

# FBs-PLC User's Manual II 【Advanced Application】

## CONTENTS

### Chapter 9 FBs-PLC Interrupt Function

9.1	The Principle and the Structure of Interrupt Function .....	9-1
9.2	Structure and Application of Interrupt Service Routine .....	9-2
9.3	Interrupt Source, Label and Priority for FBs-PLC .....	9-3
9.4	How to Use Interrupt of FBs-PLC .....	9-5
9.5	Interrupt Configuration .....	9-5
9.5.1	Interrupt Configuration Through the Operation of FP-08 .....	9-6
9.5.2	Interrupt Configuration Through the Operation of WinProladder .....	9-7
9.5.3	Internal Time Base Interrupt Configuration by R4162 .....	9-8
9.6	Examples of Interrupt Routine .....	9-8
9.7	Capture Input and Digital Filter .....	9-10

### Chapter 10 FBs-PLC High-Speed Counter and Timer

10.1	FBs-PLC High-Speed Counter .....	10-1
10.1.1	Counting Modes of FBs-PLC High-Speed Counter .....	10-1
10.2	System Architecture of FBs-PLC High-Speed Counter .....	10-2
10.2.1	The Up/Down Pulse Input Mode of High-Speed Counter (MD0,MD1) .....	10-4
10.2.2	Pulse-Direction Input Mode of High-Speed Counter (MD2, MD3) .....	10-6
10.2.3	AB Phase Input Mode of High-Speed Counter (MD4,MD5,MD6,MD7) .....	10-7
10.3	Procedure for FBs-PLC High-Speed Counter Application .....	10-10
10.4	HSC/HST Configuration .....	10-11
10.4.1	HSC/HST Configuration(Using FP-08) .....	10-11
10.4.2	HSC/HST Configuration(Using WinProladder) .....	10-14
10.5	Examples for Application of High-Speed Counter .....	10-17
10.6	FBs-PLC High-Speed Timer .....	10-22
10.6.1	HSTA High-Speed Timer .....	10-22
10.6.2	HST0~HST3 High-Speed Delay Timer .....	10-25
10.6.3	Examples for Application of High-Speed Timer HSTA .....	10-26
10.6.4	Examples for Application of High-Speed Timer HST0~HST3 .....	10-30

## Chapter 11 The NC Positioning Control of FBs-PLC

11.1	The Methods of NC Positioning	11-1
11.2	Absolute Coordinate and Relative Coordinate	11-1
11.3	Procedures of Using FBs-PLC Positioning Control	11-2
11.4	Explanation for the Positioning Control Hardware of FBs-PLC	11-3
11.4.1	Structure of Output Circuit of HSPSO	11-3
11.4.2	Hardware Wiring Layout for FBs-PLC Positioning Control	11-3
11.5	The Explanation for the Position Control Function of FBs-PLC	11-5
11.5.1	Interface of Stepping Motor	11-6
11.5.2	Interface of Servo Motor	11-7
11.5.3	Working Diagram Illustration for Servo Motor	11-8
11.6	Explanation of Function for NC Position Control Instruction	11-8
11.7	Machine Homing	11-44

## Chapter 12 The Communication Function of FBs-PLC

12.1	Functions and Applications of FBs-PLC Communication ports	12-1
12.1.1	Communication Port (Port0) : USB or RS232 Interface	12-2
12.1.2	Communication Ports (Port1 ~ Port4) : RS232 or RS485 Serial Interface	12-2
12.1.3	Ethernet Interface	12-3
12.2	How to Use FBs-PLC Communication Functions	12-4
12.3	Hardware Wiring Notifications for RS485 Interface	12-4
12.4	How to Use FBs-PLC Communication Ports	12-8
12.4.1	Matching of Hardware Interfaces and Mechanisms	12-8
12.4.2	Selection and Setting of Communication Protocols	12-12
12.4.3	Settings for Communication Parameters	12-14
12.4.4	Modem Interface Setting	12-18
12.5	Description and Application of Software Interface Types	12-18
12.5.1	Standard Interface	12-18
12.5.2	Modem-Specific Interface	12-18
12.5.3	Ladder Program Control Interface	12-20
12.6	Communication Boards(CB)	12-21
12.7	Communication Modules(CM)	12-23

12.7.1	4 Ports RS485 Central Hub (FBs-CM5H)	12-26
12.7.2	Isolated RS485 Repeater (FBs-CM5R)	12-27
12.7.3	Isolated RS232/RS485 Bi-Directional Signal Converter(FBs-CM25C)	12-28
12.8	FBs Ethernet Communication Module and Application	12-29
12.8.1	Specifications	12-29
12.8.1.1	Connector Specifications	12-29
12.8.1.2	Ethernet Specifications	12-29
12.8.2	Appearance	12-30
12.8.2.1	CM25E and CM55E Appearance	12-30
12.8.2.2	CBE Appearance	12-31
12.8.3	Serial Connector Function (Only CM25E/CM55E Provides)	12-32
12.8.4	Transforming from Ethernet to Serial Communication	12-32
12.8.5	Application Structure	12-32
12.8.5.1	Server Mode	12-33
12.8.5.2	Client Mode	12-34
12.8.6	Hardware Installation	12-35
12.8.7	Software Setup	12-36
12.8.8	Procedures to Change the Configuration	12-42
12.8.9	Pin Assignments and Protocols	12-43

## Chapter 13 The Applications of FBs-PLC Communication Link

13.1	Application for FUN151 Instruction	13-2
13.1.1	Procedures for Usage	13-2
13.1.2	Explanation of Respective Modes and Application Program for FUN151	13-2
13.2	Application for FUN150(Modbus) Instruction	13-39
13.2.1	Procedures for Usage	13-39
13.2.2	Explanation Application Program for FUN150	13-39

## Chapter 14 Application of ASCII File Output Function

14.1	Format of ASCII File Data	14-1
14.2	Application Examples of ASCII File Output	14-3

## Chapter 15 Real Time Clock (RTC)

15.1	Correspondence Between RTC and the RTCR Within PLC	15-1
------	--	------

15.2	RTC Access Control and Setting .....	15-2
15.3	RTC Time Calibration .....	15-3

## Chapter 16 7/16-Segment LED Display Module

16.1	FBs-7SG Overview .....	16-1
16.2	The Procedure of Using FBs-7SG Module .....	16-2
16.3	FBs-7SG I/O Address .....	16-2
16.4	FBs-7SG Hardware Wring and Setup .....	16-2
16.4.1	FBs-7SG Hardware Wiring .....	16-2
16.4.2	FBs-7SG Hardware Setup .....	16-3
16.4.3	LED Driving Voltage Setup and Overvoltage(O.V.) Inspection .....	16-6
16.5	7-Segment LED Display and Individual LED Display Circuits .....	16-7
16.6	Decode Display and Non-Decode Display .....	16-9
16.7	FBs-7SG Input Power Requirements and Consumption .....	16-12
16.8	Controlling Display Contents With OR on FBs-7SG .....	16-12
16.9	FBs-7SG Output Commands FUN84 : TDSP .....	16-13

## Chapter 17 Thumbwheel Switch Input Model

17.1	FBs-32DGI Specifications .....	17-2
17.2	The Procedure of Using FBs-32DGI Module .....	17-2
17.3	FBs-32DGI I/O Address .....	17-3
17.4	FBs-32DGI Hardware Description .....	17-3
17.5	FBs-32DGI Input Circuit Diagram .....	17-5

## Chapter 18 AIO Module

18.1	FBs-6AD Analog Input Module .....	18-1
18.1.1	Specifications of FBs-6AD .....	18-1
18.1.2	The Procedure of Using FBs-6AD Module .....	18-2
18.1.3	Address Allocation of FBs-PLC Analog Inputs .....	18-2
18.1.4	FBs-6AD Hardware Description .....	18-3
18.1.4.1	FBs-6AD Hardware Jumper Setting .....	18-4
18.1.5	FBs-6AD Input Circuit Diagram .....	18-7
18.1.6	FBs-6AD Input Characteristics and Jumper Setting .....	18-7
18.1.7	Configuration of Analog Input .....	18-12

18.1.8	Tracking on the OFFSET Mode Input .....	18-15
18.2	FB-4DA/2DA Analog Output Module .....	18-17
18.2.1	Specifications of FBs-4DA/2DA .....	18-17
18.2.2	The Procedure of Using FBs-4DA/2DA Analog Output Module .....	18-18
18.2.3	Address Allocation of FBs-PLC Analog Outputs .....	18-18
18.2.4	FBs-4DA/2DA Hardware Description .....	18-20
18.2.4.1	FBs-4DA/2DA Hardware Jumper Setting .....	18-21
18.2.5	FBs-4DA/2DA Output Circuit Diagram .....	18-23
18.2.6	FBs-4DA/2DA Output Characteristics and Jumper Setting .....	18-24
18.2.7	Tracking on the OFFSET Mode Output .....	18-26
18.3	FB-4A2D Analog Input/Output Module .....	18-28
18.3.1	Specifications of FBs-4A2D .....	18-28
18.3.2	The Procedure of Using FBs-4A2D Analog Input/Output Module .....	18-29
18.3.3	Address Allocation of FBs-PLC Analog Inputs/Outputs .....	18-30
18.3.4	FBs-4A2D Hardware Description .....	18-31
18.3.4.1	FBs-4A2D Hardware Jumper Setting .....	18-32
18.3.5	FBs-4A2D Input/Output Circuit Diagram .....	18-35
18.3.6	FBs-4A2D Input/Output Characteristics .....	18-35

## Chapter 19 Analog Input/Output Expansion Board

19.1	Specifications of FBs Analog Expansion Boards .....	19-1
19.2	The Procedure of Using FBs Analog Expansion Boards .....	19-3
19.3	Address Allocation of FBs Analog Expansion Boards .....	19-3
19.4	Hardware Description of FBs Analog Expansion Boards .....	19-4
19.5	FBs Analog Expansion Boards I/O Circuit Diagram .....	19-6
19.5.1	FBs-B4AD Analog Input Circuit Diagram .....	19-6
19.5.2	FBs-B2DA Analog Output Circuit Diagram .....	19-7
19.5.3	FBs-B2A1D Analog I/O Circuit Diagram .....	19-7
19.6	FBs Analog Expansion Board I/O Characteristics .....	19-8

## Chapter 20 Temperature Measurement of FBs-PLC and PID Control

20.1	Specifications of Temperature Measuring Modules of FBs-PLC .....	20-1
------	--	------

20.1.1	Thermocouple Input of FBs-PLC .....	20-1
20.1.2	RTD Input of FBs-PLC .....	20-2
20.1.3	NTC Temperature Input Module .....	20-2
20.2	The Procedure of Using FBs Temperature Module .....	20-3
20.2.1	Temperature Measurement Procedure .....	20-3
20.2.2	Closed Loop PID Temperature Control .....	20-3
20.3	The Procedure to Configure the Temperature Measurement .....	20-4
20.3.1	The Internal Format of Temperature Configuration Table .....	20-5
20.3.2	The Internal Format of Working Registers .....	20-6
20.3.3	Description of Related Special Registers for Temperature Measurement .....	20-6
20.4	I/O Addressing of Temperature Module .....	20-7
20.5	Temperature Modules Hardware Description .....	20-7
20.5.1	FBs-2TC 、 6TC 、 16TC Outlook of Top View .....	20-7
20.5.2	FBs-6RTD 、 16RTD Outlook of Top View .....	20-10
20.5.3	FBs-6NTC Outlook of Top View .....	20-11
20.6	Wiring of the Temperature Modules .....	20-12
20.6.1	Wiring of the Thermocouple Input Module .....	20-12
20.6.2	Wiring of the RTD Input Module .....	20-13
20.6.3	Wiring of the NTC Module .....	20-14
20.7	Instructions Explanation and Program Example for Temperature Measurement and PID Temperature Control of FBs-PLC .....	20-14

## Chapter 21 Analog Input and Temperature Measurement Combination Module

21.1	Specifications of Temperature & Analog Input Measuring Modules .....	21-1
21.1.1	Specifications of Temperature Measurement .....	21-1
21.1.2	Specifications of Analog Input Measurement .....	21-2
21.1.3	Common Specifications .....	21-3
21.2	The Procedures of Using Temperature Measurement .....	21-3
21.3	The Procedures to Configure the Temperature Measurement .....	21-3
21.4	Hardware Descriptions of Modules .....	21-3
21.4.1	FBs-2A4TC/FBs-2A4RTD Outlook of Top View .....	21-4

21.5	Wiring of Modules .....	21-6
21.5.1	Wiring of 2A4TC Module .....	21-6
21.5.2	Wiring of 2A4RTD Module .....	21-7
21.6	The Jumper Setup of 2A4RTD/2A4TC .....	21-8
21.6.1	Position Jumper .....	21-8
21.6.1.1	The Position Jumper of 2A4TC .....	21-8
21.6.1.2	The Position Jumper of 2A4RTD .....	21-9
21.6.2	Input Code Format Selection of Jumper Setting .....	21-9
21.6.3	Input Signal Form of Jumper Setup .....	21-10
21.6.4	Input Signal Type of Jumper Setup .....	21-10

## Chapter 22 General Purpose PID Control

22.1	Introduction of PID Control .....	22-1
22.2	How to Select the Controller .....	22-1
22.2.1	Proportional Controller .....	22-2
22.2.2	Proportional + Integral Controller .....	22-2
22.2.3	Proportional + Integral + Derivative Controller .....	22-2
22.3	Explanation of the PID Instruction and Example Program Follows .....	22-3

## 【Appendix 1】FATEK Communication Protocol

1.1.	Master and Slave Definition and Communication .....	-1
1.2.	The Communication Message Format of FATEK PLC .....	-1
1.3.	The Communication Error Code of FATEK PLC .....	-2
1.4.	The Function Description of Communication Command .....	-3
1.4.1	The Classification and Assignment of Components .....	-3
1.4.2	The Description of Communication Command .....	-4
command 40:	The gist read the system status of PLC .....	-6
command 41:	Control the PLC RUN/STOP .....	-7
command 42:	Single discrete control .....	-8
command 43:	The status reading of ENABLE/DISABLE of continuous discrete .....	-9
command 44:	The status reading of continuous discrete .....	-10
command 45:	Write the status to continuous discrete .....	-11

command 46:	Read the data from continuous registers.....	-12
command 47:	Write to continuous registers .....	-13
command 48:	Mixed read the random discrete status or register data .....	-14
command 49:	Mixed write the random discrete status or register data .....	-15
command 4E:	Testing loop back.....	-16
command 53:	The detail read the system status of PLC.....	-17

## 【Appendix 2】PWMDA Analog Output Module

1.1.	PWMDA Component Installation .....	-1
1.2.	Specifications of PWMDA .....	-3