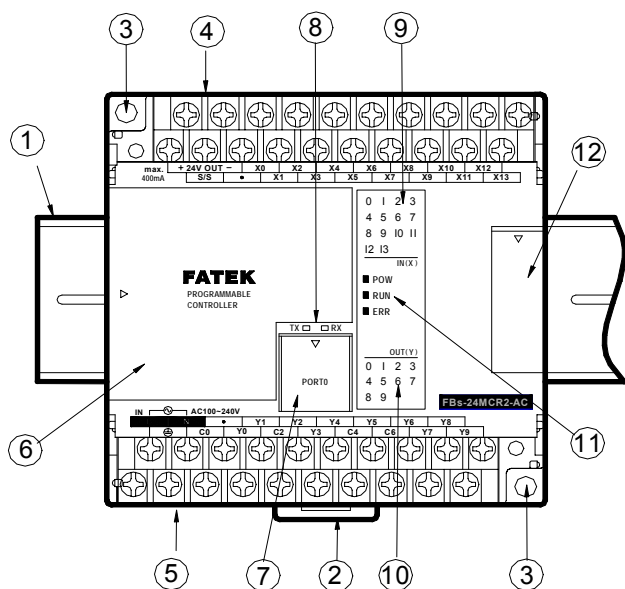


## Chapter 1 Introduction of FATEK FBS Series PLC

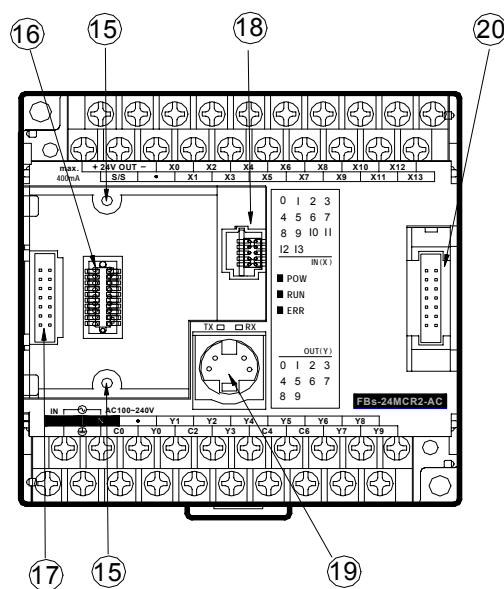
The FATEK FBS Series PLC is a new generation of micro PLC equipped with excellent functions comparable to medium or large PLC, with up to five communication ports. The maximum I/O numbers are 256 points for Digital Input (DI) and Digital Output (DO), 64 words for Numeric Input (NI) and Numeric Output (NO). The Main Units of FBs are available in three types: MA (Economy Type), MC (High-Performance Type), and MN (High-Speed NC Type). With the combination of I/O point ranges from 10 to 60, a total of 17 models are available. Fifteen DI/DO and 19 NI/NO models are available for Expansion Units/Modules. With interface options in RS232, RS485, USB, Ethernet, CANopen, Zigbee and GSM, the communication peripherals are available with 15 boards and modules.

### 1.1 Appearance of Main Unit

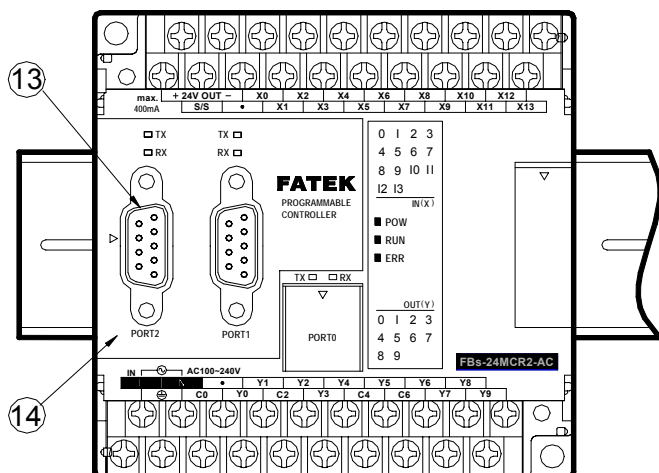
All the Main Units of FBs-PLC have the same physical structure. The only difference is the case width. There are four different case sizes, which are 60mm, 90mm, 130mm, and 175mm. The figure below will use the Main Unit case of the FBs-24MC as an example for illustration:



(Front view without Communication Board)



(Front view with cover plate removed)



(Front view with CB-22 Board installed)

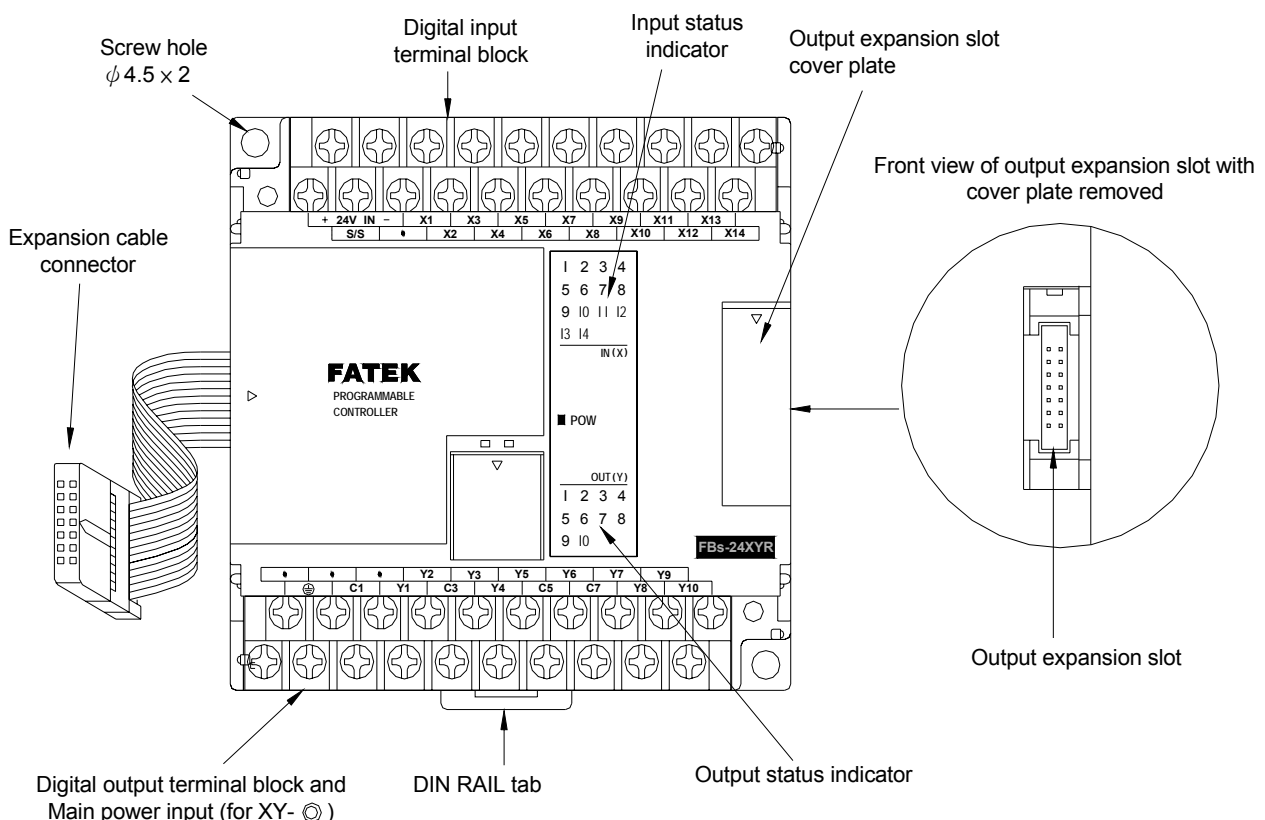
- ① 35mm-width DIN RAIL
- ② DIN RAIL tab
- ③ Hole for screw fixation ( $\phi 4.5 \times 2$ )
- ④ Terminals of 24VDC power input and digital input (Pitch 7.62mm)
- ⑤ Terminals of main power input and digital output (Pitch 7.62mm)
- ⑥ Standard cover plate (without communication board)
- ⑦ Cover plate of built-in communication port (Port 0)

- ⑧ Indicators for transmit (TX) and receive (RX) status of built-in communication port (Port0).
- ⑨ Indicator for Digital Input (Xn).
- ⑩ Indicator for Digital Output (Yn).
- ⑪ Indicator for system status (POW, RUN, ERR).
- ⑫ I/O output expansion header cover [units of 20 points or beyond only], with esthetic purpose and capable of securing expansion cable.
- ⑬ FBS-CB22 Communication Board (CB).
- ⑭ FBS-CB22 CB cover plate (each CB has its own specific cover plate)
- ⑮ Screw holes of communication board.
- ⑯ Connector for communication board (for 7 types CB of CB2, CB22, CB5, CB55, CB25, CBE, CBCAN , 3 types AIO of B2DA, B2AD, B4AD, and 2 types DAP of BDAP and BPEP)
- ⑰ Left side (communication) expansion header (only available in MC/MN model, for CM22, CM25, CM55, CM25E, CM55E, and CMGSM connection).
- ⑱ Connector for Memory Pack.
- ⑲ Connector for built-in communication port (Port 0) (With USB and RS232 optional, shown in the figure is for RS232)
- ⑳ Right side (I/O) output expansion header (only available in units with 20 points or beyond), for connecting with cables from expansion units/modules.

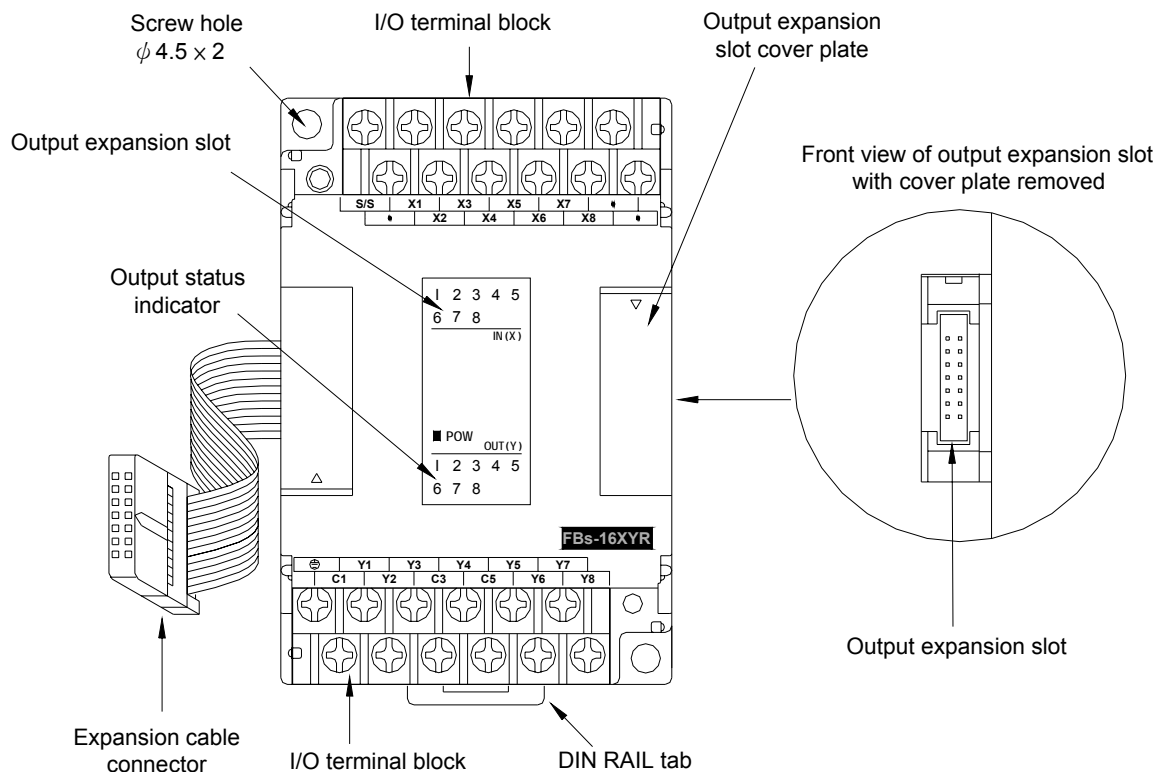
## 1.2 Appearance of Expansion Unit/Module

There are three types of cases for expansion units/modules. One type uses the same case as main unit that of the 90mm, 130mm, and 175mm, while the other two have thinner 40mm and 60mm cases, which are for expansion modules. All expansion cables (left) of expansion units/modules are flat ribbon cables (5cm long), which were soldered directly on the PCB, and the expansion header (right) is a 14Pin Header, with this to connect the right adjacent expansion units/modules. In the following, each of the three types of expansion units/modules is described as an example:

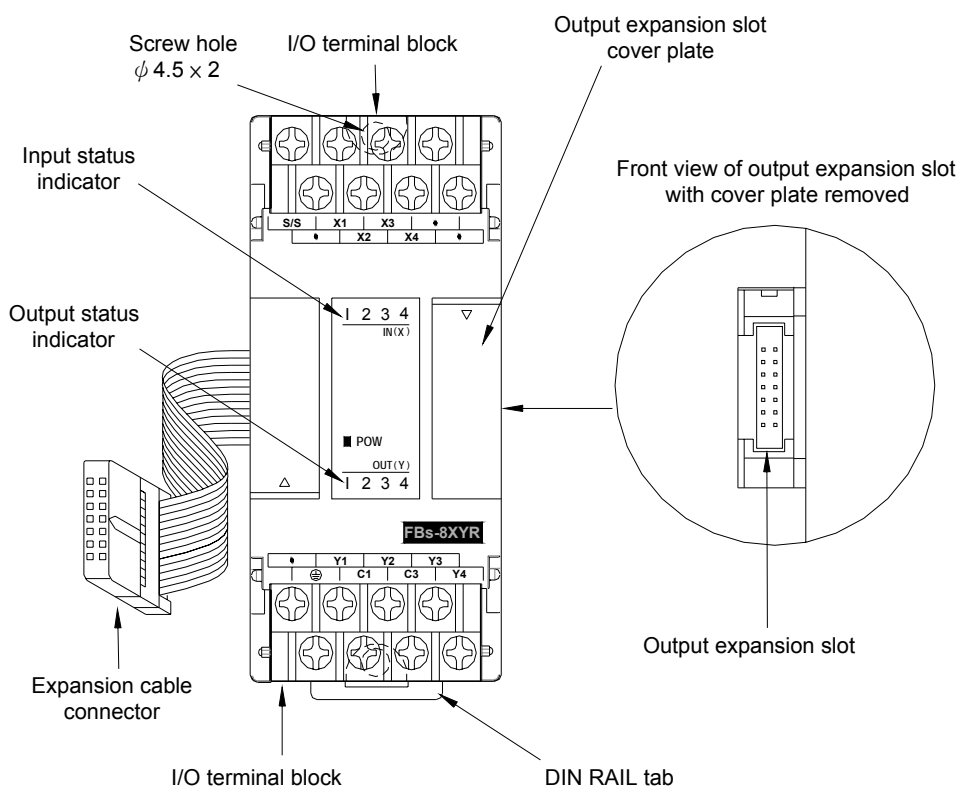
- Expansion unit/module with 90mm, 130mm, or 175mm width case: [ -24XY◇-◎, -40XY◇-◎, -60XY◇-◎, -16TC, -16RTD]



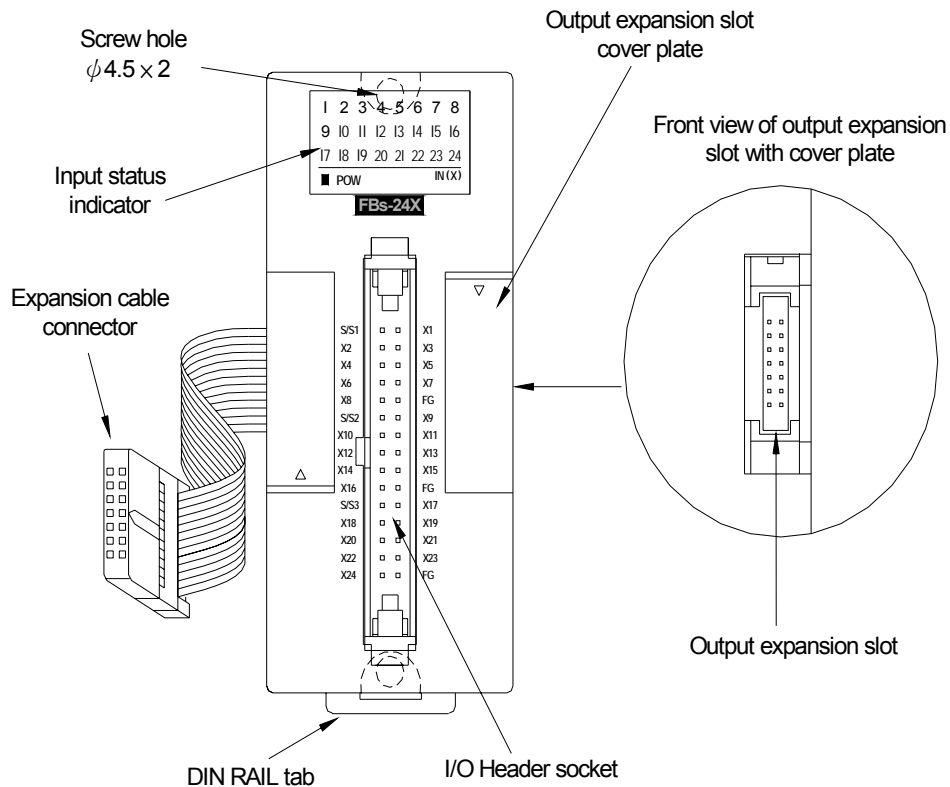
- Expansion unit/module with 60mm width case: [-16XY◇, -16Y◇, -20X ]



- Expansion module with 40mm width case: [ -8XY◇, -8Y◇, -8X, -6AD, -2DA, -4DA, -4A2D, -2A4TC, -2A4RTD, -7SG1, -7SG2, -2TC, -6TC, -6RTD, -CM5H, -6NTC, -4PT, -1LC, -1HLC, -VOM ]

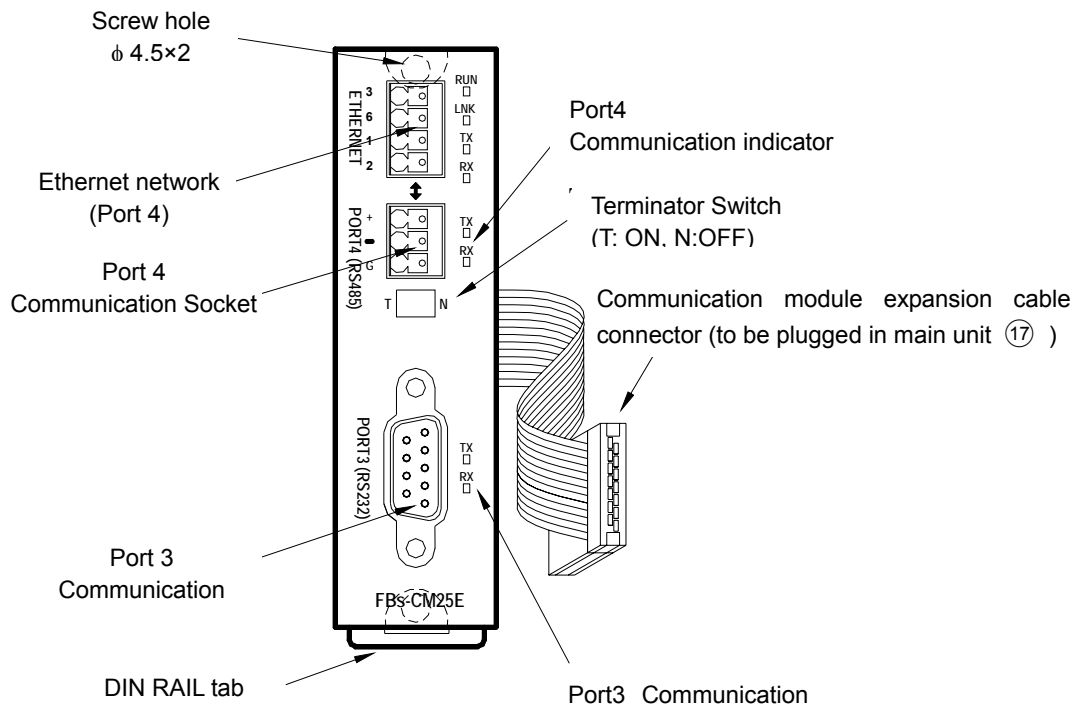


- Expansion module with 40mm width case: [ -24X, -24YT, -24YJ, -32DGI ]



### 1.3 Appearance of Communication Expansion Module

The Communication Module (CM) of FBs-PLC has a 25mm-width case, which can be used in the following seven modules: -CM22, -CM25, -CM55, -CM25E, -CM55E, -CM25C, -CM5R.



## 1.4 List of FBs-PLC Models

Module Name			Specifications
Main Units	Basic Main Units	FBs-10MA◇△-◎-C	6 points 24VDC digital input (2 points high speed 100KHz, 2 points medium speed 20KHz, 2 points medium speed total 5KHz); 4 points relay or transistor output (2 points high speed 100KHz, 2 points medium speed 20KHz); 1 RS232 or USB port(expandable up to 3); I/O is not expandable
		FBs-14MA◇△-◎-C	8 points 24VDC digital input (2 points high speed 100KHz, 2 points medium speed 20KHz, 4 points medium speed total 5KHz); 6 points relay or transistor output (2 point high speed 100KHz, 4 points medium speed 20KHz); 1 RS232 or USB port(expandable up to 3); I/O is not expandable
		FBs-20MA◇△-◎-C	12 points 24VDC digital input (2 points high speed 100KHz, 4 points medium speed 20KHz, 6 points medium speed total 5KHz); 8 points relay or transistor output (2 points high speed 100KHz, 6 points medium speed 20KHz); 1 RS232 or USB port(expandable up to 3)
		FBs-24MA◇△-◎-C	14 points 24VDC digital input (2 points high speed 100KHz, 6 points medium speed 20KHz, 6 points medium speed total 5KHz); 10 points relay or transistor output (2 points high speed 100KHz, 6 points medium speed 20KHz); 1 RS232 or USB port(expandable up to 3)
		FBs-32MA◇△-◎-C FBs-32MB◇△-◎-C	20 points 24VDC digital input (2 points high speed 100KHz, 6 points medium speed 20KHz, 8 points medium speed total 5KHz); 12 points relay or transistor output (2 points high speed 100KHz, 6 points medium speed 20KHz); 1 RS232 or USB port(expandable up to 3); (MB is detachable terminal block)
		FBs-40MA◇△-◎-C FBs-40MB◇△-◎-C	24 points 24VDC digital input (2 points high speed 100KHz, 6 points medium speed 20KHz, 8 points medium speed total 5KHz); 16 points relay or transistor output (2 points high speed 100KHz, 6 points medium speed 20KHz); 1 RS232 or USB port(expandable up to 3); (MB is detachable terminal block)
		FBs-60MA◇△-◎-C FBs-60MB◇△-◎-C	36 points 24VDC digital input (2 points high speed 100KHz, 6 points medium speed 20KHz, 8 points medium speed total 5KHz); 24 points relay or transistor output (2 points high speed 100KHz, 6 points medium speed 20KHz); 1 RS232 or USB port(expandable up to 3); (MB is detachable terminal block)
	Advanced Main Units	FBs-10MC◇△-◎	6 points 24VDC digital input (2 points high speed 200KHz, 2 points medium speed 20KHz, 2 points medium speed total 5KHz); 4 points relay or transistor output (2 points high speed 200KHz, 2 points medium speed 20KHz); 1 RS232 or USB port (expandable up to 5); built-in RTC; I/O is not expandable
		FBs-14MC◇△-◎	8 points 24VDC digital input (2 points high speed 200KHz, 2 points medium speed 20KHz, 4 points medium speed total 5KHz); 6 points relay or transistor output (2 points high speed 200KHz, 4 points medium speed 20KHz); 1 RS232 or USB port (expandable up to 5); built-in RTC; I/O is not expandable
		FBs-20MC◇△-◎	12 points 24VDC digital input (2 points high speed 200KHz, 2 points medium speed 20KHz, 6 points medium speed total 5KHz); 8 points relay or transistor output (4 points high speed 200KHz, 4 points medium speed 20KHz); 1 RS232 or USB port (expandable up to 5); built-in RTC; detachable terminal block
		FBs-24MC◇△-◎	14 points 24VDC digital input (4 points high speed 200KHz, 4 points medium speed 20KHz, 6 points medium speed total 5KHz); 10 points relay or transistor output (4 points high speed 200KHz, 4 points medium speed 20KHz); 1 RS232 or USB port (expandable up to 5); built-in RTC; detachable terminal block
		FBs-32MC◇△-◎	20 points 24VDC digital input (6 points high speed 200KHz, 2 points medium speed 20KHz, 8 points medium speed total 5KHz); 12 points relay or transistor output (6 points high speed 200KHz, 2 points medium speed 20KHz); 1 RS232 or USB port (expandable up to 5); built-in RTC; detachable terminal block
		FBs-40MC◇△-◎	24 points 24VDC digital input (6 points high speed 200KHz, 2 points medium speed 20KHz, 8 points medium speed total 5KHz); 16 points relay or transistor output (6 points high speed 200KHz, 2 points medium speed 20KHz); 1 RS232 or USB port (expandable up to 5); built-in RTC; detachable terminal block
		FBs-60MC◇△-◎	36 points 24VDC digital input (8 points high speed 200KHz, 8 points medium speed total 5KHz); 24 points relay or transistor output (8 points high speed 200KHz); 1 RS232 or USB port (expandable up to 5); built-in RTC; detachable terminal block
	NC Positioning Main Units	FBs-20MN◇△-◎	2 sets (1 axis) 920KHz 5VDC digital differential input, 10 points 24VDC digital input (4 points high speed 200KHz, 6 points medium speed total 5KHz); 2 sets (1 axis) 920KHz 5VDC digital differential output, 8 points relay or transistor output (average high speed 200KHz); 1 RS232 or USB port (expandable up to 5); built-in RTC; detachable terminal block
		FBs-32MN◇△-◎	4 sets (2 axes) 920KHz 5VDC digital differential input, 16 points 24VDC digital input (4 points high speed 200KHz, 8 points medium speed total 5KHz); 4 sets (2 axes) 920KHz 5VDC digital differential output, 8 points relay or transistor output (4 points high speed 200KHz); 1 RS232 or USB port (expandable up to 5); built-in RTC; detachable terminal block
		FBs-44MN◇△-◎	8 sets (4 axes) 920KHz 5VDC digital differential input, 20 points 24VDC digital input (8 points medium speed total 5KHz); 8 sets (4 axes) 920KHz 5VDC digital differential output, 8 points relay or low speed transistor output; 1 RS232 or USB port (expandable up to 5); built-in RTC; detachable terminal block
Right Side Expansion Modules	Expansion Power Supply	FBs-EPW-AC/D24	Power supply of 100~240VAC or 24VDC input for expansion module; 3 sets output power with 5VDC, 24VDC, and 24VDC, 14W capacity
	DIO Expansion Units	FBs-24XY◇-◎	14 points 24VDC digital input, 10 points relay or transistor output, built-in power supply
		FBs-40XY◇-◎	24 points 24VDC digital input, 16 points relay or transistor output, built-in power supply
		FBs-60XY◇-◎	36 points 24VDC digital input, 24 points relay or transistor output, built-in power supply
	DIO Expansion Modules	FBs-8X	8 points 24 VDC digital input
		FBs-8Y◇	8 points relay or transistor output
		FBs-8XY◇	4 points 24VDC digital input, 4 points relay or transistor output
		FBs-16Y◇	16 points relay or transistor output
		FBs-16XY◇	8 points 24VDC digital input, 8 points relay or transistor output
		FBs-20X	20 points 24VDC digital input
		FBs-24XY◇	14 points 24VDC digital input, 10 points relay or transistor output
		FBs-40XY◇	24 points 24VDC digital input, 16 points relay or transistor output
		FBs-60XY◇	36 points 24VDD digital input, 24 points relay or transistor output
		FBs-24X	24 points high-density 24VDC digital input, 30 pins header with latch
		FBs-24YT/J	24 points high-density transistor SINK(T) or SOURCE(J) output (0.1A max.) · 30 pins header with latch

Module Name			Specifications
Left Side Expansion Modules	Thumbwheel switch module	FBs-32DGI	8 sets 4 digits (total 32 digits) thumbwheel switch (or 128 points independent switch) multiplex input module, 30 pins header connector
	16/7 Segment LED display modules	FBs-7SG1	1 set 8 digits 7-segment/4 digits 16-segment LED display (or 64 points independent LED) output display module, 16 pins header connector
		FBs-7SG2	2 sets 8 digits 7-segment/4 digits 16-segment LED display (or 128 points independent LED) output display module, 16 pins header connector
	AIO modules	FBs-2DA	2 channels, 14-bit analog output module (-10~10V, 0~10V or -20~20mA, 0~20mA)
		FBs-4DA	4 channels, 14-bit analog output module (-10~10V, 0~10V or -20~20mA, 0~20mA)
		FBs-4A2D	4 channels, 14-bit analog input (same specification as 6AD)+2 channels, 14-bit analog output (same specification as 2DA) combo module
		FBs-6AD	6 channels, 14-bit analog input module (-10~10V, 0~10V or -20~20mA, 0~20mA)
	Temperature measurement modules	FBs-2TC	2 channels, thermocouple temperature input module with 0.1°C resolution.
		FBs-6TC	6 channels, thermocouple temperature input module with 0.1°C resolution.
		FBs-16TC	16 channels, thermocouple temperature input module with 0.1°C resolution.
		FBs-6RTD	6 channels, RTD temperature input module with 0.1°C resolution.
		FBs-16RTD	16 channels, RTD temperature input module with 0.1°C resolution.
		FBs-6NTC	6 channels, NTC temperature input module with 0.1°C resolution.
	AI + Temperature Measurement combo modules	FBs-2A4TC	2 channels, 14-bit analog input (same specifications as 6AD)+ 4 channels thermocouple temperature input (same specifications as 6TC) combo module
		FBs-2A4RTD	2 channels, 14-bit analog input (same specifications as 6AD) + 4 channels RTD temperature input (same specifications as 6RTD) combo module
	Voice modules	FBs-VOM	Built-in 1MB memory (play continuously up to 2 minutes), extendable 4GB SD card(play continuously up to 8,000 minutes) voice module, 245 messages, output 2W
	Load Cell Module	FBs-1LC	1 channel, load cell measurement module with 16-bit resolution (including sign bit)
	Potential Meter Module	FBs-4PT	4 channels, 14-bit potential meter input module (Impedance range: 1~10K Ω)
	Communication modules	FBs-CM22	2 ports RS232 (Port3 +Port 4) communication module
		FBs-CM55	2 ports RS485 (Port3 +Port 4) communication module
		FBs-CM25	1 port RS232 (Port3) + 1 port RS485 (port 4) communication module
		FBs-CM25E	1 port RS232 (Port3) + 1 port RS485 (port 4) + Ethernet network interface communication module
		FBs-CM55E	1 port RS485 (Port3) + 1 port RS485 (port 4) + Ethernet network interface communication module
		FBs-CMZB	ZigBee communication module
		FBs-CMZBR	ZigBee communication repeater
		FBs-CMGSM	GSM wireless communication module
		FBs-CM25C	General purpose RS232 to RS485/RS422 communication interface converter with photocouple isolation
		FBs-CM5R	General purpose RS485 repeater with photocouple isolation
		FBs-CM5H	General purpose 4 ports RS485 HUB with photocouple isolation, RS485 can be connected as star connection
	Communication boards	FBs-CB2	1 port RS232 (Port 2) communication board
		FBs-CB22	2 ports RS232 (Port 1+ Port 2) communication board
		FBs-CB5	1 port RS485 (Port 2) communication board
		FBs-CB55	2 ports RS485 (Port 1+ Port 2) communication board
		FBs-CB25	1 port RS232 (Port 1) + 1 port RS485 (Port 2) communication board
		FBs-CBE	1 port 10 Base T Ethernet communication board
		FBs-CBEH	1 port 100 Base T Ethernet communication board
		FBs-CBCAN	1 port CANopen communication board
	AIO boards	FBs-B2DA	2 channels, 12-bit analog output board (0~10V or 0~20mA)
		FBs-B2A1D	2 channels, 12-bit analog input + 1 channel, 12-bit analog output combo analog board (0~10V or 0~20mA)
		FBs-B4AD	4 channels, 12-bit analog input board (0~10V or 0~20mA)
	Precision Load Cell Module	FBs-1HLC	1 channel, high precision weighing control module with 24-bit resolution
	3-Axis Motion Control Module	FBs-30GM	3-Axis with linear and circular interpolation advanced motional control module, 3 sets of 200KHz high speed pulse input, 3 sets of 500KHz high speed pulse output, 14 points main unit, 16M Bytes program capacity, 20K Words retentive file register, built-in RS485 and Ethernet, 7.62mm detachable terminal block
	Simple HMI	FBs-BDAP	Board type Data Access Panel
		FBs-BPEP	Board type Parameter Entry Panel
		FBs-PEP/PEPR	Multi characters with graphics-based Parameter Entry Panel, built-in RFID Read/Write module with PEPR
		FBs-DAP-B/BR	16 X 2 LCD character display, 20 keys keyboard, 24VDC power supply, RS485 communication interface, built-in RFID Read/Write module with BR
		FBs-DAP-C/CR	16 X 2 LCD character display, 20 keys keyboard, 5VDC power supply, RS232 communication interface, built-in RFID Read/Write module with CR

Module Name			Specifications
Peripheral and Accessory	RFID Card	CARD-H	Read / Write wireless card (for FBs-DAP-BR/CR and FBs-PEPR)
	Programming Devices	FP-08	FBs- Series PLC handheld programmer
		Winproladder	FATEK-PLC Winproladder Programming software
	Memory Pack	FBs-PACK	FBs-PLC program memory pack with 20K Words program, 20K Words register, write protection switch
	PWMDA module	PWMDA	10-bit single channel pulse width modulation(PWM) 0~10V analog output (AO) module
	USB- RS232 Converter Cable	FBs-U2C-MD-180	Communication converter cable with standard USB AM connector to RS232 MD4M connector (used in standard PC USB to FBs main unit Port 0 RS232), length 180cm
	Communication cables	FBs-232P0-9F-150	MD4M to DB9F communication cable (FBs main unit Port 0 RS232 connect to standard DB9M), length 150cm
		FBs-232P0-9M-400	MD4M to DB9M communication cable (FBs main unit Port 0 RS232 connect to DB9F), length 400cm
		FBs-232P0-MD-200	MD4M to MD4M communication cable (FBs main unit Port 0 RS232 connect to FBs-PEP/PEPR), length 200cm
		FBs-232P0-MDR-200	MD4M to 90° MD4M communication cable (FBs main unit Port 0 RS232 connect to FBs-PEP/PEPR), length 200cm
	High density DIO cable	HD30-22AWG-200	High density modules(FBs-24X, FBs-24YT/J, FBs-32DGI) connector , 30pin Socket, 22AWG I/O cable, length200cm
	16/7-Segment LED display	DBAN.8-nR	0.8" 4-digit 16-segment LED display, n means R(Red) 16-segment LED characters display installed, can be 1~4
		DBAN.2.3-nR	2.3" 4-digit 16-segment LED display, n means R(Red) 16-segment LED characters display installed, can be 1~4
		DB.56-nR	0.56" 8-digit 7-segment display, n means R(Red) 7-segment LED characters display installed, can be 1~8
		DB.8-nR	0.8" 8-digit 7-segment display, n means R(Red) 7-segment LED characters display installed, can be 1~8
		DB2.3-nR	2.3" 8-digit 7-segment display, n means R(Red) 7-segment LED characters display installed, can be 1~8
		DB4.0-nR	4.0" 4-digit 7-segment display, n means R(Red) 7-segment LED characters display installed, can be 1~4
	Training Box	FBs-TBOX	46cm x 32 cm x 16cm suitcase, containing FBs-24MCT main unit. FBs-CM25E communication module (RS232 + RS485 + Ethernet network), 14 simulated input switches, 10 external relay output, Doctor terminal outlet I/O, peripherals such as stepping motor, encoder, 7-segment display, 10 of 10mm LED indicator, thumbwheel switch, and 16 key keyboard.

- ◇ : R — Relay output ; T — Transistor SINK(NPN) output ; J — Transistor SOURCE (PNP) output
- Δ : 2 — built-in RS232 port ; U — built-in USB port (non-standard)
- ◎ : AC — 100~240VAC power supply ; D12 — 12VDC power supply ; D24 — 24VDC power supply
- C : Blank — Standard ; —C — add in RTC
- The unmarked frequencies of Digital Input (DI) or Digital Output (DO) are low speed.

## 1.5 Specifications of Main Unit

Item				Specification				Note		
Execution Speed				0.33uS／per Sequence Command						
Space of Control Program				20K Words						
Program Memory				FLASH ROM or SRAM＋Lithium battery for Back-up						
Sequence Command				36						
Application Command				326 (126 types)				Include Derived Commands		
Flow Chart (SFC) Command				4						
Single Point 《BIT Status》	X	Output Contact(DI)		X0～X255 (256)				Corresponding to External Digital Input Point		
	Y	Output Relay(DO)		Y0～Y255 (256)				Corresponding to External Digital Output Point		
	TR	Temporary Relay		TR0～TR39 (40)						
	M	Internal Relay	Non-retentive	M0～M799 (800)*				Can be configured as retentive type		
				M1400～M1911 (512)						
			Retentive	M800～M1399 (600)*				Can be configured as non-retentive type		
		Special Relay		M1912～M2001 (90)						
	S	Step Relay	Non-retentive	S0～S499 (500)*				S20～S499 can be configured as retentive type		
			Retentive	S500～S999 (500)*				Can be configured as non-retentive type		
T	Timer "Time Up" Status Contact		T0～T255 (256)							
C	Counter "Count Up" Status Contact		C0～C255 (256)							
Register 《WORD Data》	TMR	Current Time Value Register	0.01S Time base		T0～T49 (50)*				T0 ～ T255 Numbers for each time base can be flexibly adjusted.	
			0.1S Time base		T50～T199 (150)*					
			1S Time base		T200～T255 (56)*					
	CTR	Current Counter Value Register	16-Bit	Retentive	C0～C139 (140)*				Can be configured as non-retentive type	
				Non-retentive	C140～C199 (60)*				Can be configured as retentive type	
			32-Bit	Retentive	C200～C239 (40)*				Can be configured as non-retentive type	
				Non-retentive	C240～C255 (16)*				Can be configured as retentive type	
	HR DR	Data Register		Retentive	R0～R2999 (3000)*				Can be configured as non-retentive type	
					D0～D3999 (4000)					
			Non-retentive	R3000～R3839 (840)*				Can be configured as retentive type		
	HR ROR		Retentive	R5000～R8071 (3072)*				When not configured as ROR, it can serve as normal register (for read/Write)		
			Read-only Register	R5000～R8071 can be configured as ROR, default setting is (0)*				ROR is stored in special ROR area and not consume program space		
			File Register	F0～F8191 (8192)*				Must save/retrieved via special commands		
	IR	Input register		R3840～R3903 (64)				Corresponding to external numeric input		
	OR	Output Register		R3904～R3967 (64)				Corresponding to external numeric output		
	SR	Special System Register		R3968～R4167 (197) R4000～R4095 (96)						
	《Special Register》	0.1mSHigh Speed Timer register		R4152～R4154 (3)						
		High Speed Counter Register	Hardware(4 sets)	DR4096～DR4110 (4×4)						
			Software (4 sets)	DR4112～DR4126 (4×4)						
Real Time Calendar Register (Not available in MA model)		R4128 (sec)		R4128 (min)	R4130 (hour)	R4131 (day)	Optional for MA module			
		R4132 (month)	R4133 (year)	R4134 (week)						
XR	Index Register		V、Z (2), P0～P9 (10)							
Interrupt Control	External Interrupt Control		32 (16 point input positive/negative edges)							
	Internal Interrupt Control		8 (1, 2 3, 4, 5, 10, 50, 100mS)							
0.1mS High Speed Timer (HST)				1 (16bits), 4 (32bits, derived from HHSC)						



High Speed Counter	Hardware High Speed Counter (HHSC) /32 bits	Channels	Up to 4	<ul style="list-style-type: none"> <li>Total number of HHSC and SHSC is 8.</li> <li>HHSC can change into High Speed Timer with 32 bits/0.1mS Time base.</li> </ul>
		Counting mode	8 (U/D, U/D × 2, K/R K/R × 2, A/B, A/B × 2, A/B × 3 A/B × 4)	
		Counting frequency	Up to 200KHz (single-end input) or 920KHz (differential input)	
	Software High Speed Counter (SHSC) /32 bits	Channels	Up to 4	
		Counting mode	3 (U/D · K/R · A/B)	
		Counting frequency	Maximum sum up to 5KHz	
Communication Interface	Port0 (RS232 or USB)		Communication Speed 4.8Kbps~921.6Kbps (9.6Kbps)*	Port1~4 talk FATEK or Modbus RTU Master/Slave Communication Protocol
	Port1~Port4 (RS232, RS485 or Ethernet)		Communication Speed 4.8Kbps~921.6Kbps (9.6Kbps)*	
	Maximum Connections		254	
NC Positioning Output (PSO)	Number of Axes		Up to 4	
	Output Frequency		200KHz single output (single) 100KHz ( A/B way) 920KHz(single way) and 460KHz(A/B way) differential output.	
	Output Pulse Mode		3 (U/D · K/R · A/B)	
	Positioning Language		Special Positioning Programming Language	
HSPWM Output	Number of Points		Up to 4	
	Output Frequency		72Hz~18.432KHz (with 0.1% resolution) 720Hz~184.32KHz (with 1% resolution)	
Captured input	Points		Max.36 points (all of main units have the feature)	
			> 10 $\mu$ S(super high speed/high speed input)	
	Captured pulse width		> 47 $\mu$ S(medium speed input)	
			> 470 $\mu$ S(mid/low speed input)	
Setting of Digital Filter	X0~X15		Frequency 14KHz ~ 1.8MHz	Chosen by frequency at high frequencies
			Tine constant 0 ~ 1.5mS/0 ~ 15mS,adjustable by step of 0.1mS/1mS	Chosen by time constant at low frequencies
	X16~X35		Time constant 1mS~15mS,adjustable by step of 1mS	
Maximum expandable module			32	

## 1.6 Environmental Specifications

Item			Specification	Note
Operating Ambient Temperature	Enclosure equipment	Minimum	5°C	Permanent Installation
		Maximum	40°C	
	Open equipment	Minimum	5°C	
		Maximum	55°C	
Storage Temperature			-25°C~+70°C	
Relative Humidity (non-condensing, RH-2)			5%~95%	
Pollution Level			Degree II	
Corrosion Resistance			By IEC-68 Standard	
Altitude			≤2000m	
Vibration	Fixed by DIN RAIL		0.5G, for 2 hours each along the 3 axes	
	Secured by screws		2G, for 2 hours each along the 3 axes	
Shock			10G, 3 times each along the 3 axes	
Noise Suppression			1500Vp-p, width 1us	
Withstand Voltage			1500VAC, 1 minute	L, N to any terminal

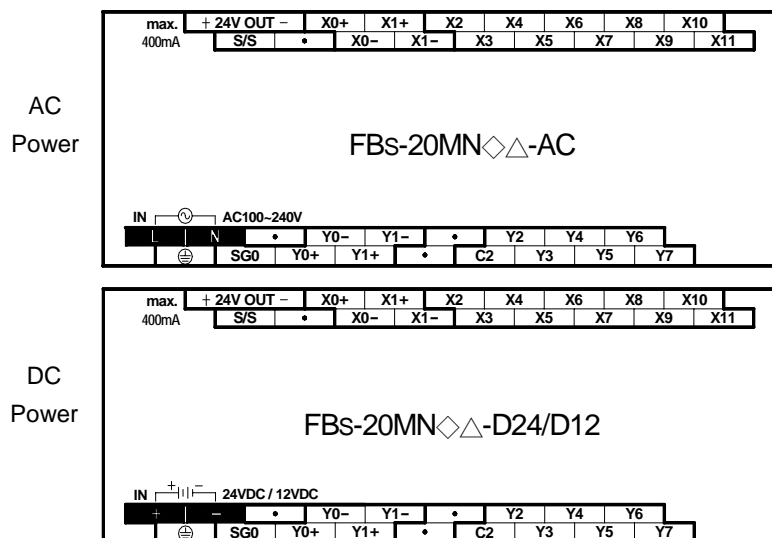
### Warning

The listed environmental specifications are for FBs-PLC under normal operation. Any operation in environment not conform to above conditions should be consulted with FATEK.

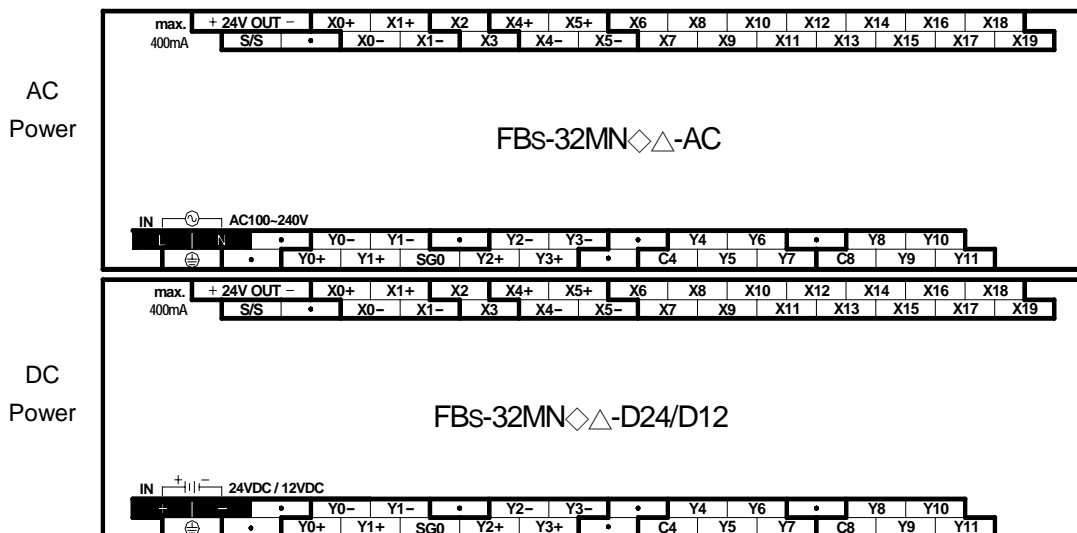
## 1.7 Connection Diagrams of Various Models

### 1.7.1 NC Control Main Unit [7.62mm Detachable Terminal Block]

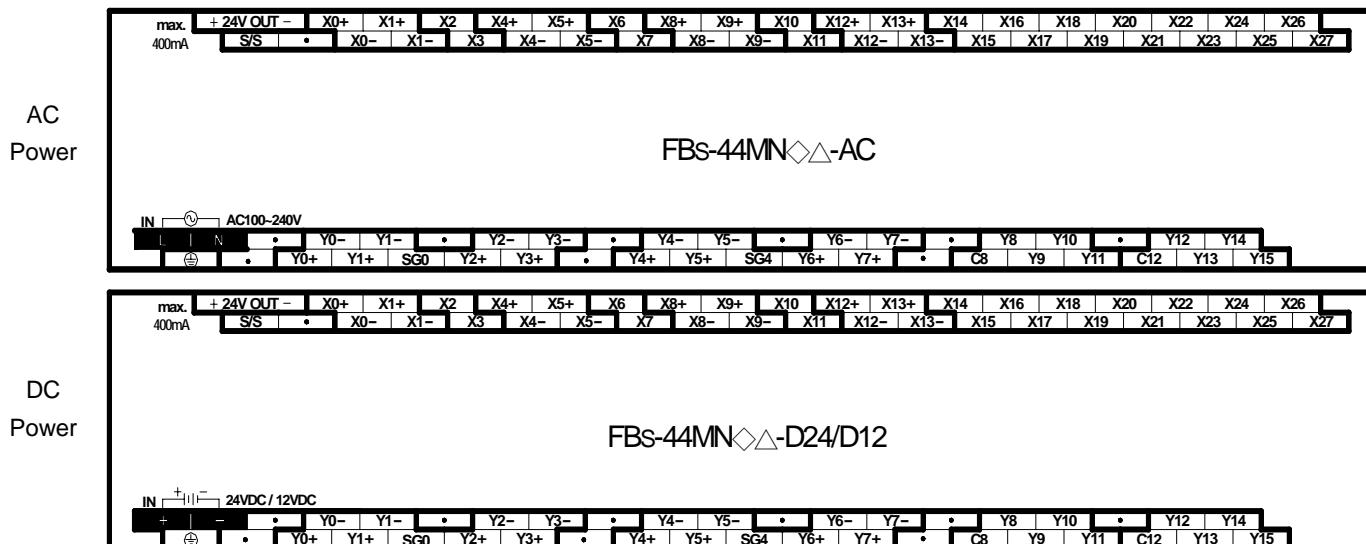
- 20 point digital I/O main unit (12 points IN, 8 points OUT)



- 32 point digital I/O main unit (20 points IN, 12 points OUT)



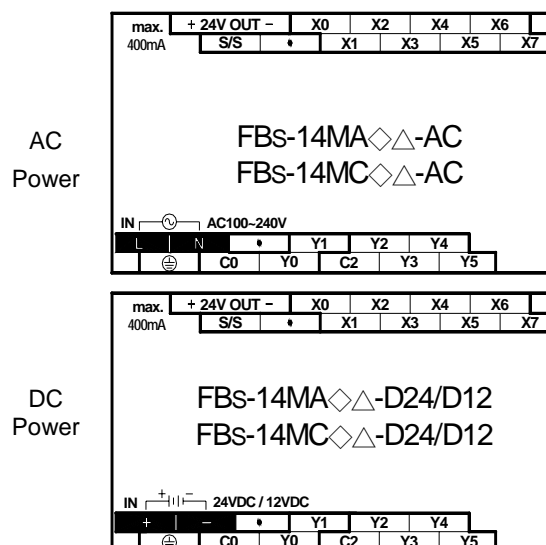
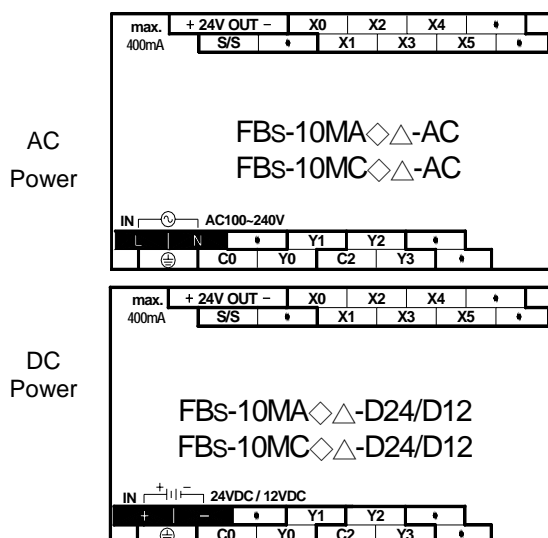
- 44 point digital I/O main unit (28 points IN, 16 points OUT)



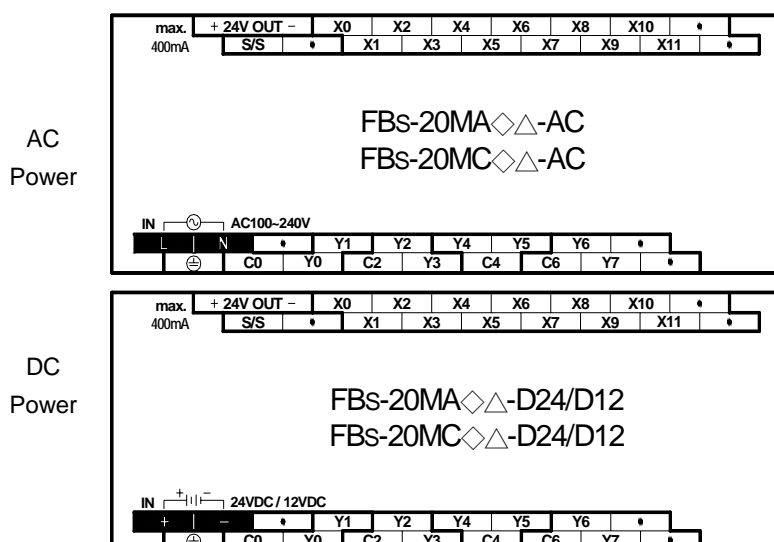
## 1.7.2 Basic/Advanced Main Unit

[7.62mm Terminal Block, fixed in model MA, detachable in models MB/MC]

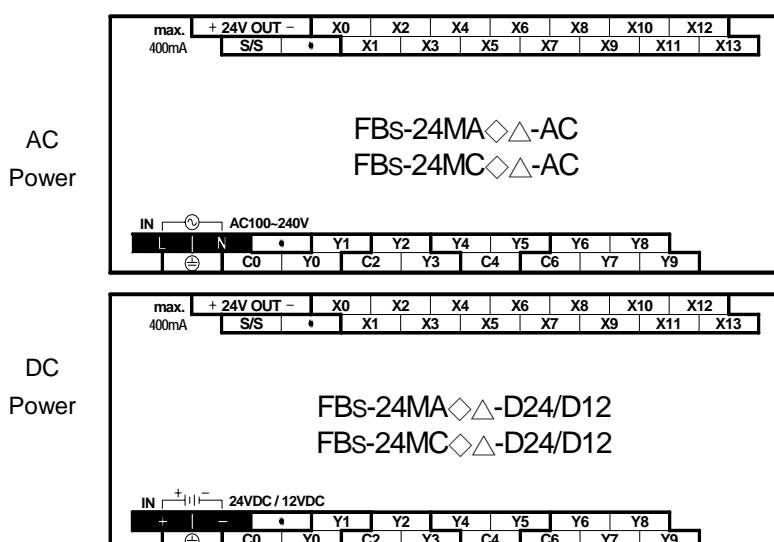
- 10 point digital I/O main unit (6 points IN, 4 points OUT)
- 14 point digital I/O main unit (8 points IN, 6 points OUT)



- 20 point digital I/O main unit (12 points IN, 8 points OUT)

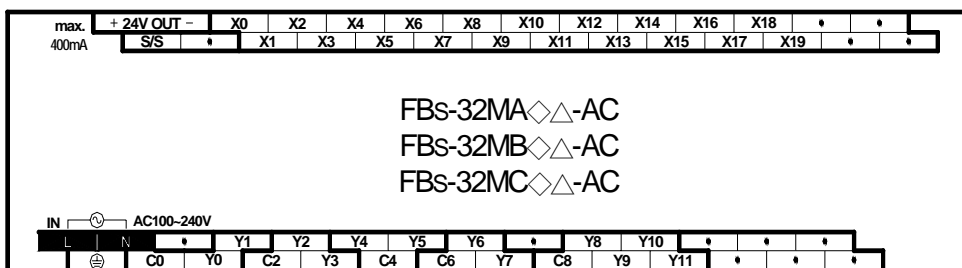


- 24 point digital I/O main unit (14 points IN, 10 points OUT)

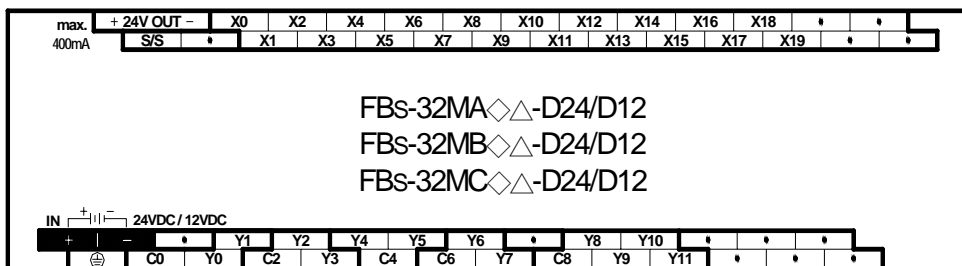


- 32 point digital I/O main unit (20 points IN, 12 points OUT)

AC  
Power

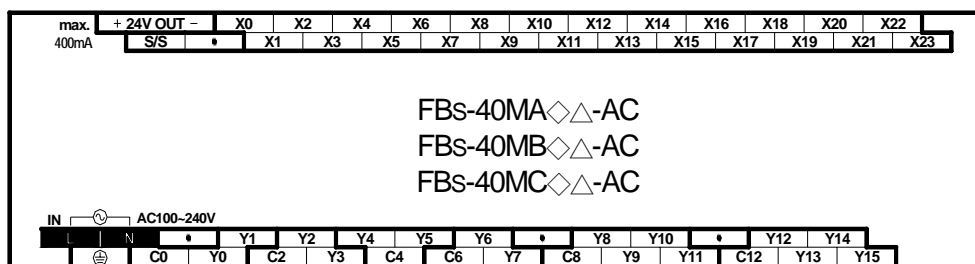


DC  
Power

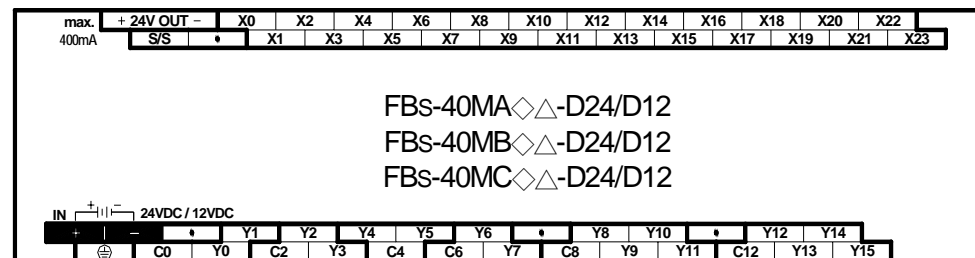


- 40 point digital I/O main unit (24 points IN, 16 points OUT)

AC  
Power

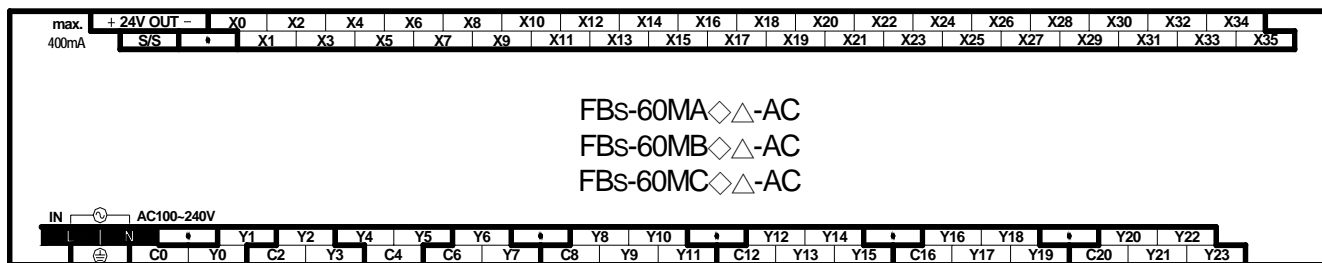


DC  
Power

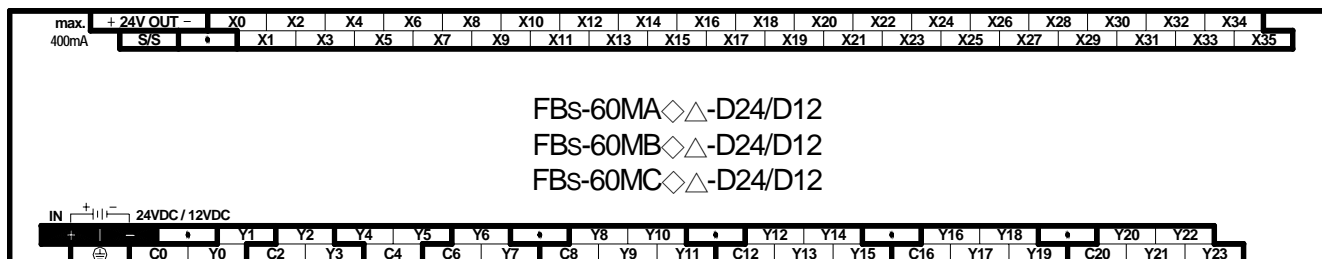


- 60 point digital I/O main unit (36 points IN, 24 points OUT)

AC  
Power



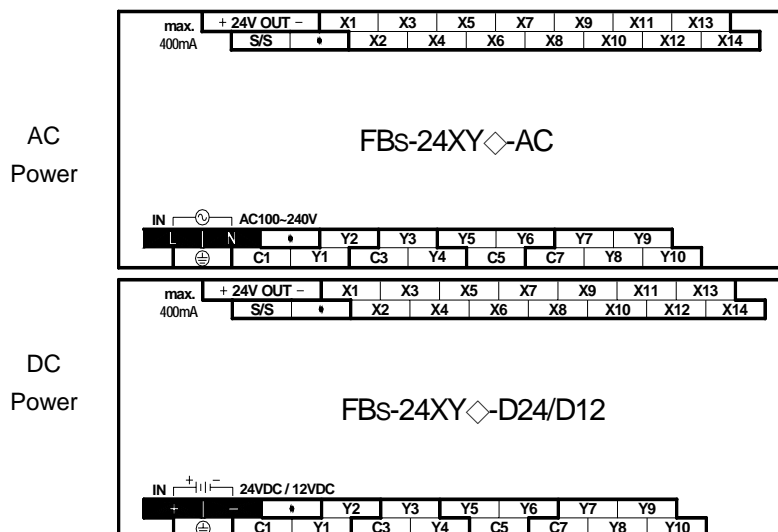
DC  
Power



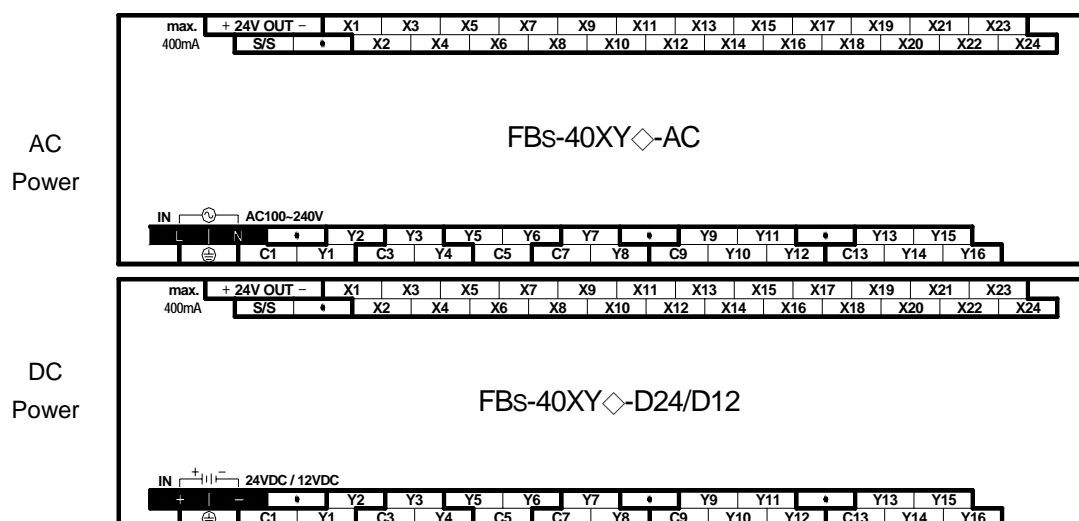
### 1.7.3 Digital I/O Expansion Unit

[7.62mm fixed terminal block]

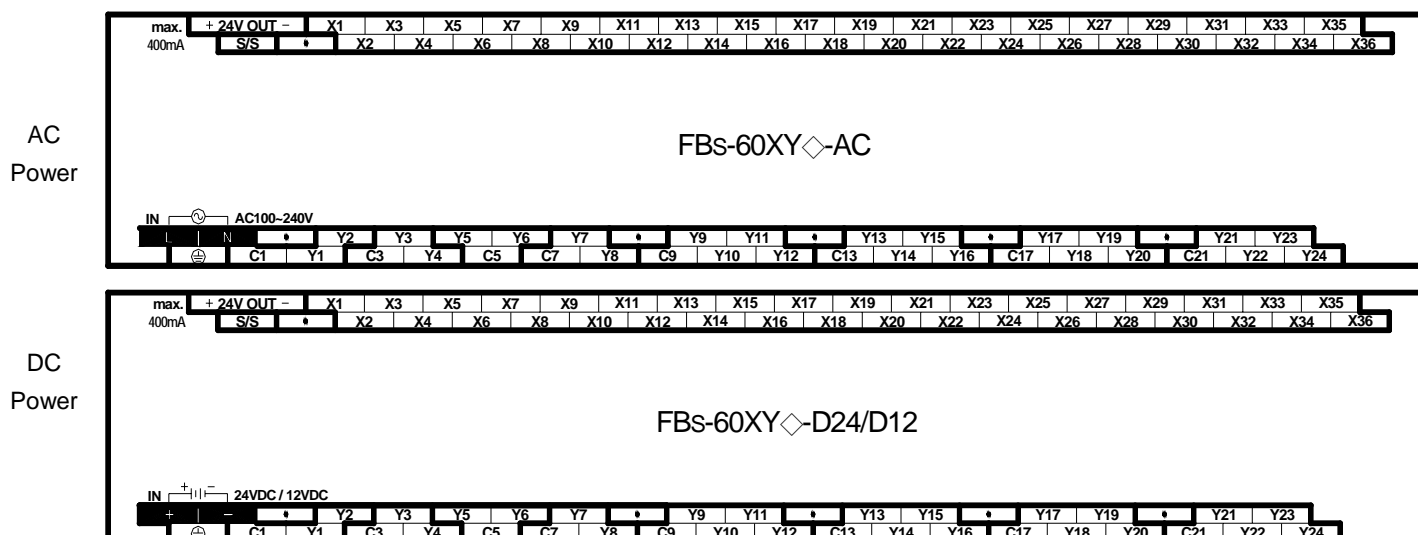
- 24 point I/O expansion unit (14 points IN, 10 points OUT)



- 40 point I/O expansion unit (24 points IN, 16 points OUT)

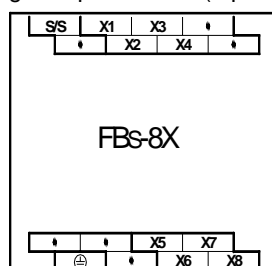
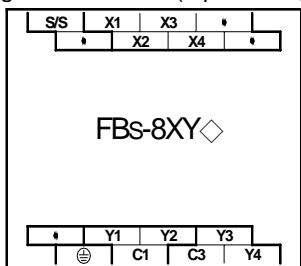


- 60 point I/O expansion unit (36 points IN, 24 points OUT)

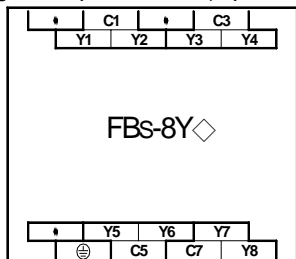


[7.62mm fixed terminal block]

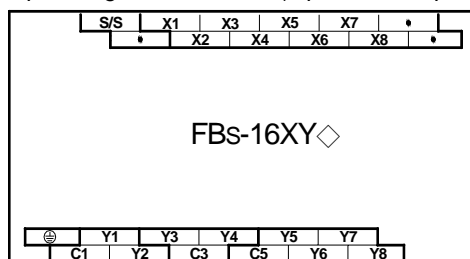
- 8 point digital I/O module (4 points IN, 4 points OUT)
- 8 point digital input module (8 points IN )



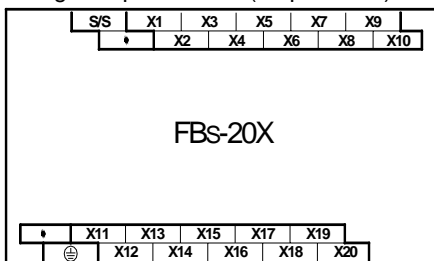
- 8 point digital output module (8 points OUT)



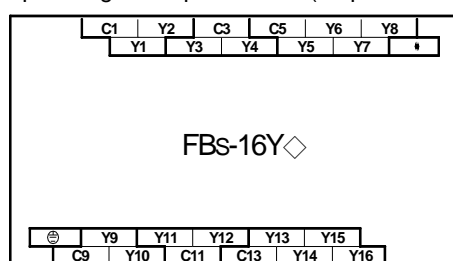
- 16 point digital I/O module (8 points IN, 8 points OUT)



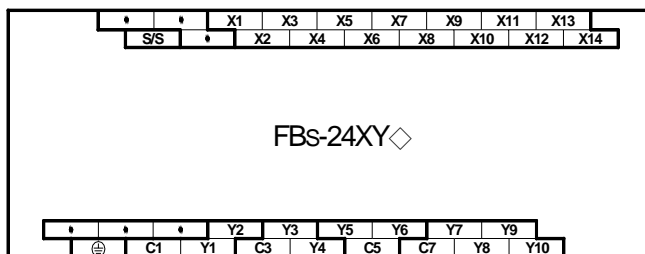
- 20 point digital input module (20 points IN)



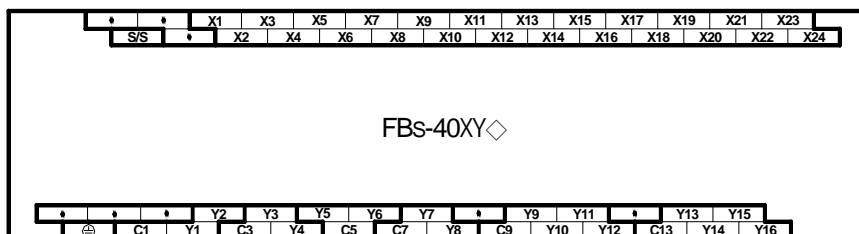
- 16 point digital output module (16 points OUT)



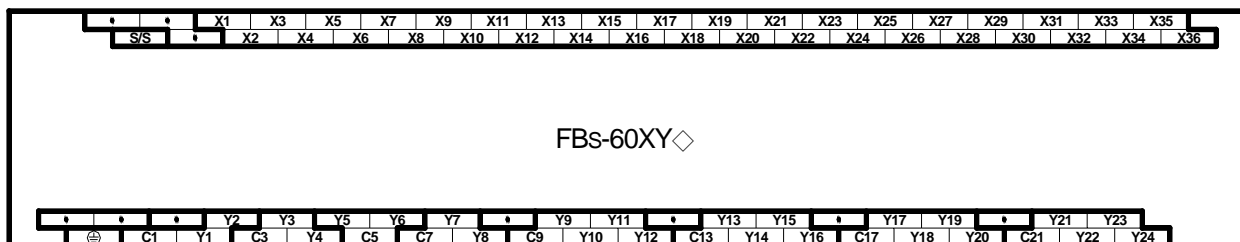
- 24 point digital I/O module (14 points IN, 10 points OUT)



- 40 point digital I/O module (24 points IN, 16 points OUT)



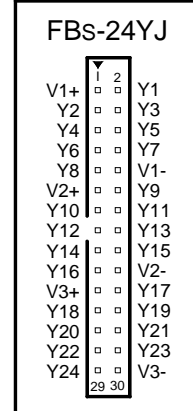
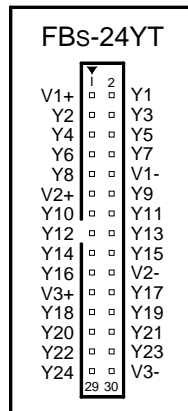
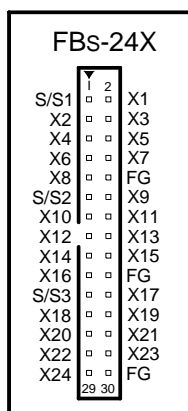
- 60 point digital I/O module (36 points IN, 24 points OUT)



## 1.7.5 High-Density Digital I/O Expansion Module

[30Pin/2.54mm Header connector]

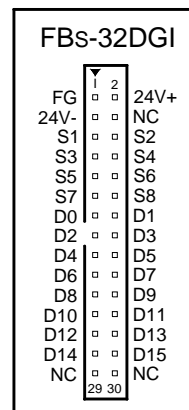
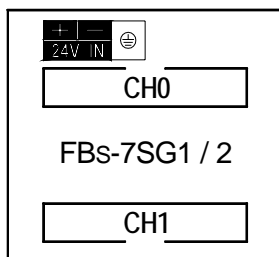
- 24 point high-density input module (24 points IN)
- 24 point high-density transistor output module (24 points OUT)



## 1.7.6 Numeric I/O Expansion Module

[2.54mm Header connector]

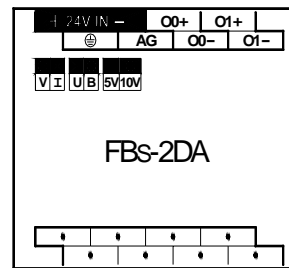
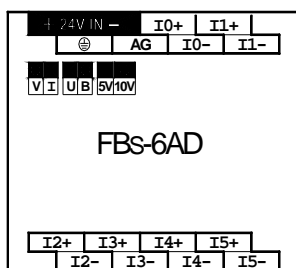
- 7 segment LED display module (8 digits/-7SG1, 16 digits/-7SG2) [16 pin/2.54mm Header connector]
- Thumbwheel switch multiplex input module (4 digits×8) [30Pin/2.54mm Header connector]



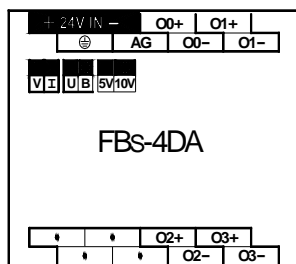
## 1.7.7 Analog I/O Expansion Module

[7.62mm fixed terminal block]

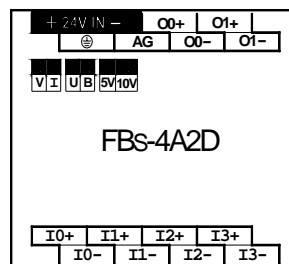
- 6 channel A/D analog input module
- 2 channel D/A output module



- 4 channel D/A output module



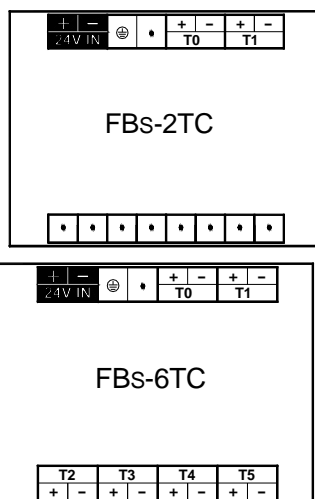
- 4 channel A/D input, 2 channel D/A output module



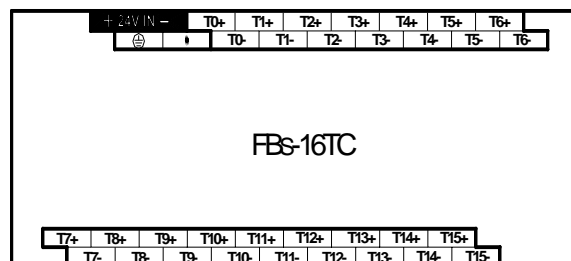
## 1.7.8 Temperature Input Module

[7.62mm fixed terminal block]

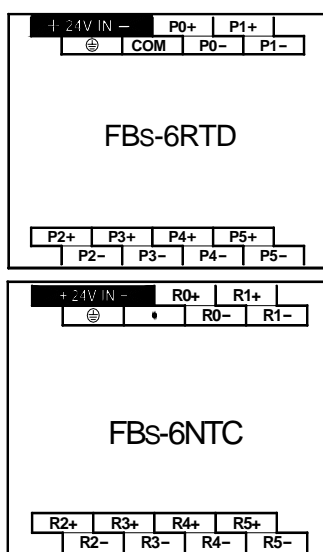
- 2/6 channel thermocouple input module



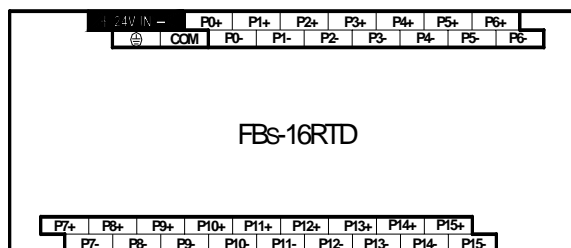
- 16 channel thermocouple input module



- 6 channel RTD input module



- 16 channel RTD input module

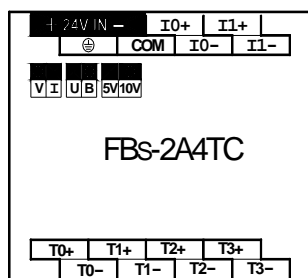




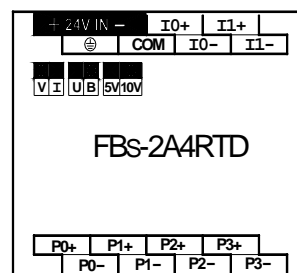
### 1.7.9 Analog/Temperature Combo Module

[7.62mm fixed terminal block]

- 2 channel A/D analog input & 4 channel thermocouple input module



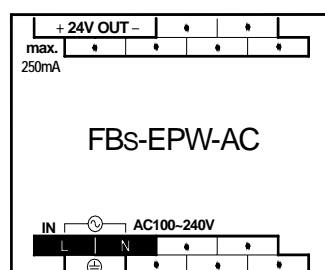
- 2 channel A/D analog input & 4 channel RTD input module



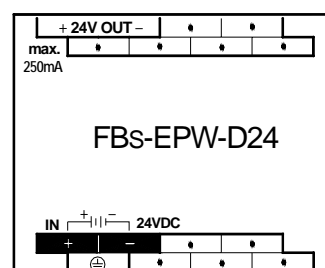
### 1.7.10 Expansion Power Module

[7.62mm fixed terminal block]

AC  
Power

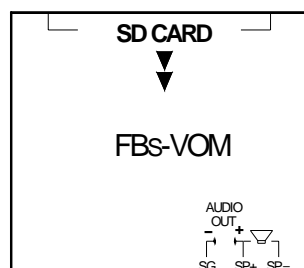


DC  
Power



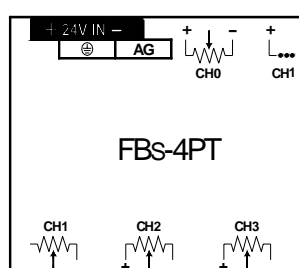
### 1.7.11 Voice Output Module

[7.62mm fixed terminal block]



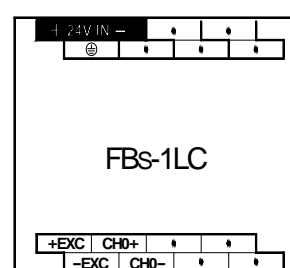
### 1.7.12 Potential Meter Module

[7.62mm fixed terminal block]



### 1.7.13 Load Cell Module

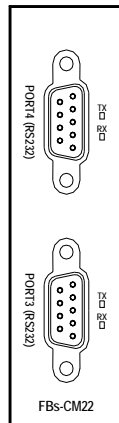
[7.62mm fixed terminal block]



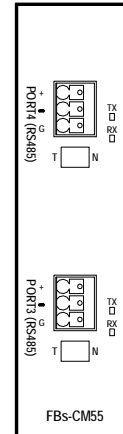
## 1.7.14 Communication Module (CM)

[DB-9F connector/3Pin or 4Pin spring terminal block]

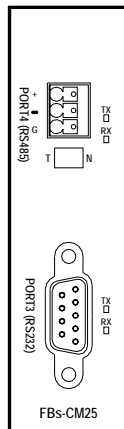
- 2 RS232 ports



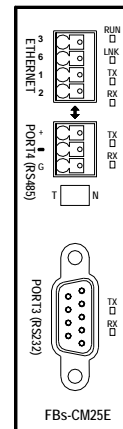
- 2 RS485 ports



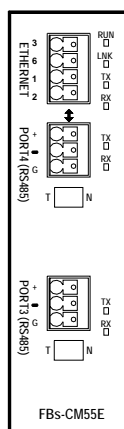
- 1 RS232 + 1 RS485 ports



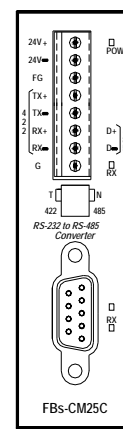
- 1 RS232 + 1 RS485 + Ethernet



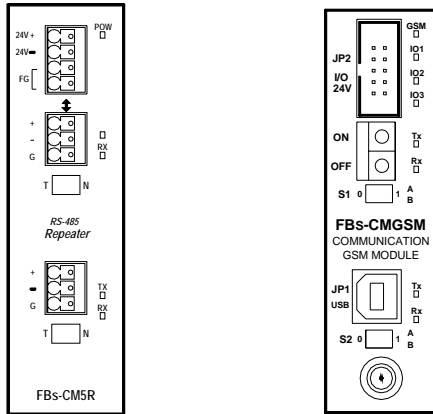
- 2 RS485 ports + Ethernet



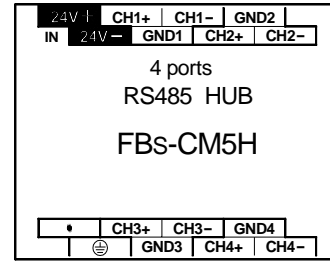
- RS232 ↔ RS485 / RS222 Converter



- RS485 Repeater ● GSM/GPRS



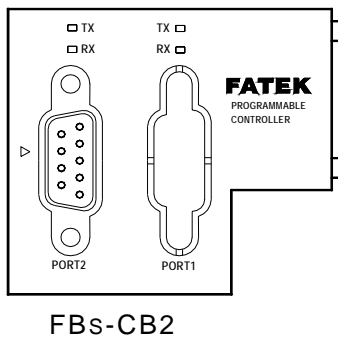
- RS485 HUB  
[7.62mm fixed terminal block]



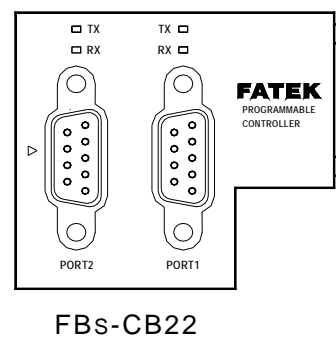
### 1.7.15 Communication Board (CB)

[DB9F/3Pin spring terminal block](Below are outlooks of CB and the corresponding cover plates)

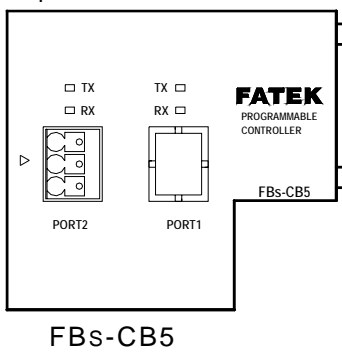
- 1 RS232 port



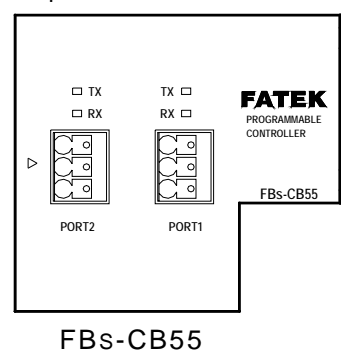
- 2 RS232 ports



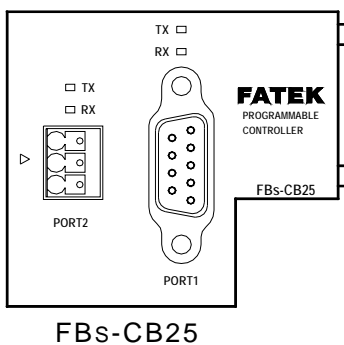
- 1 RS485 port



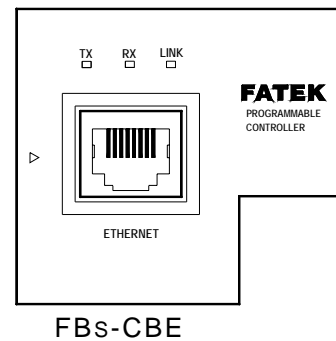
- 2 RS485 ports



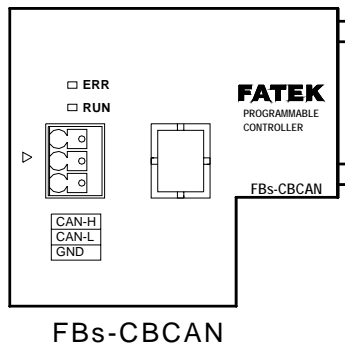
- 1 RS232 + 1 RS485 ports



- 1 Ethernet port

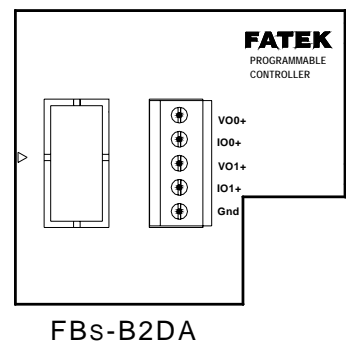
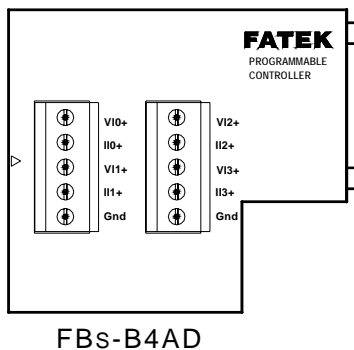


- CANopen

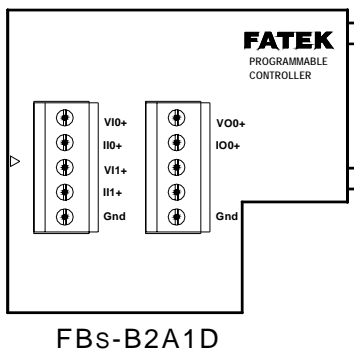


#### 1.7.16 Analog Expansion Board [5Pin European terminal block]

- 4 channel A/D analog input board
- 2 channel D/A analog output board

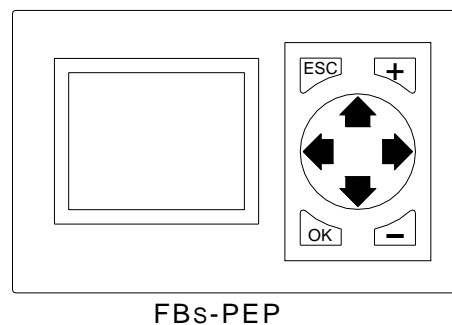
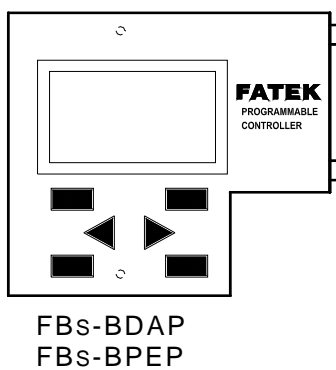


- 2 channel A/D analog input & 1 channel D/A analog output board



#### 1.7.17 Simple HMI

- Board-type
- Stand-alone



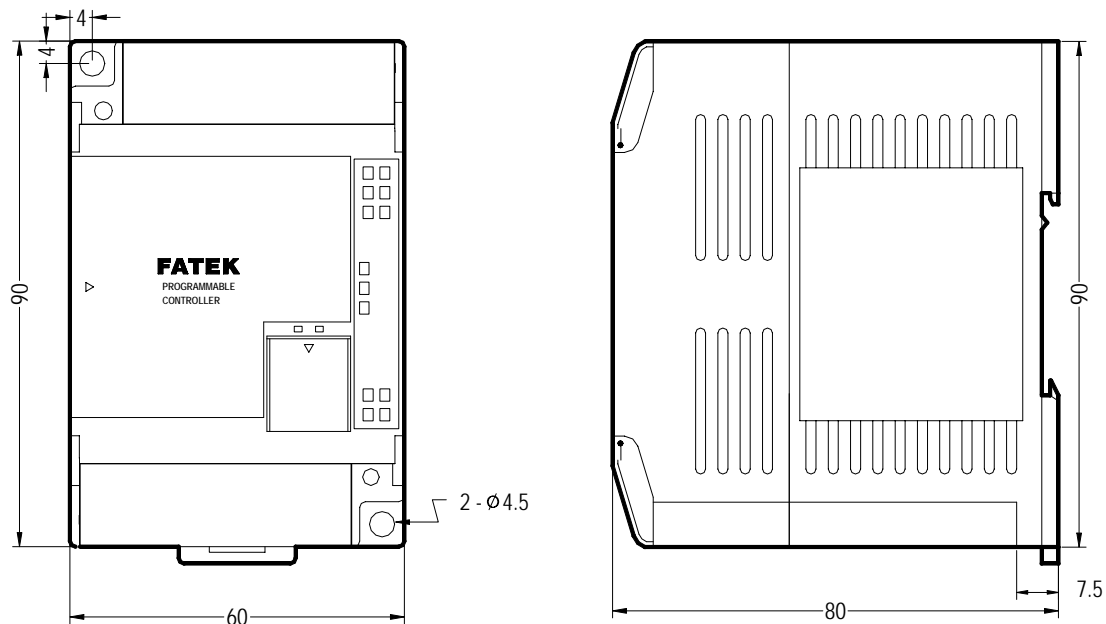
## 1.8 Drawings with External Dimensions

### (1) Outlook I :

Main Unit : FBS-10M△, FBS-14M△

Expansion Module : FBS-16Y, FBS-16XY, FBS-20X

\* (Main Unit and Expansion Module have the same type of base, with different top cover, as shown in the figure)

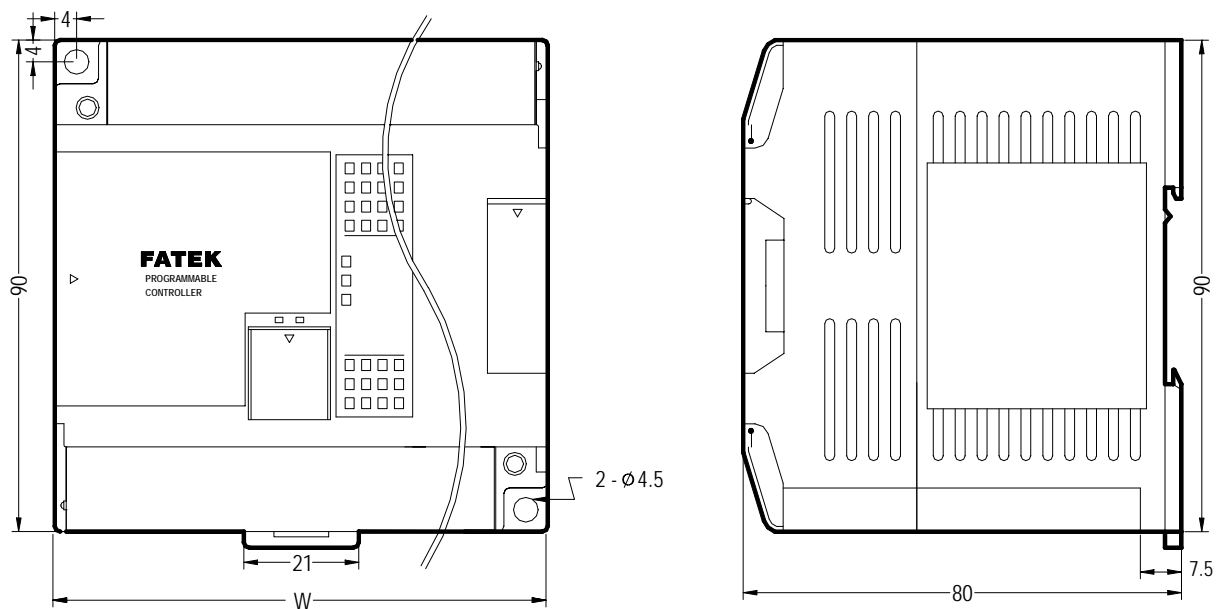


units : mm

### (2) Outlook II :

Main Unit : FBS-20M△, FBS-24M△, FBS-32M△, FBS-40M△, FBS-60M△

Expansion Module : FBS-24XY(⊙), FBS-40XY(⊙), FBS-60XY(⊙), FBS-16TC, FBS-16RTD



units : mm

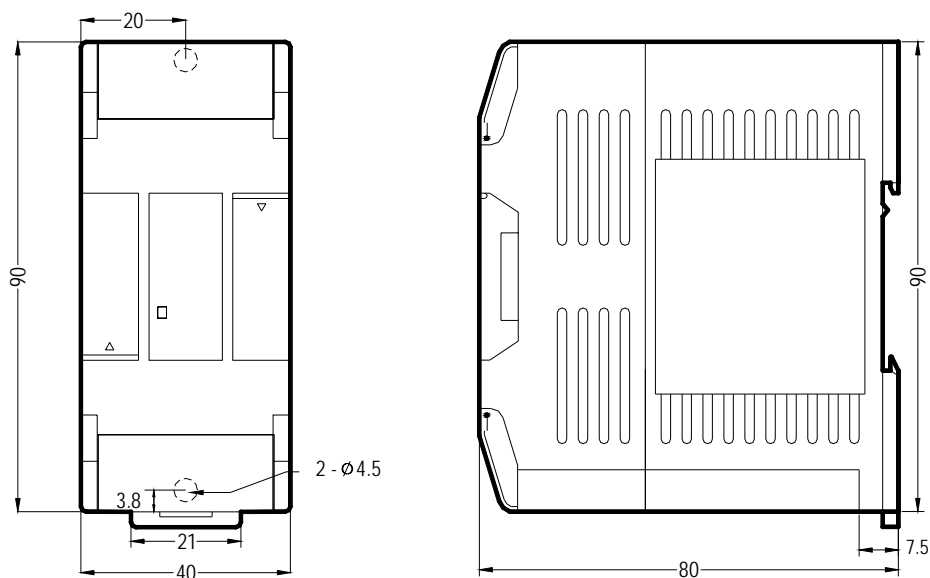
W	Model
90mm	FBS-20M△, FBS-24M△, FBS-24XY(⊙), FBS-16TC, FBS-16RTD
130mm	FBS-32M△, FBS-40M△, FBS-40XY(⊙)
175mm	FBS-60M△, FBS-60XY(⊙)

(3) Outlook III :

Expansion Module : ① FBs-8X, FBs-8Y, FBs-8XY, FBs-7SG1, FBs-7SG2, FBs-6AD, FBs-2DA, FBs-4DA, FBs-4A2D, FBs-2TC, FBs-6TC, FBs-6RTD, FBs-CM5H, FBs-2A4TC, FBs-2A4RTD, FBs-4PT, FBs-1LC, FBs-1HLC, FBs-6NTC, FBs-VOM

② FBs-24X, FBs-24YT, FBs-24YJ, FBs-32DGI

\*(Modules ① and ② have the same type of base, with different top cover. Top cover of Module ① is shown in the following figure)

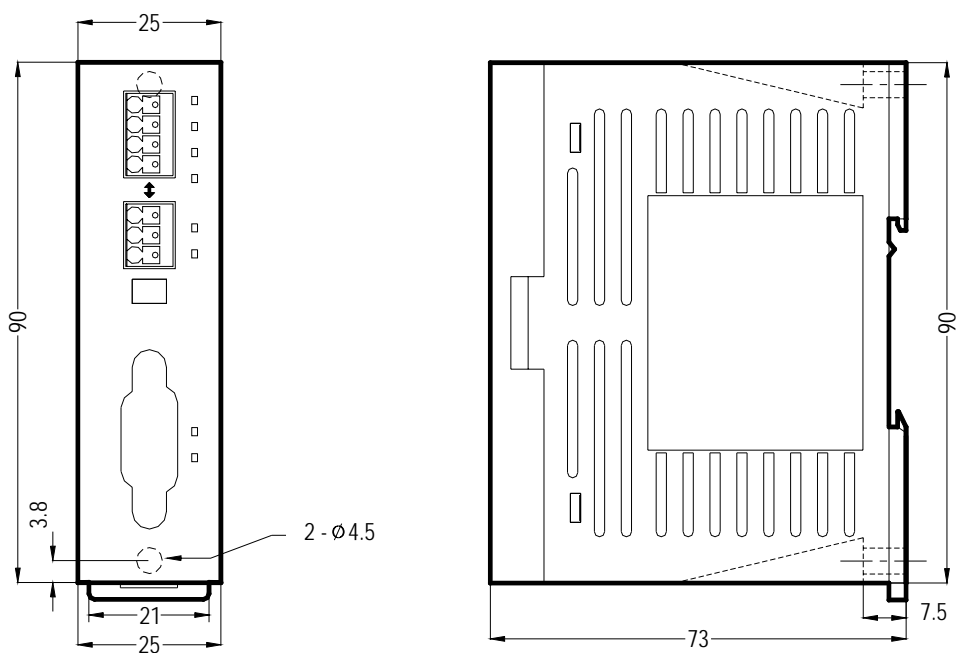


units : mm

(4) Outlook IV:

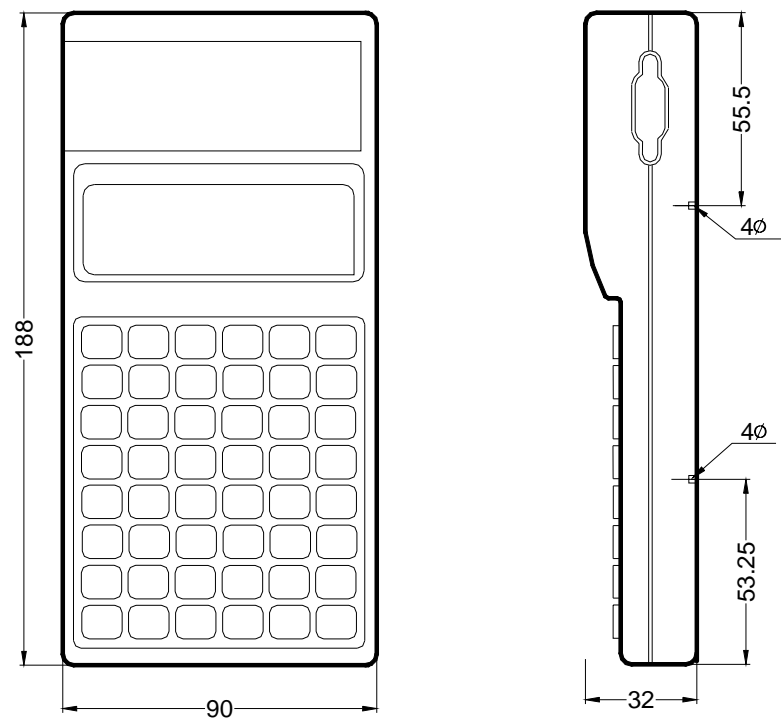
Communication Module : FBs-CM22, FBs-CM55, FBs-CM25, FBs-CM25E, FBs-CM55E, FBs-CM25C, FBs-CM5R

\*(All modules have the same type of base, with different top cover. Top cover of Module -CM25E is shown in the figure)



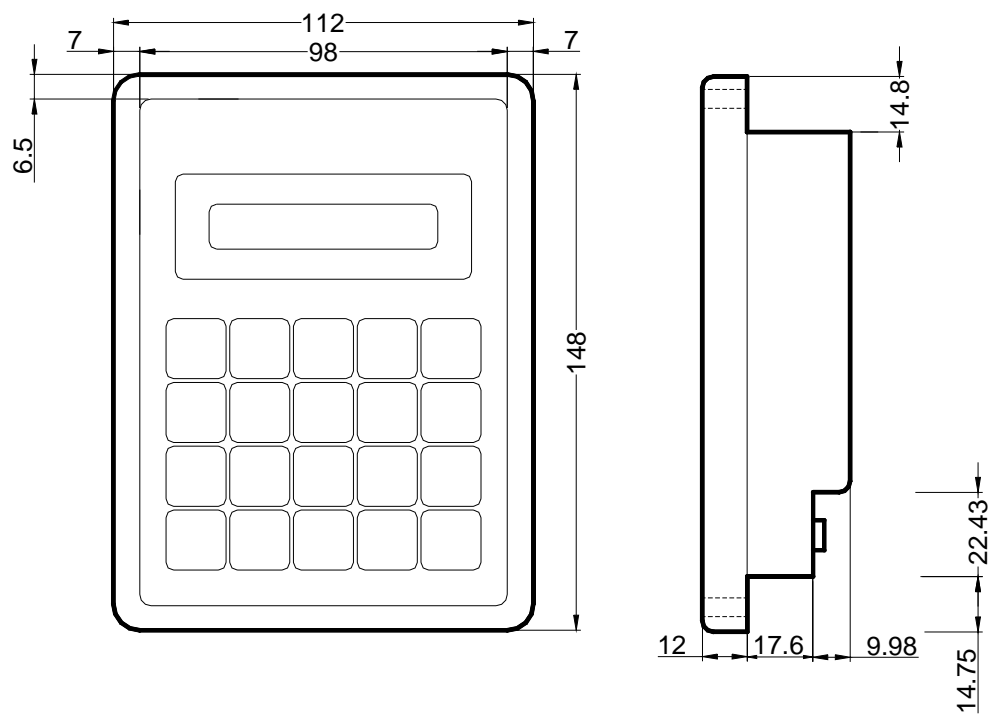
units : mm

- (5) Outlook V :  
Programming Panel : FP-08



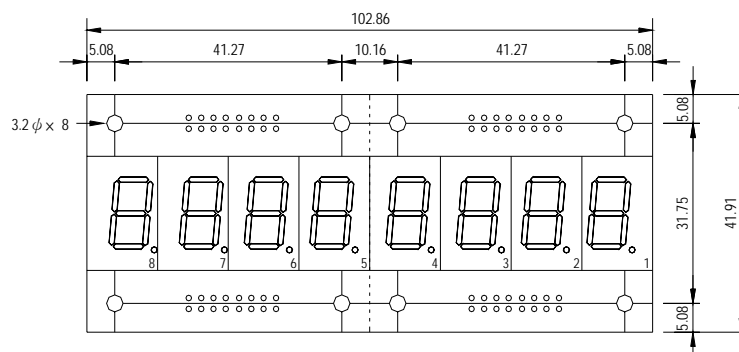
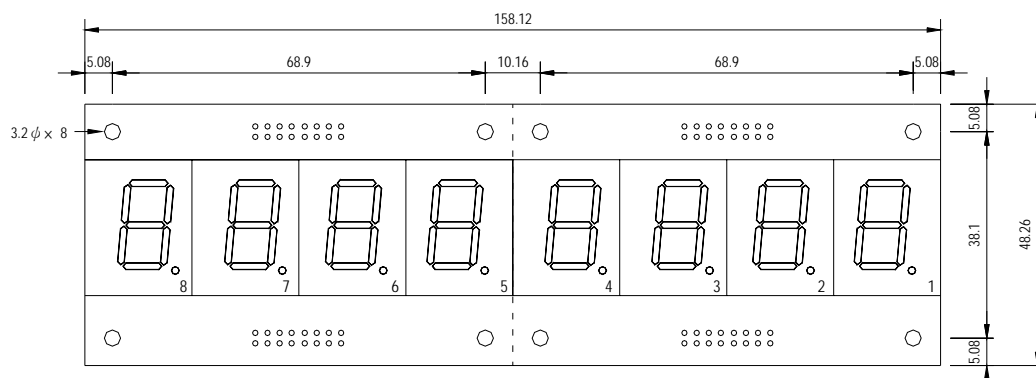
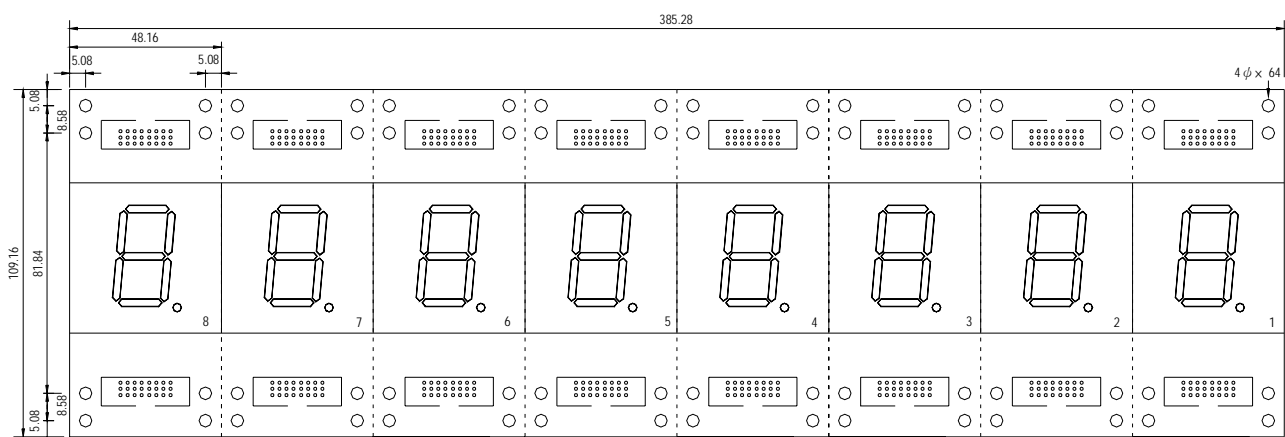
units : mm

- (6) Outlook VI :  
Data Access Panel : FB-DAP



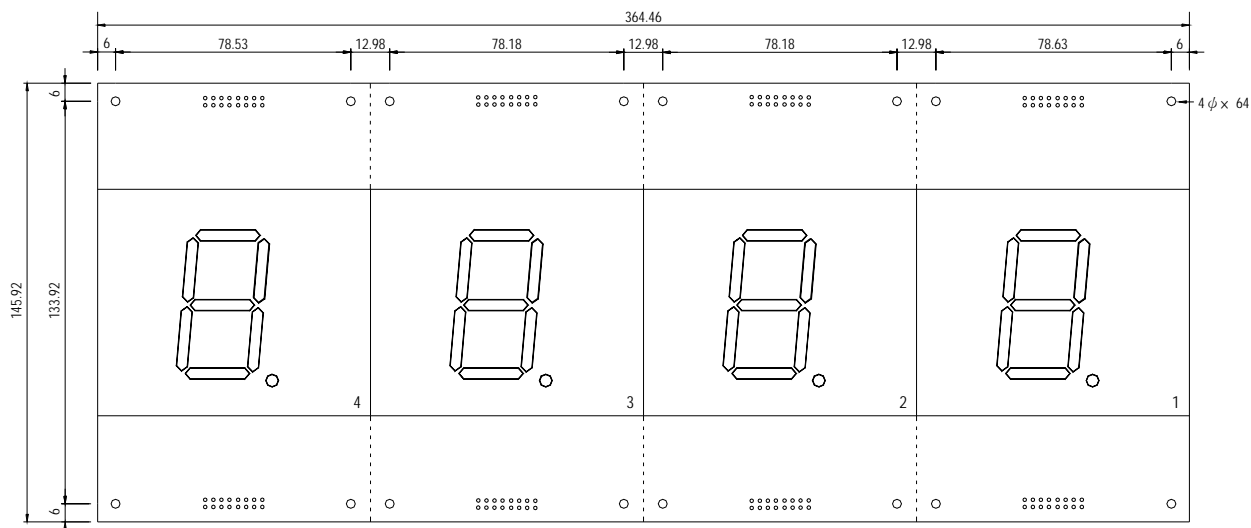
7-segment / 16-segment LED display board :

DB.56-8R/DB.8-8R/DB2.3-8R/DB4.0-4R/DBAN.8-4R/DBAN2.3-4R

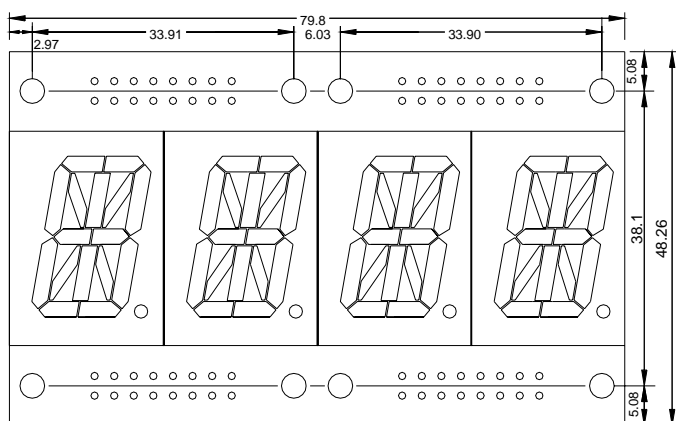
DB.56-8RDB.8-8R

DB2.3-8R

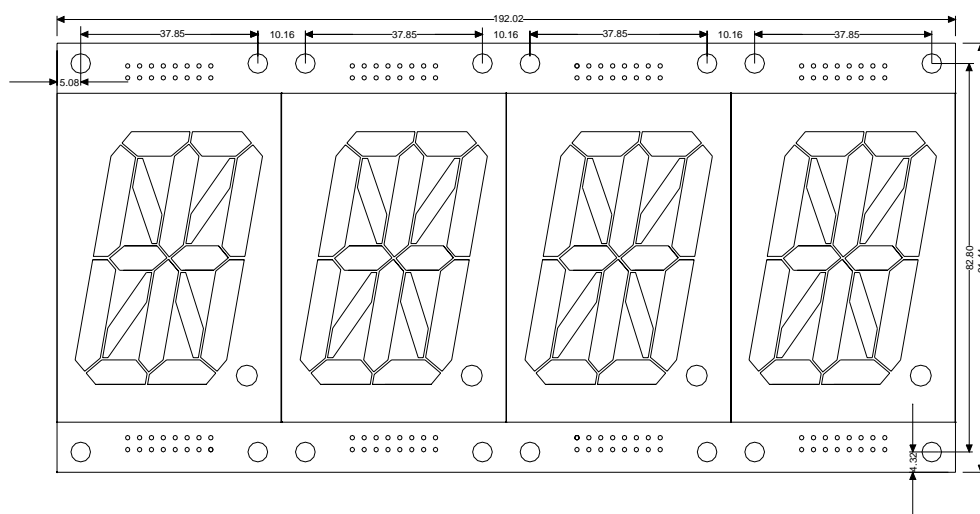




**DB4.0-4R**



**DBAN.8-4R**



**DBAN2.3-4R**