **Reference** Device default values is displayed only when "KV-8000/7500/7300/5500/5000/3000", or "KV Nano Series" is selected for the PLC model.

■ **File register settings**

Register information to be written to FM (file register) devices. When data is transferred, this information will be saved to the CPU unit's memory card.
Up to 1000 patterns of information can be registered. Use instructions dedicated for use with file registers to read this information from the memory card.

📖 "File Register Settings" (page 12-7)

> **Reference** File register settings is displayed only when "KV-8000/7500/7300/5500/5000/3000" is selected for the PLC model.

■ **User documents**

Transfer any file to the CPU memory user memory area or to a memory card.
Documents such as specifications and procedures can be managed together with projects in the PLC.

> **Reference** User documents is displayed only when "KV-8000/7500/7300" is selected for the PLC model.

● **Transferring from a PC to the PLC**

1 **Select and right click the transfer destination drive, and select "Open folder (O)".**

The folder in which user documents are stored opens.
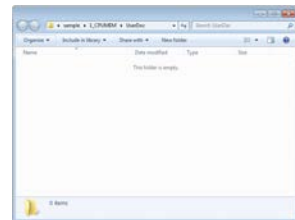
2 **Place the file to transfer in the folder.**
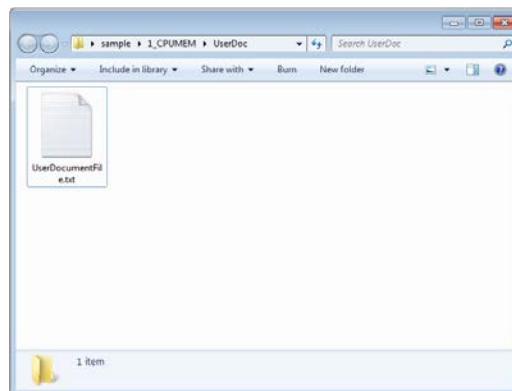
3 **Click the "Monitor/Simulator (N)" menu ▶ "Transfer to PLC (W)".**

4 **Make sure that "User Document" is checked and click "Execute".**

The document is sent to the PLC.

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● **Reading from the PLC to a PC**

1 **Click the "Monitor/Simulator (N)" menu ▶ "Read from PLC (R)".**

2 **Make sure that "User Document" is checked and click "Execute".**

3 **Select and right click the drive to read from, and select "Open folder (O)".**

The folder in which user documents are stored opens, and the user documents that have been read are stored in the folder.
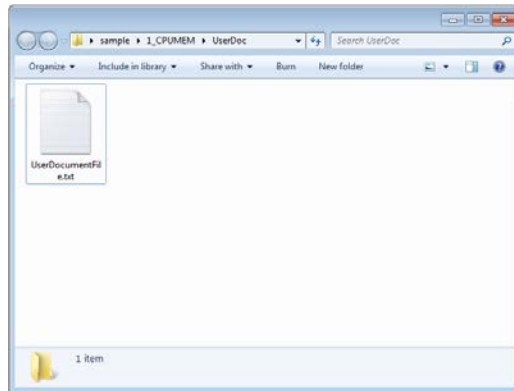
> | Reference | Files in CPU memory or a memory card can also be transferred/read from "Tool (T)" →
> "Storage device transfer tool (3)".
> 📖 "Storage Device Transfer Tool" (page 12-32)

"Library" tab

This section describes the display when the "Library" tab of a workspace area is selected.

> **Reference** The "Library" tab is displayed only if "KV-8000/7500/7300/5500/5000/3000/1000" is
> selected and KV STUDIO's editing mode is "Editor".

■ Application package

Displays the application package(s) that can be used with KV-8000 Series and KV-7000 Series with
CPU function version 2.1 or later.

● Application package right-click menu

The following menu is displayed when you right click "Application package".

Item	Description
Register an application package	Select a .fz1 file and then register the application package.

● How to use application packages

Double click the application package you want to use in the workspace, or drag it and drop it onto the
ladder edit window for the module you want to place it in.
If you enter each item when the [Application package] dialog box is displayed, a function block will be
placed in the ladder program, the function block will be registered in "Project" → "Function block" in
the workspace, and a unit program will be registered according to the content.

■ System function block

The dedicated system function block is provided by some units and is available according to the
purpose of a unit.

● Right-click menu of system function block

When you right-click "System function block", the following menu appears.

Item	Description
Register a system function block.	Select a .fz1 file and then register the system function block.

● How to use system function block

From the workspace area, drag a system function block and then drop it to the ladder edit screen of a
desired module.
The function block is placed in the ladder program and registered in the workspace area's "Project"
▶ "Function block".

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■ **System macro**

The dedicated system function block is provided by some units and is available according to the purpose of a unit.

● **How to use system macro**

From the workspace area, drag a system macro and then drop it to the ladder edit screen of a desired module.

A macro start instruction (MSTRT instruction) is added to the ladder program and registered in the workspace area's "Project" ▶ "Macro" ▶ "Self-hold macro".

■ **User function block**

Displays the function blocks/functions the user has created and registered.

● **Registering to user function block**

Select the function block in the Project tab and execute [Register in library] from the right click menu.

Alternative procedure   With the project tab and the library tab side by side dragged, you can specify the position to be added by draging the function block in project tab and droping it to where under the user function block in library tab.
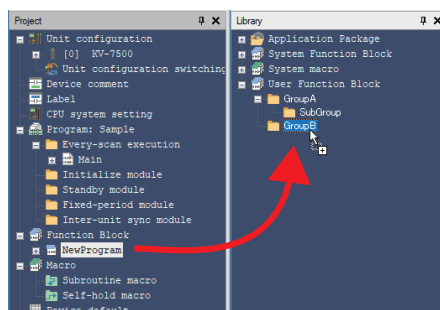
● **Using user function blocks**

Drag the function block to use from the library tab and drop it onto the module.

The function block will be registered in the project tab.

Reference   The function blocks/functions nested and used in the function block/function will also be registered in the project tab.

"Monitor" tab

This section describes the display when the "Monitor" tab of a workspace area is selected.

| Reference | The "Monitor" tab is displayed if "KV-8000/7500/7300/5500/5000/3000/1000" or "KV Nano Series" is selected and KV STUDIO's editing mode is "Monitor", "Online edit", "Simulator", "Simulator edit" or "Replay". |

■ Programs

You can execute or stop programs created during a monitor, online edit, simulator, simulator edit or replay process.
For details on macro, refer to the User's Manual of the CPU unit used.
For details on function block, refer to the 📖 "KV-8000 Series User's Manual" 📖 "KV-7000 Series User's Manual".

● Right-click menu of program

When you right-click a registered program, the following menu appears.

Item	Description
Open	Open the selected macro.
Device settings for each program	Display "Device settings for each program" in the "CPU system setting" dialog box 📖 "Device setting for each program" (page 6-63)
Module execution sequence setting	Display "Module execution sequence setting" in the "CPU system setting" dialog box. 📖 "Module execution sequence settings" (page 6-49)
Start module*1	Start the selected module.
Stop module*1	Stop the selected module.
Properties	Display properties of the selected program.

*1 It is displayed only if the model is "KV-8000/7500/7300/5500/5000/3000" or "KV Nano Series".

Output Window

View(V) ▶ **Output window(O)**   ▶ **Convert(C)**

▶ **Search 1(S)**

▶ **Search 2(E)**

▶ **Verify(V)**

▶ **Output(J)**

▶ **Local assignment(A)**

▶ **Break history(B)**

Select the "View(V)" menu ▶ "Output window(O)", and then show or hide each output window.

```
Convert                                                              ▣
  Conversion result OK (number of errors: 0   number of warnings: 0)
      * Program capacity              624.572 kB/25165.824 kB (2.48%use)
      * Object size                   6.996 kB/14942.208 kB (0.05%use)
      * EtherNet/IP setting size      0.480 kB/2097.152 kB (0.02%use)
      * EtherNet/IP refresh setting size  0.020 kB/163.840 kB (0.01%use)
      * Total number of steps         53 / 1536000 (Total instructions: 50)
      * Internal workspace(bit)       6/131072
      * Internal workspace(word)      0/12288
      * User memory size              0.000 kB/41943.040 kB (0.00%use)
 Convert  Search1
```

Window	Explanation
Conversion	Display conversion result of a ladder program. 📖 "Convert" (page 8-2)
Search	In the search/replace dialog box, after a search is performed, if you click the "List view" button, the search result shown can be used as cross reference. 📖 "Cross References" (page 5-16)
Verify	Display the verification result of a project. 📖 "Verifying Projects" (page 4-4)
Output	Display a log of output to PLC.
Local assignment	Display the number of reserved local devices and local device assignment list for each program during ladder program conversion.
Break history	Display a history of break occurrence.

> **Reference** If you right-click the output window, and select "Save as text(K)", the content displayed in the output window can be saved to a text file (.txt).

Instruction/Macro/Pack Pallet

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

📒 **"View(V)"** ▶ **"Instruction/macro/pack pallet(I)"** Ctrl + Shift + P

If you select the "View(V)" menu ▶ "Instruction/macro/pack pallet(I)", the instruction, macro, or pack pallet is displayed.

Clicking "Instruction" tab, "Macro" tab, or "Pack" tab of the instruction/macro/pack pallet switches the display screen.

(Alternative procedure)

- Select a cell with no instruction input on the ladder diagram, and then press the ⏎ key.
- Align the pointer with a cell you want to input instruction on the ladder diagram, and then double-click it.

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■ **Instruction pallet**

A list of symbols (instruction, macro, and pack) that can be used in instruction/macro/pack pallet is displayed.
Because it is possible to drag a symbol from the "Instruction/Macro/Pack Pallet" window and drop it to the ladder edit window, you can input instruction like you are drawing a ladder diagram.
For details on how to input from instruction/macro/pack pallet, see ▭ "Entering Instructions" (page 5-39).
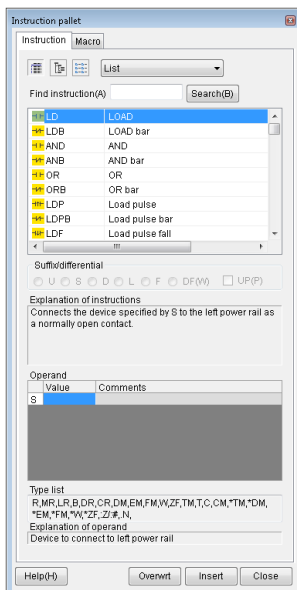
Item	Description
(list icon)	Display a list of symbols with simple explanation of their operation.
(tree icon)	Display symbols in the tree form.
(list icon)	Display symbols in a list.
List (dropdown)	You can select, by group, the instructions displayed in the list of symbols. Select "List, Basic instruction, Application instruction, Operation instruction or Expanded instruction".
Search for instruction	Enter an instruction in the right box, and then click "Search(B)" button to search for the instruction.
Suffix/differential	You can set this item when you select an instruction that permits it. When you select an instruction that does not permit you to set this item, the selection will be disabled. The default suffix is "U".
Explanation of instruction	Display an explanation of the operation of the selected symbol.
Operand	Enter a value and comment.
Type list	This displays a list of devices that can be set to the selected operand.
Operand explanation	Display explanation of the selected operand.

Sidebar: **6** VIEW

■ **Macro pallet**

List of macros
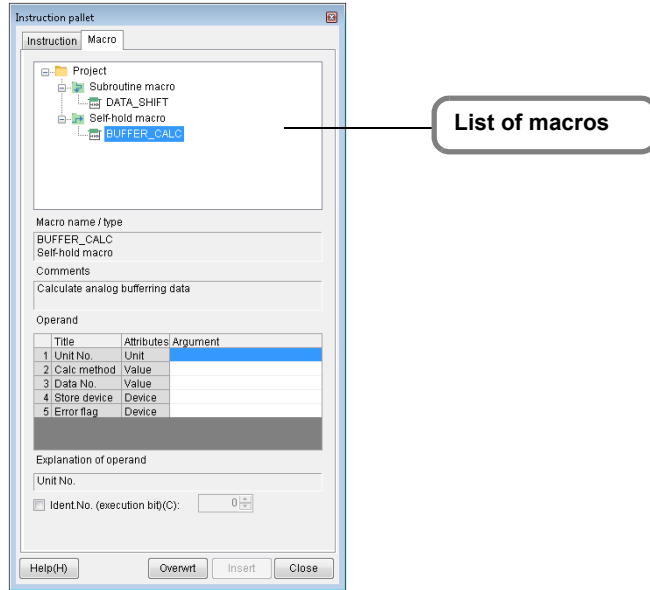
Item	Explanation
Macro name/type	Display the name and type of the selected macro.
Comment	Display content entered in the comment field of macro's properties.
Operand	Display the title/attribute of the argument of the selected macro. Enter the value of an operand.
Operand explanation	Explanation of the selected operand is displayed.
ID (execution bit)	When this check box is selected, you can set the macro ID number to an arbitrary value, so that the execution bit can be used in the ladder program.
Help	Display help for the macro and macro instruction.
Overwrite	Overwrite the instruction used to call the set macro in the editor.
Close	Exit the instruction/macro/pack pallet.

Reference ⌐ For macro details, see the User's Manual of the CPU unit used.

■ **Pack pallet**

| Reference | Pack pallet is displayed only when "KV-700" or "KV-700+M" is selected.
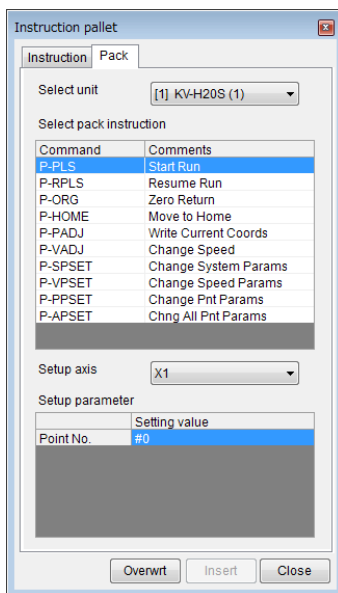
Item	Explanation
Select unit	Select from the position determination unit (KV-H20S/H40S/H40G) that has been set in the unit editor.
Select pack instruction	Select a pack instruction. For details on pack instruction, refer to 📖 "9-3 Positioning unit pack instruction" in the KV-700 User's Manual.
Axis setup	Select an operation axis.
Parameter setting	Set parameters. The parameters change depending on the selected pack instruction.
Help	Start the PDF help for pack instruction.
Overwrite	Overwrite the set pack instruction in the editor.
Close	Exit the pack instruction pallet.

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Displaying the Device Comment Edit Window

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

⊞ **"View(V)"** ▶ **"Device cmnt edit window(C)"** Ctrl + F7

Click the "View (V)" menu ▶ "Device cmnt edit window (C)" to display the device comment edit window.
Click the "Global" tab or "Local" tab of the device comment edit window to switch the screen that is
displayed. (The "Local" tab is only displayed when "KV-8000/7500/7300/5500/5000/3000/1000", or "KV
Nano Series" is selected for the PLC model.)
Click "Details" to change the displayed screen so that devices are displayed in detail.

Alternative procedure
• Double-click a device comment in the workspace.
• Right-click, and then select "Device cmnt edit window (K)" from the menu that appears.

Reference For details on the display of comments, see 📖 "Displaying Comments" (page 6-44).

Item		Explanation
Select device		Select the device whose comment you want to edit.
Select unit		Select the unit whose comment you want to edit.
Program selection*1		Select a program to edit its comment.
Register special device		Click this to register predefined comments of special devices.
Register unit device*2		Select a unit, and then click this to register the unit-characteristic predefined comments.
Details		Click this to switch to the detailed display.
Closes detail		Click this to close the detailed display.
Display mode	All devices	Select this option to display all devices.
	Used	Select this option to display only the devices that are being used by the ladder program.
	Unused	Select this option to display only the devices that are not being used by the ladder program.
Update		Click this to update information such as the local devices and the use statuses to the latest information.
Register comments/label		When this checkbox is selected, only the devices to which comments or labels are registered are displayed.
Display label		When this checkbox is selected, only the devices to which labels are registered will be displayed in the list.
Use status		If it is selected, the use status of the global or local device appears. If a program is selected from the list, the device use status of the selected program appears. If "----" is selected from the list, the use status of all devices in the project appears.
Translation		Display "Translation" dialog box.
Jump		The cursor moves to the specified device number.
Search		Enter a device comment or device number, and the cursor moves to the location of the search result.
⬇ (down arrow)		Click this to move the cursor to the next search result in the down direction.
⬆ (up arrow)		Click this to move the cursor to the next search result in the up direction.
🔍 (search option)		Click this to display the "Search option setting" dialog box.
Comment editing area		Display and enter comments for each device and comment set. Double click the comment set name to change the name, display order and whether the comment set is displayed.*3

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*1 This item is enabled only when "KV-8000/7500/7300/5500/5000/3000/1000", or "KV Nano Series" is selected for the PLC model.
*2 This item is enabled only when "KV-8000/7500/7300/5500/5000/3000/1000/700/700+M", or "KV Nano Series" is selected for the PLC model.
*3 Comment sets can be edited only when the selected PLC model is "KV-8000/7500/7300".

> **Reference** For details on the characters that cannot be used in comments, see 📖 "App 2 List of Characters That Cannot Be Used" (page A-40).

● Search option settings

Click 🔍 in the "Device comment edit" dialog box to display the following dialog box.

Alternative procedure Right-click the comment editing area in the "Device comment edit" dialog box, and then select "Search option" from the menu that appears.
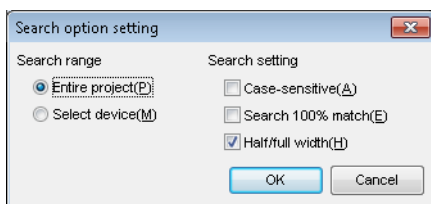
	Item	Explanation
Search range	Entire project	The entire project will be searched.
	Selected device	All of the device types currently displayed will be searched.
Case sensitive		When this checkbox is selected, a case-sensitive search will be executed.
Search 100% match		When this checkbox is selected, only items that exactly match the entered characters will be found as a result of searches.
Half/full width		When this checkbox is selected, half-width characters and full-width characters will be differentiated during searches.

● **Translating character strings**

Translate the strings by using the universal comment dictionary (Japanese, English, Simplified Chinese,Traditional Chinese, Korean, Spanish) that will be registered to the PC when KV STUDIO is installed.

> **Reference** You can also register additional words freely into the universal comment dictionary.
> 📖 "Universal Comments Dictionary Edit" (page 12-20)

1 **Drag the comment that you want to translate, and then click "Translation".**

"Translation" dialog box is displayed.
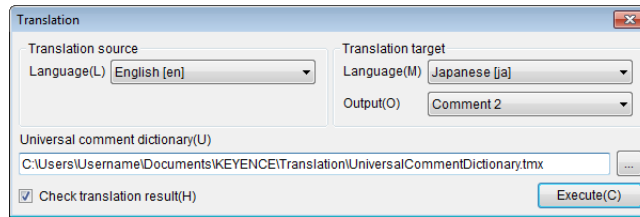
Item		Explanation
Translation source	Language	Select the translation source language.
Translation target	Language	Select the translation target language.
	Output	Select the comment set to store the strings after the translation.
Universal comment dictionary		Specify the universal comment dictionary to translate.
Check translation result		When this check box is selected, the dialog box is displayed to check the detailed results after executing the translation.

> **Reference** • You can change the languages that can be selected to the source language and the target language in the universal comment dictionary editing.
> 📖 "Universal Comments Dictionary Edit" (page 12-20)
> • When the comment set name is clicked, all of the comments displayed in the "Device comment edit" dialog box can be selected.

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2 Select the source language, target language and output, and click "Execute".

Translate character strings according to the universal comment dictionary.

When "Check the translation results" check box is not selected, the character strings after translation is stored to the output destination comment set.

When "Check the translation results" check box is selected, the dialog box in which you can check the detailed translation results is displayed.
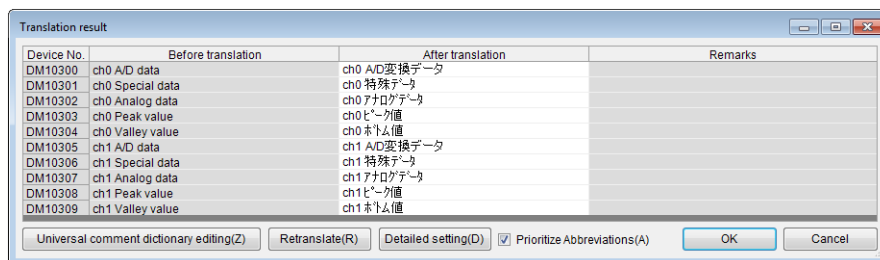
Item	Explanation
Device No.	Display the device of character strings that ran the translation.
Before translation	Display the character strings before translation.
After translation	Display the character strings after translation. Select this to edit character strings.
Remarks	Displays notes for the translation results.
Universal comment dictionary editing	Start "Universal Comment Dictionary Editing" dialog[1]
Retranslate	Execute translation again according to the universal comment dictionary.
Detailed settings	Specify the universal comment dictionary file (*.tmx) to retranslate.
Prioritize abbreviations	If the translated character string exceeds 32 characters, and two translated character strings are registered for the same character string in the universal comment dictionary editing, the shorter character string is used for the translation.[2]

*1 📖 "Universal Comments Dictionary Edit" (page 12-20)
*2 Abbreviations are registered in the order of "normal character string" → "character strings of abbreviation" to be used in the universal comment editing as shown below.
   Normally, the character string with a lower ID number is used for the translation.
      Setting example
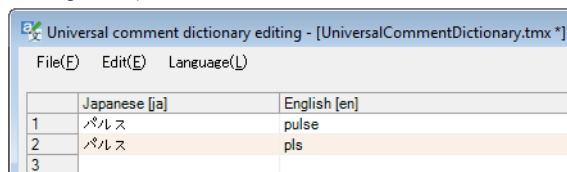
3 Check or edit the translation results, and then click "OK".

The translation is confirmed, and the translated character string is stored in the output target comment set.

■ **Registering device comments**

Register a device comment.

Click the comment editing area and register device comments.

Enter device comments for word devices in units of bits (this is only supported by the KV-8000/7500/7300, the KV-5500/5000/3000 with CPU function version 2.0 or later and by the KV Nano Series)

You can register device comments in units of bits for the following word devices in the device comment edit window.

- DM (data memory bit)
- EM (data memory bit)*
- FM (file register bit)*
- W (link register bit)
- ZF (file register bit; consecutive number method)*
- TM (temporary memory bit)
- CM (control memory bit)
- * This item is not available for the KV Nano Series.

| Reference | You can register device comments for word devices in units of words or in units of bits.

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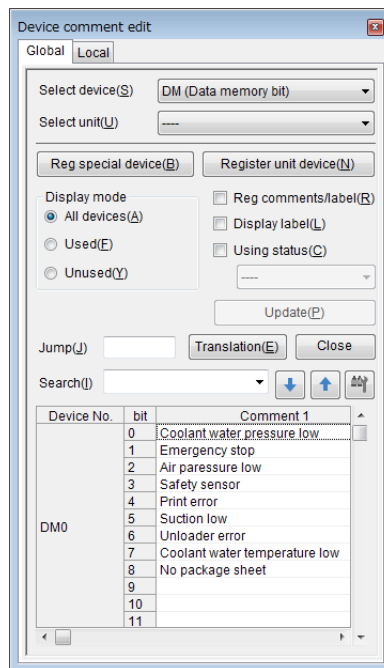
■ **Right-click menu for the comment editing area**

The following menu is displayed when you right click the comment editing area.

Item	Explanation
Undo	Cancel the previous operation.
Redo	Cancel the operation that was undone with "Undo."
Cut	Cut the selected area.
Copy	Copy the selected area.
Paste	Paste the cut or copied data at the cursor position.
Delete	Delete the selected area.
Move together with bit comments in word	Move the device comments registered in units of bits together with the other device comments of the word device.
Copy with the device No.	Copy the comment of the selected area with the device number.
Search the next point.	Move the cursor to the next search result in the down direction.
Search upwards	Move the cursor to the next search result in the up direction.
Search option	Display the "Search option setting" dialog box.
Translation	Display the "Translation" dialog box.
Replace	Replace a character string in the comment edit window.
Cross reference	Create a cross reference.
Register unit device	Register a unit device comment.

> **Reference** You can copy and paste data between KV STUDIO and Microsoft Excel.
> ($\boxed{\text{Ctrl}}$ + $\boxed{\text{C}}$ and $\boxed{\text{Ctrl}}$ + $\boxed{\text{V}}$)

● **Replacing character strings**

Replace a character string in the comment edit window.

1 **Right-click the comment editing area and then select "Replace" (or press $\boxed{\text{Ctrl}}$ + $\boxed{\text{H}}$).**

The "Device comment edit window (replace)" dialog box is displayed.

Item		Explanation
Search string		Enter the character string to search for. Click ▼ to display a pulldown menu with a list of the last 10 selected items.
Replace string		Enter the character string to replace found strings with. Click ▼ to display a pulldown menu with a list of the last 10 selected items.
Case sensitive		When this checkbox is selected, a case-sensitive search will be executed.
Search 100% match		When this checkbox is selected, only items that exactly match the entered characters will be found as a result of searches.
Replace range	Entire project	The replacement will be performed on the entire project.
	Select device	The replacement will be performed on all of the device types currently displayed.
	Select range	The replacement will be performed on the selected range.

2 **To replace individual character strings, click "Execute." To replace all character strings in a batch, click "Replace all."**

Variable Edit Window

View(V) ▶ Variable Edit Window(L)

Select "Display (V)" ▶ "Variable Edit Window (L)" from the menu.

Alternative procedure Double-click "Variable" in the workspace

No.	Item	Content
1	Global / Local tab	Switch between the global variable edit window and local variable edit window.
2	Variable name	Enter the variable name (128 half-width characters / 128 full-width characters).
3	Data type	Select the data type of the variable. BOOL/UINT/INT/UDINT/DINT/REAL/LREAL/STRING/ TIMER/COUNTER/Array / Structure / Function block
4	Assigned device	Set when manually assigning variables to devices of the CPU unit. Assignment is not mandatory. This item does not exist in the local variable edit window.
5	Value	When the constant is checked in item 7: Specifies the value of the constant when a variable is processed as constant. Since the variable is processed as a constant, it cannot be changed to a value other than the set value in the program. When the constant is not checked in item 7: Sets the initial value of the variable. It can be changed to a value other than the initial value in the program. When the assigned device is set, the initial value cannot be set in the variable edit window. Set the initial value of the assigned device in the device initial value setting.
6	Retain	Checked variables keep their values even when the power is turned off. The maximum number of variables that can be kept is 30000 including bits, words and counters. When the assigned device is set, the keep-alive setting should be performed for the set device. For details on the keep-alive settings, refer to "KV-8000 Series User's Manual".
7	Constant	Checked variables are processed as constants. Variables set as constants do not consume the work area.
8	Comment	Sets the comment of the variable (32 half-width characters / 32 full-width characters). The set comment is displayed in the KV STUDIO ladder edit window. Comments 1 to 8 can be set for one variable.

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■ Context Menu in Variable Edit Window

Right-click in the "Variable Edit Window" to display the following menus.

Item	Explanation
Move to global variable	This menu is displayed only in the local tab, which moves the selected local variable to global variable.
Cut	Cut the selected variable.
Copy	Copy the selected variable.
Paste	Paste the cut / copied variable.
Delete row	Delete the selected row.
Search	Search for a variable name in the variable edit window. Select the search target from "Variable name", "Assigned device" and "Value".
Replace	Replace a string in the variable edit window.
Translate	Translate the comment set in the variable.
Cross reference	Create a cross reference.
Read from ladder[1]	This menu is displayed only in the local tab. When clicked, unregistered labels used in the target module are loaded as local variables in bath.
Open	Display a list of members of structure type variables.
Close	Hide the list of members of structure type variables.

*1   Unregistered variables in the ladder edit window can also be registered by clicking "Register in local variables (1)" or "Register in global variables (2)" in the context menu.

> **Reference** You can copy and paste data between KV STUDIO and Microsoft Excel.
> (Ctrl + C and Ctrl + V)

● Search for string

Right-click in "Variable Edit Window" and select "Search (F)".

Alternative procedure   Ctrl + F
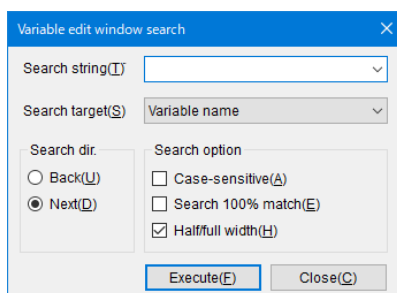
Item		Explanation
Search string		Enter the string to search for. When clicking the ▼ button, a pull-down menu is displayed, and a search string can be selected from the past 10 records.
Search target	Variable name	Search for variable names.
	Initial value	Search for the values set in the variable.
Search dir.	Back	Search upwards.
	Next	Search downwards.
Case-sensitive		Search by distinguishing uppercase and lowercase characters.
Search 100% match		Search for items that exactly match the entered characters only.
Half/full width		Search by distinguishing half-width and full-width characters.

● **Replace string**

Right-click in "Variable Edit Window" and select "Replace (H)".

Alternative procedure   ⌊Ctrl⌋ + ⌊H⌋
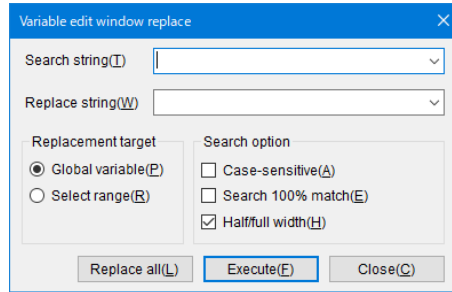
Item		**Explanation**
Search string		Enter the string to replace. When clicking the ▼ button, a pull-down menu is displayed, and a search string can be selected from the past 10 records.
Replacement string		Enter the replacement string. When clicking the ▼ button, a pull-down menu is displayed, and a replacement string can be selected from the past 10 records.
Replacement target*1	Global variable	Replace all global variables.
	Select range	Replace local variables in the range selected by dragging.
Replacement target*2	Program unit	Replace all local variables in the currently selected program.
	Select range	Replace local variables in the range selected by dragging.
Case-sensitive		Search by distinguishing uppercase and lowercase characters.
Search 100% match		Search for items that exactly match the entered characters only.
Half/full width		Search by distinguishing half-width and full-width characters.

*1   This is only displayed in the global tab.

*2   This is only displayed in the local tab.

Click the "Execute (F)" button for individual replacement. Click "Replace All (L)" for batch replacement.

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Structure

View(V) ▶ **Structure(J)** ▶ **New(N)**

▶ **Edit(E)**

Select "View (V)" ▶ "Structure (J)" ▶ "New (N)" from the menu.

Alternative procedure Double-click "Structure" in the workspace
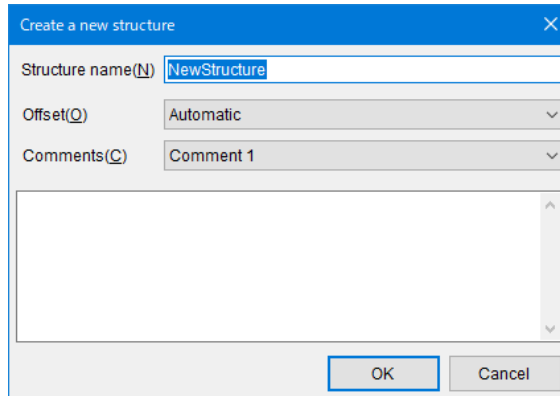
Item	Content
Structure name	Specifies the name of the structure. Up to 128 characters.
Offset	Selects the offset of each member of the structure from "Auto / Manual". For details on offset, refer to "KV-8000 Series User's Manual".
Comments	The string entered in the input field is displayed on the right of the structure name in the KV STUDIO workspace. Up to 8 types of comments 1 to 8 can be set.

Set the member name and data type, etc. of each member.
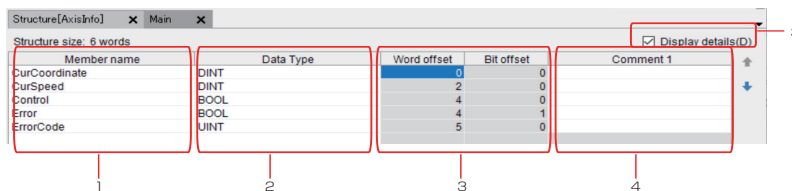
No.	Item	Explanation
1	Member name	Specifies the member name of the structure. Up to 128 characters.
2	Data type	Specifies the member name of the structure.
3	Detail display	Check to display word offset and bit offset.
	Offset	Displays the offset information of each member of the structure. When the offset is set to "Auto", the offset automatically set is displayed, and the background is grayed out and cannot be set. When the offset is set to "Manual", the word offset and bit offset can be entered for each member.
4	Comment	Sets the comment for each member. Up to 8 types of comments 1 to 8 can be set.

Displaying the Label Edit Window

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

▦ **"View(V)"** ▶ **"Label edit window(L)"**

Click the "View (V)" menu ▶ "Label edit window (L)." The dialog box that is displayed varies depending on the PLC model (the CPU unit used).

● **When the PLC model is the KV-8000/7500/7300/5500/5000/3000 or KV Nano Series**

When the selected PLC model is the KV-8000/7500/7300/5500/5000/3000 or KV Nano Series, you can register global labels and local labels by switching between the "Global" tab and "Local" tab.

"Global" tab

Configure global label registration settings.

Item	Explanation
Label name	Enter the label name.[4]
Data format	Specify the data format of the devices assigned to the global label.
Bit (BOOL)	Data is processed as bit type data.
1-word unsigned integer (UINT)	Data is processed as 16-bit unsigned data (the default suffix is U).
2-word unsigned integer (UDINT)	Data is processed as 32-bit unsigned data (the default suffix is D).
1-word signed integer (INT)	Data is processed as 16-bit signed data (the default suffix is S).
2-word signed integer (DINT)	Data is processed as 32-bit signed data (the default suffix is L).
Floating number (REAL)	Data is processed as single precision floating point real numbers (the default suffix is F).
Double floating number (LREAL)	Data is processed as double precision floating point real numbers (the default suffix is DF).
Text string (STRING)	Data is processed as character string data.[1]
Timer	Data is processed as a timer. Devices other than timer devices are not assigned.
Counter	Data is processed as a counter. Devices other than counter devices are not assigned.
Arrangement	Data is processed as the global label array when script programs are used.[2]
Device/constant	Specify the devices and constants assigned to the global label.[3]
Label comment	Set global label comments. You can set comments that are different from the comments of the assigned devices. (You can enter up to 32 half-width characters or 16 full-width characters.)
⬆ (up)	Click this to move the selected line up by one position. You cannot use this button when the sort function is enabled.
⬇ (down)	Click this to move the selected line down by one position. You cannot use this button when the sort function is enabled.
⬇ (enable sort function)	Click this to enable the sort function in the "Label Edit window."

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*1 When you specify character strings for the data format, the "Char size input" dialog box is displayed, so set the number of characters that can be entered in units of bytes.

*2 When you are writing script programs, this is processed as the global label array. You cannot use this array when you are creating ladder programs.

   📖 KV-8000/7000/5000/3000/1000 Series and KV Nano Series Script Programming Manual

*3 You can assign constants to global labels. Specify constants within the range of the specified data format.

*4 When the selected PLC model is KV-8000/7500/7300, 32 half-width or full-width characters can be entered. When it is KV-700/700+M/24(40)/10(16)/P16, 60 half-width characters or 30 full-width characters can be entered. When it is another device, 32 half-width characters or 16 full-width characters can be entered.

> **Reference**   The range of the device assigned to the label is displayed in the status bar of the "Label edit" window.
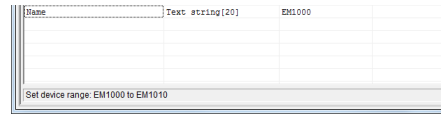
"Local" tab

Configure local label registration settings.
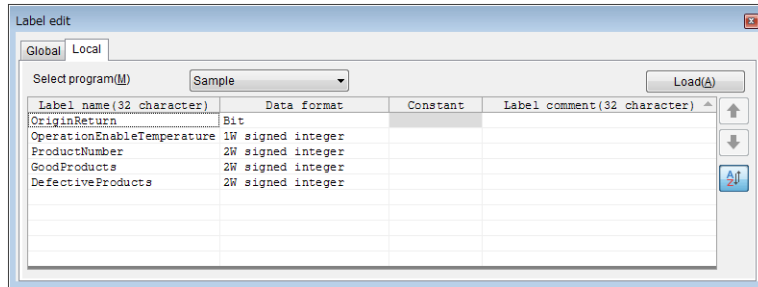
Item	Explanation
Program selection	Select a program to register local labels.
Load	Load and then register unregistered labels used by the program.
Label name[*1]	Enter the label name. [*5]
Data format	Specify the data format of the devices assigned to the local labels.
Bit (BOOL)	Data is processed as bit type data.
1-word unsigned integer (UINT)	Data is processed as 16-bit unsigned data (the default suffix is U).
2-word unsigned integer (UDINT)	Data is processed as 32-bit unsigned data (the default suffix is D).
1-word signed integer (INT)	Data is processed as 16-bit signed data (the default suffix is S).
2-word signed integer (DINT)	Data is processed as 32-bit signed data (the default suffix is L).
Floating number (REAL)	Data is processed as single precision floating point real numbers (the default suffix is F).
Double floating number (LREAL)	Data is processed as double precision floating point real numbers (the default suffix is DF).
Text string (STRING)	Data is processed as character string data.[*2]
Timer	Data is processed as a timer. Devices other than timer devices are not assigned.
Counter	Data is processed as a counter. Devices other than counter devices are not assigned.
Arrangement	Data is processed as the local label array when script programs are used.[*3]
Constant	Specify the constants assigned to the local labels.[*4]
Label comment	Set local label comments.[*5]
(up)	Click this to move the selected line up by one position. You cannot use this button when the sort function is enabled.
(down)	Click this to move the selected line down by one position. You cannot use this button when the sort function is enabled.
(enable sort function)	Click this to enable the sort function in the "label edit window."

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*1 The same label name can be used in different programs. However, if a local label has the same name as a global label, then the local label takes priority and will be used first.

*2 When you specify character strings for the data format, the "Char size input" dialog box is displayed, so set the number of characters that can be entered in units of bytes.

*3 When you are writing script programs, this is processed as the local label array. You cannot use this array when you are creating ladder programs.

📖 KV-8000/7000/5000/3000/1000 Series and KV Nano Series Script Programming Manual

*4 You can assign constants to local labels. Specify constants within the range of the specified data format.

*5 When the selected PLC model is KV-8000/7500/7300 you can enter up to 32 half-width or full-width characters, and when it is another device you can enter up to 32 half-width characters or 16 full-width characters.
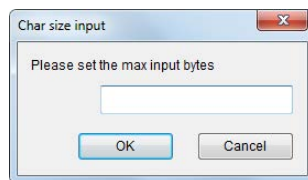
● When the PLC model is the KV-1000/700/700+M/P16/10/16/24/40

You can only register global labels.
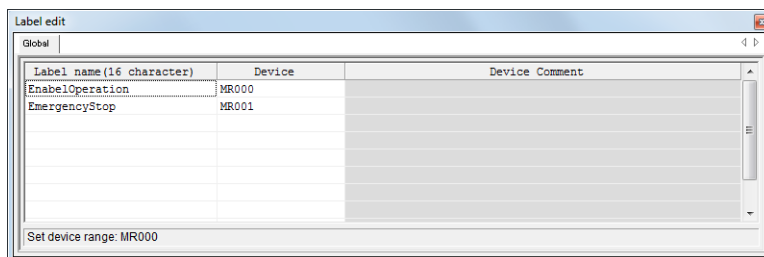
Item	Explanation
Label name	Enter the label name. (You can enter up to 16 half-width characters or 8 full-width characters.)
Device	Enter the device.
Device Comment	This displays the device comments.

Reference 📖 For details on the characters that cannot be used in labels, see 📖 "App 2 List of Characters That Cannot Be Used" (page A-40).

■ **Right-click menu for the label edit window**

The following menu is displayed when you right-click in the "Label edit window."

Item	Explanation
Cut	Cut the selected label.
Copy	Copy the selected label.
Paste	Paste the cut or copied label.
Batch-insert[*1]	Insert a batch of labels.
Insert Rung	Insert an empty rung at the selected rung.
Delete rung	Delete the selected rung.
INC insert[*1]	Additionally register the device at a position offset by one (+1) from the registered device directly above the selected one. This is known as "incremental registration."
Batch-change data format[*1]	Change all data formats as a batch.
No assort	Restore the sorted labels to their previous order.
Sort by label name	Sort the label names into ascending order. If you sort the data into ascending order and then sort the data according to the label names, the data will be rearranged into descending order.
Sort by data format[*1]	Sort the data according to the data format.[*2] If you sort the data into ascending order and then sort the data according to the data format, the data will be rearranged into descending order.
Sort by device order	Sort the devices into ascending order. If you sort the data into ascending order and then sort the data according to the devices, the data will be rearranged into descending order.
Sort by comment	Sort the comments into ascending order. If you sort the data into ascending order and then sort the data according to the comments, the data will be rearranged into descending order.
Search	Search for a character string in the label edit window.
Replace	Replace a character string in the label edit window.
Cross reference	Create a cross reference.

*1 This item is displayed only when the selected PLC model is the KV-8000/7500/7300/5500/5000/3000 or KV Nano Series.
*2 Data formats are sorted in the following order.

Priority: high

Bit
1-word unsigned integer
2-word unsigned integer
1-word signed integer
2-word signed integer
Single precision floating point real number
Character string
Timer
Counter
Array
Double precision floating point real number

Priority: low

For information on displaying labels, see 📖 "Displaying Variable" (page 6-43).

Reference	You can copy and paste data between KV STUDIO and Microsoft Excel. (Ctrl + C and Ctrl + V)

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● **Searching for character strings**

Search for a character string in the label edit window.

Right-click in the "Label Edit window," and then select "Find" from the menu that appears.
The "Label edit window (search)" dialog box is displayed.

Alternative procedure　Press　Ctrl　+　F .

Item		Explanation
Search string		Enter the character string to search for. Click ▼ to display a pulldown menu with a list of the last 10 selected items.
Case sensitive		When this checkbox is selected, a case-sensitive search will be executed.
Search 100% match		When this checkbox is selected, only items that exactly match the entered characters will be found as a result of searches.
Differentiate between half-width/full-width characters		Differentiates between half-width and full-width characters when searching.
Search target	Label	Labels will be searched.
	Device	Devices will be searched.
Search direction	Up	The cursor will be moved up, and the next device that matches the search conditions will be displayed.
	Down	The cursor will be moved down, and the next device that matches the search conditions will be displayed.

● **Replacing character strings**

Replace a character string in the label edit window.

1 **Right-click in the "Label Edit window," and then select "Replace" from the menu that appears.**
The "Label edit window (replace)" dialog box is displayed.

Alternative procedure　Press　Ctrl　+　H .

Item		Explanation
Search string		Enter the character string to search for. Click ▼ to display a pulldown menu with a list of the last 10 selected items.
Replace string		Enter the character string to replace found strings with. Click ▼ to display a pulldown menu with a list of the last 10 selected items.
Case sensitive		When this checkbox is selected, a case-sensitive search will be executed.
Replace range	Entire project	The replacement will be performed on the entire project.
	Selection range	The replacement will be performed on the selected range.

2 **To replace individual character strings, click "Execute." To replace all character strings in a batch, click "Replace all."**

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VIEW

Device Use List

"View(V)" ▶ **"Device use list(Z)"** ⌃Ctrl + E

Click the "View (V)" menu ▶ "Device use list (Z)" to display a list of the use statuses of the devices.

Item	Explanation
Global (tab)	This displays the use list of global devices.
Local (tab)[*1]	This displays the use list of local devices.
Select device	Select the device whose use list you want to display.
Select unit	Select when you want to display use lists separately for PLC expansion and special units. When selected you can select the relays (R), data memory (DM), buffer memory (UG), internal unit devices (UD) and other devices assigned to the unit (the devices that can be selected vary according to the unit). When "----" is displayed, the use list of all units will be displayed.
Register special device	Click this to register special device comments.
Register unit device	Click this to register unit device comments.
Display mode — All devices	The specified devices will be displayed in the list regardless of whether the devices are being used or not.
Display mode — Used	The list of devices that are being used in the program will be displayed.
Display mode — Unused	The list of devices that are not being used in the program will be displayed.
Reg comments/label	When this checkbox is selected, the list of devices that have comments registered to them will be displayed.
Display labels	When this checkbox is selected, only the devices to which labels are registered will be displayed in the list.
Using status	When this checkbox is cleared, only the device numbers and comments will be displayed in the list.
Program selection[*1]	Specify a program in order to display the use list. When "----" is displayed, the use list for all programs will be displayed.
Update	Click this to update the device use list to the latest information.
Translation	Display "Translation" dialog box.
Search	Enter a device comment or device number, and the cursor moves to the location of the search result.
⬇ (down arrow)	Click this to move the cursor to the next search result in the down direction.
⬆ (up arrow)	Click this to move the cursor to the next search result in the up direction.
🔍 (search option)	Click this to display the "Search option setting" dialog box.
Close details[*2]	Hide the detailed settings (special device registration, unit device registration, display mode, comment registration, use status, program selection, and update).

*1 This item is displayed only when the selected PLC model is "KV-8000/7500/7300/5500/5000/3000/1000" or "KV Nano Series".

*2 After the details are closed, the "Detail" button is displayed instead of the "Close detail" button. Click "Detail" to display the detailed settings.

> **Reference**
> - You can edit ladder programs while the "Device use list" is displayed.
> - The meanings of the items in the device use list are shown below.

Item	Explanation
Device No.	This displays the device number.
┤ ├	This indicates a contact instruction. When one or more contacts are used, ✳ is displayed.
‒( )‒	This indicates an output instruction. When one or more outputs are used, ✳ is displayed.
Cnt	This displays the number of times that the output instruction has been written in the ladder program.
Comment 1 and 2	These display device comments. You can also edit the comments.

● **Translating the strings**

Translate the strings by using the universal comment dictionary that will be registered to the PC when KV STUDIO is installed.

1 **Drag the comment that you want to translate, and then click "Translation".**

The "Translation" dialog box is displayed.

For details on the "Translation" dialog box, refer to 📖 "Translating character strings" (page 6-25).

Displaying the Use Statuses

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"View(V)" ▶ **"Display use status(U)"**

Click the "View (V)" menu ▶ "Display use status (U)" to display a list of the devices that are being used in the program.

Item		Explanation
Select device		Select the device whose use status you want to display.
Program selection		Specify a program or unit to display its use status. If a unit is selected the use status of the unit's buffer memory (UG) and unit internal data (UD) will be displayed. If "Global" is selected, the use status of all programs will be displayed.
Search direction	Up	Searching will be executed up from the position of the currently selected device.
	Down	Searching will be executed down from the position of the currently selected device.
Search device	Used	The devices that are being used in the program will be searched.
	Unused	The devices that are not being used in the program will be searched.
	Confliction	The devices that have conflicts in the program will be searched.

Item	Explanation
Execute search	Click this to perform the search according to the conditions that you specified with the search direction and the devices to search. Each time that you click this button, the cursor will move to the next search result.
Update	Click this to update the device use list to the latest information.
Option	Click this to display the "Setup device usage option" dialog box.*
Jump	Jump to display the specified device number.

* You can specify the "ignore ZRES instruction" setting in the "device service status option setting" dialog box.

> **Reference**
>
> - You can edit ladder programs while the "application status display" dialog box is displayed.
> - Device numbers are displayed as shown below.
>
>   For MR000 to MR015
>
>
>
> - The values in the table indicate the number of times that the device is used (contact or output) in the ladder program.
> - When a device is used 100 times or more, "*" is displayed.
> - The meanings of the different cells is shown below.
>
>   Light yellow: This indicates a device that is being used in the ladder program without a conflict.
>
>   White: This indicates a device that is not used in the ladder program.
>
>   Yellow: This indicates a device that is being used in the ladder program with a conflict.

Displaying CPU System Settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"View(V)" ▶ **"CPU system setting(P)"**

Click the "View (V)" menu ▶ "CPU system setting (P)" to display the "CPU system setting" dialog box.
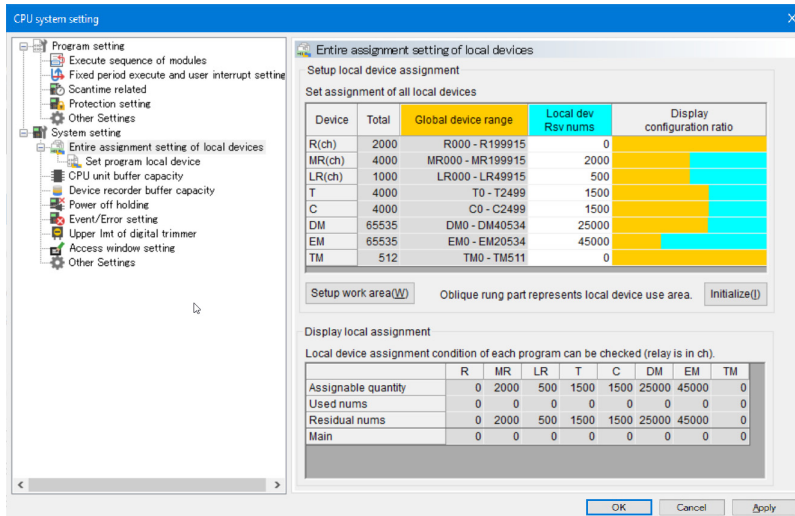
For details on the CPU system settings, see 📖 "6-2 CPU System Setting Dialog Box" (page 6-49).

Mnemonics Lists

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"View(V)" ▶ **"Mnemonic list(N)"**

Display the ladder program in the active window as a mnemonics list.

✎ Point	**You can only use the menu to select the mnemonics list in Monitor or Simulator mode.**

Click the "View (V)" menu ▶ "Mnemonic list (N)" to display the mnemonics list window.

Alternative procedure Double-click a rung number.
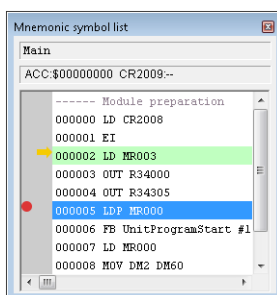
	Reference	When you click a rung number in the ladder edit window, the cursor in the mnemonics list moves to the position corresponding to the rung number.

● Setting rung breaks

You can set rung breaks by double-clicking a rung in the mnemonics list window (you can set breaks on multiple rungs). 🔴 will be displayed beside rungs on which breaks are set, as shown in the figure to the right.
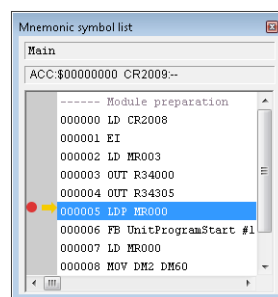
When program execution reaches a rung on which a break has been set, a message like that shown in the figure to the right is displayed, and the program execution is paused.

📖 "Rung breaks" (page 11-10)
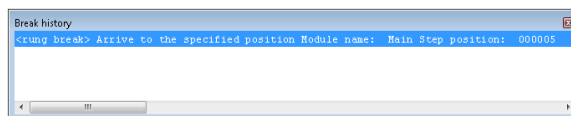
	Reference	The rung break function in Monitor mode is available only for the "KV-5500", "KV-5000", "KV-3000", and "KV-1000". In Simulator mode, this function is available for all PLC models.

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Enlarging and Reducing the Display

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

⊕ **"View(V)"** ▶ **"Zoom in(E)"** [Ctrl] + [PageUp]

⊖ **"View(V)"** ▶ **"Zoom out(R)"** [Ctrl] + [PageDown]

Ladder diagrams can be displayed in five sizes. The default is "100%" when KV STUDIO is started for the first time.

Click the "View (V)" menu ▶ "Zoom in (E)" or "Zoom out (R)" to enlarge or reduce the display.

> **Reference**
> - Click the "Tool (T)" menu ▶ "Option (O)" to open the "option settings" dialog box. You can also use the "Set display mode" tab to set the display size.
> - You can also enlarge and reduce the display by holding down Ctrl and using the mouse wheel.

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Auto Zoom

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

⊞ **"View(V)"** ▶ **"Auto zoom(A)"**

The ladder diagram is automatically enlarged or reduced to match the window size.

Click the "View (V)" menu ▶ "Auto zoom (A)."

When you select "Auto zoom," the "Zoom in (E)" and "Zoom out (R)" options are disabled.

> **Point** **Not displayed in KV-8000 with CPU function version 2.0 or later.**

Displaying Variable

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"View(V)" ▶ **"Display label(G)"** [Ctrl] + [Backspace]

Instead of symbol device names, labels are displayed.

Click the "View (V)" menu ▶ "Display label (G)" to display labels instead of device names.

For details on editing labels, see 📖 "Displaying the Label Edit Window" (page 6-33).

Displaying Variable and Devices

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"View(V)" ▶ **"Display variable and device(D)"** [Ctrl] + [Backspace]

Symbol device names and variable are displayed side by side.

Click the "View (V)" menu ▶ "Display variable and device(D)" to display device names and variable side by side.

For details on editing variable, see 📖 "Variable Edit Window" (page 6-29).

> **Point** **"Variable and Device Display(D)" is a menu displayed only in KV-8000 with CPU function version 2.0 or later. "Label and Device Display(D)" is displayed in other models.**
> **For the contents of the menu, replace "variable" in the above description with "label".**
> **For editing labels, refer to "Displaying the Label Edit Window" (page 6-33).**

Displaying Comments

"View(V)" ▶ **"Display cmnts(F)"** [Ctrl] + [(Space)]

Follow the procedure below to switch between displaying and hiding device comments.
Click the "View (V)" menu ▶ "Display cmnts (F)." Each time that you click this menu item, comments toggle between being displayed and being hidden.
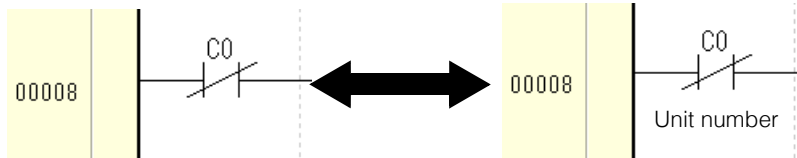
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| Reference | • Click the "Tool (T)" menu ▶ "Option (O)" to open the "option settings" dialog box. You can also use the "Set display mode" tab to toggle between displaying and hiding comments.
In addition, you can select the comment set to display.
• For details on editing comments, see 📖 "Displaying the Device Comment Edit Window" (page 6-23). |

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Displaying Devices for Units

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"View(V)" ▶ **"Display unit device(Y)"** [Shift] + [(Space)]

Display device names of symbols in device notation for the unit.
With device notation for units, relays and DM entries assigned with the Unit Editor can be expressed in the notation "nth relay or DM from the start of the nth-connected unit."
For example, the relay number of the 5th input on the input unit that is in the position next to the CPU is "R01_005." The relay number of the 31st relay on the output unit that is in the third position from the CPU is "R03_115."

Unit number   Unit relay number

R05_010

Unit number: This is the connection number assigned to the unit as 0, 1, 2, 3, 4, and so on where 0 indicates the CPU.
Unit relay number: This is the relay number assigned to the occupied relay starting from 00000.

Unit number	0	1	2	3	4	5
KV-U7	KV-DR1	KV-5000	KV-B16X*	KV-C32X*	KV-B16T*	KV-C32T*	KV-H20S
Unit relay number	00000 to 01915	00000 to 00015	00000 to 00115	00000 to 00015	00000 to 00115	00000 to 01215

3rd relay number of the KV-5000 (R30002)	**R00_002**
5th relay number of the KV-B16X* (R32004)	**R01_004**
17th relay number of the KV-C32T* (R32500)	**R04_100**
603rd relay number of the KV-H20S (R33203)	**R05_603**

> ✎ **Point**   **Devices of CPUs other than the KV-8000/7500/5500/5000 cannot be displayed in the device notation for units.**

Click the "View (V)" menu ▶ "Display unit device (Y)" to display device names of symbols in the editor in the device notation for units.

> Reference ▱   Click the "Tool (T)" menu ▶ "Option (O)" to open the "option settings" dialog box. You can also use the "Set display mode" tab to set the device notation for units.

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Displaying Local Assignment Destinations During Monitoring

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"View(V)" ▶ "Display local assignment destination(W)"

This applies only in the Monitor or Simulator mode: When you click the "View (V)" menu ▶ "Display local assignment destination(W)", local devices, local labels, function block argument and macro argument devices (only for the KV-1000) appear in the global device list of the assignment destination.

If the CPU unit is the KV-8000/7500/7300/5500/5000/3000 or KV Nano Series, then the function block argument and macro argument devices (P, V, UR, UM or UV) appear on the workspace memory (VM) or workspace relay (VB) of the assignment destination.

> **Reference** Click the "Tool (T)" menu ▶ "Option (O)" to open the "option settings" dialog box. You can also use the "Set display mode" tab to set the device notation for units.

> **Point** **The destination of the variable is not displayed.**

Displaying Ladder Monitor Values in Hexadecimal

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"View(V)" ▶ "Display Ladder monitor value in Hex(X)"

Click the "View (V)" menu ▶ "Display ladder monitor value in Hex (X)" to display, only during Monitor mode, Online Edit mode, Simulator mode, or Simulator Edit mode, the current value in the ladder diagram in hexadecimal.

> **Reference** Click the "Tool (T)" menu ▶ "Option (O)" to open the "option settings" dialog box. You can also use the "Set display mode" tab to set the device notation for units.

Clearing the Background Color of Changed Cells

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"View(V)" ▶ "Clear changed background color(H)"

Cells that have been edited in Online Edit mode are displayed with a light blue background to indicate that the program has been changed. This function clears this change indication.

Click the "View (V)" menu ▶ "Clear changed background color (H)" to clear the background colors that indicate that the program has been changed.

> **Reference** You can also use the following methods to set the automatic clearing of changed background colors.
> - Click the "Monitor/Simulator (N)" menu ▶ "Start online edit (J)."
>   📖 "Online Edit Settings" (page 9-121)
> - Click the "Tool (T)" menu ▶ "Option (O)" to display the "option settings" dialog box, and then use the "Online edit setting" tab to configure the setting.

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Flow

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

▬ **View(V)** ▶ **Flow(B)** ▶ **Properties window(P)**

▶ **Grid display**

▶ **Tag display**

You can select "View(V)" menu ▶ Flow(B) to change the flow settings.

Flow is a program type of unit program function can be used for X-Unit (KV-XH16ML / XH04ML etc.).

Selecting "Properties window(P)" displays the properties window of the block.

Selecting "Grid display" displays a grid on the flow edit screen.

Selecting "Tag display" displays the tag parts of the flow.

For details on the flow, refer to the user's manual of each X-Unit.

✎ Point	"View(V)" ▶ Flow(B) can be selected only if the flow edit screen is selected.

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Set various CPU unit parameters.

For details on how to display the "CPU system settings" dialog box, see 📖 "Displaying CPU System Settings" (page 6-41).

> ✏️ **Point** **The "CPU system setting" dialog box is displayed only when the selected PLC model is "KV-8000/7500/7300/5500/5000/3000/1000" or "KV Nano Series".**

Program Settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Use this screen to configure general program settings, such as the module execution sequence and the scan time.

Module execution sequence settings

To configure the module execution sequence settings, select "Execution sequence of modules" on the "CPU system setting" dialog box.

For details on how to display this item from the menu, see 📖 "Module Execution Sequence Settings" (page 7-9).
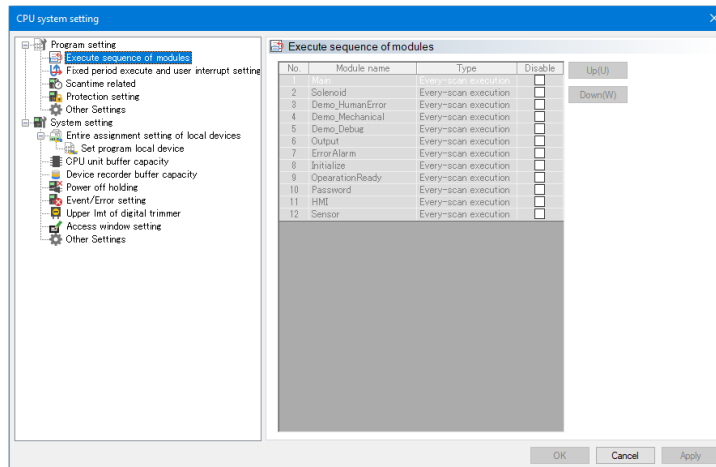
You can set the execution sequence when there are multiple modules. Modules are executed in the order of their set numbers.

Item	Explanation
No.	This displays the module execution sequence.
Module name	This displays the names of the modules registered to the project.
Type	This displays the module type.
Disable	Select these checkboxes to disable the corresponding modules. Disabled modules will not be executed.
Up	Click this to move the selected module up in the execution sequence by one spot.
Down	Click this to move the selected module down in the execution sequence by one spot.

> ✏️ **Point** **Module type must be set in the following order of execution: "Inter-unit synchronization module" → "Fixed period module" →"Initialization module" →"Every-scan execution module/standby module".**

Fixed-period execution and user interrupt settings (KV-8000/7000 Series)

To configure the fixed-period execution and user interrupt settings, select "Fixed period execute and user interrupt setting" on the "CPU system setting" dialog box.

> ✎ **Point**
>
> **Setting items in "Fixed period execute and user interrupt settings" differ according to whether the selected PLC model is the KV-8000/7000 Series or KV-5000/3000 Series. For the KV-5000/3000 Series, see 📖 "Fixed-period execution and user interrupt settings (KV-5000/3000 Series)" (page 6-52).**
>
> **When the PLC model is "KV Nano Series," you can select the items shown under 📖 "User interrupt settings (KV Nano Series)" (page 6-54).**

■ Fixed-period/inter-unit synchronization module settings

Configure the modules that will be executed at fixed-periods.

For details on modules, see 📖 KV-8000 Series User's Manual 📖 "4-8 Module" in the KV-7000 Series User's Manual.

Item	Explanation
Module name	The module names of the fixed-period modules and inter-unit synchronization modules registered to the project.
Period	Confirm/set the period for each module. The setting range for fixed-period modules are as follows.
	0.05 to 6000.00 (ms)
	0.01 to 60.00 (s)
Unit	Use the Unit Editor to set the period for inter-unit synchronization modules. 📖 "Chapter 3 UNIT EDITOR" (page 3-1)
When operation begins, set to execution	When this checkbox is selected, the modules start executing as soon as the CPU unit starts operating. When this checkbox is cleared, use the MDSTRT instruction to execute modules.

■ **Setting the interrupt priority**

Set the priority of interrupts when multiple interrupts occur.

For details on interrupts, see 📖 KV-8000 Series User's Manual 📖 "4-7 Interrupt" in the KV-7000 Series User's Manual.

Item	Explanation
Item	This displays items to which interrupt processing can be applied. When fixed-period modules/inter-unit synchronization modules are registered, their module names are displayed. When the unit configuration includes a unit that supports unit interrupts, select a unit from the blank space on the lowest line.
Interrupt factor	Set the interrupt factor for each interrupt item. This is blank for fixed-period modules. To perform a unit interrupt, select the interrupt factor for fixed-period modules.
Priority	Set the priority of all the interrupt items. There are three priority levels. "High" means the highest priority and "low" means the lowest priority.

> Reference
> • In the default settings, the priority level for inter-unit synchronization modules is "High."
> • In the initial settings the priority level of fixed-period modules is set to "medium. "
> • In the initial settings the priority level of unit interrupt is set to "low."
> • The priority level can be set for up to 64 unit interrupts.
> • Unselected unit interrupts operate as if the priority level is set to "low".

● **Units that support unit interrupt**

The KV-7000 Series Extended Unit (S-Unit or X-Unit) supports unit interrupt.
Refer to the user's manual of each unit for details about interrupt factor.

● **Priority when two or more interrupts have the same priority level**

When several interrupt factors that have the same priority level occur, the interrupt item that occurred first is prioritized, and the other interrupts are executed later.
When the interrupt factor occur simultaneously, the processing order of each interrupt is as follows.

■ General settings for fixed-period modules and interrupt priority

Item	Explanation
Enable interrupt in instruction execution	When this checkbox is selected, interrupts will occur and fixed-period modules will be executed even during the execution of instructions of other modules.
Save and restore Z1 to Z10 when interrupt starts and ends	When this checkbox is selected, index registers Z1 to Z10 will be automatically stored in workspace memory when an interrupt program starts. When the interrupt program is finished, the index register values stored in workspace memory will be restored to Z1 to Z10.
Initialize	Click this to return all the items in the "fixed period operation and user interrupt setting" screen to their default values.

Fixed-period execution and user interrupt settings (KV-5000/3000 Series)

To configure the fixed-period execution and user interrupt settings, select "Fixed period execute and user interrupt setting" on the "CPU system setting" dialog box.

> **Point**
> **Setting items in "Fixed period execute and user interrupt settings" differ according to whether the selected PLC model is the KV-8000/7000 Series or KV-5000/3000 Series.**
> **For the KV-8000/7000 Series, see 📖 "Fixed-period execution and user interrupt settings (KV-8000/7000 Series)" (page 6-50).**
> **When the PLC model is "KV Nano Series," you can select the items shown under 📖 "User interrupt settings (KV Nano Series)" (page 6-54).**
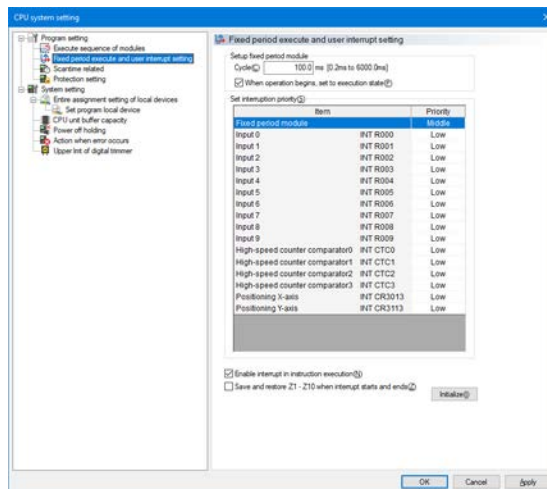
■ Fixed-period module settings

Configure the fixed-period module settings.
For details on the fixed period modules, see 📖 "3-8 Module" in the KV-5500/5000/3000 Series User's Manual.

Item	Explanation
Cycle	Set the cycle time of fixed-period modules.
When operation begins, set to execution	When this checkbox is selected, the fixed-period modules start executing when the CPU unit starts operating. When this checkbox is cleared, use the MDSTRT instruction to execute fixed-period modules.

■ Setting the interrupt priority

Set the priority of interrupts when multiple interrupts occur.

For details on interrupts, see 📖 "3-5 Interrupt" in the KV-5500/5000/3000 Series User's Manual.

Item	Explanation
Item	This displays the items to which interrupt processing can be applied.
Priority	Set the priority of all the interrupt items.* There are three priority levels. "High" means the highest priority and "low" means the lowest priority.

* When priority levels are the same, the priority of interrupt items is shown below.
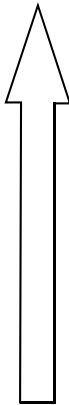
Priority: high ↑ **Priority: low**

Fixed-period module	
Input 0	INT R000
Input 1	INT R001
Input 2	INT R002
Input 3	INT R003
Input 4	INT R004
Input 5	INT R005
Input 6	INT R006
Input 7	INT R007
Input 8	INT R008
Input 9	INT R009
High-speed counter comparator 0	INT CTC0
High-speed counter comparator 1	INT CTC1
High-speed counter comparator 2	INT CTC2
High-speed counter comparator 3	INT CTC3
Positioning X axis	INT CR3013
Positioning Y axis	INT CR3113

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■ General settings for fixed-period modules and interrupt priority

Item	Explanation
Enable interrupt in instruction execution	When this checkbox is selected, interrupts will occur and fixed-period modules will be executed even during the execution of instructions of other modules.
Save and restore Z1 to Z10 when interrupt starts and ends	When this checkbox is selected, index registers Z1 to Z10 will be automatically stored in workspace memory when an interrupt program starts. When the interrupt program is finished, the index register values stored in workspace memory will be restored to Z1 to Z10.
Initialize	Click this to return all the items in the "fixed period operation and user interrupt setting" screen to their default values.

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User interrupt settings (KV Nano Series)

To configure the user interrupt settings, select "User interrupt setting" on the "CPU system setting" dialog box.

> **✎ Point**
>
> **"User interrupt setting" can only be selected when the selected PLC model is "KV Nano Series."**
>
> **When the selected PLC model is the KV-8000/7000/5000/3000 Series you can select the items shown under ☐ "Fixed-period execution and user interrupt settings (KV-8000/7000 Series)" (page 6-50) and ☐ "Fixed-period execution and user interrupt settings (KV-5000/3000 Series)" (page 6-52).**
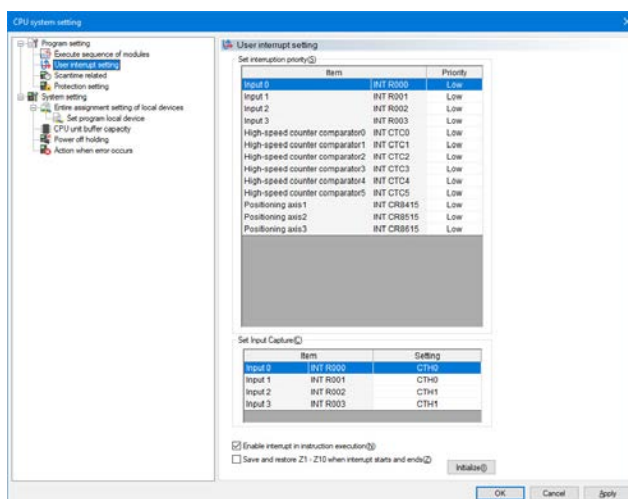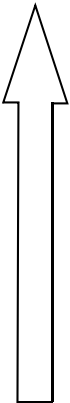
■ Setting the interrupt priority

Set the priority of interrupts when multiple interrupts occur.

For details on interrupts, see 📖 "4-7 Interrupts" in the KV Nano Series User's Manual.

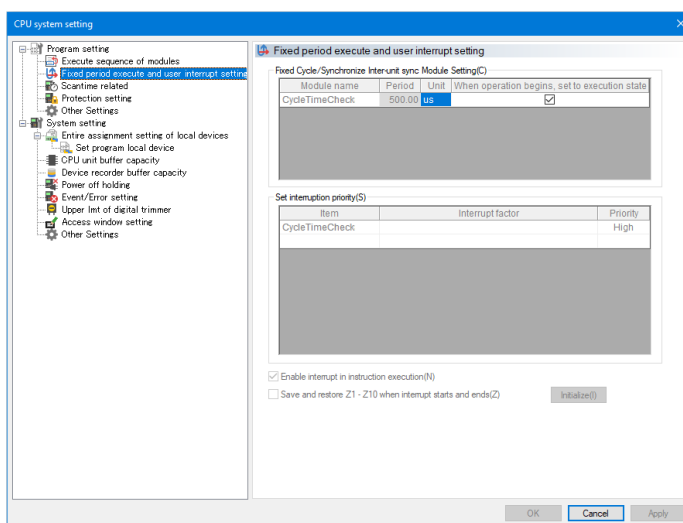| Item	Explanation
Item	This displays the items to which interrupt processing can be applied. Set the priority of all the interrupt items.*
Priority	There are three priority levels. "High" means the highest priority and "low" means the lowest priority.

* When the priority levels are the same, input interrupts are given the highest priority, followed by high-speed counter comparator interrupts, and then followed by positioning interrupts. Within each interrupt factor, interrupts are given priority based on the interrupt number, with lower numbers being given higher priority. For the KV Nano Series, the priority of interrupt items is shown below.

Priority: high

↑

Priority: low

Input 0	INT R000
Input 1	INT R001
Input 2	INT R002
Input 3	INT R003
High-speed counter comparator 0	INT CTC0
High-speed counter comparator 1	INT CTC1
High-speed counter comparator 2	INT CTC2
High-speed counter comparator 3	INT CTC3
High-speed counter comparator 4	INT CTC4
High-speed counter comparator 5	INT CTC5
High-speed counter comparator 6	INT CTC6
High-speed counter comparator 7	INT CTC7
Positioning axis 1	INT CR8415
Positioning axis 2	INT CR8515
Positioning axis 3	INT CR8615
Positioning axis 4	INT CR8715

* This represents a situation in which the KV-N60** is used. The number of high-speed counter comparators and the number of positioning axes vary depending on the model.

■ Input capture settings

Set the high-speed counter number for the input capture function which captures the current value of a high-speed counter at the timing of input to R000 to R003.

For details on input capturing, see 📖 "5-4 High-speed counter" in the KV Nano Series User's Manual.

■ General interrupt priority settings

Item	Explanation
Enable interrupt in instruction execution	When this checkbox is selected, interrupts will occur even during the execution of instructions of other modules.
Save and restore Z1 to Z10 when interrupt starts and ends	When this checkbox is selected, index registers Z1 to Z10 will be automatically stored in workspace memory when an interrupt program starts. When the interrupt program is finished, the index register values stored in workspace memory will be restored to Z1 to Z10.
Initialize	Click this to return all the items in the "User interrupt setting" screen to their default values.

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Scan time related settings

To configure the settings related to scan time, select "Scan time related settings" on the "CPU system setting" dialog box.

For details on the scan time, see the User's Manual of the CPU unit used.

Item	Explanation
Synchronize Units *1	This enables inter-unit synchronization. Use the Unit Editor to set the units and periods that will be synchronized.
Synchronize Inter-unit sync Module	This synchronizes the operation of each unit with the execution of the ladder program for inter-unit synchronization modules.
Synchronize Every-scan Module and Standby Module	This synchronizes the operation of each unit with the execution of the ladder program for every scan modules and standby modules.
Fixed scan time operation	Fixed scan time operation is performed. Set the scan time value. When the "Synchronize Units," checkbox is selected and "Synchronize Every-scan Module and Standby Modules" is selected or the "Enable END processing time setting" checkbox is selected, this setting will be grayed out and cannot be selected.
Scan time	Set the scan time to an arbitrary time. Set this to a value that is greater than the actually measured scan time. If you set this to a value that is less than the actually measured scan time, operations cannot be performed within the fixed scan time.
Enable END processing time	This will enable the END processing time setting. Set an END processing time. When the "Synchronize Units" checkbox is selected and "Synchronize Every-scan Module and Standby Modules" is selected or the "Fixed scan time operation" checkbox is selected, this setting will be grayed out and cannot be selected.
END processing time	Set the END processing time. Set this value when there are large fluctuations in the scan time due to factors other than the ladder program, such as logging processing and communication processing.
Enable performance monitor*2	When this checkbox is selected, the performance monitor can be used.

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*1 You can select this only on the KV-8000 Series and KV-7000 Series (Ver. 1.1 or later) .

*2 This option is not displayed when the selected PLC model is the KV-8000/7000 Series or KV Nano Series. For these models, the performance monitor is always enabled.

For details on the END processing time, see the User's Manual of the CPU unit used.

For details on the performance monitor, see 📖 "Performance Monitor" (page 11-21).

> | Reference | When the selected PLC model is the KV-1000, use the MEMSW instruction and CM (control memory) entries to configure these settings. For details, see 📖 the KV-8000/7000/5000/3000/1000 Series and KV Nano Series Instruction Reference Manual.

Protection settings

To configure the settings related to protection, select "Protection setting" on the "CPU system setting" dialog box.
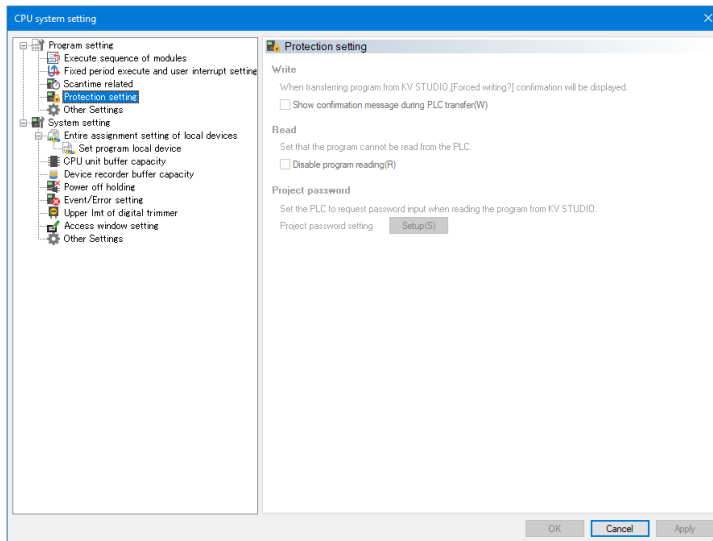
Item	Explanation
Write	When this checkbox is selected, a confirmation message is displayed when an attempt is made to transfer a ladder program to the CPU unit that is already stored there.
Read	When this checkbox is selected, the ladder programs stored on the CPU unit are read protected (reading of the programs is disabled).
Project password	Click "Setup" to display the password setting window.

> | Reference | When the selected PLC model is the KV-1000, use the MEMSW instruction to configure these settings.
> For details, see 📖 the KV-8000/7000/5000/3000/1000 Series and KV Nano Series Instruction Reference Manual.

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Other Settings

To configure other settings, select "Other settings" on the "CPU system setting" dialog box.

> ✏️ **Point** **"Other Settings" can be selected only when the selected PLC model is KV-8000/ 7500/7300.**
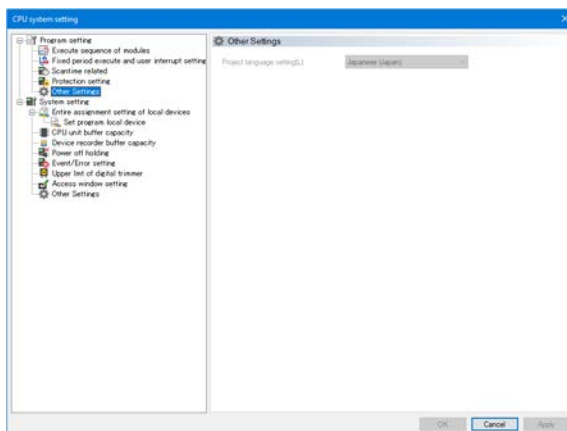
Item	Explanation
Project language setting	Select the language to be used when editing projects.

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System Settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Use this screen to configure general CPU system settings, such as assigning local devices and setting power off holding.

Overall local device assignment settings

To set the assignments of all the local devices, select "Entire assignment of local device" on the "CPU system setting" dialog box.
For details on how to display this item from the menu, see ☐ "Overall Local Device Assignment Settings" (page 8-6).
For details on local devices, see the User's Manual of the CPU unit used.

■ For the KV-8000/7500/7300/5500/5000/3000 or KV Nano Series

Reference┐ For the KV Nano Series, the total number of devices is different. In addition, EM cannot be used.

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Setup local device assignment

Number	Item	Explanation
1	Local dev Rsv nums	This displays the number of local devices reserved for each device. You can also set the values. The number of reserved local devices is the number of all local devices in the project.
2	Global device range	This displays the range of global devices that can be used. The range changes according to the set number of reserved local devices.
3	Display configuration ratio	This displays the assignment status of each device as a graph. The number of devices set with "Local dev Rsv nums" is displayed as "used local devices" + "unused local devices."
4	Total	This displays the total number of local devices for each device. Total number = the number of global devices + the number of reserved local devices + the number of reserved system devices.
5	Initialize	Click "Initialize" to return the set numbers of reserved local devices to their initial (default) values.
6	Setup work area	Click this to display the "Workspace setting" dialog box.　📖 "Setting the work area" (page 6-61)

Display local assignment

Number	Item	Explanation
7	Assignable quantity	This displays the number of local devices that can be assigned within the project. These values are set to match "Local dev Rsv nums".
7	Used nums	Display the total number of local devices used in each program.
7	Residual nums	This displays the remaining number of local devices that can be used. Remaining number of items = the number of items that can be used - the number of used items.
8	Display the assignment status for each program.	Display the assignment status of the local devices of each program. You can set the assignments of the items whose "Auto" checkboxes you clear as shown in 📖 "Device setting for each program" (page 6-63).

Setting the work area

Number	Item	Explanation
1	Set number	Set the size of the area that holds variables. Ensure that the "number set" is more than the "number used" when setting. A conversion error will occur if the "number set" is less than the "number used". Set a multiple of 16 for the "number set" for bits. Writing during RUN cannot be performed when the "number set" is changed. In addition, holding of variables assigned to the devices of CPU unit should follow the holding settings of the assigned devices. 📖 "Power off holding settings" (page 6-66)
	Used nums	The total size of variables for which "Hold" is checked in the variable edit window is displayed.
2	Number of work area for script text string	Set the number of work areas when character text functions are processed with scripts. The specified number of local work areas for words will be consumed.
3	Assignment for interrupt program[*1]	Separately set the number of work areas for each assignment priority when handling character string functions with scripts in assignment programs, fixed-period modules, and inter-unit synchronization modules. It consumes local works for word in the local work area.
4	Possible quantity used	This displays the number of local work areas that can be used in the project.
	Used nums	Display the total number of work areas, function blocks / macro arguments and @FM used in the project.
	Residual nums	This displays the remaining number of local work areas that can be used. Remaining number of items = the number of items that can be used - the number of used items.
5	Display the assignment status for each program.	Display the assignment status of the local work areas of each program. Clear the "Auto" checkbox to enable the setting of the number of local work areas to be used.

*1 This setting is available only for KV-8000 Series and KV-7000 series (Function Ver. 2.2 or higher).
  It is not displayed for KV-5500/5000/3000 series and KV Nano series.

> **Point**
> **When using the script string function in both the assignment program (or the periodic module, the inter-unit synchronization module) and the normal module other than the assignment, allocate the number of script character string work areas for assignment and normal module respectively. Or use the DI commands/ EI commands to program so that no assignments are generated during character string processing in normal modules. In the case of assignment is not performed, If the character string function of interrupt program is executed during the character string function processing with a normal module, character string processing will not be performed normally due to the same work area is used.**

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■ For the KV-1000
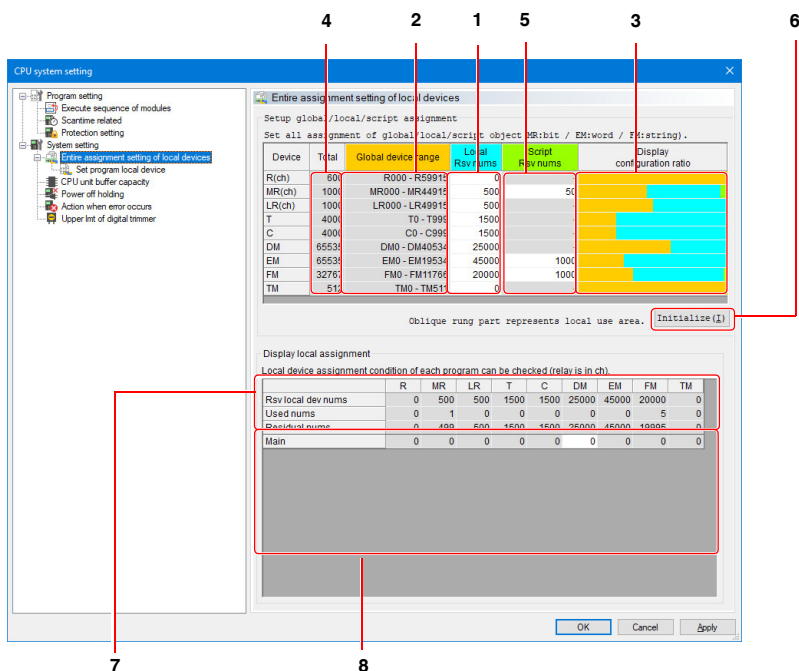
Setup global/local/script assignment

Number	Item	Explanation
1	Local Rsv nums	This displays the number of local devices reserved for each device. You can also set the values. The number of reserved local devices is the number of all local devices in the project.
2	Global device range	This displays the range of global devices that can be used. The range changes according to the set number of reserved local devices.
3	Display configuration ratio	This displays the assignment status of each device as a graph. The number of devices set with "Local Rsv nums" is displayed as "used local devices" + "unused local devices."
4	Total	This displays the total number of local devices for each device. Total number = the number of global devices + the number of reserved local devices + the number of reserved system devices.
5	Script Rsv nums	This displays the number of reserved workspace devices for scripts. You can also set the values.
6	Initialize	Click "Initialize" to return the set numbers of reserved local devices to their initial (default) values.

Display local assignment

Number	Item	Explanation
7	Rsv local dev nums	This displays the number of local devices that can be assigned within the project. These values are set to match the set number of reserved local devices.
	Used nums	Display the total number in each program.
	Residual nums	This displays the remaining number of local devices that can be used. Remaining number of items = the number of items that can be used - the number of used items.
8	Display the assignment status for each program.	Display the assignment status of the local devices of each program. You can set the assignments of the items whose "Auto" checkboxes you clear as shown in 📖 "Device setting for each program" (page 6-63).

Device setting for each program

To set devices for a specific program, select "Set devices for each program" in the "CPU system setting" dialog box.
For details on how to display this item from the menu, see 📖 "Setting Local Devices for Each Program" (page 8-6).
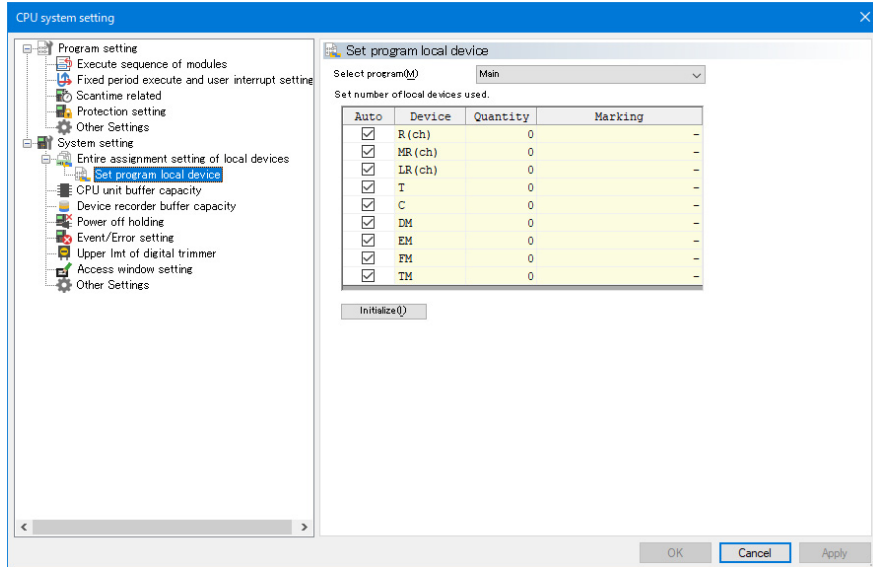
Reference▷ For the KV Nano Series, EM and FM cannot be used.

Item	Explanation
Program selection	Select a program.
Auto	When this checkbox is selected, the selected device will be assigned automatically. You cannot set the number of devices for devices whose automatic assignment has been enabled. By clicking "Auto," you can select or deselect all devices simultaneously.
Quantity	Set the number of local devices that are used by each device. This setting is disabled for the devices whose "Auto" checkboxes have been selected.
Marking	When the number of local devices is set, the assigned local device number is displayed.
Initialize	Click "Initialize" to return the set numbers of local devices to their initial (default) values.

For details on local devices, see the User's Manual of the CPU unit used.

CPU unit buffer capacity setting

To set the CPU unit buffer capacities, select "CPU unit buffer capacity" on the "CPU system setting" dialog box.

For details on the CPU unit buffer, see the User's Manual of the CPU unit used.
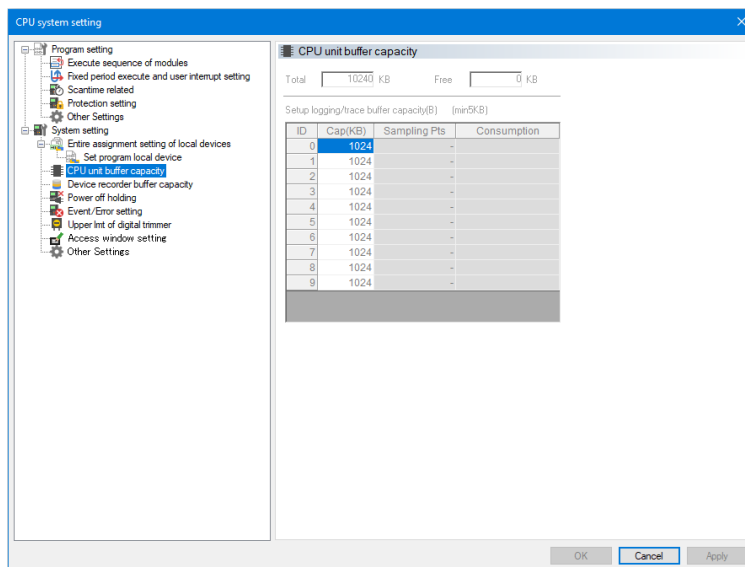
Item	Explanation
Total	This displays the total buffer capacity of the CPU unit. (KV-8000 Series: 10240kB, KV-7000 Series: 2048 kB, KV-5000/3000 Series: 1024 kB, KV Nano Series: 320 kB)
Free	This displays the free buffer capacity with the current settings.
ID	This is the ID number of logging and tracing.
Cap (KB)	Set the buffer capacity used for logging and tracing for each ID number.
Sampling Pts	This displays the number of sampling points for logging and tracing.
Consumption	This displays, in byte units, the unit buffer capacity that is consumed per sampling point of logging or tracing.

For details on logging and tracing, see the User's Manual of the CPU unit used.

Reference	When the selected PLC model is the KV-1000, the CPU unit buffer capacity cannot be set.

Device recorder buffer capacity setting

For the device recorder buffer capacity setting, select "Device recorder buffer capacity setting" in the "CPU System Settings" dialog. Setting is required to use the operation recorder function of the KV-8000 series. For details on the operation recorder function, refer to ▯ "KV-8000 Series User's Manual".

> ✎ **Point**
>
> **The setting can be performed only when the PLC model is KV-8000. When another model is selected, the "Device Recorder Buffer Capacity Selection" item is not displayed.**
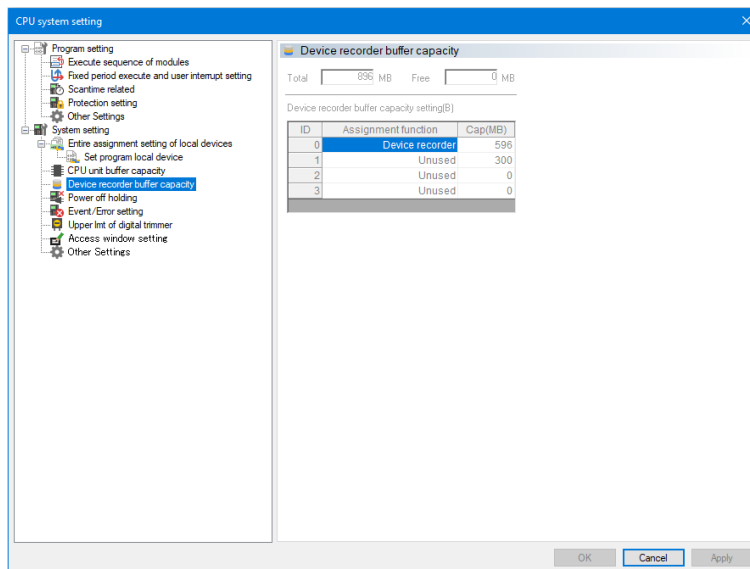
Item	Explanation
Total	Display the total capacity of the device recorder buffer of the CPU unit. KV-8000 series: 896MB
Free	Display the free buffer capacity under the current setting condition.
ID	ID number of the operation recorder function.
Assignment function	Display the function assigned to the object ID.
Capacity (MB)	Set the buffer capacity assigned to the object ID within the range of 0MB or 40~896MB.

Power off holding settings

To configure the power off holding settings, select "Power off holding setting" on the "CPU system setting" dialog box.

■ **KV-8000/7500/7300**

For details on power off holding, see ☐ KV-8000 Series User's Manual ☐ "4-4 Device and constant" in the KV-7000 Series User's Manual.

Item	Explanation
Select device	Select the device whose power off holding settings you want to configure.[1]
Range	This displays the range that can be set.
Setting	Select to hold or clear the range. Hold: When the power turns off, the current values (statuses) of the devices within the range are held. Clear: When the power turns off, the current values (statuses) of the devices within the range are cleared.

[1] The devices for which power off holding can be set are shown below.

Device Name	Range
R (relay)	R000 to R199915
B (link relay)	B00 to B7FFF
DM (data memory)	DM0 to DM65534
EM (expanded data memory)	EM0 to EM65534
ZF (file register, consecutive number method)	ZF0 to ZF524287
W (link register)	W0 to W7FFF
C (counter)	C0 to C3999

* When the PLC model is KV-7500/7300 and the setting of the CPU function version of the project is 2.2 or earlier, it is up to R99915.

⚠ CAUTION	**Do not configure the power off holding settings for relays assigned to I/O units and special units. Doing so may cause the program to operate incorrectly.**

■ **KV-5500/5000/3000**

For details on power off holding, see 📖 "3-6 Device and constant" in the KV-5500/5000/3000 Series User's Manual.
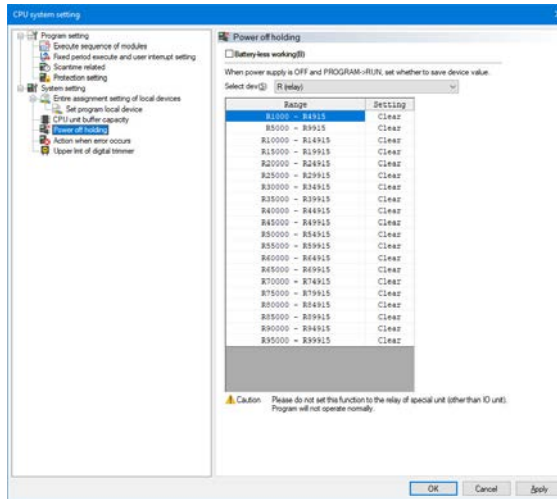
Item	Explanation
Battery-less working	When this checkbox is selected, operation without a battery will be performed.
Select device	Select the device whose power off holding settings you want to configure.[*1]
Range	This displays the range that can be set.
Setting	Select to hold or clear the range. Hold: When the power turns off, the current values (statuses) of the devices within the range are held. Clear: When the power turns off, the current values (statuses) of the devices within the range are cleared.

*1 The devices for which power off holding can be set are shown below.

Device Name	Range
R (relay)	R1000 to R99915
B (link relay)	B00 to B3FFF
DM (data memory)	DM0 to DM65534
EM (expanded data memory)	EM0 to EM65534
ZF (file register, consecutive number method)	ZF0 to ZF32766
W (link register)	W0 to W3FFF
C (counter)/ CTC (high-speed counter comparator)	C0 to C3999/ CTC0 to CTC3

For details on operation without a battery, see 📖 "2-16 Battery-less working" in the KV-5500/5000/3000 Series User's Manual.

⚠ CAUTION	**Do not configure the power off holding settings for relays assigned to I/O units and special units. Doing so may cause the program to operate incorrectly.**

■ **KV-1000**

When the selected PLC model is the KV-1000, use the MEMSW instruction to configure these settings. For details, see 📖 the KV-8000/7000/5000/3000/1000 Series and KV Nano Series Instruction Reference Manual.

■ **KV Nano Series**

For details on power off holding, see 📖 "4-4 Devices and Constants" in the KV Nano Series User's Manual.

Item	Explanation
Leading device	Set the leading device from which power off holding will be performed. Up to 20 different device numbers can be set even of the same device types, such as DM0 and DM1000.
Number	Set the number of devices for which power off holding will be performed. (When you select C devices, two words will be held for each of the devices.)
Range	The range changes automatically when you set the leading device and the number of devices. The range cannot be changed manually.
Retain CPU Positioning Setting	When this checkbox is selected, power off holding can be set to the devices used for CPU positioning.
Setup axis (Axis 1 to Axis 4)	When these checkboxes are selected, the system parameters and point parameters used for the selected CPU positioning axis will be held. For a system parameter, 40 words will be held for each axis. For a point parameter, words of the number specified at "Point parameter holding setting" × 10 will be held.
Point parameter holding	You can set this to a value between 0 and 20. For each axis number specified under "Setup axis," the specified number of point parameters from point number 1 will be held. 10 words will be held for each point parameter.
Retain KV-D30 Setting	When this checkbox is selected, power off holding can be set to the devices used for the KV-D30. 500 words will be held.
Consumption status of memory area for holding device values while power is OFF	This displays the area that is actually required according to the device range that can be used for power off holding. White indicates free space. The other colors indicate the areas reserved for power off holding. By default, counters (C0 to C255), data memory (DM0 to DM1999), and control memory for built-in positioning are reserved for power off holding. The capacity available for power off holding with the KV Nano Series is 3072 words.

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*1 The devices for which power off holding can be set are shown below.

Item	Explanation
DM (data memory)	DM0 to DM32767
W (link register)	W0 to W3FFF
C (counter)	C0 to C511

Setting actions when errors occur

To set the actions taken when an error occurs, select "Action when error occurs" on the "CPU system setting" dialog box.

■ KV-7500/7300/5500/5000/3000/1000

Item	Explanation
Error group	This displays the errors registered on the CPU unit.
CPU operation	Select the CPU action when a CPU unit error occurs. Stop (error): The error will be processed as a serious error and CPU operation will be stopped. Continue (warning): The error will be processed as a minor error and CPU operation will continue without stopping. * You cannot change that have gray backgrounds.
Use log	When this checkbox is selected, error occurrences will be written to the error log. * You cannot change that have gray backgrounds.
Default setting	Click "Default setting" to return the set items to their initial (default) values.

> **Reference** When the selected PLC model is the KV-1000, use the MEMSW instruction and CM (control memory) entries to configure these settings. For details, see 📖 the KV-8000/7000/5000/3000/1000 Series and KV Nano Series Instruction Reference Manual.

■ **KV Nano Series**

Item	Explanation
Error group	This displays the errors registered on the CPU unit. For the errors included in the error group, see 📖 "List of PLC Unit Errors" in the KV Nano Series User's Manual.
CPU operation	Select the CPU action when a CPU unit error occurs. Stop (error): The error will be processed as a serious error and CPU operation will be stopped. Continue (warning): The error will be processed as a minor error and CPU operation will continue without stopping. * You cannot change that have gray backgrounds.
Use log	When this checkbox is selected, error occurrences will be written to the error log. * You cannot change that have gray backgrounds.
Default setting	Click "Default setting" to return the set items to their initial (default) values.

Event/error setting

For the event / error setting, select "Event / Error Setting" in the "CPU System Settings" dialog.

> ✎ **Point**
>
> **The setting can be performed only when the PLC model is KV-8000. When another model is selected, the "Event / Error Setting" item is not displayed.**

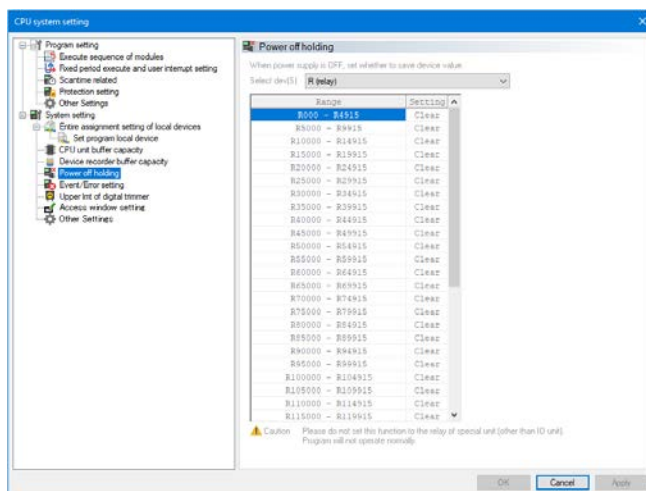| Item	Explanation
Error group	Display the errors registered in the CPU unit.
CPU operation	Select the CPU operation when an error occurs in the CPU unit. Stop (Major error): Process as a major error, and stop the CPU operation. Continue (Minor error): Process as a minor error, and continue without stopping the CPU operation. * Items with gray background cannot be changed.
Use log	When the check box is turned ON, the error occurred will be written to the error history. * Items with gray background cannot be changed.
"Default setting"	Click the "Default setting" button to restore the set items to their initial values (default).
Record device value changes	When the check box is turned ON , the history of device value change events is recorded.
Recorded only when the device value changes	When the check box is turned ON, the history is recorded as a device value change event only when the device value changes.

Setting the upper limits of the digital trimmers

To set the upper limits of the digital trimmers, select "Upper limit of digital trimmer" on the "CPU system setting" dialog box.

For details on the digital trimmers, see the User's Manual of the CPU unit used.
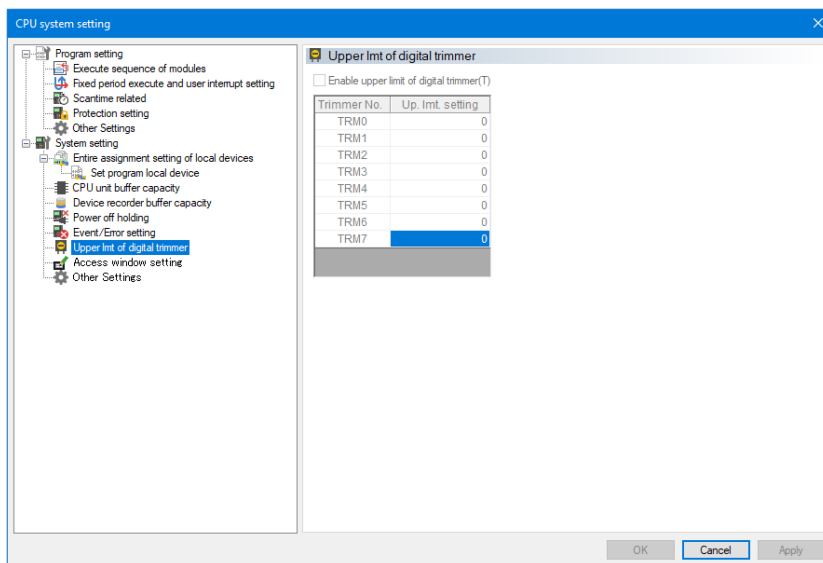
Item	Explanation
Enable upper limit of digital trimmer	Select this checkbox to enable the setting of the upper limits of the digital trimmers. Clear this checkbox to disable the upper limits of the digital trimmers.
Trimmer No.	This is the number of the trimmer whose upper limit you want to set.
Upper limit setting	Set the upper limit of the digital trimmer of the selected trimmer number. Setting range: 0 to 4294967295.

> **Reference** When the selected PLC model is the KV-1000, use the MEMSW instruction and CM (control memory) entries to configure these settings. For details, see 📖 the KV-8000/7000/5000/3000/1000 Series and KV Nano Series Instruction Reference Manual.
> When the selected PLC model is the KV Nano Series, the digital trimmer upper limit settings are not displayed.

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Access Window Settings

To configure access window settings, select "Access window settings" on the "CPU system setting" dialog box.

For details on the access window, see 📖 "KV-8000 Series User's Manual" and "2-1 Access Window" in 📖 "KV-7000 Series User's Manual".

| ✎ Point | **"Access window settings" can be selected only when the selected PLC model is KV-8000/7500/7300.** |

Item	Explanation
Set the language	Set the language to display when the PLC is turned on from "According to PLC setting", "Japanese", "English" or "simplified Chinese". When "According to PLC setting" is set, the language that was being set when power was turned off at last is displayed.
Set display comment number	You can set the comment set number (message set number) when displaying the following. • Comment display of device monitor • Comment display of alarm monitor • User message When you set other than "According to PLC setting", the displayed comment set number when power is turned on follows the settings of KV STUDIO.
Backlight OFF time	Set the time after which the backlight turns off when the access window keys are not operated. If "Always on" is set, the backlight stays on even if no keys are operated.
Display message when applying power	Display a user message of the specified ID when power is turned on.
Cancel message display with Enter key	When the user message is displayed, press "ENTER" key to select whether the user message will be cleared.
Message editor	Display the edit dialog of the user message.

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● **Message editor**

Item	Explanation
ID	The ID number of each message and the control relay (CR) allocated to the trigger device is displayed. Each user message can be displayed in the access window by turning each control relay (CR) ON. 63 IDs are available.
Message 1/2/3/4/5/6/7/8	Enter the user message that is displayed in the access window. Up to 8 sets of messages can be entered for each message.
Translation	Display "Translation" dialog box.

* For the operation of "Translation" dialog box, see 📖 "Translating character strings" (page 6-25).

Other Settings

When using the ladder monitor function in the VT5-WX series, perform settings related to the transfer of ladder monitor data.

✎ Point	**Displayed only in KV-8000 with CPU function version 2.0 or later. This menu is not displayed if another model is selected.**
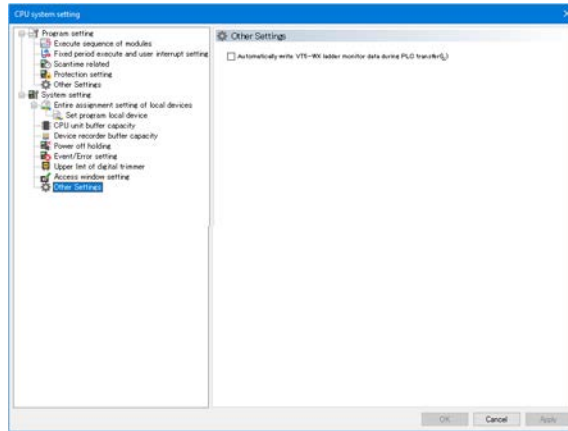
Item	Explanation
VT5-WX ladder monitor data during PLC transfer	When checked, the ladder monitor data for VT5-WX is also transferred during PLC transfer.

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PROGRAMS

This chapter describes program functions and how to use them.

PROGRAMS

About Programs

This chapter describes the operation of functions that are called from the "Program" menu of KV STUDIO.

For program overview, features, and function details, refer to the User's Manual of the CPU unit used.

Creating New Programs

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Program(M) ▶ New program(G)

1 **From the "Program(M)" menu,** ▶ **select "New program(G)".**

The "Create new program" dialog box appears.

[Alternative procedure] Right-click in the workspace, and then select "New program(M)" from the menu.

2 **Enter a name for the new program, select its program type, and then click "OK".**

A new program is created in the workspace with the specified type.

Item	Description
Program name	Enter a name for the new program.
Program type	Select one of the following program types. Every-scan module Initialization module Standby module Fixed-period module[*1] Inter-unit sync module[*2] Function block[*2] Function[*2] Subroutine type macro Self-hold type macro
Auto-assign local devices	If you select this check box, a new module will be assigned to a local device.
Perform OFF process when stopping execution	If you select this check box, when the program stops, all execution conditions are turned OFF and then one scan is executed.

*1 Cannot be selected if the device is the KV-1000 Series or the KV Nano Series.
*2 Can only be selected if the device is the KV-8000/7000 Series.

● **Length of program name**

Depending on the CPU unit and program type, the length of a program name differs, as follows:

CPU unit		Module name	Function block name	Macro name
KV-8000 Series		64 characters No distinction between full-width and half-width characters	64 characters No distinction between full-width and half-width characters	12 characters No distinction between full-width and half-width characters
KV-7000 Series	CPU function version 2.0 or later	64 characters No distinction between full-width and half-width characters	64 characters No distinction between full-width and half-width characters	12 characters No distinction between full-width and half-width characters
	CPU function version before 1.1	24 characters No distinction between full-width and half-width characters	-	12 characters No distinction between full-width and half-width characters
KV-5000/3000/1000 Series KV Nano Series		24 half-width characters 12 full-width characters	-	12 half-width characters 6 full-width characters

[Reference]
• For details on characters that cannot be used in program name, see ☐ "App 2 List of Characters That Cannot Be Used" (page A-40).
• The CPU function version of the KV-7500/7300 can be upgraded by using KV STUDIO. ☐ "Checking the Function Version" (page 12-23)

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PROGRAMS

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Opening

Program(M) ▶ **Open(E)**

In the workspace, select a program you want to open, and then select the "Program(M)" menu ▶ "Open(E)".

Alternative procedure
- Right-click in the workspace, and then select "Open(O)" from the menu.
- In the workspace, double-click a program you want to open.

Closing

Program(M) ▶ **Close(L)** Ctrl + F4

In the workspace, select a program you want to close, and then select the "Program(M)" menu ▶ "Close(L)".

Deleting

Program(M) ▶ **Delete(D)**

In the workspace, select a program you want to delete, and then select the "Program(M)" menu ▶ "Delete(D)".

Alternative procedure
- Right-click in the workspace, and then select "Delete(D)" from the menu.
- In the workspace, select a program you want to delete, and then press the Delete key.

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PROGRAMS

Properties

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Program(M) ▶ **Properties(H)**

In the workspace, select a program you want to open, and then select the "Program(M)" menu ▶ "Properties(H)".
The "Program properties" dialog box appears.

Alternative procedure Right-click in the workspace, and then select "Properties(A)" from the menu.
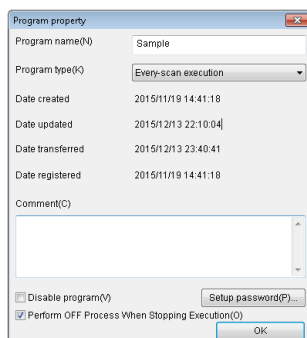
Item	Description
Program name	Program name. You can change it.
Program type	Program type. You can change it.
Date created	Date the program was created
Date updated	Date the program was updated
Date transferred	Date the program was transferred
Date registered	Date the program was registered
Comment	Enter a comment here.
Setup password[1]	Open the "Setup Password" dialog box to set up a password for the program.
Disable program	If you select this check box, the selected program is disabled. Disabled programs are not transferred to the CPU unit.
Perform OFF process when stopping execution[2]	If you select this check box, when the program stops, all execution conditions are turned OFF and then one scan is executed.
Read-only[3]	If you select this check box, program editing is not allowed.

[1]   Can be selected only if the model and program type support it.
      📖 "Setting program password" (page 7-5)
      If a password is set to a program, then "Remove password" appears instead of "Set password".
[2]   Can only be selected if the device is the KV-8000/7000 Series.
[3]   Can be selected only if the program type is function block or function.

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■ **Setting program password**

You can set a password to a specific program.

When a program is set with a password, you need to enter the password before you can open it.

The following programs can be set with a password. () indicates character length of password that you can set.

Yes : Password can be set.

No : Password cannot be set.

PLC models	Module	Function block	Macro
KV-8000 Series	Yes (Up to 32 half-width characters)	Yes (Up to 32 half-width characters)	Yes (Up to 32 half-width characters)
KV-7000 Series	Yes (Up to 32 half-width characters)	Yes (Up to 32 half-width characters)	Yes (Up to 32 half-width characters)
KV5000/3000 Series	No		Yes (Up to 6 half-width characters)
KV Nano Series	Yes (Up to 32 half-width characters)		Yes (Up to 32 half-width characters)
KV-1000 Series	No		Yes (Up to 6 half-width characters)
KV-700 Series	No		
KV-P16 Series	No		
KV-10/16/24/40 Series	No		

✎ **Point**

Store the newly set password in a safe place. If you lose the password, you will no longer be able to open a program set with that password.

● **Setting password**

From the properties of the program, click "Setup password".

The "Setup Password" dialog box appears.

(Alternative procedure)   Right-click in the workspace, and then select "Setup password (B)" from the menu.
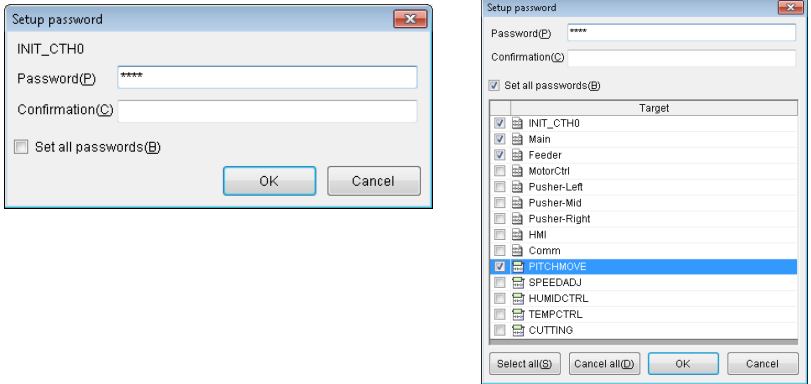
Item	Description
(Program name)	Name of a program you want to set with a password
Password	Enter a password here. 　　For the KV-5500/5000/3000/1000 Series: Up to 6 half-width characters. 　　For the KV-8000/7500/7300 or the KV Nano Series: Up to 32 half-width 　　characters. All characters entered are displayed as "*".
Confirmation	Enter the same password again. All characters entered are displayed as "*".
Set password to multiple programs	If you select this check box, a list of existing programs appears, and you can set the password to the selected programs.

Reference
- To remove a password, leave the password field blank.
- Depending on the model and program type, some programs cannot be set with a password.
  📖 "Setting program password" (page 7-5)

● **Removing password**

From the program properties, click "Reset password".

The "Reset password" dialog box appears.

(Alternative procedure)   • Right-click in the workspace, and then select "Reset password(G)" from the menu.
- In the workspace, double-click a program.
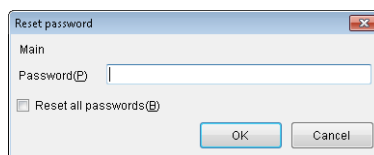
Reference
- The password remains removed until the project is closed. To restore the password, open the project again.
- Depending on the model and program type, some programs cannot be set with a password.
  📖 "Setting program password" (page 7-5)

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PROGRAMS

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Setting Arguments

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

 Program(M) ▶ **Argument settings(Z)**

In the workspace, select a program you want to set up with arguments, and then select the
"Program(M)" menu ▶ "Argument settings(Z)".
The "Function block argument setting" or "Macro argument setting" dialog box appears.

Alternative procedure Right-click in the workspace, and then select "Argument setting(Z)" from the menu.

■ Function block argument setting
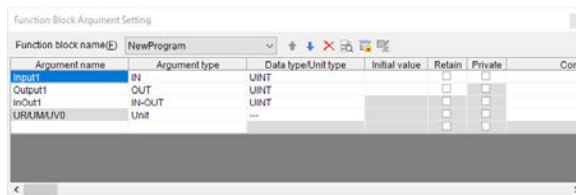
Item	Description
Function block name	Specify a function block to set up arguments. The pull-down menu shows function blocks registered to the project being edited.
⬆	Move the selected argument up in the display order by one spot.
⬇	Move the selected argument down in the display order by one spot.
✕	Delete the selected argument.
⯊Q	Create a cross reference for the selected argument.
🔒	Set up a password to display arguments that are set to be private.
🈯	Move the selected argument up in the display order by one spot.
Argument name*1	The "Translate" dialog is displayed, and the selected argument comment is translated. 📖 "Translating character strings" (page 6-25)
Argument type	Display the argument type used in the function block.
Data type / unit type*2	Display the data type set for the argument. If the argument type is unit, the unit type is displayed.
Display format / unit type*3	Display the display format set for the argument. If the argument type is unit, the unit type is displayed.
Initial value	Set the initial value to be stored when omitting the argument.
Keep*2	The value of the argument is retained even when the power is turned off.
Private	Set the argument to private. Arguments set as private are not displayed in the function block symbol.
Comments 1~8*1	Enter "Operand description" displayed in the "Operand Edit" dialog. Up to 8 types of comments can be set, and the displayed comments can be switched.

*1 Up to 128 characters can be set (Width-insensitive).
*2 This item is displayed only for KV-8000 with CPU function version 2.0 or later.
*3 This item is displayed only for models other than KV-8000 with CPU function version 2.0 or later.

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PROGRAMS

• Up to 64 arguments can be registered, which can be of argument type of
"IN" (up to 32), "OUT" (up to 32), "IN-OUT" (up to 32) , or "Unit Device" (up to 8).
• You can display the "Function block argument setting" dialog box to edit a ladder program.

■ Macro argument setting
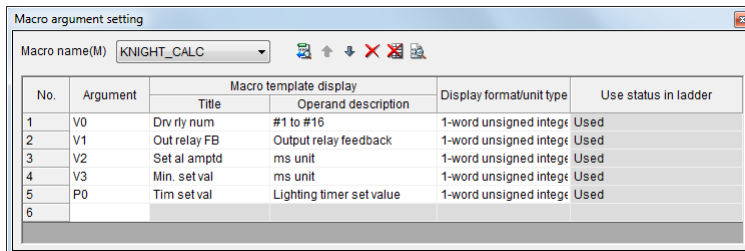
Item	Description
Macro block name	Specify a macro to set up arguments. The pull-down menu shows macros registered to the project being edited.
(icon)	Load argument information of the specified macro from the ladder diagram again.
(icon)	Move the selected argument up in the display order by one spot.
(icon)	Move the selected argument down in the display order by one spot.
(icon)	Delete the selected argument.
(icon)	Create a cross reference for the selected argument.
(icon)	Set up a password to display arguments that are set to be private.
No.	Display the number of the macro argument.
Argument	Display the argument device used in the macro.
For macro palette display — Title	Enter a name for the argument. [*1]
For macro palette display — Operand explanation	Enter an explanation for the operand that will be displayed in the "Edit operand" dialog box. [*2]
Display format/unit type	For UR/UM/UV devices, enter a unit type. For P and V devices, enter a display format used in the editor.
Ladder diagram usage status	Display the usage status of arguments in a ladder program as "Use" or "Not used".

*1 If the model is is the KV-8000/7500/7300 Series, then up to 12 characters (no distinction between half-width and full-width characters) can be used. For other models, up to 12 half-width characters or 6 full-width characters can be used.

*2 If the model is is the KV-8000/7500/7300 Series, then up to 24 characters (no distinction between half-width and full-width characters) can be used. For other models, up to 24 half-width characters or 12 full-width characters can be used.

Reference • Up to 10 arguments can be used.
• You can display the "Macro argument setting" dialog box to edit a ladder program.
• The setting is reflected in "Instruction/Macro/Pack palette".
For details on Instruction/macro/pack palette, see "Entering Instructions" (page 5-39).

Point

If you specify UR/UM/UV to an argument, then two arguments are used.
If only DM or the relay of a unit device is used as argument device, then two arguments are also used.

Converting Unit Device

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Program(M) ▶ Convert unit device(Q)

From the "Program(M)" menu, ▶ select "Convert unit device(Q)" to convert unit devices used in the function block or macro into arguments.

Alternative procedure From the ladder editing window of the function block or macro, right-click and then select "Convert unit device(K)" from the menu.

For details on argument and unit device, refer to the User's Manual of the CPU unit used.

Module Execution Sequence Settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Program(M) ▶ Setup module execution sequence(V)

From the "Program(M)" menu, ▶ select "Setup module execution sequence(V)" to set up an execution sequence for modules in the project.

For details on module execution sequence, see 📖 "Module execution sequence settings" (page 6-49).

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PROGRAMS

MEMO

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PROGRAMS
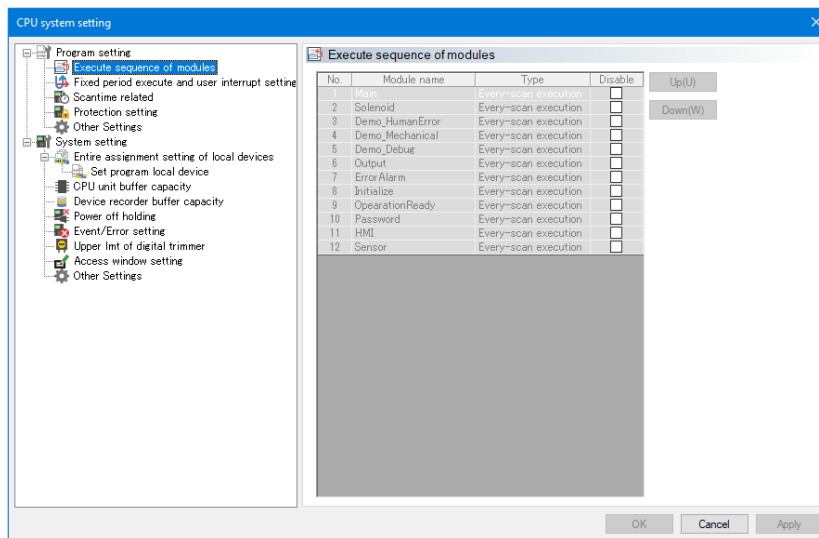
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CONVERT

The chapter describes the conversion functions and how to use conversions.

CONVERT

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This section describes the functions contained in the "Convert (A)" menu.

Convert

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Convert(A)" ▶ "Convert(C)" Ctrl + F9

Programs that you make with the editor cannot be transferred to a PLC as is.
To transfer a ladder program to a PLC, the ladder program must be converted to machine code.
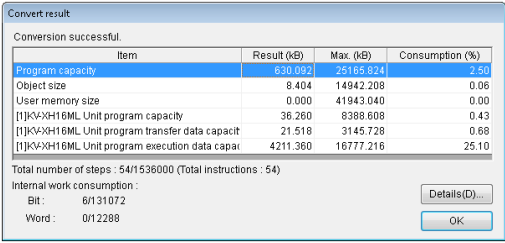
> **Reference** When you click the "Monitor/Simulator (N)" menu ▶ "Transfer to PLC → Monitor mode (C)," the ladder program is automatically converted into machine code and then transferred to the PLC without the need for you to explicitly execute the conversion operation.

Click the "Convert (A)" menu ▶ "Convert (C)."
The ladder program is converted, and the conversion results are displayed.

KV-8000/7500/7300

When conversion ends successfully, the percentage of the PLC memory that the converted ladder program corresponds to is displayed.

- Program capacity : This is the amount of memory that will be used when the entire program including rung comments is transferred to the unit.
- Object size : This is the amount of memory that will be used when the ladder program excluding rung comments is converted to a format that can be executed on the unit.
- User memory size[*1]: This is the amount of user memory such as file register, user document, and log data.

*1 The user memory size is displayed only when the selected PLC model is "KV-8000/7500/7300".

Click "Details" to display the number of steps used by each module and the consumption of the internal workspace (bits and words).
The total number of steps includes instructions and rung comments.

> **Reference** When an error occurs during conversion, the message "Conversion failed." is displayed. You can use the output window to check the error details.
> 📖 "Output Window" (page 6-18)

8
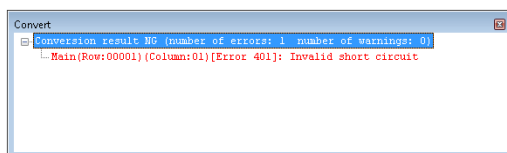
CONVERT

Checking for Device Conflicts

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

"Convert(A)" ▶ **"Check device confliction(B)"**

Click the "Convert (A)" menu ▶ "Check device confliction (B)" to switch between checking for and not checking for device conflicts during ladder program conversion.

When a check mark is displayed: Device conflicts are checked for.

When a check mark is not displayed: Device conflicts are not checked for.

■ Device conflicts

A device conflict is a situation in which the same device is specified by multiple instructions that specify a range, such as the block transfer (BMOV) or batch transfer (FMOV) instruction.

Example

When the following ladder program is written, a conflict will occur between DM3102 and DM3103.
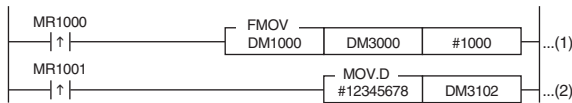
(1) Operation of the FMOV instruction
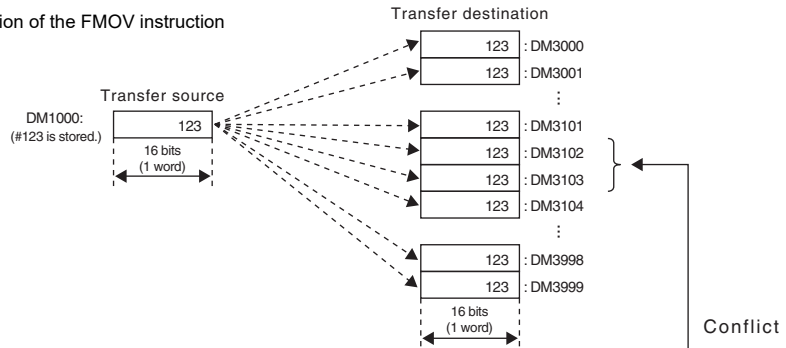
(2)Operation of the MOV.D instruction
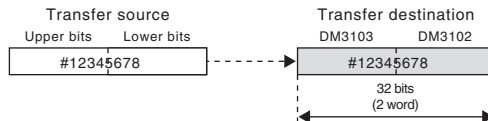
✏ **Point** | **You cannot check for device conflicts for devices modified by index registers and for instructions in which the number of devices used cannot be specified.**

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CONVERT

Clearing Invalid Operands

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

"Convert(A)" ▶ **"Clear invalid operands(I)"**

Invalid operands are sometimes generated when unit settings are changed after the ladder program is made.

Click the "Convert (A)" menu ▶ "Clear invalid operands (I)" to clear invalid operands.

> **Reference** **Invalid operands**
>
> • When you are using expansion units, use the Unit Editor to assign relays and DM entries. The unit setting information is linked to the ladder program. When you change the unit setting information, the relay and DM numbers in the ladder program are automatically changed to match. However, when a unit to which relays and DM entries have been assigned is deleted, the relays and DM entries that were assigned to the unit will exist in the ladder program even though the unit no longer exists. Relays and DM entries whose associations with a unit have been discontinued in this way are called "invalid operands."
> Ladder programs that contain invalid operands will not be converted successfully. To delete invalid operands, use the "invalid operand clear function" to delete invalid operands or check and then re-enter each invalid operand individually.
>
> • You can use the search function to search for invalid operands.
> 📖 "Device Search" (page 5-6)

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CONVERT

Checking for Duplicate Coils

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Convert(A)" ▶ **"Duplicate coil check(D)"**

Click the "Convert (A)" menu ▶ "Duplicate coil check (D)" to check for duplicate coil positions in the ladder program.

> **Reference**
> - Duplicate coil positions are not regarded as errors during conversion.
> - When multiple OUT, OUB, DIFU, and DIFD instructions are used on the same output relay, the last instruction written is given priority and output. (In both of the following examples, output R500 does not turn ON even if input R000 turns ON.)

A ladder that has been checked for duplicate coils	A ladder that has not been checked for duplicate coils
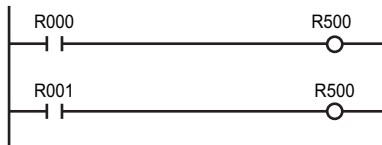
```
    R000              R500         R000              R500
    ─┤ ├──────────────( )─         ─┤ ├──────────────(SET)─

    R001              R500         R001              R500
    ─┤ ├──────────────( )─         ─┤ ├──────────────( )─
```
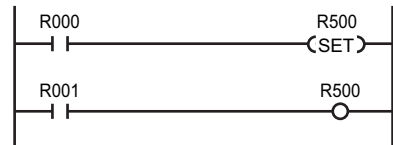
- When a duplicate coil is found, the operand and row number of the duplicate coil are displayed in the output window.

Search1			
Program name	Row	C...	Description
--	--	--	"Double coil check" search result: 2
Sample	00001	10	"Double coil check":OUT R500
Sample	00002	10	"Double coil check":OUT R500

Search1 Convert

> **Point**
> - **The duplicate coil check is conducted on four instructions: OUT, OUB, DIFU, and DIFD.**
> - **Even if an error is not discovered by the duplicate coil check, some ladder programs function as if they have a duplicate coil.**
> - **If you use a global device for an output relay in a function block or macro, and then call that function block or macro multiple times, a duplicate coil will occur.**

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CONVERT

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Setting Local Devices for Each Program

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

🖾 **"Convert(A)"** ▶ **"Set local devices for each program(S)"**

Click the "Convert (A)" menu ▶ "Set local devices for each program(S)" to set the number of local devices for each program.
For details on setting local devices for each program, see "Device setting for each program" (page 6-63).
For details on local devices, see User's Manual of the CPU unit used.

Overall Local Device Assignment Settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

🖾 **"Convert(A)"** ▶ **"Set entire assignments of local devices(A)"**

Click the "Conversion (A)" menu ▶ "Set entire assignments of local devices (A)" to set the number of local devices used in the entire project.
For details on the overall local device assignment settings, see 📖 "Overall local device assignment settings" (page 6-59).
For details on local devices, see User's Manual of the CPU unit used.

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CONVERT

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MONITOR/SIMULATOR

The chapter describes the monitor and simulator functions and how to use the monitor and simulator.

MONITOR/SIMULATOR

This section describes the functions contained in the "Monitor/Simulator (N)" menu.

Preparation before Monitoring

Prepare the following items in advance.

■ Connecting to a USB port

USB cable model: OP-35331

KV-8000/7500/7300/5500/5000/3000/1000/700 or
KV Nano Series

OP-35331
(Cable length: 3 m)   To USB connector

To USB connector

PC
KV STUDIO
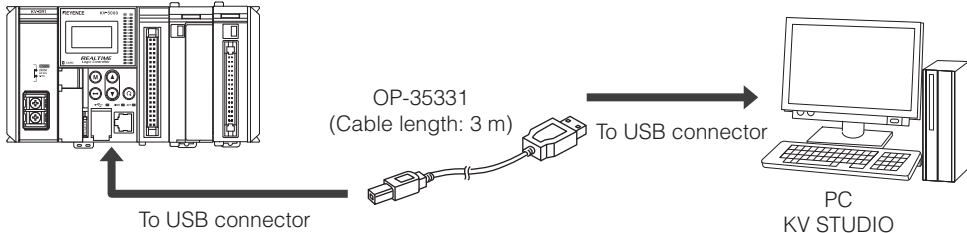
> **Point**
> • **Be sure to use the OP-35331 dedicated cable. If you use a different cable, operations may not be performed correctly.**
> • **Be sure to install KV STUDIO on the PC before you connect the KV-8000/7500/ 7300/5500/5000/3000/1000/700 or KV Nano Series to the USB port of the PC.**
> 📖 **"1-4 Installing the Software" (page 1-10)**

■ Connecting to an Ethernet port

KV-8000/7500/7300/5500/5000/3000/1000/700 or
KV Nano Seies

PC
KV STUDIO

Hub

STP or UTP straight cable   STP or UTP straight cable
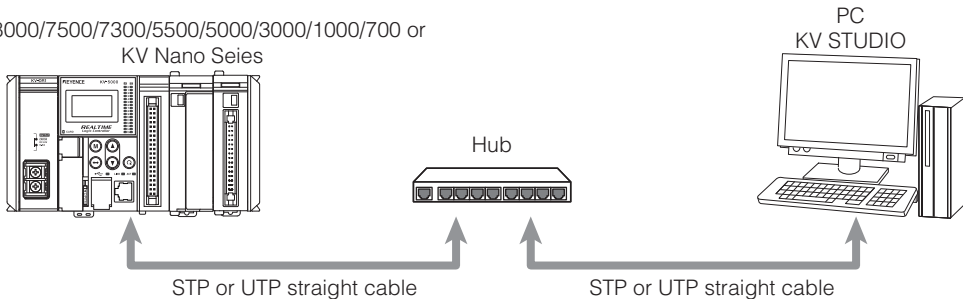
> **Point**
> • **When you are making a 10BASE-T Ethernet connection, use a category 3 or higher STP or UTP cable.**
> • **When you are making a 100BASE-T Ethernet connection, use a category 5 or higher STP or UTP cable.**
> • **You can also use the access window to configure the Ethernet settings of the PLC.**
> • **The KV-8000/7500 built-in Ethernet port supports MDI/MDI-X automatic switching. When you are connecting other PLC models to a PC directly, use an STP or UTP crossover cable.**

■ Connecting to a D-sub 9-pin serial port

Connection cable model: OP-26487

D-sub 9-pin style conversion connector model: OP-26486

KV-7300/3000/1000/700/10 (16)/24 (40)/P16 or
KV Nano Series

OP-26401
OP-26486

To D-sub 9-pin
serial port

PC
KV STUDIO

To modular connector   OP-26487
(Cable length: 2.5 m)

KV unit pin numbers

1 2 3 4 5 6

	KV			PC	
RD	3	←	3	SD
SD	5	→	2	RD
			4	DR
			6	ER
			7	RS
			8	CS
SG	4		5	SG

Dedicated connector   D-sub 9-pin connector
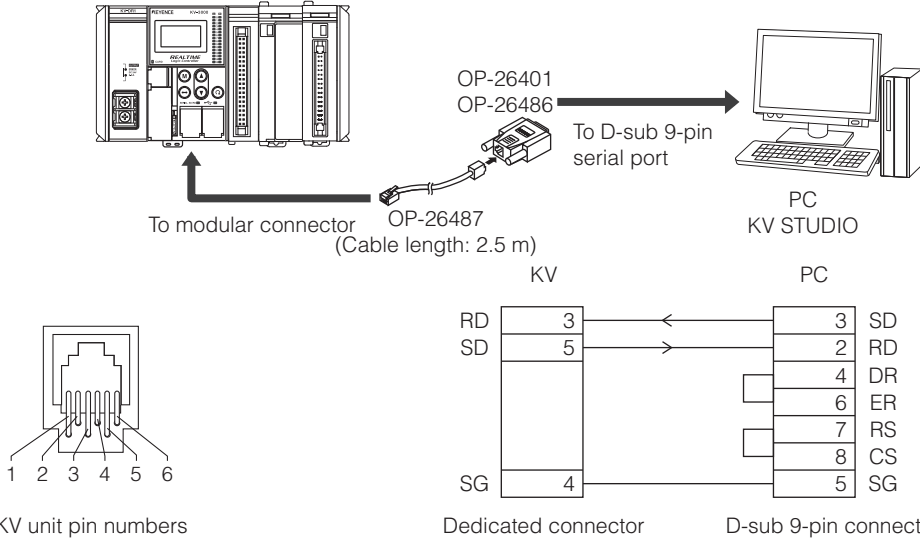
NOTICE	**Note that incorrectly connecting the PLC to the printer port of a PC may damage the PC or PLC.**

✎ Point	**Be sure to use the OP-26487, OP-26486, or OP-26401 dedicated cable. If you use a different cable, operations may not be performed correctly.**

■ Connecting to the Bluetooth unit KV-BT1

USB adapter for
Bluetooth connections
+

KV-BT1

KV-5500, KV-5000 version 1.1 or later,
or KV-3000 version 2 or later

PC
KV STUDIO
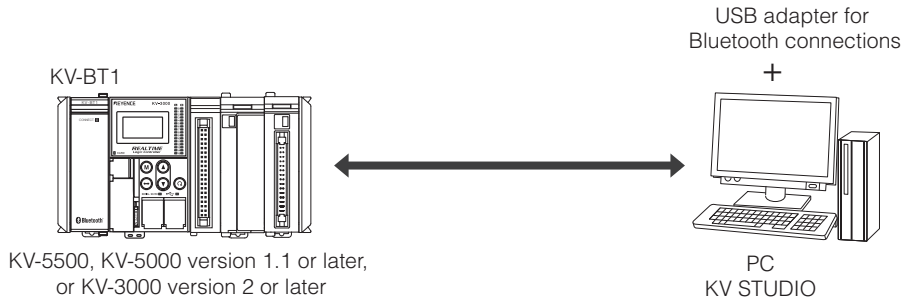
✎ Point	• **The KV-BT1 can be connected to the KV-5000 (version 1.1) and to CPU units with CPU function version 2.0 or later.** • **For details on the USB adapter for Bluetooth connections, see the user's manual included with the USB adapter for Bluetooth connections.**

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MONITOR/SIMULATOR

Returning to the Editor

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

    🔧 **"Monitor/Simulator(N)"** ▶ **"Return to Editor(X)"** 　Ctrl　 **+** 　F1　

Click the "Monitor/Simulator (N)" menu ▶ "Return to Editor (X)."

| Reference | • The current state (Editor, Monitor, Simulator, Online Edit, or Simulator Edit) is displayed on the KV STUDIO mode bar. • You can also use the mode bar to return to the editor directly. |

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MONITOR/SIMULATOR

Communication Settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Configure the settings for communication between the CPU unit and PC.

Communication settings

🖱 **"Monitor/Simulator(N)"** ▶ **"Setup communication(T)"** ▶ **"Setup communication(C)"**

You can configure the settings of various communication methods.
Click the "Monitor/Simulator (N)" menu ▶ "Setup communication (T)" ▶ "Setup communication (C)" to display the "Comm settings" dialog box.

Detailed communication settings
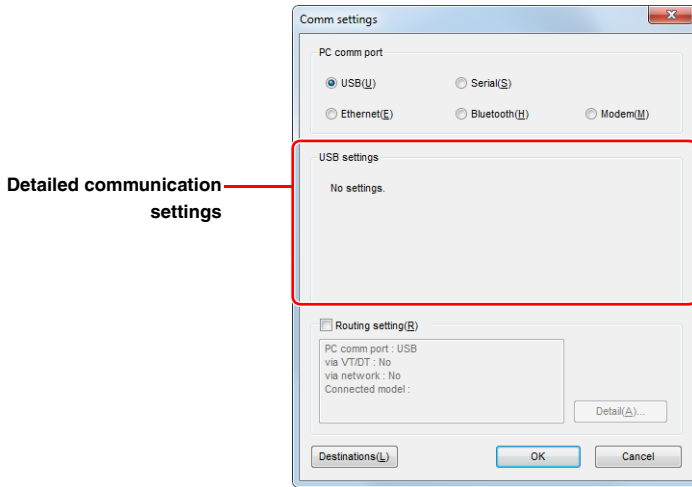
Item	Explanation
PC comm port	Select the communications port on the PC to be used for communication with the PLC.
USB[*1]	Select this option when you are connecting through the USB interface. This is selected by default.
Serial[*2]	Select this option when you are connecting through the RS-232C interface. Select this when the connection destination is KV-7300/3000/1000/700, KV Nano series, KV-X 202/XL402 or KV-L2*V etc.
Ethernet[*1]	Select this option when you are connecting through the Ethernet interface. Select this to connect to the built-in Ethernet port of the KV-8000/7500/5500/5000 or to the KV-LE21V.
Bluetooth	Select this option when you are connecting through the Bluetooth interface to a KV-BT1 that is connected to the KV-5000 (version 1.1) and to a KV-5500/5000/3000 with CPU function version 2.0 or later.
Modem	Select this option to communicate through a modem with a remote KV-8000/7500/7300/5500/5000/3000/1000/700.
(Detailed communication settings)	The displayed content changes depending on the selected communications port.
Routing setting	Select this checkbox to, instead of connecting a PLC directly to a PC, connect through a VT5, VT3 or VT2 Series connected to the PLC or through FL-net or Ethernet.
Detailed setting	This button is enabled when the "Routing setting" checkbox is selected. Click this to display the "Routing detailed setting" dialog box.
Destinations	Click this to display a pulldown menu.
Add to destinations list	Click this to add the connection destination to the connection destination list file.
Open destinations list	Click this to open the connection destination list file. If the connection destination list file does not exist, you can create a new one.

*1 You cannot use this method to connect to the KV-P16 or KV-10/16/24/40.
*2 Use the KV-L2*V to connect to the KV-8000/7500/5500/5000.

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MONITOR/SIMULATOR

■ USB connection

Connect the PLC and a PC through the USB interface.
Select the "USB" radio button under "PC comm port." You do not have to configure any detailed settings.

✎ Point	• **You cannot use a USB hub.**
	• **You cannot connect to the KV-10 (16), KV-24 (40), or KV-P16 through the USB interface.**

■ Serial connection

Connect the PLC and a PC through the RS-232C interface.
Select the "Serial" radio button under "PC comm port."

Item	Explanation
COM port	Select the number of the COM port that the cable is connected to. The default value is "COM1." A COM port is a serial port. The RS-232C interface is used to perform communication. The available COM ports, the number of which vary depending on the PC model, are displayed in the list.
Baud rate	Select the baud rate. The selection ranges and default values of the baud rates are shown below.

Model	Selection Range	Default
KV-8000/7500/7300/5500/5000*, KV-3000, KV-1000, KV Nano Series	9600, 19200, 38400, 57600, 115200	115200
KV-700, KV-24 (40), KV-10 (16), KV-P16	9600, 19200, 38400, 57600	57600

Item	Explanation
Unit No. setting	Click "Unit No. setting" to display the "Unit No. Setting" dialog box.

* Serial communication unit is required separately for serial connection with KV-8000/7500/5500/5000.

✎ Point	**If selectable COM ports are not displayed in the "Serial port (COM) setting" dialog box, or the number of COM ports displayed is less than the number of the actual COM ports, the COM ports have not been correctly recognized by Windows. Have Windows correctly recognize the COM ports. See the user's manual of your PC or contact its manufacturer.**	

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● **Setting the unit number**

With KV STUDIO, you can use a single PC to transfer programs to several PLCs or to monitor programs on several PLCs by specifying the station numbers of the serial communication devices connected in a multi-drop configuration.

✎ Point	• **The built-in serial ports of the KV-7300/3000/1000/700 and KV Nano Series**
	cannot be connected in a multidrop configuration. For KV-7300/3000/1000/700
	LV-L2*V is required, and for the KV Nano Series KV-N11L or KV-NC20L is
	required.
	• **This dialog box is not displayed when the KV-10 (16), KV-24 (40), or KV-P16 is**
	selected for the PLC model.
	• **You can set the unit number when the monitor is stopped (when**
	communication is not in progress).

KV-8000/7500/7300/5500/5000/3000/1000/700

Station number 2   1   KV STUDIO

Port 2: RS-422A   RC-232C/RS-422A converter
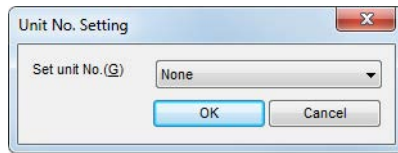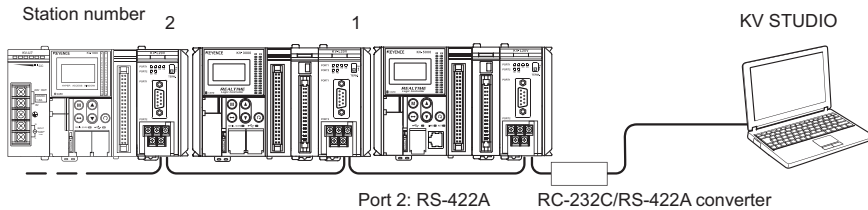
Item	Description
Set unit No.	Set the unit number of the KV-L2*V to communicate with.

Reference	The unit number is the number set to "Station No." in the KV-L2*V unit setup window in
	the Unit Editor.

   📖 KV-L21V User's Manual
   📖 KV-L20V User's Manual
   📖 "Chapter 3 UNIT EDITOR"

✎ Point	**You can specify a value between 0 and F for the unit number in the "Unit No.**
	Setting" dialog box, but you can only specify a value between 0 and 9 in the KV-L2*V
	Unit Editor.

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KV Nano Series

Station number

RS-422A

Item	Explanation
Set unit No.	Set the unit number of the KV-N11L or KV-NC20L to communicate with.

> **Reference** The unit number is the number set to "KV mode Station No." in the KV-N11L or KV-NC20L unit setup window in the Unit Editor.
> 📖 "KV Nano Series Serial Communication Function User's Manual"

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■ **Ethernet connection**

Connect the PLC and a PC through the Ethernet interface.
Select the "Ethernet" radio button under "PC comm port."
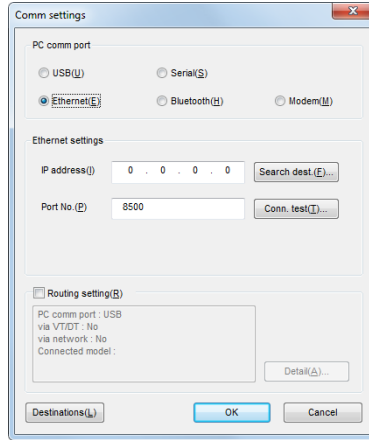
Item	Description
IP address	Enter the IP address of the KV-8000/7500/7300/5500/5000/3000/1000/700 or KV Nano Series to connect to.
Search destination	Click this to search for the KV-8000/7500/7300/5500/5000/3000/1000/700 or KV Nano Series connected through the Ethernet interface.
Port No.	Enter the port number of the KV-8000/7500/7300/5500/5000/3000/1000/700 or KV Nano Series to connect to.
Conn. test	Click this to test the connection by sending a Ping instruction to the port number of the entered IP address.

Reference
- You can use the connection destination list to select a registered connection destination from the menu.
- To connect to the KV-7300/3000/1000/700 through the Ethernet interface, the KV-XLE02/ KV-EP21V, KVLE21V, or KV-LE20V is also required.

  ☐ KV-XLE02 User's Manual
  ☐ KV Series Ethernet/IP Function User's Manual,
  ☐ KV-LE21V User's Manual, and
  ☐ KV-LE20V User's Manual
- To connect to the KV Nano Series through the Ethernet interface, the KV-NC1EP is also required.

  ☐ KV Series Ethernet/IP Function User's Manual

Point
- **Configure these settings when the monitor is stopped (when communication is not in progress). You cannot configure the detailed Ethernet settings during monitoring (when communication is in progress).**
- **You cannot connect to the KV-10 (16), KV-24 (40), or KV-P16 through the Ethernet interface.**

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● **Searching for connection destinations**

Search for connection destinations connected to the network.

Item	Explanation
Select network card	Search for settings related to the PC's Ethernet port.
Network card	This displays the Ethernet port. When multiple ports exist, select the Ethernet port that you want to use from the pulldown menu.
IP address	This displays the IP address setting of the PC.
Subnet mask	This displays the subnet mask setting of the PC.
Port No.	Specify the port number of the KV-8000/7500/5500/5000 or of the connected Ethernet unit.
Execute	Click this to search for the PLC that is connected through the Ethernet interface.
Stop	Click this to abort the search.
Result	This displays the search result: a list of the PLCs whose connections were confirmed.
MAC address	This displays the MAC address.
Connected unit type	This displays the PLC model name (KV-8000/7500/7300/5500/5000/3000/1000/700 or KV Nano Series) or the Ethernet unit name (KV-LE21V, KV-EP21V or KV-NC1EP).
IP address	This displays the IP address of the KV-8000/7500/5500/5000 or of the connected Ethernet unit. When the IP address setting method is "BOOTP" or "auto switching of BOOTP fixed IP" and no IP address is assigned, "unset" will be displayed. Click "unset" to display the "IP address setting" dialog box, in which you can set the IP address.
Project name	This displays the name of the project stored on the PLC.
Select	Select the PLC in the search results that you want to connect to, and then click this to display the "Communication setting" dialog box with the IP address and port number displayed.

● **Setting the IP address**

If an IP address is not set, set an IP address.
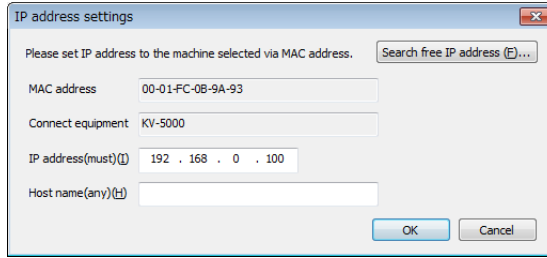
Item	Explanation
MAC address	Display the MAC address of the connected CPU unit or Ethernet unit.
Connected equipment	Display the model name of the connected CPU unit or the unit name of the Ethernet unit.
IP address (must)	Set the IP address.
Host name (any)	Set the host name.
Search free IP address	Click this to display the "Search free IP address" dialog box.

● **Searching for free IP addresses**

Search for free IP addresses on the network.
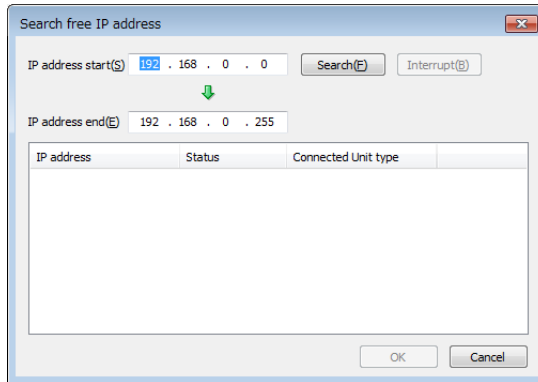
Item	Explanation
IP address start	Set the start address of the IP address range to search.
IP address end	Set the end address of the IP address range to search.
Search	Click this to search for IP addresses within the specified range.
Interrupt	Click this to abort the search.
IP address	This displays the found IP address.
Status	This displays the result of the IP address search. Unused IP addresses are displayed as "no response."
Connected Unit type	Display the model name of the connected CPU unit.
OK	Select an IP address in the search result, and then click "OK" to enter the selected IP address in the "IP address setting" dialog box.

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● **Testing connections**

Use "Ping" and "Tracert" to test whether the connection destination, the CPU unit, Ethernet unit whose IP address and port number you specified, is operating correctly.
The "Ping" and "Tracert" commands executed from the "Communications Test" dialog box function the same as the "Ping" and "Tracert" commands that are executed from the MS-DOS prompt.

Ping:	You can use this command to check whether the connection destination is operating normally by sending an IP packet to the specified IP address and receiving the sent packet from the connection destination normally. In addition, the time required to receive a response to the Ping command and the packet loss percentage are both displayed, so you can infer the speed of transmissions to the connection destination from these results.
Tracert:	This displays the route from one host to another. You can use this to check the status of the routers on the route from the host to the connection destination and to search for bottlenecks on the route from the response time of each router.

Click this to execute a Ping instruction for the connection destination.
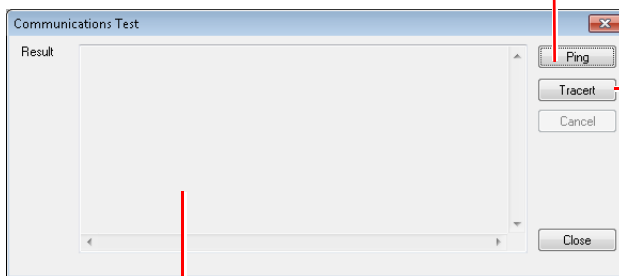
This displays the execution results of the Ping or Tracert instruction.

Click this to execute a Tracert instruction for the connection destination.

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■ **Bluetooth connection**

Connect through the Bluetooth interface a PC and a KV-BT1 that is connected to the KV-5000 (version 1.1) and to a KV-5000/3000 Series CPU unit with CPU function version 2.0 or later.
Connect the USB adapter for Bluetooth connections to the PC, and then configure the PC to enable Bluetooth communication.

Select the "Bluetooth" radio button under "PC comm port."

Item	Explanation
Identification Name	Enter the identification name set on the KV-BT1 at the connection destination. You can register this information by searching for the connection destination. The identification name is "KV-5500/5000/3000(half-width space)(identification name with the Unit Editor)." You can use the access window of the KV-5000 (version 1.1) and of the CPU unit with CPU function version 2.0 or later to check the identification name.
BD address	Enter the BD address of the KV-BT1 at the connection destination. You can register this information by searching for the connection destination. You can use the access window of the KV-5000 (version 1.1) and of the CPU unit with CPU function version 2.0 or later to check the BD address.
Passkey	Enter the passkey set on the KV-BT1 at the connection destination (the default value is 0000).
Search destination	Click this to display the "Connect target search" dialog box. Execute the search to search for KV-BT1s that can be connected to.
Port No.	This is the number of the COM port that the Bluetooth adapter is using. You can also enter the port number manually.
Manual	When this checkbox is selected, you can specify the number of the COM port on which Bluetooth communication will be performed.

Reference ▷ Even if the KV-BT1 has not been set in the Unit Editor, you can set the passkey to the default value (0000) and perform Bluetooth communication to transfer data and perform monitoring from KV STUDIO. Communication can be performed with a Bluetooth connection during the start of the design stage. Even if you add KV-BT1s at a later stage, you can perform communication with a Bluetooth connection without changing the conventional setting data.

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● **Searching for connection destinations**

Search for connection destination for Bluetooth communication.
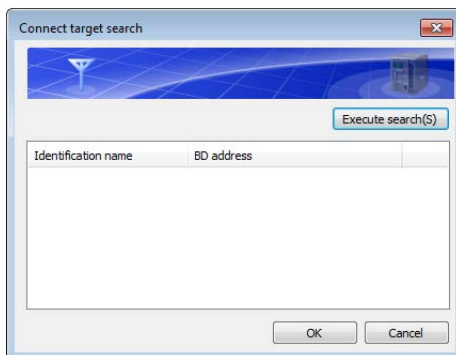
Item	Explanation
Execute search	Search for the PLCs (KV-5000 version 1.1 or later or KV-5500 or KV-3000 version 2 or later) that are connected to KV-BT1s.
Result	This displays the search result: a list of the confirmed PLCs.
Identification name	This displays the identification name that has been set on the KV-BT1.
BD address	This displays the BD address of the KV-BT1.
OK	Select a PLC in the search results, and then click "OK" to display the "Attribute setting" dialog box.

> **Point** KV-BT1s that have been set to "cannot be found" in the Unit Editor will be ignored in the search.
> **Enter details such as the identification name manually.**
> 📖 KV-5500/5000/3000 User's Manual

● **Property settings**
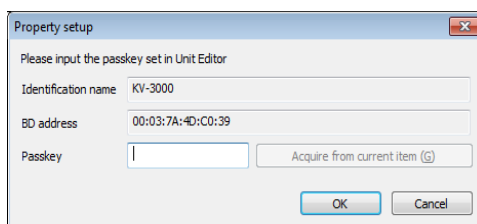
Item	Explanation
Identification name	This displays the identification name that has been set on the selected KV-BT1.
BD address	This displays the BD address of the selected KV-BT1.
Passkey	Enter the passkey set on the selected KV-BT1 (the default value is 0000).
Aquire from current item	Click this to enter the passkey set on the KV STUDIO in which editing is being performed.
OK	Click this to display the identification name, BD address, and passkey in the "Communication setting" dialog box.

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■ **Modem communication**

Use the modem mode to monitor a remote CPU unit.

📖 KV-L21V User's Manual

✎ Point	**You cannot use modem communication with the KV Nano Series, KV-10 (16), KV-24 (40), or KV-P16.**

● **Overview of modem mode**

Use modem mode to monitor remote PLCs over telephone lines by using a modem.

To perform communication in modem mode, you have to connect a modem to a PC on which KV STUDIO is installed and you have to connect the serial communication unit KV-L21V and a modem to the PLC.

📖 KV-L21V User's Manual

CPU unit   KV-L2*V   Modem   Telephone line   Modem   PC KV STUDIO

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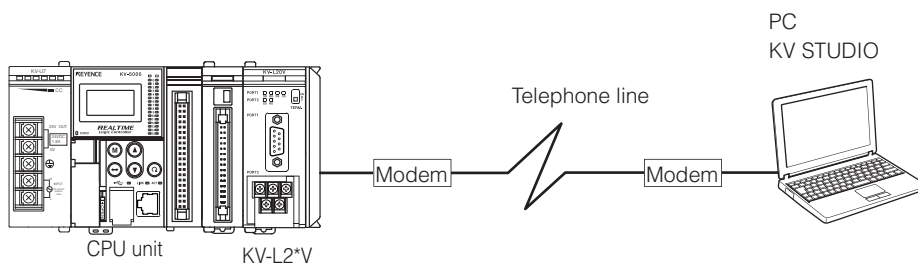
● Modem initialization

Before you perform communication, configure settings such as the modem's initialization command and the type of the telephone line.
Use the "PC modem setting" and "KV-L2*V/R modem setting" dialog boxes to configure the settings.
📖 KV-L21V User's Manual

Configuring PC-side modem settings

Click "PC modem setting" in the "Communication setting" dialog box.

Item		Explanation
Modem setting	Model	Select the modem model. • To register a new initialization command, enter the initialization command, and then click "Register." • If the connected modem is already registered, select it from the list. • To delete a registered modem, select the modem to be deleted, and then click "Delete."
	Initialization command	Enter the modem initialization command. The initialization command varies depending on the type of modem.
	Register	Click this to register the entered model and initialization command.
	Delete	Click this to delete the selected model and initialization command.
Telephone line		Select the type of telephone line from "Tone" and "Dial." Tone: Select this when you are using a push line. A tone will be generated. Pulse: Select this when you are using a dial line. A pulse tone will be generated.
Outside line dial	Outside line	Specify whether you want to originate calls on an outside line by selecting "Yes" or "No."
	Number for outside line dialing	Enter the number to append when making a call on an outside line in the "Outside line" text box.
Modem connection settings	Dial wait time	Set the time to wait (0 to 120 seconds) between dialing the other party's modem and a connection being made. The default value is 60 seconds.
COM port		Set the number of the port to use during communication.
Baud rate		Set the baud rate during communication with the modem. Select from "9600," "19200," "38400," "57600," and "115200." The default value is "38400."

> **Point** When the time until a response is received from the other party's modem is long, if the dial wait time is set to a short amount of time, the circuit may be disconnected before a response is received. Be sure to set a dial wait time that is longer than the modem's response time.

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| Reference |

• **Initialization command**

"AT commands" are commands for controlling modem operations. For every AT command, first enter "AT," and then enter the command.
KV STUDIO and the KV-L2*V use AT commands to control modems.
When you are using a modem, use an AT command to configure the settings so that data is transferred correctly between your modem and the other party's modem. This setting is called an "initialization command." The settings of the initialization command vary depending on the modem.

• **Initialization command settings**

Initialization commands are pre-registered for the following modem models. To set the initialization command, you just have to select the model name from the "Model" list.

Type	Manufacturer	Model	KV-L21V Side	PC Side
Box	AIWA	PV-BW5610	Yes	Yes
	I/O Data Devices	DFML-560E (MR)	Yes	Yes
	OMRON	ME5614D (2)	Yes	Yes
	Melco	IGM-B56KH	Yes	Yes
Card	AIWA	PV-JF56E6	No	Yes
	OMRON	ME5614C/W	No	Yes

Register the initialization command for any models that are not already registered.

Follow the procedure shown below to register the initialization command.

Enter the "AT&F" command for returning the modem to its factory default values,

check the details that are different from the factory default values, and then enter the

initialization command. You can specify multiple commands consecutively.

In the following example, the factory default values are "perform echoback," "turn CD

ON at all times," and "detect dial tone."

AT&FE0&C1X3 ⏎

— Only detect busy tones.
— Turn CD ON only when the carrier is detected.
— Do not perform echoback.
— Return the settings to the factory default values.
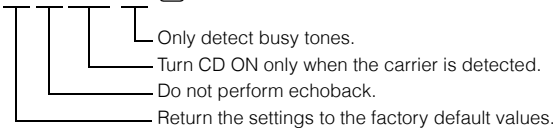
• **General AT commands**

The AT commands may vary depending on the type of the modem. Be sure to check the AT commands listed in the User's Manual of the modem you are using.

AT Command	Description
E0	Do not perform echoback.
Q0	Return result code.
V1	Return result code in English.
&C1	Turn CD ON only when the carrier is detected.
&S0	Turn DR ON at all times.
&D2	Disconnect the line when ER changes from ON to OFF.
\Q3	Use RS-CS to perform flow control.
\N3	Set the modem to auto-reliable mode.
X3	Detect busy tone (do not detect dial tone).
\J0	Fix terminal speed.
S0=2	Auto answer after 2 rings.
%C3	Automatically select MNP Class 5 or V.42 bis.

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Configuring KV-L2*V/R-side modem settings

> ✎ **Point** | Check that the monitor has stopped (communication is not in progress).

Click "KV-L2*V/R modem setting" in the "Communication setting" dialog box.

Item		Explanation
Modem	Model	Select the modem model. • To register a new initialization command, enter the initialization command, and then click "Register." • If the connected modem is already registered, select it from the list. • To delete a registered modem, select the modem to be deleted, and then click "Delete."
	Initialization command	Enter the modem initialization command. The initialization command varies depending on the type of modem.
	Register	Click this to register the entered model and initialization command.
	Delete	Click this to delete the selected model and initialization command.
Telephone		Select the type of telephone line from "Tone" and "Dial." Tone: Select this when you are using a push line. A tone will be generated. Pulse: Select this when you are using a dial line. A pulse tone will be generated.
Outside line dial	Outside line dial	Specify whether you want to originate calls on an outside line by selecting "Yes" or "No."
	Outside line	Enter the number to append when making a call on an outside line in the "Outside line" text box.
Modem conn. settings	Dial wait time	Set the time to wait (0 to 120 seconds) between dialing the other party's modem and a connection being made. The default value is 60 seconds.
COM port		Set the number of the port to use during communication.
Transfer to KV-L2*V/R		Click this to transfer the settings to the KV-L2*V/R. After you finish configuring the settings, be sure to transfer them to the KV-L2*V/R.

> ✎ **Point** | The KV-L2*V/R settings are actually stored on the CPU unit. If you change the combination of the KV-L2*V/R and CPU unit after configuring the settings, you will have to configure the "KV-L2*V/R modem setting" again.

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● **Performing communication in modem mode**

To monitor a remote PLC over a telephone line, switch to modem mode, and then phone the other party's modem that is connected to the PLC in order to enable communication.

Check that the "Modem" radio button under "PC comm port" in the "Communication setting" dialog box is selected.

> ✒ **Point** | **To communicate in modem mode, connect a modem to the PC and also connect a modem and a KV-L2*V to the PLC that you will monitor. In addition, you have to configure settings such as the modem's initialization command and the type of the telephone line in advance.**
> 📖 "Serial connection" (page 9-6)
> 📖 "Modem initialization" (page 9-16)

Stopping communication

Click the "Monitor/Simulator (N)" menu ▶ "Stop monitor (E)" or "Return to Editor (X)" to disconnect the telephone line and stop communication.

Alternative procedure — Stopping the monitor
- Click 🔴 (red).
- Press ⎡Shift⎤ + ⎡F4⎤ .
Returning to the editor
- Click ⚡ .
- Press ⎡Ctrl⎤ + ⎡F1⎤ .

Reference — To perform communication again, click the "Monitor/Simulator (N)" menu ▶ "Monitor mode (B)" to open the "Tel. No. setting" dialog box, and then click "Connect."

Registering the other party

When you first display the "Phone number setting" dialog box, the "Dial destination" list will be empty. Follow the procedure below to register other parties.

1 In the "Telephone No. setting" dialog box, enter the other party's name in the "Call to" text box and the other party's phone number in the "Telephone" text box.

Enter the name of the other party to connect to.

Enter the phone number of the other party to connect to.
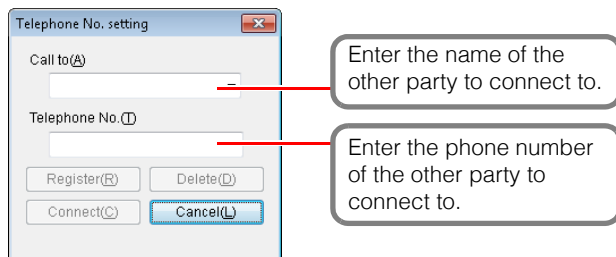
Item	Explanation
Call to	Enter the name of the other party to connect to. You can register one phone number for each party.
Telephone number	Enter the phone number of the other party to connect to. When you are making a call on an outside line, do not enter the outside line number, only enter the phone number of the other party.

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2 Click "Register."

The entered other party is registered.

■ Routing settings

Configure these settings when you will not connect the PLC to a PC directly, and will instead connect through a VT5/VT3/VT2 Series that is connected to the PLC or through FL-net.

| ✎ Point | **You can only connect a PC to a KV-10 (16), KV-24 (40), or KV-P16 directly.** |

In the "Communication setting" dialog box, select the "Routing setting" checkbox, and then click "Detail."
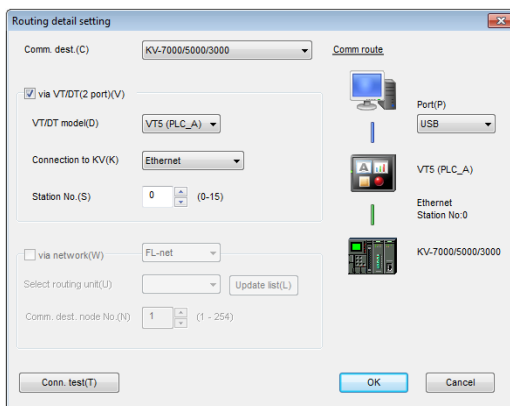
Item	Explanation
Communication destination	Select the PLC model to be connected through a route to the PC.
via VT/DT (2 port)	Select this checkbox when you want to connect through a VT or DT (2-port function).
VT/DT model	Select the model to route through.
Connection to KV	Select the method for connecting the model to route through and the PLC.
via network	Select this checkbox when you want to connect through the network.
Select routing unit	Select the unit to route through.
Update list	Click this to read the list of units from the unit configuration of the KV-8000/7500/7300/5500/5000/3000 to route through.
Communication destination node No.	Specify the IP address or node number of the equipment (KV-8000/7500/5500/5000, KV-XLE02, KV-FL20V, KV-EP21V, KV-LE21V or KV-NC1EP) that you are connecting to.
Communication route	This displays the connection state of the PLC connected to the PC.
Port	Select the communications port of the routing equipment to connect directly to the PC.
Connection test	You can test the status of the connection between the PC and the PLC with the current settings. If the connection cannot be established, check the communication settings and the cable connection status.

| ✎ Point | **When communicating via Ethernet KV-XLE02, communication can be performed only on the port set with "Communication via KV TUDIO" in the port number setting of Unit Editor KV-XLE02 unit setting. Default value is "Port 1".** |

Setting the global device comment transfer range

"Monitor/Simulator(N)" ▶ "Setup communication(T)" ▶
"Setup transfer range of global device cmnts(T)"

When the selected PLC model is the KV-8000/7500/7300/5500/5000/3000 or KV Nano Series, you can set the transfer range of global device comments during project transfers.
Click the "Monitor/Simulator (N)" menu ▶ "Setup communication (T)" ▶ "Setup transfer range of global device cmnts (T)" to display the "Global device comments transfer range setting" dialog box.
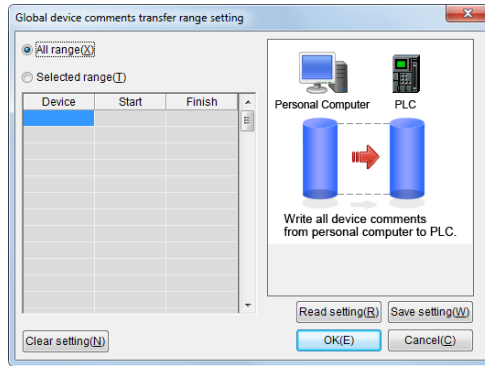
Item	Explanation
All range	When this radio button is selected, all the global device comments will be transferred.
Selected range	When this radio button is selected, you can specify the range.
Device	Specify the device type in the combo box. You can specify all the types of global devices.
Start	Specify the number of the leading device to transfer comments from.
Finish	Specify the number of the last device to transfer comments from.
Read setting	Click this to read the device range that was saved with "Save setting."
Save setting	Click this to save the device range specified with "Selected range."
Clear setting	Click this to clear all the specified devices and select the "All range" radio button.

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Configuring comment transfer settings

Set the range of comments to transfer to the PLC.

> **Reference** This option is not displayed when "KV-8000/7500/5500/5000/3000/1000/700/700+M" or "KV Nano Series" is selected for the PLC model.

> **Point**
> • **When you transfer comments together with the program to a KV-10 (16), KV-24 (40), or KV-P16, be sure to set the comment transfer range.**
> • **The number of comments that can be transferred is shown below. When you set a number of comments that is greater than or equal to the number of comments that can be transferred, comments will be transferred to the PLC up to the number of comments that can be transferred in an order determined by the set device list.**

Supported Model	Number of Comments That Can Be Transferred
KV-24 (40)	
KV-10 (16)	1000
KV-P16	

> • **The comments of the type that you selected with "Select comment" under "Show mode setting" in "Options" will be transferred to the PLC.**

Click the "Monitor/Simulator (N)" menu ▶ "Setup communication (T)" ▶ "Setup cmnts transfer (T)" to display the "Setup comment transfer" dialog box.
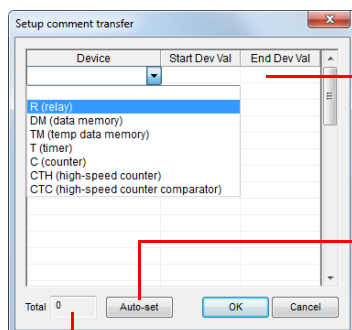
Specify the type and range of the devices to be transferred.

Click this button to specify all the comments that have been entered in the ladder program.

This displays the current number of comments that have been set.

Monitor Mode

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Monitor/Simulator(N)" ▶ **"Monitor mode(B)"** Ctrl + Shift + F3

Change to monitor mode without transferring the ladder program being edited to the PLC. Before the operation, connect the PLC to the PC and enable communication on both devices.

Reference For details on the monitor, see 📖 "9-2 Monitor Function" (page 9-48).

Click the "Monitor/Simulator (N)" menu ▶ "Monitor mode (B)" to switch to monitor mode.

Alternative procedure Select "Monitor" from the pulldown menu on the mode bar.

Editor ▼
Editor
Monitor
Online edit
Simulator
Simulator edit
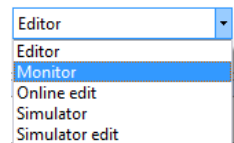
● **When the project being edited is the same as the project on the PLC**

KV STUDIO immediately switches to monitor mode.

● **When the project being edited is different from the project on the PLC**

A dialog box asking you to confirm that you want to transfer the project is displayed.
Click "Monitor mode" to switch to monitor mode with one ladder program being edited and another being executed on the PLC.
Click "PLC transfer → monitor mode" to display the "Transfer program" dialog box appears. Select the item to be transferred, and then click "Run."
📖 "PLC Transfer → Monitor Mode" (page 9-24)
Click "Cancel" to stop switching to monitor mode.
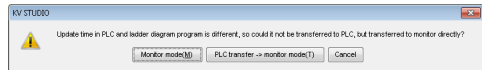
Point **For positioning unit parameter settings, the confirmation dialog box will not be displayed even if the projects are different.**

Reference The project being edited and the project being executed on the PLC are recognized as being different also in the case where the project is edited and then restored to its unedited state and in the case where only the date and time that the project was saved is different between the projects.

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PLC Transfer → Monitor Mode

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Monitor/Simulator(N)" ▶ "Transfer to PLC → Monitor Mode(C)" Ctrl + F8

The ladder program that you created in the editor is converted to machine code and is then transferred to the PLC. The unit then switches to monitor mode. Before the operation, connect the PLC to the PC and enable communication on both devices.

Reference   For details on the monitor, see ☐ "Monitor Function" (page 9-48).

1 Click the "Monitor/Simulator (N)" menu ▶ "PLC transfer → Monitor Mode (C)".

Reference   If the ladder program is not converted successfully, an error message is displayed.
Check the error details displayed in the output window, remove the cause of the error, and then transfer the program again.
☐ "Output Window" (page 6-18)

2 Specify the program items to be transferred.

The "Transfer program" dialog box is displayed.

■ When the CPU unit is the KV-8000/7500/7300/5500/5000/3000 or KV Nano Series

Transfer item information display area
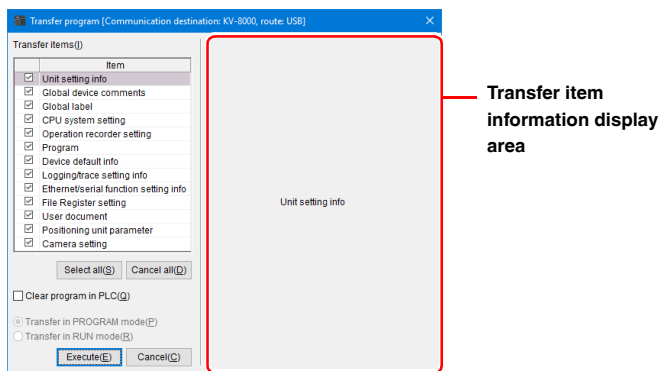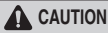
Item	Explanation
Transfer item	The items whose checkboxes are selected will be transferred to the PLC. In addition, the detailed information of the selected item is displayed in the transfer item information display area on the right side of the dialog box.
Transfer item information display area	This displays the detailed setting information of the selected transfer item. For items that do not require detailed settings, only the item name is displayed.
Select all	Click this to select the checkboxes of all transfer items.
Cancel all	Click this to clear the checkboxes of all transfer items.
Clear program in PLC	When this check box is selected, programs that have been written to the PLC will be cleared before the project is transferred to the PLC.
Transfer in to PROGRAM mode	When this radio button is selected, the PLC will be temporarily switched to PROGRAM mode, and then the project will be transferred.
Transfer in RUN mode	When this radio button is selected, the project will be transferred to the PLC as it remains in RUN mode. When programs are transferred to a PLC in RUN mode, some contents of "Unit setting info" and "CPU system setting" cannot be transferred.[*]

* The following items of the CPU system settings will not be transferred.

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- Module execution sequence settings
- Overall local device assignment settings
- CPU unit buffer information settings
- Actions when errors occur
- Protection settings
- Whether interrupts are enabled during instruction execution
- Whether Z1 to Z10 are saved when an interrupt program starts
- Whether the performance monitor is enabled (*KV-5500/5000/3000 only)

📖 "CPU System Setting Dialog Box" (page 6-49)

⚠ CAUTION	**Writing in RUN mode may cause serious problems depending on the condition of the control device connected to the PLC. Exercise caution during the operation of this function.** 📖 **"Writing data during RUN mode" in the KV-8000 Series User's Manual,** 📖 **"Writing data during RUN mode" in the KV-7000 Series User's Manual,** 📖 **"Writing data during RUN mode" in the KV-5500/5000/3000 Series User's Manual and** 📖 **"Writing data during RUN mode" in the KV Nano Series User's Manual**

● **"Global device comments" transfer item**
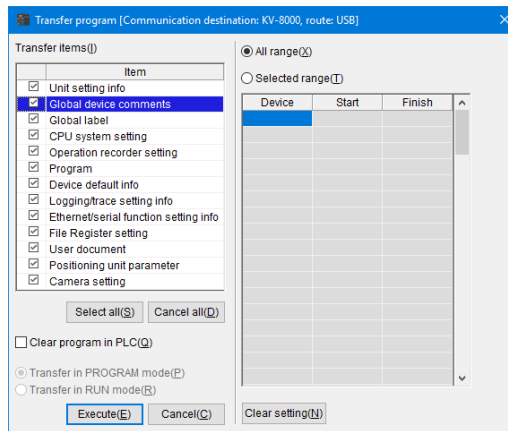
Item	Explanation
All range	When this radio button is selected, all global device comments will be transferred to the PLC.
Selected range	When this radio button is selected, you can set the range of the global device comments to transfer to the PLC.
Device	Double-click a cell to display a combo box. Enter the device type directly or select the device type from the pulldown menu.
Start	Specify the leading number of the range.
Finish	Specify the last number of the range.
Clear setting value	Click this to clear all the items that you entered while specifying the range.

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● **Transfer item "Global variable"**
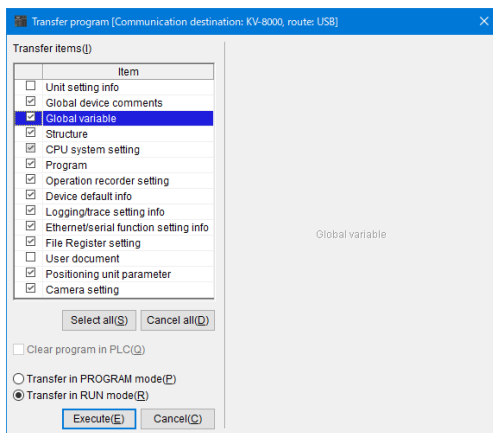
When checked, the global variable settings are transferred to the CPU unit.

● **Transfer item "Structure"**
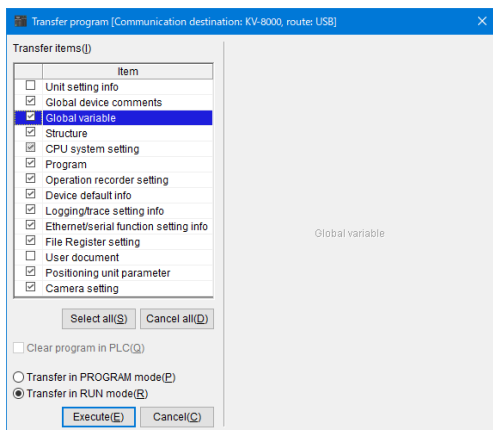
Item	Description
Structure name	Display the structure name defined in KV STUDIO.
(Checkbox)	Transfer the checked structure definition.
"Select all"	Check all checkboxes.
"Deselect all"	Uncheck all checkboxes.

● **Transfer item "Operation recorder setting"**
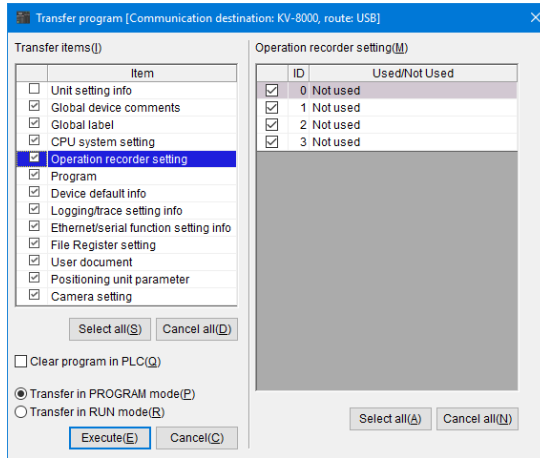
Item	Explanation
(Check box)	Transfer the operation recorder setting of the ID with the check box ON to the PLC. When the check box of "Write automatically during the PLC transfer" is turned ON in the "Operation Recorder Setting" dialog, it cannot be turned OFF.
ID	Display the IDs (0~3) that can be used in the operation recorder setting.
Used/Not used	Display whether the object ID is used in the operation recorder setting.
"Select all"	Turn ON the check boxes of all IDs.
"Cancel all"	Turn OFF the check boxes of all IDs.

Reference	The operation recorder setting is displayed only when "KV-8000" is selected as the PLC model.

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● **"Program" transfer item**
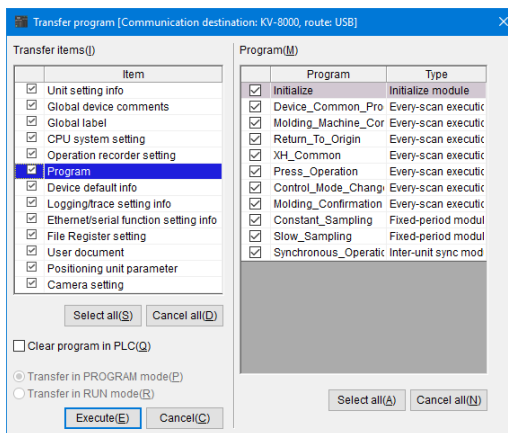
Item	Explanation
Checkboxes	Programs with check boxes selected will be transferred to the PLC. When the "Clear programs in PLC" check box is selected, these check boxes cannot be cleared.
Program name	Display all programs registered to the project being edited.
Type	Display the type of each program.
Select all	Click this to select the checkboxes of all transfer items.
Cancel all	Click this to clear the checkboxes of all transfer items.

● **"Logging/trace setting info" transfer item**
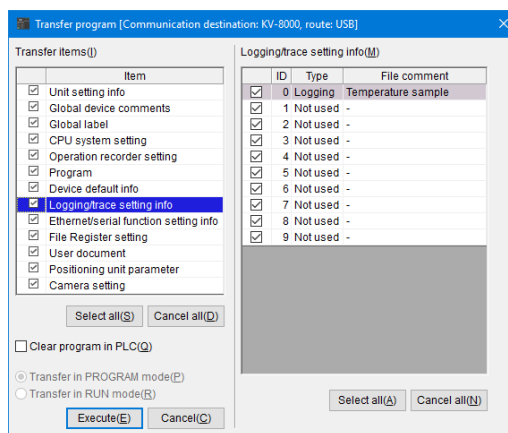
Item	Explanation
Checkboxes	The logging or tracing settings whose ID number checkboxes are selected will be transferred to the PLC.
ID	This displays the ID number of the registered logging or tracing setting.
Type	This displays the type of the registered logging or tracing setting.
File comment	This displays the file comment that was set in the "Logging/tracing setup" dialog box.
Select all	Click this to select the checkboxes of all transfer items.
Cancel all	Click this to clear the checkboxes of all transfer items.

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● **"Ethernet/serial function setting information" transfer item**
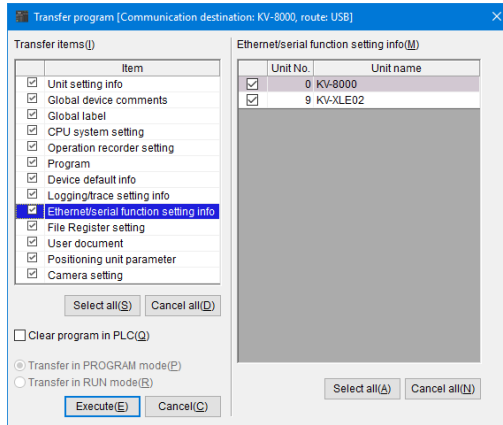
Item	Explanation
Checkboxes	Ethernet/Serial function setting of the unit which with the check box on is transferred to PLC.
Unit No.	This displays the number of the unit whose Ethernet/serial function is being set.
Unit name	This displays the name of the unit whose Ethernet/serial function is being set.
Select all	Click this to select the checkboxes of all transfer items.
Cancel all	Click this to clear the checkboxes of all transfer items.

● **"File register setting" transfer item**
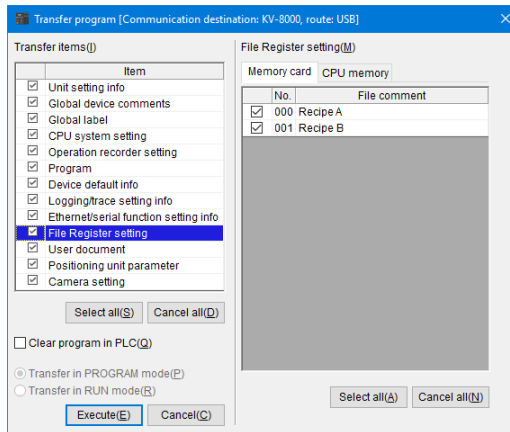
Item	Explanation
Memory card/ CPU memory	This switches the display between each transfer destination's file register setting information. (*KV-8000/7000 Series only)
Checkboxes	The file register settings whose number checkboxes are selected will be transferred to the PLC.
No.	This displays the numbers of the registered file register settings.
File comment	This displays the file comment that was set in the "File register setting" dialog box.
Select all	Click this to select the checkboxes of all transfer items.
Cancel all	Click this to clear the checkboxes of all transfer items.

Reference This item is not displayed for the KV Nano Series.

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● **"Positioning unit parameter" transfer item**
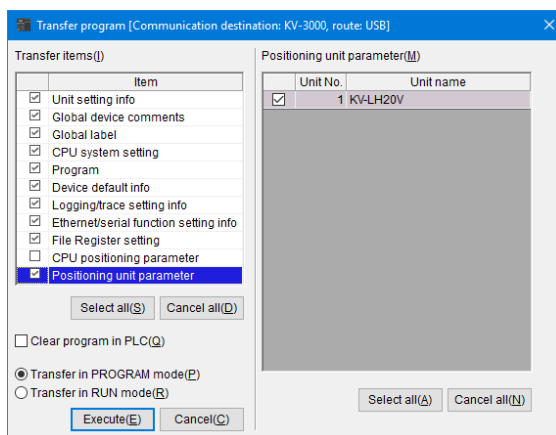
Item	Explanation
Checkboxes	Positioning settings for the units with selected checkboxes are transferred to the PLC.
Unit number	Displays the unit numbers of units that have positioning configured.
Unit name	Displays the unit names of units that have positioning configured.
Select all	Click this to select the checkboxes of all transfer items.
Cancel all	Click this to clear the checkboxes of all transfer items.

Reference — This item is not displayed for the KV Nano Series.

■ **When the CPU unit is the KV-1000/700/700+M/P16/10/16/24/40**

Select the checkboxes of the items that you want to transfer to the PLC. If the PLC to which the items will be transferred is in RUN mode, switch the PLC to PROG mode or enable writing in RUN mode.

• **When "Transfer in PROGRAM mode" is selected**
The PLC operation is stopped, and the program is written to the PLC with the PLC in PROG mode.

• **When "Transfer in RUN mode" is selected**
The PLC remains in RUN mode, and only the ladder program is written to the PLC. Until the writing of the program is completed, the program that was being executed before the transfer started continues to be executed.

⚠ CAUTION	**Writing in RUN mode may cause serious problems depending on the condition of the control device connected to the PLC. Exercise caution during the operation of this function.** 📖 **"About writing in RUN mode" in the KV-1000 Series User's Manual and** 📖 **"Precautions on writing in RUN mode" in the KV-1000 Programming Manual**

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● **Transfer item "Camera setting"**
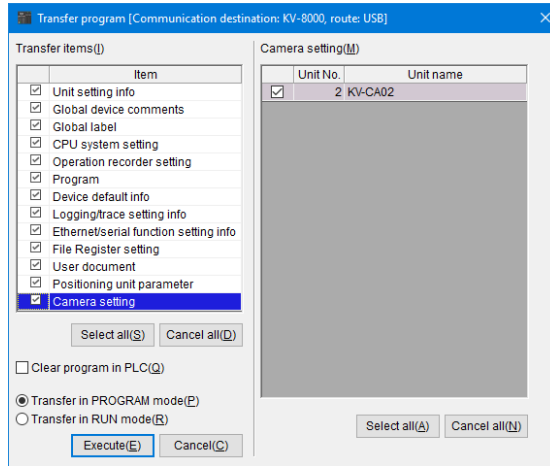
| Item	Explanation
(Check box)	Transfer the camera setting of the unit with the check box ON to the PLC.
Unit number	Display the unit number of the unit for which the camera setting has been performed.
Unit name	Display the unit name of the unit for which the camera setting has been performed.
"Select all"	Turn ON the check boxes of all IDs.
"Cancel all"	Turn OFF the check boxes of all IDs.

> **Reference** The camera setting is displayed only when "KV-8000" is selected as the PLC model.

3 **When the transfer finishes normally, the unit will automatically return to monitor mode.**

When there is no difference between the program stored on the PLC and the program being transferred, the program will not be written, and the unit will switch to monitor mode.

> **Point** **Disabled programs and function block/macro not called will not be transferred to the PLC.**

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Read from PLC → Monitor Mode

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Monitor/Simulator(N)" ▶ "Read from PLC → Monitor Mode(M)" Ctrl + F1

Transfer the ladder program in the PLC to the PC, and then switch to monitor mode. Check that the PLC is connected properly, and then perform the following operations from the editor.

> **Reference** Ladder programs are read into temporary job folders.
> If you exit the editor without saving the program, it will be deleted. To save a ladder program, save it with a new name.

> **Point** **The first time that you use the monitor, you have to set the PLC communication parameters correctly.**
> 📖 **"Communication Settings" (page 9-5)**

1 **Click the "Monitor/Simulator (N)" menu** ▶ **"Read from PLC → Monitor Mode (M)."**
The "READ PLC" dialog box is displayed.

2 **Select the items to be read.**
Use the "READ PLC" dialog box to specify the items to be read from the PLC.
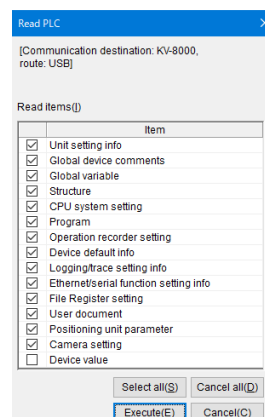
> **Point** • **When "KV-8000/7500/5500/5000/3000/1000/700/700+M" or "KV Nano Series" is selected for the PLC model, be sure to select "Unit setting info," "Program," and "CPU system setting" from the items to read.**
> • **When "KV-P16," "KV-10 (16)," or "KV-24 (40)" is selected for the PLC model, be sure to select "Program" from the items to read.**

3 **When the transfer finishes normally, the unit will automatically return to monitor mode.**

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PLC Transfer

| KV-8000 | KV-7000 | KV-5000/3000 | KV Nano |
| KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40 |

"Monitor/Simulator(N)" ▶ **"Transfer to PLC(W)"**

The ladder program created with the editor is converted to machine code and transferred. When the transfer finishes, the unit will return to editor mode. Before the operation, connect the PLC to the PC and enable communication on both devices.

1 Click the "Monitor/Simulator (N)" menu ▶ "Transfer to PLC (W)."

> **Reference** If a conversion error occurs, the message "Conversion error" will be displayed. Check the error details displayed in the output window, remove the cause of the error, and then transfer the program again.
>
> 📖 "Output Window" (page 6-18)

2 Specify the program items to be transferred.

The "Transfer program" dialog box is displayed. Specify the items to transfer to the PLC. If the PLC to which the items will be transferred is in RUN mode, switch the PLC to PROG mode or enable writing in RUN mode.
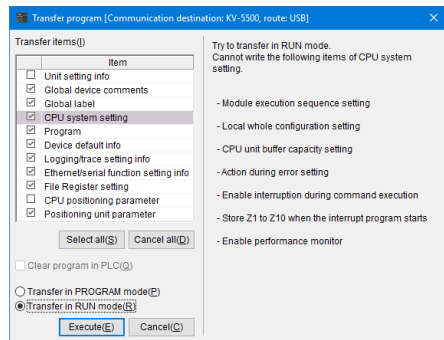
- **When "Transfer in PROGRAM mode" is selected**
  The PLC operation is stopped, and the program is written to the PLC with the PLC in PROG mode.
- **When "Transfer in RUN mode" is selected**
  "Writing in RUN," which writes only the ladder program while the PLC is in RUN mode, will be performed. Until the writing of the program is completed, the program that was being executed before the transfer started continues to be executed.

⚠ CAUTION	Writing in RUN mode may cause serious problems depending on the condition of the control device connected to the PLC. Exercise caution during the operation of this function. 📖 "Writing data during RUN mode" in the KV-8000 Series User's Manual, 📖 "Writing data during RUN mode" in the KV-7000 Series User's Manual, 📖 "Writing data during RUN mode" in the KV-5500/5000/3000 Series User's Manual and 📖 "Writing data during RUN mode" in the KV Nano Series User's Manual

✎ Point	Disabled programs and function block/macro not called will not be transferred to the PLC.

3 When the transfer finishes normally, the unit will return to editor mode.

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Reading PLC Data

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

"Monitor/Simulator(N)" ▶ **"Read from PLC(R)"** Ctrl + F5

The ladder program that has been transferred to the PLC is read into the editor. Before the operation, connect the PLC to the PC and enable communication on both devices.

Click the "Monitor/Simulator (N)" menu ▶ "Read from PLC (R)" to select the data to read.

> **Reference**
> By turning on the "Device value" item and executing PLC-Read, all device values of the PLC can be read as PlcDeviceValue.csv under the project folder. By opening the csv file in [Batch Change/Read All Device Values] dialog box and writing all items to the PLC, you can restore the device state of PLC read execution.
> * KV-1000/700/10/16/24/40 does not support the PLC-Read for "Device value".

Verify/synchronize PLC

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

"Monitor/Simulator(N)" ▶ **"Verify with PLC/synchronize(V)"**

Verify the contents of the project currently stored in the PLC memory against the contents of the project being edited in the editor.
Before the operation, connect the PLC to the PC and enable communication on both devices.

Click the "Monitor/Simulator (N)" menu ▶ "Verify with PLC/synchronize (V)" to verify the project currently stored on the PLC against the project being edited. The verification results will be displayed in the "PLC verification/synchronization" dialog box.
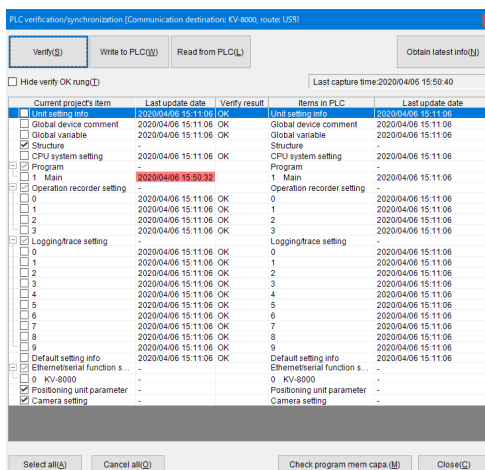
Item	Explanation
Verify	Click this to verify the items whose "Items of current project" checkboxes are selected against the project stored on the PLC, and then display the verification results. Detailed verification results will be displayed in the output window.
Write to PLC	Click this to write the items whose "Items of current project" checkboxes are selected to the PLC.
Read from PLC	Click this to read the items whose "Items of current project" checkboxes are selected from the PLC.
Obtain latest info	Click this to update all the displayed items to the latest information. For items whose last update date and time differs, the verification result in the "verification" column will be cleared.

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Item	Explanation
Current project's item	This displays the items of the project that is being edited in KV STUDIO. The items whose checkboxes are selected will be operated on when you click "Verify," "Write to PLC," or "Read from PLC."
Last update date	This displays the last date and time that items of the project being edited in KV STUDIO were updated. When there is a change in the content from the last time that a program was transferred, the cells of the corresponding items will be displayed in red.
Verify	This displays the verification results. An item being displayed as "OK" indicates that the item in the project being edited in KV STUDIO and the item in the project on the PLC match. Double-click the verification result cell to verify only the item of the corresponding row.
Items in PLC	This displays the items of the project stored in the PLC.
Last update date	This displays the last date and time that items of the project transferred to the PLC were updated. When there is a mismatch with the content that was previously transferred, the cells of the corresponding items will be displayed in red. (When designing is performed by several individuals, this indicates that there have been changes made from different PCs.) In addition, when changes are made from the access window of the CPU unit, "changed in PLC" is displayed.
Select all	Clear this to select all the "Current project's item" checkboxes.
Cancel all	Click this do clear all the "Current project's item" checkboxes.
Hide verify OK rung	When this checkbox is selected, the items that show "OK" in the "Verify" column are not displayed.
Check program memory capacity	Click this to display the capacity of the program memory area of the PLC. Click "Verify space of program memory area" to display the "Check program memory capacity" dialog box.

Editing using the right-click menu

Right-click the list in the "PLC Verification/synchronization" dialog box to edit the following items.

Item	Explanation
Delete modules without execution sequence assigned[*1]	Delete unassigned modules in the PLC. (Unassigned function block and macros cannot be deleted.)
Display the last user changed data of PLC	Acquire and display the name of the last individual to update the data on the selected PLC. Set the name of the last individual to update the data by selecting "Options," "System setting," "Set the sender of the transmission data when sending to PLC."
Delete unused structure[*2]	Delete the unused structure definition in an item existing in the PLC.

*1 This option is only displayed when the item that you right-click is a module that has not been assigned a place in the execution sequence.

*2 This option is only displayed when the item that you right-click is a module that has not been assigned a place in the execution sequence.

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● **Checking the program memory capacity**

Click "Check program memory capacity" in the "PLC Verification/synchronization" dialog box to display the "Check program memory capacity" dialog box.

```
┌─────────────────────────────────────────┐
│ Check program memory capacity            │
│                                          │
│ Program memory                           │
│     Used 4%    ( 195 kB / 5537 kB )      │
│                                          │
│  [ Clear all program memory(A) ]  [ Close(C) ] │
└─────────────────────────────────────────┘
```
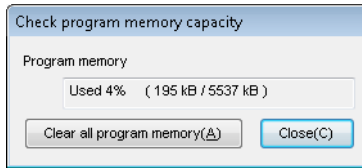
Item	Explanation
Program memory capacity	This displays the capacity of the program memory area of the connected PLC.
Clear all program memory	Click this to clear all the programs (global device comments, global labels, CPU system settings, and ladder programs) stored on the connected PLC.*
Close	Click this to close the "Check program memory capacity" dialog box.

* After all contents of the program memory are cleared, a "no ladder program" error occurs on the PLC.

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■ **Unassigned programs**

If a project has been transferred to PLC and you want to transfer a different project, you need to select the "Clear programs in PLC" check box on the "Program transfer" dialog box; otherwise, old programs inside PLC will remain as "unassigned programs".

Transfer

Before transfer:

Project A
• Module A
• Module B

After transfer:

Project 1
• Module 1
• Module 2
• Module 3
• Module A
• Module B

Project 1
• Module 1
• Module 2
• Module 3

Unassigned modules that remain on the PLC
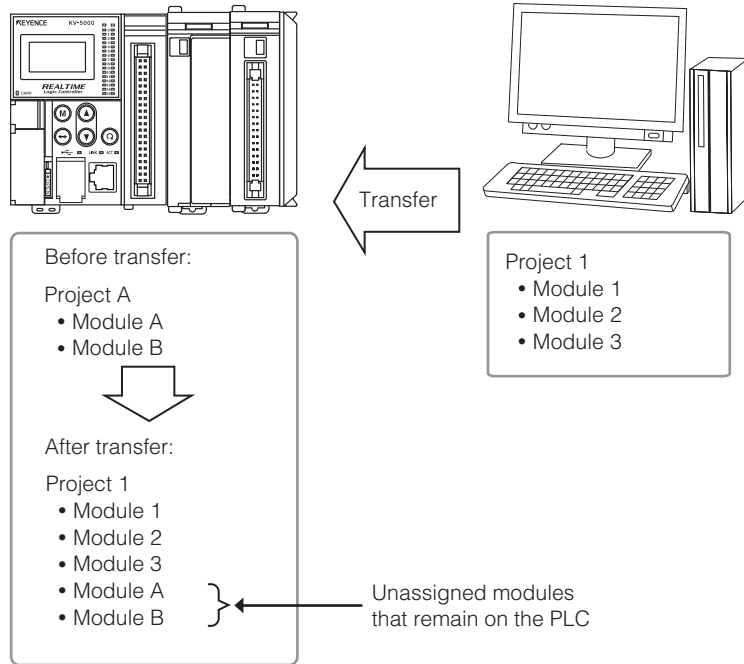
● **Deleting unassigned programs**

Use the following method to delete unassigned programs.
• Select the "Clear programs in PLC" check box on the "Program transfer" dialog box, and then transfer the project.
For unassigned modules, you can also use the following method to delete them.
• Right-click the list on the "Verify/synchronize PLC" dialog box, and then select "Delete unassigned modules in execution sequence" from the menu.

● **Read unassigned programs**

Use the "Verify/synchronize PLC" dialog box to read unassigned programs.
Select the check box of a unassigned program on the "Verify/synchronize PLC" dialog box, and then click the "Read PLC" button.
The unassigned program is read.
For unassigned modules, they are read as standby modules.

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Verifying Data against the PLC

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

🔍 **"Monitor/Simulator(N)"** ▶ **"Verify with PLC(V)"**

The contents of the program in the editor are verified against the program currently stored in the PLC memory.
Before the operation, connect the PLC to the PC and enable communication on both devices.

Click the "Monitor/Simulator (N)" menu ▶ "Verify with PLC (V)," and then use the "Transfer program" dialog box to select the items to verify.

The verification results will be displayed in the "Verify result" dialog box.
In addition, the verification result of each item will be output to the output window.

Result	Item
OK	** Unit setting info
OK	** Project
--	## CPU system setting
OK	## Module
--	## Macro
NG	** Device comments/labels
NG	## Global device comments
--	## Local device comments
--	## Label
NG	** CPU positioning parameter
--	** Logging setting info
--	** Positioning unit parameter
--	** Panel setting info
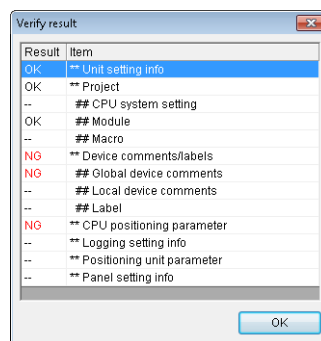
> ✎ **Point** **Use "Verify with PLC/synchronize" for the KV-8000/7500/7300/5500/5000/3000 and KV Nano Series.**

Starting the Monitor

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

🟢 (Green) **"Monitor/Simulator(N)"** ▶ **"Start Monitor(S)"** [F4]

Click the "Monitor/Simulator (N)" menu ▶ "Start monitor (S)" to start communication with the PLC.
The operating status of the PLC is displayed in each window.

Alternative procedure Select "Monitor" from the mode bar's pulldown menu.

> ✎ **Point** **While the monitor is operating, do not disconnect the cable connecting the PLC. Doing so may cause communication errors and unstable operation of the PC.**

Stopping the Monitor

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

🔴 (Red) **"Monitor/Simulator(N)"** ▶ **"Stop Monitor(E)"** [Shift] **+** [F4]

Click the "Monitor/Simulator (N)" menu ▶ "Stop monitor (E)" to stop communication with the PLC.

Online Editing

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Monitor/Simulator(N)" ▶ "Start Online Edit(O)" F10

For details on online editing, see 📖 "9-10 Online Edit Function" (page 9-118).

Simulator

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Monitor/Simulator(N)" ▶ "Simulator(L)" Ctrl + F2

For details on the simulator, see 📖 "9-11 Simulator Function" (page 9-122).

Simulator Settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

⏱ "Monitor/Simulator(N)" ▶ "Setup simulator(A)"

You can only select "Setup Simulator" in simulator mode or simulat edit mode.
Configure settings such as the scan time and wait time during simulator operation.

Setup simulator

Execute scan(S)	0 (0 to 5000 msec)
	☐ Set to fixed scan(F)
Wait time(W)	0 (0 to 10000 msec)
WDT time(D)	3000 (500 to 5000 msec)

[OK] [Cancel]

Item	Explanation
Execute scan	You can set the scan time during simulator execution to an arbitrary value. One scan of the ladder program is simulated per set scan time. By setting the scan time to that of the actual equipment, you can perform a simulation with timing that is close to that of actual operation. Select the "Set to fixed scan" checkbox, and then specify the scan time in the range of 0 to 5000. ✎ **Point** — **If you do not select this checkbox, the scan time that you set here will not be enabled, and the actual time required will be used.**
Wait time	The scan time of simulator execution will vary depending on the length of the ladder program and on the PC's performance. You can use the wait time to lengthen the scan time when it is difficult to perform debugging due to the scan time being too short.
WDT time	Watchdog timers are used to detect calculation processing congestion that is caused by problems such as PLC or program errors and the execution of long programs. Watchdog timers allow you to discover infinite loops in ladder programs. The default value is 3000 ms (3 seconds).

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VT Simulator Start

"Monitor/Simulator(N)" ▶ **"VT simulator start(I)"**

Simulate ladder program operation while communicating with the VT STUDIO design tool simulator. The ladder program and screen data can be checked while checking operation.
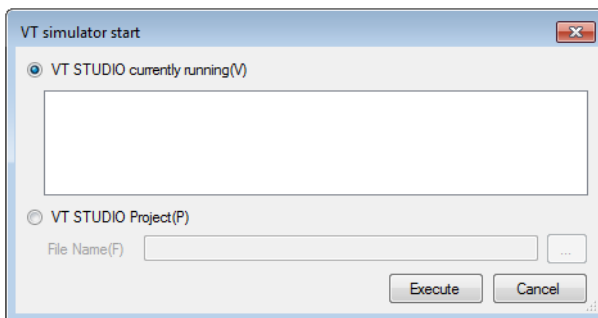
Item	Description
VT STUDIO currently running	Link with a currently running version of VT STUDIO, and switch to simulator mode.
VT STUDIO project	Specify VT STUDIO screen data, and switch to simulator mode. This automatically starts VT STUDIO.

Refer to 📖 "9-11 Simulator Function" (page 9-122) for details on the KV STUDIO Simulator.
Refer to 📖 "18-1 VT Simulator" in the VT5 Series Reference Manual for details on the VT STUDIO Simulator.

> ✎ Point
> - **VT simulator start can be used when the VT STUDIO model is set to the VT5 Series.**
> - **It is not possible to link with several VT STUDIO applications at once.**
> - **It is not possible to link with VT STUDIO while linked to another KV STUDIO.**

Simulator Edit

"Monitor/Simulator(N)" ▶ **"Start Simulator Edit(Q)"** [Ctrl] + [Shift] + [F2]

For details on simulator edit, refer to 📖 "9-12 Simulator Edit Function" (page 9-130).

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Real-Time Chart Monitor

[KV-8000] [KV-7000] [KV-5000/3000] [KV Nano]
[KV-1000] [KV-700] [KV-P16] [KV-10/16/24/40]

"Monitor/simulator(N)" ▶ **"Real-time chart monitor(H)"**

You can start the real-time chart monitor when KV STUDIO is in Editor / Monitor / Online Edit / Simulator / Simulator Edit / Replay mode.

You can also start the real-time chart monitor as a standalone application without starting KV STUDIO.

> **Point**
> • **Only the KV-8000/7000 series can be started in the simulator / simulator edit mode.**
> • **Only the KV-8000 series can be started in the replay mode.**

● **Starting the real-time chart monitor from KV STUDIO**

Click the "Monitor/Simulator (N)" menu ▶ "Real-time Chart Monitor (H)" to start the real-time chart monitor.

Alternative procedure Right-click in the registration monitor window or watch window, and then select "Real-time Chart Monitor (H)" from the menu that appears to display the real-time chart monitor with the devices registered to the registration monitor window or watch window registered.

● **Starting the real-time chart monitor as a standalone application**

Double-click the real-time chart monitor shortcut icon, which is created on the desktop when KV STUDIO (version 4.00 or later) is installed.
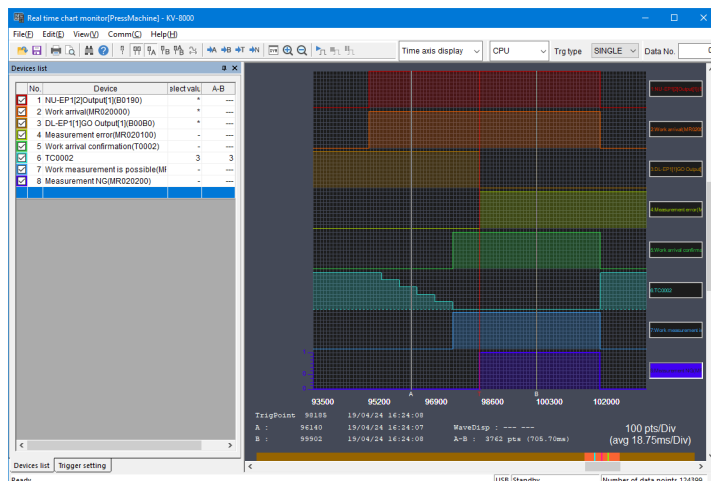
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Reference	• For details on the real-time chart monitor, see 📖 "9-6 Real-Time Chart Monitor" (page 9-65).

- When you start the real-time chart monitor as a standalone application, the "PLC model selection" dialog box is displayed.
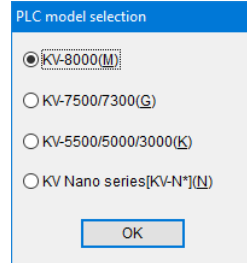
PLC model selection

◉ KV-8000(M)

○ KV-7500/7300(G)

○ KV-5500/5000/3000(K)

○ KV Nano series[KV-N*](N)

OK

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High-Speed Time Chart Monitor

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Monitor/Simulator(N)" ▶ **"High-speed Time Chart Monitor(H)"**

The high-speed time chart monitor starts with the register monitor displayed. Therefore, the devices to be monitored with the high-speed time chart monitor must be registered with the register monitor in advance.

1 **Display the registration monitor window, and then register the devices to be displayed in the high-speed time chart monitor.**

📖 "9-3 Register Monitor" (page 9-55)

2 **Click the "Monitor/Simulator (N)" menu** ▶ **"High-speed Time Chart Monitor (H)."**

Among the devices registered with the register monitor, only bit devices are displayed automatically from the top of the list in the order that the devices are registered. Up to 16 such devices are displayed.

Reference	For details on the high-speed time chart monitor, see 📖 "9-7 High-Speed Time Chart Monitor" (page 9-98).

Registration Monitor Window

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Monitor/Simulator(N)" ▶ **"Registration monitor window(G)"**

You can register multiple devices in the register monitor. You can then display the current values and time charts of the registered devices as well as change the current values.

Reference	For details about the register monitor such as how to register devices, see 📖 "9-3 Register Monitor" (page 9-55).

Point	**You can only select the registration monitor window from the menu in Editor / Monitor / Online Edit / Simulator / Simulator Edit / Replay mode.**

Click the "Monitor/Simulator (N)" menu ▶ "Register monitor window (G)" to display the registration monitor window.
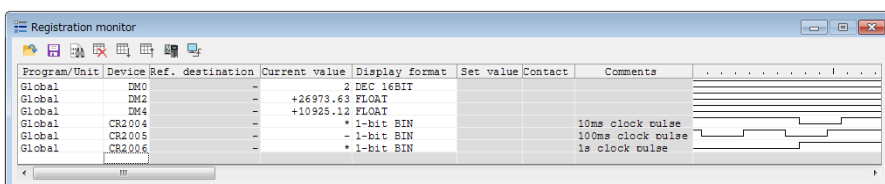
Reference	Each time that you perform the above operation, a new window will open.

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Batch Monitor Window

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Monitor/simulator(N)" ▶ "Batch monitor window(K)"

| Reference | For details on batch monitor operations, see 📖 "9-4 Batch Monitor" (page 9-60). |

| ✎ Point | **You can only select the batch monitor window from the menu in Editor / Monitor / Online Edit / Simulator / Simulator Edit / Replay mode.** |

Click the "Monitor/Simulator (N)" menu ▶ "Batch monitor window (K)" to display the batch monitor window.
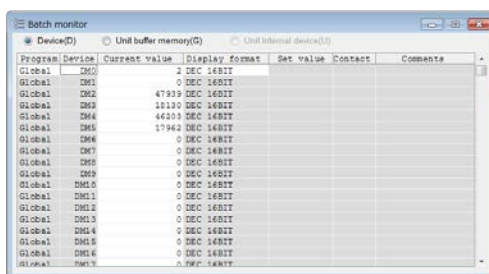
| Reference | Each time that you perform the above operation, a new window will open. |

Changing or Reading Device Values in Batches

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Monitor/simulator(N)" ▶ "Device value batch modify/read window(D)"

For the current values of the devices registered to the window, you can read all the values of the devices in the specified range from the PLC and you can write a batch of changed values to the PLC all at once. In addition, you can save the settings of the read devices and read the settings of saved devices.

| Reference | For details on the operations for changing and reading device values in batches, see 📖 "9-9 Changing and Reading Device Values in Batches" (page 9-108) |

Click the "Monitor/Simulator (N)" menu ▶ "Device value batch modify/read window(D)" to display the "device value batch modify/read window" window.
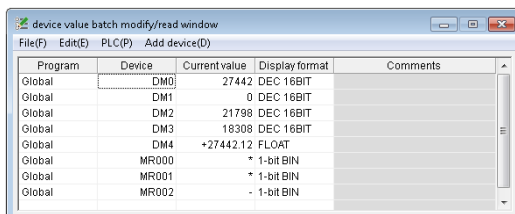
| Reference | You can only display one instance of this window. |

9 MONITOR/SIMULATOR

Displaying and Hiding the Watch Window

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

�

"Monitor/Simulator(N)" ▶ "Display/hide watch window(N)" ⎡Alt⎤ + ⎡3⎤

Display the current values of all the devices contained in the ladder blocks contained in the cells that have been selected in the editor.

When you select other ladder blocks, the display of the devices in the watch window changes to match.

✎ **Point** **You can only select the watch window from the menu in Editor / Monitor / Online Edit / Simulator / Simulator Edit / Replay mode.**

Reference The current values of all devices are also displayed when you select multiple ladder blocks.

Click the "Monitor/Simulator (N)" menu ▶ "Display/hide watch window (N)" to switch between displaying and hiding the watch window.

When a check mark is displayed: Displayed

When a check mark is not displayed: Hidden
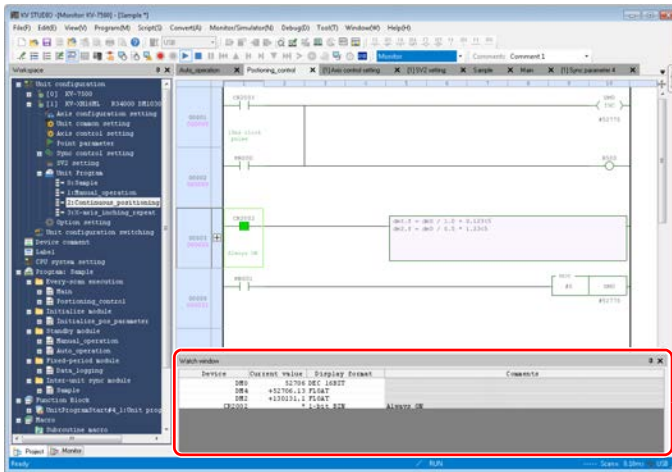
Watch window

Unit Monitor

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Unlike the register monitor and batch monitor, the unit monitor displays the values of relays and DM entries in an optimum form according to the unit to be monitored.

📖 "9-8 Unit Monitor" (page 9-106)

Built-In Function Monitor

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

By using the built-in function monitor, you can start a monitor in which devices related to various built-in functions of the CPU have been registered in advance.

📖 "9-5 Built-In Function Monitor" (page 9-63)

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Instruction Monitor

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Monitor/simulator(N)" ▶ **"Command monitor(Y)"** ▶ **"PIDAT(P)"**

You can monitor the devices that are used with the PIDAT instructions that you have selected in the editor. You can monitor the devices used with the PIDAT instructions, such as the measured values and set values, with comments, so you can check the operating condition.

PIDAT instructions can be used with KV-8000/7500/7300 CPU units, KV-5500/5000/3000 CPU units with CPU function version 2.0 or later and with KV Nano Series base units.

> **Reference** You can only select the command monitor from the menu in Editor / Monitor / Online Edit / Simulator / Simulator Edit / Replay mode.

Click the "Monitor/simulator (N)" menu ▶ "Command monitor (Y)" ▶ "PIDAT (P)" to start the PIDAT monitor.

Device	Current value	Display format	Comments
EM0	4	Signed 16-bit D	Measured value
EM100	-4000	Signed 16-bit D	Set value
EM101	20051	Signed 16-bit D	Manual operation quantity
EM102.1	-	1-bit BIN	Manual mode marking
EM102.2	*	1-bit BIN	AT start/operation in progress flag
EM105	12593	16-bit DEC	Constant of proportion
EM106	12593	16-bit DEC	Constant of integration
EM107	12593	16-bit DEC	Constant of derivation
EM115	12593	16-bit DEC	AT adjustment parameters
EM116	12593	16-bit DEC	AT hysteresis
EM117	12593	16-bit DEC	AT time out value
EM118.1	-	1-bit BIN	Operation quantity is out of limit
EM118.2	-	1-bit BIN	Change amplitude of operation quantity is out of limit
EM118.3	-	1-bit BIN	Change amplitude of measured quantity is out of limit
EM200	17201	Signed 16-bit D	Operation quantity

For details on PIDAT instructions, see ▭ the KV-8000/7000/5000/3000/1000 Series and KV Nano Series Instruction Reference Manual.
For details on how to use the icons, see "Register monitor" (page 9-49).

> **Reference** You can only select the PIDAT instruction monitor when you have selected a PIDAT instruction in the ladder program with the cursor. Once the monitor starts, it remains displayed even when the cursor is moved from the PIDAT instruction.

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MONITOR/SIMULATOR

MEMO

9

MONITOR/SIMULATOR

This section describes the monitor function and how to use it.

Monitor Function Overview

The monitor function is used to compile (convert) a ladder program created with the editor, transfer the compiled program to the PLC, and run the compiled program to actually confirm the operating status. It can also be used to transfer the program in the currently connected PLC to the PC for decompilation, and then to actually run the program to confirm the operating status.
You can use the monitor to:

- Check the operating status of a program in real time using a ladder diagram or high-speed time chart.
- Switch the operation mode of the PLC.
- Forcibly set and reset I/O contacts on the monitor screen.
- Easily change the data of devices and the set values and current values of timers and counters.
- Save or read a batch of data entries such as the current values of devices by specifying a range. The batch of data entries can be saved to or read from a storage medium such as a memory card.
- Restore some devices to their default values.

Monitor Limitations

- After you stop the monitor, do not disconnect the PLC and connect another PLC in Monitor mode. Doing so will prevent you from performing normal operation because the contents of the ladder monitor in the monitor will no longer match the contents of the ladder program on the PLC.
- If the number of devices being monitored is large, operations will be slow.
- The time chart in the register monitor does not operate in accordance with the PLC scan time.
- During the execution of the high-speed time chart monitor, other windows are not monitored.

Communication with the PLC

To communicate with the PLC, you have to configure the COM port and baud rate (communication speed) settings on the PC in advance.

> **Reference** The settings are saved in KV STUDIO and are applied the next time that KV STUDIO starts.
> For details on communication with the PLC, see 📖 "Communication Settings" (page 9-5).

Precautions When Using Serial Ports

- Before starting the monitor, use a connecting cable to connect the PLC and the PC, and then check that the serial port settings for the monitor are configured properly. If the settings are not configured properly, an error will be displayed when the monitor starts, and you will not be able to perform monitoring.
  📖 "Communication Settings" (page 9-5)
- While the monitor is operating, do not disconnect the cable connecting the PLC. Doing so may cause communication errors and unstable operation of the PC.
- Do not perform communication in a location that is subject to severe noise. Doing so may cause communication errors.
- Exercise caution during the writing of programs to prevent the connecting wire from being pulled out and to prevent communication from being stopped, as either of these may corrupt the program on the PLC.
- When frequent communication errors occur, set the baud rate (communication speed) to a lower value.

Precautions When Using USB Ports

- Turn on the CPU unit before you connect the USB cable to it.
- To use the USB interface, connect the PLC directly to the USB port of the PC. Do not use a USB HUB.
- If communication is unstable and interrupted due to noise or other causes, pull out the USB cable, which is connected to the PLC, from the PC and then connect it again. In an environment where communication is unstable or noise occurs frequently, pass the USB cable through a ferrite core. It is even more effective to wind the cable around the ferrite core.

Various Functions That Can Be Executed from the Monitor

Register monitor

The register monitor is used to display the current values and time charts of the arbitrary devices that you have registered. This function is useful when you want to check different types of devices at the same time.
For details on the register monitor, see ▭ "9-3 Register Monitor" (page 9-55).

Batch monitor

The batch monitor is used to display the current values, ON/OFF status of contacts, and registered comments of all the devices per device type.
For details on the batch monitor, see ▭ "9-4 Batch Monitor" (page 9-60).

Device vaule batch modify/read

The "device value batch modify/read" window is used to rewrite a batch of device values on the PLC or to save a batch of device values to a file.
For details on the "device value batch modify/read" window, see ▭ "9-9 Changing and Reading Device Values in Batches" (page 9-108).

Watch window

The watch window is used to display only the current values of the devices contained in the selected ladder/flow block. You can change the ladder/flow block that is displayed simply by selecting a cell/block in the editor, so this is useful when you only want to monitor the current values.

Built-in function monitor

By using the built-in function monitor, you can start a monitor in which devices related to various built-in functions of the CPU have been registered in advance.
For details on the built-in function monitor, see ▭ "9-5 Built-In Function Monitor" (page 9-63).

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Instruction monitor

You can use the instruction monitor to monitor the current values of devices that are used with the PIDAT instructions. This is useful when you want to monitor the measured values, set values, and other parameters that are used for PID.

For details on the instruction monitor, see 📖 "Instruction Monitor" (page 9-46).

High-speed time chart monitor

When the connected CPU unit is a KV-1000/700, the high-speed time chart monitor can be used to monitor external I/O and the status of devices in units of scans.

For details on the high-speed time chart monitor, see 📖 "9-7 High-Speed Time Chart Monitor" (page 9-98).

Real-time chart monitor

When the connected CPU unit is a KV-8000/7500/7300/5500/5000/3000 or KV Nano Series, the real-time chart monitor can be used to display changes in word devices, which cannot be shown with the high-speed time chart monitor, as a waveform, thus enabling more realistic monitoring.

For details on the real-time chart monitor, see 📖 "9-6 Real-Time Chart Monitor" (page 9-65).

Unit monitor

Unlike the register monitor and batch monitor, the unit monitor displays the values of relays and DM entries in an optimum form according to the unit to be monitored.

For details on the unit monitor, see 📖 "9-8 Unit Monitor" (page 9-106).

Online edit function

This function can be used to change the PLC ladder program during monitoring.

For details on the online edit function, see 📖 "9-10 Online Edit Function" (page 9-118).

Starting and Exiting the Monitor

■ Transferring and monitoring programs

Programs made with the editor can be transferred to the PLC for monitoring. For details, see 📖 "PLC Transfer → Monitor Mode" (page 9-24).

■ Reading and monitoring programs

Ladder programs on a PLC can be transferred to a PC where they are displayed as ladder programs for monitoring.

For details, see 📖 "Read from PLC → Monitor Mode" (page 9-32).

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Names and Functions of Parts of the Monitor Screen

The following windows can be displayed in Monitor mode. Also, if the batch monitor or register monitor was open the last time that you exited the monitor, the corresponding windows are automatically displayed.

- Ladder monitor
- Registration monitor window
- Batch monitor window
- Batch change/read device values
- "Correct device value" window
- Watch window
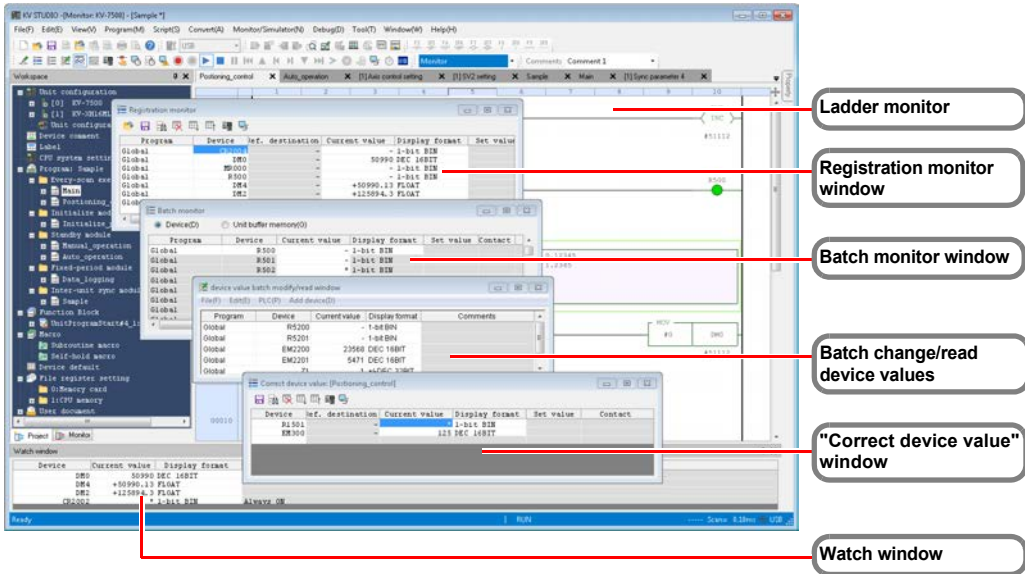
The functions of each window are described in the following sections.

"Ladder Monitor" (page 9-51)
"Register Monitor" (page 9-55)
"Batch Monitor" (page 9-60)
"About the "Device value batch modify/read" Window" (page 9-108)
"Unit Monitor" (page 9-106)
""Correct device value" window" (page 9-53)
"Watch window" (page 9-45)
"Instruction Monitor" (page 9-46)

Ladder Monitor

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

This section describes how to start and stop the monitor as well as information such as the screens that are displayed when the monitor is being executed.

■ Ladder monitor overview

The ladder monitor has the following functions.
- Turning bit devices ON and OFF
- Using the "Correct device value" window to change values such as the current values
- Setting scan time

■ About the screen display

The basic operations (such as selecting devices and displaying and hiding comments and labels) of the ladder program monitor screen are the same as those in the editor.

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MONITOR/SIMULATOR

This section describes the screens that are specific to the ladder monitor.

The title bar is changed to **[KV STUDIO]-[Monitor:KV-****]-**…**

The mode bar turns blue and "Monitor" is displayed.

Toolbar buttons used in the monitor are enabled.

The current value of each device is displayed below it. For timers and counters, black characters indicate current values, and red characters indicate set values.

The status bar turns blue and displays status information.

Communication indicator
This indicator rotates when communication is in progress.

Scan time
This displays the scan time in units of 0.01 msec.

`\     RUN                                                 ----- Scan=  0.04ms   USB`

PLC mode
This displays the PLC operation mode.

Communication port
This displays the name of the port that is being used in communication.

■ Turning bit devices ON and OFF

You can turn bit devices ON and OFF. You can use either the mouse or the keyboard to turn bit devices ON and OFF.

> ❗ **Point**
> • **You cannot turn the contacts of timers and counters and external input relays ON or OFF.**
> • **Disable the input refresh function before turning external input relays ON and OFF.**

● Double-clicking a device

Double-click the device that you want to turn ON or OFF.
The color of the contact changes to indicate the change in the ON/OFF status.

OFF status   ON status
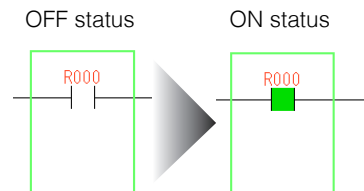
● Moving the cursor to the device and pressing ⃞ (slash)

When the cursor is displayed in green, use the arrow keys to move the cursor to the device that you want to turn ON or OFF, and then press ⃞ (slash).
The color of the contact changes to indicate the change in the ON/OFF status.

■ **Changing current values and set values**

Use the "Correct device value" window to change the current value and set value of the selected device.

There are two ways to display the "Correct device value" window.

Select the cell that contains the device whose current value or set value you want to change, and then use one of the following methods to display the "Correct device value" window.

• Press [F2] .

• Right-click the cell, and then select "Correct device value (D)" from the menu that appears.
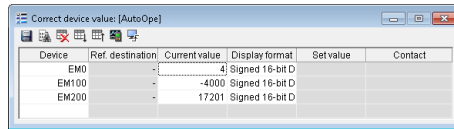
Double-click the item that you want to change, and then enter the value. (For "Display format" only, click the item, and then select a value from the displayed menu.)

Item	Explanation
Device	This displays the devices that are being monitored. Double-click an item, and then use the keyboard to change it. You cannot register local devices if no program is specified.
Reference destination	If the registered device is indirectly specified or index-modified, the reference destination device will be displayed.
Current value	This displays the current values. Double-click an item to use the keyboard to change it. For bit devices, the ON/OFF status changes every time the item is double-clicked.
Display format	This displays the display format of the value that has been registered for monitoring. Select an item, click ![icon], and then select a value from the menu that appears.
Set value	This displays the set values. Double-click an item, and then use the keyboard to change the value.
Contact	This displays the status of the timer and counter contacts.

■ **Jumping and searching**

You can jump to a desired position by specifying the rung number or step of the program, or search for an instruction or device by using an instruction or operand as a keyword. You can also search rung comments.

For details on jumping, see 📖 "Jump" (page 5-17).

For details on searching, see 📖 "Device Search" (page 5-6).

■ **Starting and stopping monitoring**

Start or stop the communication with a PLC.

For details on how to start monitoring, see 📖 "Starting the Monitor" (page 9-38).

For details on how to stop monitoring, see 📖 "Stopping the Monitor" (page 9-38).

■ **Checking for PLC errors**

PLC errors are continuously checked for during monitoring. When an error occurs on the PLC, an error message is displayed.

📖 "Lists of Error Messages" (page A-2)

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MONITOR/SIMULATOR

Setting and Operating a PLC

■ Setting the PLC operation mode

Set the operation mode of the PLC.
When you first start the monitor, the operation mode of the PLC is the mode that is in use at that point in time on the PLC.
To change the operation mode, click the "Debug (D)" menu, and then select the operation mode.
Alternatively, click one of the operation mode buttons.
For details on operation mode (RUN mode) and stop mode (PROG mode), see 📖 "RUN/Continuous Scan Execution" and "PROG/Stop" (page 11-2).

■ Registering forced sets and resets

Set and reset the registered bit devices forcefully regardless of their status in the program.
For details on the forced setting and resetting of registered devices, see 📖 "Registering Forced Sets and Resets" (page 11-12).

■ Disabling input refreshing and disabling output

The PLC has a function for disabling input refreshing and a function for disabling output.
For details on disabling input refreshing and on disabling output, see 📖 "Input Refresh Disabling" (page 11-18) and "Output Disabling" (page 11-18).

■ Scan time monitor

This displays various information such as information related to the scan time of the CPU being monitored and the number of interrupts. For details on the scan time monitor, see 📖 "Scan Time Monitor" (page 11-19).

■ Setting the calendar timer

Set the CPU unit built-in calendar timer.
For details on setting the calendar timer, see 📖 "Setting the Calendar Timer" (page 11-22).

■ Clearing all devices

Clearing all devices means initializing data memory (DM, EM, FM, W, and ZF) and the relays (R), link relays (B), latch relays (LR), and counters (C) that have been set to be held with the power off holding function or MEMSW instruction.
When all devices are cleared during monitoring, the devices on the PLC side will be initialized.
For details on clearing all devices, see 📖 "Clearing All PLC Devices" (page 11-24).

■ Clearing KV-D30 control memory (CM)

The control memory (CM) area used in the operation panel KV-D30 will be initialized.
For details on clearing KV-D30 control memory (CM), see 📖 "Clearing KV-D30 CM" (page 11-25).

■ Setting breaks

A "break" is a function for stopping a ladder program when specified conditions are met during program operation.
For details on setting breaks, see 📖 "Setting Device Breaks" (page 11-7).

The register monitor is used to register arbitrary devices and then to display and change the current values of the registered devices. This function is useful when you want to check different types of devices at the same time. This section describes how to view and operate the register monitor. You can easily display registration monitor windows for devices that have been registered by users.

Register monitor overview

The register monitor has the following functions.

- Displaying the current values, set values, contacts (the status of timer and counter contacts), and comments of registered devices
- Changing the current values and set values of registered devices
- Freely changing the positions of registered devices
- Changing display formats
- Displaying the time charts of registered devices (bit devices and word devices)

> ✎ **Point**
>
> **Register monitor time charts do not operate in units of PLC-side scans.**
> **To display the time chart monitor with higher precision, use the real-time chart monitor or the high-speed time chart monitor.**
>
> 📖 **"9-6 Real-Time Chart Monitor" (page 9-65)**
> 📖 **"9-7 High-Speed Time Chart Monitor" (page 9-98)**

Display of the Registration Monitor Window

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

For details on how to display the registration monitor window, see 📖 "Registration Monitor Window" (page 9-43).
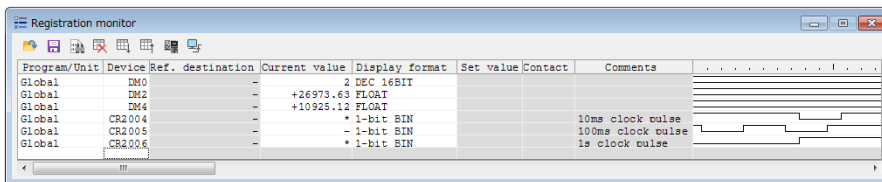
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Registering Devices

To perform monitoring with the register monitor, you have to use one of the following methods to register devices.
- Dragging the device from the ladder monitor window
- Right-clicking the device in the ladder monitor window
- Right-clicking the device in the watch window
- Using the registration monitor window
- Right-clicking the flow block when it is selected.

■ Dragging the device from the ladder monitor window

Follow the procedure below to register devices by dragging them from the ladder monitor window.

1 **In the ladder monitor window, select the cell that includes the device to be registered.**

2 **Move the mouse cursor over the range selection boundary. When the cursor changes to ⊕ , click and hold the mouse button.**

3 **Drag the device to the registration monitor window.**
While you are dragging the device, the mouse cursor will become ⬚ .
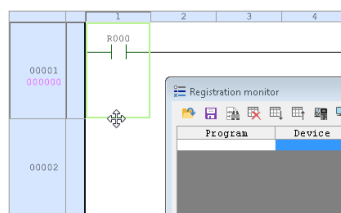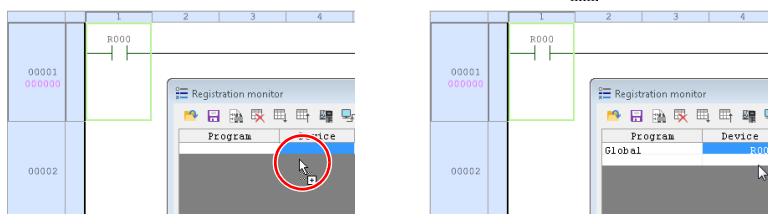
The selected device is registered in the registration monitor window.

■ Right-clicking the device in the ladder monitor window

1 **In the ladder monitor window, select a range of cells including the cell that includes the device to be registered.**

2 **Right-click the selected cells, and then select "Registration Monitor Window (R)" from the menu that appears.**

■ Right-clicking the device in the watch window

Right-click in the watch window, and then select "Registration Monitor Window (G)" from the menu that appears.

■ Specifying the device

Use the keyboard to enter the device in the registration monitor window directly.
The operation is the same as the method to change devices described in 📖 "Changing Device Settings Such As Current Values" (page 9-57).

Reference╗ After you register a device, you can continue registering devices by moving the cursor to the next rung in the registration monitor window and pressing [Ctrl] + [I] . However, you cannot perform this operation on macro argument devices.

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Changing Device Settings Such As Current Values KV-8000 KV-7000 KV-5000/3000 KV Nano KV-1000 KV-700 KV-P16 KV-10/16/24/40

Select a device in the registration monitor window, and then change the device settings such as the ON/OFF status and current value.
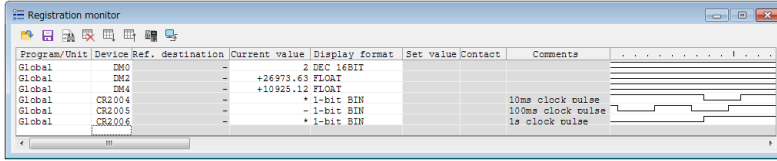
Double-click the item that you want to change, and then enter the value. Items whose settings cannot be changed are displayed in gray.
(For "Program" and "Display format", click the item, and then select from the menu that appears.)

Item	Explanation
Program/unit[*1]	Display whether the device being monitored is a global device, a local device of a currently opened program, a unit buffer memory (UG) or unit internal data (UD). Select an item, click ⧉, and then and select the value from the menu that appears (change the value).
Device	This displays the devices that are being monitored. Double-click an item, and then use the keyboard to change it. You cannot register local devices if no program is specified. You can enter part of the device comment to search for the relevant device.
Reference destination	If the registered device is indirectly specified or index-modified, the reference destination device will be displayed.
Current value	This displays the current values. (When a CTC device is selected, this displays the set value.) Double-click an item to use the keyboard to change it. For bit devices, the ON/OFF status changes every time the item is double-clicked.
Display format	This displays the display format of the value that has been registered for monitoring. Select an item, click ⧉, and then select a value from the menu that appears.
Set value	This displays the set values. Double-click an item, and then use the keyboard to change the value.
Contact	This displays the status of the timer and counter contacts.
Comments	This displays comments.
Time chart display area	This displays the time chart.

*1 This item is displayed only when "KV-8000/7500/7300/5500/5000/3000/1000" or "KV Nano Series" is selected for the PLC model.

Icons

Icon	Item	Explanation
	Read registered device information.	Click this to read register monitor information previously registered.
	Save registered device information.	Click this to save the monitor in which the current registered devices are registered.
	Cross reference.	Click this to display the cross reference of the selected device (the use status of the device) in the output window.
	Delete the registered device.	Click this to delete the registered device.
	Sort the registered devices in ascending order.	Click this to current registered devices in ascending order.
	Sort the registered devices in descending order.	Click this to sort the current registered devices in descending order.
	Real-time chart monitor of register monitor.	Click this to start a real-time chart monitor in which the contents in the current register monitor are registered.
	Derivation monitor.	Click this to start a derivation monitor in which the selected device is registered.

| Reference | • If many devices have been registered, it is easier to view all the devices by opening multiple windows.
• During the execution of the monitor, the current values and the time chart change with a speed that matches the operating speed. |

| Point | **One scale mark on the time chart does not represent one scan. It refers to the communication timing with the monitor.**
For a time chart that is accurate to each scan, use the real-time chart monitor or the high-speed time chart monitor.
   "9-6 Real-Time Chart Monitor" (page 9-65)
   "9-7 High-Speed Time Chart Monitor" (page 9-98) |

■ Sorting the display order of devices

You can sort devices according to type or according to number.
Right-click in the registration monitor window, and then select "Sort registered device" from the menu that appears.

Alternative procedure   Click the icon (⊞ or ⊞).

■ Arbitrarily changing the display order of devices

You can change the display order of devices by dragging the device at the currently selected cursor position to a different position.

Drag the device that you want to move onto the device that you want to be below the device that you are moving.
The device is inserted at the position of the mouse cursor.
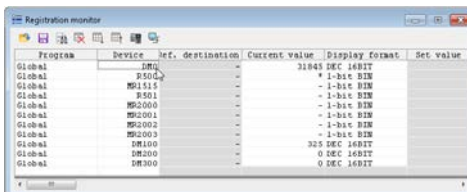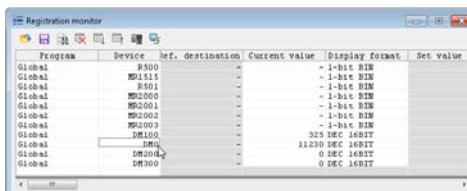
■ Returning current values to default values

Right click a device, and then select "Reset" from the menu that appears.

■ Deleting devices from the register monitor

Select the device to be deleted, and then press ⌈Delete⌋ .
The device is deleted from the registration monitor window.

Alternative procedure   Click the icon (⊞).

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■ **Switching the comment display**

Right-click in the registration monitor window, and then select "Display comment" from the menu that appears.
Select no display, or select what is displayed from each comment set.
The selected item is enabled.

■ **Displaying and hiding the set values of timers and counters as well as their contacts (the contact status of timers and counters)**

Right-click in the registration monitor window, and then select "Display/hide timer counter setting value/contact" from the menu that appears.
When a check mark is displayed, these items are displayed. When a check mark is not displayed, these items are hidden.

■ **Switching the time chart display**

Right-click in the registration monitor window, and then select "Display Time Chart" from the menu that appears.
Select "Display chart." You can select how time charts are displayed from one of the following four display types.
• None
• Small scale
• Medium scale
• High scale
The selected item is enabled.

■ **Displaying and hiding the device reference destinations**

Right-click in the registration monitor window, and then select "Display/hide device reference destination" from the menu that appears.
When a check mark is displayed, these items are displayed. When a check mark is not displayed, these items are hidden.

■ **Real-time chart monitor and high-speed time chart monitor**

By using the real-time chart monitor or high-speed time chart monitor, you can monitor external I/O and device status in units of scans.

　📖 "9-6 Real-Time Chart Monitor" (page 9-65)
　📖 "9-7 High-Speed Time Chart Monitor" (page 9-98)

■ **Reading and saving registered device information**

You can save register monitors in which device information to be monitored is registered and read register monitors in which device information to be monitored has been registered.
Right-click in the registration monitor window, and then select "Display/hide device reference destination" from the menu that appears.

(**Alternative procedure**)　Click the icon (🔧 or 💾).

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The batch monitor is used to display the current values, ON/OFF status of contacts, and registered comments of all the devices per device type. This section describes what you can operate with the batch monitor.

Batch Monitor Overview

The batch monitor has the following functions.
- Displaying the current values, set values, contacts (the status of the contacts of timers and counters), and comments of all devices simultaneously per device type
- Changing the current and set values of devices

For details on how to display the batch monitor window, see ▯ "Batch Monitor Window" (page 9-44).

Changing the Displayed Devices

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

You can change the devices that are already displayed in the batch monitor window.
There are the following two ways to change the devices.

■ Dragging devices from the ladder monitor window

In the ladder monitor, select a device that you want to display (the shape of the mouse cursor changes), and then drag the device to the batch monitor window.

The selected device and all other devices of the same type are listed in the batch monitor window. To start multiple batch monitor windows, right-click in the ladder monitor window, and then select "Batch Monitoring" from the menu that appears.

■ Specifying the device

Use the keyboard to enter the device in the batch monitor window directly.
The operation is the same as ▯ "Changing Device Settings Such As Current Values" described on the next page.

> **Reference** You can right click a device in one of the monitors listed below and select "Batch Monitor Window" to display that device first in batch monitor.
> - Ladder monitor
> - Watch window

Changing Device Settings Such As Current Values

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Select a device in the batch monitor window, and then change the device settings such as the ON/OFF status and current value.
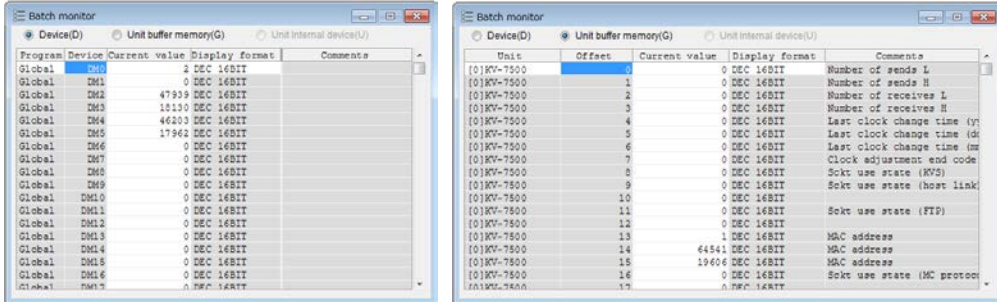
Double-click the item that you want to change, and then enter the value. Items whose settings cannot be changed are displayed in gray.

Item	Explanation
Device (D)[*1]	Select this radio button to display the batch monitor of Global devices and local devices.
Program[*2]	To perform batch monitoring of global devices, select "Global." To perform batch monitoring of local devices, select a program to monitor.
Device	This displays the devices that are being monitored. You can use the cell in the top-most line to change the devices.
Unit buffer memory (G)[*1]	Select this radio button to display the batch monitor of the buffer memory in the expansion unit. This item is disabled when a unit whose expansion unit buffer memory can be monitored is not connected.
Unit [*1]	This displays the unit that is being monitored. You can use the cell in the top-most line to change the unit that is being batch monitored.
Offset[*1]	This displays the offset from the leading address in the expansion unit's buffer memory. You can use the cell in the top-most line to change the leading address of the displayed expansion unit buffer memory.
Expansion unit internal device (U)	Select this radio button to display the batch monitor of the internal device in the expansion unit. This item is disabled when a unit whose expansion unit internal device can be monitored is not connected.
Unit	This displays the unit that is being monitored. You can use the cell in the top-most line to change the unit that is being batch monitored.
Device	This displays the devices that are being monitored. You can use the cell in the top-most line to change the devices.
Current value	This displays the current values. (When a CTC device is selected, this displays the set value.) Double-click a current value to use the keyboard to change it. For bit devices, the ON/OFF status changes every time the item is double-clicked.
Display format	This displays the display format of the values that are being batch monitored. You can use the cell in the top-most line to change the display format.
Set value	This displays the set values. You can change the set values for any cell in which values are displayed.
Contact	This displays the status of the timer and counter contacts.
Comments	This displays comments.

*1 This item is displayed only when "KV-8000/7500/7300/5500/5000/3000" or "KV Nano Series" is selected for the PLC model.

*2 This item is displayed only when "KV-8000/7500/7300/5500/5000/3000/1000" or "KV Nano Series" is selected for the PLC model.

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■ **Creating cross references**

Right-click in the batch monitor window, and then select "Cross reference" from the menu that appears.

A cross reference to the device that you right-clicked is created.

> **Reference**   When "Expansion unit buffer memory" is selected, you cannot create cross references.

■ **Switching the comment display**

Right-click in the batch monitor window and select "Display comment" in the menu that appears. Then select no display, or select what is displayed from each comment set.

The selected item is enabled.

> **Reference**   When "Expansion unit buffer memory" is selected, you can choose whether to display comments.

■ **Returning current values to default values**

Right-click in the batch monitor window, and select "Forcedly set/reset register" from the menu that appears. Then select "Reg set" or "Reg reset".

The current value of the device that you right-clicked is returned to its default value.

📖 "Setting Device Default Values" (page 12-5)

■ **Registering forced sets and resets**

Right-click in the batch monitor window, and select "Forcedly set/reset register" from the menu that appears. Then, select "Reg set" or "Reg reset".

A forced set or reset of the device that you right-clicked is registered or cleared.

📖 "Registering Forced Sets and Resets" (page 11-12)

The built-in function monitor allows you to easily display the positioning, high-speed counter, and other functions used in the CPU built-in function in a monitor window. This section describes the functions of the built-in function monitor.

Features of the Built-In Function Monitor

By default, a monitor window for the special functions that are built-in to the CPU unit is available, which enables you to easily monitor the CPU. You can display up to 10 built-in function monitors simultaneously.

> ✎ **Point** | **You can only select the built-in function monitor from Monitor, Simulator, Online Edit, or Simulator Edit.**

Displaying the Built-In Function Monitor

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Monitor/Simulator(N)" ▶ "Built-in Function Monitor(P)"

Right-click CPU unit in "Unit Configuration" of the workspace, and then select "Built-in Function Monitor" from the menu that appears to display the "Builtin function monitor selection" dialog box. Select the required window, and then click "Display."
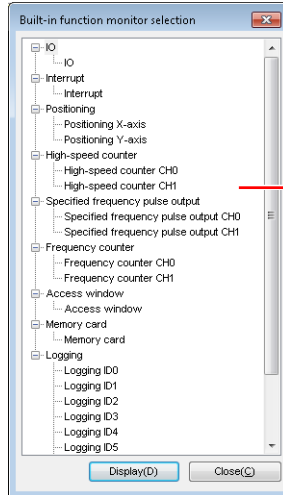
The window registered to the built-in function monitor is displayed.

> **Reference** • By default, the following windows are registered to the built-in function monitor.
> • Some windows may not be displayed or monitoring may not be available depending on the PLC model or the presence or absence of extension cassettes.

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Window Name	Function	KV-8000	KV-7500 KV-7300	KV-5500 KV-5000 KV-3000	KV-1000	KV-700	KV-N14*/ N24*/ N40*/ N60*	KV-NC32T
I/O	Monitor for CPU built-in I/O.	–	–	Yes	Yes	Yes	Yes	Yes
Interrupt	Monitor for CPU interrupts.	–	–	Yes	Yes	Yes	Yes	Yes
Positioning	Monitor for the CPU built-in positioning function. As you can select the monitor of the axes that can be used, the number of displayed axes varies depending on the model.	–	–	Yes	Yes	Yes	Yes	Yes
High-speed counter	Monitor for the CPU high-speed counter. As you can select the monitor of the channels of the high-speed counter that can be used, the number of displayed channels varies depending on the model.	–	–	Yes	Yes	Yes	Yes	Yes
Specified frequency pulse output	Monitor for the CPU specified frequency counter. As you can select the monitor of the channels of the pulse output that can be used, the number of displayed channels varies depending on the model.	–	–	Yes	Yes	Yes	Yes	Yes
Frequency counter	Monitor for the CPU frequency counter. As you can select the monitor of the channels of the frequency counter, the number of displayed channels varies depending on the model.	–	–	Yes	Yes	Yes	Yes	Yes
Analog volume	Monitor for the analog volume.	–	–	–	–	–	Yes	–
Cam switch	Monitor for the cam switch.	–	–	–	–	Yes	–	–
Access Window	Monitor for aspects of the access window such as the alarm function and user messages.	Yes	Yes	Yes	Yes	Yes	Yes	–
Serial	Monitor for the built-in serial function and the extension serial communication function.	–	–	–	–	–	Yes	Yes
Storage	Monitor for the memory card or CPU memory.	Yes	Yes	–	–	–	–	–
Memory card	Monitor for the memory card.	–	–	Yes	Yes	–	–	Yes
Logging	Monitor for the logging ID. (The ID is not displayed for the KV-700.)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Operation recorder	Monitor of the operation recorder function.	Yes	–					
QL	Monitor for the QL Series.	–	–	–	–	Yes	–	–

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9-6 Real-Time Chart Monitor

The real-time chart monitor is a function that can monitor the status of bit data and word data in various sampling periods, such as scan units. This section describes the functions of the real-time chart monitor.

> **Point**
> - **The real-time chart monitor can only be used when "KV-8000/7500/7300/5500/5000/3000" or "KV Nano Series" is selected for the PLC model.**
> - **The real-time chart monitor can monitor variables and labels in addition to devices. Only KV-8000 with CPU function version 2.0 or later can monitor variables. Other models can monitor labels.**

Features of the Real-Time Chart Monitor

- Real time sampling of bit date and word date using scan time unit is available.
- When KV-8000/7500/7300 is selected as an enabled device, sampling while communicating with KV studio is available.
- When "KV-8000" is selected as the PLC model, it is possible to display the waveform or camera video of the device data of the operation recorder in coordination with the replay mode of KV STUDIO.
- You can set trigger conditions, which enables you to easily set traps during debugging.
- You can read data traced with the CPU's tracing function and display the data in a time chart format.
- You can read CSV data saved with the CPU's logging/tracing function and display the data in a time chart format.
- You can also start the real-time chart monitor as a standalone application without starting KV STUDIO.
- You can make the real-time chart monitor window transparent when it is started from KV STUDIO. You can debug while checking waveforms and ladders simultaneously.
- You can display a 2D path when using two axes such as X-Y.
- You can superimpose this with saved data and compare the waveform changes.

Displaying the Real-Time Chart Monitor

For details on how to start the real-time chart monitor, see 📖 "Real-Time Chart Monitor" (page 9-41).

Names and Functions of Parts of the Real-Time Chart Monitor
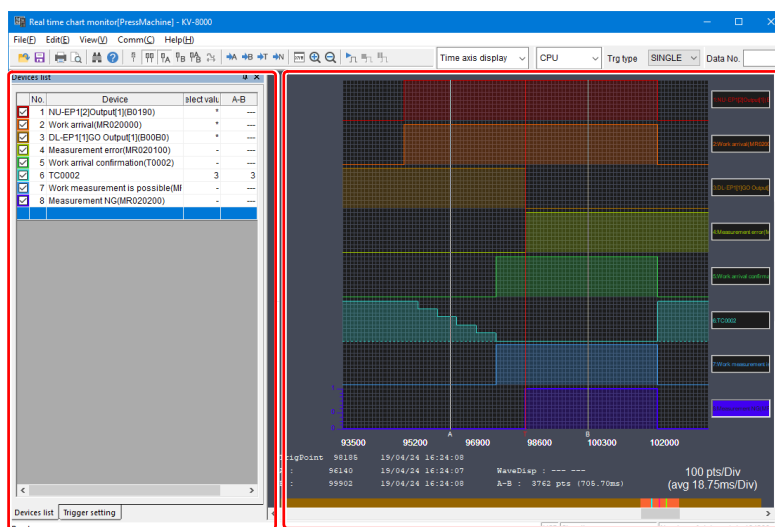
Device List / Trigger Setting / Camera Display Area   Time chart display area

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■ **Device List / Trigger Setting / Camera Display Area**

Register the device / variable to monitor and set the triggers.

● **"Device list" tab**

Register the device / variable to monitor and configure the waveform display settings.

Item	Explanation
Checkboxes	The waveforms of the device / variable whose checkboxes are selected are displayed.
No.	This displays the registration numbers of the device / variable that are being monitored.
Device	Display what to monitor.
Selected value/ current value	During tracing, "Current Value" is displayed in the column title and the current values of all the traced device / variable are displayed. These are displayed according to the display format set in the "Device Setting" dialog box. When a bit data is turned ON, "*" is displayed. When a bit device is turned OFF, "O" is displayed. When tracing is stopped, "Selected Value" is displayed in the column title and the value at the cursor position is displayed.
A/B	This displays the differential value between Cursor A and Cursor B. For bit data, "---" is displayed.

• How to register and edit device / variable

After selecting the cell to register / edit, enter the device number or variable name directly.

When you start entering the value, the "Device setting" dialog box is displayed.

Alternative procedure	• Double-click the cell to be registered or edited.
	• Select the cell to be registered or edited, and then press [Enter] .
	• Right-click the cell to be registered or edited, and then select "Register/Edit(R)" from the menu that appears.

When the operation mode is "CPU", "Unit" or "CPU + Unit"

When the operation mode is "Replay Mode"

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Item	Explanation
No.	This displays the registration number of the device to be registered or edited.
Unit selection	It is displayed only when the operation mode is "Replay Mode". Display the unit to be registered / edited. Select a unit from the drop-down list.
Program	This item is displayed only when the compatible model of the linked KV STUDIO is KV-8000 with CPU function version 2.0 or later. Select the target program when registering local variables.
Device	This displays the device / variable to be registered or edited. To make the device number editable, double-click the cell or select the cell and press Enter. Variables can also be registered when the variable information is obtained from KV STUDIO. Variable information can be obtained from "Display (V)" ▶ "Get comment from KV STUDIO (N)" in the real-time chart monitor menu.
Display format	Select the display format of the registered data. The display formats are listed below. • Binary 1BIT • Decimal 16BIT, unsigned • Decimal 16BIT, signed • Hex 16BIT • Decimal 32BIT, unsigned • Decimal 32BIT, signed • Hex 32BIT • FLOAT When the registered data is bit device (R, B, MR, LR, CR, T, C, or CTC[*1]), you can only select "Binary 1BIT." When the registered data is a word device (DM, W, EM[*2], FM[*2], ZF[*2], TC (timer current value), CC (counter current value), Z, CM, CTH[*1], TM, or TRM[*2]), you cannot select "Binary 1BIT." When registering variables, LREAL, STRING and IN-OUT arguments of function block type variables cannot be registered. In addition, when registering array type variables and structure type variables, the elements and members should be specified. *1 CTH and CTC cannot be used with the KV-8000/7000 Series. *2 EM, FM, ZF and TRM cannot be used with the KV Nano Series.
Color	This displays the color of the displayed waveform. To edit a color, click the color cell.
Display in logic format	This option becomes active when the display format is a format other than "Binary 1BIT." When this checkbox is selected, waveforms are displayed in logic format.
Real time scaling	This option becomes active when the display format is a format other than "Binary 1BIT." When this checkbox is selected, the display range is automatically adjusted during sampling to match the maximum and minimum values of the data.

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Registering devices from KV STUDIO

- To register device / variable, drag the ones that you have written in the KV STUDIO ladder editor.
- In a ladder program, select a cell in which the device / variable that you want to register in the real-time chart monitor has been written, and then start the real-time chart monitor.
- Right-click in the registration monitor window or the watch window, and then use the menu that appears to start the real-time chart monitor. The real-time chart monitor starts with the device / variable registered in the registration monitor window or the watch window registered in it.

> **Reference**   If you register global labels, local labels and local devices, the assigned devices will be registered.

> ✎ **Point**   **When you register or edit a device / variable, all the displayed waveforms are cleared.**

- Deleting device / variable

  Select the cell to be deleted, and then press   [Delete] .

  > **Alternative procedure**   • Right-click the cell to delete, and then select "Delete (C)" from the menu that appears.

- Incremental registration of devices

  Register an additional device by incrementing (+1 or +2) the device number of a registered device. Select the cell directly below the cell where you want to perform incremental registration, and then press [Ctrl] + [I].

  > **Alternative procedure**   • Right-click the device that you want to perform incremental registration on, and then select "Increment registration (I)" from the menu that appears.
  > - When the display format of the device that you want to perform incremental registration on is "Binary 1BIT," "Decimal 16BIT," or "Hex 16BIT," the device whose device number is at a +1 offset to the specified device number is added.
  > - When the display format of the device that you want to perform incremental registration on is "Decimal 32BIT" or "Hex 32BIT," the device whose device number is at a +2 offset to the specified device number is added.

  > ✎ **Point**   **Variables cannot be registered in increments.**

- Displaying device comments

  Display the registered devices as comments and device numbers. For labels, label names are displayed.
  For local devices and local labels, the name of the module used is also displayed.
  Right-click the device that you want to display as a device comment, and then select "Display device comments (C)" from the menu that appears.

  > **Alternative procedure**   • Click the "View (V)" menu ▶ "Display device comments (C)."

  > ✎ **Point**   **You can use this function when you start the real-time chart monitor from KV STUDIO.**
  > **When you start the real-time chart monitor as a standalone application, you cannot select this function.**

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● **"Trigger setting" tab**

Configure trigger settings.

Item		Explanation
Trigger Position	After trigger data size	Set the amount of data to collect after a trigger occurs. Move the slider left and right to change the amount of data. Move the slider to the left to increase the amount of data. Move the slider to the right to decrease the amount of data. In addition, you can directly enter the amount of data as a percentage.
Sampling period[1]		1 to 50ms : Perform sampling using the selected period. SCAN : Perform sampling for each PLC scan. Instruction trigger (TRGD) : Perform sampling for each execution of the TRGD instruction (which specifies ID10 in the operand) on the ladder.
Trigger condition		Set the trigger conditions.
Bit data	Checkboxes	Select these checkboxes to specify the bit data.
	Device number	Specify the bit data to trigger on. You can only specify the bit data that have been registered in the "Device list" tab.
	Trigger attribute	Specify the bit data attribute. ON: When the bit data turns ON, the trigger occurs. OFF: When the bit data turns OFF, the trigger occurs.
	Trigger condition	Specify the trigger condition of the bit data. AND: When all bit data conditions are met, the trigger occurs. OR: When one of the conditions is met, the trigger occurs.
Trigger condition		Specify the trigger condition of the bit data and the word device. AND: When all the bit data and word data conditions are met, the trigger occurs. OR: When one of the conditions is met, the trigger occurs.
Word data	Checkbox	Select this checkbox to specify the word data.
	Device number	Specify the word data to trigger on. You can only specify the word data that have been registered in the "Device list" tab.
	Trigger condition	Specify the trigger condition of the word data. $\geqq$: When the data value is greater than or equal to the comparison value, the trigger occurs. $>$: When the data is greater than the comparison value, the trigger occurs. $\leqq$: When the data value is less than or equal to the comparison value, the trigger occurs. $<$: When the data value is less than the comparison value, the trigger occurs. $\neq$: When the data value is not equal to the comparison value, the trigger occurs. $=$: When the data value is equal to the comparison value, the trigger occurs.
	Comparison value	Enter the value to compare the word data with.

*1 The setting differs if unit trace or inter-unit synchronization trace is used.
📖 "Switching operation mode (when the target PLC is the KV-8000/7000 Series only)" (page 9-71)

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● **"Camera Display" tab**

Display the camera video played back in the replay mode of KV STUDIO.

✎ Point	The "Camera Display" tab is displayed only when the operation mode of the real-time chart monitor is the replay mode.

Item	Explanation
(Drop-down list)	Select the camera to be displayed when using multiple cameras.
Frame advance	Perform the frame advance operation for the playback position. ⏮ Return the playback position by the specified size. ⏭ Advance the playback position by the specified size. ×1 Specify the amount of frame advance after 1 click from "×1/×2/×4/×8".

■ **Setting the trigger type**

Select the mode to use to monitor triggers.
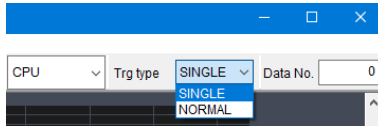
● **Trigger type "SINGLE"**

When a trigger occurs, the specified amount of data is traced, and then tracing is stopped automatically.

● **Trigger type "NORMAL"**

When a trigger occurs, the specified amount of data is traced, and then tracing is paused automatically.
When tracing is paused, the real-time chart monitor continues monitoring the PLC and waits for the next trigger.
When a trigger occurs again, the specified amount of data is traced, and then tracing is paused.
This will continue until you stop tracing.

📖 "Stopping tracing" (page 9-96)

■ **Switching operation mode (when the target PLC is the KV-8000/7000 Series only)**

You can change the operation mode of the real-time chart monitor.
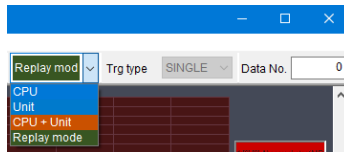
● **"CPU"**

It is used as a normal real time chart monitor.

The status of the bit data and word data of the CPU unit can be monitored.

● **"Unit"**

Switch to unit trace.

It is possible to switch only when using X-Unit (KV-XH16ML / XH04ML etc) supports unit trace.

Data in X-Unit is possible to be monitored.

Example: For KV-XH16ML / XH04ML

Data in KV-XH16ML / XH04ML such as current coordinates and current rate, position deviation and feedback torque, positioning start and positioning end is possible to be monitored.

Sampling cycle of unit trace is as follows.

- For X-Unit with control period: Specify sampling period in multiples of the control period.
- For X-Unit without control period: Specify sampling period in the range of 0.125 to 50ms (0.125ms units).

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● **CPU + Unit**

Switch to Inter-unit synchronous trace when Inter-unit synchronization is used.

It is possible to be switched only when using X-Unit (KV-XH16EC/XH16ML/XH04ML etc) which supports unit trace and Inter-unit synchronization.

It is possible to monitor data in X-Unit which can be monitored by unit trace and CPU device at the same time.

Sampling interval of Inter- unit synchronization traces becomes to the Inter-unit synchronization period.

> | Reference | • For details of unit trace, refer to User's manual of each X-Unit.
> | | • For detail on inter-unit synchronization, refer to the 📖 "KV-8000 Series User's manual" and 📖 "KV-7000 Series User's manual".

> | Point | **Unit trace and inter-unit synchronization trace can be used after you start the real-time chart monitor from KV STUDIO.**
> | | **If only a single one starts, then selection is not possible.**

● **"Replay Mode" (Only when the object PLC is the KV-8000 series)**

After synchronizing with the replay mode of KV STUDIO, the camera video played back in the replay mode or the waveform of the device / variable data is displayed. When the replay cursor is operated, the playback position of replay of KV STUDIO is also linked, which can be used to master the status of the ladder when the waveform changes.

The sampling period in the replay mode is the sampling period set in "Operation Recorder Setting" of KV STUDIO.

> | Reference | • For details on the replay mode, refer to 📖 "Replay function" (page 10-8).
> | | • For details on the operation recorder function, refer to "KV-8000 Series User's Manual".

> | Point | • **Replay mode is a function that can be used when starting the real-time chart monitor from KV STUDIO for which KV-8000 is selected as the PLC model. It cannot be selected when started separately.**
> | | • **When no KV STUDIO is started in the replay mode, the replay mode of the real-time chart monitor cannot be selected.**

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■ **Changing the display mode (when the target PLC is the KV-8000/7000 Series only)**

You can change the display mode of the real-time chart monitor.
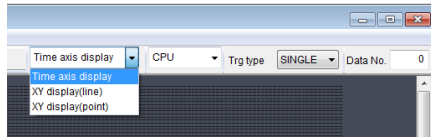
● **"Time axis display"**

You can monitor changes over time with the horizontal axis showing time and the vertical axis showing device values.

● **"XY display (line)"**

You can monitor the path over time with the horizontal and vertical axis showing device values. Graphs are registered and displayed in the following order: The top device set in the device list is the horizontal axis of graph 1, the second device is the vertical axis of graph 1, the third device is the horizontal axis of graph 2. To change the combinations displayed change the order of the device list. You can display the path in 2D by combining the current coordinates of multiple axes, and combine the encoder high-speed counter value and displacement data to plot the shape.

● **"XY display (point)"**

You can monitor using a scatter diagram with the horizontal and vertical axis showing device values. Graphs are registered and displayed in the following order: The top device set in the device list is the horizontal axis of graph 1, the second device is the vertical axis of graph 1, the third device is the horizontal axis of graph 2. To change the combinations displayed change the order of the device list. This can be used to check through a scatter diagram.

> ✎ **Point**　**Bit devices cannot be registered when the display mode is "XY display (line/point)".**

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■ **Time chart display area**

This displays the waveform and various information of the device / variable that you are monitoring.

Cursor A

Cursor B

Trigger point

Replay cursor

Sampling information display
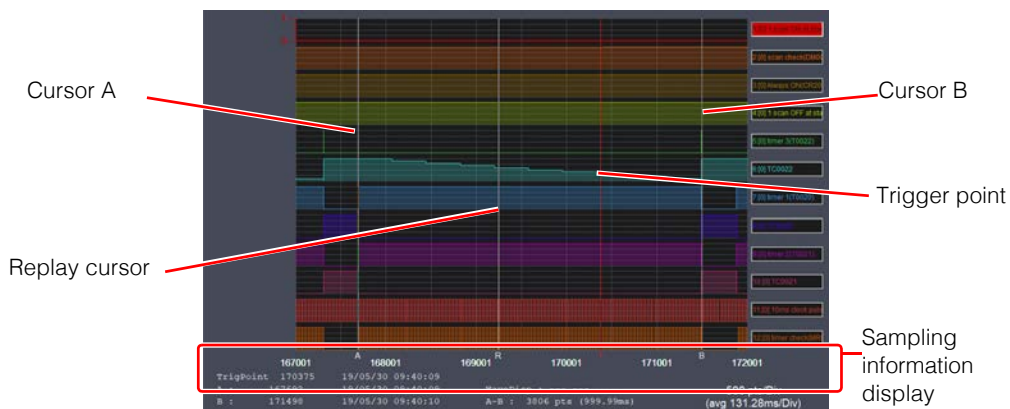
Cursor A and cursor B

You can use a cursor to check the value at the selected position and you can use both cursors to check information such as the timing and the response delay.

To move a cursor, drag it with the mouse.

To make fine adjustments to the cursor position, use the cursor keys on the keyboard.

Trigger point

When you are performing sampling when triggers occur, the point at which the trigger occurred is displayed.

You can check the absolute position of the trigger point and the date and time that the trigger occurred in the sampling information display.

In the replay mode, the point at which the file save trigger of the operation recorder function is ON is displayed.

Replay cursor

It is displayed only when the display mode is the replay mode. The position of the data played back in the replay mode is displayed.

Sampling information display

This displays information related to the displayed time chart.

TrigPoint: This displays the position and the date and time that the trigger occurred.[1]

A: This displays the position and the date and time of cursor A.[1]

B: This displays the position and the date and time of cursor B.[1]

A-B: This displays the distance and time between cursor A and cursor B.

100pts/Div: This displays the unit of the currently displayed X grid (the number of samples/Div) and the average time (ms/Div).[2]

[1] The position assumes the beginning of the data to be 0.
[2] The unit changes when you expand or shrink the time axis. (The default is 100 pts/Div.)

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■ XY display area

This area shows a variety of information including the waveform of monitored device / variable.
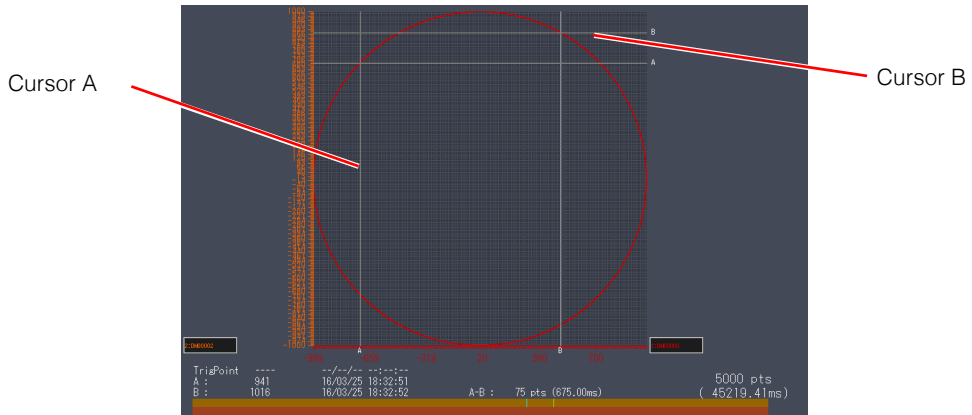
Cursor A

Cursor B

Cursors A and B

Use a cursor to check the value of the selected location, or use the two cursors to check timing, response delay, etc.

Click the scrolling part at the bottom to move the cursor.

To fine tune the position of a cursor, use the cursor keys on the keyboard.

Sampling information display

Shows information about the displayed XY display area.

TrigPoint: This displays the position and the date and time that the trigger occurred.[1]

A: This displays the position and the date and time of cursor A.[1]

B: This displays the position and the date and time of cursor B.[1]

A-B: This displays the distance and time between cursor A and cursor B.

*1 For positions, the beginning of the data is considered to be 0.
*2 The unit changes as the time axis is expanded or reduced. (Default value: 100 pts/Div)

"File (F)" Menu

■ Open file

Open a real-time chart file (*.rtc).
Click the "File(F)" menu ▶ "Open file(O)," and then select the real time chart file from the "Open file" dialog box.

Alternative procedure • Ctrl + O
• 🔄

■ Save

Save (overwrite) the real-time chart monitor data.
Click the "File(F)" menu ▶ "Save(S)." When you save a file for the first time, specify the file name in the "Save As" dialog box to save the file.

Alternative procedure • Ctrl + S
• 💾

■ Save as

Save the real-time chart monitor sampling data to a file under a new file name.
Click the "File(F)" menu ▶ "Save As(A)," specify the file name in the "Save As" dialog box, and then click "Save."
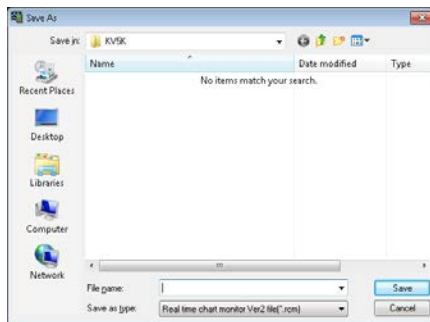
Item	Explanation
Save in	Select the drive and the folder in which you want to save the file.
File name	Enter the file name.
Save as type	Select the type of file to save: a real-time chart version 2 file (*.rcm) or a real-time chart version 1 file (*.rtc). Files saved in *.rtc format can be opened with the version 1 real-time chart monitor.

Reference The following data will be deleted when you save data as a .rtc file.
- FLOAT display type device and trigger settings
- XYM-display settings of devices
- Device comment display settings
- Real-time scaling settings

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■ Comparison waveform registration (KV-8000 series only)

This is the function to read the data of the device / variable saved in another file and display it side by side with the data displayed in the real-time chart monitor. The data that can be read through the comparison waveform registration is as follows.

Item	Explanation
rcm file	The file saved after read from KV-8000 is displayed by the real-time chart monitor.
csv file	The file saved in the CSV file format after read from KV-8000 is displayed by the real-time chart monitor.
TMN file	It is the operation recorder data saved by KV-8000.

> **✎ Point**
>
> **The comparison waveform registration function is a function to display and compare the waveform of the file saved after reading data from KV-8000. The file saved after reading data from other CPU units than KV-8000 cannot be displayed and compared.**

1 **Select "File" ▶ "Register comparison waveform(M)" from the menu.**

The "Registration of comparison waveform" dialog is displayed.

> **Alternative procedure** • ⌨️ Ctrl + M

2 **Select the file to be read and click "Next".**

The screen for selecting the device / variable is displayed.
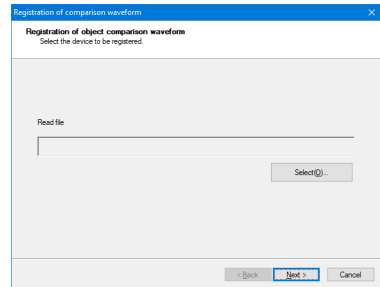
3 **Select the device to be read and display color, and click "Finish".**

The selected device is added and displayed in the display device / variable of the real-time chart monitor.
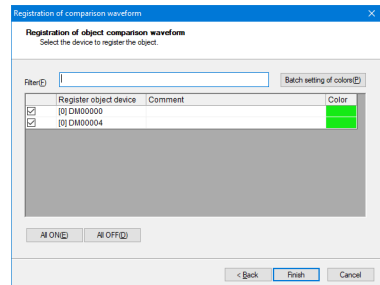
✎ **Point**

- **The comparison waveform registration function is a function to display and compare the waveform of the file saved after reading data from KV-8000.**
  The file saved after reading data from other CPU units than KV-8000 cannot be displayed and compared.
- **The comparison waveform registration cannot be performed while tracing.**
- **The data that can be read is only the data of the same unit configuration.**
- **Up to 8 files can be registered.**
- **The total number of devices / variables that can be registered and device / variable already registered to the real-time chart monitor is up to 88.**
- **Device / variable registered as comparison waveforms are not saved.**

■ **Save as CSV/TXT file**

Save the real-time chart monitor data in CSV format or TXT format.
Select the "File (F)" menu ▶ "Save as CSV/TXT file (C)," and then specify the file name in the "Save As" dialog box to save the file.

■ **Read CSV file**

You can read CSV data saved with the CPU's internal logging/tracing function into the real-time chart monitor.

1 **Select the "File (F)" menu > "Read CSV file (L)."**

The "Read logging/tracing file wizard " dialog box appears.
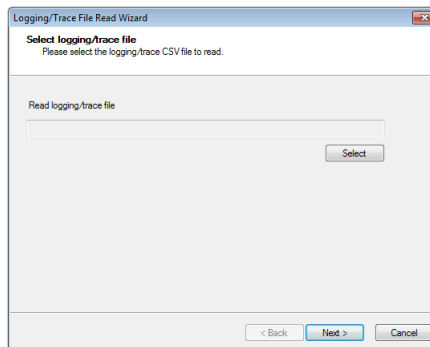
2 **Select the logging/tracing file to read and click "Next."**

The "Select device " screen appears.

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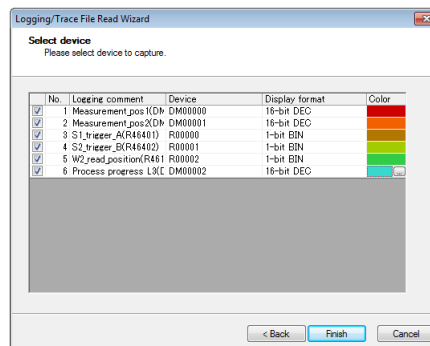
3 **Change the device and display format as necessary, and then click "Finish."**

The logging/tracing data will be read into the real-time chart monitor.

> | Reference | Trigger position information can also be read for data files saved using the tracing function.

> | Point | **When data is read into the real-time chart monitor, check "Add a device comment line " in the "Option settings " in "Logging/tracing setting". If there is no comment line, time stamp information cannot be read normally.**

■ Print settings

Configure the print settings for the real-time chart monitor data.
Click the "File (F)" menu ▶ "Print setup (R)," and then configure the printer settings in the "Printer setup" dialog box.
For details on the printer settings, see the printer manual.

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■ Print

Print the real-time chart monitor data.

Click the "File (F)" menu ▶ "Print (P)," and then configure the print settings in the "Print" dialog box.

Alternative procedure
- $\boxed{Ctrl}$ + $\boxed{P}$
- [printer icon]
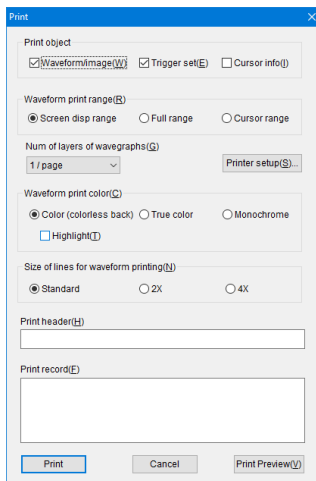
Item	Explanation
Print object	Select the items to print. The items whose checkboxes are selected will be printed.
Waveform print range	Select the waveform range to print. The waveforms within the range indicated by the selected radio button will be printed.
Number of layers of wavegraphs	Specify the number of waveforms to print on one page. The setting range is 1 to 8 layers/page.
Printer setup	Click this to configure printer settings.
Waveform print color	Select the print color of waveforms. Waveforms will be printed in the color indicated by the selected radio button.
Highlight	When this checkbox is selected, waveforms will be highlighted when printed. This is only displayed when "Color (colorless back)" is selected.
Size of lines for waveform printing	Select the thickness of the waveform lines to print. Waveforms will be printed with the line thickness indicated by the selected radio button.
Print header	Add a title to the items to print.
Print record	Add a comment to the items to print.
Print	Click this to print the data.
Cancel	Click this to cancel printing and close the "Print" dialog box.
Print Preview	Click this to display a print preview.

■ Print preview

Display a print preview of the real-time chart monitor data.

Click the "File (F)" menu ▶ "Print Preview(V)" to display the "Print Preview" screen.

Alternative procedure
- [preview icon]

■ Exiting the real-time chart monitor

Exit the real-time chart monitor.

Click the "File (F)" menu ▶ "Exit (X)" to close the "Real-time Chart Monitor" dialog box.

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"Edit (E)" Menu

■ Search

Search the data of a single sampled waveform.

Activate the waveform graph that you want to search, and then click the "Edit (E)" menu ▶ "Find (F)" to open the "Find" dialog box.

You can switch the data to be searched by changing the active waveform data.

Alternative procedure • Ctrl + F

• 🔍

Reference ▱ Cursor A will automatically move to the found position.

● When you are searching a bit device
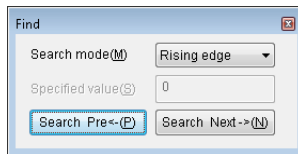
Item	Explanation
Search mode	Select the search mode from the pulldown menu. Rising edge: The point where the device changes from OFF to ON will be searched for. Falling edge: The point where the device changes from ON to OFF will be searched for
Search Pre ←	Click this to search for the previous data (left side) from the point of cursor A.
Search Next →	Click this to search for the next data (right side) from the point of cursor A.

● When you are searching a word device

Item	Explanation
Search mode	Select the search mode from the pulldown menu. Maximum value: The maximum value of the device / variable will be searched for. Minimum value: The minimum value of the device / variable will be searched for. Local maximum value: The local maximum value of the device / variable will be searched for. Local minimum value: The local minimum value of the device / variable will be searched for. Specified value: Select this when you want to search for a specified value.
Specified value	You can only enter this value when you select "Specified value" as the search mode. Enter the value to search for.
Search Pre ←	Click this to search for the previous data (left side) from the point of cursor A.
Search Next →	Click this to search for the next data (right side) from the point of cursor A.

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■ **Combination search**

Search the data of multiple sampled waveforms by combining the search conditions.

Click the "Edit(E)" menu ▶ "Combine search(C)" to open the "Combination Find" dialog box.

| Reference | Cursor A will automatically move to the found position. |

Bit data combination condition

Bit data search conditions

Word data search conditions

Bit data and word data combination condition

Item		Explanation
Bit data combination condition		Select the condition to use to combine the specified bit data search conditions. AND: The point in which all the bit data search conditions are met will be searched for. OR: The point in which at least one of the bit data search conditions is met will be searched for.
Bit data search conditions	Select	The device / variable whose checkboxes are selected will be searched.
	Device	This displays the registered bit data.
	ON/OFF	Specify the status of the bit data to be searched.
Bit data and word data combination condition		Select the condition to use to combine the specified bit data and word data search conditions. AND: The point in which all the bit data and word data search conditions are met will be searched for. OR: The point in which at least one of the bit data or word data search conditions is met will be searched for.
Word data search conditions	Select	The device / variable whose checkbox is selected will be searched.
	Device	Select a registered word data from the pulldown menu.
	Cond (condition)	Specify the word data search condition. =: The point at which the data value is equal to the comparison value will be searched for. >: The point at which the data value is greater than the comparison value will be searched for. <: The point at which the data value is less than the comparison value will be searched for. < >: The point at which the data value is not equal to the comparison value will be searched for.
	Value	Specify the value to compare with the word data being searched.
	Display format	This displays the display format of the device / variable registered to the real-time chart monitor.
Search Pre ←		Click this to search for the previous data (left side) from the point of cursor A.
Search Next →		Click this to search for the next data (right side) from the point of cursor A.
Close		Click this to close the "Combination Find" dialog box.

■ **Searching for the next point**

Search for the next piece of data that comes after the point of cursor A (to the right of the cursor) in the active waveform graph.
When the "Search" dialog box is displayed, the search will be performed according to the conditions set in the dialog box.
Click the "Edit (E)" menu ▶ "Search Next (N)" to start the search.

Alternative procedure • F3

■ **Searching for the previous point**

Search for the previous piece of data that comes before the point of cursor A (to the left of the cursor) in the active waveform graph.
When the "Search" dialog box is displayed, the search will be performed according to the conditions set in the dialog box.
Click the "Edit (E)" menu ▶ "Search previous (F)" to start the search.

Alternative procedure • Shift + F3

■ **Jumping to cursor A**

Click the "Edit (E)" menu ▶ "Jump (J)" ▶ "Cursor A (A)" to jump to the position of cursor A.

Alternative procedure • Ctrl + A
• ➡A

■ **Jumping to cursor B**

Click the "Edit (E)" menu ▶ "Jump (J)" ▶ "Cursor B (B)" to jump to the position of cursor B.

Alternative procedure • Ctrl + B
• ➡B

■ **Jumping to the trigger position**

Click the "Edit (E)" menu ▶ "Jump (J)" ▶ "Trigger position (T)" to jump to the trigger position.

Alternative procedure • Ctrl + T
• ➡T

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■ Jumping to the specified data number

Click the "Edit (E)" menu ▶ "Jump (J)" ▶ "Specify data No. (N)" to jump to the specified data number.

Specify the data number in the "Data No." box on the right side of the toolbar.

(Alternative procedure)
- [Ctrl] + [N]
- ➡N
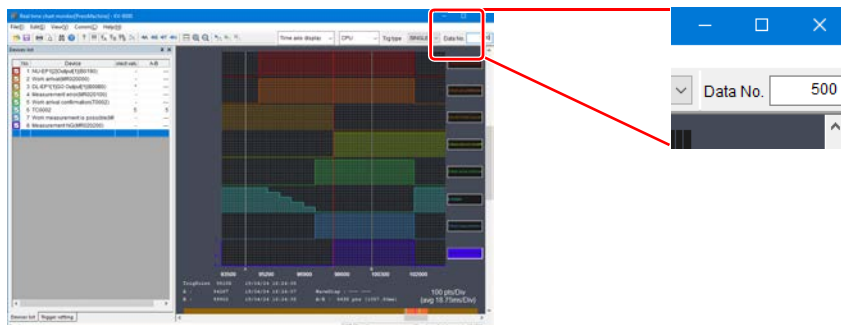
■ Jump to the position of replay cursor

When "Edit (E)" ▶ "Jump (J)" ▶ "Replay Cursor (R)" is selected from the menu, jump to the data number when the operation record save trigger is ON.

(Alternative procedure)
- [Ctrl] + [R]
- ➡R
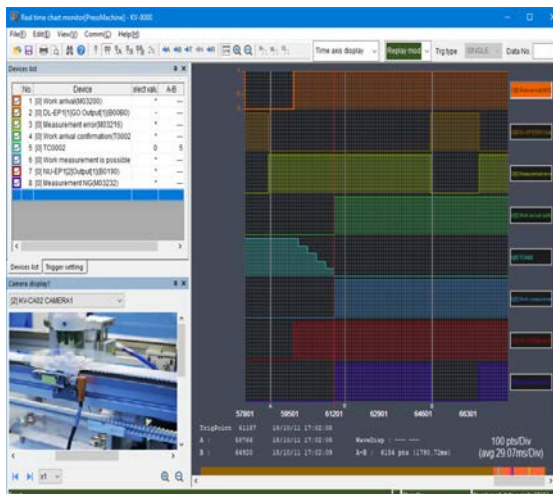
"View (V)" Menu

■ Device list display

Click the "View (V)" menu ▶ "Device list (E)" to display the "Device list" tab in the device register and trigger setting area. In addition, a check mark is displayed in the menu.
Click "Device list (E)" while the "Device list" tab is displayed to hide the "Device list" tab and remove the check mark from the menu.

■ Trigger setting display

Click the "View (V)" menu ▶ "Trigger setting (G)" to display the "Trigger setting" tab in the device register and trigger setting area. In addition, a check mark is displayed in the menu.
Click "Trigger setting (G)" while the "Trigger setting" tab is displayed to hide the "Trigger setting" tab and remove the check mark from the menu.

■ XYM display

Click the "View (V)" menu ▶ "XYM display(X)" to display the numbers of the devices registered in the device list in XYM marking. In addition, a check mark is displayed in the menu.
Click "XYM display(X)" while the device numbers are displayed in XYM marking to display device numbers and remove the check mark from the menu.

■ Acquire XYM display information from KV STUDIO

Click the "View (V)" menu ▶ "Acquire XYM Display Info from KV STUDIO (M)" to read the XYM display information from the project of KV STUDIO in which the real-time chart monitor was started. When relays have been registered in the device list, whether they are assigned to input relays (X) or output relays (Y) is read and acquired. The assignment to input relays or to output relays cannot be read for some units.

■ Display device comments

Click the "View (V)" menu ▶ "Device display comment (C)" to display as comments the numbers of the devices registered to the device list. In addition, a check mark is displayed in the menu.
Click "Device display comment (C)" while device comments are displayed to display device numbers and remove the check mark from the menu.

■ Acquire comment from KV STUDIO

Click the "View (V)" menu ▶ "Acquire comment from KV STUDIO" to read the comments and variable information from the project of KV STUDIO in which the real-time chart monitor was started.

> | Reference | • When you start the real-time chart monitor as a standalone application, you cannot read comments.
> • When you acquire comments and save the data, the acquired comments are also saved. Even the next time that the real-time chart monitor is started as a standalone application, the comments will be displayed.

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■ **Display settings**

Click the "View (V)" menu ▶ "Display setting (S)" to display the "Display setting" dialog box.
Configure the settings related to the display of the real-time chart monitor.

Alternative procedure
- RIght-click the time chart display area, and then select "Display setting (S)" from the menu that appears.
- Right-click a device number displayed on the right side of the time chart display area.

The "Display setting" dialog box consists of three tabs: "Display range," "Scale," and "Common."

■ **Group settings**

Click the "View (V)" menu ▶ "Group settings (J)" to display a wave shape in the same range and same position as the registered device. When they are grouped, the other devices are aligned with the display settings of the youngest device and displayed superimposed.
Up to 8 groups can be used, and devices can be used without being grouped.

Grouped devices are displayed together and surrounded by a special frame.
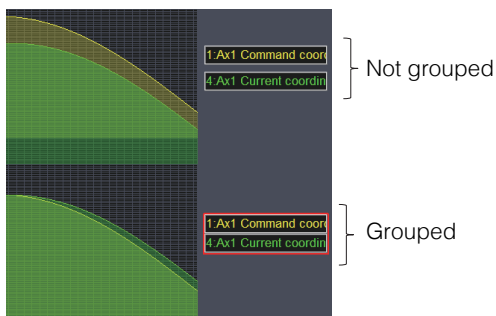
| Point | Only devices with the same device size (1 word or 2 words) can be grouped. |

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● **"Display range" tab**

Item	Explanation
Device List	This displays the list of registered device / variable. The waveforms of the device / variable whose checkboxes are selected are displayed.
All devices ON/ OFF	Click this to select and clear all the device / variable checkboxes.
Word (double word) device display set to logic mode	When this checkbox is selected, waveforms are displayed in logic format. This cannot be selected when you select a bit data.
Real time scaling	When this checkbox is selected, the display range is automatically adjusted in real time according to changes to the current value (word data only).
Display setting	Set the display position of waveforms in the time chart display area.
Visible area	Click this to set the waveform display area to the range of 0 to 300 Div. **About the colors displayed in the explanatory note:** White: The area of the selected device / variable waveform that is not displayed Light blue: The part of the selected device / variable waveform that is not displayed on the screen Blue: The part of the selected device / variable waveform that is displayed on the screen Gray: Among the parts displayed on the screen, the part of the selected waveform that is not displayed on the screen
Screen display area	Click this to set the waveform display area to the range set with "Y(Up/Down)Div" on the "Common" tab. **About the colors displayed in the explanatory note:** Display range White: The range in which the waveform is not drawn Gray: The range in which the waveform is drawn Display position White: The range of the selected device / variable waveform that is not displayed Light blue: The range of the selected device / variable waveform that is displayed Red: Partition line
Display range	Set the upper and lower limits of the range of the sampled data to display.
Split number	When you set the number of partitions, red partition lines are drawn in the explanatory note. Click the position that you want to display to set the waveform display position automatically.
Display position	Enter the upper and lower limits to set the display range. You can enter values in the range of 0 to 300 Div, but the upper limit must be greater than the lower limit.
Display range initialization	Click this to return the display position upper and lower limits to their default values.
Overlap on the screen	Click this to overlap the display of all the waveforms.
Parallel layout in area	Click this to tile the display of the waveforms.
Apply to all devices with same data length	Click this to apply the settings in the "Display range" tab to the waveforms of all the device / variable that have the same data size.
OK	Click this to apply the settings and close the "Display setting" dialog box.
Cancel	Click this to discard the settings and close the "Display setting" dialog box.
Update	Click this to apply the settings. The "Display setting" dialog box does not close.

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● **"Scale" tab**

Item	Explanation
Scale	Set whether the scale on the left side of the waveform is displayed or hidden.
Display	The scale will always be displayed.
Selecting waveforms only	The scale will be displayed only for the waveform of the selected device / variable.
Hide	The scale will not be displayed.
Y-axis scale interval	Set the interval between the numbers displayed next to the scale.
Apply to all waveforms	Click this to apply the "Scale" settings to all the waveforms.
Scale within chart	Configure the settings for the scale inside the time chart.
Display	The scale will always be displayed.
Selecting waveforms only	The scale will be displayed only for the waveform of the selected device / variable.
Hide	The scale will not be displayed.
Apply to all waveforms	Click this to apply the "Scale within chart" settings to all the waveforms.
Scale shared within chart	Set the display method and the display interval to use when scales overlap. These settings are shared between all the scales within the time chart display area.
Overlap display of scales	For all the waveforms, scales are displayed at the same relative position. When waveforms overlap, the waveform of the selected device / variable is displayed on top (the display interval is set according to the display interval in the X-axis direction).
Parallel display scale	One scale is displayed per grid section.
X-axis display interval	Set the display interval of the scales in the chart.
OK	Click this to apply the settings and close the "Display setting" dialog box.
Cancel	Click this to discard the settings and close the "Display setting" dialog box.
Update	Click this to apply the settings. The "Display setting" dialog box does not close.

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● **"Common" tab**

Item	Explanation
Size of lines	Set the line thickness of the waveforms to display.
All thin lines	Thin lines will be used to display all the waveforms.
Select only thick lines	A thick line will be used to display only the waveform of the selected device / variable.
All thick lines	Thick lines will be used to display all the waveforms.
Display shadows	Displays shadows at the lower limit of the display range and between waveforms.
X (Left/Right) Div	Set the number of grid sections in the time-axis direction (horizontal) and the number of samples in units of grid sections.
Number of grids	Set the number of grid sections to display in the time-axis direction (horizontal) of the waveform display part. Setting range: 10 to 100
pts/Div	Select the number of samples per Div (1 grid section). Alternatively, you can click the "View" menu ▶ "Time axis zoom in" or "Time axis zoom out."
Y (Up/Down) Div	Set the number of grid sections in the vertical-axis direction.
Number of girds	Set the number of grid sections to display in the vertical-axis direction of the waveform display part. Setting range: 10 to 100
Trigger Line	Configure the display setting of the trigger line of word data. You can only configure this setting when you set a word data to trigger on.
Display	The trigger line will be displayed.
Hide	The trigger line will not be displayed.
Trigger view position	Specify the display position of the trigger line when a trigger occurs.
Color	Set the display colors other than the colors of the waveforms.
Background	Set the background color outside of the waveform display part.
Chart	Set the background color in the waveform display part.
Grid	Set the color of the grid in the waveform display part.
Character	Set the color of the characters in the time chart display area.
Transparency	When KV STUDIO is active, set the transparency of the real-time chart monitor window.*
White background	Click this to set the background of the waveform display part to white and to set the colors of all waveforms automatically.
Black background	Click this to set the background of the waveform display part to black and to set the colors of all waveforms automatically.
OK	Click this to apply the settings and close the "Display setting" dialog box.
Cancel	Click this to discard the settings and close the "Display setting" dialog box.
Update	Click this to apply the settings. The "Display setting" dialog box does not close.

* The real-time chart monitor can only be made transparent when it is started from KV STUDIO.

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● **"Display XY" tab**
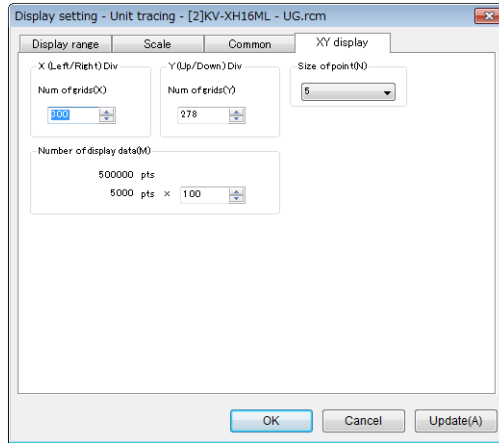
Item	Description
No. of X (←→) Div grids	Specify the number of grids for the horizontal axis
No. of Y (↑↓) Div grids	Specify the number of grids for the vertical axis.
Size of point	Set the size at which to display dots.
Number of display data	The number of data that will be displayed on the XY display figure.
OK	Update the settings and close the "Display settings" dialog box.
Cancel	Cancel changes made to the settings and close the "Display settings" dialog box.
Apply	Update the settings without closing the "Display settings" dialog box.

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■ **Overlap waveform display**

Click the "View (V)" menu ▶ "Cascade waveforms (O)" to display all device / variable waveforms overlapping each other.

● **Display in 1 range**

All device / variable are cascaded in a common range.

● **Display by the range of each device**

This can be selected only when the comparison waveform is registered. When the same device / variable as the device / variable of comparison source is registered, the device / variable are cascaded in a common range.

■ **Tile waveform display**

Click the "View (V)" menu ▶ "Tile waveforms (L)" to vertically tile the display of the waveforms of all device / variable.

● **Tile by device**

All device / variable are displayed side.

● **Tile by file**

This can be selected only when the comparison waveform is registered. The file from the comparison source and the registered file are displayed side by side vertically by file.

■ **Time scale zoom in**

Click the "View (V)" menu ▶ "Time scale zoom in (U)" to zoom in on the waveform display part in the time-axis direction (horizontally).

(Alternative procedure) • [Alt] + [→]
• 🔍

■ **Time scale zoom out**

Click the "View (V)" menu ▶ "Time scale zoom out (D)" to zoom out from the waveform display part in the time-axis direction (horizontally).

(Alternative procedure) • [Alt] + [←]
• 🔍

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■ Number of grid sections to zoom in or out

Set the number of vertical and horizontal grid sections of the waveform display part.

● Zooming in on the vertical grid

Click the "View (V)" menu ▶ "Number of grids zoom in/out (V)" ▶ "Vertical zoom in (T)" to zoom in on the vertical grid of the waveform display part (reduce the number of grid sections displayed).

(**Alternative procedure**)　●　[Ctrl] + [↑]

● Zooming out from the vertical grid

Click the "View (V)" menu ▶ "Number of grids zoom in/out (V)" ▶ "Vertical zoom out (B)" to zoom out from the vertical grid of the waveform display part (increase the number of grid sections displayed).

(**Alternative procedure**)　●　[Ctrl] + [↓]

● Zooming in on the horizontal grid

Click the "View (V)" menu ▶ "Number of grids zoom in/out (V)" ▶ "Horizontal zoom in (R)" to zoom in on the horizontal grid of the waveform display part (reduce the number of grid sections displayed).

(**Alternative procedure**)　●　[Ctrl] + [→]

● Zooming out from the horizontal grid

Click the "View (V)" menu ▶ "Number of grids zoom in/out (V)" ▶ "Horizontal zoom out (L)" to zoom out from the horizontal grid of the waveform display part (increase the number of grid sections displayed).

(**Alternative procedure**)　●　[Ctrl] + [←]

■ Zooming in on and zooming out from the display range

Set the display range of the selected waveform.

● Zooming in on the display range

Click the "View (V)" menu ▶ "Display range zoom in/out (V)" ▶ "Display range zoom in (T)" to zoom in on the waveform display range (reduce the display width).

(**Alternative procedure**)　●　[Alt] + [↑]

● Zooming out from the display range

Click the "View (V)" menu ▶ "Display range zoom in/out (V)" ▶ "Display range zoom out (B)" to zoom out from the waveform display range (increase the display width).

(**Alternative procedure**)　●　[Alt] + [↓]

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● **Moving the display range up**

Click the "View (V)" menu ▶ "Display range zoom in/out (V)" ▶ "Display range up (U)" to move the position of the display range up without changing the waveform display range width.

(**Alternative procedure**) • [Shift] + [↑]

● **Moving the display range down**

Click the "View (V)" menu ▶ "Display range zoom in/out (V)" ▶ "Display range down (D)" to move the position of the display range down without changing the waveform display range width.

(**Alternative procedure**) • [Shift] + [↓]

■ **Automatically adjusting the display range**

Click the "View (V)" menu ▶ "Auto adjust display range (Q)" to optimize the display range of the selected device / variable to match the waveform.

✎ **Point** **You can only optimize word data.**

■ **Displaying the date and time on the horizontal axis**

Click the "View (V)" menu ▶ "Display date and time on scale (Y)" to display the date on the scale of the horizontal axis.

✎ **Point** **You can only display the date for data that you read with "Read tracking data in PLC."**

📖 **"Reading traced data on a PLC" (page 9-97)**

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■ **Displaying cursors**

Display the cursors in the waveform display part.

Set the cursors in the waveform display part to display in the sampling information display part information such as the values and the dates and times at the cursor points and the distance between cursors A and B.

● **Hiding cursors**

Click the "View (V)" menu ▶ "Cursor (R)" ▶ "Hide cursor (N)" to hide the cursors.

Alternative procedure   ● ⯒

● **Displaying cursors**

Click the "View (V)" menu ▶ "Cursor (R)" ▶ "Show cursor (V)" to display cursors A and B.

Alternative procedure   ● ⯒⯒

● **Selecting cursor A**

Click the "View (V)" menu ▶ "Cursor (R)" ▶ "Select Cursor A (A)" to select cursor A.

Alternative procedure   ● ⯒A

● **Selecting cursor B**

Click the "View (V)" menu ▶ "Cursor (R)" ▶ "Select Cursor B (B)" to select cursor B.

Alternative procedure   ● ⯒B

● **Selecting cursors A and B**

Click the "View (V)" menu ▶ "Cursor (R)" ▶ "Select Cursor AB (C)" to select cursors A and B.

Alternative procedure   ● ⯒A B

■ **Waveform comparison manual adjustment**

The position of the registered comparison object waveform can be adjusted.

Alternative procedure   ● ⥂

✎ **Point**

Waveform comparison manual adjustment is a function that can be used only when the PLC model is KV-8000.

■ Display format

You can display the X and Y axis (excluding time axes) of the graph being displayed in 2D, or display a scatter diagram for speed etc.

● Time axis display

Select "View (V)" ▶ "Display format (P)" ▶ "Time axis display (T)" from the menu to display the value of each parameter on the vertical axis and time on the horizontal axis.

(**Alternative procedure**)   • Change display bar

● XY display (line)

Select "View (V)" ▶ "Display format (P)" ▶ "XY display (line) (L)" from the menu to monitor the path over time with the horizontal and vertical axis showing device values.

(**Alternative procedure**)   • Change display bar

● XY display (point)

Select "View (V)" ▶ "Display format (P)" ▶ "XY display (point) (L)" from the menu to monitor using a scatter diagram with the horizontal and vertical axis showing device values.

(**Alternative procedure**)   • Change display bar

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"Comm setting (C)" Menu

■ Communication settings

Configure the settings for communication between the real-time chart monitor and the PLC.

Click the "Comm setting (C)" menu ▶ "Comm setting (T)" to display the communication setting dialog box.

For details on the communication setting dialog box, see 📖 "Communication Settings" (page 9-5).

■ Connect to simulator

On menu, select "Communication (C)" ▶ "Connect to simulator (W) "

It communicates with KV Studio in simulator mode or simulator edit mode, and start tracing.

> | Reference | This option is only available when KV-8000/7500/7300 is selected as an enabled device.
> When real time chart monitor is launched while KV STUDIO is in either simulator mode or simulator edit mode, it will be automatically selected.

> | ✎ Point | **It can be selected only when the operation mode is "CPU".**
> **It cannot be selected in "Unit", "CPU + Unit" and "Replay Mode".**

■ Starting tracing

Start tracing the registered devices.

Click the "Comm setting (C)" menu ▶ "Start tracing (S)" to start communication with the PLC and to start tracing the registered devices.

| Alternative procedure | • F5 |
| | • ▶⌐ |

■ Stopping tracing

Click the "Comm setting (C)" menu ▶ "Stop tracing (E)" to stop tracing.

| Alternative procedure | • Shift + F5 |
| | • ■⌐ |

■ Pausing tracing

Click the "Comm setting (C)" menu ▶ "Pause tracing (I)" to pause tracing. To restart tracing, click "Pause tracing (I)" again.

| Alternative procedure | • F6 |
| | • ▮⌐ |

■ Reading traced data on a PLC

Use the real-time chart monitor to read tracing data saved with the trace function of the KV-8000/7500/
7300/5500/5000/3000 or KV Nano Series
Click the "Comm setting (C)" menu ▶ "Read traced data in PLC (P)" to read tracing data from the
PLC.

For details on the tracing function, see User's Manual of the CPU unit used.

✎ Point	• **You cannot use the real-time chart monitor to trace the tracing data that you have read.**
	• **This option is only available if it is used as a normal real time chart monitor. This option cannot be selected if it is used as unit trace or inter-unit synchronization trace.**

"Help (H)" Menu

■ Displaying the user's manual

Click the "Help (H)" menu ▶ "User Manual (H)" to display the real-time chart monitor's PDF manual.

Alternative procedure • F1

■ Displaying the version of the real-time chart monitor

Click the "Help (H)" menu ▶ "Version information (A)" to display the real-time chart monitor's "Version
information" dialog box.

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9-7 High-Speed Time Chart Monitor

The high-speed chart monitor is a function that can monitor the external I/O and the status of bit devices in scan units. This section describes the functions of the high-speed time chart monitor.

> **Point** **The high-speed time chart monitor can only be used when "KV-1000" or "KV-700" is selected for the PLC model.**

Features of the High-Speed Time Chart Monitor

- The high-speed time chart monitor differs from the time chart display of the register monitor in that data sampling can be performed in real time at almost the scan time of the PLC.
- You can set trigger conditions, which enables you to easily set traps during debugging.
- You can sample up to 16384 data items. These data items can also be saved to files.
- The high-speed time chart monitor is equipped with a bit pattern search function, which enables searching of time charts with ON/OFF conditions.

Displaying the High-Speed Time Chart Monitor

The high-speed time chart monitor starts when you display the register monitor.
For details, see 📖 "High-Speed Time Chart Monitor" (page 9-43).

Names and Functions of Parts of the High-Speed Time Chart Monitor

(14) Trigger mode selection switch
(4) Cursor A
(6) Trigger point
(13) Trigger attribute guide
(2) Display magnification setting
(3) Contacts registered for monitoring
(5) Cursor B
(12) Trigger attribute setting
(21) Monitor start switch
(1) Chart diagram
(20) Recording period
(18) Sampling condition setting
(22) Fixed scan time operation setting
(16) Trigger condition
(23) File save and read switches
(15) Data after trigger cursor
(7) Sampling information display
(17) Trigger condition search
(24) Close switch
(19) Lost area
(10) Scroll switches
(9) Current position display
(11) Cursor jump switches
(8) Cursor setting switches

(1) Chart diagram

The sampled time chart is displayed as white lines. The lower line indicates OFF and the upper line indicates ON.
The time of one gradation varies according to the value that you set with the (20) "Recording period" pulldown list.

(2) Display magnification setting

Specify the dot width of the gradations that are used to display the time chart.
You can specify one of 9 levels, from ×1 to ×9. The default value is ×2. When there will be short intervals between the devices to be monitored turning ON and OFF, set a large value. When there will be long intervals between the devices to be monitored turning ON and OFF, set a small value. Doing so makes the data easier to view.

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(3) Contacts registered for monitoring

This displays the contacts to monitor with the high-speed time chart monitor.

> **Reference** You cannot register contacts to monitor in the high-speed time chart monitor window. Use the registration monitor window to register contacts. To change the registered contacts, you have to close the high-speed time chart monitor, use the register monitor to register the contacts to monitor again, and then open the high-speed time chart monitor window again.

(4) Cursor A

This cursor is displayed in yellow.
By using this cursor with cursor B, you can check information such as the timing and response delay between registered devices.
There are two ways to move this cursor: by dragging the cursor and by turning on the switch of the (8) "Cursor setting switches," and then clicking the destination that you want to move the cursor to.

Turn the cursor setting switch on, and then click the destination that you want to move the cursor to.

Drag the cursor.

The cursor position and the distance between cursors A and B can be checked in (7) "Sampling information display."
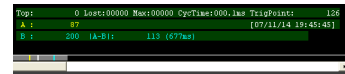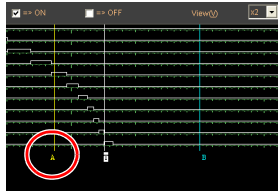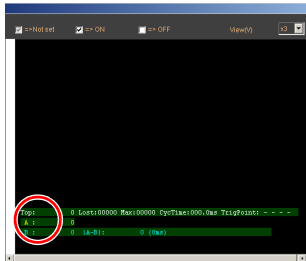
(5) Cursor B

This cursor is displayed in blue.
By using this cursor with cursor A, you can check information such as the timing and response delay between registered devices.
There are two ways to move this cursor: by dragging the cursor and by turning on the switch of the (8) "Cursor setting switches," and then clicking the destination that you want to move the cursor to.

Turn the cursor setting switch on, and then click the destination that you want to move the cursor to.

Drag the cursor.

The cursor position and the distance between cursors A and B can be checked in (7) "Sampling information display."
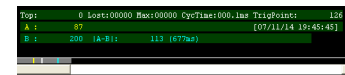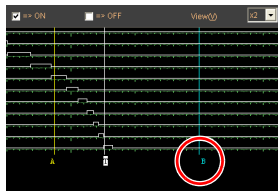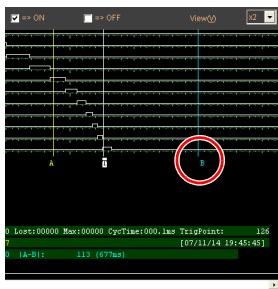
(6) Trigger point

This point is displayed in white.

When you are performing sampling when triggers occur, the point at which the trigger occurred is displayed.

The absolute position of the trigger point and the date and time that it occurred can be checked in (7) "Sampling information display" as explained below.
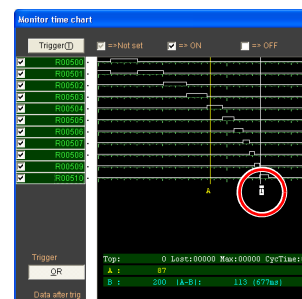
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(7) Sampling information display

This displays information related to the displayed time chart.

Top: This displays the position of the left edge of the currently displayed time chart.[*]

A: This displays the position of cursor A.[*]

B: This displays the position of cursor B.[*]

|A-B|: This displays the distance and time between cursor A and cursor B.

Lost: This displays the number of lost data points from the 32 sampled data points.

Max: This displays the maximum number of lost data points.

CycleTime: This displays the average of the scan times of the 32 sampled points.

TrigPoint: This displays the position where the trigger occurred.[*]

[XX/XX/XX XX : XX : XX]: This displays the date and time that the trigger occurred.
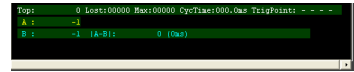
* The position is displayed taking the point where the monitor start switch was pressed as position 0.

Point	**An error of several ms may occur in the time displayed by |A-B| depending on the lost sampling data and the display performance of the PC. Also, accurate times are not displayed for roughly the first 30 scans worth of data.**

(8) Cursor setting switches

Use these switches to set how cursors A and B are displayed and moved. Each time that you press a switch, it toggles between on and off.

Switch A is pressed: Click the chart display to move cursor A to that position.
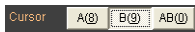
Switch B is pressed: Click the chart display to move cursor B to that position.
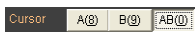
Switch AB is pressed: Click the chart display to move cursors A and B with the distance between them maintained.
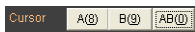
No switch is pressed: Clicking the chart display has no effect.

(9) Current position display

This displays the position of the currently displayed data in the overall sampled time chart. You can change the display position by using the scroll bar displayed below it.
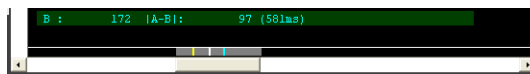
Band (gray): This is the currently displayed area.

Line (yellow): This is the position of cursor A.

Line (blue): This is the position of cursor B.

Line (white): This is the trigger point.

(10) Scroll switches

These switches are used to scroll the time chart screen. When the (8) "Cursor setting switches" are turned on, the selected cursors also move.

《《(3) : Click this to scroll the time chart screen one half screen to the left.

《(4) : Click this to scroll the time chart screen one dot to the left.

(5)》 : Click this to scroll the time chart screen one dot to the right.

(6)》》 : Click this to scroll the time chart screen one half screen to the right.

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(11) Cursor jump switches

Click these switches to jump to the cursor A, cursor B, or cursor trigger position.

| Jump | TRG(1) | A(2) | B(3) |

> **Reference** The display will not jump to the position of a cursor that does not exist.

(12) Trigger attribute setting

Set the ON/OFF attributes for triggering on the contacts that are registered for monitoring.

☑ : No setting (not used as a trigger condition)

☑ : ON setting (a trigger occurs when the device turns ON)

☐ : OFF setting (a trigger occurs when the device turns OFF)

(13) Trigger attribute guide

This is a guide for the trigger attribute switches set in (12) "Trigger attribute setting."

☑ =>Not set : No setting (not used as a trigger condition)

☑ => ON : ON setting (a trigger occurs when the device turns ON)

☐ => OFF : OFF setting (a trigger occurs when the device turns OFF)

(14) Trigger mode selection switch

Use this switch to select whether to apply triggers. When triggers are being applied and a trigger condition is met, the amount of data that you specified with the (15) "Data after trigger cursor" is acquired, and then tracing stops automatically.

This button being depressed indicates that triggers are being applied.

Trigger① : Triggers are being applied.   Trigger① : Triggers are not being applied.

(15) Data after trigger cursor

Set the amount of data to collect after a trigger occurs when you are performing sampling when triggers occur.

When the cursor is at the right edge, tracing is automatically stopped after roughly 16000 pieces of data are collected after the trigger point.

When the cursor is at the left edge, tracing is automatically stopped after roughly 250 pieces of data are collected after the trigger point.

The default cursor position is the left edge.
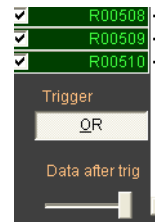
> **Reference** The total amount of data that can be collected for a single trigger is 16384 pieces of data. The more the cursor is moved to the right, the less data is collected before a trigger occurs.

(16) Trigger condition

Set the trigger condition when (14) "Trigger mode selection switch" is turned on.

AND: A trigger occurs when all conditions are met.

OR: A trigger occurs when at least one of the conditions is met.
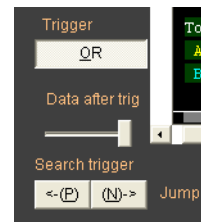
(17) Trigger condition search

Search for the positions that match the trigger conditions set with (12) "Trigger attribute setting" and (16) "Trigger condition."

<-(P) :   Click this to search to the left.

(N)-> :   Click this to search to the right.

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(18) Sampling condition setting

- `Rec failed Area(E)` "Rec failed area" button
  When this button is turned on, lost data ranges are displayed as blanks. When this button is turned off, the time chart is displayed with lost parts ignored.
  With the high-speed time chart monitor, data is sometimes lost due to the processing capability of the PC in use or the scan time of the KV-1000/700. Use this button to set whether to display lost data on the screen.

  > **Reference**
  > If lost parts are ignored, only the data that could be sampled is displayed, so the number of valid data items increases. However, the points for A and B shown in the sampling information display are different from the actual elapsed time.

- `Disable Waveform(D)` "Disable waveform" button
  When this button is turned ON, waveforms that are being sampled are not displayed. Because the waveform is not drawn on the screen, the PC performance increases, which results in less lost data compared with normal operation.

(19) Lost area

When the "Rec failed area" button is turned on, the lost data ranges are displayed as blanks.

(20) Recording period

Set the recording period of the time chart.
You can select one of seven periods: SCAN, 1ms, 2ms, 5ms, 10ms, 20ms, or 50ms.
When you select "SCAN," sampling is performed once per scan time of the KV-1000/700 that is being sampled.
When you select a value other than "SCAN," if the specified sampling time is longer than the actual scan time, sampling is performed at the set time. If the specified sampling time is shorter than the actual scan time, sampling is performed once per scan time.
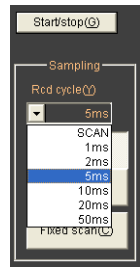
> **Example**
> **If "1ms" is set as the recording period when the scan time is 2 ms, sampling is performed once per scan time (2 ms) because the set recording period is shorter than the scan time.**

(21) Monitor start switch

Use this switch to start and stop the monitor. Each time that you press this switch, the monitor starts or stops.

(22) Fixed scan time operation setting

Use this setting to operate the KV-1000/700 at a fixed scan time.
Normally, the scan time increases and decreases according to the execution state of instructions and the ON/OFF status of I/O. When you are displaying a time chart with the recording period set to "SCAN," the time per gradation loses uniformity. So, when you want to perform measurement with uniform time, enable the fixed scan time operation setting. Doing so ensures that the ladder program is always executed at a uniform time even for scans in which the ladder execution time is fast because waits will be applied in these situations. You can perform measurements at equidistant intervals even when the recording period is set to "SCAN" by enabling the fixed scan time operation setting.
Set the fixed scan time to a value larger than the actual scan time. If the actual scan time is slower than the value set for the fixed scan time, the ladder program will be executed at the actual scan time. Also, if data is lost because the processing speed of the PC being used cannot keep up with the scan time, you can reduce data loss by applying waits to the scan time by enabling the fixed scan time operation setting.
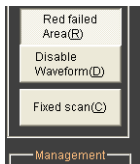
> **Point**
> **This setting is cleared when you turn the KV-1000/700 ON or OFF or when you switch between RUN mode and PROG mode.**
> **Also, this setting is disabled if a program contains a ladder that is set to a fixed scan time.**

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Follow the procedure below to enable the fixed scan time operation setting.

1 **Click "Fixed scan."**

The "Set fixed scan" dialog box is displayed.
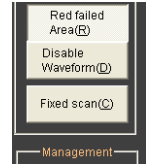
2 **Select the "Use fixed scan time func" checkbox, and then enter the scan time.**

Select this checkbox.

Enter the scan time in units of ms.
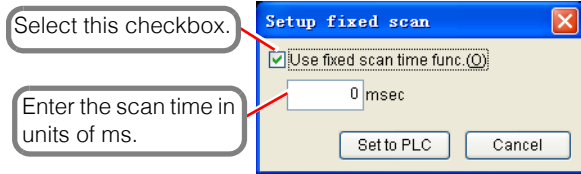
3 **Click "Set to PLC."**

The fixed scan time function is enabled.

| Reference | To disable the fixed scan time function, clear the "Use fixed scan time func" checkbox, and then click "Set to PLC." |

(23) File save and read switches

Use these switches to save and read sampled time charts.
For details on how to operate these functions, see 📖 "Saving time charts" and "Reading time charts".

| ✎ Point | **Time charts cannot be saved or read while they are being recorded. Be sure to stop the high-speed time chart before you save or read a time chart.** |

(24) Close switch

Use this switch to close the high-speed time chart monitor window.
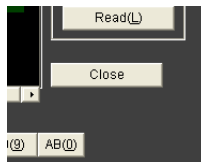
■ **Saving time charts**

Follow the procedure below to save time charts.

1 Click "Save."

The "Save As" dialog box is displayed.
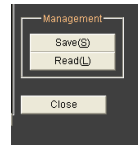
2 Specify the folder (directory) and file name to the save the time chart to.

Specify the folder (directory) to save to.

Specify the file name.

Do not change the file type from "KVS time chart file (*.tcf)."

Item	Explanation
Save in	Specify the folder (directory) to save the time chart in. Normally, the project folder containing the ladder program being monitored opens.
File name	Enter the name of the time chart to save.
Save as type	Specify "KVS time chart file (*.tcf)."

> **Reference** Even if you do not append ".tcf" to the file name, this extension will be automatically appended to the file name when the file is saved.

■ **Reading time charts**

Follow the procedure below to read time charts.

1 Click "Read."

The "Open" dialog box is displayed.

2 Specify the file to read.

Specify the folder in which the time chart to read is saved.

Specify the file name.

Do not change the file type from "KVS time chart file (*.tcf)."
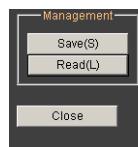
Item	Explanation
Save in	Specify the folder (directory) in which the time chart to read is saved. Normally, the project folder containing the ladder program being monitored opens.
File name	Enter the name of the time chart to read.
Files of type	Specify "KVS time chart file (*.tcf)."

> | Reference | • You can specify the time chart by entering the file name or by using the mouse to select the time chart to read from the list of files.
> | | • Time charts can be read even when the monitor is offline.
> | | • To read a file, even during monitoring, you have to open the register monitor and then open the time chart monitor.

■ Saving time charts as bitmaps

Follow the procedure below to save the displayed time chart in bitmap format.

> | Point | **The displayed range of the time chart is saved in bitmap format. The parts of the time chart that are not displayed are not saved.**

1 Click "Save."

The "Save As" dialog box is displayed.
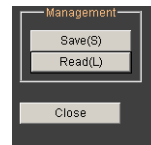
2 Specify the folder (directory) and file name to the save the time chart to.

Specify the folder (directory) to save to.

Specify the file name.
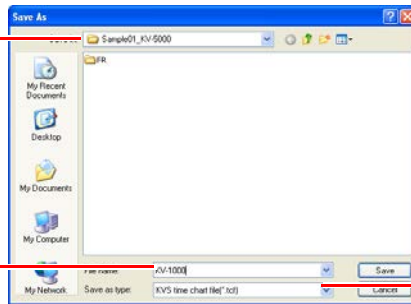
Select "bitmap file (*.bmp)" as the file type.

Item	Explanation
Save in	Specify the folder (directory) to save the bitmap file in. Normally, the project folder containing the ladder program being monitored opens.
File name	Enter the name of the bitmap file to save.
Save as type	Specify "bitmap file (*.bmp)."

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Unlike the register monitor and batch monitor, the unit monitor displays the values of relays and DM entries in an optimum form according to the unit to be monitored. This section describes how to view and operate the unit monitor.

Features of the Unit Monitor

The unit monitor has the following features.

- DM entries and relays assigned to each unit can be displayed in the state that they were originally registered.
- It is easy to perform monitoring because display formats and layout templates are provided for each unit.
- You can monitor a unit simply by selecting it, without having to worry about the assignment status of relays and DM entries.

Displaying the Unit Monitor

KV-8000   KV-7000   KV-5000/3000   KV Nano
KV-1000   KV-700   KV-P16   KV-10/16/24/40

"Monitor/Simulator(N)" ▶ "Unit Monitor(U)"

- Click the "Monitor/Simulator (N)" menu ▶ "Unit Monitor (U)," select the unit that you want to monitor, and then click "Display."
- In the "Unit settings" of the workspace, right-click the unit that you want to monitor, and then select "Unit Monitor" from the menu that appears.
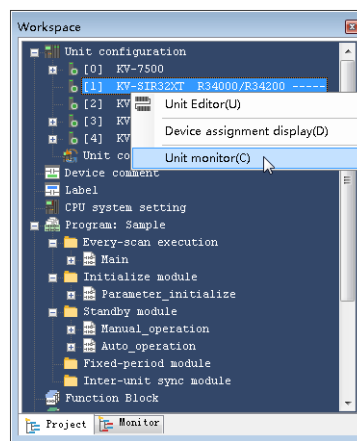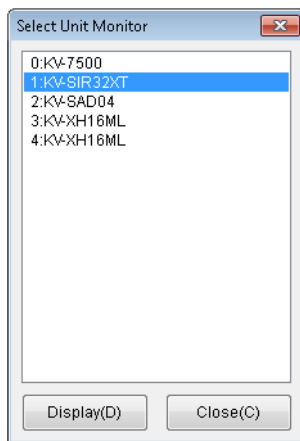
| Point | The unit monitor can only be selected from the menu in Monitor/Online Edit/ Replay mode. |

About the Unit Monitor Window

KV-8000   KV-7000   KV-5000/3000   KV Nano
KV-1000   KV-700   KV-P16   KV-10/16/24/40

This section describes the unit monitor screen for the KV-SIR32XT. For details on the functions of other units and on how to set these functions, see the user's manuals for the other units.

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16-, 32-, and 64-point unit monitor

(4) Comment display area
(5) Unit information
(10) Channel selector tab
(1) Input/output relay
(2) Leading relay number
(3) ON/OFF state display
(9) Input time constant
(6) Relay number
(7) Word display value
(8) "Display format selector" button
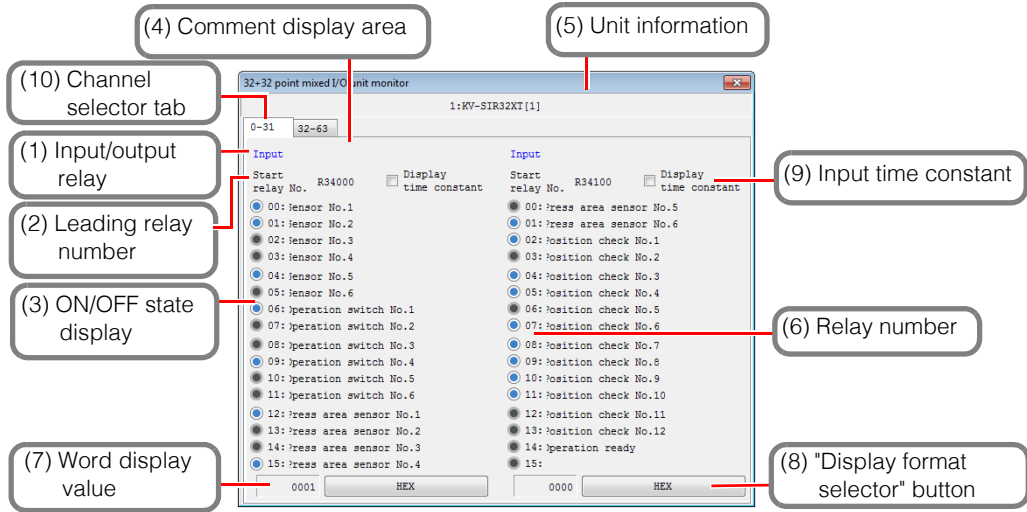
Name	Function
(1) Input/output relay	This shows whether each relay is an input or output relay.
(2) Leading relay number	This displays the leading number of the relays assigned to the selected unit. The settings made in the Unit Editor are applied to this number. The leading relay number is displayed for each channel (every 16 points).
(3) ON/OFF state display	This displays the ON/OFF state of the relay. OFF: Gray. ON: Blue for an input unit and green for an output unit.
(4) Comment display area	This displays the device comment of the relay. The displayed comment is the first registered comment set.
(5) Unit information	This displays the information (unit connection number and PLC name) of the selected unit.
(6) Relay number	This displays which relay number (nth relay number) the relay is starting from the leading relay number at "(1) Leading relay number."
(7) Word display value	This area is used to display the value of the relays of each channel as expressed in words.
(8) "Display format selector" button	Click this to select one of three types of display formats for the word display value: "DEC (unsigned)," "DEC (signed)," or "Hex."
(9) Input time constant	When this checkbox is selected, the input time constant of each input relay set in the Unit Editor is displayed.
(10) Channel selector tab	Use these tabs to switch between the channels to monitor. The "0-31" tab shows the lower two channels of a 64-point unit, and the "32-63" tab shows the upper two channels.

Reference For details on the unit monitor for special units, see the manual of each special unit.

Point
- **You cannot change the "(9) Input time constant" setting in the unit monitor.**
- **When the "(9) Input time constant" setting has been changed while monitoring is being performed from the access window, the new setting will not be applied to the unit monitor display. To apply the new setting to the unit monitor display, close and open the unit monitor window again.**
- **When using the online edit function to change a program that directly outputs built-in output relay (example: R500) within an interrupt program, write "DR (example: DR500)."**
  Writing "R" may lead to improper operation.

The "device value batch modify/read" window is used to rewrite a batch of device values on the PLC or to save a batch of device values to a file. This section describes how to operate the "device value batch modify/read" window.

About the "Device value batch modify/read" Window

For details on how to display the "device value batch modify/read" window, see 📖 "Changing or Reading Device Values in Batches" (page 9-44).
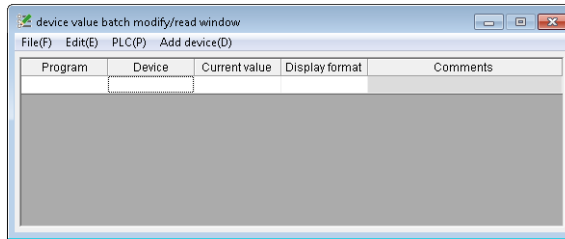
Creating New CSV/TXT Files

KV-8000　KV-7000　KV-5000/3000　KV Nano　KV-1000　KV-700　KV-P16　KV-10/16/24/40

"File(F)" ▶ "New CSV/TXT File(N)"

Create a new CSV file or TXT file to be used in the "device value batch modify/read" window.

In the "device value batch modify/read" window, click the "File (F)" menu ▶ "New CSV/TXT file (N)" to create a new CSV file.
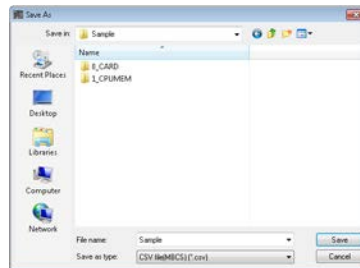
> ✏ **Point**　**Save any changes to the file that you are editing before you create a new file.**

■ "Device value batch modify/read" window limitations

This window has the following limitations.
- You cannot use index devices and indirect reference devices.
- Only the current value of timers (T), counters (C), and high-speed counters (CTH) can be used (you cannot use contacts and set values).
- Only the set values of high-speed counter comparators (CTH) can be used (you cannot use contacts).
- Only the devices that exist on the PLC that you are editing can be used.
- Do not access DM, EM, FM, W, ZF, C, T, CTH, CTC and CM devices with the binary 1BIT display format.
  In addition, when you set the display format to 32-bit, specify even numbers for the device numbers.
- When you are saving data to a memory card, you cannot use the T, C, CTC, and CTH devices.

Opening CSV/TXT Files

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Open CSV/TXT File(O)"**

In the "device value batch modify/read" window, click the "File (F)" menu ▶ "Open CSV/TXT file (O)"
to display the "Open" dialog box.
Select a CSV file or TXT file, and then click "Open."
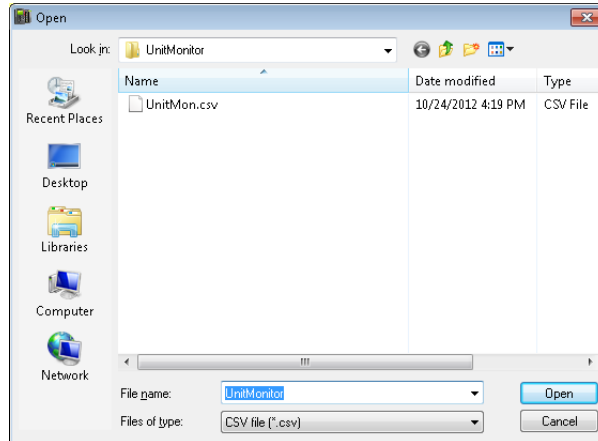
Saving CSV/TXT Files

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Save CSV/TXT file(S)"**

In the "device value batch modify/read" window, click the "File (F)" menu ▶ "Save to CSV/TXT file (S)"
to save (overwrite) the file you are editing.

✎ Point | **When you are editing a new file, you cannot select "Save to CSV/TXT file."**

Saving CSV/TXT Files with New File Names

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Save CSV/TXT file as(A)"**

In the "device value batch modify/read" window, click the "File (F)" menu ▶ "Save CSV/TXT file as (A)"
to display the "Save as" dialog box.
Save the file that you are editing with a new file name.

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Reading Data from a Memory Card

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Read memory card(R)"**

In the "device value batch modify/read" window, click the "File (F)" menu ▶ "Read memory card (R)" to display the "Memory card" dialog box.
Specify the drive and folder that the CSV file or TXT file was saved to with the "device value batch modify/read" window.
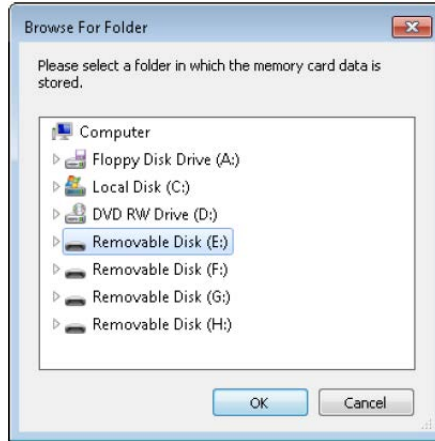
| Reference | You cannot read CSV files or TXT files that were not saved with the "device value batch modify/read" window. |

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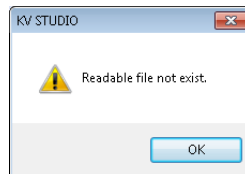
Writing Data to a Memory Card

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Write memory card(Z)"**

In the "device value batch modify/read" window, click the "File (F)" menu ▶ "Write memory card (Z)" to display the "Memory card" dialog box.
Specify the drive and folder on the memory card in which you want to save the data.

■ **KV-5500/5000/3000/1000/700**   ■ **KV-8000/7500/7300, KV-NC32T**
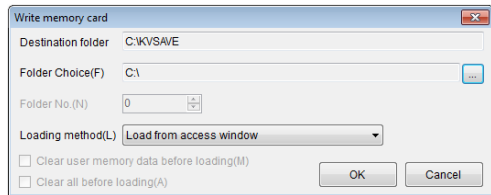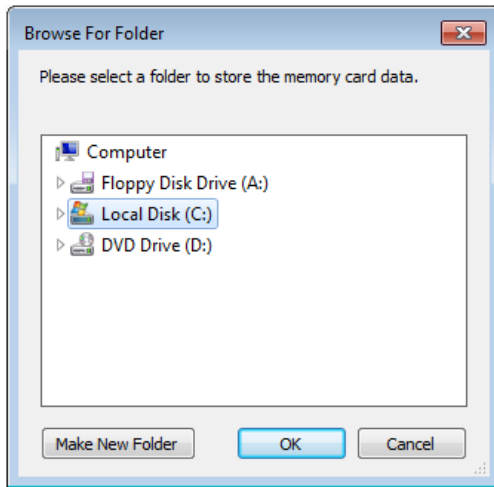
For details on saving data to memory cards,
see 📖 "Saving Data to and Reading Data from Memory Cards" (Page 4-10).

When an error is present in the data being edited in the "device value batch modify/read" window, the following dialog box is displayed. Click "No" to return to the edit screen of the "device value batch modify/read" window.

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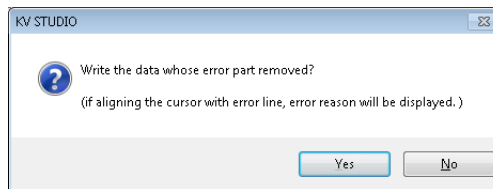
Closing Files

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Close file(C)"**

In the "device value batch modify/read" window, click the "File (F)" menu ▶ "Close file (C)" to close the file being edited.

If you have changed the data being edited, the following dialog box is displayed. Click "No" to discard the data being edited.
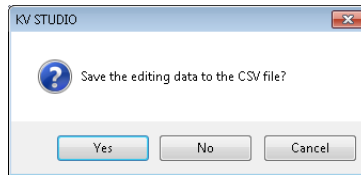
Exiting from the Window

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"File(F)" ▶ **"Exit(X)"**

In the "device value batch modify/read" window, click the "File (F)" menu ▶ "Exit (X)" to exit from the "device value batch modify/read" window.

If you have changed the data being edited, a confirmation dialog box is displayed.

Cross References

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Edit(E)" ▶ **"Cross reference(F)"**

Select a device that you are editing in the "device value batch modify/read" window, and then click the "Edit (E)" menu ▶ "Cross reference (F)" to create a cross reference in the output window of KV STUDIO.

For details on cross references, see ▭ "Cross References" (page 5-16).

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Undo

KV-8000	KV-7000	KV-5000/3000	KV Nano
KV-1000	KV-700	KV-P16	KV-10/16/24/40

"Edit(E)" ▶ **"Undo(U)"**

Cancel the previous operation in the "device value batch modify/read" window and restore the previous state.

> ✎ **Point**
>
> **The "Undo" and "Redo" options in the "device value batch modify/read" window are disabled by default.**
> **To enable "Undo" and "Redo," in KV STUDIO, click the "Tool (T)" menu ▶ "Option (O)," and then select the "Enable device value batch modify/read window "Undo/Redo"" checkbox ☑ in the system setting tab.**
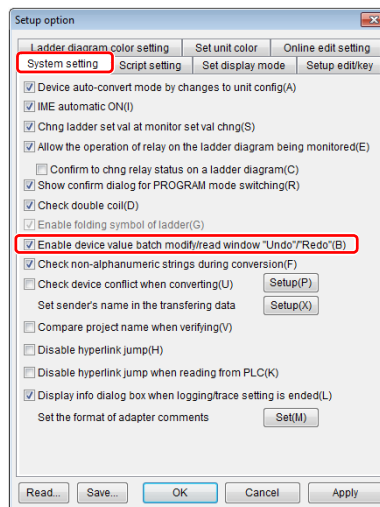
Redo

KV-8000	KV-7000	KV-5000/3000	KV Nano
KV-1000	KV-700	KV-P16	KV-10/16/24/40

"Edit(E)" ▶ **"Redo(R)"**

Cancel the operation that was undone with "Undo (U)" in the "device value batch modify/read" window.

> **Reference** ✎ When an operation cannot be redone, this menu item is displayed in gray and cannot be selected.

Select All

KV-8000	KV-7000	KV-5000/3000	KV Nano
KV-1000	KV-700	KV-P16	KV-10/16/24/40

"Edit(E)" ▶ **"Select all(A)"**

Select all the cells in the "device value batch modify/read" window.
Click the "Edit (E)" menu ▶ "Select all (A)."

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Cut, Copy, or Paste the Selected Range

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Edit(E)" ▶ **"Cut selected range(T)"**

▶ **"Copy selected range(C)"**

▶ **"Paste selected range(P)"**

Cut or copy the cell selected in the "device value batch modify/read" window, and then paste the cell.

Deleting Rungs

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Edit(E)" ▶ **"Delete Rung(D)"**

Delete the rung containing the cell selected in the "device value batch modify/read" window.
Click the "Edit (E)" menu ▶ "Delete Rung (D)."

Deleting the Selected Range

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Edit(E)" ▶ **"Delete selected range(Y)"**

Delete the cells in the range selected in the "device value batch modify/read" window.
Click the "Edit (E)" menu ▶ "Delete selected range (Y)".

Sorting Data in Device Order

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Edit(E)" ▶ **"Sort by devices(S)"**

Sort the data being edited in the "device value batch modify/read" window into device order.
Click the "Edit (E)" menu ▶ "Sort by devices (S)."

Before sorting   After sorting

Reading All Items from the PLC

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"PLC(P)" ▶ **"Read all items from PLC(R)"**

Read from the PLC the current values of all the data being edited in the "device value batch modify/read" window.
Click the "PLC (P)" menu ▶ "Read all items from PLC (R)."

> ✎ **Point** **Configure KV STUDIO and the PLC so that they can communicate with each other before performing this operation.**

Reading a Selected Range from the PLC

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"PLC(P)" ▶ **"Read selected range from PLC(P)"**

Read from the PLC the current values of the devices in the rungs containing the cells selected in the "device value batch modify/read" window.
Click the "PLC (P)" menu ▶ "Read selected range from PLC (P)."

> ✎ **Point** **Configure KV STUDIO and the PLC so that they can communicate with each other before performing this operation.**

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Writing All Items to the PLC

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"PLC(P)" ▶ **"Write PLC into all items(W)"**

Write the current values of all the data being edited in the "device value batch modify/read" window to the PLC.
Click the "PLC (P)" menu ▶ "Write PLC into all items (W)."

> ✎ **Point** **Configure KV STUDIO and the PLC so that they can communicate with each other before performing this operation.**

Writing a Selected Range to the PLC

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"PLC(P)" ▶ **"Write selected range to PLC(Q)"**

Write the current values of the devices in the rungs containing the cells selected in the "device value batch modify/read" window to the PLC.
Click the "PLC (P)" menu ▶ "Write the selected range into PLC (Q)."

> ✎ **Point** **Configure KV STUDIO and the PLC so that they can communicate with each other before performing this operation.**

Batch Insert

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Add device(D)" ▶ **"Batch insert(B)"**

Specify a range to insert the devices into the "device value batch modify/read" window in a single batch.
Click the "Add device (D)" menu ▶ "Batch insert (B)" to display the "Batch insert" dialog box.
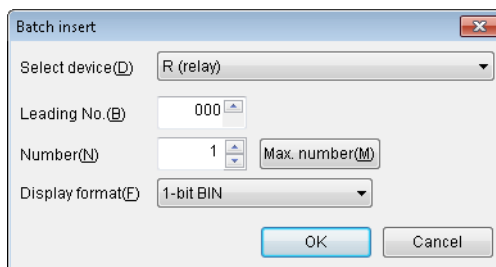
Item	Explanation
Select device	Select the type of device to insert a batch of. Click ▼ to display the device types that you can select in a pulldown menu. **Reference** — The types of devices that you can select vary depending on the PLC model of the project that you are editing.
Leading No.	Specify the leading number of the devices to insert a batch of. **Reference** — When you are specifying bit devices and the display format is "1-bit BIN," specify devices in bit units. In all other situations, specify devices in channel units.
Number	Specify the number of devices in the batch that you want to insert. **Reference** — When the display format is "Decimal 32BIT," "±Decimal 32BIT," "Hex 32BIT," or "FLOAT," the number of devices inserted equals the number of devices specified × 2 word units.
Max. number	Click this to automatically store the maximum number of devices that can be inserted for the specified device in the "Number" text box.
Display format	Specify the display format of the devices to enter a batch of. Click ▼ to display the display types that you can select in a pulldown menu.

Inserting Rungs

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Add device(D)" ▶ **"Insert rung(L)"**

Insert a blank rung into the position of the specified rung.
Click the "Add device (D)" menu ▶ "Insert rung (L)."

Incremental Insertion

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Add device (D)" ▶ **"Insert increment(L)"** Ctrl + I

Insert the device whose device number equals the number of the previous device + 1 (or + 2).

Click the "Add device (D)" menu ▶ "Insert increment (I)."

Item	Description
Program[*2]	The same program of the previous device is selected.
Device	The device number equal to the number of the previous device + 1[*1] is inserted.
Current value	The same value of the previous device is copied.
Display format	The same display format of the previous device is selected.

*1 When the display format of the previous device is "Decimal 32BIT," "±Decimal 32BIT," "Hex 32BIT," or "FLOAT," +2 is added to the device number, which is then inserted.

*2 This item is enabled only when "KV-8000/7500/7300/5500/5000/3000/1000" or "KV Nano Series" is selected for the PLC model.

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This section describes the online edit function, which can be used to change PLC ladder programs while they are being monitored.

Overview

The online edit function enables you to change the ladder program directly on the KV STUDIO monitor screen. This function is useful when you are performing the minor on-site adjustments of final debugging during program creation and when you are changing simple programs.

Online Edit Features

The features of the online edit function are shown below.
• Even during online editing, you can check the ON/OFF status of devices and changes in device values in real time in the same manner that you check this information on the monitor screen.
→ This makes debugging while checking the operating status of devices in real time possible.
• The backgrounds of the edited locations change to light blue, which enables you to identify at a glance the cells in which modifications have been made.
→ This makes it easy to perform changes again if, for example, devices are found to be operating incorrectly as a result of a change.
• All screens can be edited during online editing.
→ This makes it possible to perform editing as if you were in Editor mode without switching between circuits being edited, even when you are setting interlocks on multiple circuits.

Precautions When Using the Online Edit Function

⚠ WARNING	If you use the online edit function with the PLC in RUN mode, using the function incorrectly may lead to serious damage to equipment or serious injury to personnel. Thoroughly read the following precautions to ensure proper use of the function. • Before you use the online edit function, thoroughly check the vicinity around the equipment to ensure that no injury or damage will arise even if an accident occurs. • Do not add circuits that operate immediately after a program is transferred (such as circuits whose execution conditions are NC contacts). Doing so may cause the machinery to go out of control. • Do not delete outputs that have been turned ON. Deleting outputs that have been turned ON will leave the output in the ON state.

▶ Important	• If the monitor is forcibly stopped during online editing or during the transfer of ladder programs due to an error on the PC, ladder programs that have not been transferred to the PLC will be discarded. • The ON/OFF status and values of devices that are being monitored during online editing are displayed based on the ladder program (the program currently running on the PLC) immediately before online editing was started. Until you transfer a program, the PLC operations do not reflect the program status during online editing. To have the PLC operate a program that you have made additions and changes to through online editing, you have to transfer the program to the PLC. • If you add or delete macro instructions during online editing, you will not be able to perform writing in RUN mode. • You cannot assign local devices during online editing. Return to the editor, and then perform the assignments again. • When using the online edit function to change a program that directly outputs a built-in output relay (example: R500) within an interrupt program, write "DR." Writing "R" may lead to improper operation.

Starting the Online Edit Function

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

🖼 "Monitor/Simulator(N)" ▶ "Start Online Edit(O)" F10

1 **Click the "Monitor/Simulator (N)" menu ▶ "Start Online Edit (O)."**

The KV STUDIO title bar changes from "Editor" to "Online Edit", and the online edit function becomes active. The mode bar is changed to orange, and the "Online Edit" is displayed.

(Alternative procedure) Select "Online edit" from the mode bar's pulldown menu.

> ✎ **Point** **When the project being edited is different from the project stored on the PLC, you cannot change directly from Editor mode to Online Edit mode. Transfer the project that you are editing or switch to Monitor mode, and then switch to Online Edit mode.**

> **Reference** You can also continue monitoring each device's ON/OFF status and value in real time during online editing.

2 **Edit the ladder program.**

Edit the ladder program. Edit it in the same way as in Editor mode.
📖 "EDIT" (Page 5-1)

The backgrounds of cells that have been added or changed are displayed in light blue, which indicates that the program has been changed.
You can check the Changing List from [Edit] ▶ [Online Edit Changing Search].

Also, in the online edit setting, if you have not set the Clear Timing for Change Background Color to Auto, clear the Change Background Color manually. (KV-1000/700 / P16 / 10/16/24/40 only)
📖 "Clearing the Background Color of Changed Cells" (page 6-46)

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Transferring Ladder Programs in Online Edit Mode

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

🖳 **"Monitor/Simulator(N)"** ▶ **"Transfer Online Edit(F)"** F11

Transfer the ladder program that you edited during online editing to the PLC.
Click the "Monitor/Simulator (N)" menu ▶ "Online Editor transfer (F)" to transfer the ladder program to the PLC.

Alternative procedure — Right-click in the ladder edit window, and then select "Online edit transfer (E)" from the menu that appears.

Reference — If the edited ladder program cannot be converted successfully, an error message is displayed, and the error details are displayed in the output window. Remove the cause of the error, and then transfer the ladder program again.

✎ **Point** — **KV-8000 with CPU function version 2.0 or later displays the PLC Verification / Synchronization dialog without automatically performing online edit and transfer when the following conditions are met.**
- **Global variables, structure definitions or function block settings have been changed in the CPU unit.**
- **Some data have been changed in both KV STUDIO and CPU unit**

Check the program differences in KV STUDIO and CPU unit in the PLC Verification / Synchronization dialog, and determine the items to be transferred.
📖 **"Verify/synchronize PLC" (Page 9-34)**

⚠ **CAUTION** — **Writing in RUN mode may cause serious problems depending on the condition of the control device connected to the PLC. Exercise caution during the operation of this function.**
📖 **"Writing data during RUN mode" in the KV-8000 Series User's Manual,**
📖 **"Writing data during RUN mode" in the KV-7000 Series User's Manual,**
📖 **"Writing data during RUN mode" in the KV-5500/5000/3000 Series User's Manual or**
📖 **"Writing data during RUN mode" in the KV Nano Series User's Manual**

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Online Edit Settings

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

"Monitor/Simulator(N)" ▶ "Setup Online Edit(J)"

The backgrounds of cells that have been added or changed during online editing are displayed in light blue, which indicates that the program has been changed. Set the timing with which this program change indication is automatically cleared.

> ✎ **Point**   **You can only select the online edit settings when KV STUDIO in Monitor mode or Online Edit mode.**

1 **Click the "Monitor/Simulator (N)" menu ▶ "Setup online edit (J)."**

The "Setup option" dialog box is displayed.

2 **Select the timing with which the background color that indicates program changes is automatically cleared.**

The background color is cleared with the timing indicated by the selected checkboxes.

Item	Explanation
Change to monitor mode after online edit transfer	When this checkbox is selected, the mode will be automatically changed to Monitor mode after a ladder program edited with the online editor is transferred.
Auto (Monitor → Online Edit)*	When this checkbox is selected, the background colors indicating changes will be cleared when the mode is switched from Monitor mode to Online Edit mode.
Auto (Monitor → Editor)*	When this checkbox is selected, the background colors indicating changes will be cleared when the mode is switched from Monitor mode to Editor mode.
Auto (Online Edit → Monitor)*	When this checkbox is selected, the background colors indicating changes will be cleared when the mode is switched from Online Edit mode to Monitor mode.
Display confirmation dialog box during online edit transfer	When this checkbox is selected, a confirmation dialog box will be displayed when a ladder program edited with the online editor is transferred.

* This option cannot be selected when the selected PLC model is "KV-8000/7500/7300/5500/5000/3000" or "KV Nano Series."

> ✎ **Point**   **If no checkboxes are selected, the background colors indicating changes to the program will not be cleared.**
> **Therefore, you will have to clear the background colors manually. To manually clear a background color, click the "View (V)" menu ▶ "Clear background color (H)."**
> 📖 **"Clearing the Background Color of Changed Cells" (page 6-46)**

3 **When you finish configuring the settings, click "OK."**

The "Setup option" dialog box closes.

This section describes the simulator function and how to use it.

Simulator Function Overview

The simulator is used to simulate, without connecting to a PLC, the operation of ladder programs that you create with the editor. You can use the simulator to:

- **Operating conditions of the program can be monitored real time on a ladder monitor, a registration monitor, a batch processing monitor, and a real time chart monitor.**
- **Perform simulations with various execution methods such as continuous scan, continuous step, single step, and single scan.**
- **Perform efficient debugging by using the provided functions such as reversed step and reversed continuous step.**
- **Easily change the set values and current values of timers, counters, and other devices.**

* A real time chart monitor on simulator is available only when KV-8000/7500/7300 is selected as an enabled device

Simulator Limitations

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

■ Common limitations

- You cannot simulate the operation of expansion units.
- High-speed counters are not supported by the simulator function.
- The direct clock pulse function is not supported by the simulator.
- The positioning control function is not supported by the simulator function.
- The RCOM instruction is not supported by the simulator function.
- When the WTIME instruction is executed, an error check is performed, but this does not mean that the PC's clock is changed.
- The following limitations are present on the operation of interrupt programs.

Item	Explanation
High-speed counter comparator matching relay (Example: INT CTC0) High-speed counter comparator matching 2 relay (Example: INT CR3013; INT CR8415 on the KV Nano Series) Fixed-period modules (KV-5000/3000 Series only)	The interrupt program does not run.
Interrupts caused by input relays (Example: INT R000) Interrupts caused by comparator upper limit/lower limit relays Fixed-period modules (KV-8000/7000 Series only) Unit interrupt (KV-8000/7000 Series only)	When interrupts are enabled, the interrupt program is executed during the END processing of the scan in which the interrupt occurred.

- Because simulations are performed in Windows, the scan time is longer than the actual scan time. Note this point when you set the time of timers.
- Because the same operations of the PLC are simulated internally in the PC that you are using, the display of the scan time will vary slightly between different types of PCs, even when you are simulating the operation of the same ladder program.
- Storage device instructions (KV-8000/7000 Series only) use 0_CARD/1_CPUMEM in the project folder as the root folder.
- The error codes occurring when the file operation error occurs may be different from the PLC unit because it is simulated on Windows.

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■ **Control relays and control memory entries supported by the simulator**

The control relays and control memory entries that operate in the simulator are shown below.

● **Supported control relays (CR)**

Device	State				
CR2002	Always turned ON				
CR2003	Always turned OFF				
CR2004	10 ms clock pulse (duty cycle: 50%)				
CR2005	100 ms clock pulse (duty cycle: 50%)				
CR2006	1 s clock pulse (duty cycle: 50%)				
CR2007	Turned OFF for just one scan when operation starts				
CR2008	Turned ON for just one scan when operation starts				
CR2009	Turned ON when the calculation result is negative or when an overflow occurs				
CR2010	Turned ON when the calculation result is zero				
CR2011	Turned ON when the calculation result is positive				
CR2012	Turned ON when a calculation execution error occurs				
CR2600 CR2601	INT0 interrupt polarity[1]		**Rising Edge**	**Falling Edge**	**Both Edges**
		CR2600	OFF	ON	OFF	ON
		CR2601	OFF	OFF	ON	ON
CR2602 CR2603	INT1 interrupt polarity[1]		**Rising Edge**	**Falling Edge**	**Both Edges**
		CR2602	OFF	ON	OFF	ON
		CR2603	OFF	OFF	ON	ON
CR2604 CR2605	INT2 interrupt polarity[1]		**Rising Edge**	**Falling Edge**	**Both Edges**
		CR2604	OFF	ON	OFF	ON
		CR2605	OFF	OFF	ON	ON
CR2606 CR2607	INT3 interrupt polarity[1]		**Rising Edge**	**Falling Edge**	**Both Edges**
		CR2606	OFF	ON	OFF	ON
		CR2607	OFF	OFF	ON	ON
CR2608 CR2609	INT4 interrupt polarity[1,2]		**Rising Edge**	**Falling Edge**	**Both Edges**
		CR2608	OFF	ON	OFF	ON
		CR2609	OFF	OFF	ON	ON
CR2610 CR2611	INT5 interrupt polarity[1,2]		**Rising Edge**	**Falling Edge**	**Both Edges**
		CR2610	OFF	ON	OFF	ON
		CR2611	OFF	OFF	ON	ON
CR2612 CR2613	INT6 interrupt polarity[1,2]		**Rising Edge**	**Falling Edge**	**Both Edges**
		CR2612	OFF	ON	OFF	ON
		CR2613	OFF	OFF	ON	ON
CR2614 CR2615	INT7 interrupt polarity[1,2]		**Rising Edge**	**Falling Edge**	**Both Edges**
		CR2614	OFF	ON	OFF	ON
		CR2615	OFF	OFF	ON	ON
CR2700 CR2701	INT8 interrupt polarity[1,2]		**Rising Edge**	**Falling Edge**	**Both Edges**
		CR2700	OFF	ON	OFF	ON
		CR2701	OFF	OFF	ON	ON
CR2702 CR2703	INT9 interrupt polarity[1,2]		**Rising Edge**	**Falling Edge**	**Both Edges**
		CR2702	OFF	ON	OFF	ON
		CR2703	OFF	OFF	ON	ON
CR2814	Zero suppression setting for the DASC and FASC instructions[1]				
CR2815	"+" omission setting for the DASC and FASC instructions[1]				

* Even if you use CR devices other than those listed above, these other CR devices will not function in the simulator.
*1 This item is not available for the KV-8000/7000 Series.
*2 This item is not available for the KV Nano Series.

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● **Supported control memory entries (CM)**

Device	Function	
CM00700	Reading of a calendar timer (set date and time of a PC)	Year
CM00701		Month
CM00702		Day
CM00703		Hour
CM00704		Minute
CM00705		Second
CM00706		Day of the week

*　Even if you use CM devices other than those listed above, these other CM devices will not function in the simulator.

■ **Device status when the simulator is stopped**

Switching the simulator from continuous scan execution to being stopped is equivalent to switching the mode of the PLC from RUN mode to PROG mode.
The devices operate as shown below.

Device	Status				
	KV-8000	**KV-7500/7300**	**KV-5500/ 5000/3000**	**KV Nano Series**	**KV-1000/700/700+M/ P16/10/16/24/70**
R (relay)	Power off holding setting[1]			Reset	MEMSW instruction[2] setting
B	Power off holding setting[1]			Reset	-
MR	Reset				
LR	Holds the status				
CR	CR2002: ON CR2003 to CR2008: Holds the status Other devices: OFF				
DM	Holds the status				
EM and FM	Holds the status			-	Holds the status
ZF	Holds the status			-	-
W	Holds the status				-
TM	Holds the status				
T	When the timer number was set with a UDT instruction Contact: OFF Current value: Holds the status When the timer number was set with a method other than a UDT instruction Contact: OFF Current value: Set to the set value Unregistered: Sets the current value to 0		Contact: OFF Current value: Set to the set value Unregistered: Sets the current value to 0	When the timer number was set with a UDT instruction (#0 to #9) Contact: OFF Current value: Holds the status (#10 to #511) Contact: OFF Current value: Set to the set value When the timer number was set with a method other than a UDT instruction Contact: OFF Current value: Set to the set value Unregistered: Sets the current value to 0	Contact: OFF Current value: Set to the set value Unregistered: Sets the current value to 0
C	Holds the contact and the current value				
CTH	-		Holds the status		
CTC	-		Holds the status		
Z	Holds the status				
CM	Holds the status				

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*1 Configure the power off holding settings in the CPU system settings. 📖 "CPU System Setting Dialog Box" (page 6-49)

*2 For details on the MEMSW instruction, see 📖 the KV-8000/7000/5000/3000/1000 Series and KV Nano Series Instruction Reference Manual.

■ Device status when the simulator is reset

When you reset the simulator, all the devices are cleared.

The devices operate as shown below.

Device	Status				
	KV-8000	KV-7500/7300	KV-5500/5000/3000	KV Nano Series	KV-1000/700/700+M/P16/10/16/24/70
R (relay)	OFF				
B	OFF				
MR	OFF				
LR	Holds the status				
CR	Contact: OFF Registered: Sets the current value to the same value as the set value Unregistered: Sets the current value to 0				
DM	0				
EM and FM	0			-	0
ZF	Reset			-	
W	Holds the status			-	
TM	0				

T	Contact: OFF
	Current value: Set to the set value
	Unregistered: Sets the current value to ???
				When the timer number was set with a UDT instruction (#0 to #9)
				  Contact: OFF
				  Current value: Holds the status
				(#10 to #511)
				  Contact: OFF
				  Current value: Set to the set value
				
				When the timer number was set with a method other than a UDT instruction
				  Contact: OFF
				  Current value: Set to the set value
				
				Unregistered: Sets the current value to ???
					Contact: OFF
					Current value: Set to the set value
					Unregistered: Sets the current value to ???

C	Contact: OFF Current value: 0				
CTH	-	Holds the status			
CTC	-	Holds the status			
Z	0				
CM	Reset	Holds the status			

*1 Power off holding settings are configured in CPU system settings. 📖 "CPU System Setting Dialog Box" (page 6-49)

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Starting and Exiting the Simulator

| KV-8000 | KV-7000 | KV-5000/3000 | KV Nano |
| KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40 |

🖥 **"Monitor/Simulator(N)"** ▶ **"Simulator(L)"** [Ctrl] + [F2]

■ How to start the simulator

1 **Click the "Monitor/Simulator (N)" menu** ▶ **"Simulator (L)."**

The display switches to the simulator screen, and the ladder program that was displayed in the editor is displayed.

(**Alternative procedure**) : "Simulator" from the mode bar's pulldown menu.

| ✎ Point | **The simulator does not start when a conversion error occurs. Correct the erroneous part so that there is no conversion error, and then start the simulator again.** |

■ How to exit the simulator

Follow the procedure below to exit the simulator and return to the editor.
Because device values are cleared before you return to the editor, the next time that you start the simulator, all devices will have their default values.

1 **Click the "Monitor/Simulator (N)" menu** ▶ **"Return to Editor (X)."**

(**Alternative procedure**)
- Click 🔧 .
- Press [Ctrl] + [F1] .
- Select "Editor" from the mode bar's pulldown menu.

Starting and Stopping the Simulator

| KV-8000 | KV-7000 | KV-5000/3000 | KV Nano |
| KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40 |

For details on the simulator's continuous scan execution and on stopping the simulator,
see 📖 "RUN/Continuous Scan Execution", and "PROG/Stop" (page 11-2).

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Names and Functions of Parts of the Simulator Screen

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

When you start the simulator, the simulator screen is displayed with the ladder program that you were editing in the editor.

Also, the batch monitor window and registration monitor window are also displayed if these monitor windows were previously displayed.

Mnemonic symbol list

Batch monitor window

Registration monitor window

"Correct device value" window
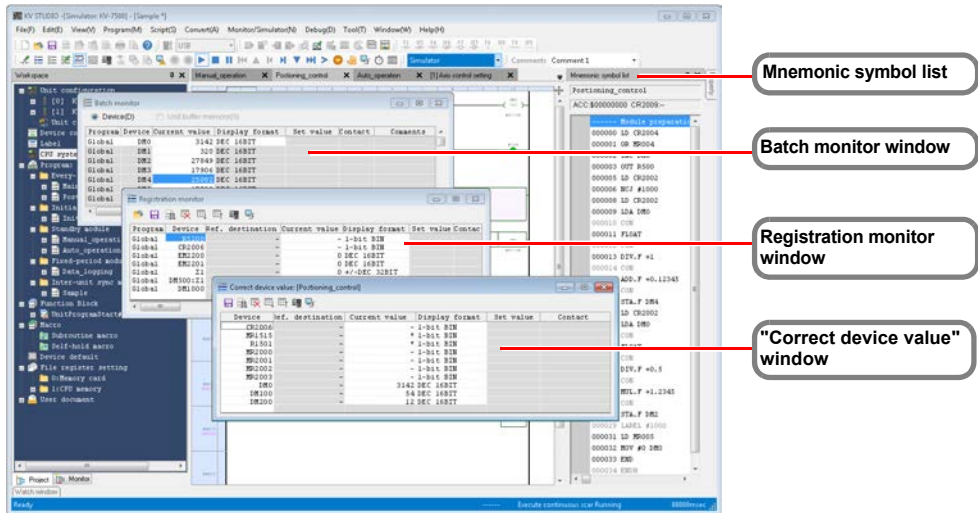
The functions of each window are described in the following sections.

📖 "Mnemonics Lists" (page 6-42)

📖 "Batch Monitor" (page 9-60)

📖 "Register Monitor" (page 9-55)

📖 ""Correct device value" window" (page 9-53)

Simulator Execution

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

This section describes the execution methods of the simulator.

Scan execution

This section describes scan execution.

■ Scan execution function overview

Scan execution refers to executing ladder programs in one scan (cycle), from initialization processing to end processing.

There are two scan execution methods, continuous scan execution and single scan execution. Of these, the operation of continuous scan execution is the same as the operation when you use "RUN" in the monitor.

You can set the scan time and watchdog timer and change the current values and set values.

Rung breaks are not applied during scan execution. Device breaks are only applied during end processing when conditions are met.

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■ Continuous scan execution

The program is executed continuously.
The status is the same as the status when the
PLC is in RUN mode. Continuous scan execution
is used for normal debugging of ladder
programs.
For the continuous scan execution procedure,
see 📖 "Continuous Step Execution" (page 11-3).
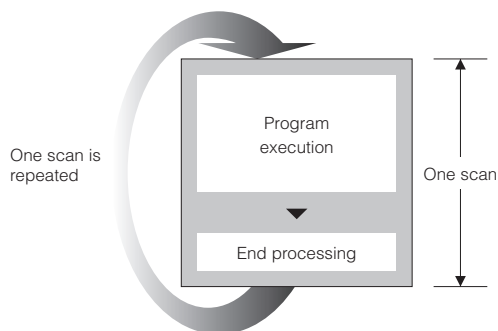
■ Single scan execution

The program is executed for only a single scan.
After you execute a single scan in continuous
scan execution mode, program operation is
paused.
You can use this execution method to check
detailed timing operations, such as checking the
operation of the ladder program the instant that a
certain relay within it is turned ON.
For the single scan execution procedure, see
📖 "Single Scan Execution" (page 11-3).
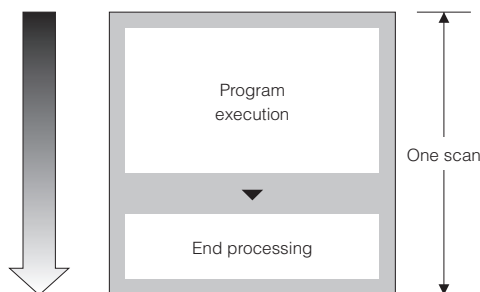
■ Setting breaks

A "break" is a function for stopping a ladder program when specified conditions are met during program
operation. Breaks are used to check the operating status in parts and to find locations where bugs are
present. For details on breaks, see 📖 "Setting Device Breaks" (page 11-7).

■ Setting the wait time

The scan time of simulator execution will vary depending on the length of the ladder program and on
the PC's performance.
If it is difficult to perform debugging because the scan time is too short, you can lengthen the scan
time by using a wait time.

■ Setting the scan time

You can set the scan time of simulator execution to an arbitrary value.
One scan of the ladder program is simulated per set scan time. This feature allows you to simulate the
execution of ladder programs with timing close to that of actual operation by performing simulations
with the scan time set to that of an actual PLC.

■ Setting the watchdog timer

Watchdog timers are used to detect calculation processing congestion that is caused by problems
such as PLC or program errors and the execution of long programs. Watchdog timers allow you to
discover infinite loops in ladder programs.

Use the simulator setting dialog box to set watchdog timers.
📖 "Simulator Settings" (page 9-39)

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Step execution

This section describes step execution.

■ Step execution function overview

Step execution refers to the simulation of a ladder program one instruction at a time. During step execution, the mnemonic list is displayed so that you can check what rung is currently being executed. You can set both device breaks and rung breaks, which enables you to view the operating status at each step of a program from a specified input to output. Therefore, you can quickly find locations where bugs are present. With programs comprising a combination of multiple calculation instructions, this is useful for finding the cause when results are in error even though correct values have been entered.

The following execution methods are available for executing the steps: "continuous step," "single block execution," "single step," "reversed continuous step," "reversed single block execution," and "reversed single step."

The functions of each window are described in the following sections.

📖 "Continuous Step Execution" (page 11-3)

📖 "Single Block Execution" (page 11-4)

📖 "Single Step Execution" (page 11-4)

📖 "Reversed Continuous Step Execution" (page 11-5)

📖 "Reversed Single Block Execution" (page 11-5)

📖 "Reversed Single Step Execution" (page 11-6)

■ About the mnemonic symbol list window

When you perform step execution, information such as the device values and ON/OFF display changes in the ladder monitor window to match the speed of operations. In addition, the current position is scrolled to match the speed of operations. What's more, the mnemonic list window opens, and the mnemonic rung that is currently being executed is highlighted.

Value of the internal register at the cursor position

ON/OFF status at the cursor position
●: ON -: OFF

Execution rung cursor (yellow)
The rung that is currently being executed is highlighted in green.

Break point (purple)
This indicates a break point.

Cursor position
The selected rung is highlighted in blue.

```
Mnemonic symbol list                [X]
AutoOpe
ACC:$BF3826A9   CR2009 --
       000002 NCJ #1000
       000004 LD> DM0 #360
    →  000005 NCJ #2000
       000007 LD CR2002
       000008 MOV #0 DM0
       000010 LABEL #2000
       000012 LD CR2002
       000013 LDA DM0
       000014 CON
       000015 FLOAT
       000016 CON
       000017 RAD
       000018 CON
       000019 SIN
       000020 CON
       000021 STA.F DM2
       000023 LD CR2002
```

■ Pausing and stopping operation

You can pause and stop scan execution and step execution.
For the pausing and stopping procedure, see 📖 "Pause" (page 11-6).

■ Reset

Return current values to their defaults.

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This section describes the simulator edit function, which allows you to edit KV STUDIO ladder programs while simulating.

Simulator Edit Function Overview

Simulator edit allows you to directly change ladder programs in the KV STUDIO simulator screen. This function is useful for debugging and making simple changes to the program during simulation.
For details on the simulator function, refer to 📖 "9-11 Simulator Function" (page 9-122)

- As on the simulator screen, you can check the ON/OFF status of devices and changes in device values while using simulator edit.
  →This makes it possible to debug while checking ladder program operation.
- The backgrounds of edited cells change to light blue, which enables you to identify at a glance which cells have been modified.
  →This makes it easy to edit the program again if devices start to operate incorrectly as a result of changes.
- All screens can be edited during simulator edit.
  →This makes it possible to perform editing as if you were in editor mode without switching between circuits being edited, even when you are setting interlocks on multiple circuits.

Precautions When Using the Simulator Edit Function

✎ **Point**
- **The ON/OFF status and values of devices that are being simulated during simulator edit are displayed based on the ladder program (the program currently being simulated) immediately before simulator edit was started. Until you transfer a program, the PLC operations do not reflect the program status during simulator edit. To have the PLC operate a program that you have made additions and changes to through simulator edit, you have to transfer the program to the PLC.**
- **You cannot assign local devices during simulator edit. Return to the editor, and then perform the assignments again.**

In addition to the above, the limitations that apply to the simulator function also apply to simulator edit.
📖 "Simulator Limitations" (page 9-122)

Starting Simulator Edit

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

🖼 **"Monitor/Simulator(N)"** ▶ **"Start simulator edit(Q)"** ⌨Ctrl + ⌨Shift + ⌨F2

1 **Click the "Monitor/Simulator(N)" menu** ▶ **"Start simulator edit(Q)".**

The KV STUDIO title bar changes from "Editor" to "Simulator Edit", and the simulator edit function becomes active. The mode bar is changed to orange, and the "Simulator Edit" is displayed.

Alternative procedure   Select "Simulator edit" from the mode bar's pulldown menu.

Reference   You can also continue simulating each device's ON/OFF status and value in real time while in simulator edit.

2 **Edit the ladder program.**

Edit the ladder program. Edit it in the same way as in Editor mode.
📖 "EDIT" (Page 5-1)

The backgrounds of cells that have been added or changed are displayed in light blue, which indicates that the program has been changed.
📖 "Clearing the Background Color of Changed Cells" (page 6-46)

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MONITOR/SIMULATOR

Simulator Edit Transfer

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Monitor/Simulator(N)" ▶ "Transfer simulator edit(Z)" F11

Transfer the ladder program that you edited in simulator edit to the emulator.
Click the "Monitor/Simulator (N)" menu ▶ "Transfer simulator edit (Z)" to transfer the ladder program to the emulator.

Alternative procedure Right-click in the ladder edit window, and then select "Transfer simulator edit (Z)" from the menu that appears.

Reference If the edited ladder program cannot be converted successfully, an error message is displayed, and the error details are displayed in the output window. Remove the cause of the error, and then transfer the ladder program again.

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MONITOR/SIMULATOR

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10

OPERATION RECORD/ REPLAY

This chapter describes the operation record / replay function and its usage.

Various functions included in the "Operation Recorder/Replay (R)" menu are described.

> ✎ **Point**
>
> **"Operation Recorder/Replay (R)" is a menu that is displayed only when KV-8000 is selected as the supported model in KV STUDIO Ver.10 or later.**

Operation Recorder Setting

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

Operation Recorder/Replay (R) ▶ Operation Recorder Setting (P)

Select "Operation Recorder/Replay (R)" ▶ "Operation Recorder Setting (P)" from the menu. Setting is required when using the operation record function. For details on the operation record function, refer to "KV-8000 Series User's Manual".

Read the operation record in the CPU unit

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

Operation Recorder/Replay (R) ▶ Read Operation Record in CPU Unit (D)

Select "Operation Recorder/Replay (R)" ▶ "Read Operation Record in CPU Unit (D)" from the menu. The Save Operation Recordd in the CPU unit is read to the PC.

Item	Description
Select	Select the target Save Operation Recordd in the PC.
"All check ON"	Check all operation records.
"All check OFF"	Uncheck all operation records.
"Delete"	Delete the selected operation record from the CPU unit.
Split and save	After clicking, the operation record is split and stored in the specified capacity.
"Save"	After clicking, a dialog for selecting the save location folder is displayed, and the operation record is saved in the selected folder.

Read Operation Record in CPU Unit → Replay Mode 　KV-8000　KV-7000　KV-5000/3000　KV Nano　KV-1000　KV-700　KV-P16　KV-10/16/24/40

Operation Recorder/Replay (R) ▶ Read Operation Record in CPU Unit → Replay Mode (O)

Select "Operation Recorder/Replay (R)" ▶ "Read Operation Record in CPU Unit → Replay Mode (O)" from the menu. The operation record stored in the CPU unit is read to the PC, and KV STUDIO is switched to the replay mode.

Operation recorder selection			✕
Operation recorder	Date and time of creation	Size[MB]	
/1_CPUMEM/RECORD_0/001_20190417125655	2019/04/17 12:56:55	11	

Update(U) ☐ Delete the operation record read from the CPU unit successfully　　　Select(R)
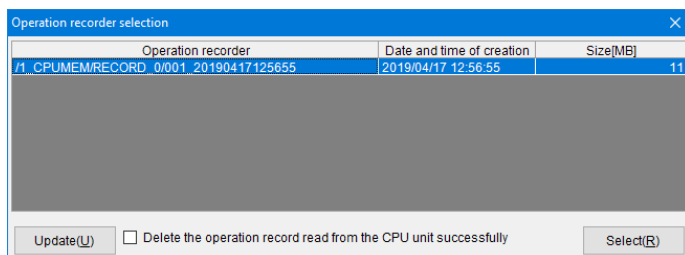
Item	Description
"Update"	Check the operation record existing in the CPU unit, and additionally display if a new operation record is saved.
Delete the operation record read from the CPU unit successfully	If checked, the operation records that have been read successfully will be deleted from the CPU unit.
"Select"	Save the selected operation record in the PC, and switch KV STUDIO to the replay mode.

Replay mode 　KV-8000　KV-7000　KV-5000/3000　KV Nano　KV-1000　KV-700　KV-P16　KV-10/16/24/40

Operation Recorder/Replay (R) ▶ Replay Mode (R)

Select "Operation Recorder/Replay (R)" ▶ "Replay Mode (R)" from the menu. Switch KV STUDIO to the replay mode. For details on replay, refer to 📖 "Replay function", Page 10-8.

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OPERATION RECORD/REPLAY

Operation Recorder Monitor

KV-8000 KV-7000 KV-5000/3000 KV Nano KV-1000 KV-700 KV-P16 KV-10/16/24/40

Operation Recorder/Replay (R) ▶ Operation Recorder Monitor (M)

Select "Operation Recorder/Replay (R)" ▶ "Operation Recorder Monitor (M)" from the menu. The status of the operation record function can be monitored.

✎ **Point**

The Operation Recorder Monitor is a menu that can be selected only when KV STUDIO is in the monitor or online editing mode.
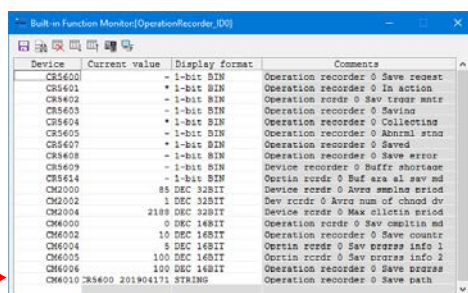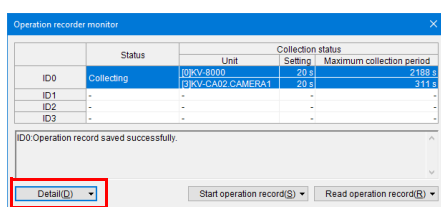
Item		Description
Operation Recorder Monitor	Status	Display the status of the operation record function.
	Collection status	Display the collection time set in the Operation Recorder Settings and the maximum collection period.
	"Details"	Click to display the built-in function monitor.
	"Start Operation Record"	Click to collect and save the operation record data.
	"Read Operation Record"	Read the operation record from the CPU unit.
Built-in function monitor		Monitor with CR and CM related to the operation record function registered.

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OPERATION RECORD/REPLAY

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Save Operation Record

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

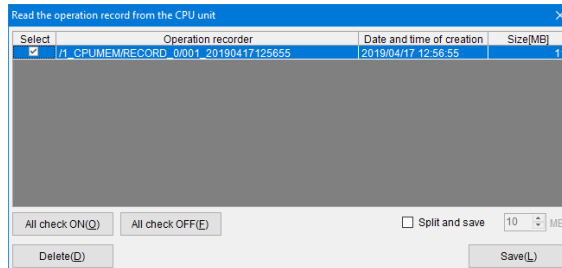**Operation Recorder/Replay (R) ▶ Save Operation Record (L)**

Select "Operation Recorder/Replay (R)" ▶ "Save Operation Record (L)" from the menu. The split save / cut save is performed for the operation record played back during replay.

■ Split and Save

The operation record is split in the specified size and saved.

■ Cutout and Save

The operation record is cut and saved after selected only by the specified time or data. Click "Detailed Settings" to select the data to be saved.
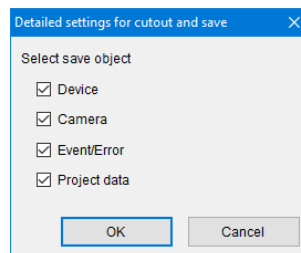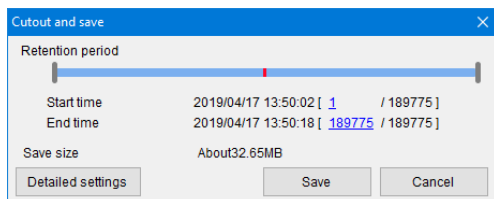
Operating bar

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Operation Recorder/Replay (R) ▶ Operating Bar Display (Q)

Select "Operation Recorder/Replay (R)" ▶ "Operating Bar Display (Q)" from the menu. The operation bar to perform playback and stop of replay in the replay mode is displayed.

Event / error log window

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Operation Recorder/Replay (R) ▶ Event / Error Log Window (E)

Select "Operation Recorder/Replay (R)" ▶ "Event / Error Log Window (E)" from the menu. A list of events or errors that occurred in the PLC is displayed in the replay mode.

✎ **Point**

Save Operation Record, operation bar and event / error log window are menus that can be selected only when KV STUDIO is in the replay mode.

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OPERATION RECORD/REPLAY

Device change point search

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

Operation Recorder/Replay (R) ▶ Device Change Point Search (C)

Select "Operation Recorder/Replay (R)" ▶ "Device Change Point Search (C)" from the menu. The replay position can be changed by searching for the timing at which the specified device / variable has changed in the replay mode.

✎ **Point**

"Device Change Point Search (C)" is a menu that can be selected only when KV STUDIO is in the replay mode.
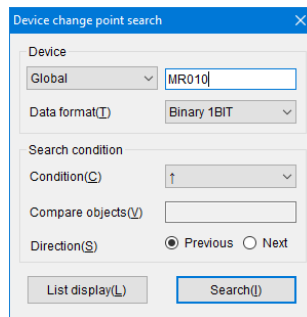
Item		Description
Device		Enter the search target. The local variables / local tag can be set as the search object after selecting the module name in the pull-down menu.
Data format		Binary 1BIT / Decimal 16BIT / Decimal 32BIT / ± Decimal 16BIT / ± Decimal 32BIT / Select from FLOAT/DOUBLE FLOAT.
Conditions	When "Binary 1BIT" is selected in "Data Format"	↑ — Search for data points where the device / variable is started.
		↓ — Search for data points where the device / variable is closed.
		↑↓ — Search for data points where the device / variable is started or closed.
		On[1] — Search for all data points where the device / variable is ON.
		Off[1] — Search for all data points where the device / variable is OFF.
	When others than "Binary 1BIT" are selected in "Data Format"	When > is established[1] — Search for all data points where the device / variable value is greater than the comparison object.
		When >= is established[1] — Search for all data points where the device / variable value is greater than or equal to the comparison object.
		When = is established[1] — Search for all data points where the device / variable value is equal to the comparison object.
		When != is established[1] — Search for all data points where the device / variable value is not equal to the comparison object.
		When < is established[1] — Search for all data points where the device / variable value is smaller than the comparison object.
		When <= is established[1] — Search for all data points where the device / variable value is smaller than or equal to the comparison object.
		Minimal value — Search for all data points where the device / variable value is the minimal value.
		Extreme value — Search for all data points where the device / variable value becomes extreme.
		Minimum value — Search for 1 data point where the device / variable value becomes minimum.
		Maximum value — Search for 1 data point where the device / variable value becomes maximum.

*1 When executing "List Display", only the initial data points with the conditions met are displayed in a list.
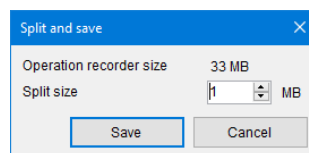
10

OPERATION RECORD/REPLAY

Replay VT Viewer

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Operation Recorder/Replay (R) ▶ Replay VT Viewer (I)

Select "Operation Recorder/Replay (R)" ▶ "Replay VT Viewer (I)" from the menu. The state when the device / variable data of operation record is displayed on the human machine interface can be simulated in conjunction with VT STUDIO in a PC. For details on the Replay VT Viewer, refer to ▢ "Replay VT Viewer", Page 10-12.

10

OPERATION RECORD/REPLAY

Replay function

The replay function that can play back the operation records saved in the KV-8000 series is described.

> ✎ **Point**
>
> **The replay function can be used only with KV STUDIO Ver.10 or later and the supported model of KV-8000.**

Overview of replay function

Replay is a function to play back the operation records saved in the KV-8000 series. Operation record refers to the device/variable data collected by the KV-8000 series, PLC event log, project data, and video data shot with the camera input unit KV-CA02. The following functions can be achieved after playing back the operation record with the replay function.

- The status of the ladder program when a fault occurs can be played back along with the video shot by the camera[*1].
- The position to play back the operation record can be specified from the event or error log and device value change event, so the status when the problem occurs can be mastered.
- The device/variable data when a fault occurs can be displayed in the time chart format in conjunction with the real-time chart monitor.
- The status of the human machine interface when a fault occurs can be reproduced in conjunction with VT STUDIO[*2].

*1   The camera input unit KV-CA02 is required.
*2   VT STUDIO Ver.7.10 or later is required.

Replay restrictions

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Replay mode is a mode to play back the Save Operation Recordd beforehand. The following restrictions exist during replay.
- The ladder programs cannot be edited.
- The device/variable values cannot be rewritten from the registration monitor window and batch monitor window.
- The monitor functions that can be used in the replay mode are as follows. Monitor functions other than the following cannot be used in the replay mode.
    - Real-time chart monitor
    - Registration monitor / batch monitor
    - Watch window
    - Built-in function monitor
    - Instruction monitor
    - Event / error monitor
    - Unit monitor
    - Cyclic communication error monitor
    - Sensor I/O monitor
    - Sensor dedicated monitor
    - KV socket information monitor

Start and End of Replay

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Operation Recorder/Replay (R) ▶ Replay Mode (R)

■ How to start replay

1 Select "Operation Recorder/Replay (R)" ▶ "Replay Mode (R)" from the menu.

> (**Alternative procedure**)   Select Replay from the pull-down menu in the mode bar.

The following dialog will be displayed. Select the method for reading the operation record, and read the operation record.

Operation recorder selection		×
Object selection ◉ In the PC ◯ In the CPU unit		
Operation recorder C:\Users\Keyence\Desktop\Data\000_20190417165404\record.TMN	...	
	OK	Cancel
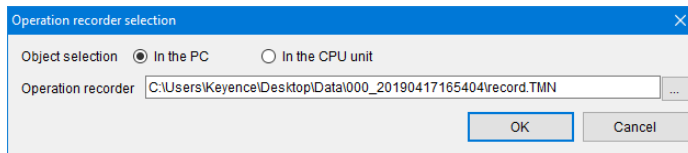
> ✎ **Point**
>
> **When selecting "In the CPU unit", read it while the PC and CPU unit can communicate.**

■ How to end replay

1 Select "Monitor / Simulator (N)" ▶ "Return to Editor (X)" from the menu.

> (**Alternative procedure**)   Select the editor from the pull-down menu in the mode bar.

Playback and stop of replay

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

- Playback: Click the ▶ icon in the operation bar.
- Stop: Click the ❚❚ icon in the operation bar.

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OPERATION RECORD/REPLAY

Name and function of each part of replay screen

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

When replay is started, the ladder program read from the operation record is expanded and the replay screen is switched to. The camera monitor that displays the video data shot with KV-CA02 and the event / error log that displays the log of events that occurred in the PLC are displayed. The operation bar for display and operation of the playback position of replay is displayed at the bottom of the screen.

- Event/Error log window
- Ladder editing window
- Camera monitor
- Operation bar
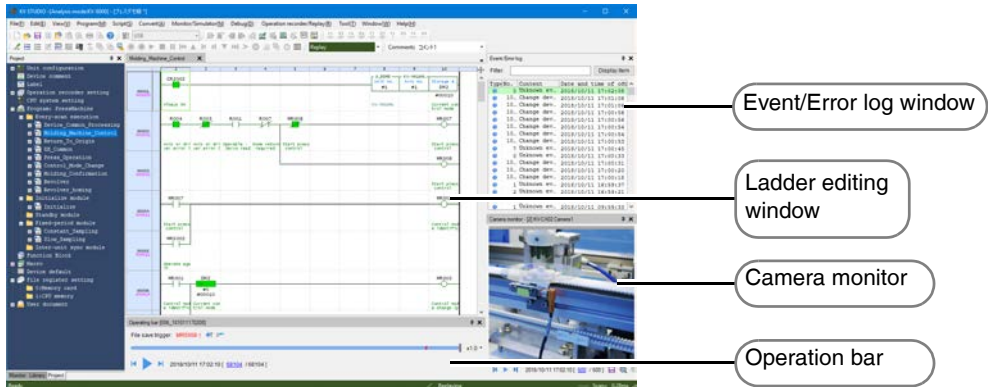
■ Camera monitor

The video data shot with the camera input unit KV-CA02 is displayed.

Item		Description
Camera monitor	Interlock cancel	The search bar for adjusting the playback position of the camera video is displayed, and the camera video can be played back independently. Since it is not interlocked with the device/variable data, all data stored in KV-CA02 can be checked when the collection time of camera record is specified individually in the Operation Recorder Settings. When unchecked, the camera video can be played back in conjunction with the ladder program.
	File format save	Click the ⊟ icon to display the "File Format Save" dialog. The video data of the operation record is saved as a movie file (.avi) or an image file (.jpg). When saving as an image file, the images are saved by frame.
File format save dialog	Target camera	When using multiple ports or multiple KV-CA02, select the camera to save the video data.
	Start time / End time	Set the range to save. The save size changes depending on the save range.
	Camera monitor	Display the camera monitor selected as the target camera.

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OPERATION RECORD/REPLAY

■ Event / error log window

The log of events or errors that occurred in the PLC is displayed.

The log of events / errors that occurred within the range of the operation record is displayed with a green background.

The latest log of events / errors in the events / errors that occurred at the playback time is displayed with a blue background.

The playback position of replay can be moved to the position where the target event / error log occurred after clicking Event / Error Log.
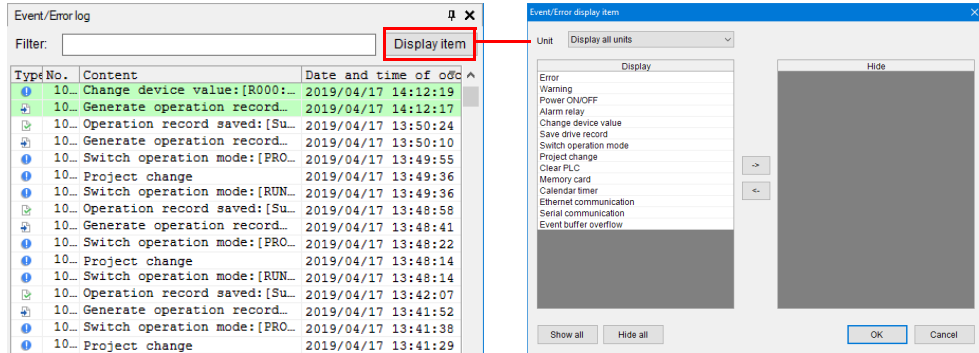
Item		Description
Event / error log window	Filter	Only the content that matches the entered keyword is displayed.
	Display item	Click to display the "Event / Error Display Item" dialog.
Event / error display item dialog	Unit	Select the unit to display the event / error log content.
	Show / Hide	Select to show or hide each event / error.
	Show all	Click to show all items.
	Hide all	Click to hide all items.

■ Operating bar

Perform playback and stop of replay, and adjust the playback position.

Playback / stop / forward / backward of replay.

Move the playback position when a file save trigger occurs.

Start relation mapping.

Change the playback speed of replay.

Display the location of the file save trigger.

Display the current playback position.

The current playback position is displayed by the data number. The playback position can be changed by directly specifying the data number.

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OPERATION RECORD/REPLAY

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Replay VT Viewer that can reproduce the status of the human machine interface using the device/ variable data of the Save Operation Recordd in the KV-8000 series is described.

> ✎ **Point**
>
> **Replay VT Viewer is a function that can be used when the following conditions are met.**
> - **KV STUDIO Ver.10 or later and the supported model of KV-8000**
> - **VT STUDIO Ver.7.10 or later and the PLC model set to KV-8000**

Replay VT Viewer

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

Replay VT Viewer is a function that starts the Replay VT Viewer of VT STUDIO and reproduces the status of the human machine interface when KV STUDIO is in the replay mode.

Restrictions on Replay VT Viewer

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

The Replay VT Viewer has the following restrictions.

- The PLC device/variable value cannot be changed from Replay VT Viewer. The switch can be pressed and the numeric keypad can be displayed, but the device/variable value cannot be changed.
- System memory area, global function control, page switching using the Function control by device / variable, show / hide control of local window or global window, etc. are not supported.
- The trend graph (real-time) and alarm parts do not operate.
- When using the MultiTalk function in VT STUDIO or adjusting multiple station numbers under the PLC communication conditions, only one PLC device / variable can reproduce the operation. Other PLC device / variable always display 0.

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OPERATION RECORD/REPLAY

Start and end of Replay VT Viewer

`KV-8000` `KV-7000` `KV-5000/3000` `KV Nano`
`KV-1000` `KV-700` `KV-P16` `KV-10/16/24/40`

Operation Recorder/Replay (R) ▶ Replay VT Viewer (I)

■ How to start Replay VT Viewer

1 Select "Operation Recorder/Replay (R)" ▶ "Replay VT Viewer (I)" from the menu.
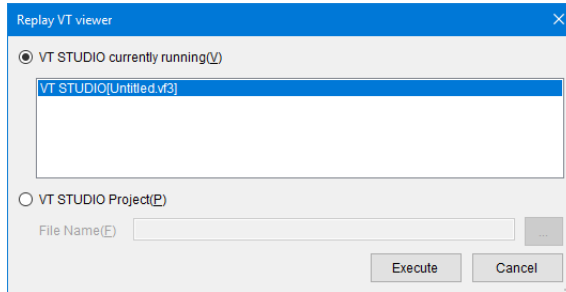
Item	Description
VT STUDIO currently running	Start the Replay VT Viewer in conjunction with the currently running VT STUDIO.
VT STUDIO Project	Specify the screen data of VT STUDIO. After clicking "Execute", the VT STUDIO project and Replay VT Viewer screen will be started automatically.

When the linked VT STUDIO is set to communicate with multiple KV-8000, the following dialog will be displayed, so the target PLC to be linked with the replay mode of KV STUDIO should be selected.
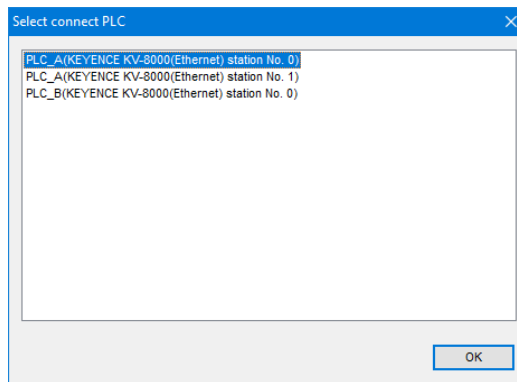
> **Point**
>
> **When the specified VT STUDIO project is not set to communicate with KV-8000, the Replay VT Viewer cannot be started.**

■ How to end Replay VT Viewer

1 Click the "×" button on the upper right of the "Replay VT Viewer" window.

MEMO

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OPERATION RECORD/REPLAY

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11

DEBUG

This chapter describes the debug functions and how to use these functions.

DEBUG

This section describes the functions contained in the "Debug (D)" menu.
Depending on the KV STUDIO mode, some functions cannot be used. Refer to the User's Manual of the CPU unit used for details.

> **Reference** Items displayed on [Debug (D)] menu differ when selecting a flow function which can be used with X-Unit (KV-XH16EC/XH16ML/XH04ML etc.). For details, refer to User's manual of each X-Unit.

> **⚠ CAUTION** **Depending on the status of the control equipment that is connected to the PLC, debugging during monitoring may be extremely dangerous. Exercise caution during the operation of this function.**

RUN/Continuous Scan Execution

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

(Monitor)(Simulator)(Online Edit)(Simulator Edit)

▶ **"Debug(D)"** ▶ **"RUN/cont. scan(R)"**

In this mode, the program is being executed.
Click the "Debug (D)" menu ▶ "RUN/cont. scan (R)" to change the mode to RUN/continuous scan execution mode.

> **Reference** After you execute a single scan in continuous scan execution mode in the simulator, program operation is paused.

> **Point** **When the RUN/PROG switch of the CPU unit is PROG, KV STUDIO cannot switch to RUN/Continuous Scan Execution Mode.**

PROG/Stop

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

(Monitor)(Simulator)(Online Edit)(Simulator Edit)

■ **"Debug(D)"** ▶ **"Program/stop(P)"**

In this mode, program execution is stopped.
Click the "Debug (D)" menu ▶ "Program/stop (P)" to change the mode to PROG/stop mode.

> **Reference** After you execute a single scan in PROG/stop mode in the simulator, program operation is paused.

Single Scan Execution

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

(Monitor)(Simulator)　　　　　　　　　　　　　　> **"Debug(D)"** ▶ **"Execute 1 scan(T)"** F9

In this mode, the program is executed for one scan only. After you execute a single scan in continuous scan execution mode, program operation is paused.
This mode is useful for checking program operation one scan at a time.

> | ✎ Point | • **This mode is only valid when you are using breaks.** |
> |---|---|
> | | • **When you execute a single scan during step execution, the program is executed from the current step to "END" or "ENDH" in the final module of the execution sequence.** |
> | | • **When you execute a single scan, you will not be able to use reversed step execution (in the simulator).** |
> | | 📖 **"Reversed Single Step Execution" (page 11-6)** |
> | | 📖 **"Reversed Continuous Step Execution" (page 11-5)** |
> | | • **1 scan can be executed during monitoring only when KV-5500/5000/3000 is selected as the PLC model.** |

Continuous Step Execution

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

(Simulator)　　　　　　　　　　▶▶ **"Debug(D)"** ▶ **"Execute continuous step(S)"** Shift + F8

```
Mnemonic symbol list                         ⊠
AutoOpe
ACC:$3F7F0004  CR2009:--
------ Module preparation
000001 LDP CR2004
000002 NCJ #1000
000004 LD> DM0 #360
000005 NCJ #2000
000007 LD CR2002
000008 MOV #0 DM0
000010 LABEL #2000
000012 LD CR2002
000013 LDA DM0
000014 CON
000015 FLOAT
000016 CON
000017 RAD
000018 CON
000019 SIN
```

▶▶
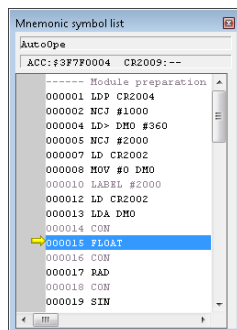
In this mode, single instructions are executed continuously.

In this mode, the program is executed continuously. When operation is stopped, the mnemonic symbol list window is displayed, and the rung being executed is highlighted.

📖 "About the mnemonic symbol list window" (page 9-129)

Reference	When you split the screen, only the lower screen is scrolled to match the speed of operations. To check only the behavior of a specific section of the ladder program, use the upper screen.

11

DEBUG

Single Block Execution

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

(**Monitor**)(**Simulator**)   ▼ **"Debug(D)"** ▶ **"Execute 1 Block(J)"**

In this mode, the program is executed one ladder block at a time.
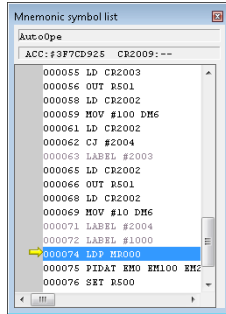Click the "Debug (D)" menu ▶ "Execute 1 Block (J)." After you execute a single block in continuous scan execution mode, program operation is paused.

```
Mnemonic symbol list                    ☒
AutoOpe
ACC:#3F7CD925   CR2009:--
  000055 LD CR2003                      ▲
  000056 OUT R501
  000058 LD CR2002
  000059 MOV #100 DM6
  000061 LD CR2002
  000062 CJ #2004
  000063 LABEL #2003
  000065 LD CR2002
  000066 OUT R501
  000068 LD CR2002
  000069 MOV #10 DM6
  000071 LABEL #2004
  000072 LABEL #1000                    ▤
⇨000074 LDP MR000
  000075 PIDAT EM0 EM100 EM2
  000076 SET R500                       ▼
◄ | ▥                       ►
```

One ladder block is executed every time ▼ **is clicked.**

✎ **Point**
- **This mode is only valid when you are using breaks.**
- **During monitoring, you cannot perform single block execution if no breaks are set.**
- **When "KV-8000/7500/7300" or "KV Nano Series" is selected for the PLC model, you cannot perform single block execution during monitoring.**
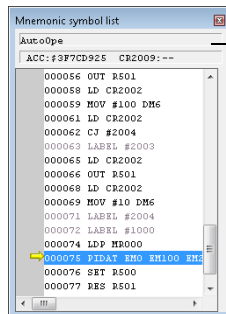
Single Step Execution

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

(**Monitor**)(**Simulator**)   ▶❙ **"Debug(D)"** ▶ **"Execute 1 step(W)"** [F8]

In this mode, the ladder program is executed one step at a time. After you execute a single step in scan execution mode, program operation is stopped.

```
Mnemonic symbol list                    ☒
AutoOpe
ACC:#3F7CD925   CR2009:--
  000056 OUT R501                       ▲
  000058 LD CR2002
  000059 MOV #100 DM6
  000061 LD CR2002
  000062 CJ #2004
  000063 LABEL #2003
  000065 LD CR2002
  000066 OUT R501
  000068 LD CR2002
  000069 MOV #10 DM6
  000071 LABEL #2004
  000072 LABEL #1000
  000074 LDP MR000                      ▤
⇨000075 PIDAT EM0 EM100 EM2
  000076 SET R500
  000077 RES R501                       ▼
◄ | ▥                       ►
```

One step is one instruction.

One instruction is executed every time ▶❙ **is clicked.**

Click the "Debug (D)" menu ▶ "Execute 1 step (W)" to display the mnemonic symbol list window with the rung being executed highlighted.

📖 "About the mnemonic symbol list window" (page 9-129)

✎ **Point**
- **This mode is only valid when you are using breaks.**
- **During monitoring, you cannot perform single step execution if no breaks are set.**
- **Single step execution can be executed during monitoring only when KV-5500/ 5000/3000 is selected as the PLC model.**

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DEBUG

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Reversed Continuous Step Execution

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

(Simulator)　　　　　　　　|◄◄ **"Debug(D)"** ▶ **"Execute reverse cont. step(Y)"** [Shift] **+** [F7]

Click the "Debug (D)" menu ▶ "Execute reverse cont. step (Y)."

After single step execution or continuous step execution is performed, continuous step execution is performed on the executed steps in the reverse direction.

|◄◄

In this mode, single instructions are executed continuously.

Reversed Single Block Execution

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

(Simulator)　　　　　　　　▲ **"Debug(D)"** ▶ **"Execute Reverse 1 Block(K)"**

In this mode, the program is executed one ladder block at a time in the reverse direction.

Click the "Debug (D)" menu ▶ "Execute Reverse 1 Block (K)."

One ladder block is executed every time ▲ **is clicked.**

11

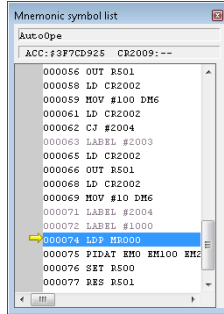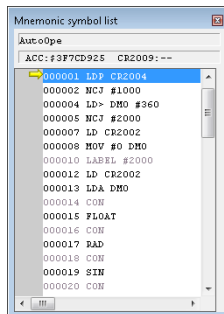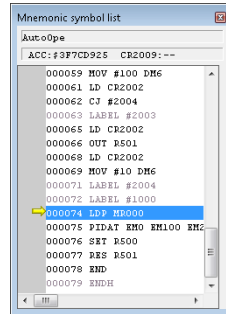**DEBUG**

Reversed Single Step Execution

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

(**Simulator**)   ◀ **"Debug(D)"** ▶ **"Execute reverse 1 step(G)"** F7

Click the "Debug (D)" menu ▶ "Execute reverse 1 step (G)."

After single step execution or continuous step execution is performed, the executed steps are executed one step at a time in the reverse direction.

```
Mnemonic symbol list
AutoOpe
ACC:#3F7CD925  CR2009:--
000059 MOV #100 DM6
000061 LD CR2002
000062 CJ #2004
000063 LABEL #2003
000065 LD CR2002
000066 OUT R501
000068 LD CR2002
000069 MOV #10 DM6
000071 LABEL #2004
000072 LABEL #1000
000074 LDP MR000
000075 PIDAT EM0 EM100 EM2
000076 SET R500
000077 RES R501
000078 END
000079 ENDH
```

One instruction is executed every time ◀ is clicked.

> Reference When you perform single step execution, values that have been changed as a result of the program execution are returned to their statuses from before the program was executed.
>
> This mode allows you to perform debugging efficiently because, for each instruction, you can check the operation (changes in operations caused by contacts turning ON and OFF and by the values of word devices) of the ladder program you have created and restore the result of the operation.

Pause

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

(**Monitor**)(**Simulator**)   ⏸ **"Debug(D)"** ▶ **"Pause(I)"** F6

Click the "Debug (D)" menu ▶ "Pause (I)."

This pauses continuous scan execution and continuous step execution.

> ✎ Point **You can pause operations in the monitor when all of the following conditions are met.**
> - **The mode is RUN mode.**
> - **A break has been set.**
> - **A break is not being performed.**
> - **Temporary stop can be executed during monitoring only when KV-5500/5000/3000 is selected as the PLC model.**

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DEBUG

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Reset

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

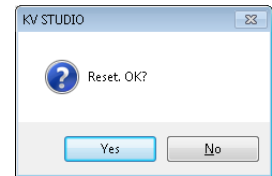(Simulator)   🔽 **"Debug(D)"** ▶ **"Reset(A)"**

Click the "Debug (D)" menu ▶ "Reset (A)."
This stops any operations that are in progress.
The same processing is performed as when you turn the PLC off and
then turn it back on.
To cancel a reset, click "No."

Setting Device Breaks

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

(Monitor)(Simulator)   ✋ **"Debug(D)"** ▶ **"Set device break(B)"**

A "break" is a function for stopping a ladder program when specified conditions are met during
program operation. The following two types of breaks are available.
• Device break . . . . . Program operation is stopped according to the conditions that you specify for
device/variable/label in the "Device break settings" dialog box.
• Rung break . . . . Program operation is stopped at the rungs that you specify in the "Mnemonic
symbol list" window.

> ✎ Point   **Break can be executed during monitoring only when KV-5500/5000/3000 is**
> **selected as the PLC model.**

■ **Maximum number of break conditions that can be set and operation**

**according to debug functions**

○ . . . . Program operation is stopped.   × . . . . . Program operation is not stopped.

	Device Break		Rung Break	
	Monitor	**Simulator**	**Monitor**	**Simulator**
Maximum number of break conditions that can be set	1*	16	4	16
RUN/continuous scan execution	○	○	○	×
Single scan execution	○	○	○	×
Continuous step execution	-	○	-	○
Reversed continuous step execution	-	○	-	○

* You cannot use AND or OR to make combined conditions.

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DEBUG

Device breaks

A "device break" is a function for stopping a ladder program when the conditions that you specify are met during program operation. Breaks are used to check the operating status in parts and to find locations where bugs are present. Also, if you use breaks together with the step execution function, you can check operations in a shorter length of time, and you can stop program operation according to the logical OR or AND of multiple conditions during simulation.

1 **Click the "Debug (D)" menu ▶ "Setup device break (B)."**
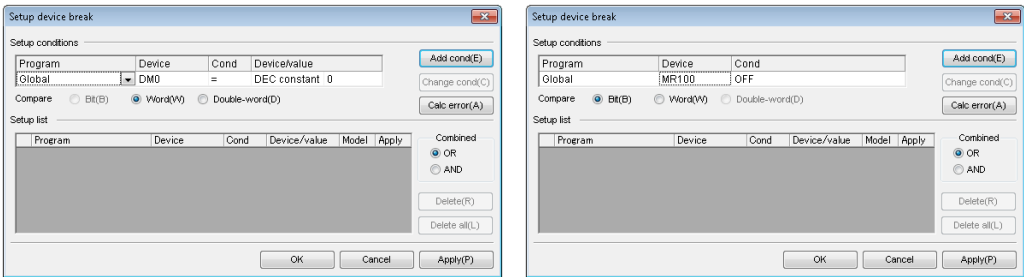
Item	Explanation
Program[*]	Specify a program.
Device	Enter the device / variable / label that will be the interrupt condition.
Cond (condition)	Set the condition.
Device/value	Set the value to be compared with a constant or device / variable / label.
Add conds (Add condition)	Click this to add a condition.
Change conds	Click this to change the selected condition.
Calc error	Click this to register CR2012 (calculation error) to the list of settings.
Compare	Select "Bit" to compare 1 bit only, "Word" to compare 16-bit data, and "Double word" to compare 32-bit data.
Setup list	This displays the registered device breaks. Only the breaks whose checkboxes are selected are enabled.
Combined	Select "OR" or "AND" as the combination break condition (in the simulator)

* This item is displayed only when "KV-8000/7500/7300/5500/5000/3000/1000" or "KV Nano Series" is selected for the PLC model.

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2 **Specify the conditions. When is a word or a double-word, use a comparison operation to specify the condition.**

When is a bit data

Item		Explanation
Device		Enter the device / variable / label that will be the interrupt condition.
Cond (condition)	ON	The contact turning ON is set as the condition.
	OFF	The contact turning OFF is set as the condition.

When is a word data or a double-word data

Item		Explanation
Device		Enter the device / variable / label that will be the interrupt condition.
Compare condition	$<$[1]	The right side being greater than the left side is set as the condition.
	$=$	The left side being equal to the right side is set as the condition.
	$\neq$[3]	The left side and the right side being different is set as the condition.
	$>$[1]	The left side being greater than the right side is set as the condition.
	$\leq$[1]	The right side being greater than or equal to the left side is set as the condition.
	$\geq$[1]	The left side being greater than or equal to the right side is set as the condition.
Device/value[2]		Set the device/variable/label or constant.

[1] This cannot be used in the monitor.
[2] Only constants can be set in the monitor.
[3] This cannot be used in the simulator.

3 **When you are setting the condition of a bit data, select "Bit." When you are setting the condition of a word data, select "Word." When you are setting the condition of a double-word data, select "Double-word."**

4 **Click "Add conds."**
The specified conditions are added, and the details are displayed in the list of settings.

5 **To register multiple conditions, repeat steps 2 to 4.**

6 **When you have finished registering all the conditions, click "Apply" and then "OK."**
The "Device break settings" dialog box closes.

■ **Changing registered conditions**

Select the condition that you want to change in the list of settings, set the new condition, and then click "Chng conds."
The condition on the rung where the cursor is located is changed.

> **Reference** You can register new device break conditions by clicking "Add conds."

■ **Deleting registered conditions**

Select the condition that you want to delete in the list of settings, and then click "Delete."
The condition on the rung where the cursor is located is deleted.

■ **Disabling registered conditions**

Select the condition that you want to disable in the list of settings, and then clear the checkbox on the left of the condition.

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DEBUG

Rung breaks

Monitor **Simulator**

A "rung break" is a function for stopping a ladder program at a rung that you specify in the "Mnemonic symbol list" window. When rung breaks are used, program execution is automatically stopped at the specified rungs during continuous scan execution[*], single scan execution[*], continuous step execution, and reversed continuous step execution.

* In the simulator, program execution cannot be stopped during continuous scan execution and single scan execution.

For example, if you set a rung break at a particular step to investigate the ladder operation at that step in detail, the program execution will stop at the preset step, which makes it easy to check the program operation.

In the "Mnemonic symbol list" window, double-click the step that you want to specify.
● is displayed to the left of the specified rung.

Point	**Break can be executed during monitoring only when KV-5500/5000/3000 is selected as the PLC model.**

Reference	You can set multiple rung breaks.

📖 "Maximum number of break conditions that can be set and operation according to debug functions" (page 11-7)
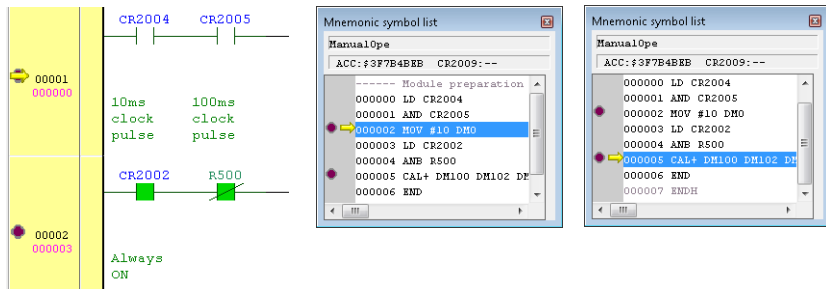
■ To execute operation again

Operate the function that you want to execute again.

- Continuous scan execution: 📖 "RUN/Continuous Scan Execution" (page 11-2)
- Single scan execution: 📖 "Single Scan Execution" (page 11-3)
- Continuous step execution: 📖 "Continuous Step Execution" (page 11-3)
- Reversed continuous step execution: 📖 "Reversed Continuous Step Execution" (page 11-5)

■ To cancel a rung break setting

Double-click a step on which a rung break has been set.
● , which indicates a rung break, disappears.

Derivation monitor

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

**(Monitor) (Simulator) (Online Edit) (Simulator Edit)**

💻 **"Debug(D)"** ▶ **"Derivation monitor(N)"**

Monitor the number of times that rising edges or falling edges occur for the specified bit. You can monitor up to four device / variable / label can be monitored.
The derivation monitor function can be used with KV-8000/7000 Series CPU units, KV-5000/3000 Series CPU units with CPU function version 2.0 or later, or with KV Nano Series base units.

> ✎ **Point**
> • **When word data is specified, the least significant bit is operated.**
> • **Rising edges and falling edges are not detected when there is no net change to a value within a scan (for example, when the value changes from ON to OFF and then back to ON).**
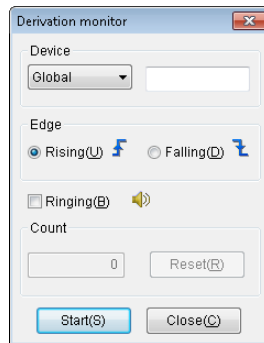
Item	Explanation
Device	Specify the device / variable / label to monitor.[*1]
Edge	Select whether to detect rising edges or falling edges.
Ringing	When this checkbox is selected, a buzzer sounds when a rising edge or falling edge is detected.
Count	This displays the number of times that rising edges or falling edges have been detected.
Reset	Click this to clear the count to zero.
Start	Click this to start the derivation monitor.

*1 You cannot register timers and counters that do not exist in the ladder program.

> **Reference** ⬚ You can add devices by dragging the device / variable / label that have been written in the ladder editor.

> ✎ **Point**
> **You cannot use the derivation monitor with the following.**
> • **Indirect references**
> • **Index modified devices**
> • **Index register Z**
> • **Current values and set values of timers and counters**
> • **High-speed counters**
> • **Trimmers (TRM)**
> • **V and UV macro arguments (words)**

11

DEBUG

Registering Forced Sets and Resets

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

(Monitor) (Online Edit)   "Debug(D)" ▶ "Forced set/reset register(X)"

Forcibly set or reset the target ignoring the device's refresh status and the ladder program.
Click the "Debug (D)" menu ▶ "Forced set / reset register (X)."

> ✎ **Point**
> • **You can only register the R, B, and MR* devices for forced sets and resets (you cannot register CR and LR devices).**
>   * You cannot register MR devices with the KV Nano Series.
> • **KV-8000 with CPU function version 2.0 or later can register the following for forced set / reset.**
>   • **R, B, MR, LR devices**
>   • **Global variables automatically assigned to the work area**
>   • **Global variables assigned to R, B, MR and LR**
>   • **Global variables assigned to DM, EM, FM, ZF, W and TM bits**
>   * Local variables cannot be registered for forced set / reset.
> • **When the selected PLC model is the KV-5500/5000/3000, R000 to R915 cannot be registered.**
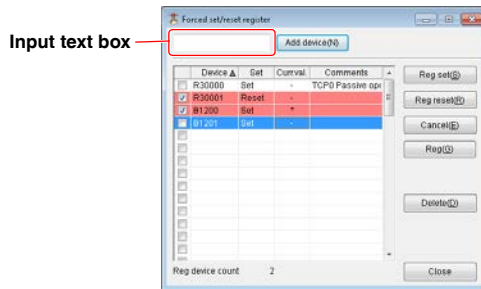
Input text box

Item	Explanation
Input text box	Enter the target that you want to register for forced sets or resets.
Add device	Click this to register the target that you entered in the input text box for forced sets or resets.*
Checkboxes	Select the checkbox to forcibly set or reset the registered target. The cells of target whose checkboxes are selected are displayed in red, which indicates that the targets are being forcibly set or reset. Clear the checkboxes to cancel the forced set or reset operation.
Device	The target that have been registered for forced sets and resets are displayed in ascending order. Click the title cell to change the sort method to descending order.
Set	This displays the registration type (set or reset). Double-click the cell to switch between set and reset. You can also use the "Reg set" and "Reg reset" buttons to change the settings.
Current value	This displays the status of the registered target. ●: ON -: OFF
Comments	This displays the target comments. Right-click the cell, and then use the menu that appears to switch the comment type.
Reg set	Click this to change the registration type of all selected target to set and to select all their checkboxes.
Reg reset	Click this to change the registration type of all selected target to reset and to select all their checkboxes.
Cancel	Click this to clear the checkboxes of all the selected target.

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Reg	Click this to select the checkboxes of all the selected target.
Delete	Click this to delete the selected target.
Reg device count	Display the number of targets registered for forced set / reset. The cells of the registered devices are displayed in red. You can register up to 32 (16 for the KV Nano Series).

* You can even add devices by dragging the devices that have been written in the ladder editor.

Reference
- You can create a cross reference to a registered device by right-clicking it and using the menu that appears.
- When you register a device for forced sets or resets, the corresponding cells in the "Forced set/reset register" dialog box are displayed in red, and the message "Forced set/reset registration in progress "blinks in the KV STUDIO toolbar.

Event/Error Monitor

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40
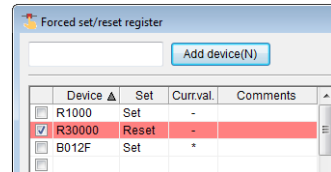
(Monitor)(Editor)(Simulator)   Debug(D) ▶ Event/Error Monitor(E)
(Online Edit)   (Simulator Edit)   (Replay)

Monitor the current status and event/error log of the KV-8000 Series.
Click the "Debug (D)" menu ▶ "Event/Error Monitor (E)."

Reference   The error monitor should be used for the KV-7500/7300/5500/5000/3000 and KV Nano series.

Item	Explanation
PLC status	This displays the current PLC status.
Mode	This displays the operation mode of the PLC.
Switch status	This displays the status of the PLC unit switches.
Calendar timer	This displays the time that the operation mode and switch status information was acquired. Move the mouse pointer over this cell to display a button. Click this button to display the "PLC calendar timer setting" dialog box.

Item	Explanation
Current error	This displays the error that is currently occurring on the PLC. Click the error details to display in the ladder editor the location that caused the error.
Type	This displays the error type as an icon.
No.	This displays the error number.
Description	Display error details, the program that caused the error, and the position where the error occurred (step number).
Date/time	This displays the time that the error occurred.
Unit monitor	Click to display the "Unit Monitor Selection" dialog, and display the unit monitor of the selected unit.
Clear	Click this to clear the items displayed under "Current error."
Event/Error log[*1]	This displays the log of error occurrences. Click the error details to display in the ladder editor the location that caused the error. The number of errors that can be recorded[*] varies depending on the error type. Error (serious error)　：This records the occurrence of an error that caused the PLC operation to stop. Warning (minor error)　：This records the occurrence of an error that did not cause the PLC operation to stop (the PLC remained in RUN mode). Power ON/OFF　：This records the power turning on or off. Alarm relay　：This records the change of an alarm relay (CR3300 to CR3415) from OFF to ON. Event[*2]　：Record the events occurred in the PLC. Device value change[*2]　：Record the device value rewrites occurred in the human machine interface or access window.
Type	This displays the error type as an icon. ⚠ : Minor error (warning) ❌ : Serious error ↻ : Power ON or OFF 📥 : Operation record save trigger occurred 📝 : Operation record save completed ℹ : PLC event log, device value change log
No.	This displays the error number.
Description	Display error details, the program that caused the error, and the position where the error occurred (step number). ▶ : Click to switch to the replay mode. ⬇ : Click to read the operation record to the PC.
Date/time	This displays the time that the event/error occurred.
Update	Update the contents of the event / error history to the latest information.
Clear log	Click this to clear the event/error log.
Save file	Click this to save the event/error log to a CSV format file or a TXT format file.
Close	Click this to close the event/error monitor window.

*1　The maximum number of histories that can be recorded is as follows.

Error Category	Number of Entries
Error (serious error)	32
Warning (minor error)	200 (100 minor errors of the unit and 100 other minor errors)
Power ON or OFF	Power ON: 20, Power OFF: 20
Alarm relay	16
Event	Depending on the log of events occurred
Device value change	10000

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DEBUG

*2   The contents displayed in the event and device value change log are as follows.

■ Event log and device value change log that can be displayed in the event / error monitor

● PLC event log

The PLC event log that can be displayed in the event / error monitor is as follows.

Event name	Target unit	Content
Mode switching	CPU Unit	The operation mode (PROG⇔RUN) has been switched.
Project change	CPU Unit	The project has been changed by transferring the project from KV STUDIO or loading the project from the SD card or CPU memory.
Operation record save trigger occurred	CPU Unit	Operation record save trigger has occurred.
Operation record save completed	CPU Unit	Saving of operation record succeeded or failed.
Memory card	CPU Unit	Memory card slot cover has been opened or closed. Memory card has been mounted or unmounted.
Calendar timer setting change	CPU Unit	Calendar timer settings have been changed.
Alarm	CPU Unit	Alarm relay status has changed.
PLC clear	CPU Unit	Various histories of the PLC have been cleared.
Event buffer overflow	CPU Unit	The history recording cannot catch up as the events have occurred continuously.
Ethernet communication	CPU Unit KV-XLE02	The link status of Ethernet (Normal ⇔ Abnormal) has changed.
Serial communication error	KV-XL202 KV-XL402	A parity error, structure error or overflow error has occurred during serial communication.
Serial communication error	KV-XL202 KV-XL402	Checksum error has occurred during serial communication.

● Device value change log

The device value change log that can be displayed in the event / error monitor is as follows.

• Device value change from the VT5/VT3 series human machine interface

• Device value change from the access window of the CPU unit

• Device value change from the equipment connected via the Modbus server function or KV higher-level link function
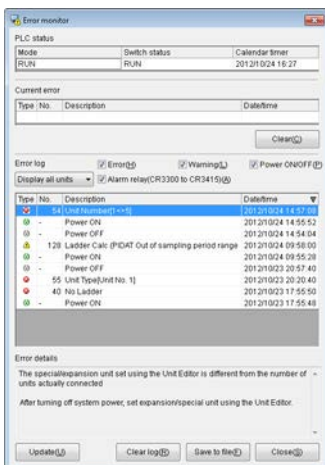
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Error Monitor

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

(Monitor)(Editor)(Simulator)
(Online Edit)(Simulator Edit)

🖳 **"Debug(D)"** ▶ **"Error monitor(E)"**

Monitor the current status and error log of the KV-7500/7300/5500/5000/3000 or KV Nano Series.
Click the "Debug (D)" menu ▶ "Error monitor (E)."

Item		Explanation
PLC status		This displays the current PLC status.
	Mode	This displays the operation mode of the PLC.
	Switch status	This displays the status of the PLC unit switches.
	Calendar timer	This displays the time that the operation mode and switch status information was acquired. Move the mouse pointer over this cell to display a button. Click this button to display the "PLC calendar timer setting" dialog box. With the KV Nano Series, the background is displayed in red when a clock data lost error has occurred.
Current error		This displays the error that is currently occurring on the PLC. Click the error details to display in the ladder editor the location that caused the error.
	Type	This displays the error type as an icon. ⚠ : Minor error (warning). ❌ : Serious error.
	No.	This displays the error number.
	Description	Display error details, the program that caused the error, and the position where the error occurred (step number).
	Date/time	This displays the time that the error occurred.
	Clear	Click this to clear the items displayed under "Current error."
Error log		This displays the log of error occurrences. Click the error details to display in the ladder editor the location that caused the error. The number of errors that can be recorded[*] varies depending on the error type. Error (serious error): This records the occurrence of an error that caused the PLC operation to stop. Warning (minor error): This records the occurrence of an error that did not cause the PLC operation to stop (the PLC remained in RUN mode). Power ON/OFF: This records the power turning on or off. Alarm relay: This records the change of an alarm relay (CR3300 to CR3415) from OFF to ON.

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Item	Explanation
Type	This displays the error type as an icon. ⚠ : Minor error (warning). ❌ : Serious error. 🔵 : Power on or off.
No.	This displays the error number.
Description	Display error details, the program that caused the error, and the position where the error occurred (step number).
Date/time	The times at which errors occurred are displayed in ascending order. Click the title cell to change the sort method to descending order.
Update	Click this to acquire the latest error information from the PLC.
Clear log	Click this to clear the error log.
Save to file	Click this to save the error log to a CSV format file or a TXT format file.
Close	Click this to close the error monitor window.

* The maximum number of entries in the log is shown below.

Error Category	Number of Entries
Error (serious error)	32
Warning (minor error)	32 (KV-7000 Series: 64)*
Power ON or OFF	Power on: 20, power off: 20
Alarm relay	64 (KV Nano Series: 16)

 * For KV-7000 series, it is a total of 32 mild errors due to unit error and 32 other mild errors.

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Input Refresh Disabling

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

(Monitor)(Online Edit)   **"Debug(D)" ▶ "Inhibit input refresh(F)"**

The KV Series has a function for disabling input refreshing.

When input refreshing is disabled, the reading of the PLC input relays (input refreshing) is stopped.

In this situation, you can forcibly turn external input relays ON and OFF from the monitor, which enables you to perform debugging while checking the output of actual equipment.

With the monitor started, click the "Debug (D)" menu ▶ "Inhibit input refresh (F)."

When the function is enabled, a checkmark is displayed next to the menu item.

Click the menu item again to disable the function and clear the checkmark.

> **Reference**
> - The input refresh disabling setting is enabled on all external input relays.
> - The enabled input refresh disabling setting is disabled when the PLC operation mode is changed from PROG to RUN, or when the PLC is turned off and then back on again.

Output Disabling

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

(Monitor)(Online Edit)   **"Debug(D)" ▶ "Inhibit output(O)"**

When you disable output, output is not generated from the external output terminals even when the program is executed.

With the monitor started, click the "Debug (D)" menu ▶ "Inhibit output (O)."
When the function is enabled, a checkmark is displayed next to the menu item.
Click the menu item again to disable the function and clear the checkmark.

> **Reference**
> - The output disabling setting is enabled on all external outputs.
> - The enabled output disabling setting is disabled when the PLC operation mode is changed from PROG to RUN, or when the PLC is turned off and then back on again.

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DEBUG

Scan Time Monitor

KV-8000 KV-7000 KV-5000/3000 KV Nano
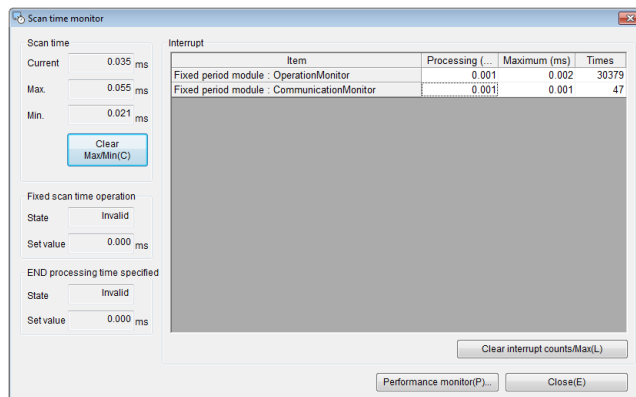KV-1000 KV-700 KV-P16 KV-10/16/24/40

(Monitor)(Editor)(Online Edit)   "Debug(D)" ▶ "Scan time monitor(H)"

Monitor the items related to the KV-8000/7500/7300/5500/5000/3000 or KV Nano Series scan time and the number of times that interrupts occur.
Click the "Debug (D)" menu ▶ "Scan time monitor (H)."

■ For the KV-8000/7500/7300

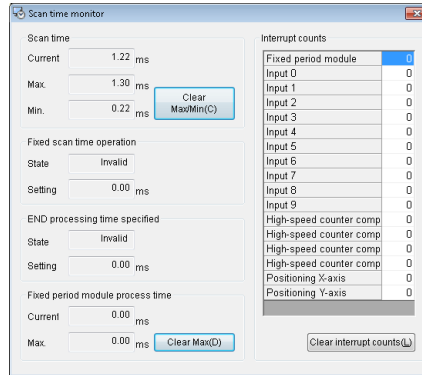| Item	Explanation
Scan time	This displays the monitor information related to the scan time.
Current value	This displays the current value of the scan time.
Max	This displays the maximum value of the scan time during the period from the start of operation (when the mode was switched from PROG mode to RUN mode) to now.
Min	This displays the minimum value of the scan time during the period from the start of operation (when the mode was switched from PROG mode to RUN mode) to now.
Clear Max/Min	Click this to clear the maximum and minimum values to zero.
Fixed Scan time operation	This displays the monitor information related to the fixed scan time operation.
State	This displays whether fixed scan time operation is enabled or disabled.[1]
Setting	This displays the set value of fixed scan time operation.
END processing time specified	This displays the monitor information related to the END processing time.
State	This displays whether END processing time is enabled or disabled.[2]
Setting	This displays the set value of END processing time.
Interrupt	This displays monitor information related to the interrupt processing time and interrupt count.
Item	This displays the cause of interrupt processing.
Processing time	This displays the processing time of the last executed interrupt processing.
Max	This displays the maximum processing time of interrupt processing.
Count	This displays the number of times that interrupts have occurred during the period from the start of operation (when the mode was switched from PROG mode to RUN mode) to now.
Clear Interrupt counts/Max	Click this to clear to zero the number of times that interrupts have occurred and the maximum values for all interrupt processing.
Performance monitor	Click this to display the performance monitor window.

*1 If the "Execute fixed scanning time operation" checkbox under "Scanning time related setting" of "CPU system setting" is selected, "Valid" is displayed. If the checkbox is cleared, "Invalid" is displayed.
   📖 "CPU System Setting Dialog Box" (page 6-49)
*2 If the "Enable END processing time setting" checkbox under "Scanning time related setting" of "CPU system setting" is selected, "Valid" is displayed. If the checkbox is cleared, "Invalid" is displayed.
   📖 "CPU System Setting Dialog Box" (page 6-49)

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■ **For the KV-5500/5000/3000 and KV Nano Series**

Item	Explanation
Scan time	This displays the monitor information related to the scan time.
Current value	This displays the current value of the scan time.
Max	This displays the maximum value of the scan time during the period from the start of operation (when the mode was switched from PROG mode to RUN mode) to now.
Min	This displays the minimum value of the scan time during the period from the start of operation (when the mode was switched from PROG mode to RUN mode) to now.
Clear Max/Min	Click this to clear the maximum and minimum values to zero.
Fixed Scan time operation	This displays the monitor information related to the fixed scan time operation.
State	This displays whether fixed scan time operation is enabled or disabled.[2]
Setting	This displays the set value of fixed scan time operation.
END processing time specified	This displays the monitor information related to the END processing time.
State	This displays whether END processing time is enabled or disabled.[3]
Setting	This displays the set value of END processing time.
Fixed period module processing time[4]	This displays the monitor information related to the fixed period module processing time.
Current[4]	This displays the current value of the fixed period module processing time.
Max[4]	This displays the maximum value of the processing time during the period from the start of fixed period module execution to now.
Clear Max[4]	Click this to clear the maximum value of the fixed period module processing time to zero.
Interrupt	This displays monitor information related to the interrupt processing time and interrupt count.
Item	This displays the cause of interrupt processing.
Processing time[1]	This displays the processing time of the last executed interrupt processing.
Max[1]	This displays the maximum processing time of interrupt processing.
Count	This displays the number of times that interrupts have occurred during the period from the start of operation (when the mode was switched from PROG mode to RUN mode) to now.
Clear Interrupt counts/ Max[1]	Click this to clear to zero the number of times that interrupts have occurred and the maximum values for all interrupt processing.
Performance monitor[1]	Click this to display the performance monitor window.

*1 This item is only displayed when the KV-5500/5000/3000 with CPU function version 2 or later or the KV Nano Series is used. This item is not displayed if the "Enable performance monitor" checkbox in "CPU system setting" is selected but the setting has not been transferred to the PLC. (For the KV Nano Series, this checkbox does not exist.)

*2 If the "Execute fixed scanning time operation" checkbox under "Scanning time related setting" of "CPU system setting" is selected, "Valid" is displayed. If the checkbox is cleared, "Invalid" is displayed.
   📖 "CPU System Setting Dialog Box" (page 6-49)

*3 If the "Enable END processing time setting" checkbox under "Scanning time related setting" of "CPU system setting" is selected, "Valid" is displayed. If the checkbox is cleared, "Invalid" is displayed.
   📖 "CPU System Setting Dialog Box" (page 6-49)

*4 This option is not displayed for the KV Nano Series.

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Performance Monitor

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40
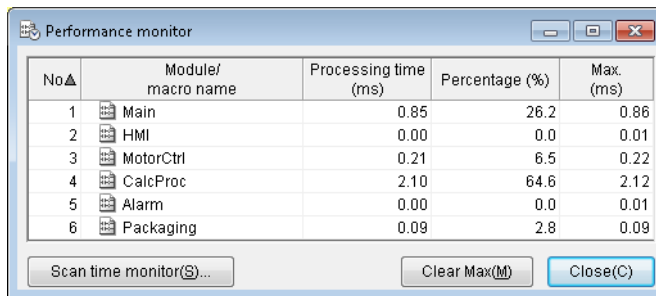
Monitor Editor Online Edit   "Debug(D)" ▶ "Performance monitor(Q)"

Monitor the execution time for each program on the KV-8000/7500/7300/5500/5000/3000 or the KV Nano Series.

Click the "Debug (D)" menu ▶ "Performance monitor (H)."

The performance monitor can be used with KV-8000/7000 Series CPU units, KV-5500/5000/3000 CPU units with CPU function version 2.0 or later and with KV Nano Series base units.

No▲	Module/ macro name	Processing time (ms)	Percentage (%)	Max. (ms)
1	Main	0.85	26.2	0.86
2	HMI	0.00	0.0	0.01
3	MotorCtrl	0.21	6.5	0.22
4	CalcProc	2.10	64.6	2.12
5	Alarm	0.00	0.0	0.01
6	Packaging	0.09	2.8	0.09

Scan time monitor(S)...   Clear Max(M)   Close(C)

Item	Explanation
No	This displays the execution sequence of modules.[1]
Program name	Display the name of the program being monitored.
Processing time	Display the execution time of the program.
Percentage	This displays the percentage of the total processing time that is occupied by this module.[2]
Max	This displays the maximum value of the processing time.[3]
Scan time monitor	Displays the scan time monitor window.
Clear Max	Click this to clear all the maximum values of the program to zero.

[1] Because the execution sequence of modules is displayed, "No" is not displayed for function blocks and macros.

[2] Because the percentage of processing time of modules is displayed, no ratio is displayed for function blocks and macros.

[3] This is initialized to 0 when the mode is switched from PROG mode to RUN mode.

✎ Point	**For KV-5500/5000/3000, when you execute the performance monitor, the scan time of the CPU unit will become longer.**
	📖 **KV-5500/5000/3000 Series User's Manual**

▶ Important	• **• To use the performance monitor with KV-5500/5000/3000, click the "View" menu "CPU system setting" ▶ "Scanning time related setting," and then select the "Enable performance monitor" checkbox.**
	• **If you are using macros and you have disabled modules, the macro name displayed in the performance monitor may be different from the macro name displayed in the "Monitor" tab of the workspace in KV STUDIO Monitor mode or Online Edit mode.**

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Setting the Calendar Timer

(Monitor) (Online Edit)   🔢 **"Debug(D)"** ▶ **"Setup calendar timer(C)"**

Set the built-in calendar timer of the KV-8000/7500/7300/5500/5000/3000/1000/700 or KV Nano
Series.
There are the following three ways to set the calendar timer.

✎ Point	• **In KV STUDIO, you can set the calendar timer to a value in the range of 00:00:00, January 1, 2000 to 23:59:59, December 31, 2037.** • **The calendar timer setting is not available with the KV-N14**.**

■ Matching the calendar timer to the PC's clock

1 **Click the "Debug (D)" menu** ▶ **"Setup calendar timer (C)."**

The "PLC calendar timer setting" dialog box is displayed.

2 **Check that the "Match to PC clock" checkbox is selected, and then click "OK."**

The PLC's built-in calendar timer is changed to match the PC's clock.

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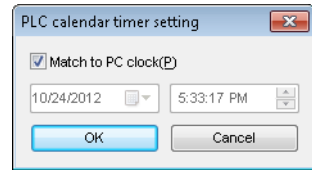
DEBUG

■ Manually entering the date and time

1 **Click the "Debug (D)" menu** ▶ **"Setup calendar timer (C)."**

The "PLC calendar timer setting" dialog box is displayed.

2 **Clear the "Match to PC clock" checkbox, and then set the date and time.**

The calendar timer's date and time are entered.
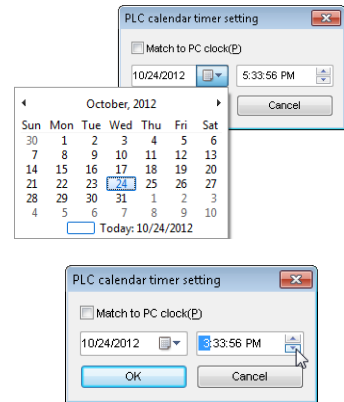
■ Using the KEYENCE VT5/VT3 Series to enter the date and time

When you are using the VT5/VT3 Series, you can enter the touch panel's time into the PLC by enabling the PLC time synchronization setting. Because you can set PLC devices as triggers, you can enter (synchronize) the time based on touch panel operations. Moreover, time can be entered (synchronized) automatically when the system detects that the time data has been cleared.

For detailed instructions, see 📖 "PLC time synchronization" in the VT5 Series Reference Manual and 📖 "PLC time synchronization" in the VT3 Series Reference Manual.
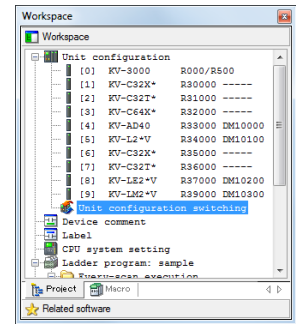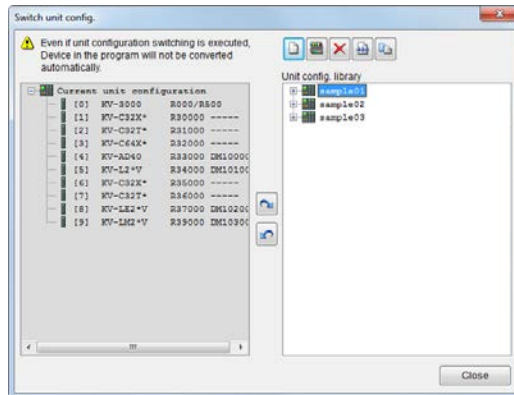
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DEBUG

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Clearing All PLC Devices

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

(**Monitor**)(**Online Edit**)

"Debug(D)" ▶ **"Clear all PLC devices(L)"** ▶ **"Clear all DMs(D)"**

▶ **"Clear all EMs(E)"**

▶ **"Clear all FMs(F)"**

▶ **"Clear all W(W)"**

▶ **"Clear all ZF(Z)"**

▶ **"Clear all Rs (hold)(H)"**

▶ **"Clear all Rs(R)"**

▶ **"Clear all Bs(B)"**

▶ **"Clear all LRs(L)"**

▶ **"Clear all counters(C)"**

▶ **"Initialize kept variable / argument(C)"**

When you clear all the devices, the data memory entries (DM, EM, FM, or ZF), the relays that have been set to be held with the "Power off holding setting" screen in the "CPU system setting" dialog box or with the MEMSW instruction, the latch relay (R), link relay (B), or the counters (C) are all initialized. When you clear all devices during monitoring, the PLC-side devices are cleared to zero.

Click the "Debug (D)" menu ▶ "Clear all PLC devices (L)," and then specify the device that you want to clear to zero.

"Initialize kept variable / argument" is to change the value of the variable, function block or function argument set for keeping to the initial value. If no initial value is set, 0 is stored.

| Reference | • You can only clear all devices when the PLC is in PROG mode.
• "Clear all LRs (L)" is only displayed when the KV-8000/7500/7300/5500/5000/3000/ 1000 or KV Nano Series is selected for the PLC model.
• "Clear all EMs (E)" and "Clear all FMs (F)" are only displayed when the KV-8000/7500/ 7300/5500/5000/3000/1000 is selected for the PLC model.
• "Clear all W (W)" and "Clear all Bs (B)" are only displayed when the KV-8000/7500/ 7300/5500/5000/3000 or KV Nano Series is selected for the PLC model.
• "Clear all ZF (Z)" is only displayed when the KV-8000/7500/7300/5500/5000/3000 is selected for the PLC model.
• "Initialize kept variable / argument (V)" is displayed only in KV-8000 with CPU function version 2.0 or later.

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Clearing KV-D30 CM

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

(Monitor)(Online Edit)   **"Debug(D)" ▶ "Clear CMs for KV-D30(D)"**

Click the "Debug (D)" menu ▶ "Clear CMs for KV-D30 (D)" to start clearing the CM and display the progress of the clear operation on a graph.
The control memory (CM) area used in the operation panel KV-D30 will be initialized.

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DEBUG

MEMO

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DEBUG

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TOOL

This chapter describes various tool functions.

TOOL

This section describes the functions contained in the "Tool (T)" menu.

Unit Editor

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

▦ **"Tool(T)"** ▶ **"Unit Editor(U)"** [Ctrl] + [U]

With the KV-8000/7500/7300/5500/5000/3000/1000/700 or KV Nano Series, you have to register the connected units to the CPU before you execute ladder programs. Use the Unit Editor to select the connected units to create a unit configuration, then, transfer the created unit configuration to the PLC. For details on the Unit Editor, see 📖 "Chapter 3 UNIT EDITOR" (page 3-1).
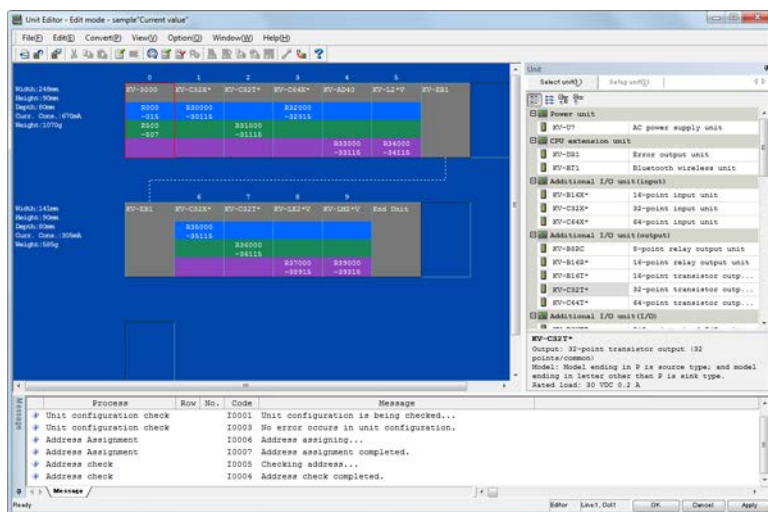
| Reference | When you are using only the base unit and expansion I/O units of the KV Nano Series, you can operate the system even if you do not set the unit configuration.

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TOOL

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Switching the Unit Configuration

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"Unit config switch(N)"**

Click the "Tool (T)" menu ▶ "Unit config switch (N)" to display the "Switch unit configuration" dialog box.

Alternative procedure   Double-click "Unit configuration switching" in the workspace.

| Item		Explanation
Unit configuration library		This displays a multiple unit configurations as a library. The unit configuration library differs depending on the project.
	Create a new file	Click this to create a new unit configuration file. When you specify the name to register to the library, the Unit Editor starts, so set the unit configuration to register.
	Edit	Click this to start the Unit Editor, and then change the registered unit configuration file.
	Delete	Click this to delete the unit configuration file. You will not be able to restore deleted files.
	Rename	Click this to change the name of a registered unit configuration file.
	Save with other name	Click this to copy the selected unit configuration file, and then save it with a different name.
	Set to current unit configuration	Click this to overwrite the current unit configuration with the settings of the selected unit configuration file. A confirmation message asking if you want to register the current unit configuration to the library is displayed.
	Save current unit configuration	Click this to assign a name to the current unit configuration and register it to the library.

✎ Point   **When you use the "Switch unit configuration" dialog box to switch the unit configuration, the devices used by the ladder program will not be converted automatically.**

**12**

TOOL

Logging and Tracing Settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ "Logging/tracing setting"

Logging and tracing refer to the recording of the status of devices with specified timing. Use KV STUDIO to set information such as the devices that you want to record and the triggers, and then save the recorded data to a memory card or CPU memory. The logging data is saved in CSV format, so you can import the data into spreadsheet software such as Excel for analysis.
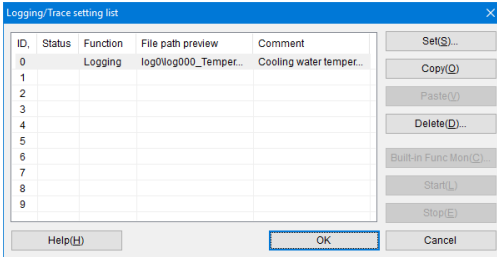
For details on logging and tracing settings, see User's Manual of the CPU unit used.
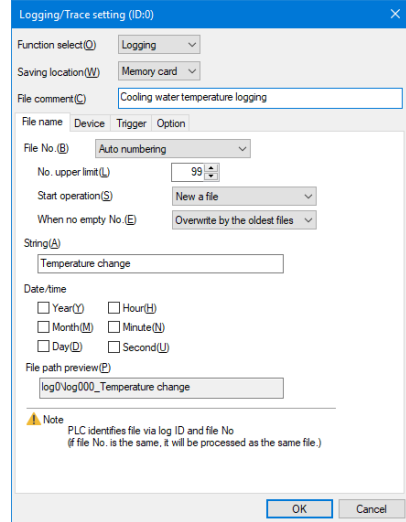
✎ Point	• **Only the tracing function is available on the KV-N14**/N24**/N40**/N60**.**
	• **CPU memory can only be selected as the save destination for the KV-8000/7500/7300.**

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TOOL

Setting Device Default Values

[KV-8000] [KV-7000] [KV-5000/3000] [KV Nano]
[KV-1000] [KV-700] [KV-P16] [KV-10/16/24/40]

▦ **"Tool(T)"** ▶ **"Setup device defaults(V)"**

Set the device default values that are read when the CPU unit starts operation.
Click the "Tool (T)" menu ▶ "Setup device defaults (V)."

Alternative procedure Double-click "Device default" in the workspace.

List of default values
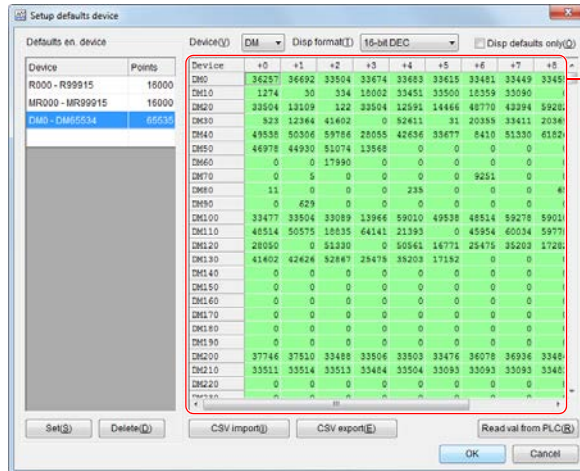
Item		Explanation
Default enable device		Set the enabled range of devices to which default values have been entered.
	Device	This displays the devices and ranges to enable the setting of default values for.[*]
	Points	This displays the number of devices to enable the setting of default values for.[*]
	Setup	Click this to display the "Setup device" dialog box. Set the devices and ranges to enable the setting of default values for.
	Delete	Click this to delete a set device to which default values have been enabled.
Device		Select the type of device that you will set default values for.
Display format		Select the display format of the values displayed in the list of default values.
Display defaults only		When this checkbox is selected, only the devices to which default values have been enabled are displayed.
List of default values		This displays the default values to be set. The leading device numbers are listed vertically, and the offset amounts from the leading device numbers are listed horizontally. The devices to which default values have been enabled are displayed in green.
	Value-entry method	Select the cell whose value you want to enter, and then enter the value directly. When the display format is "ASCII16BIT," double-click the cell to display the "Character string setting" dialog box, and then enter the character string.
CSV/TXT import		Click this to import a device default values file that has been saved in CSV format or TXT format.
CSV/TXT export		Click this to save the set device default values to a file in CSV format or TXT format.
Read value from PLC		Click this to read the current values from the PLC as the default values data.

* Double-click this item to display the "Setup device" dialog box.

Reference After you finish setting the default values, click "OK" to save the data as a device default values setting file (file name: DevInit.dvi). You can import a device default values setting file from another project by clicking the "File (F)" menu ▶ "Import (I)" ▶ "Import device default value (D)."

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TOOL

■ **"Setup device" dialog box**

Click "Set" in the "Setup defaults device" dialog box to display the "Setup device" dialog box.
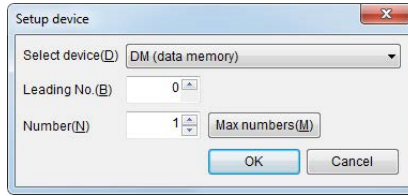
Item	Explanation
Select device	Select the type of the devices that you will enable the setting of device default values for.
Leading No.	Specify the leading number of the devices that you will enable the setting of device default values for.
Number	Specify the number of devices (the range) from the leading number of the devices that you will enable the setting of device default values for.
Max. numbers	Click this to calculate the number of devices from the leading number to the last device number and display this calculated value in the "Number" box.

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TOOL

File Register Settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"Setup File Register(F)"** ▶ **"Create new(A)"**

Add file register settings.

Click the "Tool (T)" menu ▶ "File Register setting (F)" ▶ "Create new (A)".

When you click "Create new (A)," the "Setup file register No." dialog box is

displayed, so specify the save destination and setting number.
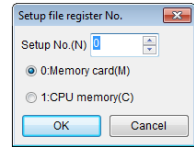
Alternative procedure Double click "File Register" in the workspace.

Reference
- To change the file register settings, select the target setting from the workspace, and then double-click that setting.
- For the KV-5500/5000/3000, "Save destination" will not be displayed, and the file register will be saved to the memory card.
- The file register setting No. can be set between 0 and 999 for each save destination.
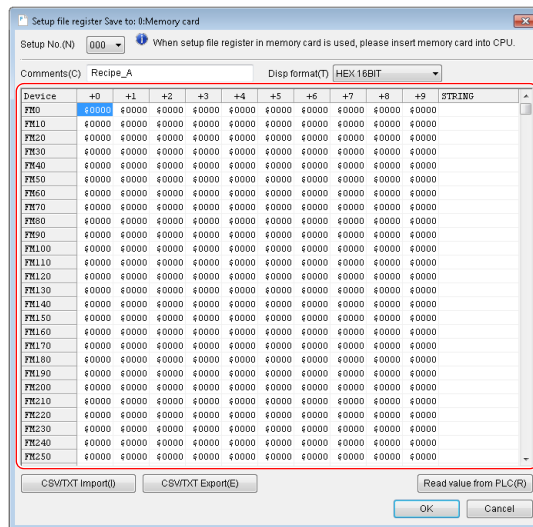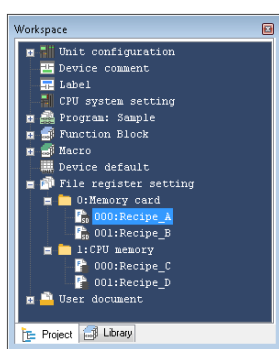
List of file
register settings

Item	Explanation
Setup No.	If multiple sets of file register settings (Setup No.) exist, you can switch between the settings.
Comments	Add a comment to the Setup No. whose file register settings you are editing.
Display format	Select the display format of the values displayed in the list of file register settings.
List of file register settings	This displays the values to set. The leading device numbers are listed vertically, and the offset amounts from the leading device numbers are listed horizontally.
Value-entry method	Select the cell whose value you want to enter, and then enter the value directly. When the display format is "ASCII16BIT," double-click the cell to display the "Character string setting" dialog box, and then enter the character string.
CSV/TXT import	Click this to import a file register settings file that has been saved in CSV format or TXT format.
CSV/TXT export	Click this to save the set file registers to a file in CSV format or TXT format.
Read value from PLC	Click this to read the current FM values from the PLC as the file register settings data.

Reference After you finish setting the file registers, click "OK" to save the data as a file register settings file (file name: FR (Setup No.).fru/.frb). You can import a file register settings file from another project by clicking the "File (F)" menu ▶ "Import (I)" ▶ "Import File Register setting (F)."
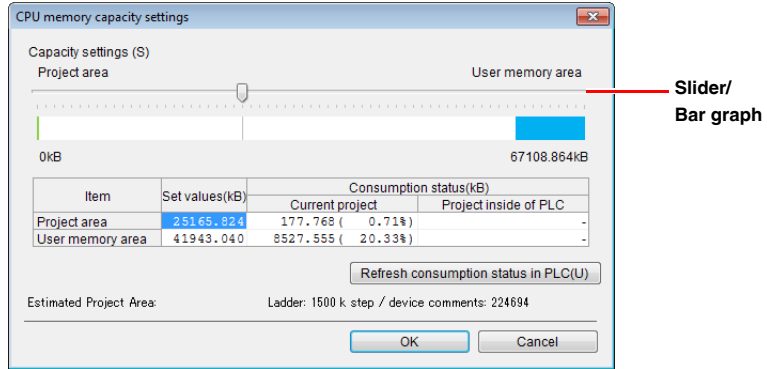
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TOOL

CPU Memory Capacity Settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Set the allocation ratio of the project area and user memory area in the CPU memory.

Click the "Tool (T)" menu ▶ "CPU memory capacity setting (4)."

For details on the CPU memory, see 📖 "KV-8000 Series User's Manual" and "5-3 CPU Memory" in the KV-7000 Series User's Manual.

Item	Explanation
Slider	Drag the slider to set the allocation ratio of the project area and user memory area.
Bar graph	This displays a bar graph showing the consumption status of each area of the project being edited in KV STUDIO. Left side (green): Project area Right side (blue): User memory area
Set value (kB)	This displays the size allocated to each area. It changes automatically as the slider is moved.
Consumption status (kB) — Current project	This displays the consumption status of each area of the project being edited in KV STUDIO. (The consumption ratio of the set value is displayed as a percentage)
Consumption status (kB) — Project in the PLC	This displays the consumption status of each area of the project in the PLC. (The consumption ratio of the set value is displayed as a percentage.) Click "Refresh the internal PLC consumption status" to display this.
Refresh consumption status in PLC	This obtains and displays the internal PLC consumption status from the PLC. *Make sure that the PLC and KV STUDIO can communicate before executing this.
Estimated project area	This displays the space for the ladder program and device comments in the project currently being edited in KV STUDIO.

Point **If the consumption status of each area is above the set value, the program cannot be transferred to the PLC. Adjust the slider so that the consumption status is below the set value, or reduce the amount of data.**

Reference The data stored in each area is as follows.

Project area	User memory area
Unit setting information Device default value settings CPU system settings Programs Device comments Labels	File registers User documents Logging data Other data

The unit settings/unit data/access window settings are in a different area.

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E-Mail Settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

✉ **"Tool(T)"** ▶ **"Built-in Ethernet setting(E)"** ▶ **"Setup mail(E)"**

or "Tool(T)" ▶ **"Expansion unit setting(S)"** ▶ **(Target expansion unit)** ▶ **"Setup mail(E)"**

For details on how to configure e-mail settings see 📖 KV-XLE02 User's Manual, 📖 the KV-LE21V
User's Manual and 📖 the KV Series Ethernet/IP Function User's manual.

E-Mail Communication Command Maker

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

📧 **"Tool(T)"** ▶ **"Built-in Ethernet setting(E)"** ▶ **"Mail command maker(R)"**

or "Tool(T)" ▶ **"Expansion unit setting(S)"** ▶ **(Target expansion unit)** ▶ **"Mail command maker(R)"**

For details on how to use the e-mail communication command maker, see 📖 KV-XLE02 User's
Manual, 📖 the KV-LE21V User's Manual and 📖 the KV Series Ethernet/IP Function User's manual.

Simple PLC Link Settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

📑 **"Tool(T)"** ▶ **"Built-in Ethernet setting(E)"** ▶ **"Simple PLC link setting(G)"**

or "Tool(T)" ▶ **"Expansion unit setting(S)"** ▶ **(Target expansion unit)** ▶ **"Simple PLC link setting(G)"**

For details on how to set the simple PLC link function, see 📖 the KV-LE21V User's Manual and
📖 the KV Series Ethernet/IP Function User's Manual.
The simple PLC link function can be used with the KV-EP21V, KV-LE21V, KV-7500, KV-5500, version
1.1 or later of the KV-5000 and KV-NC1EP.

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TOOL

FTP Client Settings

`KV-8000` `KV-7000` `KV-5000/3000` `KV Nano`
`KV-1000` `KV-700` `KV-P16` `KV-10/16/24/40`

"Tool(T)" ▶ **"Built-in Ethernet setting(E)"** ▶ **"FTP client setting(J)"**

or "Tool(T)" ▶ **"Expansion unit setting(S)"** ▶ **(Target expansion unit)** ▶ **"FTP client setting(J)"**

For details on how to set the FTP client function, see ☐ KV-XLE02 User's Manual, ☐ the KV-LE21V User's Manual and ☐ the KV Series Ethernet/IP Function User's Manual.
The FTP client function can be used with the KV-EP21V, KV-LE21V, KV-7500, KV-5500, version 1.1 or later of the KV-5000 and KV-NC1EP.

Serial PLC Link Settings

`KV-8000` `KV-7000` `KV-5000/3000` `KV Nano`
`KV-1000` `KV-700` `KV-P16` `KV-10/16/24/40`

"Tool(T)" ▶ **"Expansion unit setting(S)"** ▶ **"KV-LM21V setting(Z)"** ▶ **"Serial PLC link setting(Z)"**

or "Tool(T)" ▶ **"Serial PLC link setting(Z)"**

For details on how to set the serial PLC link function, see ☐ the KV-LM21V User's Manual and ☐ the KV Nano Series Built-In Serial Communication Function User's Manual. The serial PLC link function can be used with the KV-LM21V (KV-8000/7000/5000/3000 Series), KV-N11L and KV-NC20L (KV-Nano Series).

CPU Positioning Parameter Settings

`KV-8000` `KV-7000` `KV-5000/3000` `KV Nano`
`KV-1000` `KV-700` `KV-P16` `KV-10/16/24/40`

"Tool(T)" ▶ **"CPU positioning parameter setting(I)"**

What are CPU positioning parameter settings?
The KV-5500/5000/3000/1000/700 and KV Nano Series PLC have a pulse output function for position and speed control. This function enables you to control equipment such as stepping motors and pulse-type AC servo motors. By editing the CPU positioning parameters, you can set parameters for trapezoidal control such as the starting speed, the operating speed, the acceleration time, and the deceleration time. There are two types of parameters: point parameters and system parameters.

Point parameters . . . . . . These parameters, such as the travel target point (position), operating and starting speed, and acceleration and deceleration time, are the basic parameters for trapezoidal control.
System parameters . . . . These parameters are used to set the sensor input, pulse output, comparator, origin returning operation, and JOG operation.

Main functions
KV-5500/5000/3000/1000/700
- You can use KV STUDIO to set up to 32 point parameters in advance. If more than 32 point parameters are required, use the ladder program to modify the contents of control memory (CM).
- You can choose from two control modes: position control and speed control. You can set the target value or the travel amount as a relative value or absolute value.
- You can output pulses for two axes and you can set the frequency of the pulse for each axis to a value within the range of 50 Hz to 100000 Hz.
- For the pulse output mode, both the 1-pulse mode and the 2-pulse mode are supported, so you can switch between modes to select the one that matches the mode of the connected motor driver.

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TOOL

KV Nano Series
- You can use KV STUDIO to set up to 20 point parameters for each axis in advance. If more than 20 point parameters are required, use the ladder program to modify the contents of control memory (CM). (With the KV Nano Series, you have to set the range of point parameters for power off holding in the CPU system settings—by default, points 1 to 10 will be held.)
- You can choose from two control modes: position control and speed control. You can set the target value or the travel amount as a relative value or absolute value.
- Depending on the model, you can output pulses for between two and four axes and you can set the frequency of the pulse for each axis to a value within the range of 1 Hz to 100000 Hz.
- For the pulse output mode, both the 1-pulse mode and the 2-pulse mode are supported, so you can switch between modes to select the one that matches the mode of the connected motor driver.

Follow the procedure below to start the "CPU positioning parameter edit" tool. (The following procedure is for the KV-5500/5000/3000/1000/700.)

1 **Click the "Tool (T)" menu ▶ "CPU positioning parameter setting (I)."**

The "CPU positioning parameter setting" tool starts.
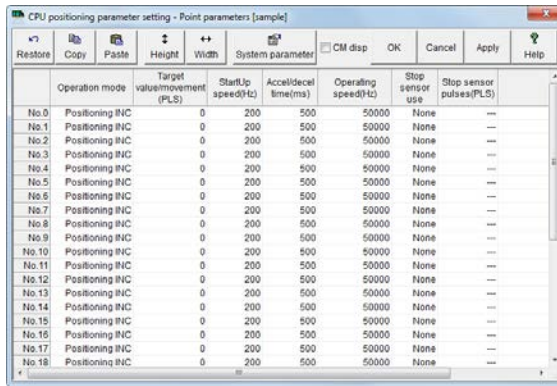
2 **Edit the parameters.**

Set parameters such as the point parameters and system parameters.

Parameter to Set		Description
Point parameter		Set the operation details for each point.
System parameter	I/O setting	Configure input settings such as sensors and Z-phase and set the pulse output mode.
	Comparator setting	Set the operations of comparators 0 to 2.
	Origin returning	Set the origin returning operation.
	JOG	Set the jog operation.

For details on how to set each parameter, see 📖 "2-12 Motor (positioning) control" in KV-5500/5000/3000 Series User's Manual.

3 **When you have finished editing parameters, close the "CPU positioning parameter edit" screen.**

The point parameters and system parameters that you have set are saved to file.
Use positioning instructions when you write the ladder program.

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TOOL

CPU High-Speed Counter Setting Wizard

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"CPU high-speed counter setting wizard(H)"**

Start the setting wizard for the high-speed counter of the CPU built-in functions.
For detailed instructions on how to operate the CPU high-speed counter setting wizard, see 📖 "2-8 High-speed counter" in the KV-5500/5000/3000 Series User's Manual or 📖 "5-4 High-Speed Counter" in the KV Nano Series User's Manual.

EtherNet/IP Settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"Built-in Ethernet setting(E)"** ▶ **"EtherNet/IP setting(W)"**

or "Tool(T)" ▶ **"Expansion unit setting(S)"** ▶ **(Target expansion unit)** ▶ **"EtherNet/IP setting(W)"**

Start the Ethernet/IP setting tool for the EtherNet/IP unit.
The Ethernet/IP function can be used with the KV-XLE02/KV-EP21V/KV-NC1EP/KV-8000/7500/5500.
For details on how to configure the settings, see 📖 KV-XLE02 User's Manual, 📖 the KV Series Ethernet/IP Function User's Manual.

KV-XH settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"Expansion unit setting(S)"** ▶ **"KV-XH Setting(X)"**

The various settings screens of the KV-XH16EC/XH16ML/XH04ML are displayed here.
For details on how to set up the KV-XH16EC/XH16ML/XH04ML, refer to 📖 the "KV-XH16ML/XH04ML User's Manual", 📖 the "KV-XH16EC User's Manual"

✎ Point	**To display the various setting screens of the KV-XH16EC/XH16ML/XH04ML, you need to use the unit editor to place the position determination/motion unit KV-XH16EC/XH16ML/XH04ML in advance.** 📖 **"Chapter 3 UNIT EDITOR" (page 3-1)**

KV-SH settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"Expansion unit setting(S)"** ▶ **"KV-SH Setting(S)"**

The various setting screens of the KV-SH04PL are displayed here.
For details on how to set up the KV-SH04PL, refer to 📖 the "KV-SH04PL User's Manual"

✎ Point	**To display the various setting screens of the KV-SH04PL, you need to use the unit editor to place the position determination unit KV-SH04PL in advance.** 📖 **"Chapter 3 UNIT EDITOR" (page 3-1)**

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Communication positioning parameter setting

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

📊 **"Tool(T)"** ▶ **"Expansion unit setting(S)"** ▶ **"KV-LH setting(Q)"** ▶ **"Communication positioning parameter setting)(Q)"**

Start the KV-LH20V communication positioning parameter setting software.
For detailed instructions on how to operate the Communication positioning parameter setting software, see 📖 the KV-LH20V User's Manual.

KV MOTION+

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

📇 **"Tool(T)" "Expansion unit setting(S)"** ▶ **"KV-ML/MC setting(T)"** ▶ **"KV MOTION+(T)"**

Start the positioning/motion unit parameter setting software (KV MOTION+).
For detailed instructions on how to operate KV MOTION+, see 📖 the KV-ML/MC Setting Tool (KV MOTION+) User's Manual.

> ✎ **Point** **Before you use the KV-ML/MC setting tool (KV MOTION+), you have to configure a positioning/motion unit KV-ML16V/MC40V/MC20V in the Unit Editor.**
> 📖 **"Chapter 3 UNIT EDITOR" (page 3-1)**

MOTION BUILDER

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

📇 **"Tool(T)"** ▶ **"Expansion unit setting(S)"** ▶ **"KV-H20S/40S/20G Setting(M)"** ▶ **"MOTION BUILDER(M)"**

Start the positioning unit parameter setting software MOTION BUILDER.
For detailed instructions on how to operate MOTION BUILDER, see 📖 the MOTION BUILDER User's Manual.

> ✎ **Point** **Before you use MOTION BUILDER, you have to configure a positioning unit KV-H20/H20S/H40S/H20G in the Unit Editor.**
> 📖 **"Chapter 3 UNIT EDITOR" (page 3-1)**

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TOOL

Positioning unit simple setting

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"Expansion unit setting(S)"** ▶ **"KV-H20S/40S/20G setting(S)"** ▶ **"Positioning unit simple setting(S)"**

The simple setting function of the positioning unit is a function for setting the parameters of the KV-H20S/H40S/H20G positioning unit. This function collects only the often-used parameters from those that are required for the positioning unit, which enables you to easily set these parameters from the screen in which you are creating the ladder program.

The settings that you can edit with the simple setting function are shown below.

- Point parameters . . . . . For each point, set the operation mode, target value or travel amount, operating speed, stop sensor usage, and number of stop sensor standard pulses.
- System parameters. . . . Set the items related to I/O settings, the origin returning and JOG operations, and the operating speed.
  These are parameters that are common to all operation.
- Speed parameters . . . . Set speed number 1 to 16.

For detailed instructions on how to operate the simple setting function of the positioning unit, see 📖 the KV-700 Series Positioning Unit Simple Setting Software User's Manual.

✎ Point	• **You can use this function when the KV-H20S/H40S/H20G positioning unit is selected.**
	• **The simple setting function does not support the KV-H20 positioning high-speed counter unit.**
	• **Modem mode does not support the transfer of parameters.**

MV LINK STUDIO

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

📇 **"Tool(T)"** ▶ **"Expansion unit setting(S)"** ▶ **"MV-L40 setting(Y)"** ▶ **"MV LINK STUDIO(Y)"**

Start the MV-L40 parameter setting software MV LINK STUDIO.
For detailed instructions on how to operate MV LINK STUDIO, see 📖 the Parameter Settings Monitoring Software MV LINK STUDIO User's Manual.

✎ Point	**Before you use MV LINK STUDIO, you have to configure an MV-L40 in the Unit Editor.**

KV-XLE setting

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"Expansion unit setting(S)"** ▶ **"KV-XLE setting (E)"**

Displays various setting screen of KV-XLE 02.
For detailed setting of KV - XLE 02, refer to 📖 "KV - XLE 02 User 's Manual".

✎ Point	**To display various setting screen of KV - XLE 02, it is necessary to arrange KV-XLE02 with unit editor.**
	📖 **"Chapter 3 UNIT EDITOR" (page 3-1)**

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KV-XL setting

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

<div align="center">

"Tool(T)" ▶ **"Expansion unit setting(S)"** ▶ **"KV-XL setting (L)"**

</div>

Displays various setting screen of KV-XL202 / XL402.

For detailed setting of KV-XL202 / XL402, refer to 📖 "KV-XL202 / XL402 User's Manual".

✎ Point	**To display various setting screen of KV-XL202 / XL402, it is necessary to arrange KV-XL202 / XL402 with unit editor.** 📖 **"Chapter 3 UNIT EDITOR" (page 3-1)**

PROTOCOL STUDIO

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"Expansion unit setting(S)"** ▶ **"KV-L2*V setting(P)"** ▶ **"PROTOCOL STUDIO(P)"**

Start the KV-L2*V/R communication macro support software PROTOCOL STUDIO.

For detailed instructions on how to operate PROTOCOL STUDIO, see 📖 the KV-L21V User's Manual and the KV-L20V User's Manual.

✎ Point	• **Before you use PROTOCOL STUDIO, you have to configure a KV-L2*V/R in the Unit Editor and set the operation mode to PROTOCOL STUDIO mode.** • **After PROTOCOL STUDIO has started, you can edit ladder programs, but if you change the unit setting information while PROTOCOL STUDIO is starting, the communication protocols that you have set in PROTOCOL STUDIO will not operate normally. Be sure to exit PROTOCOL STUDIO before you change the unit setting information.**

PROTOCOL BUILDER

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"Expansion unit setting(S)"** ▶ **"KV-L20 setting"** ▶ **"PROTOCOL BUILDER(Z)"**

Start the KV-L20 protocol macro function setting software PROTOCOL BUILDER.

For detailed instructions on how to operate PROTOCOL BUILDER, see 📖 the PROTOCOL BUILDER User's Manual.

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KV-CA02 Settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

Tool(T) ▶ **Expansion unit setting(S)** ▶ **KV-CA02 Setting(C)**

Set the camera connected to KV-CA02.

For the detailed setting method of the camera, refer to 📖 "KV-CA02 User's Manual".

> ✏ **Point**
>
> **To display the camera setting screen, it is necessary to con-figure KV-CA02 through the Unit Editor in advance.**
> 📖 **"Chapter 3 UNIT EDITOR" (page 3-1)**

KV-CL20 Settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"Expansion unit setting(S)"** ▶ **"KV-CL20 Setting(C)"**

Start the CC-Link unit KV-CL20 setting tool.

For detailed instructions on how to operate the KV-CL20 setting tool, see 📖 the KV-CL20 User's Manual.

KV-DN20 Settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"Expansion unit setting(S)"** ▶ **"KV-DN20 Setting(D)"**

Start the device network unit KV-DN20 setting tool.

For detailed instructions on how to operate the KV-DN20 setting tool, see 📖 the KV-DN20 User's Manual.

Panel Editor

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"Panel editor(N)"**

For detailed instructions on how to operate the panel editor, see 📖 the Display Internal Panel Installation PLC KV-P Series User's Manual.

KL Address Settings

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"KL address setting(L)"**

Start the KL Series address setting software.

For detailed instructions on how to operate the KL series address setting software, see 📖 the KL Master Station Unit KL-N20V User's Manual.

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KV STUDIO RECORDER

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"KV STUDIO RECORDER(A)"**

You can use the KV STUDIO RECORDER to record the video of up to one hour of the KV STUDIO operation data and monitor data to a PC. When you stop recording video, the recorded data is saved. You can use KV STUDIO PLAYER to play back the data.

✎ Point	• **KV STUDIO RECORDER is a tool that has been optimized for recording the video content displayed in KV STUDIO. During video recording, the content that is displayed on the top layer of the PC will be recorded. However, regarding the display of contents from applications other than KV STUDIO, the image quality may decrease and the file size may increase.** • **You cannot start multiple instances of KV STUDIO RECORDER.** • **During video recording, the following functions will be disabled.** The starting of the screen saver, desktop wallpaper, the full drag setting, and the Aero function (when using Windows 10/8/7) • **When you are using Windows 10/8/7, you have to log in as a user with "Administrator" rights or higher.** • **The image quality of the recorded video of the file may decrease depending on factors such as the performance of the PC that you are using.** • **When negative values are used in coordinates on a display other than the primary display, you cannot use KV STUDIO RECORDER.**

1 **Click the "Tool (T)" menu** ▶ **"KV STUDIO RECORDER (A)."**

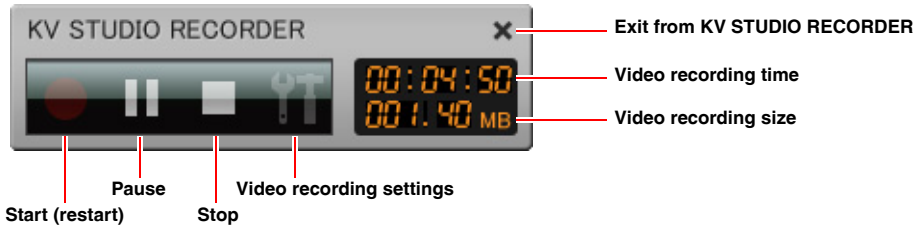When KV STUDIO RECORDER starts, the "Video recording frame" and the "KV STUDIO RECORDER" dialog box are displayed.

2 **Use the mouse to adjust the position and size of the "Video recording frame" to match the area whose video will be recorded.**
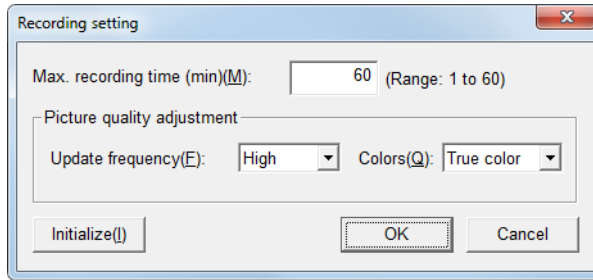

"Video recording frame"

"KV STUDIO RECORDER" dialog box
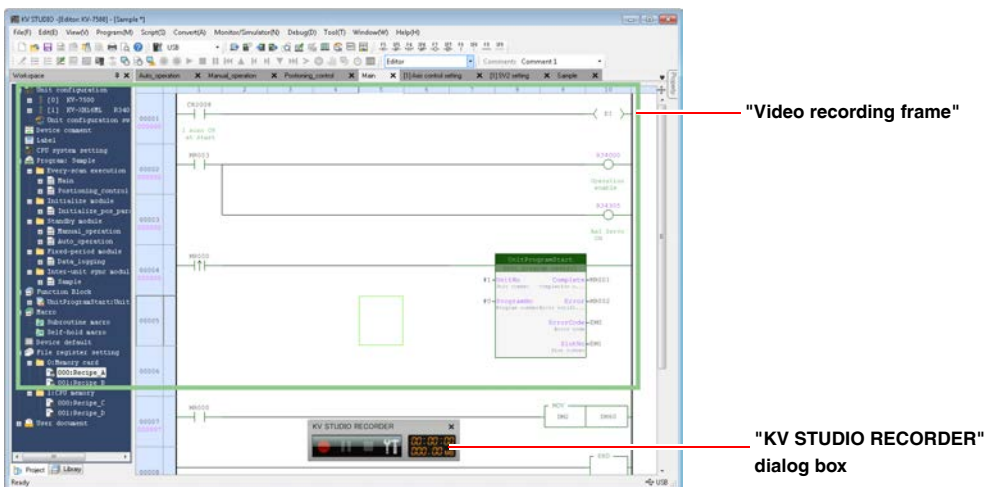
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TOOL

3 **Use the "KV STUDIO RECORDER" dialog box to start and stop video recording.**

When you stop video recording, the recorded content is saved to a file.

KV STUDIO RECORDER

Exit from KV STUDIO RECORDER

00:04:50   **Video recording time**

001.40 MB   **Video recording size**

Pause   **Video recording settings**

Start (restart)   **Stop**

● **Recording settings**

Recording setting

Max. recording time (min)(M):   60   (Range: 1 to 60)

Picture quality adjustment

Update frequency(F):   High   Colors(Q):   True color

Initialize(I)   OK   Cancel

Item		Explanation
Max. recording time(min)		Set the maximum video recording time to a value within the range of 1 to 60 (minutes). During video recording, if the maximum video recording time elapses, video recording will be stopped automatically.
Picture quality adjustment	Update frequency	Set the update period of video recording to high, medium, or low. (The default value is high.)
	Colors	Set the number of colors to use during video recording to full color or 256 colors. (The default value is true color.)
Initialize		Click this to restore the video recording settings to their default values.

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TOOL

KV STUDIO PLAYER

KV-8000 | KV-7000 | KV-5000/3000 | KV Nano
KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40

"Tool(T)" ▶ **"KV STUDIO PLAYER(B)"**

You can use KV STUDIO PLAYER to play back files whose video has been recorded using KV STUDIO RECORDER.

> ✎ **Point**
> - **400 MB or more free space must be available on the hard disk when KV STUDIO PLAYER is used.**
> - **You cannot start multiple instances of KV STUDIO PLAYER.**
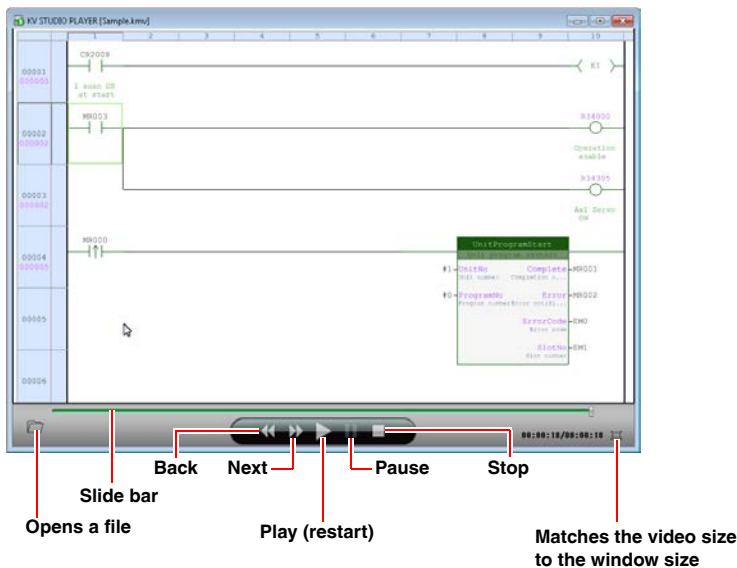
1 **Click the "Tool (T)" menu ▶ "KV STUDIO PLAYER (B)."**

When KV STUDIO PLAYER starts, the "KV STUDIO PLAYER" window is displayed.

> (Alternative procedure)
> You can start KV STUDIO PLAYER as a standalone application by clicking "All Programs" on the Windows "Start" menu ▶ "KEYENCE KV STUDIO Ver.**" ▶ "tool" ▶ "KV STUDIO PLAYER."
>
> * ** is the version of KV STUDIO.

2 **Open a file whose video you recorded using KV STUDIO RECORDER, and then play back the file.**

Back Next Pause Stop

Slide bar

Opens a file

Play (restart)

Matches the video size
to the window size

> ✎ **Point**
> **Movement using the back and next icons and the slide bar is only valid for the read video recording data (the green bar).**

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TOOL
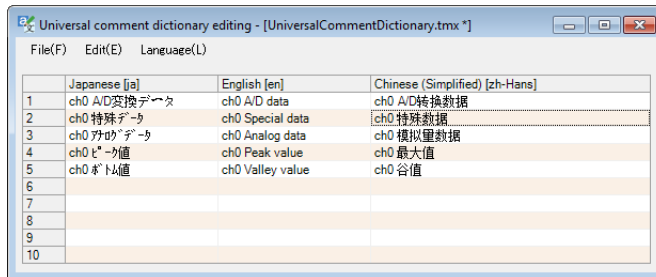
Universal Comments Dictionary Edit

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"Universal Comments Dictionary Edit(6)"**

Edit the universal comment dictionary in the below screens when using the translation function.

- Device comment edit window (page 6-16)
- "Device Use List" (page 6-39)
- "Message editor" (page 6-74)

Click "Tool (T)" ▶ "Universal Comments Dictionary Edit (6)" in the menu.

Item	Explanation
ID	A translation can be entered for each ID. By default, IDs 1 to 10 are displayed. If a character string is entered into the lowest line, a new ID is automatically added.
Character string editing area	A character string can be entered for each language. In the initial state, you can enter with English, Japanese, Simplified Chinese, Traditional Chinese, Korean and Spanish. You can add various languages from the universal comments dictionary edit menu "Edit (E)" ▶ "Translation Language Settings (S)".

Opening a Translation Memory

"File(F)" ▶ **"Open(N)"** Ctrl + O

Click "File (F)" from the universal comment dictionary editing menu ▶ "Open (N)" to specify the existing universal comment dictionary file (.tmx).

Saving a Translation Memory

"File(F)" ▶ **"Save(S)"** Ctrl + S

Click "File (F)" from the universal comment dictionary editing menu ▶ "Save (S)" to save (overwrite) the universal comment dictionary currently being edited.

Saving a Translation Memory With a New Name

"File(F)" ▶ **"Save as(A)"**

Click "File (F)" from the universal comment dictionary editing menu ▶ "Save as (A)" to save the universal comment dictionary currently being edited under a new name.

Close

"File(F)" ▶ **"Close(C)"**

Click "File (F)" from the universal comment dictionary editing menu ▶ "Close (C)" to close the universal comment dictionary currently open.

Import

"File(F)" ▶ **"Import(I)"**

Click "File (F)" from the universal comment dictionary editing menu ▶ "Import (I)" to import the existing universal comment dictionary contents specified to the user translation memory currently being edited.

Cut, Copy, Paste and Delete

"Edit(E)" ▶ **"Cut(T)"** Ctrl + X
"Edit(E)" ▶ **"Copy(C)"** Ctrl + C
"Edit(E)" ▶ **"Paste(P)"** Ctrl + V
"Edit(E)" ▶ **"Delete(Y)"** Del

Select an area and cut, copy, paste or delete that area.

Configuring Translation Language Settings

"Edit(E)" ▶ **"Translation language settings (S)"**

Languages can be added, deleted, or sorted by clicking "Edit (E)" ▶ "Translation language settings (S)" in the universal comment dictionary editing menu.

Setting the Display Language

"Language(L)" ▶ **"English(E)"**
"Language(L)" ▶ **"Simplified Chinese(C)"**
"Language(L)" ▶ **"Traditional Chinese(T)"**
"Language(L)" ▶ **"Japanese(J)"**
"Language(L)" ▶ **"Korean(K)"**

Switch the menu display of "Universal Comment Dictionary Editing" from the languages below.
The change is applied when "Universal Comment Dictionary Editing" is opened again.

English
Simplified Chinese
Traditional Chinese
Japanese
Korean

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TOOL

About translation operation

Describes details of the translation operation, such as when a different translation is registered in the dictionary with the same word.

Translates according to the following rules for the translation.

- Do not translate in the case of source language's words are registered in the dictionary, but the words for target language are not registered (blank).
- Uppercase and lowercase letters, halfwidth and double-byte characters (including space characters) are not distinguished.
- In the case of a target language is a language divided by spaces such as English, translation will be performed with a one-byte space between words.
- In the case of words in the dictionary multiple hit in the language of translation source language, translate according to the following priority order.

  (1) <u>Registration order in dictionary</u>
      Prioritize translation in order of registration in the dictionary (those registered above).

  (2) <u>Length of matching character string</u>
      Preferentially translate words with long character strings matching the translation source language.
      Example:

      Product Work   Work
      Number No   No
      Product number   Product Number

      n the case of above etc is registered, to translate " Product number ", the perfectly matched long character string "Product Number" will first match and is translated as "Product Number".

  (3) <u>Length of character string of target language</u>
      If character string lengths matching translation source language are the same "abbreviation is priority", the abbreviation (the string with short string length of target language) takes precedence.
      Example:

      Product number   Product Number
      Product number   ProductNum
      Product number   ProductNo

      In the case of above is registered, it will normally be translated into the topmost sentence, but if 'Prioritize abbreviation' is selected, it will be translated to "ProductNo".

  (4) <u>Dictionary type</u>
      When terminologies originally registered during KV STUDIO installation overlapping with them additionally registered as dictionaries, preferentially use the terminologies registered additionally.

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TOOL

Checking the Function Version

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"Functional version validation(X)"** ▶ **"PLC(P)"**

Display the function version of the connected PLC.

The system program of a PLC connected to a KV-8000/7000 Series and KV Nano Series system can be updated when it gets old.

■ KV-8000/7000 Series

Use the dialog box shown below to display type, function version and serial number of the unit configuration.
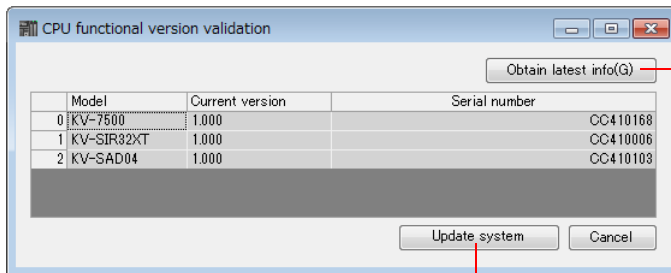
Check the version by communicating with the currently connecting PLC.

Updates the system program.

● Updating the system program

If the function version of the units is old, use the system program to update it.

✎ Point	• **System program updates can be carried out in PROG mode.**
	• **System program updates can be carried out only during USB communications.**

NOTICE	• **Do not turn the unit off when updating the system program. The unit may not be able to run correctly.**
	• **When updated, all clear is carried out on the unit and ladder programs are also deleted. Before updating the system program, create program backups as necessary.**
	• **Stop all PLC communication before carrying out system program updates.**

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TOOL

1 Click the [Update system program] button.

The [Update system program] dialog box appears.

Select the unit for which system program is to be updated, and then check the "Update" check box.

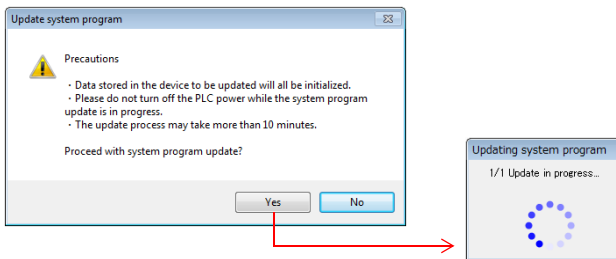Select "Version after update", and then select the target version from the pull-down menu.

	Model	Current version	Up	Version after update	Serial number
0	KV-7500	1.000	✓	1.100	CC410168
1	KV-SIR32XT	1.000	☐	(Will not be updated)	CC410006
2	KV-SAD04	1.000	☐	(Will not be updated)	CC410103

⚠ Connect PLC via USB.

⚠ Program will be deleted once the system program is updated.

⚠ Please do not turn off the power until the update has completed.
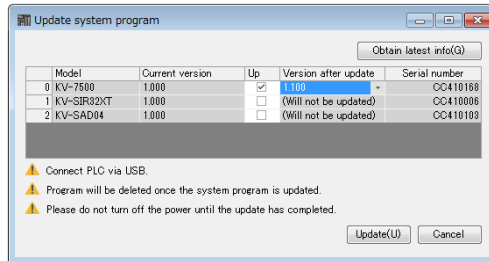
Reference	You can select a version older than the current one to downgrade to that older version.

Point	• **To update the current version to the latest one, you need to update KV STUDIO to the latest version in advance. You can download the KV STUDIO updater from our web site.** • **The "Update" check box can be only checked when updates for the current version are available for units.**

2 Click the [Update] button.

A system program update begins.

Update system program

Precautions

⚠ · Data stored in the device to be updated will all be initialized.
· Please do not turn off the PLC power while the system program update is in progress.
· The update process may take more than 10 minutes.

Proceed with system program update?

[Yes] [No]

Updating system program

1/1 Update in progress...

■ KV-5000/3000 Series

The dialog box shown below appears to display type and function version of the CPU unit.
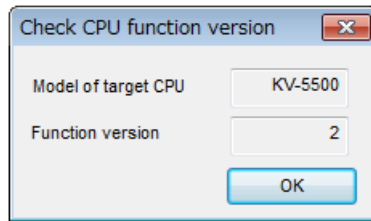
■ KV Nano Series

The dialog box shown below appears to display type and function version of the CPU unit.
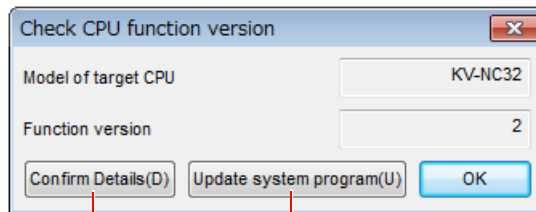
Displays an explanation.　　　**Updates the system program.**

● Updating the system program

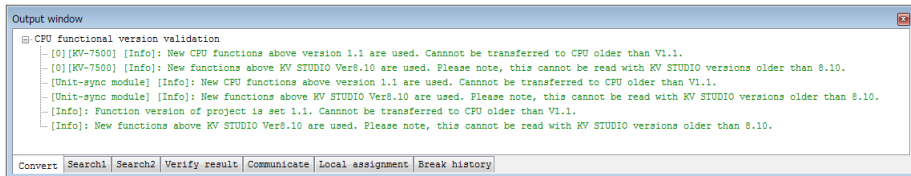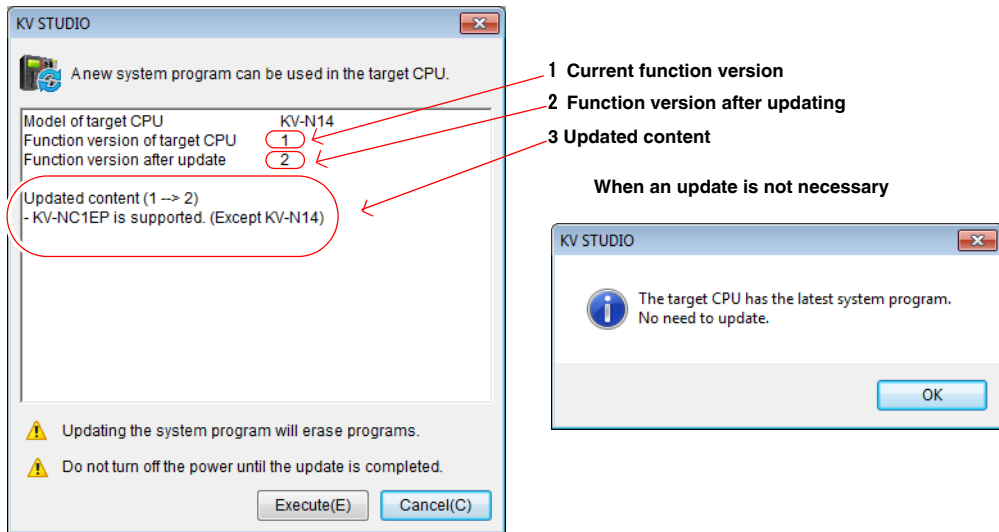If the CPU unit function version is old, update the system program to update the version.

📖 "Checking the CPU function version (Updating the system program)" (page 12-27)

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TOOL

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Checking the Function Version (Project)

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"Check function version (X)"** ▶ **"Project(J)"**

Display the function version compatible with functions used in the project and related precautions in the output window.

```
Output window                                                                              ☒
☐ CPU functional version validation
   ├ [0][KV-7500] [Info]: New CPU functions above version 1.1 are used. Cannnot be transferred to CPU older than V1.1.
   ├ [0][KV-7500] [Info]: New functions above KV STUDIO Ver8.10 are used. Please note, this cannot be read with KV STUDIO versions older than 8.10.
   ├ [Unit-sync module] [Info]: New CPU functions above version 1.1 are used. Cannnot be transferred to CPU older than V1.1.
   ├ [Unit-sync module] [Info]: New functions above KV STUDIO Ver8.10 are used. Please note, this cannot be read with KV STUDIO versions older than 8.10.
   ├ [Info]: Function version of project is set 1.1. Cannnot be transferred to CPU older than V1.1.
   └ [Info]: New functions above KV STUDIO Ver8.10 are used. Please note, this cannot be read with KV STUDIO versions older than 8.10.

Convert  Search1  Search2  Verify result  Communicate  Local assignment  Break history
```

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TOOL

Checking the CPU function version (Updating the system program)

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ "Functional version validation (X)" ▶ "System program update (U)"

From KV STUDIO, update the system program on the connected base unit.

✎ Point	• **System program updates can be carried out in PROG mode.**
	• **System program updates can be carried out only during USB communications.**

NOTICE	• **Do not turn the unit off when updating the system program. The unit may not be able to run correctly.**
	• **When updated, all clear is carried out on the unit and ladder programs are also deleted. Before updating the system program, create program backups as necessary.**
	• **Stop all PLC communication before carrying out system program updates.**

1 Select "Tool (T)" ▶ "Functional version validation (X)" ▶ "Update system program (U)". The below dialog box is displayed. Confirm that the KV Nano Series and USB cable are connected, and click "OK".

> **Alternative procedure** Click the [Update system program] button in the [Check the CPU Function Version] dialog box.

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TOOL
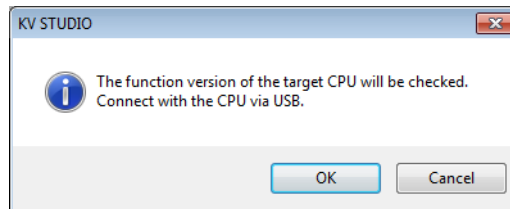
2 **Check if the connected KV Nano Series is the latest version. If it is not the latest version, click the "Execute" button to start a system version update.**

1 **Current function version**

2 **Function version after updating**

3 **Updated content**

When an update is not necessary

3 **Click "Execute" to update the PLC unit function version.**
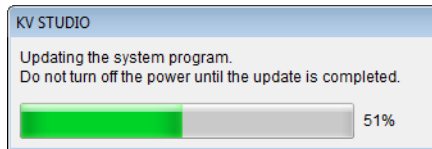
4 **The dialog below is displayed when the update is complete.**
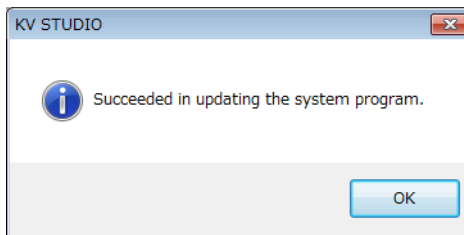
| Point | If there is other communication between the PLC unit and computer when the system program update is executed, the following dialog is displayed and the system update does not start. |

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TOOL

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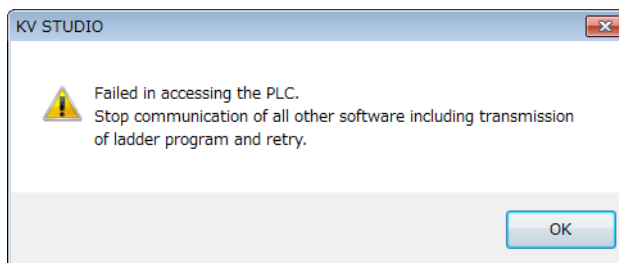
Setting the KV STUDIO Language

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"KV STUDIO language setting (2)"**

Set the KV STUDIO language. You can create projects in many different languages regardless of the OS language by changing the language settings.

Click the "Tool (T)" menu ▶ "KV STUDIO language setting (2)."
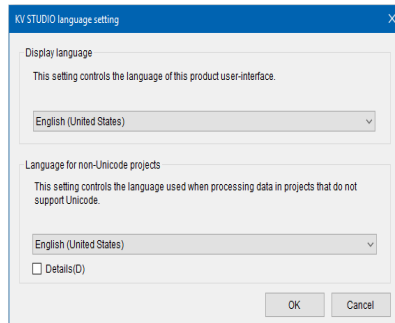
Item	Explanation
Display language*	Select a display language for KV STUDIO from Japanese, English, Chinese (Simplified), Chinese (Traditional), and Korean.
Project languages not supported by Unicode	Select the language in which character strings that are not supported by the project's Unicode are processed. In the initial state, you can choose from Japanese, English, Chinese (Simplified), Chinese (Traditional) and Korean.
Advanced settings	When this is checked, languages other than Japanese, English, Chinese (Simplified), Chinese (Traditional) and Korean can be set in "Project languages not supported by Unicode". Languages that are registered in the OS can be selected.

* The language can only be changed in the KV-STUDIO global edition.

✎ **Point**

- **If a project created using a version of KV STUDIO with a different "Project languages not supported by Unicode" setting is opened, it may fail to load, or some character strings may be replaced with question marks. Close the project, and then change the language settings so that the KV STUDIO and project settings are the same, then re-open the project.**
- **KV STUDIO language settings can only be configured when all projects are closed.**
- **Programs cannot be copied between projects with different "Project languages not supported by Unicode" settings.**

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TOOL

Clear PLC

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"Clear PLC(1)"**

Execute RAM clear, clearing the user memory or a clear all operation from KV STUDIO against the connecting basic unit.

> **Reference** You can execute a PLC clear operation even when KV STUDIO has been started but no projects have been started.

> **Point**
> - **This operation is available only with the KV-8000/7000 Series or KV Nano Series.**
> - **The user memory clear is displayed only in the KV-7000 Series.**
> - **This operation is disabled in Monitor mode and in Online Edit mode. Execute this operation in Editor mode.**
> - **For models other than the KV-8000/7000 Series or KV Nano Series, perform clear SRAM or clear all operations from the access window.**

1 **Click the "Tool (T)" menu** ▶ **"Clear PLC (1)."**

The "Clear PLC" dialog box is displayed.

2 **Select "Clear All," "Clear RAM," or "Clear User Memory," and then click "Execute (E)."**
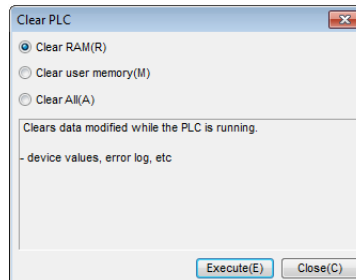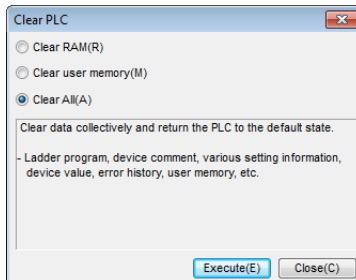
3 A confirmation dialog is displayed regardless of whether you selected "Clear All," "Clear RAM,"
or "Clear User Memory."
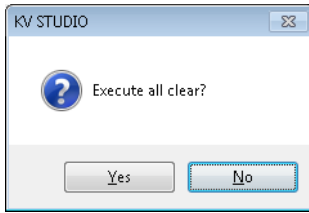
✏ Point	• **"Clear All," "Clear RAM," and "Clear User Memory" cannot be performed in RUN mode. Switch to PROG mode before executing these operations.**
	• **Do not turn off the base unit while "Clear All," "Clear RAM," or "Clear User Memory" is being performed.**

4 When a completion dialog box is displayed, click "OK" to finish the operation.
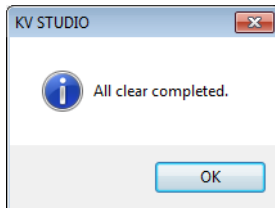
✏ Point	**After the "Clear All," "Clear RAM," or "Clear User Memory" operation is finished, the results of confirming whether the "Clear All," "Clear RAM," or "Clear User Memory" operation completed successfully are displayed through communication.**

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TOOL

Storage Device Transfer Tool

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Tool(T)" ▶ **"Storage transfer tool(3)"**

Backup or restore the user memory area in CPU memory or the files in the memory card to PC.

Click the "Tool (T)" menu ▶ "Storage transfer tool (3)."

Alternative procedure　In the Windows start menu, click "Programs" ▶ "KEYENCE KV STUDIO Ver.**" ▶
"Tool" ▶ "Storage transfer tool" to open the tool as a standalone application.
* ** is the version of KV STUDIO used.
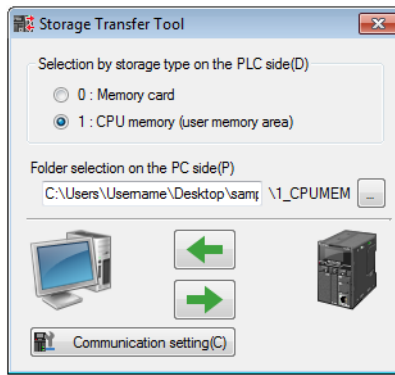
Item	Explanation
Selecting the storage type on the PLC side	Select the storage in the PLC from the memory card or CPU memory (user memory area).
Selecting the folder on PC side	Select the folders to backup or restore on the PC side. The save destination for the project is selected by default. You can also enter any folder.
←	Backup the data in the PLC to PC.
→	Restore the PC data into the PLC.
Communication settings	Configure the settings for communication between the PLC and PC. 📖 "Communication Settings" (page 9-5)

12

TOOL

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Customize

"Tool(T)" ▶ **"Customize(K)"**

You can customize shortcut keys and the toolbar.

1 **Click the "Tool (T)" menu** ▶ **"Customize (K)."**

The "Customize" dialog box is displayed.

2 **Select the menu to be continued to customize.**

- "Shortcut keys(S)"
- "Toolbar(T)"

For details about the setting in each window, see the following.

Shortcut keys
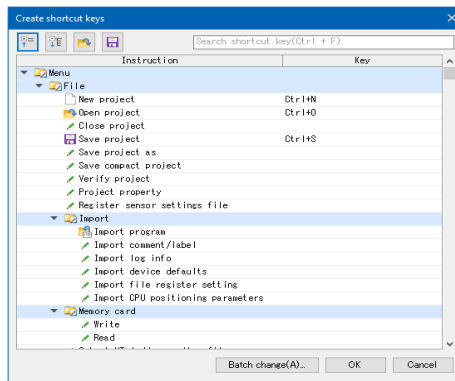
Item	Explanation
Batch change	Changes shortcuts to initial format, GPPQ format, GPPA format, CX format, and Logix format all at once.
(Search for)	Enter an arbitrary character string in the text box on upper right to jump to the corresponding command.
Command	Shows all commands which can assign shortcut keys.
Key	Example 1: For Ctrl + H, enter H key at the same time as Ctrl key. Example 2: For Ctrl +., Ctrl + K, enter "." key at the same time as Ctrl key followed by entering Ctrl key and K key at the same time. (2 stroke key)
[icon] [Close all]	Collapse and display everything for each category.
[icon] [Open all]	Expand and display everything for each category.
[icon] [Read]	Read the setting file (* .key) of the saved shortcut key.
[icon] [Save]	Save the customized shortcut key settings.

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TOOL

■ Changing keys in batches

Change the shortcut keys to the initial format, GPPQ format, GPPA format, CX format, and Logix format all at once.

📖 "List of GPPQ and GPPA Format Shortcut Keys" (page A-51)

Click "Batch change".
Use the "Batch change keys" dialog box to select the key format.

Batch change keys

Selection of key format

Default format

OK   Cancel
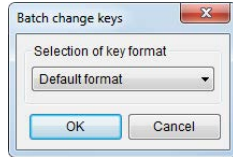
Toolbar

You can customize the toolbar. Select the checkboxes of the items that you want to display on the toolbar.
To display all toolbar items, click "All ON." To hide all toolbar items, click "All OFF."
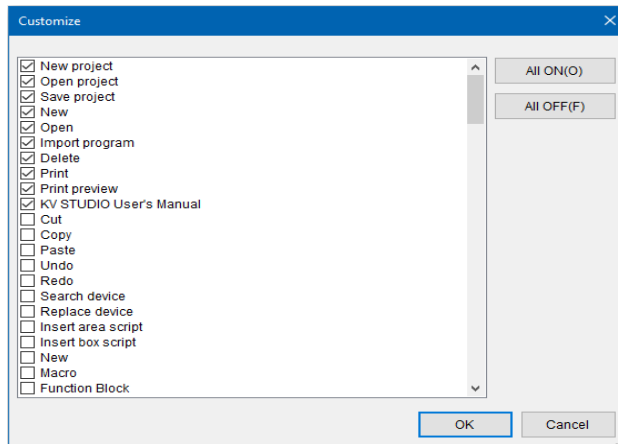
Customize

New project
Open project
Save project
New
Open
Import program
Delete
Print
Print preview
KV STUDIO User's Manual
Cut
Copy
Paste
Undo
Redo
Search device
Replace device
Insert area script
Insert box script
New
Macro
Function Block

All ON(O)
All OFF(F)

OK   Cancel

Options

"Tool(T)" ▶ **"Option(O)"**

■ **Setting the ladder diagram colors**

Set the layout of the colors on the KV STUDIO screen.

1 Click the "Tool (T)" menu ▶ "Option (O)," and then click the "Ladder diagram color setting" tab.

2 To change the color of an item, click the color button next to it.

| Reference | • The colors that you set here are saved to KV STUDIO, and they are also enabled the next time that you start KV STUDIO.
• To return the saved colors to their defaults, select your desired settings from "Select template". |

3 Select the color.

| Reference | If you cannot find the color you want, click "Define Custom Colors>>" to make the color. Specify the hue and brightness of the color, and then click "Add to Custom Colors" to add the color to the list. The button is added to "Custom colors." |

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TOOL

■ Setting the unit colors

Set the color of each unit that is displayed in the Unit Editor. When you assign a relay or DM entry from the Unit Editor, the corresponding device in the ladder diagram is displayed in the set color.

> **Reference** You can change the unit display colors from the editor or from the Unit Editor.
> Changed unit colors are reflected in both the editor and the Unit Editor.
> For details on how to set colors in the Unit Editor, see 📖 "Setup unit color" (page 3-46).

1 **Click the "Tool(T)" menu ▶ "Option(O)," and then click the "Set unit color" tab.**

2 **To change the color of an item, click the color button next to it.**
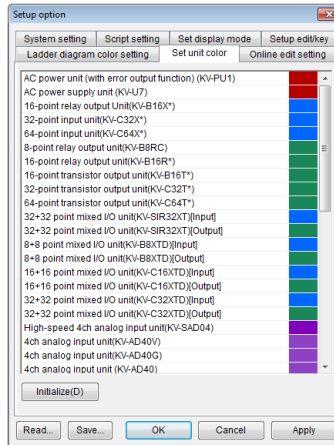
> **Reference** • The colors that you set here are saved to KV STUDIO, and they are also enabled the next time that you start KV STUDIO.
> • To return the saved colors to their defaults, click "Initialize."

3 **Select the color.**

> **Reference** If you cannot find the color you want, click "Define Custom Colors>>" to make the color. Specify the hue and brightness of the color, and then click "Add to Custom Colors" to add the color to the list. The button is added to "Custom colors."

■ Online edit settings

Cells that have been edited in Online Edit mode are displayed with a light blue background to indicate that the program has been changed. Set the timing with which this program change indication is automatically cleared.
For details, see 📖 "Online Edit Settings" (page 9-121).

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TOOL

■ System settings

Click the "Tool (T)" menu ▶ "Option (O)," and then click the "System setting" tab.

Item	Explanation
Device auto-convert mode by changes to unit config	KV STUDIO has a "device auto-convert function." This function automatically replaces device numbers in the ladder program to match any changes that are made to devices assigned to units that have already been assigned a device in the Unit Editor. When this checkbox is selected, the device auto-convert function is enabled. **✎ Point** — **When you are not using the device auto-convert function, manually change device numbers in the ladder program after you change the assigned devices that were set in the Unit Editor.**
IME automatic ON	When this checkbox is selected, IME automatically turns ON.
Change ladder set value at monitor set value change	During monitoring, when you change the set value of a device such as a timer or counter, the ladder program setting is also changed.
Allow the operation of relay on the ladder diagram being monitored	Clear this checkbox when you do not want to allow relays to be turned ON and OFF by double-clicking them in the ladder diagram during monitoring.
Confirm to chng relay status on a ladder diagram	When you operate a relay during monitoring, a confirmation dialog box will be displayed. When this checkbox is cleared, relay operations will be executed immediately.
Show confirm dialog for PROGRAM mode switching	When this checkbox is selected, a confirmation dialog box will be displayed when you switch from monitoring to PROG mode.
Check double coil	During ladder program entry, if you enter an instruction such that the operand of a coil instruction is duplicated (excluding copy and paste operations), a warning dialog box will be displayed.
Enable folding symbol of ladder[*1]	Use the "Loopback Ladder" command on the "Edit" menu, to insert an instruction that uses the loopback symbol (→≫). When this checkbox is cleared, an operation equivalent to a conventional loopback will be performed. **✎ Point** — **When you are using version 2 or earlier of KV STUDIO to read a ladder program created with version 3 or later (by opening a file, opening memory card data, reading data from a PLC, or monitoring a PLC unit), you may not be able to read the ladder program because the loopback symbol is not supported by version 2 or earlier.**
Enable device value batch modify/read window "Undo/Redo"	Select this checkbox to enable the "Undo" and "Redo" commands in the "Edit" menu of the "device value batch modify/read" dialog box. When this checkbox is cleared, you cannot click "Undo" and "Redo."

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TOOL

Item		Explanation
Check device conflict when converting		When this checkbox is selected, conflicting devices will be checked for during ladder program conversion, and the results will be output to the output window.
	Setup	Click this to display the "Device application status option setting" dialog box.[2]
Set sender's name in the transferring data		When transferring a project to the PLC, set the name of the sender in the data being transferred.
	Setup	Click this to display the "Final addresser settings" dialog box.[3]
Compare project name when verifying		When this checkbox is selected, the project name will also be compared during PLC verification.
Matching of ladder blocks is prioritized during verification		Verification will be considered in blocks during the PLC verification after selected. If only mnemonics match in different circuit blocks, it will be judged as NG.
Disable hyperlink jump		When this checkbox is selected, hyperlinks are disabled.
Disable hyperlink jump when reading from PLC		When this checkbox is selected, transferred projects are read from the PLC with the "Disable hyperlink jump" checkbox automatically selected.
Display info dialog box when logging/trace setting is ended		When the unit configuration contains a KV-LE21V (KV-LE20V and KV-NC1EP), select this checkbox to display the "Jump to EtherNet relevant function" dialog box when you finish configuring the logging settings.
Set the format of adapter comments		Click "Set(M)" to display the "Adapter comments format setting" dialog box. You can set the device comment items that are automatically assigned to the adapter.
Display Argument/Label.		When this checkbox is selected, the [Argument / label / variable] dialog box will appear.
Display instruction/macro/pack pallet while it is possible to edit the program.		When this checkbox is selected, the [Command / Macro / Pack Palette] dialog box will be displayed during Editor Mode, Online Edit Mode, Simulation Edit Mode.

[1] This option can only be set when the KV-1000 is selected for the PLC model.

[2] You can configure the "Ignore ZRES command" setting in the "Device application status option setting" dialog box.

[3] You can set the name of the final sender in the "Final addresser setting" dialog box.
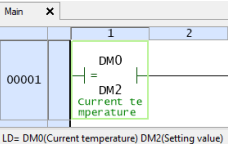
■ Script settings

Click the "Tool (T)" menu ▶ "Option (O)," and then click the "Script setting" tab.

Configure the script-related settings.
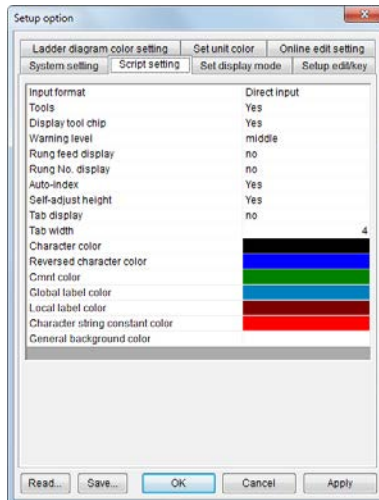
■ Display mode settings

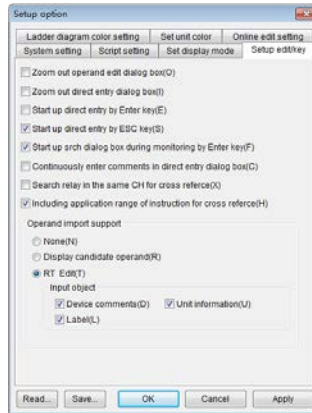Click the "Tool (T)" menu ▶ "Option (O)," and then click the "Set display mode" tab.

Item		Explanation
Display size	Auto	The display size is changed automatically to match the size of the ladder edit window.
	200% to 80%	The set magnification is used for display. 100% is the standard size.
Display by XYM		Select this checkbox to display device names with XYM marking.
Display labels		Select this checkbox to display the label name for each device.
Display label / variable and device		Select this checkbox to display both the label / variable name and device number for each device.
Display unit device		Select this checkbox to display the ladder program device names with the device notation for units.
Display local assign devs during mon		Select this checkbox to display local devices of ladder diagrams and assignment destinations of local labels with global device notation during monitoring and simulating.
Display ladder Monitor values in HEX		Select this checkbox to display the current values on the ladder diagram in hexadecimal during monitoring and simulating.
Zero-suppress display ladder device No.		Select this checkbox to suppress the display of zeros for displayed device numbers. Example) When zero suppress is not used: R00500. When zero suppress is used: R500.
Display devices when expand pack-inst		Select this checkbox to display PACK instruction symbols with CM bit OUT instructions when expanding PACK instructions contained in ladder programs for the KV-700.
Display comment		Select this checkbox to display comments on ladder diagrams.
Number of comment lines		Specify the number of lines of comments to display as a number between 2 and 4.
Limit the number of displayed lines of operand		Check to limit the number of displayed lines of operand. Strings that cannot be displayed within the limits are displayed with a break in the middle.
Maximum number of displayed lines of operand		Specify the number of displayed lines in the range of 1~8 lines.
Change rung at the space of cmnts		Select this checkbox to use line breaks at white-space characters (both full-width and half-width spaces) contained within device comments.
Change rung at the period of cmnts		Select this checkbox to use line breaks at periods contained within device comments.
Display cell information		The instruction of the selected cell, object device and device comment are displayed at the bottom of the ladder edit window.
Font size	Device No.	Select the size of the fonts to use in displaying device numbers.
	Device comment	Select the size of the fonts to use in displaying device comments.
	Rung comment/ script	Select the size of the fonts to use in displaying rung comments and scripts.

Item	Explanation
Font name	Select the font in which to display character strings in ladder diagrams.*
Enable anti-aliasing	Applies anti-aliasing to character strings displayed in ladder diagrams.
Select comments	Select the number of the comment set to be displayed in ladder diagrams.

* Only monospaced fonts installed on your PC can be selected.

■ Edit and key settings

Click the "Tool (T)" menu ▶ "Option (O)," and then click the "Setup edit/key" tab.

Item	Explanation
Zoom out operand edit dialog box	Select this checkbox to display the operand edit dialog box with the type list and explanation of operands omitted.
Zoom out direct entry dialog box	Select this checkbox to display the direct entry dialog box with the comment field omitted.
Start up direct entry by Enter key	Select this checkbox to enable the starting of the direct entry dialog box by pressing ⏎ .
Start up direct entry by ESC key	Select this checkbox to enable the starting of the direct entry dialog box by pressing Esc .
Start up search dialog box during monitoring by Enter key	Select this checkbox to enable the starting of the search dialog box by pressing ⏎ during monitoring.
Continuously enter comments in direct entry dialog box	Select this checkbox to enable the entry of comments in the direct entry dialog box after first entering the instruction and operands.
Search relay in the same CH for cross reference	Select this checkbox to search other relays that are in the same channel as the specified relay number when creating a cross reference.
Including application range of instruction for cross reference	Select this checkbox to display, in addition to the devices used in the operand, all the devices occupied by the instruction when creating a cross reference. However, index device specifications and indirectly referenced devices will not be displayed.
Insert a blank line without connecting ladder blocks when entering a vertical connection line downward	Insert a blank line without connecting ladder blocks with vertical line when entering a vertical line downward.
Display candidate operand	Operand candidates will be displayed in each input box.
RT Edit[1]	Operand input will be enabled for device comments, labels, and unit information.
Enable Roman alphabet search[2]	When RT editing is enabled, operand is displayed as it suggests Hiragana, Katakana, or Kanji when words are typed with Roman alphabet. By inputting words delimited with "_" (underscore), operands that contain several words can be searched.

Item	Explanation
Automatically display script input candidates	When RT editing is enabled, candidate functions, devices and variables are displayed while entering Roman characters or kana in a KV script.

*1 If the amount of data, such as device comments and labels, is large, edit operations may become slow. In this situation, do not select the "RT Edit" option.

*2 Roman alphabet search becomes available only when a display language KV STUDIO is set to Japanese. When Roman alphabet search is enabled, it may take longer time until the search result is displayed. In such cases, please turn OFF the Roman alphabet search.

> Reference You can read and save the option settings. The files that can be read are shown below.
>
> •KV STUDIO version 5, KV STUDIO version 6 and KV STUDIO version 7 option settings files (KVS.ini)*
>   * Only reading is supported.
> •Option settings file (.kop)
>
> How to read settings
>   1 Click the "Tool (T)" menu ▶ "Option (O)," and then click "Read."
>   2 Read an option settings file (*.kop).
>
> How to save settings
>   1 Click the "Tool (T)" menu ▶ "Option (O)," and then click "Save."
>   2 Save the option settings file (*.kop).

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TOOL

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MEMO

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TOOL

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SCRIPT

This chapter describes how to enter and edit scripts.
For details on scripts, see the KV-8000/7000/5000/3000/1000 Series and KV Nano Series Script Programming Manual.

SCRIPT

This section describes how to insert scripts.

For details on scripts, see the KV-8000/7000/5000/3000/1000 Series and KV Nano Series Script Programming Manual.

Inserting Area Scripts

| KV-8000 | KV-7000 | KV-5000/3000 | KV Nano |
| KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40 |

▤ **"Script(S)"** ▶ **"Insert area script(A)"** [Ctrl] + [R]

When you use an area script, the entire rung is written as script.

1 Click the cell (rung) in which you want to create the area script.

2 Click the "Script (S)" menu ▶ "Insert area script (A)."

> **Alternative procedure** Right-click in the ladder edit window, and then select "Edit script (X)" ▶ "Insert area script (A)" from the menu that appears.
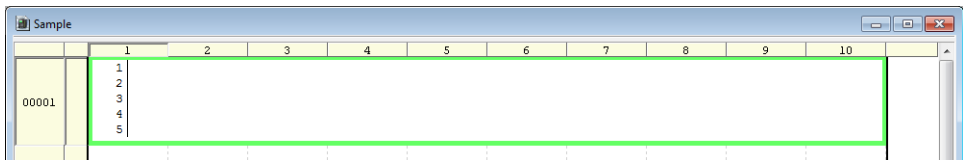
3 Enter the script.

4 After you finish entering the script, press [Esc] .

> **Alternative procedure**
> • Click the ladder edit window outside of the area where you are writing the script.
> • Press [Ctrl] + [↵] .

Inserting Box Scripts

| KV-8000 | KV-7000 | KV-5000/3000 | KV Nano |
| KV-1000 | KV-700 | KV-P16 | KV-10/16/24/40 |

▤ **"Script(S)"** ▶ **"Insert box script(B)"** [Ctrl] + [B]

Box scripts have ladder execution conditions, which enables you to specify with the ladder program when and with what timing the program written in the script is executed.

1 Use the ladder editor to write the execution condition, and then click the cell in which you want to create the box script.

2 Click the "Script (S)" menu ▶ "Insert box script (B)."

> **Alternative procedure** Right-click in the ladder edit window, and then select "Edit script (X)" ▶ "Insert box script (B)" from the menu that appears.
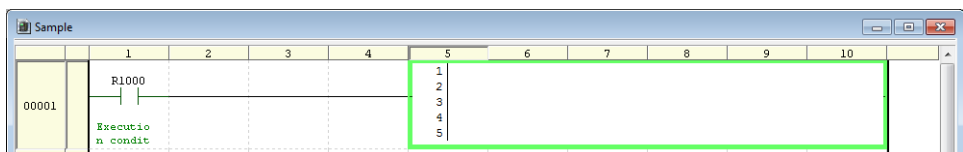
3 Enter the script.

4 **After you finish entering the script, press** $\boxed{\text{Esc}}$ **.**

Alternative procedure	• Click the ladder edit window outside of the area where you are writing the script.

• Press $\boxed{\text{Ctrl}}$ + $\boxed{\text{↵}}$.

Switching the Edit Method

KV-8000	KV-7000	KV-5000/3000	KV Nano
KV-1000	KV-700	KV-P16	KV-10/16/24/40

"Script(S)" ▶ "Change edit method(N)" ▶ "Direct input(D)"
▶ "Window(W)"

Select the method for editing scripts. Select whether to write scripts directly in the script editor or to open a separate window for writing scripts.

1 **Click the "Script (S)" menu** ▶ **"Change edit method (N)"** ▶ **"Direct input (D)" or "Window (W)."**
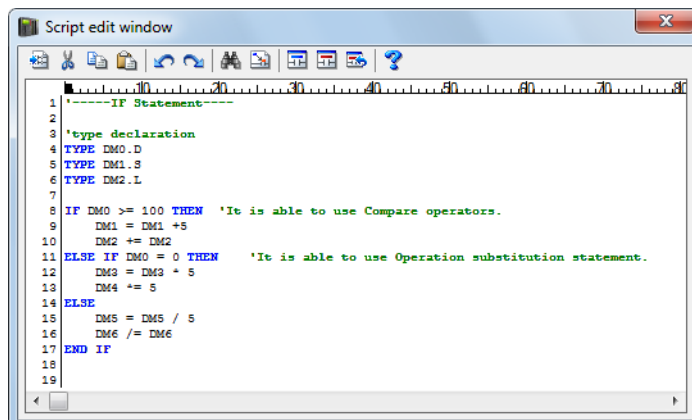
Direct input (script editor)

Window (script edit window)

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SCRIPT

Convert the entered script.

Converting Only the Selected Script

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Script(S)" ▶ **"Convert selected script(S)"** ⌈Ctrl⌉ + ⌈T⌉

Select the script to be converted, and then click the "Script (S)" menu ▶ "Convert selected script (S)."
The selected script is converted, and the ⊞ button is displayed on the rungs of the converted script.
When there is a mistake in the script, an error message is displayed, and the error location is
displayed in the output window.

Converting All Scripts

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Script(S)" ▶ **"Convert all scripts(C)"**

Click the "Script (S)" menu ▶ "Convert all scripts (C)."
The scripts are converted, and the ⊞ button is displayed on the rungs of the converted scripts.
When there is a mistake in a script, an error message is displayed, and the error location is displayed
in the output window.

Setting the Warning Level of Script Conversion Errors

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Script(S)" ▶ **"Set script warning level(W)"**

Set the warning level of the errors that are displayed during script conversion.

> ❗ **Point** **This function can be used to efficiently convert scripts by hiding warnings that
> are normally displayed. The warnings are hidden according to the set script
> warning level. Exercise sufficient caution when writing and converting scripts.**

1 **Click the "Script (S)" menu ▶ "Set script warning level (W)."**

The "Script warning level setting" dialog box is displayed.

When you select the "Not output warning when different suffix specified for global label data type"
checkbox, warnings will not be generated if you specify a suffix that is different from the data type that
was defined during global label registration.
Example) When you specify "1 word unsigned integer: UINT" in the global label definition and then
specify the .L suffix in a script.

2 **Select a warning level, and then click "OK."**

The warning level is set.

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This section describes the display of scripts after ladder conversion.

You can display and check as a converted ladder program the script that you have created.

Displaying Converted Ladder Programs

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40
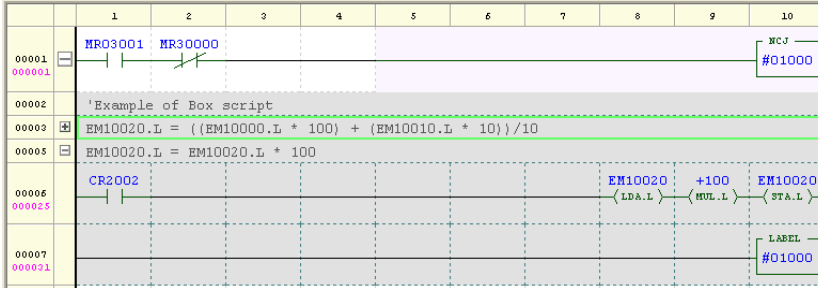
"Script(S)" ▶ **"Display/hide converted ladder(V)"** Ctrl + G
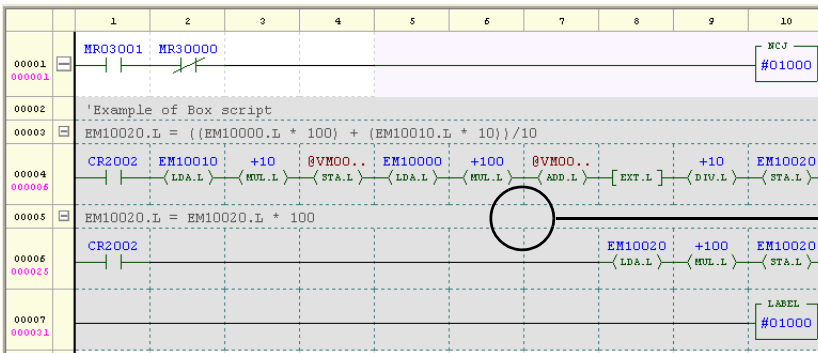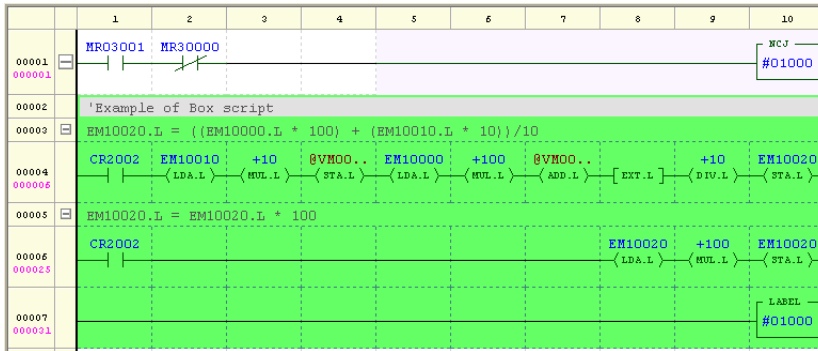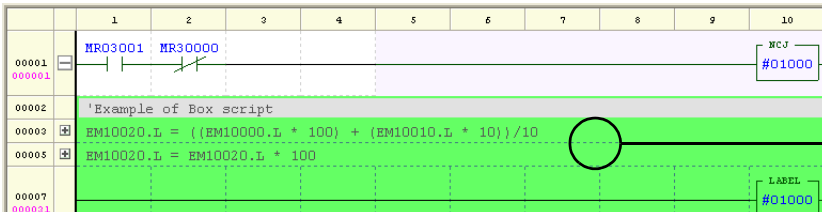
To display a converted ladder program, follow the procedure below.

1 **Select the script that you want to display.**
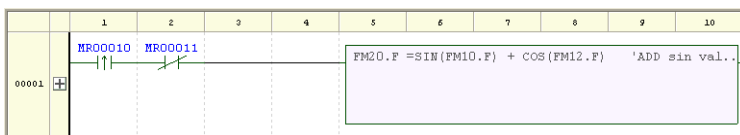
2 **Click the "Script (S)" menu ▶ "Display/hide converted ladder (V)." When the ladder is displayed, click "Display/hide converted ladder (V)" again to close the converted ladder program and display only the script.**

The converted ladder program is displayed.
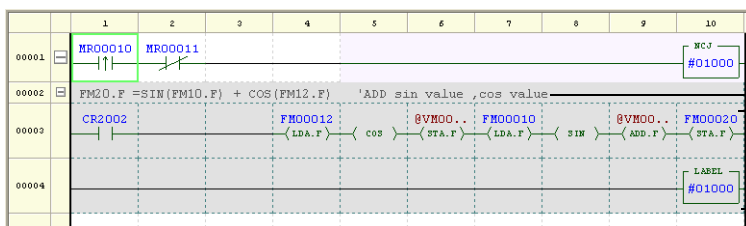
The script that you have written is displayed.

The converted ladder program is displayed.

Alternative procedure Click ➕ on the rung to be displayed.

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Displaying All the Converted Ladder Programs

"Script(S)" ▶ "Display entire content of converted ladder(X)"

Among the converted ladder programs that have been displayed with "Display/hide converted ladder," display all the converted ladder programs that have been collapsed.

1 **Select a ladder or script in the converted ladder program to be displayed.**

2 **Click the "Script (S)" menu ▶ "Display entire content of converted ladder (X)."**

The entire content of the converted ladder program that has been displayed with "Display/hide converted ladder" is displayed.

Right-click the converted ladder program to display the right-click menu for scripts.

Reference You can display and hide individual rungs by clicking ⊞ of a rung of a ladder or script in the converted ladder program.

Alternative procedure Right-click a converted ladder program, and then select "Script edit (X)" ▶ "Display all converted ladder (X)" from the menu that appears.

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Collapsing All the Converted Ladder Programs

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Script(S)" ▶ **"Fold entire content of converted ladder(O)"**

Among the converted ladder programs that have been displayed with "Display/hide converted ladder," collapse all the ladder parts and display only the rung comments that have been written in scripts.

1 Select a ladder or script in the converted ladder program to be collapsed.

2 Click the "Script (S)" menu ▶ "Fold entire content of converted ladder (O)."

Among the converted ladder programs that have been displayed with "Display/hide converted ladder," only the rung comments that have been written in scripts are displayed.

Right-click the converted ladder program to display the right-click menu for scripts.

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Reference │ You can display and hide individual rungs by clicking ⊞ of a rung of a ladder or script in the converted ladder program.

Alternative procedure │ Right-click the converted ladder program, and then select "Script edit (X)" ▶ "Fold entire content of converted ladder (O)" from the menu that appears.

This section describes functions for assisting in script entry.

Displaying Script Function Candidates

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Script(S)" ▶ "Script function list(F)" Ctrl + (Space)

Display a list of function candidates when you do not know the function name or when you enter part of the function name.

1 Enter part of the function name, and then click the "Script (S)" menu ▶ "Script function list (F)."

The script function candidates are displayed.
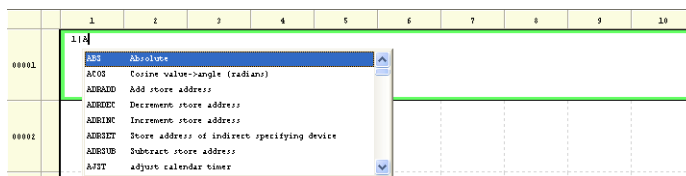
2 Select the function that you want to use and press ⏎ or double-click the function that you want to use.

The selected function is inserted at the cursor location in the script editor.

Displaying Simple Formats

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

"Script(S)" ▶ "Script function tip(H)" Ctrl + Shift + (Space)

When you are entering a function, display information such as whether arguments and return values are present. Information is displayed as simple-format script function hints.

1 Place the "|" mouse cursor to the right of the "(," and then select the "Script (S)" menu ▶ "Script function tip (H)."

A script function hint is displayed in a simple format.
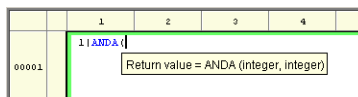
(Alternative procedure) If you enter the function name and "(," the script function hint will be displayed automatically.

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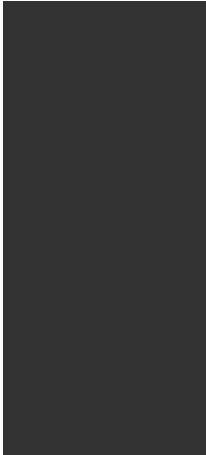
APPENDICES

Read the list of error messages if problems arise during use and if you want to know the details of and remedy for an error that occurs during programming.
A list of shortcut keys is also provided as a quick reference.

APPENDICES

This appendix describes the error messages that are displayed during operation and the remedies to take when error messages are displayed.

Errors That Occur in the Editor

The following error messages are displayed in the editor.

Error Message	Cause	Remedy
Dialog box		
"Unusable text string is included at the beginning."	"_" was used at the start of a module name, macro name, etc.	Use characters that are permitted in module names and macro names.
"Contain unusable text string."	A forbidden character was used in a project name, macro name, label name, etc.	Use characters that are permitted in module names, macro names, label names, etc.
"Invalid file."	Data may be corrupt.	Use ScanDisk or a similar application to check the disk. Restore any files that have errors in them. Then, re-install KV STUDIO.
"Failed to open file."		
"File reading fails."		
"Project name invalid."	The project name is empty.	Enter a project name and then save the project.
"Script information reading fails."	Data may be corrupt.	Use ScanDisk or a similar application to check that no errors are present on the disk.
"Module information reading fails."		
"Function block information reading fails."		
"Macro information reading fails."		
"LD rung information reading fails."		
"Rung comment information reading fails."		
"Invalid comment/tab file."		
"Undefined program type"		
"Device comment cannot set for this device category."	The device may be an argument device.	Change to a device to which a comment can be set.
"No mnemonics information."	Data may be corrupt.	Use ScanDisk or a similar application to check that no errors are present on the disk.
Output window		
"Device assigned to label is illegal. Fail to reading [XXX]."	A character string that cannot be used with labels was used.	Use characters that can be used for labels.
"Disconversion processing failure."	A syntax error occurred during conversion to a ladder diagram.	Change the program.

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Errors and Warnings That Occur during Conversion

The following error messages (the error numbers are shown in parentheses) are displayed during conversion.
Eliminate the cause of the error before performing conversion.

■ Error messages

Error Message	Cause	Remedy
"Invalid parallel connection to be executed after box script" (601)	There is an invalid parallel connection which will be executed after a box script.	Do not use parallel connections after box scripts.
"Empty script cannot be converted." (296)	An area or box script is empty.	Write a function in or delete the empty script.
"Vertical line cannot be connected to a rung comment or script." (283)	A vertical line is connected to a rung comment or script.	Delete the vertical line that is connected to the rung comment or script.
"Output instruction is connected in parallel." (403)	For a vertical box type instruction (SFT, KEEP, ITVL, UDC, UDT, JOGX, JOGY, JOG, or PID), an additional output instruction is connected in parallel.	For vertical box type instructions (SFT, KEEP, ITVL, UDC, UDT, JOGX, JOGY, JOG, and PID), do not connect additional output instructions in parallel.
"Connecting rung disconnected" (400)	A connection line is disconnected in a ladder block.	Be sure to connect all connection lines.
"Non-contact instruction is connected in parallel." (402)	Parallel connections cannot include output instructions.	Do not connect instructions other than contact instructions in parallel.
"Invalid short circuit" (401)	There is a short circuit in the power rail or output line.	Rewrite the ladder program so that no short circuit occurs.
"No short circuit to power rail" (403)	An input condition has been set on an independent output type instruction (END, ENDH, STP, STE, MCR, RET, FOR, NEXT, GOTO, LABEL, INT, or RETI).	Delete the independent output type instruction's input condition.
"Text string label exceeding 32 bits cannot be specified as an operand with a value of macro instruction attribute." (245)	A character string label whose size exceeds 32 bits (including NULL: 8 bits for termination) cannot be set to V of a macro argument.	Ensure that character string labels set to V of macro arguments are 32 bits (including NULL: 8 bits for termination) in size or less.
"Unit type not set for argument device. Set it in "Setup macro argument"." (270)	The unit type has not been set in the macro argument definition.	Set the unit type for the argument device.
"The macro with a specified name is not defined." (235)	An unregistered macro was called.	Define a macro with the specified name.
"MEND instruction exists in a program which is not self-hold type macro." (280)	A MEND instruction exists in a program which is not a self-hold type macro.	Only use the MEND instruction in self-hold type macros.
"MEND instruction does not exist in self-hold type macro." (258)	There is no MEND instruction in a self-hold type macro.	Write the MEND instruction in self-hold type macros.
"Program specified by executing bit is invalidated" (273)	The program specified with the execution bit is not called in the module.	Enable the specified program.
"Program size exceeds the upper limit." (701)	The size of a program has exceeded the upper limit for program size per module / macro.	Reduce the program size of the module / macro.
"No module" (200)	No module exists.	Modify the settings so that at least one every-scan execution module can be executed.
"Macro device cannot be used in a module" (298)	A macro device (UR, UM, P, or V) exists in a module.	Delete the macro device (UR, UM, P, or V) in the module.
"The module with a specified name is not defined." (250)	An unregistered module was called.	Define a module with the specified name.
"Too much macro instruction operands" (237)	There are too many operands for a macro instruction.	Check the number of operands for the macro instruction.
"No DM in the specified unit, fail to use UM." (289)	The unit specified in UM has no DM.	Specify a unit number of a unit containing DM in UM.

Error Message	Cause	Remedy
"No relay in the specified unit, fail to use UR." (288)	The unit specified in UR has no relay.	Specify a unit number of a unit containing a relay in UR.
"The ID No. of the macro is duplicated." (286)	A macro ID number has been duplicated.	Do not use duplicated macro ID numbers.
"Script work area is specified for macro argument P." (246)	A script workspace area has been set for macro argument P.	Do not set script workspace areas for macro argument P.
"Device which can be indirectly specified is not set for macro argument P." (243)	A device that can be indirectly specified is not set for macro argument P.	Set a device that can be indirectly specified for macro argument P.
"Device which can be indirectly specified is not set for macro argument P." (243)	DR has been specified for P as a macro argument.	Do not specify DR for P as a macro argument.
"Device / variable that cannot be specified for macro argument P has been specified. [Operand]" (243)	Bit in a word has been specified for the assignment target of the macro argument P. Elements of BOOL type array members of structure type variables such as stVar.bMember[2] are also included in the bits in the word.	Set a device that can be specified indirectly for the macro argument P. Do not specify DR for the macro argument P. Do not specify the bit in a word for the macro argument P.
"No macro argument is used in a macro program. Check "Setup macro argument"." (705)	No arguments are used in a macro.	Use at least one argument in the macro.
"Macro argument device is invalid." (269)	The device set in a macro argument device does not match the device type in the cell where the macro was actually called.	Ensure that the device set in a macro argument device matches the device type in the cell where the macro was actually called.
"Macro execution bit is used in the macro." (281)	A macro execution bit has been set in a macro.	Do not set macro execution bits in macros.
"Macro instruction cannot be used in a macro." (259)	A macro instruction has been used in a macro.	Do not use macro instructions in macros.
"Interrupt instruction cannot be used in a macro." (260)	Interrupt instructions cannot be used in macros.	Do not use interrupt instructions in macros.
"Unit with the No. specified in the macro instruction is not set." (240)	The unit with the number specified in the macro instruction has not been set.	Use the macro instruction to specify a unit that has been set.
"Unit type of the No. specified in the macro instruction is different from the unit type assigned in the argument setting dialog." (271)	The type of the unit whose number was specified in the macro instruction is different from the unit type assigned in the argument setting dialog box.	Ensure that the type of the unit whose number was specified in the macro instruction matches the unit type assigned in the argument setting dialog box.
"No macro name specified in macro instruction" (231)	No macro name was specified in the macro instruction.	Specify macro names in macro instructions.
"Operand for macro instruction is specified with device instead of unit No. Specify unit No." (242)	The operand for the macro instruction was specified with a device instead of with a unit number.	When a unit number was assigned to a macro instruction operand, do not use a device to specify the operand.
"Macro instruction operand insufficient" (236)	Some macro instruction operands were missing.	Check the macro instruction operands.
"Execution bit is not correctly specified." Specify a correct program. (278)	The execution bit was not specified properly.	Make sure the program specified with the execution bit exists.
"ID No. is not specified for the macro specified with the execution bit." (279)	The ID number has not been specified by the macro specified with the execution bit.	To specify a macro with an execution bit, set the ID number of the macro.
"Program specified with the execution bit does not exist." (215)	The program specified with the execution bit does not exist.	The specified program should be created by the running bit or the identification number of the running bit should be set to other than 0 on the macro palette.
"The program specified with the execution bit is not called in the module." (272)	The program specified with the execution bit is not called in the module.	Call the program specified with the execution bit from within the module, or review the execution bit.
"Macro instruction is used in initialization module. The macro is not executed in second and later scans." (931)	A macro instruction has been used in the initialization module.	Do not use macro instructions in the initialization module.
"More than one fixed-period module cannot be used." (88)	Multiple fixed period modules exist.	Use only one fixed period module.

Error Message	Cause	Remedy
"Executing fixed-period module requires interrupt to be enabled. Use EI instruction." (936)	A fixed period module has been used, but no EI instruction exists.	To execute fixed period modules, execute the EI instruction.
"There is no every-scan execution module at all. "(85)	No every-scan execution module exists.	Create at least one every-scan execution module.
"The transmittable limit number of modules (excluding macros) is exceeded." (282)	The limit of the number of modules that can be transmitted (excluding macros) has been exceeded.	Reduce the number of modules (excluding macros).
"Number of programs can be transmitted (Macro/Function block counts the number of called times) is exceeded." (300)	Sum of the number of modules and expanded Macro/Function blocks exceeds the upper limit.	Set the number of Module/Macro/Function blocks below the limit. For each unit's limit, see the user's manual of the unit.
"Subroutine called inside a subroutine is defined after the calling position." (65)	When a subroutine was called inside a subroutine, the subroutine to be called was not located at a position between the beginning of the program and the CALL instruction.	Move the subroutine to be called to a position before the CALL instruction in the program.
"Subroutine No. duplicate" (66)	The same subroutine number has been specified in different SBN instructions.	Do not specify the same subroutine number.
"Subroutine of specified No. is not defined." (65)	There is no SBN instruction with the subroutine number specified in a CALL instruction.	Define a subroutine with the specified number.
"Program size exceeded the upper limit." (407)	Size of the intermediate code area exceeded the upper limit.	Reduce the program size.
"More than 100 rungs in one ladder block" (313)	The number of rungs in a ladder block has exceeded 100.	Reduce the rungs in the ladder block to 100 or less.
"The number of ladder rungs per module exceeded the limit (40,000 rungs)." (294)	The ladders used in one module have more than 40,000 rungs total.	Ensure that the ladders used in one module have 40,000 or less rungs total.
"Operand size exceeded the upper limit." (416)	The size of the operand table has exceeded the upper limit.	Reduce the number of operands in the ladder program.
"Global comment size exceeded the upper limit." (702)	The total size of the global device comments has exceeded the upper limit.	Reduce the total size of the global device comments.
"Global label size exceeded the upper limit." (702)	The total size of the global labels has exceeded the upper limit.	Reduce the total size of the global labels.
"The object size of the entire program exceeded the upper limit." (406)	The size of the object area has exceeded the upper limit.	Delete instructions to reduce the object size.
"Ladder block too large (MPS and MPP pairs nested over 8 levels). Divide it into several blocks." (609)	MPS and MPP pairs have been nested over 8 levels.	Rewrite the program by dividing the block into several blocks.
"Ladder block too large. Divide it into several blocks." (610)	The ladder block is too large.	Rewrite the program by dividing the block into several blocks.
"Local device comment size exceeded the upper limit." (702)	The total size of the local device comments per module has exceeded the upper limit.	Reduce the total size of the local device comments.
Total sum of the number of instructions, rung comment rungs, and scripts exceeded the upper limit." (703)	The number of steps in the entire ladder has exceeded the upper limit.	Reduce the number of instructions, the number of rung comment rungs, or the number of scripts.
"When this block is arranged, max rungs in a block (100 rungs) may be exceeded. Reduce rungs. If the same module contains any block which can be converted only with Ver. 6.01 and above, the number of ladder rungs may change after the arrangement." (24)	Due to block arrangement, the maximum number of rungs in the block has exceeded 100.	Rewrite the ladder so that the number of rungs in the block will be 100 or less.
"The range specified with the number of work areas for the script text string is exceeded. See [Set entire assignments of local devices]-[Setup work area]." (275)	The range specified with the number of workspace areas for script character strings has been exceeded.	Change the range of the workspace area by selecting "Set entire assignments of local devices" and then "Setup work area."

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Error Message	Cause	Remedy
"The number of work area for word of script work device being used exceeded the setting. See [Set entire assignments of local devices]." (202)	The workspace devices of the script have exceeded the workspace area setting.	Change the range of the workspace area by selecting "Set entire assignments of local devices" and then "Setup work area."
■ In editor mode "Number of local devices used for each program exceeds, refer to [Device settings by program]." ■ In online edit mode "Number of local devices used for each program exceeds. Transfer CPU system settings with editor mode.To manually set the number of local devices, change [Device setting by program]." (211)	The amount of consumed local devices of a module has exceeded the number of local devices assigned to each module.	Change the range of the workspace area by selecting "Set local devices by program" and then "Setup workspace area."
"The local work area (for word) used by the local label/script work/MC instruction is insufficient. Check [Setup work area]." (714)	The total consumption of a workspace area (for words) has exceeded the upper limit for a project.	Change the setting so that the total consumption of the workspace area (for words) is less than or equal to the upper limit.
"The local work area used by local label/script work/MC instruction is insufficient. Check [Setup work area]." (714)	For the program where "Automatic" check boxes in the workspace settings are not selected, the number of workspace areas used in the program exceeded the number of set local workspace areas.	Check the "Setup work area" settings.
"The local work area (for bit) used by the local label/script work is insufficient. Check [Setup work area]." (713)	The total consumption of the workspace area (for bits) has exceeded the upper limit for a project.	Change the setting so that the total consumption of the workspace area (for bits) is less than or equal to the upper limit.
"The global device is specified within the local device area. Return to Editor and see [Set entire assignments of local devices]." (213)	A global device exists within the local device area.	Return to the editor, and then check the "Set entire assignments of local devices" settings.
"The global device is specified within the script work area. See [Setup work area]." (277)	A global device has overlapped the script workspace area.	Specify global devices so that they do not overlap the script workspace area.
"The capacity of the internal work area (bit) is exceeded. For consumption of the internal work area, see the instruction reference manual." (83)	The number of differential instructions and instructions for acquiring rising or falling edges has exceeded the upper limit for such instructions that can be allocated to one project.	Reduce the number of instructions that use a large amount of the internal workspace (bit).
"The capacity of the internal work area (bit) in the module is exceeded. For consumption of the internal work area, see the instruction reference manual." (82)	The number of differential instructions and instructions for acquiring rising or falling edges has exceeded the upper limit for such instructions that can be allocated to one module.	Reduce the number of instructions that use a large amount of the internal workspace (bit).
"The capacity of the internal work area (word) is exceeded. For consumption of the internal work area, see the instruction reference manual." (84)	The number of instructions that use the internal workspace, such as SHOT and FLIK, has exceeded the number of such instructions that can be used in one project.	Reduce the number of SHOT and FLIK instructions.
"Incomplete label definition exists. A global label needs to be assigned with a device." (709)	A label with an incomplete definition exists.	Assign devices to global labels.
"Incomplete label definition exists. The input is insufficient or the required work area is too large." (709)	A label with an incomplete definition exists.	Check the label definition.
"The data type of the global label is set smaller than the operand used by the instruction." (711)	The data type of a global label has been set smaller than the operand used by the instruction.	If the data type of the global label is ".U," change it to ".D." If the data type of the global label is ".S," change it to ".L."
"The data type of the local label is set smaller than the operand used by the instruction." (711)	The data type of a local label has been set smaller than the operand used by the instruction.	If the data type of the local label is ".U," change it to ".D." If the data type of the local label is ".S," change it to ".L."

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Error Message	Cause	Remedy
"The range of the data type of the global label overlaps with the area assigned to the local device." (712)	The range used for a label exceeds the range available for global devices.	Change the device to which the global label is assigned, or change the area assigned to the local device.
"Same label No. is used in two or more locations." (61)	There are multiple LABEL instructions with label numbers between 0 and 999.	Use only one label number among LABEL instruction numbers 0 to 999.
"Same label No. is used in two or more locations." (61)	The same label number has been specified in different LABEL, CJ, NCJ, and GOTO instructions.	Do not use the same label number in different LABEL, CJ, NCJ, and GOTO instructions.
"Unassigned label exists. Register the label in the Label edit window." (214)	There is an unassigned label.	Register the unassigned label.
"This label has a data type which cannot accept instructions." (710)	• In a global label, the data type specified to the operand of a ladder instruction is inappropriate for the operand allowed for that instruction. • In a local label, the label set to the operand of a ladder instruction is inappropriate for the operand allowed for that instruction. • In a local label, the type of the operand of a ladder instruction is larger than the defined size of the local label.	Ensure that the data type of the global or local label matches the data type allowed for the operand.
"This label has a data type which cannot be used for instruction operand." (718)	Although real numbers are used for a global or local label, the target of the operand is an integer. Or, although integers are used for a label, the target of the operand is a real number.	Ensure that the setting of the global or local label matches the device type used for the operand.
"The number of automatically assigned local devices set for each program was changed through editing. Check the editing details." (212)	The local device assignments have been changed during OE.	Writing in RUN mode is disabled for projects in which the local device assignments have been changed. Switch to PROG mode, and then transfer the project.
"Unit assignment includes device which uses the local device assignment area. Use Unit Editor to change the unit assignment range, or change the value of [Local dev Rsv nums] in the Set entire assignments of local devices dialog." (314)	Devices assigned to the EIP refresh device overlap the area assigned to the local devices.	Use the Unit Editor to change the unit assignment range, or change the value of "Local dev Rsv nums" in the "Set entire assignments of local devices" dialog box.
"Unit assignment includes device which uses the local device assignment area. Use Unit Editor to change the unit assignment range, or change the value of [Local dev Rsv nums] in the Set entire assignments of local devices dialog." (299)	Devices assigned to the unit overlap the area assigned to the local devices.	Use the Unit Editor to change the unit assignment range, or change the value of "Local dev Rsv nums" in the "Set entire assignments of local devices" dialog box.
"Number of reserved local devices is insufficient. See [Set entire assignments of local devices]." (203)	The consumption of local devices is too great and has exceeded the total number of reserved local devices.	The number of reserved local devices is insufficient. See the "Set entire assignments of local devices" settings.
"The numeral change operand of device is used, local device with automatic assignment is used. Shall confirm assignment range of local device." (934)	A local device set to automatic assignment is being used as an operand that uses a variable number of devices.	Check the assignment range of the local device.
"Index assignment is used in the local device set to automatic assignment. Shall confirm assignment range of local device." (933)	Index specification is being used in a local device set to automatic assignment.	Do not use index specification in local devices set to automatic assignment. To use index devices, do not set the automatic assignment of local devices.

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■ In editor mode "Depending on the number of devices using commands, the number of used local devices exceeds. Rrefer to the command reference manual or [Device setting by program]." ■ In online edit mode "Number of local devices used for each program exceeds. Transfer CPU system settings with editor mode.To manually set the number of local devices, change [Device setting by program]." (274)	The number of devices used by instructions has exceeded the number of usable local devices.	Reduce the number of devices of the local label to be used or use the CPU system settings to change the area of the local devices to be used.
"The specified operand is out of the range for direct input/output." (82)	A DR-specified relay has not been assigned to a unit. The unit containing the DR-specified relay specified or the relay itself does not support direct I/O.	Do not specify DR for relays that do not support DR.
"INCENC", "RCNT", "FCNT", and "PLSOUT" do not operate properly when they are executed simultaneously in the same project." (80)	Multiple of the following instructions specified with the same counter number have been used in the project. INCENC RCNT FCNT PLSOUT	Use only one of the following instructions specified with the same counter number in a program. INCENC RCNT FCNT PLSOUT
"TM is specified as the operand of which the value is the attribute of the macro instruction." (244)	#TM cannot be specified as an operand of which the value is an attribute of a macro instruction.	Do not specify #TM as an operand of which the value is an attribute of a macro instruction.
"Two or more STG instructions are used in one block." (73)	Multiple STG instructions exist in the block.	Use only one STG instruction in a block.
"A local label of the data type other than a 2-word unsigned integer is used in the indirect specification." (216)	Only 32-bit unsigned can be used for the type of indirectly specified local labels.	Set the type of indirectly specified local labels to 32-bit unsigned.
"17 or more BREAK instructions are used between FOR/NEXT instructions." (301)	You cannot use 17 or more BREAK instructions between one set of FOR and NEXT instructions. When FOR and NEXT instructions are nested, you cannot use 17 or more BREAK instructions in the entire nested block.	Delete BREAK instructions between FOR and NEXT instructions until there are 16 or less BREAK instructions present.
"9 or more BREAK instructions are used between FOR/NEXT instructions." (301)	You cannot use 9 or more BREAK instructions between one set of FOR and NEXT instructions. When FOR and NEXT instructions are nested, you cannot use 9 or more BREAK instructions in the entire nested block.	Delete BREAK instructions between FOR and NEXT instructions until there are 9 or less BREAK instructions present.
"BREAK instruction is used at a location other than between FOR and NEXT instructions." (63)	A BREAK instruction has been used at a location other than between FOR and NEXT instructions.	Use BREAK instructions only between FOR and NEXT instructions.
"Subroutine call nesting of CALL instruction exceeded 16 levels." (64)	Subroutine call nesting through the use of the CALL instruction has exceeded 16 levels. CALL from the main program is counted as one level.	Limit subroutine call nesting through the use of the CALL instruction to 16 levels or less.
"Subroutine call nesting of CALL instruction exceeded 4 levels." (64)	Subroutine call nesting through the use of the CALL instruction has exceeded 4 levels. CALL from the main program is counted as one level.	Limit subroutine call nesting through the use of the CALL instruction to 4 levels or less.

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Error Message	Cause	Remedy
"LABEL instruction in which the label No. specified with CJ/NCJ/GOTO/SCJ instruction is defined does not exist." (76)	For LABEL instruction numbers 0 to 999, the label number specified with the CJ, NCJ, GOTO, or SCJ instruction does not exist. LABEL instruction numbers 0 to 999 are the labels used in a ladder other than scripts.	Define the label number specified with the CJ, NCJ, GOTO, or SCJ instruction in a LABEL instruction.
"Subroutine called by ECALL instruction does not exist, or subroutine in macro is specified." (88)	The module name specified with an ECALL instruction does not exist.	Create a module with the name specified with the ECALL instruction.
"The subroutine of the specified No. does not exist in the module specified with ECALL instruction." (88)	The subroutine whose number was specified in the module whose name was specified by the ECALL instruction does not exist.	Create a subroutine with the specified number in the specified module.
"END instruction cannot be found." (71)	No END instruction exists in the program.	Write the END instruction in the program before the ENDH instruction.
"ENDH instruction cannot be found." (72)	No ENDH instruction exists in the program.	Write the ENDH instruction on the final rung of the program.
"A program other than interrupt program or subroutine is written between END and ENDH instructions." (63)	You cannot write programs other than interrupt programs and subroutines between the END and ENDH instructions.	Do not write programs other than interrupt programs and subroutines between the END and ENDH instructions.
"FOR/NEXT instruction pairs nested over 16 levels." (67)	The nesting of FOR and NEXT instruction pairs has exceeded 16 levels.	Limit the nesting of FOR and NEXT instruction pairs to 16 levels or less.
"FOR/NEXT instruction pairs nested over 8 levels." (67)	The nesting of the pairs has exceeded 8 levels.	Limit the nesting of FOR and NEXT instruction pairs to 8 levels or less.
"FOR and NEXT instructions are not paired." (68)	FOR and NEXT instructions must be used in pairs.	Use FOR and NEXT instructions in pairs.
"INT/RETI instructions nested." (67)	INT and RETI instruction pairs have been nested.	Do not nest INT and RETI instruction pairs.
"INT and RETI instructions are not written between END and ENDH instructions." (63)	An interrupt program defined by the INT and RETI instructions has been written in a position other than between the END and ENDH instructions.	Write interrupt programs defined by the INT and RETI instructions between the END and ENDH instructions.
"INT and RETI instructions are not paired." (68)	INT and RETI instructions have not been paired.	Use INT and RETI instructions as a pair.
"INV/MEP/MEF instruction connection incorrect" (604)	An INV, MEP, or MEF instruction has been connected directly to the right or left power rail.	Do not connect INV, MEP, and MEF instructions directly to the right or left power rail.
"STG instruction is not paired." (305)	A block containing an STG or STG instruction has been connected in parallel.	Do not use the STG instruction in a parallel connection.
"Same relay No. is used in two or more STG instructions." (61)	The same relay number has been used in different STG instructions.	Do not use the same relay number in multiple STG instructions.
"MC/MCR instructions nested." (67)	MC and MCR instruction pairs have been nested.	Ensure that the sequence of MC and MCR instructions does not lead to nesting.
"MC/MCR instructions nested over 15 levels." (67)	The nesting of MC and MCR instruction pairs has exceeded 15 levels.	Limit the nesting of MC and MCR instruction pairs to 15 levels or less.
"Self-hold type macro is specified in MCALL instruction." (233)	A different type of macro (self-hold) has been specified in an MCALL instruction.	Specify a subroutine type macro in the MCALL instruction, or use MSTRT instructions for self-hold type macros.
"Initialization module cannot be specified for MDSTRT/MDSTOP instruction." (251)	The initialization module has been specified with the MDSTRT and MDSTOP instructions.	Because the initialization module is executed at the beginning of operation, do not use the MDSTRT or MDSTOP instructions to specify the initialization module.
"Subroutine type macro is specified in MSTRT instruction." (232)	A different type of macro (subroutine) has been specified in an MSTRT instruction.	Use a self-hold type macro in the MSTRT instruction. For subroutine type macros, use the MCALL instruction.
"SBN and RET instructions must be paired." (68)	SBN and RET instructions are not paired.	Use the SBN and RET instructions as a pair.

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Error Message	Cause	Remedy
"SBN/RET instructions nested." (67)	SBN and RET instruction pairs have been nested.	Write SBN and RET instructions so that they are not nested.
"SBN and RETI instructions are not written between END and ENDH instructions." (63)	A subroutine defined by the SBN and RET instructions has been written in a position other than between the END and ENDH instructions.	Write the SBN and RET instructions between the END and ENDH instructions.
"STP/STE instructions nested over 16 levels." (67)	The nesting of STP and STE instruction pairs has exceeded 16 levels.	Limit the nesting STP and STE instruction pairs to 16 levels or less.
"STP/STE instructions nested over 8 levels." (67)	The nesting of STP and STE instruction pairs has exceeded 8 levels.	Limit the nesting STP and STE instruction pairs to 8 levels or less.
"STP and STE instructions must be paired." (68)	STP and STE instructions are not used as a pair.	Use the STP and STE instructions as a pair.
"Cannot be used in a subroutine program." (77)	One of the following instructions has been used in a subroutine (between SBN and RET). STG, JMP, ENDS, INT, RETI, or MEMSW.	Check the instructions in the subroutine.
"Unit No. in PACK instruction is invalid." (700)	The unit number specified in a PACK instruction is invalid.	Specify a correct unit number.
"Lower limit is higher than upper limit." (939)	In a LIMIT or BANDC instruction, the lower limit is higher than the upper limit.	Set the LIMIT or BANDC instruction so that the upper limit is higher than the lower limit.
"Cannot be used in an interrupt program." (62)	You cannot use the following instructions in an interrupt program. TMR, TMH, TMS, TMU, UDT, C, UDC, OUTC, DIFU, DIFD, W_ON, W_OFF, W-UE, W-DE, STG, JMP, ENDS, HKEY, ITVL, SFT, LDP, LDF, ANP, ANF, ORP, ORF, ALT, SHOT, ONDL, OFDL, FLIK, PID, SBN, RET, LDPB, LDFB, ANPB, ANFB, ORPB, ORFB, MEP, MEF, SORTN, MPRINT, MREADL, MCOPY, MMOV, MREN, MFREEK, MSTAT, PIDAT, RAMP, TPOUT, LLFLT, SPWR, SPRD, SSVC, SCJ, FRSTM, FRLDM, RCOM, ABSENC, INCENC, MWRIT, MREAD, MFREE, MMKDIR, MRMDIR, MDEL, AWNUM, and AWMSG.	Do not use the following instructions in interrupt programs. TMR, TMH, TMS, TMU, UDT, C, UDC, OUTC, DIFU, DIFD, W_ON, W_OFF, W-UE, W-DE, STG, JMP, ENDS, HKEY, ITVL, SFT, LDP, LDF, ANP, ANF, ORP, ORF, ALT, SHOT, ONDL, OFDL, FLIK, PID, SBN, RET, LDPB, LDFB, ANPB, ANFB, ORPB, ORFB, MEP, MEF, SORTN, MPRINT, MREADL, MCOPY, MMOV, MREN, MFREEK, MSTAT, PIDAT, RAMP, TPOUT, LLFLT, SPWR, SPRD, SSVC, SCJ, FRSTM, FRLDM, RCOM, ABSENC, INCENC, MWRIT, MREAD, MFREE, MMKDIR, MRMDIR, MDEL, AWNUM, and AWMSG.
"High-speed counter instruction (CTHn) is used simultaneously." (80)	The same counter number has been specified for CTH and any of the following instructions in the project. INCENC RCNT FCNT PLSOUT	Do not use the same counter number for a high-speed counter instruction (CTHn) and other instructions.
"Cannot be used in the initialization module." (81)	In an initially executed module, you cannot use instructions that use edge flags (bit workspace) such as those shown below. Differential instruction When an edge flag is positive Timer instruction Counter instruction W_ON, W_OFF, HKEY, ITVL, JMP, ENDS, and PID	Do not use instructions that use edge flags in the initialization module.
"Unpaired LABEL or CJ/GOTO instructions exceeded 200." (600)	The number of unpaired LABEL instructions or CJ and GOTO instructions has exceeded 200.	Reduce the number of unpaired LABEL instructions or CJ and GOTO instructions.
"Corresponding counter instruction (C, UDC, OUTC) is not programmed." (76)	A corresponding counter instruction has not been written in the program.	Write the corresponding counter instruction (C, UDC, or OUTC).
"Corresponding timer instruction (TMR, TMH, TMS, UDT, TMU) is not programmed." (76)	Timer Tn has been referenced in an operand, but no TMR, TMH, TMS, UDT, or TMU instruction with a corresponding timer number exists.	Write the corresponding timer instruction (TMR, TMH, TMS, UDT, or TMU).

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"Corresponding high-speed counter comparator instruction (CTC) is not programmed." (76)	CTC (0 to 7) has appeared in an operand, but no corresponding CTC instruction exists.	Write the corresponding high-speed counter comparator instruction (CTC).
"Corresponding high-speed counter No. is not used. [CTHn]" (76)	CTH has been used in an operand, but none of the following instructions exist. CTH INCENC FCNT RCNT PLSOUT	Write the corresponding high-speed counter number.
"Corresponding high-speed counter instruction (CTHn) is not programmed." (76)	A high-speed counter instruction (CTHn) that corresponds to the CTCn being used by a CTCn instruction or operand is not being used.	Write the corresponding high-speed counter instruction (CTHn).
"This instruction cannot be used for the target unit." (605)	In a unit-specific instruction, the unit type of the unit specified with <Unit No.> does not match the unit type supported by the unit-specific instruction.	Correct the unit number of the unit-specific instruction.
"This instruction cannot be used for the target unit." (608)	The unit number specified in one of the following instructions is outside of the range of the KV sensor network. SPWR SPRD SSVC	Correct the unit number of the sensor setting instruction.
"Same counter No. is used in two or more C/ UDC/OUTC instructions." (61)	The same number has been used in multiple counter instructions.	Do not use the same counter number in multiple C, UDC, and OUTC instructions.
"Same timer No. is used in two or more TMR/ TMH/TMS/UDT/TMU instructions." (61)	The same number has been used in multiple timer instructions.	Do not use the same timer number in multiple TMR, TMH, TMS, UDT, and TMU instructions.
"Same No. is used in timer and counter." (61)	A timer instruction and a counter instruction have been written with the same number or the same number has been used in multiple timer or counter instructions. (This error does not occur with the KV-5000/3000 Series and KV Nano Series.)	Do not use the same number in multiple timer and counter instructions.
"Same high-speed counter comparator No. is used in two or more CTC instructions." (61)	The same high-speed counter comparator number cannot be used in different CTC instructions.	Do not use the same high-speed counter comparator number in multiple CTC instructions.
"Same high-speed counter No. is used in two or more CTH instructions." (61)	The same high-speed counter number cannot be used in different CTH instructions.	Do not use the same high-speed counter number in multiple CTH instructions.
"Same relay No. is used in two or more DIFD instructions." (61)	The same relay number has been used in different DIFD instructions. However, the same relay number can be used in DIFU and DIFD instructions.	Do not use the same relay number or comparator number in multiple DIFD instructions.
"Same relay No. is used in two or more DIFU instructions." (61)	The same relay number has been used in different DIFU instructions. However, the same relay number can be used in DIFU and DIFD instructions.	Do not use the same relay number or comparator number in multiple DIFU instructions.
"Same relay No./comparator No. is used in two or more INT instructions." (61)	The same relay number or comparator number has been used in different INT instructions.	Do not use the same relay number or comparator number in multiple INT instructions.
"Same relay No. is used in the first/last operand for two or more SFT instructions." (61)	The same relay number has been used in the same operand position in different SFT instructions.	Do not use the same relay number in multiple SFT instructions.
"Same relay No. is used in two or more W-DE instructions." (61)	The same relay number has been used in different W-DE instructions. However, the same relay number can be used in a W-DE instruction and in W-ON, W-OFF, and W-UE instructions.	Do not use the same relay number in multiple W-DE instructions.

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Error Message	Cause	Remedy
"Same relay No. is used in two or more W-OFF instructions." (61)	The same relay number has been used in different W-OFF instructions. However, the same relay number can be used in a W-OFF instruction and in W-ON, W-UE, and W-DE instructions.	Do not use the same relay number in multiple W-OFF instructions.
"Same relay No. is used in two or more W-ON instructions." (61)	The same relay number has been used in different W-ON instructions. However, the same relay number can be used in a W-ON instruction and in W-OFF, W-UE, and W-DE instructions.	Do not use the same relay number in multiple W-ON instructions.
"Same relay No. is used in two or more W-UE instructions." (61)	The same relay number has been used in different W-UE instructions. However, the same relay number can be used in a W-UE instruction and in W-ON, W-OFF, and W-DE instructions.	Do not use the same relay number in multiple W-UE instructions.
"When parallel block starts from power rail or ends at output rung, limit the parallel block length to 9. Otherwise, limit the length to 8." (312)	MPS and MPP pairs have been nested over 8 levels.	Rewrite the ladder so that the parallel block length becomes 9 or less.
"Must be paired with JMP/ENDS instruction." (413)	A STG instruction has been used, but no JMP or ENDS instruction exists.	Use an STG instruction with a JMP or ENDS instruction as a pair.
"Must be paired with STG instruction." (414)	A JMP instruction has been used, but the STG instruction to be paired with does not exist.	
"Must be paired with STG instruction." (415)	An ENDS instruction has been used, but the STG instruction to be paired with does not exist.	
"Reserved operand" (62)	"???" has been specified as an operand.	Specify correct devices as operands.
"Instruction duplicate" (60)	You cannot use the END instruction and HKEY instruction two or more times within the effective program range.	Only use the END instruction and HKEY instruction once within the effective program range.
"Unit configuration not set. Set unit configuration in Unit Editor." (239)	No unit configuration has been set.	Set the unit configuration in the Unit Editor.
"Conversion failed because CPU model set in unit setup information is different from the project. Open Unit Editor and update the unit setup information." (704)	The CPU model setting is different from that of the project.	Open the Unit Editor, and then update the unit setting information.
"Unit No. not defined in unit configuration is specified as argument for unit-specific instruction." (603)	The argument number in a unit-specific instruction is outside of the range of the current number of units.	Check the argument number in the unit-specific instruction.
"Label cannot be specified as unit No. for argument of unit-specific instruction." (607)	A label has been used as an argument number operand of a unit-specific instruction.	Do not use labels as argument number operands of unit-specific instructions.
"Address setting value of unit setup information is out of the assignment range. Open Unit Editor and change address setting." (717)	The transfer failed because the device settings of a unit are outside of their range.	Change the address setting in the unit setting information.
"Logging or tracing function (file save destination: memory card) is used in the logging setting." (425)	The logging settings include a setting that requires a memory card.	In the logging settings, do not use a logging or tracing function that will save files to a memory card.
"A device which cannot be operated with the current model is used in the logging setting." (427)	CTH or CTC has been set in the logging settings.	Do not set CTH or CTC to the devices in the logging settings.
"TRGD instruction is used 9 times or more with the same logging ID." (86)	The TRGD instruction has been used 9 times or more with the same logging ID in the project.	Limit the number of TRGD instructions used with the same logging ID to 8 or less.
"EtherNet/IP setting size exceeded the upper limit." (410)	The size of the EtherNet/IP settings has exceeded the upper limit.	Configure the EtherNet/IP settings so that their size does not exceed the upper limit.
"Device assignment setting for EIP automatic refresh exceeded the upper limit." (411)	The total size of all devices in "EIP refresh setting" (excluding reserved units) has exceeded the upper limit.	Reduce the device assignment setting for EIP automatic refresh.

Error Message	Cause	Remedy
"The adapter for specified node address is reserved." (89)	The adapter for the node address specified with the SPWR, SPRD, or SSVC instruction has been reserved.	Cancel the reservation of the specified node address.
"Specified parameter No./service No. does not exist." (86)	In an SPWR, SPRD, or SSVC instruction, the node address, slot number, and parameter number all have immediate values and the corresponding sensor has no parameters used for sensor parameter transfer instructions.	Check that the sensor set with the SPWR, SPRD, or SSVC instruction supports the sensor setting instruction.
"Memory card function is used for FTP file transfer in the FTP client setting." (424)	The FTP client settings include a setting that requires a memory card.	Delete the setting that requires a memory card from the FTP client settings.
"Axis No. is out of range (Range: 1 to 2). Point No. is out of range (Range: 1 to 25)." (602)	The axis number or parameter in a unit-specific instruction is outside of its range.	Set the axis number and point number to values within their ranges.
"Specified CPU unit does not have a unit function." (706)	The CPU unit specified with a macro instruction does not have a unit function.	Check the unit function of the specified CPU unit.
"Internal error occurred during conversion." (999)	An error was detected during conversion processing.	Contact your KEYENCE representative.
"Invalid operand. Select [Convert] → [Clear invalid operands]." (62)	There is an invalid operand (a relay or DM entry whose association with the unit has been deleted).	This is an invalid operand. Click the "Convert" menu → "Clear invalid operands."
"A device which cannot be operated with the current model is used for PLC event in the mail setting." (426)	A CTH or CTC that cannot be used in the email settings has been set.	Do not use CTH or CTC in the email settings.
"INT command (Unit No., Factor No.) is duplicated." (61)	The combination of the same unit number and the cause number is used in the different INT instruction.	Integrate the same unit number and the INT instruction cause number or reduce them.
"The number of INT instruction has exceeded its limit." (69)	The number of INT instruction has exceeded its limit.	Reduce the INT instruction.
"The specified unit number in the INT instruction or the interrupt of the cause number does not exist." (70)	The specified unit number in the INT instruction or the interrupt of the cause number does not exist.	Change the unit number or the cause number or add the corresponding unit.
"The specified operand is out of the range for direct input/output." (82)	The specified operand is out of the range for direct input/output.	Check the assignment of the device.
"The number of fixed-period module has exceeded its limit." (88)	The number of fixed-period module has exceeded its limit.	Reduce the fixed-period module.
"User memory area size exceeds the setting value of memory capacity setting." (93)	The size of CPU memory area has exceeded the setting value of memory capacity settings.	Reduce the data of CPU memory area or increase the assignment of the memory capacity settings.
"Unusable character is used in the file name and folder name of CPU memory." (94)	Unusable character is used in the file name and folder name of CPU memory.	Change the file and folder names.
"The file path length in CPU memory has exceeded its limit." (95)	The file path length in CPU memory has exceeded its limit.	Shorten the file name and folder name or reduce the folder hierarchy.
"The total number of the files and folders in CPU memory has exceeded its limit." (96)	The total number of the files and folders in CPU memory has exceeded its limit.	Reduce the number of files and folders.
"The number of the folder hierarchy in CPU memory has exceeded its limit." (97)	The number of the folder hierarchy in CPU memory has exceeded its limit.	Reduce the folder hierarchy.
"The size of the project area has exceeded the set value of memory capacity settings." (98)	The size of the project area has exceeded the set value of memory capacity settings.	Reduce the project size or increase the assignment of the memory capacity settings.
"Unusable character is used in the file name and folder name of the memory card." (99)	Unusable character is used in the file name and folder name of the memory card.	Change the file and folder names.
"The file path length in the memory card has exceeded its limit." (100)	The file path length in the memory card has exceeded its limit.	Shorten the file name and folder name or reduce the folder hierarchy.
"In the user document, the transferable maximum capacity 64MB to the PLC for the memory card (followed by the annotation of page A-13) has exceeded." (101)	In the user document, the transferable maximum capacity 64MB to the PLC for the memory card has exceeded.	Reduce the user document files for the memory card 64MB or less.
"Unusable character is included in the string constants." (719)	Unusable character is included in the string constants.	Change the string constant.

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Error Message	Cause	Remedy
"Unusable character is included in the module name." (719)	Unusable character is included in the module name.	Change the module name.
"Unusable character is included in the macro name." (719)	Unusable character is included in the macro name.	Change the macro name.
"Unusable character is included in the module comment." (719)	Unusable character is included in the module comment.	Change the module comment.
"Unusable character is included in the macro comment." (719)	Unusable character is included in the macro comment.	Change the macro comment.
"Unusable character is included in the project name." (719)	Unusable character is included in the project name.	Change the project name.
"Unusable character is included in the project comment." (719)	Unusable character is included in the project comment.	Change the project comment.
"Unusable character is included in the author." (719)	Unusable character is included in the author.	Change the author.
"Unusable character is included in the macro argument title." (719)	Unusable character is included in the macro argument title.	Change the macro argument title.
"Unusable character is included in the macro argument operand." (719)	Unusable character is included in the macro argument operand.	Change the macro argument operand.
"Unusable character is included in the global label name." (719)	Unusable character is included in the global label name.	Change the global label name.
"Unusable character is included in the local label name." (719)	Unusable character is included in the local label name.	Change the local label name.
"Unusable character is included in the global label comment." (719)	Unusable character is included in the global label comment.	Change the global label comment.
"Unusable character is included in the local label comment." (719)	Unusable character is included in the local label comment.	Change the local label comment.
"Unusable character is included in the global device comment." (719)	Unusable character is included in the global device comment.	Change the global device comment.
"Unusable character is included in the logging and trace file comment." (719)	Unusable character is included in the logging and trace file comment.	Change the logging and trace file comment.
"Unusable character is included in the character string constant of the global label." (719)	Unusable character is included in the character string constant of the global label.	Change the character string constant of the global label.
"Unusable character is included in the character string constant of the local label." (719)	Unusable character is included in the character string constant of the local label.	Change the character string constant of the local label.
"The module name is too long." (720)	The module name is too long.	Shorten the module name.
"The macro name is too long." (720)	The macro name is too long.	Shorten the macro name.
"The module comment is too long." (720)	The module comment is too long.	Shorten the module comment.
"The macro comment is too long." (720)	The macro comment is too long.	Shorten the macro comment.
"The project name is too long." (720)	The project name is too long.	Shorten the project name.
"The project comment is too long." (720)	The project comment is too long.	Shorten the project comment.
"The macro argument title is too long." (720)	The macro argument title is too long.	Shorten the macro argument title.
"The macro argument operand is too long." (720)	The macro argument operand is too long.	Shorten the macro argument operand.
"The global label name is too long." (720)	The global label name is too long.	Shorten the global label name.
"The local label name is too long." (720)	The local label name is too long.	Shorten the local label name.
"The global label comment is too long." (720)	The global label comment is too long.	Shorten the global label comment.
"The local label comment is too long." (720)	The local label comment is too long.	Shorten the local label comment.
"The global device comment is too long." (720)	The global device comment is too long.	Shorten the global device comment.
"The local device comment is too long." (720)	The local device comment is too long.	Shorten the local device comment.
"The logging and trace file comment is too long." (720)	The logging and trace file comment is too long.	Shorten the logging and trace file comment.

Error Message	Cause	Remedy
"The character string constant of the global label name is too long." (720)	The character string constant of the global label name is too long.	Shorten the character string constant of the global label.
"Size of user memory area is set to 0 Byte, but the file exists."(93)	An empty file (0 byte) exists in the user memory area of current project with the set value of user memory area in CPU memory capacity setting dialog is 0 Byte.	Delete empty files in user memory area of the current project.
"There is an inter-unit synchronization module, but inter-unit synchronization is not set to" To use ". "(220)	Inter-unit synchronization module exists even though the [Inter-unit synchronization function] setting in unit editor is "Not use".	Delete the Inter-unit synchronization module or set [Inter-unit synchronization function] setting in unit editor to "To use".
"Inter-unit synchronization is set to"To use ", but there is no inter-unit synchronization module. "(221)	Inter-unit synchronization module setting is "To use" in unit editor, but the Inter-unit synchronization module does not exist.	Create an inter-unit synchronization module or set [Inter-unit synchronization function] setting of unit editor to "Not use".
"Synchronization target of inter-unit synchronization is set other than "Inter-unit module", but there is an inter-unit module."(222)	Inter-unit synchronization module exists with the Inter-unit synchronization target is set other than "Inter-unit synchronization module".	Set Inter-unit synchronization target to "Inter-unit synchronization module" for the scan time related CPU system setting or delete the Inter-unit synchronization module.
"Number of Inter-unit synchronization modules exceeds the limit."(223)	Inter-unit synchronization module exists more than one of the upper limit.	Set the number of Inter-unit synchronization modules to one.
"It is impossible to use MCALL / MSTRT / FB command for the function called from FUN command."(234)	MCALL / MSTRT / FB command is used for the function called from FUN command.	Delete the MCALL / MSTRT / FB command without corresponding function.
"Calling function block from function block exceeds 8 steps."(238)	Nesting of function block exceeds 8 steps.	Rewrite the program to nest within 8 steps.
"It is impossible to use MCALL / MSTRT command for the function block called from FB command."(241)	MCALL / MSTRT command is used for the function block called from FB command.	Delete MCALL / MSTRT command in the corresponding function block.
"String labels larger than 32 bits can not be specified as the IN / OUT argument operand of function block command."(245)	If the size of character string label exceeds 32 bits (termination (including NULL: 8 bits)), it can not be specified for IN / OUT operand of function block argument.	Set the size of character string label for IN / OUT operand of function block argument to 32 bits or less (termination (including NULL: 8 bits)).
"Identification No. can not be used for FB / FUN command."(255)	Function block identification number can not be used for function block command.	Delete the identification number attached to function block name of function block command.
"For the macro argument P or V, specify the beginning of device that can reserve a 2-word area."(256)	The global device specified for 2 words macro argument of MCALL / MSTRT command is out of range.	Change the device number specified for operand to within the device range.
"Interrupt command can not be used in function block."(260)	Interrupt command can not be used in Function block.	Do not use the interrupt command in function block.
"In order to use UMALLOC / UPSTRT / UPSTOP / UFSUS / UFRSM command, the project CPU function version must be 2.0 or higher."(263)	Unit program command is used if CPU function version is set to an unit program unsupported version.	Delete UMALLOC / UPSTRT / UPSTOP / UFSUS / UFRSM command or change the project CPU function version to 2.0 or higher.
"It is a command can not be used for target unit."(266)	The unit not supports UMALLOC / UFREE / UTRG command is specified by unit number operand.	Delete UMALLOC / UPSTRT / UPSTOP / UFSUS / UFRSM command or specify the unit number of supported unit.
"In order to use ATAN2 command, the project CPU function version must be 2.0 or higher."(267)	In order to use ATAN2 command, need to change the project CPU function version to 2.0 or higher.	Set the CPU function version to 2.0 or higher.
In order to use double precision suffix with APR command, the project CPU function version must be 2.0 or higher."(268)	In order to use double precision suffix with APRcommand, need to change the project CPU function version to 2.0 or higher.	Set the CPU function version to 2.0 or higher.
"In order to use single precision / double precision suffix with MAX / MIN / AVG / WSUM command, the project CPU function version must be 2.0 or higher."(269)	In order to use single precision / double precision suffix with MAX / MIN / AVG / WSUM command, the project CPU function version must be 2.0 or higher.	Set the CPU function version to 2.0 or higher.
"Unit type is not set for argument device. Set it in [Argument setting of Function block]."(270)	Unit type is not set in argument definition of function block.	Set unit type for argument device.

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Error Message	Cause	Remedy
"Unit type which number specified by function block command differs from which assigned in argument setting dialog."(271)	The unit type which number specified by function block command differs from the unit type assigned in argument setting dialog.	Match the unit type which number specified by function block command and which assigned in argument setting dialog.
"Macro running bit is used in function block."(281)	Macro running bit is used in function block.	Do not use the macro running bit in the function block.
"Number of read data exceeds the maximum value."(284)	Number of unit specific command's read data exceeds the upper limit. (Such as the fourth operand of U_RDBF)	Change the number of read data operands to within the upper limit.
"Multiple FB / FUN can not be described in one block."(613)	More than one FUN / FB is described in one block.	Do not write multiple FUN / FB commands within one block.
"There is an illegal parallel connection executed after FB / FUN."(614)	There is an illegal parallel connection executed after FB / FUN.	Do not connect in parallel after FB command.
"The display format range of function block command operand exceeds the usable area of device."(722)	Device range used in display format of the function block command operand exceeds the usable range of device.	Reset the operand display format or change the device specified for function block command operand.
"It is a command word that can be used only when the project CPU function version is 2.1 or higher. [Command word]"(723)	If CPU function version is smaller than 2.1, the command word for unit type check is used.	If using the command for unit type checking, change the project CPU function version to 2.1 or higher.
"It is a command word that can be used only when the project CPU function version is 2.2 or higher. [Command word]"(723)	If CPU function version is smaller than 2.2, the corresponding unit specific command is used.	If using the specified unit specific command, change the project CPU function version to 2.2 or higher.
"If specifying a device / label for the unit number of unit specific command, the project CPU function version must be 2.1 or higher. [Command word"(724)	If the CPU function version is smaller than 2.1, the device or label is specified as the unit number with the operand of unit type check command.	In order to uo use a device or label for the unit number operand of unit type checking command, change the project CPU function version to 2.1 or higher.
"In order to use the unit type without assigned in argument setting, the project CPU function version must be 2.1 or higher."(725)	If CPU function version is smaller than 2.1, Unit type of function block argument is unassigned.	In order to unassign the unit type of function block argument, change the project CPU function version to 2.1 or higher.
"In order to use the unit program in [Unit name], the project CPU function version must be 2.1 or higher."(728)	If CPU function version is smaller than 2.1, the unit program is used for CPU.	In order to use unit projects for CPU, change the project CPU function version to 2.1 or higher.
"Unit [Unit number]: There is a unit program that can not be used in the function version of unit name. The unit function version must be n or more. [Unit program name]"(729)	There are unit programs that can not be used in unit function version of the project.	Change unit function version of the project.
"In order to use FUN / FB / FEND command, the project CPU function version must be 2.0 or higher."(730)	Function block command (FUN / FB / FEND) is used if a function block unsupported version is set for the project CPU function version.	Delete function block command or change the project CPU function version to 2.0 or higher.
"FEND command exists in a program / function that is not a function block."(732)	FEND command exists in module / aacro / function block which is not a function block.	Delete the FEND command of corresponding module / macro / function block.
"A function block other than FB command is specified."(733)	A function block other than FB command is specified.	Specify a function block name for the operand of FB command.
"A function block other than FUN command is specified."(734)	A function block other than FUN command is specified.	Specify a function block name for the operand of FUN command.
"The function block with a specified name is not defined."(735)	An unregistered function block was called.	Define the function block or delete the function block command.
"There are arguments which can not be omitted in function block."(736)	Operands that can not be omitted for function block command are omitted.	Specify an operand as the argument that can not be omitted for function block command.
"Function block command has too many operands. (Specified number> Correct number)"(737)	Function block command has too many number of operand specifications	Match the number of arguments for function block command to the number of function block definitions.
"A function block call from function block recursed."(738)	Function block recursive call is not possible.	Do not use recursive call of function block.
"The unit with a number specified by function block command is not set."(739)	The unit setting with an unit number specified by function block command does not exist.	Specify an unit number exists in unit setting.

Error Message	Cause	Remedy
Function block A device that can be specified for a unit device argument is not set."(740)	A device that can not be specified for unit device argument of function block is specified.	Specify the device that can be specified by unit device argument of function block.
"The device that can be specified is not set for the function block unit device argument."(741)	The indirect specifiable device is not set for function block argument.	Specify the device indirectly specifiable for function block argument.
"#TM is specified as the IN / OUT argument operand of function block command."(742)	#TM can not be specified as the operand whose function block command attribute is IN / OUT.	Do not use #TM as an operand whose function block command attribute is IN / OUT.
"Function block argument device is invalid."(743)	The device type which set in the function block argument device differs from the device type in the cell actually called the function block.	Match the device type set in function argument device with the device type in the cell that actually called the function block.
"There is a private argument whose function block default value is not set."(744)	The private argument default value of function block argument is not set.	Set the default value to IN type of function block private argument.
"For using a long project name, the project CPU function version must be 2.0 or higher."(745)	In order to set the project name to 33 characters or longer, it is necessary to change CPU function version to 2.0 or more.	Set the CPU function version to 2.0 or higher.
"For using a long module name, the project CPU function version must be 2.0 or higher."(746)	In order to set the module name to 25 characters or longer, it is necessary to change CPU function version to 2.0 or more.	Set the CPU function version to 2.0 or higher.
"For using settings that do not perform OFF processing when stopping execution, the project CPU function version must be 2.0 or higher."(747)	In order to enable [Do not perform OFF processing when stopping execution] of the program, it is necessary to change CPU function version to 2.0 or more.	Set the CPU function version to 2.0 or higher.
"Since the display format is not bit, it is not possible to specify a word device by bit."(750)	Specify other than 0th bit of the bit in word as the IN or OUT (except bit) argument of function block argument.	In order to specify the bit in word as an IN or OUT (other than bit) argument of function block argument, specify the 0th bit.
"Timer / counter / index register can not be used for argument of double precision floating point type."(751)	Timer / counter / index register is used for argument of double precision floating point type.	Do not use the timer / counter / index register as an argument of double precision floating point type.
"Function is specified from MCALL command · MSTRT command · FB command."(755)	Function can not be specified from MCALL command, MSTRT command, or FB command.	Do not specify MCALL command · MSTRT command · FB command from function.
"For using the language setting of comment setting, the project CPU function version must be 2.0 or higher."(756)	There is a language setting of comment setting other than "Not set" in the case of the project CPU function version is smaller than 2.0.	Set the CPU function version to 2.0 or higher. Or, set all setting languages of comment setting to "Not set".
"For using function block [Function block name], the project CPU function version must be n or more."(757)	There is a function block created with a function version higher than the current function version.	Change the project CPU function version.
"The target unit of function block is not specified."(759)	The target type unit is not specified for the unit device argument of function block.	Specify the unit number of the unit specified by unit device parameter type of function block.
"For using function block [Function block name], the project unit function version must be n or more."(758)	There is a function block created with a function version higher than the current unit function version.	Change the project unit function version.
"In order to use the script character string work for interrupt program, the CPU function version must be 2.2 or higher."(761)	For using the script character string work for interrupt program, the CPU function version must be 2.2 or higher.	Set the CPU function version to 2.2 or higher.
"Function block command is used in the initialization module. Function block will not executed after the second scanning."(931)	Function block command is used in the initialization module.	Do not use function block command in initialization module.
In order to use data acquisition trigger (Flow), the project CPU function version must be 2.2 or higher. [Logging / Trace setting: ID]	"Data acquisition trigger (Flow)" is set for the trigger setting of logging / tracing setting in the case of the project CPU function version is smaller than 2.2.	Set the CPU function version to 2.2 or higher. Or, set the trigger setting of logging / trace setting to something other than "Data acquisition trigger (Flow)".

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Error Message	Cause	Remedy
To use R100000 or higher, the project CPU function version must be 2.3 or higher. [Sections Used] (763)	In the [Sections Used] of error messages, R100000 or higher that can be used only for KV - 7500/7300 with CPU function version 2.3 or later has been set.	Change the project CPU function version, or review the [Sections Used] setting to be within R99915.
"The element number of the array must be specified in [ ]. [Operand without [ ]]" (826)	The element number of array type variable has not been specified in [ ].	Specify the element number of array type variable in [ ].
"Variable-length operand cannot be specified. [Operand name]" (797)	A variable-length variable has been specified for an operand that cannot specify a variable-length variable.	Specify a fixed-length variable or device.
"The function name cannot be specified for function argument / variable. [Function name]" (779)	The function name has been used for the function argument name or the variable name specified as argument.	Change the argument name and variable name to a string other than the function name.
"Only variable can be specified. [Operand name]" (780)	Device or value other than variable has been specified for an operand that can only specify a variable.	Specify a variable.
"There are members that have not been set. [Structure name]" (781)	Structure members have not been set correctly.	Check the structure settings.
"The number of nested segments in a structure has exceeded 8. [Structure name]" (782)	The number of nested segments in a structure has exceeded 8.	Check the structure settings, and change the data type of members so that the number of nested segments is 8 or less.
"The structure size has exceeded the upper limit. Check the number of members or the offset setting. [Structure name]" (783)	The structure size has exceeded the upper limit.	Take the following measures to reduce the structure size. • Reduce the number of members in the structure • Correct the offset to reduce fillers
"The bit offset position of type name / type member can be specified as 0 only. [Structure name.Member name]" (784)	The bit offset position of members other than the BOOL type has been set to a value other than 0.	Set the bit offset position of members other than the BOOL type to 0.
"Offset positions are duplicated. [Structure name]" (785)	Offset positions of the structure members are duplicated.	Set so that the offset positions of the structure members are not duplicated.
"The variable holding area is insufficient. Reduce the number of variables held or increase the number of variable holding areas set in [Work Area Settings]." (787)	The size of variables / arguments held has exceeded the variable holding area set in [Work Area Settings].	Reduce the number of variables / arguments held or increase the number of variable holding areas in [Work Area Settings].
"The member does not exist. Please register the member. [Structure member name]" (788)	The specified member does not exist.	Register the specified member, or select the specified member from the registered members.
"The member does not exist. [Member name]" (788)	The specified member does not exist.	Register the specified member, or select the specified member from the registered members.
"The argument does not exist. Check the argument setting in the function block settings. [Function block argument name]" (789)	The specified argument does not exist.	Register the specified argument, or select the argument from the registered arguments.
"The array subscript has exceeded the number of elements. [Subscript constant / variable name with constant attribute]" (790)	The specified element number has exceeded the number of elements set in the variable edit window.	Specify an element number less than the number of elements set in the variable edit window.
"Array dimensions do not match. Data type of [Operand in [] of array] [Variable name] is [Data type]." (791)	The specified number of dimensions has exceeded the number of dimensions set in the variable edit window. Example) The third dimension is specified for a two-dimensional array type variable.	Specify the number of dimensions below the value set in the variable edit window.

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Error Message	Cause	Remedy
"Only the INT/UINT/DINT/UDINT type variables and word devices can be specified for the array subscript. [Operand]" (792)	Variable or word device other than the INT/UINT/DINT/UDINT type has been specified for the array subscript.	Specify an INT/UINT/DINT/UDINT type variable or word device for the array subscript.
"The range of bit specification has exceeded the range set by the variable data type. [Modified operand]" (793)	The specified bit position has exceeded the range of the data type.	Specify the bit position in the following ranges according to the target data type. For INT/UINT type: 0 to 15 For DINT/UDINT type: 0 to 31
"Bit specification in a word can be used only for integer type variables." (794)	Bit position has been specified for a variable of a data type for which bit position cannot be specified.	Bit position can be specified only for the INT/UINT/DINT/UDINT type. Do not specify bit position for variables of other data types.
"Members of argument type IN-OUT of function block type variable cannot be accessed. [Argument name]" (795)	The IN-OUT argument has been specified after writing "Function block type variable name.Argument name".	Only IN and OUT arguments can be specified after writing "Function block type variable name.Argument name". When using the IN-OUT argument, use the device / variable specified as argument.
"The number of elements cannot be specified in [ ] for non-array type variables. [Operand]" (796)	An element number has been specified in [ ] for a variable other than array type.	Set the data type of the variable with element number specified in [ ] to array.
"The number of structure definitions has exceeded the upper limit." (798)	The number of structure definitions has exceeded the upper limit.	Reduce the number of structure definitions to the upper limit (800) or less.
"The string length has exceeded the string length in the argument settings. [Argument name:]" (799)	The string length of the string constant specified in the function block argument has exceeded the string length set in the argument settings.	Control the string length of the string constant specified in the argument to the value set in the argument settings or less.
The data types of the operand and argument do not match in the function block instruction. [Argument name] (800)	The data type of the function block argument does not match that of the variable specified as argument.	Keep the data type of the argument matched with that of the specified variable.
The data types of the operand and argument do not match in the function instruction. [Argument name] (800)	The data type of the function block argument does not match that of the variable specified as argument.	Keep the data type of the argument matched with that of the specified variable.
The data types of the operand and return value do not match in the function instruction. [Function name]" (800)	The data type of the function block argument does not match that of the variable specified as argument.	Keep the data type of the argument matched with that of the specified variable.
"Device / variable that cannot be specified for indirect reference using ADRSET has been specified. [Operand]" (801)	Device / variable for which the address cannot be obtained using ADRSET has been specified.	Do not specify the first operand of ADRSET for the following devices / variables. • Structure member • Array type variable element • Specific bit of word device • Function block argument specified by "Function block type variable name.Argument name" • Function block IN argument, OUT argument, UV (When used in the function block)
"A variable other than the [Function block name] type is specified for the instance name." (802)	The variable specified as instance in the FBCALL/FBSTRT instruction is not the function block type variable to be called.	Specify the same function block type variable as the function block to be called for the instance.
"A value out of the range of argument data type has been set. [Argument name]" (803)	A direct value out of the range of the data type has been specified for the function block argument.	Correct the direct value specification of the function block argument.

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Error Message	Cause	Remedy
"The dimension does not exist. [Dimension operand]" (804)	Dimension that does not exist in the second operand of the ACNT instruction has been specified.	Specify the dimension number that exists.
"No value can be written to the OUT argument. [Operand]" (805)	A value was written to the OUT argument after writing "Function block type variable name.Argument name".	Do not write a value after specifying "Function block type variable name.Argument name" for the OUT argument.
"The number of variables held has exceeded the upper limit." (808)	The number of definitions for variables held has exceeded 30000.	Reduce the number of definitions for variables held to 30000 or less.
"The compatible model must be KV-8000 with CPU function version 2.0 or later to use the [Instruction name] instruction." (811)	Instruction that cannot be used with the CPU unit with CPU function version lower than 2.0 has been used.	Upgrade the CPU function version to 2.0 or higher when using the following instructions. FBCALL/FBSTRT/BBMOV/BBCMP/ ACNT/BSIZE/WSIZE instructions
"The number of variables has exceeded the upper limit." (812)	The number of variables defined in the variable edit window has exceeded 100000.	Reduce the number of defined variables to 100000 or less.
• Writing to EN is impossible. • No value can be read from EN. [Operand] (813)	No value can be written to EN after writing "Function block type variable name.EN". The value of EN cannot be read after writing "Function block type variable name.EN" from a program outside the function block.	Do not write a value to EN after writing "Function block type variable name.EN". Do not read the value of EN after writing "Function block type variable name.EN" from a program outside the function block.
Writing to ENO is impossible. [Operand]" (813)	No value can be written to ENO after writing "Function block type variable name.ENO" from a program outside the function block.	Do not write a value to ENO after writing "Function block type variable name.ENO" from a program outside the function block.
"Loop has occurred in the structure nesting. [Structure name]" (818)	The structure nesting has formed a loop.	Ensure that the nesting does not form a loop in the structure definition.
"The size of variable information held has exceeded the upper limit. Reduce the number of variables held." (820)	The size of variable information held in the item has exceeded the upper limit.	Reduce the number of variables held or shorten the names of variables held.
"No value can be written to [Specification target]. [Operand]" (825)	Writing to the module running bit, macro running bit and _FUN_ENO has been performed.	Do not write to the module running bit, macro running bit and _FUN_ENO.
"The size of VT5-WX ladder monitor data has exceeded the upper limit." (828)	The size of VT5-WX ladder monitor data has exceeded the upper limit.	Reduce the number of programs written in the module in the ladder program. It is not necessary to reduce the number of programs written in function blocks, functions and macros.
"The total size of strings has exceeded the upper limit. Reduce the string length of variable names / structure names / function block names / string constants." (827)	The total size of strings in the item has exceeded the upper limit.	Reduce the string length or definition of variable names, structure names, function block names and string constants.
"This is a variable of data type that cannot use index modification." (830)	Index modification has been used for a variable that cannot use index modification.	Do not use index modification for structure type variables and function block type variables.
"Device must be assigned to use index modification." (831)	Index modification has been used for a variable that cannot use index modification.	When using index modification, take one of the following measures. • Set the device to be assigned to the variable • Set index modification for indirect reference of the variable

Error Message	Cause	Remedy
"The assignment target is a device for which index modification cannot be performed." (832)	The variable with index modification used is assigned to the bit in a word.	When index modification is performed for the variable assigned to a bit device, set the assignment target device to bit device (R or MR).
"Bits other than the first in 16-bit unit cannot be specified. [Operand]" (833)	Bit position other than the first in the 16-bit unit has been specified for the operand.	When specifying bit data, specify the first bit in 16-bit unit.

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■ Warning messages

Warning Message	Cause	Remedy
"An even number is recommended for device No. because the 2nd operand for ADRSET consumes two words." (900)	An odd device number has been specified for the second operand for ADRSET.	Specify an even device number for the second operand for ADRSET.
"The 1st operand of ADRSET instruction is used to set automatic assignment of local device. Shall confirm assignment range of local device." (932)	A local device set to automatic assignment has been used as the first operand of an ADRSET instruction.	Specify devices other than local devices set to automatic assignment as the first operand of ADRSET instructions.
"Specify the CH beginning address when you specify the bit device to the argument device of the unit-specific instruction." (380)	The bit device excluding the CH beginning (R002, R106, R1012, etc.) is specified in the argument device of the unit-specific instruction.	Specify the CH beginning (R000, R100, R1000, etc.) bit device to the argument device of the unit-specific instruction.
"Relay No. which does not provide sufficient response speed for HSP instruction is set." (418)	An HSP instruction has been written so that its first operand is an input relay that is not a high-speed input relay (a relay from R108 to R203 has been specified). (This only occurs on the KV-N60**.)	When using the KV-N60**, do not use the HSP instruction with R108 to R203.
"A relay in the range for which direct input/ output is impossible is specified in the first operand for the RFSX/RFSY instruction." (404)	The following causes are likely. • The relay for the first operand has not been assigned to the unit. • The relay for the first operand has been assigned to the unit of a KV bus version 1 slave. • The relay specified for the first operand does not support direct I/O even when a KV bus version 2 slave is used.	Do not use RFSX or RFSY for relays that do not support direct refresh instructions.
"Relay No. which cannot be used for HSP instruction for the current model." (421)	An HSP instruction has been written so that the first operand is a relay number that does not work with the current model.	Specify a relay number that can be used with the HSP instruction.
"Cannot be used for the current model." (422)	One of the following instructions that cannot be used with the current model has been written in the program. • MWRIT, MREAD, MFREE, MMKDIR, MRMDIR, MDEL, MPRINT, MREADL, MCOPY, MMOV, MREN, MFREEK, or MSTAT. • AWNUM or AWMSG.	Disable or delete the instruction that cannot be used.
"Cannot be used for the current model." (422)	One of the following instructions that cannot be used with the current model (KV-N14**) has been written in the program. • WTIME or AJST • LDWK, ANDWK, or ORWK • LDWKB, ANDWKB, or ORWKB • LDCAL, ANDCAL, or ORCAL • LDCALB, ANDCALB, or ORCALB	Disable or delete the instruction that cannot be used.
"The expansion unit specified with the unit No. does not exist." (405)	The first argument of a UREAD, UWRIT, or UFILL instruction is a direct value and the unit corresponding to the set number does not exist. Alternatively, this unit does not have buffer memory.	Specify the numbers of existing units as the first argument of UREAD, UWRIT, and UFILL instructions.
"Same label name is used for global and local labels." (708)	The same label name is used for both global and local labels.	Set the global and local labels so that they do not use the same label name.
"To use clock-related functions, set the CPU operation for [Time error] to [Continue (warning)] in the action when an error occurs in setting of the CPU system setting." (438)	The CPU operation when a time error occurs has been set to "Continue (ignore)" in the settings for operations when errors occur in the CPU system settings, and one or more of the following clock-related functions has been used. • Logging settings (excluding internal memory tracing) • EP unit • Calendar contact instruction or weekly contact instruction • ARES instruction • Clock processing instruction • Memory card instruction • CM700 to CM706 • CM2200 to CM2226 • CM2250 to CM2276 • CR2311 • CR3900 to CR3903 and CR3905 to CR3909 • CR3300 to CR3502	In the settings for operations when errors occur in the CPU system settings, set the CPU operation for "Time error" to "Continue (warning)."

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Warning Message	Cause	Remedy
"Comparator 2 matching relay with positioning axis No. which cannot be used for the current model" (419)	An INT instruction has been written so that the first operand is a positioning comparator 2 matching relay that cannot be used.	Specify the device of an axis number that can be used.
"Axis No. which cannot be used for the current model." (423)	An axis number that cannot be used with the current model has been specified in one of the following instructions. • PSTRT • ORG • JOG • TCH • HOME • CHGSP • CHGTGT • RFSPS	Specify an axis number that can be used.
"High-speed counter comparator No. which cannot be used for the current model" (428)	A CTC instruction that cannot be used with the current model is present, or CTC is present in an operand.	Specify a high-speed counter comparator number that can be used.
"High-speed counter No. which cannot be used for the current model" (417)	A CTH instruction that cannot be used with the current model is present, or CTC or CTH is present in an operand.	Specify a high-speed counter number that can be used.
"High-speed counter No. which cannot be used for the current model" (420)	A high-speed counter number that cannot be used with the current model has been specified in one of the following instructions. • RFSCTH (first operand) • INCENC (second operand) • PLSOUT (first operand) • FCNT (first operand) • RCNT (first operand)	Specify a high-speed counter number that can be used.
"Direct clock pulse of high-speed counter No. which cannot be used for the current model is used." (439)	The direct clock pulse of a high-speed counter number that cannot be used with the current model has been used.	Specify a high-speed counter number that can be used.
"No device assigned to a refresh device within the specified device range." (88)	In cyclic communication refresh instruction RFSCI or RFSCO, there is no device that has been assigned to a refresh device within the device range specified with the operand.	Specify a device that has been assigned to a refresh device.
"Specified slot No. does not exist in the scan list." (85)	In an SPWR, SPRD, or SSVC instruction, the slot number corresponding to both the node address and slot number does not exist in the EtherNet/IP settings.	Check the slot number in the SPWR, SPRD, or SSVC instruction or check the EtherNet/IP settings.
"The sensor setting instruction cannot be used for the specified sensor." (87)	In an SPWR or SPRD instruction, the sensor parameter transfer instruction target flag of the parameter number corresponding to the node address, slot number, and parameter number has been turned OFF.	Check that the node address, slot number, and parameter number specified in the sensor setting instruction are the targets of the sensor setting instruction.
"The sensor setting instruction cannot be used for the specified sensor." (90)	In an SSVC instruction, the sensor service instruction target flag of the service number corresponding to the node address, slot number, and parameter number has been turned OFF.	Check that the node address, slot number, and parameter number specified in the sensor setting instruction are the targets of the sensor setting instruction.
"The specified node address does not exist in the scan list." (84)	The specified node address with SPWR, SPRD or SSVC does not exist in the EtherNet/IP settings.	Check the SPWR, SPRD or SSVC instruction node address or the EtherNet/IP settings.
"Unusable character is included in the local device comment." (719)	Unusable character is included in the local device comment.	Change the local device comment.
"The character string constant is too long." (720)	The character string constant is too long.	Shorten the string constant.
"The character string constant of the local label name is too long." (720)	The character string constant of the local label name is too long.	Shorten the character string constant of the local label.

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Warning Message	Cause	Remedy
"Unit specific command [Unit specific command word] can not be used for the current unit setting of [Unit number]: [Unit name]. Check the unit setting."(225)	For the unit which specified by the unit number operand of unit specified command, an unit specific command is used for the function unsupported by the current unit editor setting.	Change the function to which unit specific command belongs to the setting to be used by unit setting of unit editor, or delete Unit specific command. * The following functions may be possible. • Socket function of KV-8000/7500/KV-XLE02 • PLC link function of KV-XLE02/XL202/XL402
"In order to specify bit device for the argument device of unit specific command device, specify the address with CH leading."(257)	An address of bit device with other than CH leading is specified for the argument device of unit specific command.	In order to specify bit device for the argument device of unit specific command device, specify the address with CH leading.
"Function block argument is not used in the function block program. Refer to [Function block argument setting]."(705)	Argument is not used in function block.	Use at least one argument in function block.
"While execution stops, program processing OFF can not be called from program not processing OFF."(748)	[Perform OFF processing while execution stops] program is called from the program set to [Do not perform OFF processing while execution stops].	Align the setting [Do not perform OFF processing while execution stops] with the caller and the caller program, or delete the call processing.
"The operand display format of function block command does not match the display format of function block argument."(752)	Function block argument display format and operand argument / label display format do not match.	Align the display format of function block argument and the display format of operand argument / label.
"Value is written to the caller's IN argument."(753)	IN argument is specified for OUT, IN - OUT argument of function block.	Check the argument specification while paying attention to the nesting of function block.
"The value specified for function block command operand is out of the range of argument display format."(760)	A direct value outside the display format range of function block argument is specified.	Reset the direct value specification of function block argument.
"A conversion error has occurred during operation recorder setting. Keep the settings of PLC and KV STUDIO matched. [Operation recorder: ID]" (786)	The operation recorder settings of PLC and KV STUDIO do not match.	Match all settings with the PLC check / synchronization function, or transfer all items with the PLC transfer operation.
"No value can be read from the IN argument. [Operand]" (807)	The value of IN argument was read after writing "Function block type variable name.Argument name".	Do not read the value after specifying "Function block type variable name.Argument name" for the IN argument.
"The same function block type variable has been called with different instructions (FBCALL/FBSTRT)." (819)	The same function block type variable has been called with both FBCALL and FBSTRT instructions.	The instruction to call the same function block type variable should be unified to either FBCALL or FBSTRT.
"The specified variable does not exist. [Location] [Setting name] [Operand] ■ Location • For operation recorder [Operation recorder: ID] • For record / trace setting [Record / trace setting: ID] ■ Setting name • For operation recorder [Collection Period - File Save Trigger], [Collection Period - Start Trigger], [Specify Folder Name - Device], [Device Record - Individual Registration] • For record / trace setting File Name - Device], [Device], [Trigger - Bit Device], [Trace Details - File Save Trigger]" (821)	Variable that does not exist has been set in the operation recorder settings or record / trace settings.	Register the variables set in the operation recorder settings and record / trace settings, or set the registered variables.
"The variable specification method is incorrect." (822)	The variable specification method in the operation recorder settings or record / trace settings is incorrect.	Check if the variable specification is correct.

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Warning Message	Cause	Remedy
"Variable of an unusable data type has been set. [Location] [Setting name] [Operand] (823)	Variable of a data type that cannot be set has been set in the operation recorder settings or record / trace settings.	Check the variable data type set in the operation recorder settings and record / trace settings.
"Data type and variable data type do not match. [Location] [Setting name] [Operand] (824)	The variable data type does not match the data type set in the record / trace settings.	Match the data type set in the [Variable Edit Window] with the data type set in the record / trace settings.

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Errors at the Start of Monitoring and Communication Errors

The following error messages are displayed at the start of monitoring or during communication.

Error Message	Cause	Remedy
"The item mismatches the PLC model connected to the target."	The model set in the ladder program does not match the model being communicated with.	Set the model correctly.
"Password error."	The entered password is incorrect.	Enter the correct password.
"PLC status changes in transfer, Ladder conversion interrupted."	The PLC status changed during program transfer processing.	Return to editing, and then transfer the program again.
"Unstable USB communications. Disconnect and reconnect USB cable, and retry communications."	USB communication has become unstable.	Exit the monitor, reconnect the USB cable, and then start communicating again. If this error occurs frequently, reinstall the USB driver.
"USB cannot be opened."	The USB port could not be opened.	Access Device Manager from Control Panel, and then check whether the USB driver has been installed properly. If the driver has been installed, reinstall it.
"USB port disconnected"	The USB port could not be used.	Check the USB cable connection. Use Device Manager to check whether the USB driver has been installed.
"Fail to acquire PLC info."	The information of the PLC could not be obtained at the start of communication.	Check the connection of the communication cable and the communication settings.
"COM port cannot be opened."	The communications port (COM port) could not be used.	Check that the COM port selected in Device Manager can be used. Check whether the communications port is being used by another application.
"Modem not connected, or not powered on."	The modem did not return a response.	Check the connection and power supply of the modem.
"Connection session."	The connection destination is currently communicating.	Wait a while before trying to connect again.
"NO CARRIER"	Communication between the modem and the connected device is not being performed successfully.	Check the connection.
"NO DIAL"		

PLC Unit Errors

The following error messages are displayed when an error occurs on the CPU unit or base unit.

■ KV-8000/7500/7300

This section describes the errors that occur on the KV-8000/7500/7300.

You can use the following items to check for errors.

• Access Window

• KV STUDIO's error monitor

• CR/CM

Whether an error is a serious error or a minor error is determined by the error's group.

Serious errors......Scan time over errors, system errors, and setting errors

Minor errors.........Time errors, calculation errors, unit errors, memory card operation errors, memory card access errors and other errors.

Number	Group	Message	Cause	Remedy
10	Setting error	サブルーチン ネスト制限オーバー SBN Exceeds Nesting Limit 子程序嵌套超限	The subroutine nesting limit has been exceeded.	Errors that occur during ladder execution will not occur during KV STUDIO conversion. Modify the ladder program, paying close attention to the proper usage of subroutines.
11	Setting error	FOR-NEXT ネスト制限オーバー FOR-NEXT Exceeds Nesting Limit FOR-NEXT 嵌套超限	The nesting limit of FOR to NEXT instructions has been exceeded.	Errors that occur during ladder execution will not occur during KV STUDIO conversion. Modify the ladder program, paying close attention to the proper usage of the FOR and NEXT instructions.
15	Setting error	コンバートエラー Failed To Convert 转换错误	The conversion operation failed.	If you use KV STUDIO to convert a project read from the PLC, you can check the cause of the conversion failure. After you eliminate the cause of the failure, transfer the ladder program to the PLC.
22	Setting error	マクロネスト 制限オーバー Macro Exceeds Nesting Limit 宏嵌套超限	The number of macros nested in multiple interrupts has been exceeded the limit.	Reduce the number of macro instructions in the interrupt MACRO Nest program.
29	System error	ラダースタックエラー Ladder Stack Error 梯形图堆栈错误	A system error has occurred.	Turn the power on again. Contact your KEYENCE representative.
30	Scan time over	スキャンタイム オーバー Scan Time Over 扫描超时	The scan time has met or exceeded the set time.	Modify the ladder program, checking to see if the scan time has been exceeded because there are: • Repeatedly executed instructions such as FOR to NEXT instructions. • Instructions that cause processing to jump such as CJ or NCJ to LABEL. • Instructions that call programs such as CALL and MCALL. • Instructions with long processing times such as FMOV, WSR, and MAX. • Interrupt programs that are executed frequently.
31	System error	ラダースタック オーバーフロー Ladder Stack Overflow 梯形图堆栈溢出	A system error has occurred.	Turn the power on again. If this error occurs frequently, contact your KEYENCE representative.

Number	Group	Message	Cause	Remedy
33	Setting error	プログラムネスト制限オーバー Exceed Program Nesting Limit 程序嵌套超限	The number of program nests exceeded its limit.	Error that occurs during ladder execution does not become an error in the KV STUDIO conversion. Pay attention to how function block and function are used, and then review the ladder.
40	Setting error	ラダー無し No Ladder Program 无梯形图程序	There is no program.	Transfer ladder programs to the PLC before starting operation.
50	Setting error	ユニット設定チェックサム異常 Unit Info Checksum Error 单元设定检验和异常	The expansion unit settings are corrupt.	Transfer the unit setting information to the PLC.
51	Setting error	ユニット設定情報未設定 No Unit Info Set 单元设定信息未设定	The unit setting information has not been configured.	Transfer the unit setting information to the PLC.
52	Setting error	ユニット未接続 Unit Unconnected 单元未连接	Expansion units that should be present according to the unit setting information are not actually connected.	Turn the power off, and then connect all the expansion units that have been set in the Unit Editor.
53	System error	拡張バスユニットタイムアウト Expansion Bus Unit Timeout 扩展总线单元超时	The bus communication with the extension unit could not be implemented for a certain period.	If a noise source (for example, a cable in which a large current flows such as a motor cable) is close to the units, distance the units from the noise source. If this error occurs frequently, contact your KEYENCE representative.
54	Setting error	ユニット台数不一致 Number of Units Mismatch 单元台数不一致	The number of expansion units set in the Unit Editor and the number of extension units actually connected are different.	Turn the power off, and then connect all the expansion units that have been set in the Unit Editor.
55	Setting error	ユニット種別不一致 Unit Type Mismatch 单元类型不一致	The types of expansion units set in the Unit Editor and the types of expansion units actually connected are different.	Turn the power off, and then connect all the expansion units that have been set in the Unit Editor.
56	System error	拡張バス通信エラー Expansion Bus Comm Error 扩展总线通信错误	The bus communication with the extension unit could not be implemented successfully.	If a noise source (for example, a cable in which a large current flows such as a motor cable) is close to the units, distance the units from the noise source. If this error occurs frequently, contact your KEYENCE representative.
57	Setting error	エンドユニット未接続 No End Unit 结束单元未连接	No end unit is connected.	Turn the power off and then connect an end unit.
59	Setting error	ユニットバージョンエラー Unit Version 单元版本错误	The function that cannot be used in the connected extension unit version has been set. Or the extension unit that cannot connect to CPU unit is connected.	Turn the power off, and then connect all the expansion units that have been configured in the Unit Editor.
63	Setting error	電源再投入が必要 Power Restoring Needed 需要重新接通电源	Or update the system version in the case of the unit corresponding to system upgrade.	Turn the power on again.
80	System error	FLASH ROM異常 Flash ROM Failure 闪存异常	The flash ROM is abnormal.	Contact your KEYENCE representative.
83	Time error	電池電圧の低下 Battery Voltage Degradation 电池电压降低	The voltage of KV-B1 has dropped.	Replace the KV-B1.

Number	Group	Message	Cause	Remedy
85	Time error	時計データ消失 Clock Data Lost 时钟数据缺失	The clock data has been lost because of a drop in the voltage of the built-in backup capacitors. The product was not turned on for a long time or hardware is malfunctioning.	To retain the clock data, you have to turn the product on to charge the built-in backup capacitors or to install the optional battery (KV-B1). If this error occurs frequently, contact your KEYENCE representative.
86	System error	RTC異常 RTC Failure RTC 异常	The clock data is abnormal.	If this error occurs frequently, contact your KEYENCE representative.
87	Memory card access error	メモリカード異常 Memory Card Failure 存储卡异常	The access to the memory card could not be performed successfully due to the memory card degradation or noises.	Check the file system of the memory card. Use the chkdsk command from the Windows command prompt to check the file system. (Example) When the memory card is in drive E 　　　C:\WINDOWS>CHKDSK E: If a noise source (for example, a cable in which a large current flows such as a monitor cable) is close to the units, distance the units from the noise source.
88	Memory card operation error	メモリカードが抜かれました Memory Card Removed 存储卡被取出	The memory card was removed while it was being accessed.	Do not remove the memory card while it is being accessed.
89	Memory card operation error	ストレージ アクセス中電源OFF During Storage Access PowerOFF 存储体访问过程中断电	Power was turned off while the storage was being accessed.	Do not turn the power off while the storage is being accessed.
90	Other error	ストレージアクセス完了待ち Waiting Storage Access 存储体访问完成等待	The device cannot switch to RUN mode as the storage is being accessed.	Perform this operation when the storage has finished being accessed.
92	System error	アクセスウィンドウ異常 Access Window failure 访问窗异常	The communication with the access window could not be implemented successfully.	Clear the error, and then restart the unit. If this error occurs frequently, contact your KEYENCE representative.
95	Other error	ファイルアクセス中 Accessing File 文件访问中	Functions that cannot be processed at the same time were executed.	Execute at the different timing because you cannot switch from PRG mode to RUN mode, execute unit test or clear all data.
102	System error	POWER OFF エラー POWER OFF Error 断电错误	The data save process could not finish correctly when the power was turned off due to the hardware malfunctions or the noise.	If a noise source (for example, a cable in which a large current flows such as a motor cable) is close to the units, distance the units from the noise source. To clear the RAM: • Clear the PLC from KV STUDIO. • Use an extension access window cassette. If this error occurs frequently, contact your KEYENCE representative.
103	System error	電断処理超過 Shutdown Timeout 断电处理超时	A system error has occurred.	Contact your KEYENCE representative.

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Number	Group	Message	Cause	Remedy
106	System error	リセット異常 Abnormal Reset 复位异常	The data save process could not start correctly when the power was turned off due to the hardware malfunctions or the noise.	If a noise source (for example, a cable in which a large current flows such as a motor cable) is close to the units, distance the units from the noise source. To clear the RAM: • Clear the PLC from KV STUDIO. • Use an extension access window cassette. If this error occurs frequently, contact your KEYENCE representative.
107	Other error	システムエラー System Error 系统错误	A system error has occurred.	The system can continue operating, but this may lead to a serious error occurring. If this error occurs frequently, contact your KEYENCE representative.
108	Other error	コンバートワーニング Convert Warning 轉換警告	A warning occurred during conversion.	Convert the project read from the main unit via KV STUDIO, and eliminate the cause when a warning occurs. Then transfer the project to the main unit.
118	System error	不正な伝送データ Invalid Transfer Data 不正确的传输数据	A system error has occurred.	Turn the power on again. If this error occurs frequently, contact your KEYENCE representative.
120	System error	ウォッチドッグタイマ Watchdog Timer 看门狗定时器	A system error has occurred.	Turn the power on again. If this error occurs frequently, contact your KEYENCE representative.
122	System error	システムエラー System Error 系统错误	A system error has occurred.	Turn the power on again. If this error occurs frequently, contact your KEYENCE representative.
125	Other error	エラーバッファ オーバーフロー ErrorBuffer Overflow 错误缓存溢出	The number of system errors that have occurred exceeds the limit.	Clear the errors.
127	Setting error	オートローディング 失敗 Auto Loading Failed 自动加载失败	The automatic loading operation failed.	Data cannot be loaded when no data is present or when the data is from a different model PLC. The automatic loading function cannot be used when the projects stored on the PLC are write protected. In situations other than those described above, check the automatic loading completion code.
128	Calculation error	ラダー演算エラー Ladder Calc 梯形图运算错误	A calculation error (an error that turns CR2012 ON) has occurred.	Check the ladder program, and correct the cause of the calculation error.
129	Unit error	ユニットエラー Unit Error 单元错误	An error has occurred in the expansion unit.	See the manuals of the units.
131	System error	FLASH ROM フォーマット FLASH ROM Format 闪存格式	The flash ROM format is abnormal due to power-off during clearing all data, hardware malfunctions or the effects of noise.	Perform an all clear operation, and then transfer the project to the PLC again. If this error occurs frequently, contact your KEYENCE representative.
132	System error	ラダーファイル不正 Invalid Ladder File 梯形图文件不正确	The ladder stored in the flash ROM is abnormal due to power-off during clearing all data, hardware malfunctions, or noises.	Perform an all clear operation, and then transfer the project to the PLC again. If this error occurs frequently, contact your KEYENCE representative.
135	Memory card operation error	メモリカード カバーオープン Memory Card Cover Open 存储卡外盖打开	The memory card cover was open when access to the memory card has been attempted.	Close the memory card cover.

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Number	Group	Message	Cause	Remedy
136	Memory card operation error	メモリカード LOCKされています Memory Card is Locked 存储卡被锁定	The memory card was locked (write protected) when the writing data to the memory card is processed.	Unlock the memory card, or use a memory card which can be written to.
137	Memory card operation error	メモリカード 非対応の種類 Non-supported Memory Card Type 不支持的存储卡种类	A memory card that is not supported was inserted.	Use an SD card or an SDHC card.
141	Other error	CPUメモリ 書込頻度オーバー CPU Memory Write Frequency Over CPU存储器 写入频度超出	Writing to CPU memory was executed at a high frequency.	Reduce the frequency with which data is written to the CPU memory.
142	Other error	CPUメモリ 累積書込回数警告 CPU Memory Write Cycle Warning CPU存储器 累积写入次数警告	The cumulative number of writing to CPU memory is approaching the durable number of times.	The CPU memory is reaching the end of its lifespan. Reduce the frequency with which data is written to the CPU memory. Alternatively, prepare a replacement CPU unit.
143	Other error	CPUメモリ 累積書込回数オーバー CPU Memory Write Cycle Over CPU存储器 累积写入 次数超出	The cumulative number of writing to CPU memory has exceeded the durable number of times.	Read the data in the CPU unit memory and replace the CPU unit.

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■ **KV-5500/5000/3000/1000/700**

Error Message	Cause	Remedy
"CALL nesting error"	The nesting of subroutines has exceeded its limit.	This error occurs during ladder execution. Modify the ladder program, paying close attention to the proper usage of subroutines.
"FOR nesting error"	The nesting of FOR and NEXT instructions has exceeded its limit.	This error occurs during ladder execution. Modify the ladder program, paying close attention to the proper usage of the FOR and NEXT instructions.
"INT nesting error"	The number of interrupts that occurred simultaneously exceeded the limit for simultaneous interrupts.	This error occurs during ladder execution. Modify the ladder program, paying close attention to the proper usage of the INT instruction.
"MPS nesting error"	The nesting of MPS and MPP instructions has exceeded its limit.	This error occurs during ladder execution. Modify the ladder program, paying close attention to the proper usage of the MPS and MPP instructions.
"BREAK error"	The number of BREAK instructions has exceeded its limit.	This error occurs during conversion. Reduce the number of BREAK instructions between the FOR and NEXT instructions to the specified limit or less.
"Convert error"	A system error has occurred.	Clear the error, and then restart the unit. If this error occurs frequently, contact your KEYENCE representative.
"Object size overflow error"	The object size of the ladder has exceeded its capacity.	Reduce the size of the ladder program. You can use KV STUDIO to check the size of the ladder program.
"Code size overflow error"	The code size of the ladder has exceeded its capacity.	
"Macro nest error"	The number of levels of macro nesting has exceeded its limit.	This error occurs during ladder execution. Modify the ladder program, paying close attention to the proper usage of macro instructions.
"Invalid interrupt error"	A system error has occurred.	Clear the error, and then restart the unit. If this error occurs frequently, contact your KEYENCE representative.
"Macro error invalid"		
"Indirect specifying error"		
"Address error invalid"		
"Object invalid"		
"Scan time over error"	The scan time was 300 ms or more.	Modify the ladder program, checking to see if the scan time has been exceeded because there are: • Repeatedly executed instructions such as FOR to NEXT instructions. • Instructions that cause processing to jump such as CJ or NCJ to LABEL. • Instructions that call programs such as CALL and MCAL. • Instructions with long processing times such as FMOV, WSR, and MAX. • Interrupt programs that are executed frequently.
"Ladder stack overflow error"	A system error has occurred.	Clear the error, and then restart the unit. If this error occurs frequently, contact your KEYENCE representative.
"No Ladder error"	There is no program.	Transfer ladder programs to the PLC before starting operation.
"Unit setting info. error"	The expansion or special unit settings are corrupt.	Use ladder support software or a memory card to transfer the unit setting information to the PLC.
"Unit setting info. lost error"	The unit setting information has not been configured.	
"Unit unconnected error"	Expansion or special units that should be present according to the unit setting information are not actually connected.	Turn the CPU unit off, and then connect all the expansion and special units that have been set in the Unit Editor.
"Unit BSI timeout error"	The bus communication may have stopped due to noise.	Remove any sources of noise. If this error occurs frequently, contact your KEYENCE representative.

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Error Message	Cause	Remedy
"Unit number"	The number of special and expansion units set in the Unit Editor and the number of special and expansion units actually connected are different.	Turn the CPU unit off, and then connect all the expansion and special units that have been set in the Unit Editor.
"Unit type error"	The types of special and expansion units set in the Unit Editor and the types of special and expansion units actually connected are different.	
"Expansion bus communication error"	The bus communication may have stopped due to noise.	Remove any sources of noise. If this error occurs frequently, contact your KEYENCE representative.
"End unit unconnected error"	The end unit is not connected.	Turn the CPU unit off, and then connect the end unit.
"FROM abnormal"	A flash ROM error has occurred.	Contact your KEYENCE representative.
"SRAM abnormal"	The hardware is malfunctioning.	
"Backup battery voltage drop error"	The backup battery voltage has dropped.	Replace the backup battery.
"SRAM abnormality"	The data in the RAM (current values of the CM, DM, W, EM, ZF, FM, R, B, CR, LR, T, C, CTH, and CTC devices) has been corrupted due to the voltage of the backup battery dropping.	Replace the backup battery, and then execute an SRAM clear. Only the device values and alarm values will be deleted. The ladder program will not be deleted.
"RTC voltage low error"	The clock value may have been corrupted due to the voltage of the backup battery dropping.	Replace the backup battery, check the clock value, and set the clock again as required.
"Memory card abnormal"	The memory card may be damaged. It may have stopped working due to electromagnetism or noise.	Check the file system of the memory card. Use the chkdsk command from the Windows command prompt to check the file system. (Example) When the memory card is in drive E C:\WINDOWS>CHKDSK E:
"Memory card pulled out in access"	The memory card was pulled out while it was being accessed.	Use the correct operations to remove the memory card. "2-2 Memory Card" in the KV-5500/5000/3000 Series User's Manual
"Memory card close in access"	Power was turned off while the memory card was being accessed.	Use the correct operations to access the memory card. "2-2 Memory Card" in the KV-5500/5000/3000 Series User's Manual
"Memory card waiting completed"	Multiple operations were executed before accessing of the memory card completed.	Perform operations after the accessing of the memory card has completed.
"Transfer data invalid"	A system error has occurred.	Clear the error, and then restart the unit. If this error occurs frequently, contact your KEYENCE representative.
"Monitor timer error"		
"Stack overflow"		
"System error"		
"Device range error"		
"Resource error"		
"Error buffer area overflow"	The number of system errors that have occurred exceeds the limit.	
"Error buffer abnormal"	A system error has occurred.	
"Automatic reading error"	Automatic reading from the memory card has failed because: • Write protection has been set with the MEMSW instruction of the PLC's program. • There is a problem with the data stored in the files on the memory card.	• Cancel the write protection, and then transfer the data from the memory card to the PLC. • Transfer files that match the PLC.
"No Error Message"	A system error has occurred.	Clear the error, and then restart the unit. If this error occurs frequently, contact your KEYENCE representative.

■ **KV Nano Series**

This section describes the causes of and remedies for the errors numbers and messages that are displayed when an error occurs on the KV Nano Series PLC.

You can also use KV STUDIO's error monitor to check these errors.

You can use the following items to check for errors.

- ERROR LED (serious error or minor error)[*]
- POWER LED (lights in orange when an excessive current consumption error occurs)[*]
- Extension access window cassette
- KV STUDIO's error monitor

* You cannot check the numbers.
* Whether an error is a serious error or a minor error is determined by the error's group.
  Serious errorsScan time over errors, system erros, and setting errors
  Minor errorsTime errors, calculation errors, unit errors, and other errors

Number	Group	Message	Cause	Remedy
10	Setting error	CALLネスト / CALL Nest	The subroutine nesting limit has been exceeded.	Errors that occur during ladder execution will not occur during KV STUDIO conversion. Modify the ladder program, paying close attention to the proper usage of subroutines.
11	Setting error	FORネスト / FOR Nest	The nesting limit of FOR to NEXT instructions has been exceeded.	Errors that occur during ladder execution will not occur during KV STUDIO conversion. Modify the ladder program, paying close attention to the proper usage of the FOR and NEXT instructions.
15	Setting error	コンバート / Convert	The conversion operation failed.	If you use KV STUDIO to convert a project read from the PLC, you can check the cause of the conversion failure. After you eliminate the cause of the failure, transfer the ladder program to the PLC.
22	Setting error	マクロネスト / MACRO Nest	The number of macros nested in multiple interrupts has exceeded the limit.	Reduce the number of macro instructions in the interrupt program.
30	Scan time over	スキャンタイムオーバー / Scan Time Over	The scan time has met or exceeded the set time.	Modify the ladder program, checking to see if the scan time has been exceeded because there are: • Repeatedly executed instructions such as FOR to NEXT instructions. • Instructions that cause processing to jump such as CJ or NCJ to LABEL. • Instructions that call programs such as CALL and MCALL. • Instructions with long processing times such as FMOV, WSR, and MAX. • Interrupt programs that are executed frequently.
40	Setting error	ラダーナシ / No Ladder Program	There is no program.	Transfer ladder programs to the PLC before starting operation.
50	Setting error	ユニットチェックサム / Unit Checksum	The expansion unit settings are corrupt.	Transfer the unit setting information to the PLC.
51	Setting error	ユニットセッテイジョウホウ / Unit Setting Information	The unit setting information has not been configured.	Transfer the unit setting information to the PLC.
52	Setting error	ユニットミセツゾク / No Unit Connected	Expansion units that should be present according to the unit setting information are not actually connected.	Turn the power off, and then connect all the expansion units that have been set in the Unit Editor.

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Number	Group	Message	Cause	Remedy
53	System error	カクチョウバスユ ニットタイムアウト Unit Timeout	The bus communication may have stopped due to noise.	If a noise source (for example, a cable in which a large current flows such as a motor cable) is close to the units, distance the units from the noise source. If this error occurs frequently, contact your KEYENCE representative.
54	Setting error	ユニットダイスウ Number Of Units	The number of expansion units set in the Unit Editor and the number of expansion units actually connected are different.	Turn the power off, and then connect all the expansion units that have been set in the Unit Editor.
55	Setting error	ユニットシュベツ Unit Type	The types of expansion units set in the Unit Editor and the types of expansion units actually connected are different.	Turn the power off, and then connect all the expansion units that have been set in the Unit Editor.
56	System error	カクチョウバスツウ シン ExpansionBus Comm Error	The bus communication may have stopped due to noise.	If a noise source (for example, a cable in which a large current flows such as a motor cable) is close to the units, distance the units from the noise source. If this error occurs frequently, contact your KEYENCE representative.
58	System error	カクチョウ バスレンジ ExpansionBus Comm range	A system error has occurred.	Contact your KEYENCE representative.
59	Setting error	ユニットバージョン Unit Version	An attempt was made to connect an expansion unit, which cannot be connected to the base unit, to the base unit.	Turn the power off, and then connect all the expansion units that have been set in the Unit Editor.
60	Setting error	I/Oテンスウチョウカ Excessive I/O Points	The number of connectable I/O points has been exceeded.	Reduce the total number of I/O points of the expansion I/O units so that the total is within the limit of the base unit.
61	Setting error	ワリツケデバイス チョウフク Assign Device Overlap	A device assigned to an expansion unit overlaps the local device assignment area.	Use the Unit Editor to change the expansion unit device assignments or change the "Local Rsv nums" settings on the "Entire assignment setting of local devices" screen in the "CPU system setting" dialog box.
80	System error	FLASH ROM イジョウ Flash ROM Failure	A flash ROM error has occurred.	Contact your KEYENCE representative.
81	System error	RAMイジョウ RAM Failure	A system error has occurred.	Contact your KEYENCE representative.
82	Other error	AWデータイジョウ AW Data Failure	Extension access window cassette data is corrupt. The previous attempt to write data to the extension access window cassette may have failed. Alternatively, hardware is malfunctioning.	Execute the previous attempt to write data to the extension access window cassette again. If you do not want to use the data on the extension access window cassette, clear the data from the "Load/Save" menu to stop the error from occurring. If this error occurs frequently, contact your KEYENCE representative.
85	Time error	トケイデータショウ シツ Clock Data Lost	The clock data has been lost because of a drop in the voltage of the built-in backup capacitors. The product was not turned on for a long time or hardware is malfunctioning.	If necessary, reset the clock. To retain the clock data, you have to turn the product on to charge the built-in backup capacitors. If this error occurs frequently, contact your KEYENCE representative.
86	System error	RTCイジョウ RTC Failure	The clock is malfunctioning.	If this error occurs frequently, contact your KEYENCE representative.
92	Other error	AWカセット イジョウ AW Cassette Failure	An error occurred during communication with the extension access window cassette.	Turn the power off, and then connect the extension access window cassette again. If this error occurs frequently, contact your KEYENCE representative.

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Number	Group	Message	Cause	Remedy
95	Other error	ファイルアクセス チュウ File Access Busy	Functions that cannot be processed at the same time were executed. While data is being transferred to the PLC, data is being loaded or saved, and all data is being cleared, you cannot switch from PROG mode to RUN mode, execute I/O tests, or clear all data.	Execute the function again.
96	System error	ゾウセツイジョウ Extension Unit Failure	A connection error or malfunction has occurred with an extension unit.	Turn the power off, and then connect the extension unit again. If this error occurs frequently, contact your KEYENCE representative.
97	Setting error	ゾウセツシュベツ Extension Unit Type	The extension units set in the Unit Editor and the extension units actually connected are different.	Turn the power off, and then connect all the extension units that have been set in the Unit Editor.
98	Setting error	ゾウセツヒタイオウ Unsupported Ext.Unit	An extension unit that is not supported by the base unit has been connected.	Check the versions of the base unit and the extension unit.
99	System error	カッセンソウバツ Hot Plugged/ Unplugged	An extension unit was hot swapped.	If you hot swap units, the hardware may malfunction. Turn the power off before you connect or disconnect an extension unit.
101	Setting error	ゾウセツバージョン Extension Unit Version	A built-in function or extension unit function that isn't supported by the base unit has been set.	Check the versions of the base unit and the extension unit.
102	System error	POWER OFF エラー POWER OFF Error	The data save process could not finish correctly when the power was turned off. The base unit may be malfunctioning.	If a noise source (for example, a cable in which a large current flows such as a motor cable) is close to the units, distance the units from the noise source. To clear the RAM: • Clear the PLC from KV STUDIO. • Use an extension access window cassette. If this error occurs frequently, contact your KEYENCE representative.
103	System error	デンダンショリ チョウカ Shutdown Timeout	A system error has occurred.	Contact your KEYENCE representative.
104	System error	ショウヒデンリュウ チョウカ Excess Power Consumption	The current consumption has exceeded the rated value.	Check whether the total current consumption of the units connected to the service power supply and the expansion units has exceeded the system's rated value. If the rated value has been exceeded, reduce the number of units that are connected to the service power supply or reduce the number of expansion units that are connected. If the rated value has not been exceeded, contact your KEYENCE representative.
105	System error	テイデンホジ フォーマット Power-off Hold Format	The format of power off holding data is abnormal. The power may have been turned off during an all clear or RAM clear operation.	Execute an all clear or RAM clear operation. To do so: • Clear the PLC from KV STUDIO. • Use an extension access window cassette.
106	System error	リセットイジョウ Abnormal Reset	The data save process could not start correctly when the power was turned off. The base unit may be malfunctioning.	If a noise source (for example, a cable in which a large current flows such as a motor cable) is close to the units, distance the units from the noise source. To clear the RAM: • Clear the PLC from KV STUDIO. • Use an extension access window cassette. If this error occurs frequently, contact your KEYENCE representative.
107	Other error	システムエラー System Error	A system error has occurred.	The system can continue operating, but this may lead to a serious error occurring. If this error occurs frequently, contact your KEYENCE representative.

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Number	Group	Message	Cause	Remedy
118	System error	フセイナデンソウ データ / Invalid Data	A system error has occurred.	Turn the power on again. If this error occurs frequently, contact your KEYENCE representative.
120	System error	ウォッチドッグ タイマ / Watchdog Timer	A system error has occurred.	Turn the power on again. If this error occurs frequently, contact your KEYENCE representative.
122	System error	システムエラー / System Error	A system error has occurred.	Turn the power on again. If this error occurs frequently, contact your KEYENCE representative.
123	System error	デバイスハンイ / Invalid Device	A system error has occurred.	Turn the power on again. If this error occurs frequently, contact your KEYENCE representative.
125	Other error	エラーバッファ オーバーフロー / ErrorBuffer Overflow	The number of system errors that have occurred exceeds the limit.	Clear the errors.
127	Setting error	オートローディング シッパイ / Auto Loading Failed	The automatic loading operation failed.	Data cannot be loaded when no data is present or when the data is from a different model PLC. The automatic loading function cannot be used when the projects stored on the PLC are write protected. In situations other than those described above, check the automatic loading completion code.
128	Calculation error	ラダーエンザン / Ladder Calc	A calculation error (an error that turns CR2012 ON) has occurred.	Check the ladder program, and correct the cause of the calculation error.
129	Unit error	ユニットエラー / Unit Error	A unit error (an error that causes an expansion unit ERROR LED to light) has occurred.	See the manuals of the units.
131	System error	FLASH ROM フォーマット / FLASH ROM Format	The format of the flash ROM is abnormal. The power may have been turned off during an all clear operation. Alternatively, hardware is malfunctioning.	Perform an all clear operation, and then transfer the project to the PLC again. If this error occurs frequently, contact your KEYENCE representative.
132	System error	ラダーファイル フセイ / Invalid Ladder File	A ladder program saved in the flash ROM is abnormal. The power may have been turned off during an all clear operation. Alternatively, hardware is malfunctioning.	Perform an all clear operation, and then transfer the project to the PLC again. If this error occurs frequently, contact your KEYENCE representative.
135	Memory card operation error	メモリカード カバーオープン / Memory Card Cover Open	Access has been attempted while the memory card cover is open.	Close the memory card cover.
136	Memory card operation error	メモリカード LOCKサレテイマス / Memory Card Locked	There has been an attempt to write data to the memory card while it is locked (write protected).	Unlock the memory card, or use a memory card which can be written to.
140	Other error	AWデータカキコミ チュウオフ / AW Writing Power OFF	The power was turned off while data was being written to the extension access window cassette.	Do not turn the power off while data is being written to the extension access window cassette. The extension access window cassette data may be abnormal, so perform the same operation again.
250	*	AccessWindow E250 Connection Error / AccessWindow E250 Connection Error	The extension access window cassette could not be recognized by the base unit.	Turn the power off, and then connect the extension access window cassette again. Check that two extension access window cassettes are not connected. If this error occurs frequently, contact your KEYENCE representative.
251	*	AccessWindow E251 Communication Error / AccessWindow E251 Communication Error	An error occurred during communication between the extension access window cassette and the base unit.	Turn the power off, and then connect the extension access window cassette again. If this error occurs frequently, contact your KEYENCE representative.

* This error is not logged.

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Errors That Occur in the Unit Editor

The following error messages are displayed when errors occur during the operation of the Unit Editor. Excluding serious errors, explanations are omitted for errors that do not require an explanation. Detailed explanations are displayed in the message area. Follow the instructions of these descriptions to remedy the error.

■ Error that is displayed when KV STUDIO starts

Error Message	Cause	Remedy
"The PLC Link must be reset as there is no data in the unit setup information."	PLC link information could not be acquired from the unit setting information.	To save the unit setting information, the PLC link information and addresses must be set again.

■ File access errors

Error Message	Cause	Remedy
"Failed to read xxx information."	The file is corrupt or an attempt was made to open another file.	Either open the correct file, or make the file in the Unit Editor again.
"Failed to write xxx information."		

■ Operation messages

The following messages are displayed when an error occurs while you are setting units.

Error Message	Cause	Remedy
"Address cannot be entered, since no CPU is found."	Devices such as relays or DM entries were set without a CPU unit configured.	Configure the CPU unit first.
"Could not open Clipboard."	The Clipboard was in use by another process when an attempt was made to copy KL address information.	Wait a while before trying again.
"Cannot open unit setup file. Need verify the file name."	The file that was previously specified in the import dialog box has been deleted.	Enter the name of a new file.
"Cannot open unit setup file. Verify detailed message?"	The unit setting information file could not be opened.	Check the detailed message in the message display area, and then remove the cause of the error.
"Cannot input due to slave registration. Delete slave, or change the setting of slave."	An attempt was made to directly enter the addresses with the slave device settings having not been deleted.	Delete all slave settings before directly entering the addresses.
"If the slave address is to be entered, the leading relay/DM No. of master needs to be entered."	An attempt was made to manually enter the address of the slave device before determining the relay and DM numbers of the master.	Determine the relay and DM numbers of the master before manually entering the address of the slave device.
"Cannot select due to slave setting. Either close slave setup window, or set in slave setup window."	An attempt was made to change the settings in the main window on a KL unit on which the slave is currently being edited.	Change and save the settings on the master in the slave setting window.
"Cannot change as slave is being setup. Either close slave setup window, or set in slave setup window."		
"KL connection setup is already started up."	The address setting software has already been started.	Use the address setting software that has been started to set the addresses.
"Cannot save this unit setup information as setup information of unit is too large. Reduce the number of units and try again."	The unit setting information file is too large.	The unit configuration must be reduced.

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■ **Unit configuration error check**

The following errors occur during the execution of functions such as relay and DM assignments and address checks.

Error Message	Cause	Remedy
"Cannot find CPU."	The CPU unit does not exist or there is an error in the connection of an extension unit.	Configure the CPU unit. Check the configuration status of the extension units. The error might occur when an extension unit is connected with the auto-layout function turned off. This error is not displayed when operations are performed with the auto-layout function enabled.
"Lower limit value of scaling setup is upper limit value or higher."	An entered value was outside of the range specified by the upper and lower limits.	Specify a value smaller than the upper limit value as the lower limit value.
"Connection information of unit from xxx rung onwards is illegal. Check connection state."	An extension unit is configured incorrectly.	Check the configuration status of the extension unit. The error might occur when an extension unit is connected with the auto-layout function turned off. This error is not displayed when operations are performed with the auto-layout function enabled.
"Input address and output address crossed."	Input address use areas overlap output address use areas.	Configure the settings so that input address use areas do not overlap output address use areas.
"Inter-PLC communications is not set to "ON". So, the number of relays might not match the actual number of used relays."	When you enable inter-PLC communication, the number of relays is calculated from the number of addresses. For this reason, when the 8-point I/O unit is in use, the number of relays might not match the actual number of used relays. (This is not an error.)	Pay attention to the number of relays in use.

■ **Printing-related errors**

The following errors occur when an attempt is made to execute printing.
If these messages are displayed, install the latest printer driver, and then execute printing again. If this does not remedy the error, change the printer.

Error Message
"As this printer does not support clipping, it might not print out correctly."
"As this printer cannot plot rectangles, it can not print correctly."
"As this printer cannot plot lines, it can not print correctly."

APPENDICES

List of Characters That Cannot Be Used

This appendix describes the characters that cannot be used in project names, Program name (module name, macro name), function name, function block name, structure name, and device comments.

● **Characters that cannot be used in project names**

When KV-8000/7000/5000/3000 Series or KV Nano Series is selected for the PLC model

Characters that cannot be used	! ″ # $ % & ' * , . / : ; 〈 = 〉 ?
	@ ¥ ^ ` | ~ (space)

When KV-1000 is selected for the PLC model

Characters that cannot be used	! ″ # $ % & ' ( ) * , . / : ; 〈 = 〉 ?
	@ [¥] ^ ` { | } ~ (space)
Characters that cannot be used as the first character	+ – 0 1 2 3 4 5 6 7 8 9 _
Character and character strings that cannot be used as the last character or characters	_ _0 _1 _2 _3 _4 _5 _6 _7 _8 _9
Character string that cannot be used	Global

When KV-700/700+M, KV-P16, KV-10 (16), or KV-24 (40) is selected for the PLC model

Characters that cannot be used	¥ / : * ? ″ 〈 〉 |

● **Characters which cannot be used a program name**

When KV-8000/7000/5000/3000/1000 Series or KV Nano Series is selected for the PLC model

Characters that cannot be used	! ″ # $ % & ' ( ) * , . / : ; 〈 = 〉 ?
	@ [¥] ^ ` { | } ~ (space)(__) +[*1] –[*1]
Characters that cannot be used as the first character	+[*2] –[*2] 0 1 2 3 4 5 6 7 8 9 _
Character and character strings that cannot be used as the last character or characters	_ _0 _1 _2 _3 _4 _5 _6 _7 _8 _9
Character string that cannot be used	Global グローバル 全局 全域 글로벌 FUN_ENO[*1]

*1 This string cannot be used only with KV-8000 with CPU function version 2.0 or later.
*2 String that cannot be used at positions other than the start when using KV-8000 with CPU function version 2.0 or later.

When KV-700/700+M, KV-P16, KV-10 (16), or KV-24 (40) is selected for the PLC model

Characters that cannot be used	¥ / : * ? ″ 〈 〉 |

● **Characters that cannot be used in function / function block / structure names**

Characters that cannot be used	! ″ # $ % & ' * , . / : ; < = > ? @ ¥ ^ ` | ~ (スペース) (＿) + *1 – *1
Characters that cannot be used at the start	+ *2 – *2 0 1 2 3 4 5 6 7 8 9 _
Characters or strings that cannot be used at the end	_ _0 _1 _2 _3 _4 _5 _6 _7 _8 _9
Strings that cannot be used	ｸﾞﾛｰﾊﾞﾙ　グローバル　Global　全局　全域　글로벌 The following are strings that cannot be used only with KV-8000 with CPU function version 2.0 or later · TIMER　定时器　**定時器**　タイマー　COUNTER　计数器　**計數器**　카운터　FUN_ENO · Keywords specified in IEC61131-3 (For the contents of keyword, refer to "Characters that cannot be used in label / variable names".)

*1 This string cannot be used only with KV-8000 with CPU function version 2.0 or later.
*2 String that cannot be used at positions other than the start when using KV-8000 with CPU function version 2.0 or later.

● **Characters that cannot be used in variable / label names**

Characters that cannot be used	! ″ # $ % & ' ( ) * + , − . / : ; < = > ? @ [¥] ^ ` { | } ~ (space) ＿＿ (except KV-1000)
Characters that cannot be used as the first character*	0 1 2 3 4 5 6 7 8 9 _ U _
Character strings that cannot be used	Global*　グローバル*　Global　全局　全域　글로벌 The same names as instructions Device names • (1) One alphabet character + R or (2) M + a number • One alphabet character + a number • X + (A to F) • Y + (A to F) • The following key words, which are prescribed in KV script • IF, THEN, ELSE, END, SELECT, CASE, IS, TO, MC, MCR, FOR, NEXT, WHILE, DO, UNTIL, TYPE

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Character strings that cannot be used	• The following key words, which are prescribed in IEC61131-3 TRUE, FALSE, TIME, DATE, TIME_OF_DAY, TOD, DATE_AND_TIME, DT, BOOL, SINT, INT, DINT, LINT, USINT, UINT, UDINT, ULINT, REAL, LREAL, STRING, WSTRING, BYTE, WORD, DWORD, LWORD, ANY, ANY_DERIVED, ANY_ELEMENTARY, ANY_MAGNITUDE, ANY_NUM, ANY_REAL, ANY_INT, ANY_BIT, ANY_STRING, ANY_DATE, ACTION, END_ACTION, ARRAY, OF, AT, CASE, END_CASE, CONFIGURATION, END_CONFIGURATION, CONSTANT, EN, ENO, EXIT, • F_EDGE, FOR, TO, BY, DO, END_FOR, FUNCTION, END_FUNCTION, FUNCTION_BLOCK, END_FUNCTION_BLOCK, IF, THEN, ELSIF, ELSE, END_IF, INITIAL_STEP, END_STEP, NOT, MOD, AND, XOR, OR, PROGRAM, WITH, END_PROGRAM, R_EDGE, READ_ONLY, READ_WRITE, REPEAT, UNTIL, END_REPEAT, RESOURCE, END_RESOURCE, RETAIN, NON_RETAIN, RETURN, STEP, STRUCT, END_STRUCT, TASK, TRANSITION, FROM, END_TRANSITION, TYPE, END_TYPE, VAR, VAR_INPUT, VAR_OUTPUT, VAR_IN_OUT, VAR_TEMP, VAR_EXTERNAL, VAR_ACCESS, VAR_CONFIG, VAR_GLOBAL, END_VAR, WHILE, DO, END_WHILE • Other character strings (see the IEC61131-3 specifications) • Two or more continuous "_" are not allowed in a label name. The string "a_b_c" is acceptable, but "a__bc" cannot be used.

* Some of these characters and this character string can be used when "KV-1000," "KV-700/700+M," "KV-10 (16)," "KV-24 (40)," or "KV-P16" is selected for the PLC model

● **Characters that cannot be used in structure member names**

Characters that cannot be used	( ) ＊ / + − 〈 〉 = & ! ￥ ″ # $ ％ % & | ' ～ ` @ [ ] { } : ; , 。 . ? ^ (Half-width space) (Full-width space) (＿)
Characters that cannot be used at the start	0 1 2 3 4 5 6 7 8 9 _
Characters or strings that cannot be used at the end	_ _0 _1 _2 _3 _4 _5 _6 _7 _8 _9

Strings that cannot be used	グ゛ローバ゛ル グローバル Global 全局 全域 글로벌
	
	• Strings that cannot be distinguished from numeric values
	    • K
	    • K + value
	    • K + value + suffix(U/S/D/L/F/DF)
	    • K + value + E
	    • K + value + E + value
	    • K + value + E + value + suffix(F/DF)
	    • H + hexadecimal value (decimal value or ABCDEF string)
	• The following key words, which are prescribed in KV script
	  (For the contents of keyword, refer to "Characters that cannot be used in label / variable names".)
	• Keywords specified in IEC61131-3
	  (For the contents of keyword, refer to "Characters that cannot be used in label / variable names".)

● **Character that cannot be used in device comments**

Character that cannot be used	,

APPENDICES

List of Shortcut Keys

This appendix gives a list of the shortcut keys that are used to execute the various functions.

Shortcut Keys That Are Valid in the Unit Editor

● File

Import	Ctrl + I
Close	Alt + F4

● Edit

Cut	Ctrl + X
Copy	Ctrl + C
Paste	Ctrl + V
Delete	Delete
Unit comments	Ctrl + Shift + U
Block comment	Ctrl + Shift + B
System comments	Ctrl + Shift + S
Unit preset	Ctrl + R
Batch input relay No.	Ctrl + A

● Convert

Jump to error rung	F4
Auto-assign relay/DM	F5
Device check	F6

● Setup slave

Setup slave	Ctrl + N
Import slave information	Ctrl + K
Copy KL unit information	Ctrl + Alt + C
Paste KL unit information	Ctrl + Alt + V
KL address setting	Ctrl + E

● View

Display unit setting	↵
Unit Monitor	Ctrl + Alt + U
Built-in Function Monitor	Ctrl + Alt + M
Buffer memory monitor	Ctrl + Alt + R

● Window

Unit configuration area	Alt + U
Select unit	Alt + 1
Setup unit	Alt + 2
Refresh setting	Alt + 3
Message area	Alt + 4

● Help

How to use Unit Editor	F1

● Operations in the unit configuration area

Move cursor	← · → · ↑ · ↓
Move cursor to start of rung	Home
Move cursor to end of rung	End
Delete configured units	Delete
Multi select	Shift + ← · → · ↑ · ↓

● Operations in unit selection window

Move cursor	← · → · ↑ · ↓
Add selected unit	↵

● Operations in unit setup window

Move cursor	↑ · ↓
Move displayed unit	Ctrl + ← · → · ↑ · ↓
Input	Tab
Input/confirm	↵
Cancel	Esc

● Operations in message area

Move cursor	↑ · ↓

Shortcut keys that are valid on the Unit Editor slave setup screen

● File

Import slave information	Ctrl + K
Close	Alt + F4

● Edit

Cut	Ctrl + X

Copy	Ctrl + C
Paste	Ctrl + V
Delete	Delete
Input unit/slave comment	Ctrl + Shift + U
Reserve unit slave	Ctrl + R

● **Convert**

Jump to error rung	F4
Automatic address assignment	F5
Check addresses	F6

● **View**

Unit or slave settings	↵

● **Window**

Slave configuration area	Alt + C
Unit selection window	Alt + 1
Unit setup window	Alt + 2
Address setup window	Alt + 3
Message area	Alt + 4

● **Help**

How to use Unit Editor	F1

● **Operations in slave configuration area**

Move cursor	↑ · ↓
Display the Setup unit window of the selected unit	↵
Delete configured units	Delete

● **Operations in unit selection window**

Move cursor	← · → · ↑ · ↓
Add selected unit	↵

● **Operations in unit setup window**

Move cursor	↑ · ↓
Enter	Tab
Enter and confirm	↵
Cancel	Esc

● **Operations in address setup window**

Move cursor	↑ · ↓

Shortcut Keys That Are Valid in KV STUDIO

Assignment and change for shortcut key of each item are possible.

📖 "Customize" (page 12-33)

Shortcut keys that are valid on the initial screen

● **File**

New project	Ctrl + N
Open project	Ctrl + O

● **View**

Workspace	Alt + 1
Output window	Alt + 2

● **Monitor/Simulator**

PLC monitor	Ctrl + F1
Read from PLC	Ctrl + F5

Shortcut keys that are valid in editor mode

● **File**

New project	Ctrl + N
Open project	Ctrl + O
Save project	Ctrl + S
Print	Ctrl + P

● **Edit**

Undo	Ctrl + Z
Redo	Ctrl + Y
Cut	Ctrl + X
Copy	Ctrl + C
Paste	Ctrl + V
Multi paste	Ctrl + Shift + V
Search	Ctrl + F
Replace operand	Ctrl + H

New cross reference		`(Space)`
Cross reference, Create rung cmnts list		`Ctrl` + `L`
Cross reference, Previous		`Shift` + `F3`
Cross reference, Next		`F3`
Jump	Rung or rung step number	`Ctrl` + `Shift` + `G`
	Top	`Ctrl` + `Home`
	Bottom	`Ctrl` + `End`
	Previous block	`Ctrl` + `↑`
	Next block	`Ctrl` + `↓`
	Previous symbol	`Shift` + `Tab`
	Next symbol	`Tab`
	Home	`Home`
	End	`End`
	Prev. changed block	`Ctrl` + `Alt` + `←`
	Next changed block	`Ctrl` + `Alt` + `→`
	Contact/Coil	`F12`
Insert	Cell	`Ins`
	Rung	`Shift` + `↵` / `Shift` + `Ins`
	Rung comment	`Ctrl` + `↵`
	Loopback ladder	`Ctrl` + `Shift` + `F8`
Delete rung		`Shift` + `Delete`
Disable rung, Setup		`Ctrl` + `Q`
Disable rung, Cancel		`Ctrl` + `W`
Bookmark	Insert	`Ctrl` + `Shift` + `Ins`
	Set	`Ctrl` + `Shift` + `↵`
	Remove	`Ctrl` + `Shift` + `Delete`
Rung selection		`Ctrl` + `→` (`Shift` + `←`)[*1] (`Shift` + `→`)[*2]
Ladder arrangement		`Ctrl` + `Shift` + `F`
Edit list		`Ctrl` + `D`
Change operand		`↵`
Change device cmnt		`Ctrl` + `M`
Relation mapping		`Ctrl` + `Shift` + `R`
Edit connection line	Enter vert. connection line	`F8`
	Enter horiz. connection line	`F9` (`─`)
	Horizontal connection line to end of rung	`Alt` + `↵` (`Ctrl` + `Tab`)
	Delete vert. connection line	`Shift` + `F8`
	Delete horiz. connection line	`Shift` `F9` (`─`)

Edit connection line	Enter/delete vert. connection line	`Alt` + `↑` / `Alt` + `↓`
	Enter/delete horiz. connection line	`Alt` + `←` / `Alt` + `→`
Display cross references of the device at the cursor position		`(Space)`
Delete instruction to the left of cursor position		`Backspace`
Delete instruction at cursor position		`Delete`
Directly enter instruction at cursor position		`Esc`
Move symbol at the cursor position to the right		`Ins`
Enter NO contact		`F5`
Enter NC contact		`Shift` + `F5`
Enter NO contact OR		`F4`
Enter NC contact OR		`Shift` + `F4`
Enter NO contact coil		`F7`
Enter NC contact coil		`Shift` + `F7`
SET		`Alt` + `F1`
RES		`Alt` + `F2`
TMR		`Alt` + `F3`
TMS		`Alt` + `F5`
C		`Alt` + `0`
DIFU		`Alt` + `F8`
DIFD		`Alt` + `F9`
MOV		`Alt` + `F10`
LDA		`Alt` + `F11`
STA		`Alt` + `F12`
LDP		`Alt` + `F7`
LDF		`Alt` + `Shift` + `F7`
ORP		`Alt` + `Shift` + `F8`
ORF		`Alt` + `Shift` + `F9`
MEP		`Alt` + `Shift` + `F5`
MEF		`Alt` + `Ctrl` + `F5`
INV		`Alt` + `Ctrl` + `F10`
Switch between NO contact and NC contact, change suffix, enter NC contact		`/`
Switch between rising edge and falling edge		`Ctrl` + `/`

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Switch between direct input and current value◆	F2
Next pane	Ctrl + Shift + Alt + F11 *
Previous pane	Ctrl + Shift + Alt + F12 *
Increment device number	Ctrl + Shift + ↑
Decrement device number	Ctrl + Shift + ↓

* This is only valid when the display of the ladder edit window is split.

● View

Workspace	Alt + 1
Output window	Alt + 2
Instruction/Macro/Pack Pallet	Shift + Ctrl + P (↵)*
Comment editing window	Ctrl + F7
Device use list	Ctrl + E
Zoom in	Ctrl + PageUp
Zoom out	Ctrl + PageDown
Zoom in and zoom out	Alt + wheel button / Ctrl + wheel button
Display label	Ctrl + Backspace
Display cmnts	Ctrl + (Space)
Display unit device	Shift + (Space)
Switch between editing windows	Alt + F6

* This is only valid when there is no instruction in the selected cell.

● Script

Insert area script	Ctrl + R
Insert box script	Ctrl + B
Convert selected script	Ctrl + T
Display/hide converted ladder	Ctrl + G
Script function list	Ctrl + (Space)
Script function tip	Ctrl + Shift + (Space)

● Convert

Convert◆	Ctrl + F9

● Monitor/Simulator

Monitor mode	Ctrl + Shift + F3
PLC transfer → monitor mode	Ctrl + F8
PLC read → monitor mode	Ctrl + F1
PLC read	Ctrl + F5
Start Online Edit	F10
Simulator	Ctrl + F2
Starting the Simulator Edit	Ctrl + Shift + F2

● Tool

Unit Editor	Ctrl + U

● Help

Instruction help	F1
Instruction Reference Manual	Ctrl + 1

Shortcut keys that are valid in monitor mode

● Edit

Search		Ctrl + F or ↵
	Rung or rung step number	Ctrl + Shift + G
	Top	Ctrl + Home
	Bottom	Ctrl + End
	Previous block	Ctrl + ↑
	Next block	Ctrl + ↓
Jump	Previous symbol	Shift + Tab
	Next symbol	Tab ↓
	Home	Home
	End	End
	Prev. changed block	Ctrl + Alt + ←
	Next changed block	Ctrl + Alt + →
	Contact/Coil	F12

New cross reference	(Space)
Cross reference, Previous	Shift + F3
Cross reference, Next	F3
Cross reference, Create rung cmnts list	Ctrl + L
Rung selection	Ctrl + →
Switching contact between ON and OFF	/
Register set	Ctrl + Shift + J
Register reset	Ctrl + Shift + K
Cancel	Ctrl + Shift + L

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● **View**

Workspace	Alt + 1
Output window	Alt + 2
Zoom in	Ctrl + PageUp
Zoom out	Ctrl + PageDown
Zoom in and zoom out	Alt + wheel button Ctrl + wheel button
Display label	Ctrl + Backspace
Display cmnts	Ctrl + (Space)
Display unit device	Shift + (Space)
Change device value	F2
Switch between editing windows	Alt + F6

● **Monitor/Simulator**

Return to Editor	Ctrl + F1
Start Monitor	F4

Stop Monitor	Shift + F4
Start Online Edit	F10
Simulator	Ctrl + F2
Display/hide watch window	Alt + 3

● **Debugging**

Execute 1 scan	F9
Execute 1 step	F8

● **Help**

Instruction help	F1
Instruction Reference Manual	Ctrl + 1

Shortcut keys that are valid in simulator mode

● **Edit**

Search		Ctrl + F (↵)
Rung selection		Ctrl + →
Jump	Top	Ctrl + Home
	Bottom	Ctrl + End
	Previous block	Ctrl + ↑
	Next block	Ctrl + ↓
	Previous symbol	Shift + Tab
	Next symbol	Tab
	Home	Home
	End	End
	Prev. changed block	Ctrl + Alt + ←
	Next changed block	Ctrl + Alt + →
	Contact/Coil	F12
New cross reference		(Space)
Cross reference, Previous		Shift + F3
Cross reference, Next		F3
Cross reference, Create rung cmnts list		Ctrl + L
Switching contact between ON and OFF		/

● **View**

Workspace	Alt + 1
Output window	Alt + 2
Zoom in on ladder display	Ctrl + PageUp
Zoom out from ladder display	Ctrl + PageDown

Zoom in and zoom out	Alt + wheel button Ctrl + wheel button
Display label	Ctrl + Backspace
Display cmnts	Ctrl + (Space)
Display unit device	Shift + (Space)
Change device value	F2

● **Monitor/Simulator**

Return to Editor	Ctrl + F1
Monitor mode	Ctrl + Shift + F3
Start Online Edit	F10
Display/hide watch window	Alt + 3

● **Debugging**

Execute 1 scan	F9
Execute continuous steps	Shift + F8
Execute 1 step	F8
Execute reverse continuous steps	Shift + F7
Execute reverse 1 step	F7
Pause	F6

● **Help**

Instruction help	F1
Instruction Reference Manual	Ctrl + 1

Shortcut keys that are valid during online editing

● **Edit**

Undo		Ctrl + Z
Redo		Ctrl + Y
Cut		Ctrl + X
Copy		Ctrl + C
Paste		Ctrl + V
Multi paste		Ctrl + Shift + V
Search		Ctrl + F
Replace operand		Ctrl + H
Online edit Editing Search		Ctrl + . , Ctrl + O
Jump	Rung or rung step number	Ctrl + Shift + G
	Top	Ctrl + Home
	Bottom	Ctrl + End
	Previous block	Ctrl + ↑
	Next block	Ctrl + ↓
	Previous symbol	Shift + Tab
	Next symbol	Tab
	Home	Home
	End	End
	Prev. changed block	Ctrl + Alt + ←
	Next changed block	Ctrl + Alt + →
	Contact/Coil	F12
New cross reference		(Space)
Cross reference, Previous		Shift + F3
Cross reference, Next		F3
Cross reference, Create rung cmnts list		Ctrl + L
Insert cell		Ins
Insert empty rung		Shift + ↵ or Shift + Ins
Delete rung		Shift + Delete
Insert rung comment		Ctrl + ↵
Disable rung, Setup		Ctrl + Q
Disable rung, Cancel		Ctrl + W
Bookmark	Insert	Ctrl + Shift + Ins
	Set	Ctrl + Shift + ↵
	Remove	Ctrl + Shift + Delete
Rung selection		Ctrl + →
Edit connection line	Enter vert. connection line	F8
	Enter horiz. connection line	F9 (─)
	Horizontal connection line to end of rung	Alt + ↵ (Ctrl + Tab)
	Delete vert. connection line	Shift + F8

Edit connection line	Delete horiz. connection line	Shift + F9 (─)
	Enter/delete vert. connection line	Alt + ↑ / Alt + ↓
	Enter/delete horiz. connection line	Alt + ← / Alt + →
Insert loopback ladder		Ctrl + Shift + F8
Ladder arrangement		Ctrl + Shift + F
Edit list		Alt + D
Change operand		↵
Change device cmnt		Alt + M
Delete instruction to the left of cursor position		Backspace
Delete instruction at cursor position		Delete
Directly enter instruction at cursor position		Esc
Enter NO contact		F5
Enter NC contact		Shift + F5
Enter NO contact OR		F4
Enter NC contact OR		Shift + F4
Enter NO contact coil		F7
Enter NC contact coil		Shift + F7
SET		Alt + F1
RES		Alt + F2
TMR		Alt + F3
TMS		Alt + F5
C		Alt + 0
LDP		Alt + F7
DIFU		Alt + F8
DIFD		Alt + F9
LDF		Alt + Shift + F7
ORP		Alt + Shift + F8
ORF		Alt + Shift + F9
MOV		Alt + F10
LDA		Alt + F11
STA		Alt + F12
MEP		Alt + Shift + F5
MEF		Alt + Ctrl + F5
INV		Alt + Ctrl + F10
Switch between NO contact and NC contact, change suffix, enter NC contact		/
Switch between rising edge and falling edge		Ctrl + /

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Switch between direct input and current value	F2
Register set	Ctrl + Shift + J
Register reset	Ctrl + Shift + K
Cancel	Ctrl + Shift + L

● **View**

Workspace	Alt + 1
Output window	Alt + 2
Instruction/Macro/Pack Pallet	Shift + Ctrl + P (↵)*
Comment editing window	Ctrl + F7
Device use list	Ctrl + E
Zoom in	Ctrl + PageUp
Zoom out	Ctrl + PageDown
Zoom in and zoom out	Alt + wheel button / Ctrl + wheel button
Display label	Ctrl + Backspace
Display cmnts	Ctrl + ((Space))
Display unit device	Shift + ((Space))

* This is only valid when there is no instruction in the selected cell.

Shortcut keys valid in the replay mode

● **Edit**

Search		Ctrl + F ╱ ↵
Jump	Rung or rung step number	Ctrl + Shift + G
	Top	Ctrl + Home
	Bottom	Ctrl + End
	Previous block	Ctrl + ↑
	Next block	Ctrl + ↓
	Previous symbol	Shift + Tab
	Next symbol	Tab
	Home	Home
	End	End
	Prev. changed block	Ctrl + Alt + ←
	Next changed block	Ctrl + Alt + →
	Contact/Coil	F12
New cross reference		((Space))
Cross reference, Previous		Shift + F3
Cross reference, Next		F3
Cross reference, Create rung cmnts list		Ctrl + L

● **Script**

Insert area script	Ctrl + R
Insert box script	Ctrl + B
Convert selected script	Ctrl + T

● **Monitor/Simulator**

Return to Editor	Ctrl + F1
Monitor mode	Ctrl + Shift + F3
Online edit transfer	F11
Simulator	Ctrl + F2
Display/hide watch window	Alt + 3

● **Help**

Instruction help	F1
Instruction Reference Manual	Ctrl + 1

Rung selection	Ctrl + →

● **View**

Workspace	Alt + 1
Output window	Alt + 2
Zoom in	Ctrl + PageUp
Zoom out	Ctrl + PageDown
Zoom in and zoom out	Alt + wheel button / Ctrl + wheel button
Display label	Ctrl + Backspace
Display cmnts	Ctrl + ((Space))
Display unit device	Shift + ((Space))
Switch between editing windows	Alt + F6

● **Monitor/Simulator**

Return to Editor	Ctrl + F1
Start Monitor	F4
Stop Monitor	Shift + F4
Start Online Edit	F10

Simulator	Ctrl + F2
Display/hide watch window	Alt + 3

● **Help**

Instruction help	F1
Instruction Reference Manual	Ctrl + 1

List of GPPQ and GPPA Format Shortcut Keys

You can change the key assignments of each shortcut.

📖 "Customize" (page 12-33)

Enter NO contact	F5
Enter NC contact	GPPQ format: F6
	GPPA format: Shift + F5
Enter NO contact OR	GPPQ format: Shift + F5
	GPPA format: F6
Enter NC contact OR	Shift + F6
Enter coil	F7
Enter NC contact coil	Not assigned
Enter vert. connection line	GPPQ format: Shift + F9
	GPPA format: F10
Delete vert. connection line	Ctrl + F10
Enter horiz. connection line	F9
Delete horiz. connection line	Ctrl + F9
SET	Not assigned
RES	Not assigned
TMR	Not assigned
TMS	Not assigned
C	Not assigned
LDP	Shift + F7
LDF	Shift + F8
ORP	Alt + F7
ORF	Alt + F8
DIFU	Not assigned
DIFD	Not assigned
MOV	Not assigned
LDA	Not assigned
STA	Not assigned
MEP	Alt + F5
Draw and erase connection line (right)	Alt + →
Draw and erase connection line (left)	Alt + ←
Draw and erase connection line (down)	Alt + ↓
Draw and erase connection line (up)	Alt + ↑

Convert	Ctrl + Alt + F4 / F4
Direct input and current value change	Not assigned
Cross reference previous	Not assigned
Cross reference, Next	Not assigned
PLC transfer → monitor mode	F3
PLC read	Not assigned
Start Online Edit	Shift + F3
Return to Editor	F2
Next pane	Ctrl + Shift + Alt + F11
Previous pane	Ctrl + Shift + Alt + F12
Monitor mode	F3
Display cmnts	Ctrl + F5
Instruction/ Macro/Pack Pallet	Ctrl + Shift + P

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List of CX Format Shortcut Keys

You can change the key assignments of each shortcut.

📖 "Customize" (page 12-33)

Enter NO contact	C
Enter NC contact	Not assigned
Enter NO contact OR	W
Enter NC contact OR	X
Enter coil	O
Enter NC contact coil	Q
SET	Shift + F8
RES	Shift + F9
TMR	Ctrl + Alt + O
TMS	Not assigned
C	Not assigned
LDP	Not assigned
LDF	Not assigned
ORP	Not assigned
ORF	Not assigned
DIFU	Not assigned
DIFD	Not assigned
MOV	Not assigned
LDA	Not assigned
STA	Not assigned
MEP	Shift + Alt + F5

Draw and erase connection line (right)	H
Draw and erase connection line (left)	Not assigned
Draw and erase connection line (down)	V
Draw and erase connection line (up)	U
Convert	F7
Program's individual conversion	Alt + F7
Switch between direct input and current value	I
Cross reference, Previous	B
Cross reference, Next	N
PLC transfer → monitor mode	F3
PLC read	Ctrl + F5
Start Online Edit	F10
Return to Editor	F2
Next pane	Ctrl + Shift + Alt + F11
Previous pane	Ctrl + Shift + Alt + F12
Monitor mode	Ctrl + Shift + F3
Display cmnts	Alt + Y
Instruction/Macro/Pack Pallet	Ctrl + Shift + P

List of Logix Format Shortcut Keys

You can change the key assignments of each shortcut.

📖 "Customize" (page 12-33)

Enter NO contact	F5
Enter NC contact	Shift + F5
Enter NO contact OR	F4
Enter NC contact OR	Shift + F4
Enter coil	F7
Enter NC contact coil	Shift + F7
SET	Alt + F1
RES	Alt + F2

TMR	Alt + F3
TMS	Alt + F5
C	Alt + 4
LDP	Alt + F7
LDF	Alt + Shift + F7
ORP	Alt + Shift + F8
ORF	Alt + Shift + F9
DIFU	Alt + F8
DIFD	Alt + F9

MOV	Alt + F10
LDA	Alt + F11
STA	Alt + F12
MEP	Alt + Shift + F5
MEF	Ctrl + Alt + F5
Convert selected script	Ctrl + T
Edit list	Ctrl + Shift + D
Draw and erase connection line (right)	Alt + →
Draw and erase connection line (left)	Alt + ←
Draw and erase connection line (down)	Alt + ↓
Draw and erase connection line (up)	Alt + ↑
Horizontal connection rung to end of line (-)	Ctrl + Alt + ↵
Convert	Ctrl + F9
Switch between direct input and current value	F2
Cross reference	Ctrl + E
Cross reference, Previous	Shift + F3
Cross reference, Next	F3
PLC transfer → monitor mode	Ctrl + F8
PLC read	Ctrl + F5
Start Online Edit	F10
Return to Editor	Ctrl + F1
Instruction/Macro/ Pack Pallet	Alt + Ins
Insert rung comment	Ctrl + D
Switch between editing windows	Ctrl + Tab
Switch between editing windows in reverse order	Ctrl + Shift + Tab
Label Edit Window	Ctrl + W
Jump to Rung/ step No.	Ctrl + G
Insert Empty rung	Ctrl + R
Disabling Rungs Setup	Ctrl + Q
Disabling Rungs Cancel	Ctrl + Shift + W

Switch to display/hide all workspace windows	Alt + 0
Switch to display/hide all output windows	Alt + 1
Switch to display/ hide Search1 result windows	Alt + 2
Device use list	Ctrl + Shift + E
Insert area script	Ctrl + Shift + R
Insert box script	Ctrl + B
Convert selected script	Ctrl + Shift + T
Display/hide converted ladder	Ctrl + Shift + G
Execute continuous steps	Shift + F8
Execute 1 step	F8
Execute reverse continuous steps	Shift + F7
Execute reverse 1 step	F7
Pause	Shift + F6

How to Use the ⁄ (Slash) Key

KV-8000 KV-7000 KV-5000/3000 KV Nano
KV-1000 KV-700 KV-P16 KV-10/16/24/40

● **Pressing ⁄ or Ctrl + ⁄ switches the setting at the cursor position.**

The values that you can select are shown below.

•(1) NO contact or NC contact and (2) rising edge or falling edge
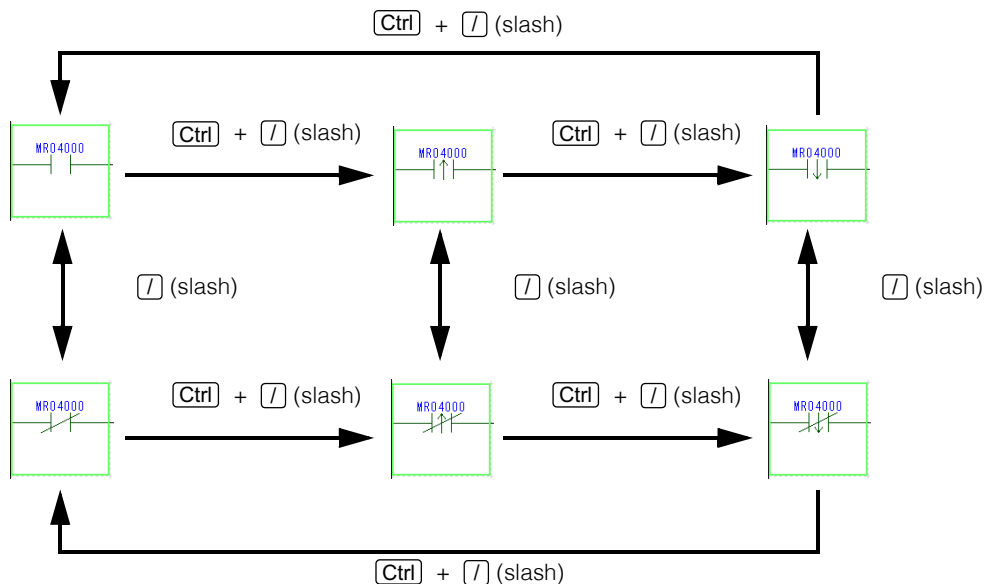
| | Point | **When you are using a KV-8000/7000/5000/3000 Series or KV Nano Series, pressing Ctrl + ⁄ changes the setting as shown below.** |
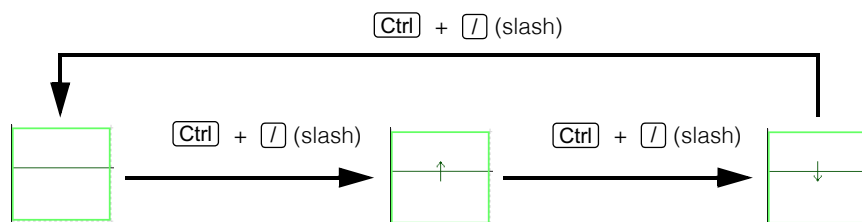
•SET and RES

• Suffix
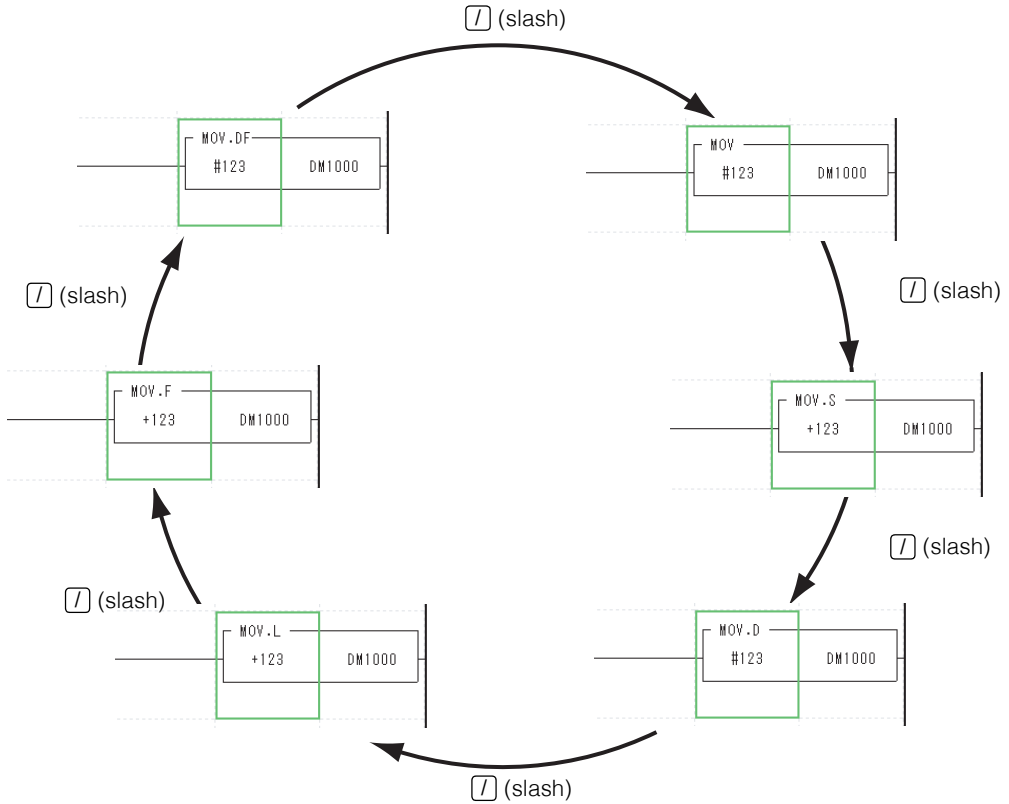
● **If you press this key when a cell with no instruction is selected, an NC contact will be entered.**
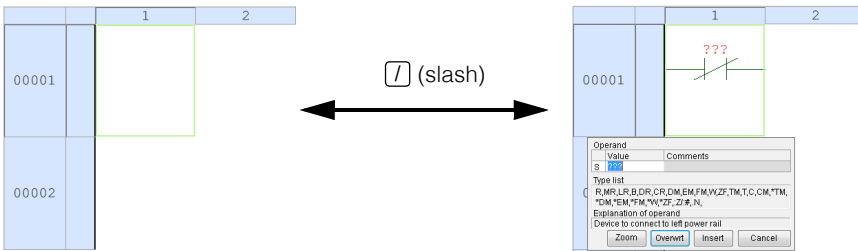
Entering Abbreviated Instructions

You can enter abbreviated forms of some instructions.

Instruction		Abbreviated Character String to Enter			
		KV-8000/7000/5000/ 3000 Series KV Nano Series	KV-1000 Series	KV-700 Series	KV-10 (16)/24 (40), KV-P16
Contact instructions	LD	A, X, AND, OR, XIC[6]			
	LDB	B, LDI, LDNOT, ANI, ANDNOT, ANB, XIO[6], /			
	ORB	ORI, ORNOT			
	LDP, ANP	P			————
	LDF, ANF	F			————
Bit contact instructions	BLD, BAND	BA			————
	BLDB, BANB	BB			————
Comparison instructions	LD=, AND=	=			————
	LD<, AND<	<			————
	LD>, AND>	>			————
	LD<=, AND<=	<=			————
	LD>=, AND>=	>=			————
	LD<>, AND<>	<>			————
Output instructions	OUT	O, Y			
	OUB	OB			
	SET	S			
	RES	R, RST			
	DIFU	PLS, U			
	DIFD	PLF, D			
Bit output instructions	BOUT	BO			————
	BOUB	BOB			————
	BSET	BS			————
	BRES	BR			————
Timer and counter instructions[1]	TMR	T, TIM, OUTT	T, TIM		
	TMH	TH, TIMH, OUTH	TH, TIMH		
	TMS	TS, OUTS	TS		
	C	CNT			
	UDC	CNTR			
Connection and end instructions	END	E, FEND			
	ENDH	H			
Stage instructions	W-ON	WON			
	W-OFF	WOFF			
	W-UE	WUE, WU			
	W-DE	WDE, WD			
Flow instructions	MC	IL			
	MCR	ILC			
Buffer memory instructions	UREAD	FROM	————	————	————
	UWRIT	TO	————	————	————
Arithmetic and comparison instructions	ADD	————	+		
	SUB	————	-[2]		
	MUL	————	*		
	DIV	————	/[3]		
	INC	++			
	DEC	- -			
	ROOT	SQRT			
Logic calculation instructions	EORA	XORA, XOR			
	ENRA	XNORA		————	————

APPENDICES

Instruction		Abbreviated Character String to Enter			
		KV-8000/7000/5000/ 3000 Series KV Nano Series	KV-1000 Series	KV-700 Series	KV-10 (16)/24 (40), KV-P16
Data control instructions	APR	SCL	———	———	———
Character processing instructions	DASC	DSTR			———
	RDASC	DVAL			———
	HASC	HSTR		———	———
	RHASC	HVAL		———	———
	FASC	FSTR		———	———
	RFASC	FVAL		———	———
Simple calculation instructions	CAL+	+	———	———	———
	CAL-	-*4	———	———	———
	CAL*	*	———	———	———
	CAL/	/*5	———	———	———
	CAL&	&, WAND	———	———	———
	CAL|	|, WOR	———	———	———
	CAL^	^	———	———	———
	CAL~	~, NOT, CML	———	———	———
	CAL>>	>>, SFR	———	———	———
	CAL<<	<<, SFL	———	———	———
Floating point instructions	DFLOAT	FLTD, DFLTD, DBL, DBLL	———	———	———
	DINTG	INTD, DINTD, FIXD, FIXLD	———	———	———
	FTODF	ECON	———	———	———
	DFTOF	EDCON	———	———	———
High-speed processing instructions	INT	I			
	RETI	IRET			

*1 You can enter timer and counter instructions even if you do not include the space between the instruction and the device number.

*2 Enter "-" directly in the "Ladder edit" window to enter a horizontal connection line.
Enter "-" in the "Direct input" dialog box (Esc) to enter the SUB instruction.

*3 Enter "/" directly in the "Ladder edit" window to enter the LDB instruction.
Enter "/" in the "Direct input" dialog box (Esc) to enter the DIV instruction.

*4 Enter "-" directly in the "Ladder edit" window to enter a horizontal connection line.
Enter "-" in the "Direct input" dialog box (Esc) to enter the CAL- instruction.

*5 Enter "/" directly in the "Ladder edit" window to enter the LDB instruction.
Enter "/" in the "Direct input" dialog box (Esc) to enter the CAL/ instruction.

*6 This can be entered only when the compatible model is KV-8000/7500/7300/KV Nano series.

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This appendix describes the items to check and how to remedy frequent communication errors that occur when using KV STUDIO to monitor KEYENCE PLCs.

> **Point** **The settings vary according to the PC you are using. For details on how to configure settings, see the manual of the PC you are using, or contact the manufacturer of your PC directly.**

● **Has the communications port been enabled in Windows?**

In the Windows system properties, check whether the communications port specified in KV STUDIO has been enabled.

Use the Device Manager to check whether the communications port has been enabled.

On the Start menu, point to "Settings," and then click "Control Panel" to open the Control Panel. Next, double-click the "System" icon to open the "System Properties" window, and then click the "Device Manager" tab. The Device Manager is displayed. Check that nothing is assigned to the communications port.
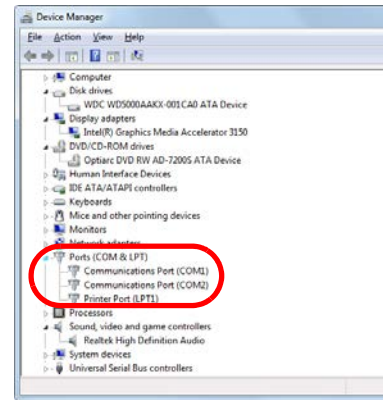
● **Has the modem been assigned to the communications port?**

Depending on the PC, the modem may be assigned to the communications port. In this situation, disconnect the modem or specify a different communications port.

● **Has a serial mouse been assigned to the communications port?**

When you are using a serial mouse with a laptop, the communications port will not be enabled even if you swap the mouse and the communication cable during communication. To perform communication, specify an available communications port in the communication settings. If no communications ports are available, you have to disconnect the serial mouse, and then restart the laptop.

● **Has infrared communication been set?**

Depending on the PC, infrared communication may have been specified for the communications port. In this situation, specify an available communications port in the communication settings. If no communications ports are available, you have to disable the infrared communication that has been set.

● **Has the USB driver been installed correctly?**

If frequent errors occur during USB communication, restart both the PLC and the PC. If frequent communication errors still occur, delete the USB driver from the Device Manager, and then install the USB driver again.

● **Are many other applications running in addition to KV STUDIO?**

If communication processing is interrupted by the processing of other applications, communication processing will be discontinued for the duration of the interrupt, and a time-out error may occur. If frequent time-out errors occur, exit all applications except KV STUDIO, and then retry communication.

● **Turn off the PC's power saving mode.**

Depending on the type of PC, processing may be executed periodically to save power. In this situation, the processing of KV STUDIO and other applications may be stopped from time to time. Time-out errors may occur because KV STUDIO does not operate during this power saving processing. If frequent time-out errors occur, turn off the PC's power saving mode by following the instructions in the user's manual included with the PC.

● **Are the Ethernet settings correct?**

When frequent errors occur during Ethernet communication, check the following items. If checking these items does not remedy the error, contact your network administrator.
• Are the correct types of cables being used?
• Are the Link indicators on the PC and the Ethernet Unit lit?
• Has the IP address been entered correctly?
• Ping the communication destination IP address to check whether the IP address exists and whether packets are being lost.

● **When the message "USB cannot be used" is displayed**

Disconnect and then reconnect the USB cable to have Windows recognize it again. If this does not work, click "System Properties," "Device Manager," "KEYENCE USB Device Class," "WDF USB for KEYENCE KV Series," and then click "Update Driver" on the "Driver" tab. This displays the device driver update wizard. Reinstall the driver. For details on installing the driver, see 📖 "1-5 Safety Precautions" (page 1-12).
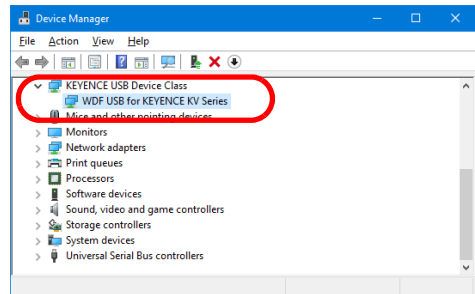
When a KV-8000/7000/5000/3000/1000 Series or KV Nano Series is being used

APPENDICES

1. KV STUDIO Operation Procedure (KV-8000/7000/5000/3000 Series)

KV STUDIO is software that is used to transfer settings and programs to the KV Series. KV STUDIO is also used to monitor the KV Series.

Follow the procedure below to control the KV Series.

```
┌─────────────────────────────────┐
│   1. Create a new project.       │
│                                  │
│  Selecting the model and         │
│  specifying the file name        │
└─────────────────────────────────┘
                ↓
┌─────────────────────────────────┐
│  2. Create unit setting          │
│     information.                 │
│                                  │
│   Setting the expansion units    │
└─────────────────────────────────┘
                ↓
┌─────────────────────────────────┐
│   3. Create a ladder project.    │
│                                  │
│   Entering and editing a program │
└─────────────────────────────────┘
                ↓
┌─────────────────────────────────┐
│   4. Transfer the project.       │
│                                  │
│  Configuring communication       │
│  settings and transferring       │
│  the project                     │
└─────────────────────────────────┘
                ↓
┌─────────────────────────────────┐
│   5. Monitor the project.        │
│                                  │
│  Using monitor mode and the      │
│  real-time chart monitor         │
└─────────────────────────────────┘
                ↓
┌─────────────────────────────────┐
│   6. Debug the project.          │
│                                  │
│ Using cross references, online   │
│ edit and replay mode[*1]         │
└─────────────────────────────────┘
```
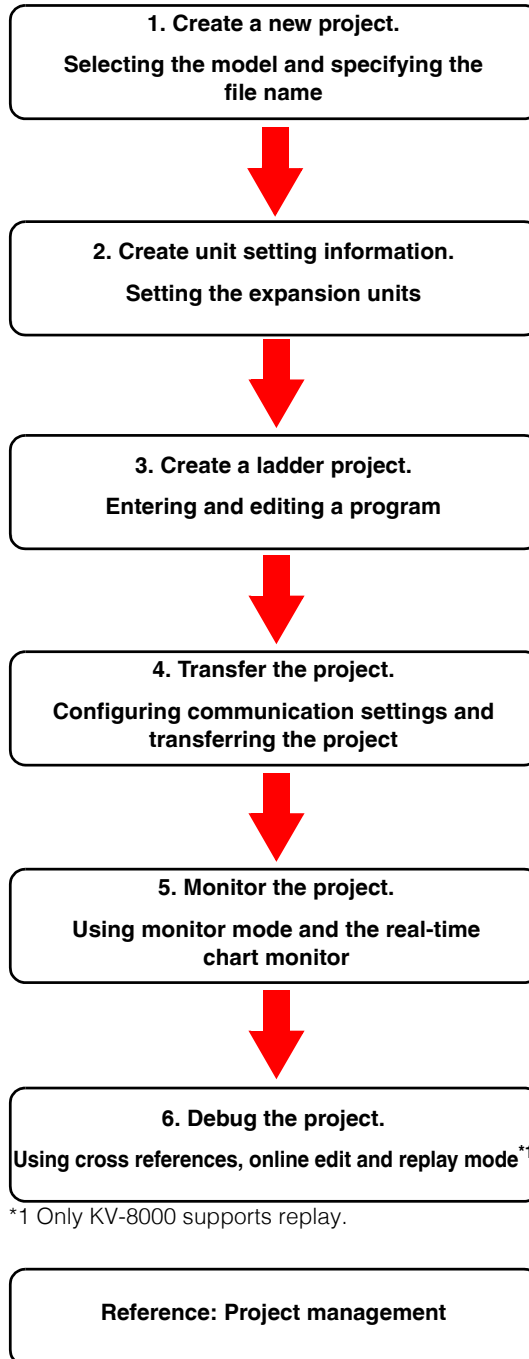
*1 Only KV-8000 supports replay.

```
┌─────────────────────────────────┐
│  Reference: Project management   │
└─────────────────────────────────┘
```

The following sections describe the procedures to follow to use a KV-3000 to transfer programs and monitor operations.

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2. Creating a New Project

This section describes the procedure to follow to start KV STUDIO and create a new project (the settings used by the PLC and the ladder program).
The KV-3000 is used in the procedure.

1 **Start KV STUDIO.**

Select KEYENCE KV STUDIO Ver.** →KV STUDIO from the start menu of Windows or execute the desktop icon.

2 **Create a new project.**

Click the "File (F)" menu → "New project (N)."
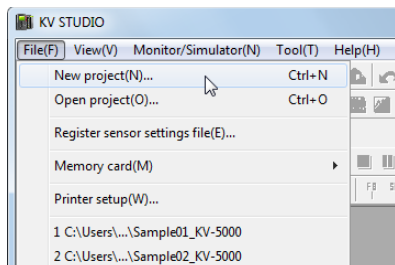
Alternative procedure
- Ctrl + N
- Click [icon] on the toolbar.
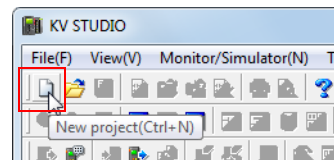
3 **Enter the project name, and then select the PLC model.**

Select "KV-3000" for the PLC model, and then click "OK."

A new project is created.

APPENDICES
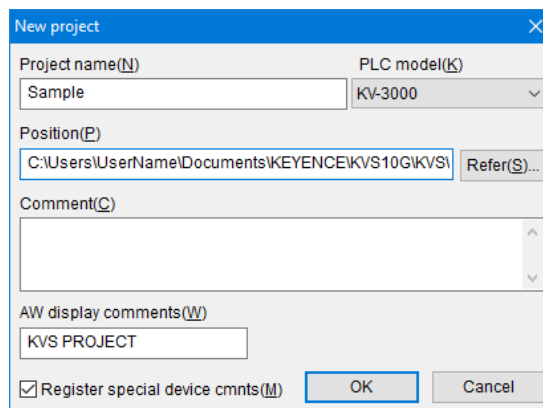
3. Creating Unit Setting Information

Set the CPU and the parameters of the expansion unit to be used.

1 **Start the Unit Editor.**

In the "Confirm unit setting information" dialog that is displayed after a new project is created, click "Yes (Y)."
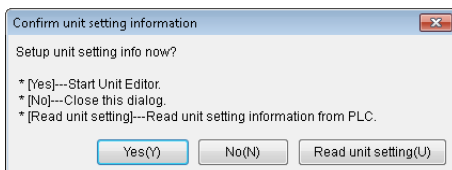
Reference	• If you are using the KV Nano Series, the "Unit Editor startup confirmation" dialog box is not displayed when a new project is created. Moreover, the unit configuration is recognized automatically, so you do not have to set units if you are only using I/O units.
	• If you are using the KV-10/16/24/40, the "Confirm unit setting information" dialog box and the Unit Editor are not displayed.

2 **Add an expansion unit.**

To add the expansion unit that you want to use, drag it to the Unit Editor.
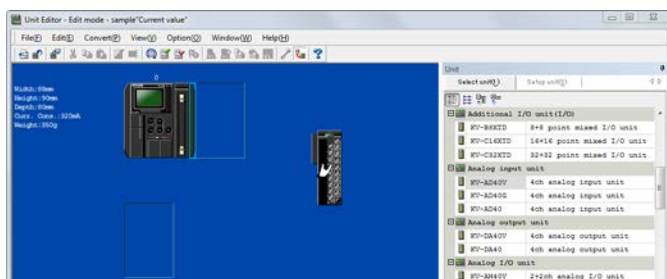
Alternative procedure Double-click the unit.

3 **Configure the unit settings.**

Select the unit and set its parameters on the "Setup unit(2)" tab.

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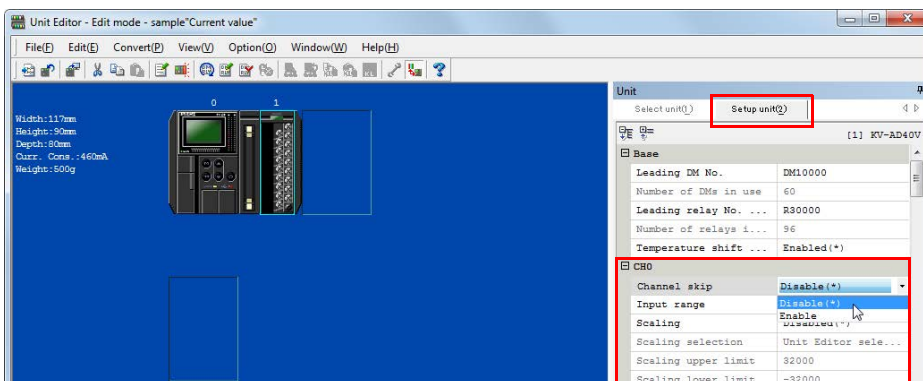
4 Set the leading device occupied by the unit.

Click the "Convert (P)" menu → "Auto assign relay/DM (A)" to assign the leading DM number and leading relay number for each unit.

Alternative procedure

- Click 🔘 .
- F5
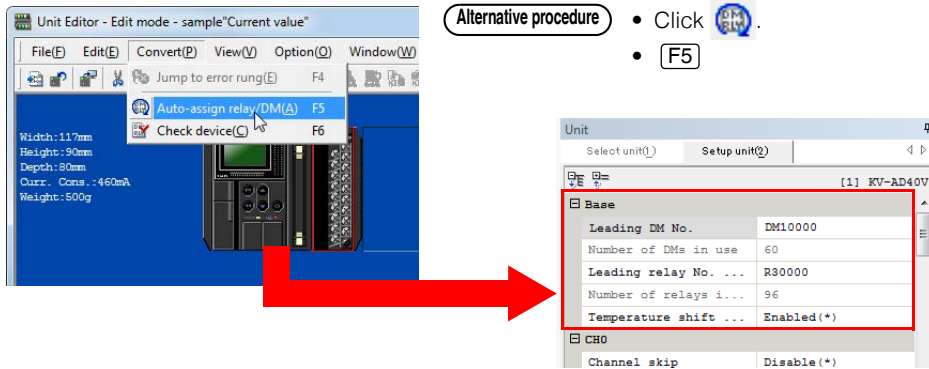
Reference

- If you are using the KV-8000/7500/5500/5000, you have to set the leading devices occupied by the KV-8000/7500/5500/5000 CPU unit in addition to the leading devices assigned to the expansion unit.
- With the KV-5000/3000, the CPU unit (base unit) occupies R000 to R915. The range between R000 and R915, including the area that is not assigned to actual I/O, is reserved by the system, so do not use this range as internal auxiliary relays.

   Area occupied for I/O on the CPU unit (base unit)

   KV-5500/5000/3000/1000:R000 to R015 for input, R500 to R507 for output

   KV-700:R000 to R009 for input, R500 to R503 for output

   KV-10/16/24/40:R000 to R107 for input, R500 to R515 for output[*]

   * This varies depending on the unit. For details, see the user's manual of each unit.
- When the "Assign devices automatically during unit configuration." checkbox is selected in the option settings of the Unit Editor, you can assign the leading DM number and leading relay number without assigning devices automatically.
- Click the "View (V)" menu → "Display unit with box (D)" to display the assigned relays grouped by functions (input, output, and other special units).

APPENDICES
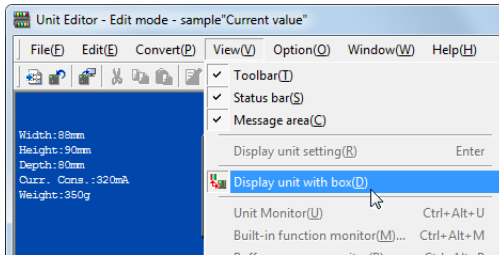
Alternative procedure Click .
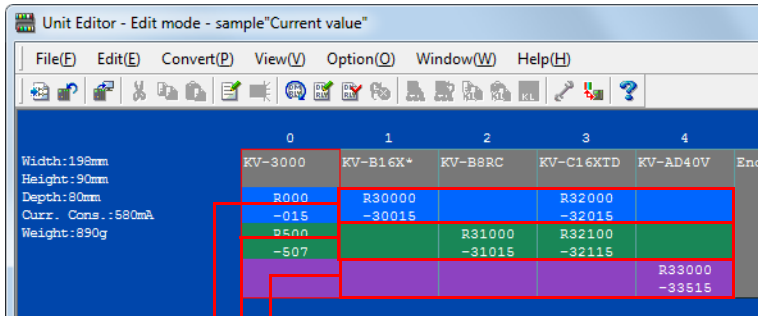
Input area

Output area

Occupied area (mixture of the input and output areas)

5 Close the Unit Editor.

Click "OK" to close the Unit Editor.

> **Reference** If you configure the Unit Editor settings and create a ladder program, and then open the Unit Editor at a later time and change the assignments, the devices used in the ladder program will be converted automatically.
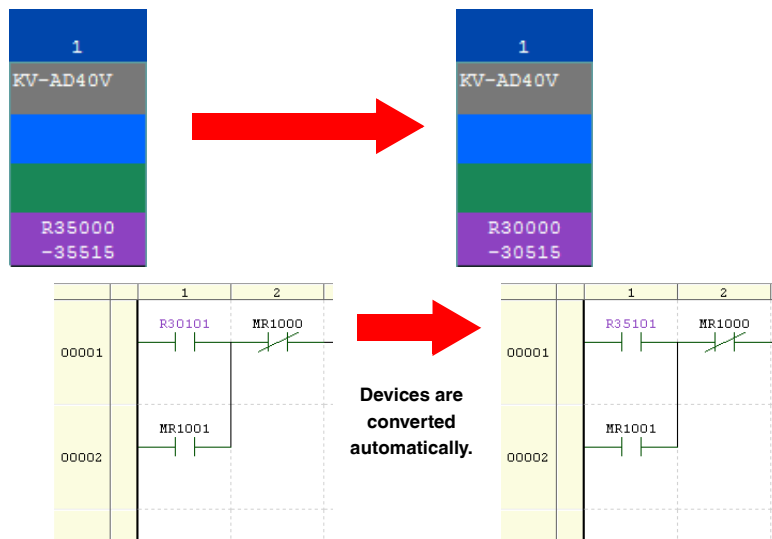
Devices are converted automatically.

4. Creating a Ladder Program

This section describes the procedure follow to create the following program.

- When the program execution starts, a set value (10000) is stored in DM0.
- When the sensor signal (R0) turns ON, the A/D conversion data of channel 0 is transferred to DM1.
- When the value in DM1 is larger than the value in DM0, R500 generates output (ON) for one second.
- The value of DM1 is rounded to the nearest tens digit, and the result is stored in DM2.

1 **Start the device comment edit window.**

Click the "View (V)" menu → "Device comment edit window (C)" to start the device comment edit window.
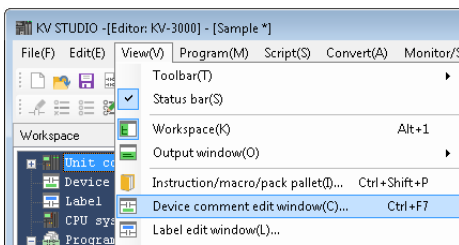
Alternative procedure Double-click the device comment in the workspace.

2 **Register a device comment.**

Click "Detail (D)," and then click "Reg unit device (N)." In the "Register unit device" dialog box, click "Reg (R)."
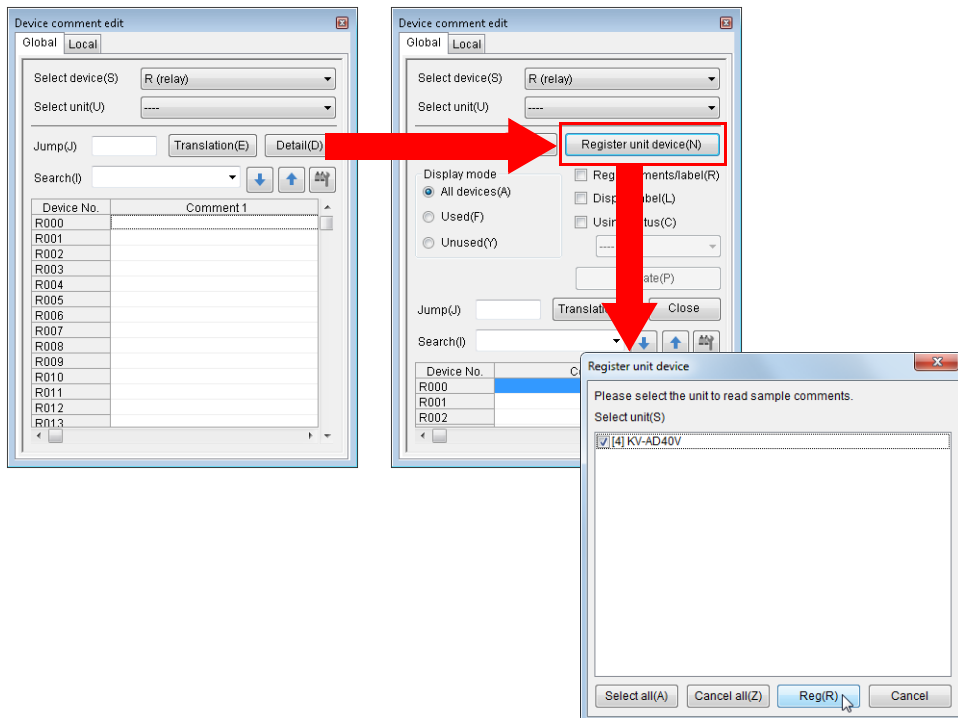
APPENDICES

Reference
- Although you can use the program without registering device comments, registered comments are useful during ladder diagram entry because they show a sample comment describing the role of the assigned device.
- You can check the registered device comments by selecting a unit from "Select unit".
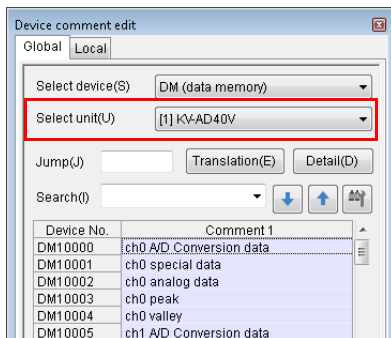
3 Create the ladder program.

3-1 When the program execution starts, a set value (10000) is stored in DM0.

i)   In the editor, type "A". Instruction candidates are displayed. Select the load instruction.
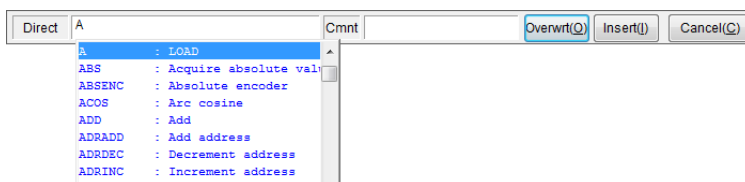
ii) Enter a space to display the candidate devices that can be entered.
Select "One scan ON when operation starts" (CR2008).
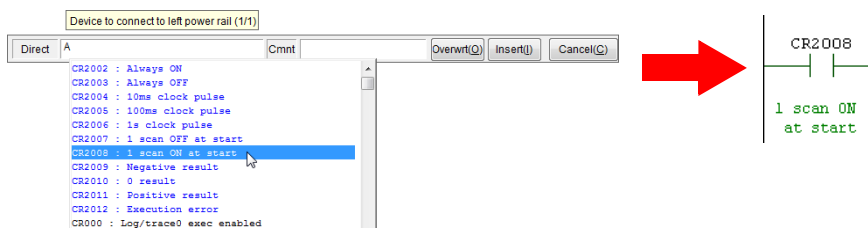
iii) Type "DW 10000 DM0".
The DW instruction is used to transfer a constant.
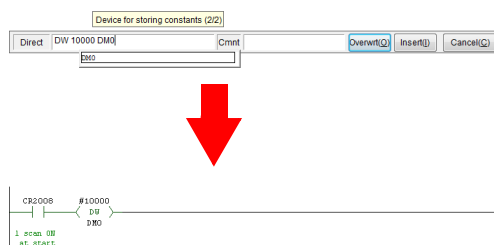
Press ⌈Ctrl⌉ + ⌈Tab⌉ to extend the connection line to the right edge.

Alternative procedure   You can also press ⌈Alt⌉ + ⌈→⌉ or ⌈Alt⌉ + ⌈↵⌉ to extend the connection line.

3-2 **When the sensor signal (R0) turns ON, the A/D conversion data of channel 0 is transferred to DM1.**

   i)   Type "P R0".

      Rising edge contact R0 is added.
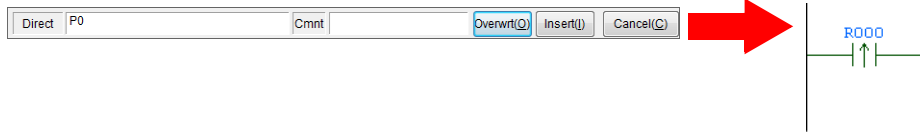
Reference	When no device is specified, R is displayed.

   ii) Type "MOV".
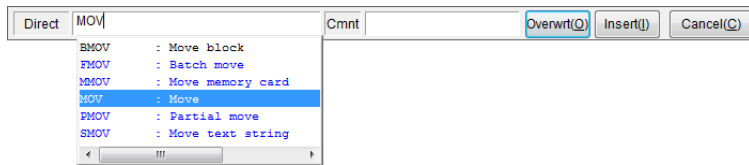
Reference	You can also type "transfer" to display MOV as an instruction candidate.

   iii) Type "A/D convert" as the source device of the transfer.

      Select "ch0 A/D Conversion data" from the displayed candidate devices.
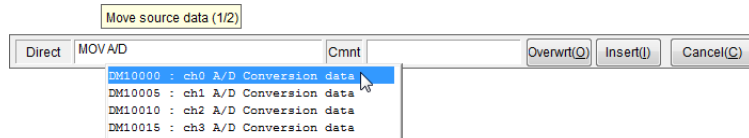
   iv) Type "DM1" as the destination device of the transfer.
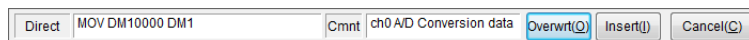
Reference	When you type "MOV DM10000 DM0". the word device is used as 16-bit unsigned data.
	If you want to use the word device as signed data, 32-bit data, or floating point data, change the suffix. You can change the suffix by placing the cursor on the instruction and pressing ☐/ .

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3-3 **When the value in DM1 is larger than the value in DM0, R500 generates output (ON) for one second.**

i) Type "P0".
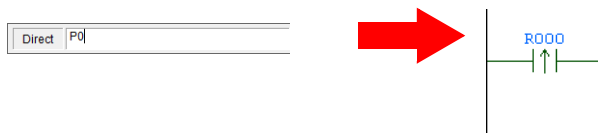
ii) Type "> DM1 DM0".
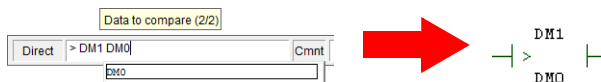
iii) Type "SHOT 100 R500".

On the rising edge of the execution condition, R500 is turned ON for one second (100 × 10 ms).
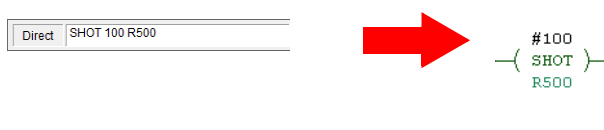
> **Reference** When you place the cursor on an instruction and press F1 , the instruction help is displayed. This allows you to easily and quickly learn how to use the instruction.

3-4 **The value of DM1 is rounded to the nearest tens digit, and the result is stored in DM2.**

i) Type "P0".
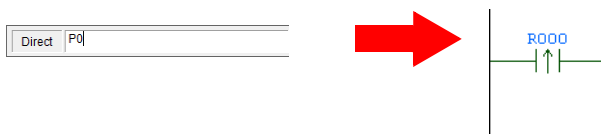
ii) Add a box script.

Click the "Script (S)" menu → "Insert box script (B)."

iii) Type "DM2=(DM1+5)/10*10" in the box script.
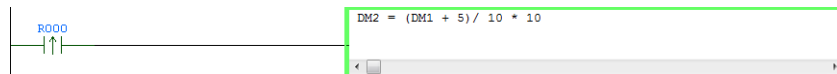
> **Reference** When you place the cursor on a function and press F1 , the script function help is displayed. This allows you to easily and quickly learn how to use the function.

APPENDICES

4 Edit the ladder program.

The program was completed in step 3. This step describes how you can easily fix parts of the program that have been entered incorrectly.

i) When an incorrect contact type (NO or NC) was entered

Select the instruction that you want to change, and then press $\boxed{/}$ to switch the contact type between NO and NC.

MR000   MR000

ii) When an incorrect device number was entered

Select the instruction that you want to change, and then enter the correct value to change the device number.

| 5 | Enter |

MR000   MR005

> **Reference** You can also change the device number by selecting the instruction and pressing $\boxed{Ctrl}$ + $\boxed{Shift}$ + $\boxed{\uparrow}$ or $\boxed{Ctrl}$ + $\boxed{Shift}$ + $\boxed{\downarrow}$.

iii) When you want to change the signed status of a device

Select the instruction that you want to change, and then press $\boxed{/}$ to change the device type (suffix) of the instruction.

$\boxed{/}$ (slash)

```
MOV.DF
#123    DM1000
```

```
MOV
#123    DM1000
```

$\boxed{/}$ (slash)

$\boxed{/}$ (slash)

```
MOV.F
+123    DM1000
```

```
MOV.S
+123    DM1000
```

$\boxed{/}$ (slash)

$\boxed{/}$ (slash)

```
MOV.L
+123    DM1000
```

```
MOV.D
#123    DM1000
```

$\boxed{/}$ (slash)

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iv) When an incorrect edge (rising or falling) was entered for a differential instruction

Select the instruction that you want to change, and then press $\boxed{\text{Ctrl}}$ + $\boxed{/}$ to change between rising and falling edges.

| Reference | • Changing the program environment |

By selecting [Tool (T)] → [Customize (K)] → [Shortcut Key (S)] in the menu and execute [All Change (O)] by tab, it is also possible to match the input method to another company method at once.

📖 "Changing keys in batches" (page 12-34)

• Expanded ladder mode

Click the "Edit (E)" menu → "Edit mode (B)" → "Expanded ladder mode (G)" to enable the entry of multiple out coils or SET or RES instructions on one rung. You can use this function to reduce the number of rungs in a program.

📖 "Expanded ladder mode" (page 5-28)

5. Transferring the Program

Use a USB cable to transfer the program that you have created.

1 Use a USB cable to connect the PC and the PLC.

| Reference | To select a communication route other than USB, click the "Monitor/Simulator (N)" menu |

→ "Setup communication (T)" → "Setup communication (C)" to display the "Comm settings" dialog box. Select the communication route in this dialog box.
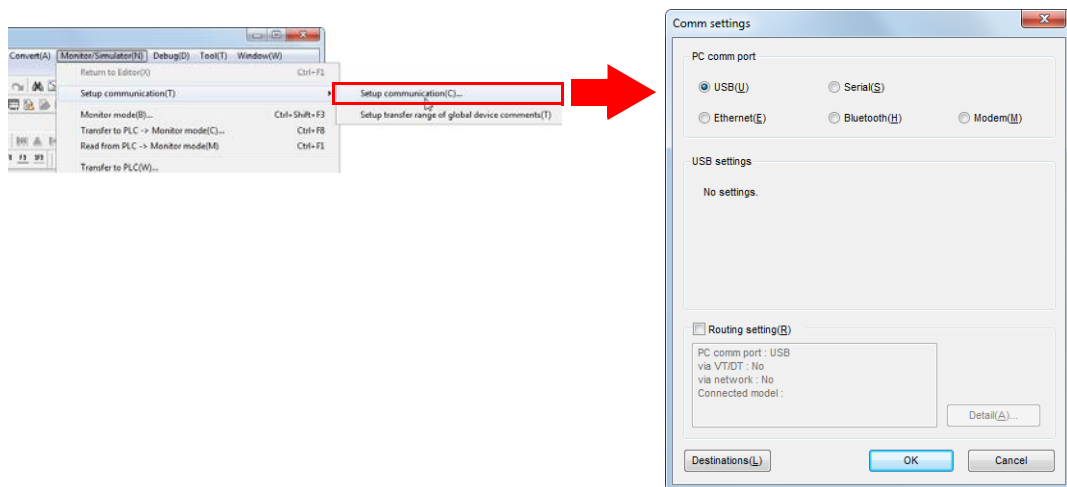
2 Transfer the program.

Click the "Monitor/Simulator (N)" menu → "Transfer to PLC → Monitor Mode (C)."

With this option selected, the ladder program will be converted and then transferred to the PLC.

* Before you transfer the program, check that the PLC is turned on.
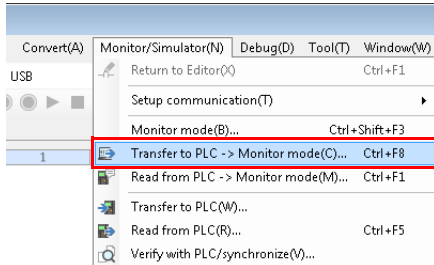
In the "Transfer program" dialog box, click "Execute."

Reference
- The program can be transferred in RUN mode under some conditions, such as when the unit configuration has not been changed.
- You can also transfer the project by using the mode bar to switch the mode.

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3 **Check that KV STUDIO is in Monitor mode.**

Click [▶] to switch to RUN mode.

**Click this to switch
between RUN mode and
PROG mode.**

⚠ CAUTION	**When the mode is switched to RUN mode, the PLC starts operating.**

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6. Monitor Function

Check that the program is being executed.

1 **Check the execution status of the ladder program.**

The contacts that have been turned ON are displayed in green. When word devices are being used, their current values are displayed below them.

| **Reference** | You can use the batch monitor, register monitor, and watch window to easily monitor the status of devices.

The batch monitor displays a batch of devices starting with the specified leading device.

The watch window displays the devices used in the selected ladder block.

The register monitor displays only the devices that you have registered for monitoring.

| **Reference** | You can also use the tooltip monitor to monitor device values.

2 **Check the execution status of each unit.**

You can use the built-in function monitor and unit monitor to check the devices that are being used by each unit.

Click the "Monitor/Simulator(N)" menu → "Built-in Function Monitor (P)" or "Unit Monitor (U)."

Alternative procedure   Right-click a unit in the workspace, and then select an item from the menu that appears.

Built-in function monitor

3 **Change the execution status of the ladder program.**

To change the execution status, you can double-click a contact or open a monitor window.

- Double-clicking a contact

- Opening a monitor window

  Monitors that can be used to change device values include the batch monitor, register monitor, and watch window.

  The following procedure describes how to use the watch window to monitor the devices used in the selected rung.

i)   Click the "Monitor/Simulator (N)" menu → "Display/hide watch window (N)" to display the watch window.

ii)   When you select a ladder rung, the devices used in the selected rung are displayed in the watch window.

APPENDICES

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iii) When you enter a value in the watch window, the value is applied to the ladder.

> **Point** **In the following situations, you may not be able to change the current value of the device.**
> - **When the device has been assigned to an input relay of the unit.**
> - **When the device is one that is controlled by the CPU unit, such as a CR or CM device.**
> - **When a value has been written into the device by an instruction in the ladder.**

4 Use the real-time chart monitor to check the status.

Perform monitoring with the real-time chart monitor, which enables you to check the status of registered devices in real time.

> **Point** **The real-time chart monitor can only be used with the KV-8000/7000/5000/3000 Series and KV Nano Series.**

i) Click the "Monitor/Simulator (N)" menu → "Real-time Chart Monitor (H)."

Alternative procedure
- Click 🖳.
- Double-click the desktop shortcut (🖳).

Reference You can start the real-time chart monitor as a standalone application even when you have not started KV STUDIO.

ii) Register R0 and DM10000 in the list of devices.

You can change the display format to display values as signed data.

iii) In the trigger settings, set R0 to ON.

iv) Start monitoring.

Click to start monitoring.

The monitoring continues until R0 turns ON. When R0 turns ON, the monitoring stops after the remaining points specified with "Data after trigger" are traced.

7. Debug Function

This section describes the procedure to follow to perform debugging when the result of monitoring was not the operation that you had intended.

1 An error has occurred.

If an error is displayed when you execute the ladder program, follow the procedure below to easily correct the problem.

i)   From the error monitor window, jump to the rung where the error occurred.

Click the error.

A divide by zero operation was executed.

ii)   Place the cursor on the problematic operand, and then press Spacebar.

The rung where the device in question is being used is displayed in the output window.

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Reference	You can use the search function to find all the devices you want to locate at one time by specifying the search width.

2 Use online edit mode to correct the program.

To start online edit mode, click the "Monitor/Simulator (N)" menu → "Start Online Edit (O)."

Alternative procedure	• Use the mode bar to change to online edit mode.
	• Press F10.

The edited block is displayed in a different color.

3 Transfer the data that you have edited in online edit mode.

Click the "Monitor/Simulator (N)" menu → "Transfer Online Edit (F)" to transfer the data that you have edited in online edit mode.

Alternative procedure	• Press F11.

When the transfer is complete, the block is displayed in its original color.

8. Project Management

This section describes how to manage projects that you have created.

■ **Applying read protection and write protection to the project on the PLC**

Use the protection settings in the CPU system settings to apply read protection and write protection.
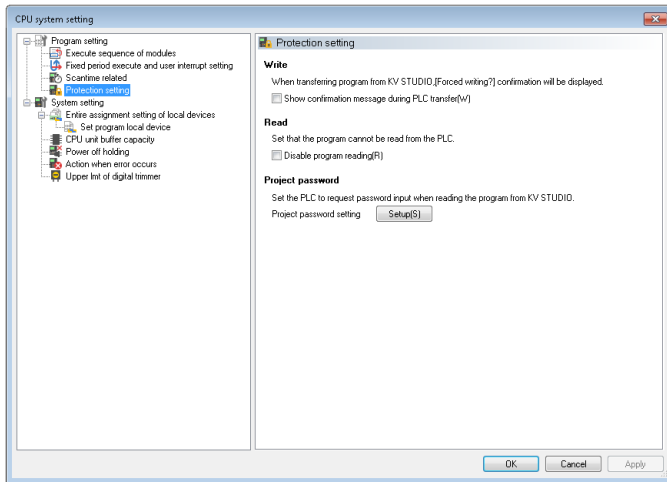
Write: When an attempt is made to transfer a project, this function displays a confirmation message to prevent accidental writing.

Read: This function prohibits the reading of a project.

Project password: When read protection has not been set to ON, this function requires password authentication to read a project.

> Reference ⬚ When you are using the KV-8000/7000 Series or KV Nano Series, you can set password protection not only on each project, but on each program as well.

■ **Saving a project as memory card data**

Click the "File (F)" menu → "Memory card (M)" → "Write (W)" to save the project as memory card data.
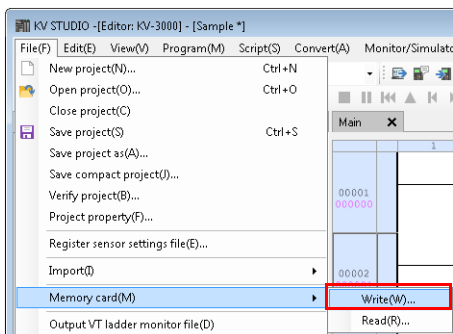
By saving a project in a folder named "AUTOLOAD" in the memory card and inserting the card into a PLC, you can make the PLC operate with the saved project when the PLC is turned on.

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■ **Saving several projects together in one file**

Click the "File (F)" menu → "Pack/save project (J)."
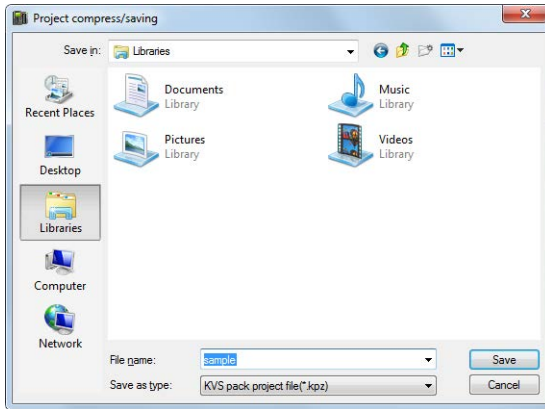
Reference	• The compressed project file is saved in .kpz format.
	• Use this function in situations such as when you are using e-mail to transfer the project.

1. KV STUDIO Operation Procedure (KV Nano Series)

KV STUDIO is software that is used to transfer settings and programs to the KV Series. KV STUDIO is also used to monitor the KV Series.

Follow the procedure below to control the KV Series.

```
┌─────────────────────────────────────┐
│        1. Create a new project.       │
│  Selecting the model and specifying the │
│               file name               │
└─────────────────────────────────────┘
                    ↓
┌─────────────────────────────────────┐
│     2. Create unit setting information. │
│        Setting the expansion units      │
└─────────────────────────────────────┘
                    ↓
┌─────────────────────────────────────┐
│        3. Create a ladder project.     │
│        Entering and editing a program   │
└─────────────────────────────────────┘
                    ↓
┌─────────────────────────────────────┐
│         4. Transfer the project.       │
│  Configuring communication settings and │
│          transferring the project       │
└─────────────────────────────────────┘
                    ↓
┌─────────────────────────────────────┐
│         5. Monitor the project.        │
│    Using monitor mode and the real-time │
│              chart monitor              │
└─────────────────────────────────────┘
                    ↓
┌─────────────────────────────────────┐
│         6. Debug the project.          │
│  Using cross references and online edit mode │
└─────────────────────────────────────┘


┌─────────────────────────────────────┐
│      Reference: Project management     │
└─────────────────────────────────────┘
```
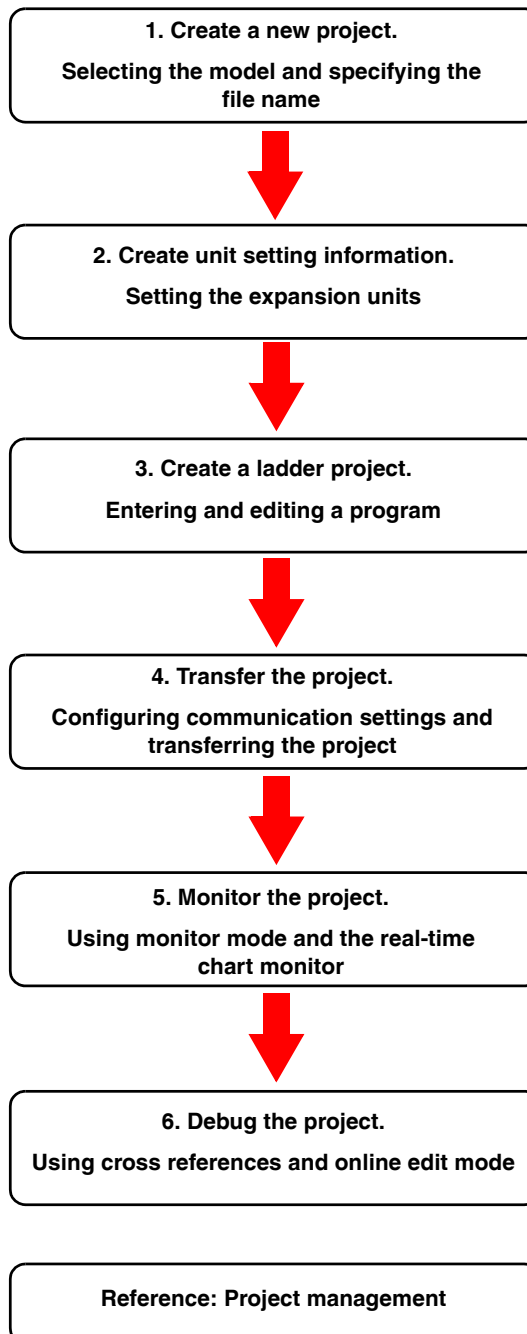
The following sections describe the procedures to follow to use a KV-N24DT to transfer programs and monitor operations.

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2. Creating a New Project

This section describes the procedure to follow to start KV STUDIO and create a new project (the settings used by the PLC and the ladder program).
The KV-N24** is used in the procedure.

1 **Start KV STUDIO.**

Select KEYENCE KV STUDIO Ver.** →KV STUDIO from the start menu of Windows or execute the desktop icon.

2 **Create a new project.**

Click the "File (F)" menu → "New project (N)."
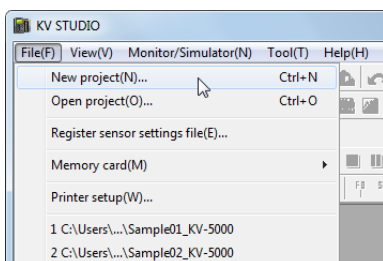
Alternative procedure
- $\boxed{\text{Ctrl}}$ + $\boxed{\text{N}}$
- Click 🗋 on the toolbar.
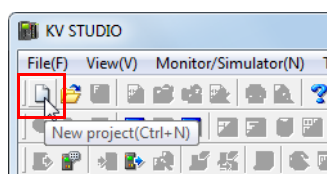
3 **Enter the project name, and then select the PLC model.**

Select "KV-N24" for the PLC model, and then click "OK."

A new project is created.

APPENDICES
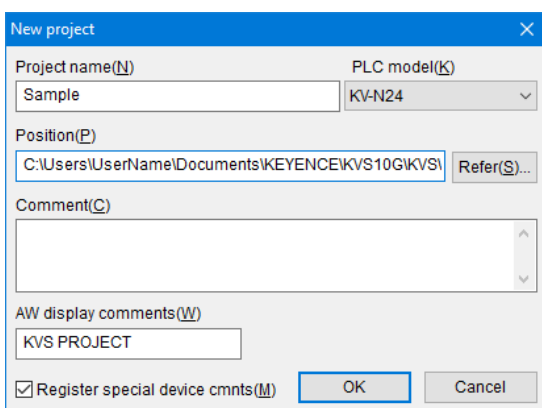
3. Creating Unit Setting Information

When only the base unit and expansion I/O unit of the KV Nano Series are used, relay numbers are assigned automatically.

Assuming that the base unit is unit number 0, the leading occupied relay is determined by calculating the unit number counted from the base unit × 1000. The input relays are assigned starting from the leading relay number + 000 and the output relays are assigned starting from the leading relay number + 500.

Therefore, in the example below, the relays are assigned starting from R1000 for the input unit (1), from R2500 for the output unit (2), and from R3000 for the input relays and R3500 for the output relays of the I/O unit (3).
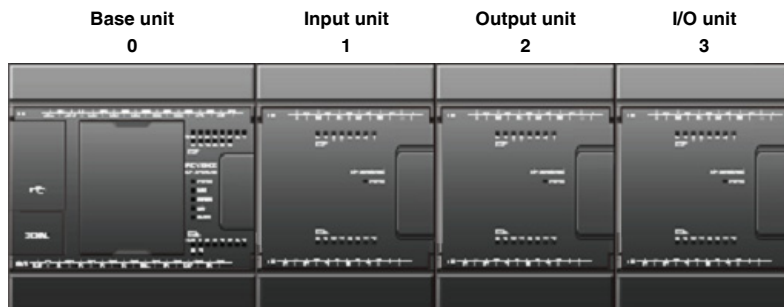
	Base unit 0	Input unit 1	Output unit 2	I/O unit 3
Model	KV-N24	KV-N16EX	KV-N16ET	KV-N8EXR
Input relays	R000 -013	R1000 -1015		R3000 -3015
Output relays	R500 -509		R2500 -2515	R3500 -3515
Special relays				

> Reference ◢ To use units other than I/O units, such as expansion units or terminal block unit function extension cassettes, you have to use the Unit Editor to assign the I/O area.

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4. Creating a Ladder Program

This section describes the procedure follow to create the following program.

- When the program execution starts, a set value (100) is stored in DM0.
- When the program execution starts, 0 is stored in the count value (DM1).
- When the sensor signal (R0) turns ON, DM1 is incremented.
- When the value in DM1 becomes equal to the value in DM0, 0 is stored in DM1 and R500 generates output (ON) for one second.

1 Create the ladder program.

1-1 When the program execution starts, the set value (100) is stored in DM0 and 0 is stored in the count value (DM1).

i) In the editor, type "A". Instruction candidates are displayed. Select the load instruction.
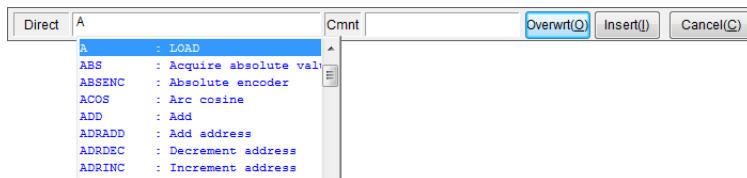
ii) Enter a space to display the candidate devices that can be entered.
Select "1 scan ON at start" (CR2008).
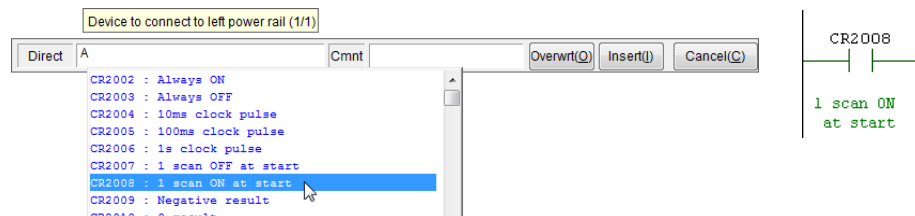
iii) Type "DW 100 DM0" and "DW 0 DM1".
The DW instruction is used to transfer a constant.
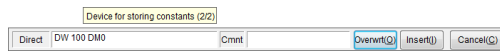
Press ⌨Ctrl + ⌨Tab to extend the connection line to the right edge.

Alternative procedure
- You can also press ⌨Alt + → or ⌨Alt + ↵ to extend the connection line.

Register "Set value" in the device comment for DM0, and "Count value" in the device comment for DM1.

Reference Although you can use the program without registering device comments, registered comments are useful during ladder diagram entry.

1-2 **When the sensor signal (R0) turns ON, DM1 is incremented.**

i) Type "P0".

Rising edge contact R0 is added.

> Direct | P0

R000

> **Reference** When no device is specified, R is displayed.

ii) Type "INC".

> Direct | INC
>
> ++ : Increment
> ADRINC : Increment address
> INC : Increment
> INCENC : Incremental encoder
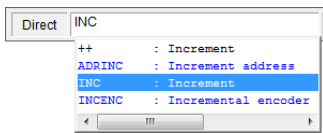
> **Reference** You can also type "increment" to display INC as an instruction candidate.

iii) Type "Count value" to indicate that this is a device to increment (to add one to).

Select DM1 (Count value) from the displayed candidate devices.
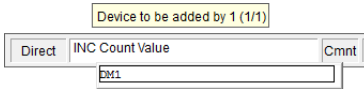
> Device to be added by 1 (1/1)
> Direct | INC Count Value | Cmnt
> DM1

1-3 **When the value in DM1 becomes equal to the value in DM0, 0 is stored in DM1 and R500 generates output (ON) for one second.**

i) Type "P0".

> Direct | P0

R000

ii) Type "= DM1 DM0".

> Data to compare (2/2)
> Direct | > DM1 DM0 | Cmnt
> DM0

DM1
=
DM0

iii) Type "SHOT #100 R500".

On the rising edge of the execution condition, R500 is turned ON for one second (100 × 10 ms).

> Direct | SHOT 100 R500

#100
(SHOT)
R500

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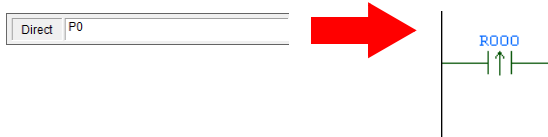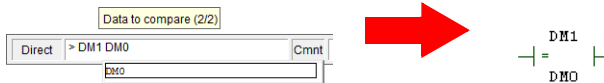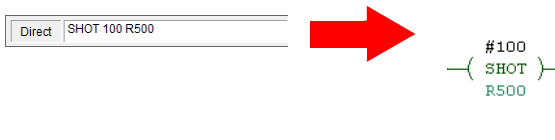
• When you place the cursor on an instruction and press `F1` , the instruction help is displayed. This allows you to easily and quickly learn how to use the instruction.

• You can use the script function to easily write programs to calculate the set value or count value.

```
DM3 = DM0 * DM2
IF LDP( R500 ) THEN
     INC( DM4 )
     DM1 = 1
END IF
```

📖 "Chapter 13 SCRIPT"

2 **Edit the ladder program.**

The program was completed in step 1. This step describes how you can easily fix parts of the program that have been entered incorrectly.

i)   When an incorrect contact type (NO or NC) was entered

Select the instruction that you want to change, and then press `/` to switch the contact type between NO and NC.

ii) When an incorrect device number was entered

Select the instruction that you want to change, and then enter the correct value to change the device number.

| Reference | You can also change the device number by selecting the instruction and pressing `Ctrl` + `Shift` + `↑` or `Ctrl` + `Shift` + `↓` .

iii) When you want to change the signed status of a device

Select the instruction that you want to change, and then press ☐/ to change the device type (suffix) of the instruction.

☐/ (slash)

MOV.DF	
#123	DM1000

☐/ (slash)

MOV	
#123	DM1000

☐/ (slash)

☐/ (slash)

MOV.F	
+123	DM1000

MOV.S	
+123	DM1000

☐/ (slash)

☐/ (slash)

MOV.L	
+123	DM1000

MOV.D	
#123	DM1000

☐/ (slash)

iv) When an incorrect edge (rising or falling) was entered for a differential instruction

Select the instruction that you want to change, and then press [Ctrl] + ☐/ to change between rising and falling edges.

Ctrl + **/**

MR000 ⟷ MR000

Reference
- Changing the program environment
  By selecting [Tool (T)] → [Customize (K)] → [Shortcut Key (S)] in the menu and execute [All Change (O)] by tab, it is also possible to match the input method to another company method at once.
  📖 "Changing keys in batches" (page 12-34)
- Expanded ladder mode
  Click the "Edit (E)" menu → "Edit mode (B)" → "Expanded ladder mode (G)" to enable the entry of multiple out coils or SET or RES instructions on one rung. You can use this function to reduce the number of rungs in a program.
  📖 "Expanded ladder mode" (page 5-28)

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5. Transferring the Program

Use a USB cable to transfer the program that you have created.

1 **Use a USB cable to connect the PC and the PLC.**

> **Reference** To select a communication route other than USB, click the "Monitor/Simulator (N)" menu → "Setup communication (T)" → "Setup communication (C)" to display the "Comm settings" dialog box. Select the communication route in this dialog box.

2 **Transfer the program.**

Click the "Monitor/Simulator (N)" menu → "Transfer to PLC → Monitor Mode (C)."

With this option selected, the ladder program will be converted and then transferred to the PLC.

* Before you transfer the program, check that the PLC is turned on.

In the "Transfer program" dialog box, click "Execute."

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Reference	• The program can be transferred in RUN mode under some conditions, such as when the unit configuration has not been changed.

• You can also transfer the project by using the mode bar to switch the mode.

Editor
Editor
Monitor
Online edit
Simulator

3 Check that KV STUDIO is in Monitor mode.

Click ▶ to switch to RUN mode.

Click this to switch between RUN mode and PROG mode.

⚠ CAUTION	When the mode is switched to RUN mode, the PLC starts operating.

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Check that the program is being executed.

1 Check the execution status of the ladder program.

The contacts that have been turned ON are displayed in green. When word devices are being used, their current values are displayed below them.

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Alternative procedure   Right-click a unit in the workspace, and then select an item from the menu that appears.

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• Double-clicking a contact

• Opening a monitor window

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The following procedure describes how to use the watch window to monitor the devices used in the selected rung.

i)   Click the "Monitor/Simulator (N)" menu → "Display/hide watch window (N)" to display the watch window.

ii)   When you select a ladder rung, the devices used in the selected rung are displayed in the watch window.

iii) When you enter a value in the watch window, the value is applied to the ladder.

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- **When the device has been assigned to an input relay of the unit.**
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	Point	The real-time chart monitor can only be used with the KV-8000/7000/5000/3000 Series and KV Nano Series.

i) Click the "Monitor/Simulator (N)" menu → "Real-time Chart Monitor (H)."

Alternative procedure
- Click 📊.
- Double-click the desktop shortcut (📊).

Reference You can start the real-time chart monitor as a standalone application even when you have not started KV STUDIO.

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You can change the display format to display values as signed data.

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iii) In the trigger settings, set R0 to ON.

iv) Start monitoring.

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The monitoring continues until R0 turns ON. When R0 turns ON, the monitoring stops after the remaining points specified with "Data after trigger" are traced.

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Click the error.

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The rung where the device in question is being used is displayed in the output window.

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You can use the search function to find all the devices you want to locate at one time by specifying the search width.

2 Use online edit mode to correct the program.

To start online edit mode, click the "Monitor/Simulator (N)" menu → "Start Online Edit (O)."

Alternative procedure
- Use the mode bar to change to online edit mode.
- Press F10.

The edited block is displayed in a different color.

3 Transfer the data that you have edited in online edit mode.

Click the "Monitor/Simulator (N)" menu → "Transfer Online Edit (F)" to transfer the data that you have edited in online edit mode.

Alternative procedure Press F11.

When the transfer is complete, the block is displayed in its original color.

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8. Project Management

This section describes how to manage projects that you have created.

■ Applying read protection and write protection to the project on the PLC

Use the protection settings in the CPU system settings to apply read protection and write protection.

Write (protection): When an attempt is made to transfer a project, this function displays a confirmation message to prevent accidental writing.

Read (protection): This function prohibits the reading of a project.

Project password: When read protection has not been set to ON, this function requires password authentication to read a project.

> **Reference** When you are using the KV-8000/7000 Series or KV Nano Series, you can set password protection not only on each project, but on each program as well.

■ Saving several projects together in one file

Click the "File (F)" menu → "Pack/save project (J)."

> **Reference**
> • The compressed project file is saved in .kpz format.
> • Use this function in situations such as when you are using e-mail to transfer the project.

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Revision History

Printing Date	Version	Details of Revision
Mar 2016	2nd version	
Aug 2016	3rd version	
Aug 2016	4th version	
Sep 2017	6th version	
Sep 2017	7th version	
Dec 2017	1st revision 1st version	
Apr 2018	2nd revision 1st version	
Dec 2018	3rd revision 1st version	
Aug 2019	4th revision 1st version	
May 2020	5th revision 1st version	

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