

FATEK® The Brand You Can Rely on



FBs - Series Programmable Logic Controller

- Cutting edge in PLC
- State of the art technology
- Compact & Powerful
- Extensive product range
- Reliable & Durable

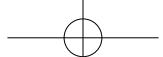
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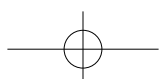
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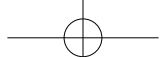
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.....more than a decade of unsurpassed '





Contents

Features	01
System Configuration	03
Model Specifications	05
• Basic main units (MA)	05
• Advanced main units (MC)	05
• NC positioning main units (MN)	06
• Digital I/O expansion units	06
• Power supplies for expansion modules	07
• Digital I/O expansion modules	07
• Thumbwheel switch input module	08
• 7/16-segment LED display modules	08
• Analog input (AI) module	08
• Analog output (AO) modules	09
• Temperature measurement modules	09
• AI/AO/Temperature Combo modules	09
• Special modules	10
• Communication modules (CM)	10
• Communication boards (CB)	10
• Analog I/O Boards	10
• Memory Pack	11
• PWM DA	11
• RFID card	11
• FP-08 handheld programming panel	11
• Data Access Panel	11
• Accessories	12
Program Development Software	13
Training Box	14
General Specifications	15
Instruction Sets	19
Dimensions	21
Model list	23

"Quality" and "Functionality"

Features

SoC-FATEK's Core Technology

The FBs-PLC's design incorporates a "System on Chips"(SoC) developed in-house by Fatek Corporation. The chip consists of over 120,000 gates which integrates powerful features such as a Central Processing Unit (CPU), Hardware Logic Solver (HLS), five high-speed communication ports, four sets of hardware high-speed counters / timers, four axes of high-speed pulse outputs for NC positioning control (with linear interpolation or dynamic tracking) 16 high-speed interrupts or captured inputs. The FBs represents high functionality and reliability with exceptional value compared to other PLC's in its class.



User friendly and powerful instruction sets

The FBs-PLC has more than 300 instructions which adopts a user friendly and readable multi-input/multi-output function structure, with multi-input instruction structure can derive many types of functionality which other brands of PLC's may require the use of many instructions to achieve this. Also the operation result can be directly sent to internal or external outputs. To increase the program readability, the inputs or outputs for each function instruction have their own mnemonic symbol attached and the content of each operand is also displayed. For high-end applications, such as PLC networking (LINK), PID control and NC positioning etc, the FBs-PLC provides dedicated convenient instructions to assist in program development.

Communication function (up to 5 ports including RS232, RS485, USB, Ethernet and GSM)

Via the five high-speed communication ports included in the SoC, the FBs-PLC's communication capability is outstanding with all five ports operating at a maximum speed of 921.6Kbps. Communications can be achieved using ASCII code or the double-speed binary code. Along with FATEK's standard protocol, Modbus ASCII/RTU/TCP or user-definable protocol are also available. The FBs-PLC also provides the option of six different communication boards and eight different communication modules for various types of communication applications. With their high speed and functionality the FBs-PLC has the greatest number of communication ports than any other PLC in its class. Each communication port comes standard with LED indicators for transmission (TX) and reception (RX) to enable the user to monitor the operation.

Up to 4 sets of high-speed pulse width modulation (HSPWM) output

The SoC inside the FBs-PLC incorporates four sets of hardware high-speed pulse width modulation outputs with a maximum frequency of 184.32KHz and 18.432KHz with resolutions of 1% and 0.1%, respectively. Different from the PWM function operated by software alone in other brands of PLC, the hardware driven high-speed PWM in the FBs-PLC operates with high precision and stability which provides the user easy control with precise accuracy.

PLC & NC Control in one and Dedicated NC Positioning Language

NC Position Control is incorporated into the SoC of the FBs-PLC which integrates PLC-NC control into one unit in order for resources sharing and reducing the need of data exchange. The NC position control adopts special positioning command language, which allows programming by mechanical or electrical units and changing control parameters during execution. One single unit has up to four axes outputs with a maximum frequency of 200KHz (MC) or 920KHz (MN) and equipped with multi-axial linear interpolation and dynamic tracking. If combined with the four sets of built-in HHSC, it can achieve positioning control with closed loop precision.

Integrated high-speed counters with counting frequency up to 920 KHz

The FBs-PLC as standard has up to 4 sets of hardware high-speed counters (HHSC) and 4 sets of software high-speed counters (SHSC). The highest counting frequency of a HHSC is 200KHz (MC) or 920KHz (MN). Each HHSC also has a clear and mask function. There are 8 counting modes including U/D, U/Dx2, P/R, P/Rx2, A/B, A/Bx2, A/Bx3 and A/Bx4 which makes the HHSC very powerful and efficient. For example, if the encoder, running at 200 pulses per revolution, adopts A/Bx4 mode the FBs-PLC can achieve the same result that a 800 pulses per revolution encoder can provide. The counter is implemented in the hardware so as not to occupy CPU processing time.

High-speed timers (HST)

The FBs-PLC is the only PLC in this class providing 0.1mS high-speed timers (the FBs-PLC having one 16-bit and 4 sets of 32-bit HST). Currently, the fastest time base of high speed timers used in other brands of PLC's is 1mS. By incorporating the interrupt function of the FBs-PLC the accuracy of 0.1mS time base high-speed timer of FBs-PLC is further enhanced and can easily achieve more precise speed detection or can be used as a frequency meter. In most cases, expensive speed detection equipment can be replaced by the economical FBs-PLC.



FATEK's Powerful Communication Features

The five communication ports in FBs-PLC can simultaneously connect to various intelligent peripherals with available interfaces such as USB, RS232, RS485 and Ethernet. Besides adopting FATEK standard communication protocol or Modbus protocol or conducting communication through the FATEK communication server, the user also can use CLINK commands to define the dedicated protocol to actively or passively establish the connection with any intelligent peripherals.

Single unit with 16 points of high-speed interrupt

The FBs-PLC provides 16 points of external interrupts. The interrupt is edge driven and the user can define which edge triggers the interrupt and can be positive, negative or both edges. The interrupts can perform high speed, emergency processing which can withstand the time jitter caused by the delay and deviation of the scan time and can be used for precision high speed positioning, machine home and high speed RPM measurement applications.

Up to 36 points of captured input

The SoC in the FBs-PLC has a capture input function, which captures and stores the external pulse of an input shorter than the scanning time of the CPU. Compared to PLC's in this class that either lack this capability or require highly sophisticated interrupt functions (which increase the CPU processing time), the FBs-PLC can handle this task easily as a general input, easily configured with high efficiency and no detriment the CPU scan time.

Complete range of peripherals

In addition to the 204 models of main CPU units, the FBs-PLC also provides 65 models of expansion I/O for selection. The expansion I/O modules include basic DI/O and AI/O, 7/16-segment LED display module, 8 types (J,K,R,S,E,T,B,N) thermocouple, Pt100, Pt1000 RTD temperature measurement modules. The FBs-PLC also provides a FBs-DAP LCD data access panel which can be linked together with a single RS485 bus. The FBs-DAP can be a simple Timer/Counter editor or it can also be used as a simple human machine interface through the function of user definable keys and message display. The FBs-DAP can be equipped with a wireless RFID sensing module and can be applied to such applications as entrance control, parking equipment and elevator control amongst others.

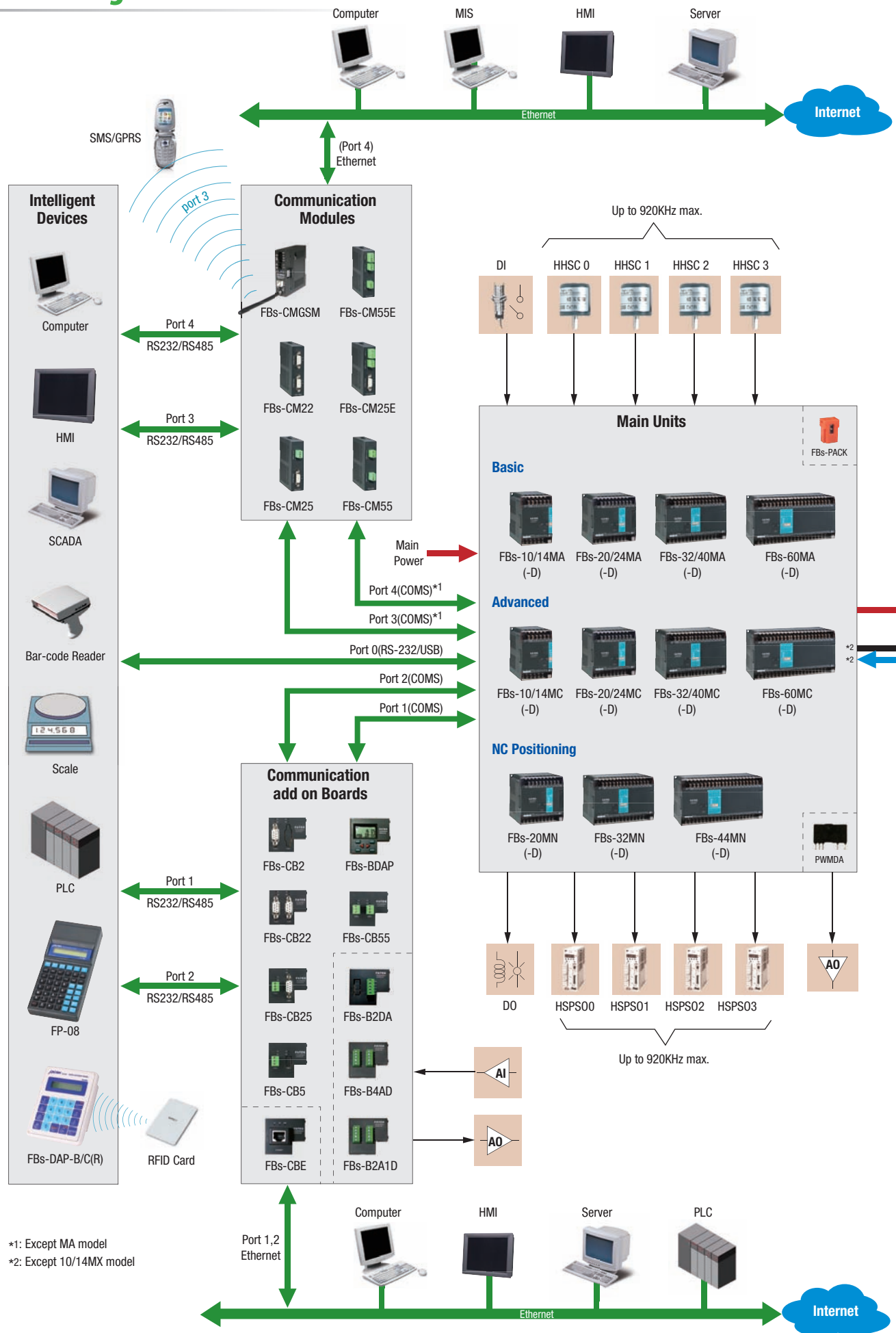
Open communication driver

The open communication protocol of the FBs-PLC is supported by all major brands of graphic supervisory software (SCADA) and leading brands of Human-Machine Interfaces (HMI) and can be directly connected with the FBs-PLC via serial and Ethernet interface. FATEK also provides Modbus protocol and FATEK DDE standard communication server or third-party OPC server for the user to easily connect the FBs-PLC to various control or supervisory systems.

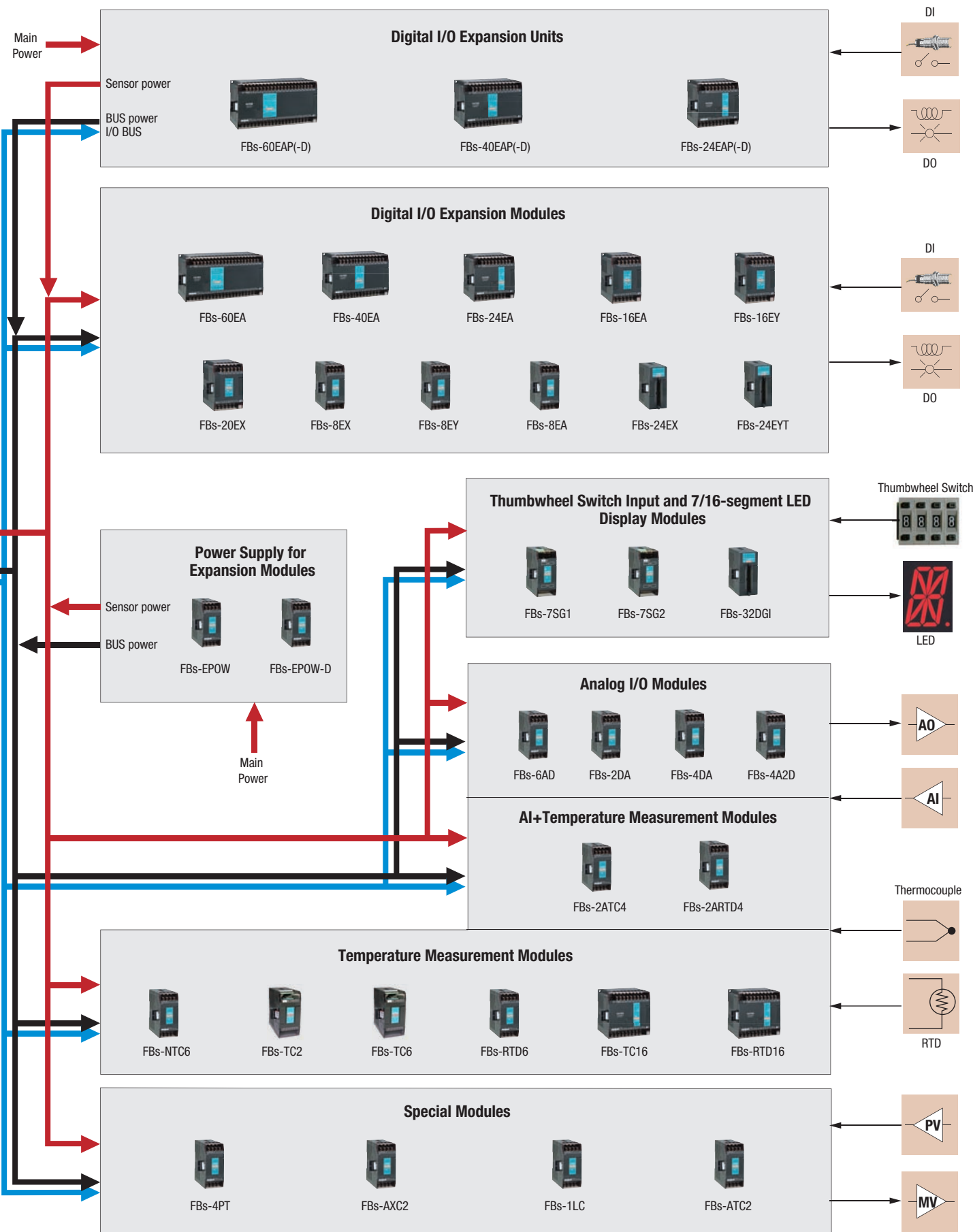
User-friendly operating environment

"WinProladder" is the Windows-based ladder diagram programming software for the FBs-PLC. It provides a user-friendly operating environment with editing, monitoring and debugging functions which allows the user to become familiar with the operation of the software in a very short time. The powerful editing function of WinProladder, assisted with keyboard, mouse and on-line help (of ladder instructions and operating guide) greatly reduces programming development time. Features which can displays the data registers directly in the ladder diagram and provide multiple status pages for monitoring gives the user the ability to monitor and debug easily.

System Configuration



*1: Except MA model
*2: Except 10/14MX model



Model Specifications

Basic main units (MA)



Spec.			Model							
			FBs-10MA	FBs-10MAT	FBs-14MA	FBs-14MAT	FBs-20MA	FBs-20MAT	FBs-24MA	FBs-24MAT
Digital input	24VDC	Medium low speed (total 5KHz)	4 points							
		Low speed	2 points		4 points		8 points		10 points	
Digital output	Relay	AC/DC(2A)	4 points	—	6 points	—	8 points	—	10 points	—
	Transistor (5 ~ 30VDC)	Medium speed 10KHz (0.5A)	—	4 points	—	4 points	—	4 points	—	4 points
		Low speed (0.5A)	—	—	—	2 points	—	4 points	—	6 points
Comm. port	Built-in		1 port (Port0, USB or RS232)							
	Expandable		2 ports (Port1 ~ 2, RS485 or RS232 or Ethernet)							
		Calendar	option							
		Built-in power supply	POW-14(AC)/DPOW-10(DC)				POW-24(AC)/DPOW-16(DC)			
		Wiring mechanism	7.62 mm terminal block							
		Dimension	Figure 2				Figure 1			



Spec.			Model					
			FBs-32MA	FBs-32MAT	FBs-40MA	FBs-40MAT	FBs-60MA	FBs-60MAT
Digital input	24VDC	Medium low speed (total 5KHz)	4 points					
		Low speed	16 points		20 points		32 points	
Digital output	Relay	AC/DC(2A)	12 points	—	16 points	—	24 points	—
	Transistor (5 ~ 30VDC)	Medium speed 10KHz (0.5A)	—	4 points	—	4 points	—	4 points
		Low speed (0.5A)	—	8 points	—	12 points	—	20 points
Comm. port	Built-in		1 port (Port0, USB or RS232)					
	Expandable		2 ports (Port1 ~ 2, RS485 or RS232 or Ethernet)					
		Calendar	option					
		Built-in power supply	POW-24(AC)/DPOW-16(DC)					
		Wiring mechanism	7.62 mm terminal block					
		Dimension	Figure 1					

Advanced main units (MC)



*: Default

Spec.			Model							
			FBs-10MC	FBs-10MCT	FBs-14MC	FBs-14MCT	FBs-20MC	FBs-20MCT	FBs-24MC	FBs-24MCT
Digital input	24VDC	High speed (200KHz)	2*~4 points				2*~6 points		2*~8 points	
		Medium speed (20KHz)	2*~0 points				4*~0 points		6*~0 points	
		Medium low speed (total 5KHz)	2 points		4 points		6 points			
Digital output	Relay	AC/DC(2A)	4 points	—	6 points	—	8 points	—	10 points	—
	Transistor (5 ~ 30VDC)	High speed 200KHz (0.5A)	—	4 points	—	4*~6 points	—	4*~8 points	—	4*~8 points
		Medium speed 20KHz (0.5A)	—	—	—	2*~0 points	—	4*~0 points	—	4*~0 points
		Low speed (0.5A)	—	—	—	—	—	—	—	2 points
Comm. port	Built-in		1 port (Port0, USB or RS232)							
	Expandable		4 ports (Port1 ~ 4, RS485 or RS232 or Ethernet or GSM)							
		Calendar	Built-in							
		Built-in power supply	POW-14(AC)/DPOW-10(DC)				POW-24(AC)/DPOW-16(DC)			
		Wiring mechanism	7.62 mm terminal block				7.62 mm detachable terminal block			
		Dimension	Figure 2				Figure 1			



*: Default

Spec.			Model					
			FBs-32MC	FBs-32MCT	FBs-40MC	FBs-40MCT	FBs-60MC	FBs-60MCT
Digital input	24VDC	High speed (200KHz)	2*~8 points					
		Medium speed (20KHz)	6*~0 points					
		Medium low speed (total 5KHz)	8 points					
		Low speed	4 points		8 points		20 points	
Digital output	Relay	AC/DC(2A)	12 points	—	16 points	—	24 points	—
	Transistor (5 ~ 30VDC)	High speed 200KHz (0.5A)	—	4*~8 points	—	4*~8 points	—	4*~8 points
		Medium speed 20KHz (0.5A)	—	4*~0 points	—	4*~0 points	—	4*~0 points
		Low speed (0.5A)	—	4 points	—	8 points	—	16 points
Comm. port	Built-in	1 port (Port0, USB or RS232)						
	Expandable	4 ports (Port1 ~ 4, RS485 or RS232, Ethernet or GSM)						
Calendar		Built-in						
Built-in power supply		POW-24(AC)/DPOW-16(DC)						
Wiring mechanism		7.62 mm detachable terminal block						
Dimension		Figure 1						

NC positioning main units (MN)



Spec.			Model					
			FBs-20MN	FBs-20MNT	FBs-32MN	FBs-32MNT	FBs-44MN	FBs-44MNT
Digital input	5VDC	Ultra high speed (920KHz)	2 points (1 axis)		4 points (2 axes)		8 points (4 axes)	
		Medium speed (20KHz)	4 points		4 points		—	
	24VDC	Medium low speed (total 5KHz)	6 points		8 points			
		Low speed	—		4 points		12 points	
Digital output	Relay	AC/DC(2A)	6 points	—	8 points	—	8 points	—
	5VDC	Differential ultra high speed 920KHz	2 points (1axis)		4 points (2 axes)		8 points (4 axes)	
		Medium speed 20KHz (0.5A)	—	6 points	—	4 points	—	—
		Low speed (0.5A)	—	—	—	4 points	—	8 points
Comm. port	Built-in	1 port (Port0, USB or RS232)						
	Expandable	4 ports (Port1 ~ 4, RS485 or RS232, Ethernet or GSM)						
Calendar		Built-in						
Built-in power supply		POW-24(AC)/DPOW-16(DC)						
Wiring mechanism		7.62 mm detachable terminal block						
Dimension		Figure 1						

Digital I/O expansion units



Spec.			Model					
			FBs-24EAP	FBs-24EAPT	FBs-40EAP	FBs-40EAPT	FBs-60EAP	FBs-60EAPT
Digital input	24VDC	Low speed	14 points		24 points		36 points	
Digital output	Relay	AC/DC(2A)	10 points	—	16 points	—	24 points	—
	Transistor (5 ~ 30VDC)	Low speed (0.5A)	—	10 points	—	16 points	—	24 points
Built-in power supply		POW-24(AC)/DPOW-16(DC)						
Wiring mechanism		7.62 mm terminal block						
Dimension		Figure 1						

Model Specifications

Power supplies for expansion modules



Spec.		Model	FBs-EPOW	FBs-EPOW-D
Capacity of output power	5VDC Bus power		400mA	400mA
	24VDC Bus power		250mA	165mA
	24VDC Sensor power		250mA	165mA
Max. power consumption			100 ~ 240VAC -15%/+10%, 21W	15VDC/24VDC -15%/+20%, 15W
Wiring mechanism			7.62 mm terminal block	
Dimension			Figure 4	

Digital I/O expansion modules



Spec.		Model	FBs-8EA	FBs-8EAT	FBs-8EX	FBs-8EY	FBs-8EYT	FBs-16EA	FBs-16EAT	FBs-20EX	
Digital input	24VDC Low speed		4 points		8 points	—	—	8 points		20 points	
Digital output	Relay AC/DC(2A)		4 points	—	—	8 points	—	8 points	—	—	
	Transistor (5~30VDC) Low speed (0.5A)		—	4 points	—	—	8 points	—	8 points	—	
Wiring mechanism			7.62 mm terminal block								
Dimension			Figure 4					Figure 3			



Spec.		Model	FBs-16EY	FBs-16EYT	FBs-24EX	FBs-24EYT	FBs-24EA	FBs-24EAT
Digital input	24VDC Low speed		—	—	24 points	—	14 points	
Digital output	Relay AC/DC(2A)		16 points	—	—	—	10 points	—
	Transistor (5 ~ 30VDC) High density Low speed (0.1A)		—	—	—	24 points	—	—
Low speed (0.5A)			—	16 points	—	—	—	10 points
Wiring mechanism			7.62 mm terminal block		30 pins header with latch		7.62 mm terminal block	
Dimension			Figure 3		Figure 6		Figure 1	



Spec.		Model	FBs-40EA	FBs-40EAT	FBs-60EA	FBs-60EAT
Digital input	24VDC Low speed		24 points		36 points	
Digital output	Relay AC/DC(2A)		16 points	—	24 points	—
	Transistor (5 ~ 30VDC) Low speed (0.5A)		—	16 points	—	24 points
Wiring mechanism			7.62 mm terminal block			
Dimension			Figure 1			

Thumbwheel switch input module



Spec.	Model	FBs-32DGI
Refresh time for input		10mS max.
Input capability		8 words (32 digits/128 individual points)
Input method		1/8 duty multiplexing input scan
Wiring mechanism		30 pins header with latch
Dimension		Figure 6

7/16-segment LED display modules



Spec.	Model	FBs-7SG1	FBs-7SG2	
Display mode	Decoding display	4 bits to represent a character. It can display 16 kinds of pre-decoded character including 0 ~ 9, -, H, E, c, t and all blank		
	Non-decoding display	Each segment controlled by 1 individual bit		
Display number of character or points of LED		8 (4*) characters or 64 points individual LED	16 (8*) characters or 128 points individual LED	
Refresh time for display		10mS max.		
LED driving specification	Driving current	40mA /segment		
	Display method	1/8 duty multiplexing display		
	Driving voltage	Low voltage	5VDC (can be 10% up)	
		High voltage	7.5V, 10V, 12.5V selectable (can be 10% up)	
Fine tune of voltage drop	0.6V, 1.2V, 1.8V selectable			
Over voltage driving indication		Each channel has individual Over Voltage (O.V.) driving LED indication		
Isolation method		Transformer (power) and photocouple (signal) isolation		
Power consumption		24VDC -15%/+20%,static consumption is 2VA max., dynamic current is increased according to display.		
Wiring mechanism		16 pins flat cable, 2.54mm header connector		
Dimension		Figure 4		

*: For 16-segment alphanumeric character

Analog input (AI) module



Spec.	Model	FBs-6AD	
Input source		Voltage input	Current input
Number of input point		6 points / 14-bit	
Digital input value		-8192 ~ +8191 or 0 ~ 16383	
Input signal range	Bipolar	-10 ~ 10V or -5 ~ 5V	-20 ~ 20mA or -10 ~ 10mA
	Unipolar	0 ~ 10V or 0 ~ 5V	0 ~ 20mA or 0 ~ 10mA
Maximum resolution		0.3mV (5V/16384)	0.61μA (10mA/16384)
Accuracy		±1%	
Conversion time		Conversion once for each scan	
Maximum input signal		±15V	±30mA
Input impedance		63.2KΩ	250Ω
Isolation method		Transformer (power) and photocouple (signal) isolation	
Power consumption		24VDC -15%/+20%, 2VA max.	
Wiring mechanism		7.62 mm terminal block	
Dimension		Figure 4	

Model Specifications

Analog output (AO) modules



Spec.	Model	FBs-2DA	FBs-4DA
Number of output point		2 points / 14-bit	4 points / 14-bit
Digital output value		-8192 ~ +8191 or 0 ~ 16383	
Output signal range	Bipolar	Voltage : -10 ~ 10V or -5 ~ 5V , Current : -20 ~ 20mA or -10 ~ 10mA	
	Unipolar	Voltage : 0 ~ 10V or 0 ~ 5V , Current : 0 ~ 20mA or 0 ~ 10mA	
Maximum Resolution		Voltage : 0.3mV (5V/16384) , Current : 0.61μA (10mA/16384)	
Accuracy		±1%	
Conversion time		Conversion once for each scan	
Allowable loading		Voltage : 500Ω ~ 1 MΩ : Current : 0Ω ~ 500Ω	
Isolation method		Transformer (power) and photocouple (signal) isolation	
Power consumption		24VDC -15%/+20%, 2VA max.	
Wiring mechanism		7.62 mm terminal block	
Dimension		Figure 4	

Temperature measurement modules



Spec.	Model	FBs-TC2	FBs-TC6	FBs-TC16	FBs-RTD6	FBs-RTD16	FBs-NTC6
Number of input points		2 points	6 points	16 points	6 points	16 points	6 points
Sensor type and temperature measurement range		Thermocouple Sensor: J (-200~1200°C) E (-190~1000°C) K (-190~1300°C) T (-190~380°C) R (0~1800°C) B (350~1800°C) S (0~1700°C) N (-200~1000°C)			3-wire RTD sensor (JIS or DIN) Pt100(-200°C~850°C) Pt1000(-200°C~600°C)		NTC sensor 10 KΩ at 25°C, B optional -20°C ~ 100°C
Temperature compensation		Built-in cold junction compensation			—	—	—
Resolution		0.1°C					
Temperature refresh time		1 or 2 seconds	2 or 4 seconds	3 or 6 seconds	1 or 2 seconds	2 or 4 seconds	2 or 4 seconds
Overall Precision		± (1%+1°C)			± 1%		+/- 1% of full scale at 25°C
Isolation method		Transformer (power) and photocouple (signal) isolation					
Power consumption		24VDC -15%/+20%, 2VA max.					
Wiring mechanism		3.81 mm European terminal block		7.62 mm terminal block			
Dimension		Figure 4		Figure 1	Figure 4	Figure 1	Figure 4

AI/AO/Temperature combo modules



Spec.	Model	FBs-4A2D	FBs-2ATC4	FBs-2ARTD4
Number of input/output point		4 points AI / 14-bit + 2 points AO / 14-bit	2 points AI / 14-bit + 4 points Temperature (TC)	2 points AI / 14-bit + 4 points Temperature (RTD)
Temperature input specification		—	Same as FBs-TC6	Same as FBs-RTD6
Analog input specification		Same as FBs-6AD	Same as FBs-6AD	Same as FBs-6AD
Analog output specification		Same as FBs-2DA / 4DA	—	—
Power consumption		24VDC -15%/+20%, 2VA max.		
Wiring mechanism		7.62 mm terminal block		
Dimension		Figure 4		

Special modules



Spec. / Model	FBs-4PT	FBs-ATC2	FBs-1LC	FBs-AXC2
Features	4 channels, 16-bit potential meter input module (Impedance range: 1K~10K Ω)	2 channels, auto. tuning temperature control module with 0.1°C resolution	1 channel, load cell module with 20-bit resolution	2 axes, with linear uncircular interpolation motion control module
Wiring mechanism	7.62 mm terminal block			
Dimension	Figure 4			

Communication modules (CM)



Spec. / Model	FBs-CM22	FBs-CM55	FBs-CM25	FBs-CM25E	FBs-CM55E
Features	2 RS232 ports (Port3+Port4) with TX, RX indicators	2 RS485 ports (Port3+Port4) with TX, RX indicators	1 RS232 (Port3) + 1 RS485 (Port4) with TX, RX indicators	1 RS232 (Port3) + 1 RS485 (Port4) with Ethernet interface and RUN, LINK, TX, RX indicators	2 RS485 ports (Port3+Port4) with Ethernet interface and RUN, LINK, TX, RX indicators
Wiring mechanism	D-SuB female	3.81 mm European terminal block	D-SuB female 3.81 mm European terminal block		3.81 mm European terminal block
Dimension	Figure 5				



Spec. / Model	FBs-CM25C	FBs-CM5R	FBs-CM5H	FBs-CMGSM
Features	General purpose optical isolation RS232↔RS485/RS422 converter, with RX indicator	General purpose optical isolation RS485 repeater, with RX indicator	General purpose optical isolation 4 ports RS485 Hub, with ACT, COLLISION indicators	GPRS/GSM wireless communication module
Wiring mechanism	D-SuB female 3.81 mm European terminal block	3.81 mm European terminal block	7.62 mm terminal block	—
Dimension	Figure 5	Figure 5	Figure 4	Figure 5

Communication boards (CB)



Spec. / Model	FBs-CB2	FBs-CB22	FBs-CB5	FBs-CB55	FBs-CB25	FBs-CBE
Features	1 port RS232 (Port 2) with TX, RX indicators	2 ports RS232 (Port 1+ Port 2) with TX, RX indicators	1 port RS485 (Port 2) with TX, RX indicators	2 ports RS485 (Port 1+ Port 2) with TX, RX indicators	1 port RS232 (Port 1) + 1 port RS485 (Port 2) with RX & TX indicators	1 port Ethernet with LINK, RX & TX indicators
Wiring mechanism	D-SuB female		3.81 mm European terminal block		D-SuB female 3.81 mm European terminal block	RJ-45

Analog I/O boards



Spec. / Model	FBs-B2DA	FBs-B4AD	FBs-B2A1D
Features	2 channels, 12-bit analog output board (0~10V or 0~20mA)	4 channels, 12-bit analog input board (0~10V or 0~20mA)	2 channels, 12-bit analog input + 1 channel, 12-bit analog output combo analog board (0~10V or 0~20mA)
Wiring mechanism	3.81 mm European terminal block		

Model Specifications

Memory pack



Spec.	Model	FBs-PACK
Memory		1M bits FLASH ROM
Memory capacity		20K words program + 20K words data
Write protection		DIP switch ON/OFF protection

PWMDA



Spec.	Model	PWMDA
Output range		DC 0~10V
Output value		0~1000
Resolution		10mV(10V/1000)
Output impedance		1KΩ
Min. load(≥10V)		5.2KΩ
D/A conversion time		<50mS

RFID card



Spec.	Model	CARD-H
Applicable DAP		FBs-DAP-BR/CR
Operated frequency		13.56MHz
Memory		64-bit with Cyclic Redundancy Check (CRC) on data
Working temperature		-25°C ~ 50°C (ISO7810)
Power source		Powered by RF
Receivable distance		10cm - 15cm
Writable times		at least 10000 times
Dimension(mm)		86 X 54 X 0.76
Weight		5g

FP-08 handheld programming panel

Easy to use and portable, with program editing, copying, status monitoring and debugging functions, most suitable for field maintenance.

Change working mode only by a single keystroke, without having tedious exit process from current working mode.



Spec.	Model	FP-08
Power consumption		5V/100mA
Keyboard		48 silicon rubber keys
Display		16-character × 2, 5×7dot matrix LCD display, with LED backlighting
Communication port		RS232 serial communication port
Dimension		Figure 7

Data Access Panel



Spec.	Model	FBs-DAP-B(R)	FBs-DAP-C(R)	FBs-BDAP
Display		16-character × 2, 5×7dot matrix LCD display, with LED backlighting		128 segments fixed-pattern LCD display
Key pads		20 (membrane)		6 (rubber)
Power consumption		24V,41mA (48mA) max.	5V,100mA (120mA) max.	5V,100mA max.
Communication Interface	Electric	RS485	RS232	Port1, CMOS
	Mechanism	5-pin European detachable terminal block	D-sub 9 pins male connector	—
	Number of linked station	Max. 16 stations	1	—
General features		Timer, counter, register, relay, access of contact in PLC		
Special features		Alarm, information display, user definable special quick keys		Station No. setup, Run/Stop Control Calendar* display and setup
Card access feature		Available only in -BR/-CR models, with maximum distance of 10 ~ 15 cm		—
Dimension		Figure 8		

* The PLC main unit must be of calendar built-in type



Accessories



Spec.	Model	LED.56R	LED.8R	LED2.3R	LED4.0R
Features		0.56" high-brightness, red color 7-segment LED display	0.8" high-brightness, red color 7-segment LED display	2.3" high-brightness, red color 7-segment LED display	4.0" high-brightness, red color 7-segment LED display



Spec.	Model	LEDAN.8R	LEDAN2.3R	DB.56 (DB.56LEDR)	DB.8 (DB.8LEDR)
Features		0.8" high-brightness, red color 16-segment LED display	2.3" high-brightness, red color 16-segment LED display	0.56" 7-segment 8 digits LED display PCB (DB.56LEDR with LED installed)	0.8" 7-segment 8 digits LED display PCB (DB.8LEDR with LED installed)



Spec.	Model	DB2.3 (DB2.3LEDR)	DB4.0 (DB4.0LEDR)	DBAN.8 (DBAN.8LEDR)	DBAN2.3 (DBAN2.3LEDR)
Features		2.3" 7-segment 8 digits LED display PCB (DB2.3LEDR with LED installed)	4.0" 7-segment 4 digits LED display PCB (DB4.0LEDR with LED installed)	0.8" 16-segment 4 digits LED display PCB (DBAN.8LEDR with LED installed)	2.3" 16-segment 4 digits LED display PCB (DBAN2.3LEDR with LED installed)



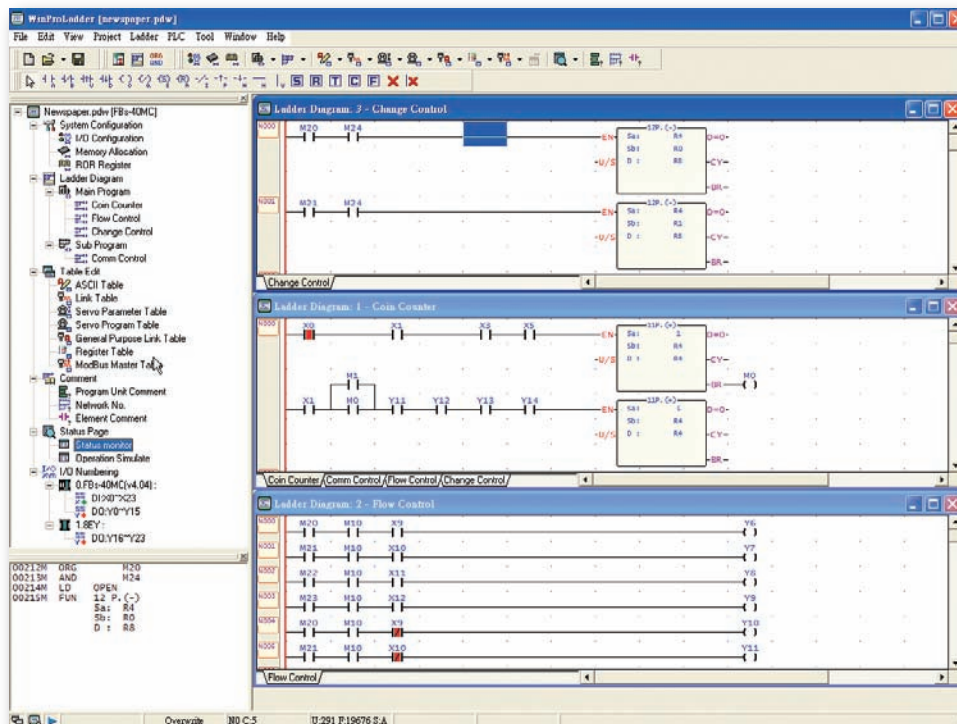
Spec.	Model	FBs-232P0-9F-150	FBs-232P0-9M-400	FBs-USBP0-180	HD30-22AWG-200
Features		Dedicated communication cable for FBs main unit port 0 (RS232) to 9-pin D-sub female connector, length 150cm	Dedicated communication cable for FBs main unit port 0 (RS232) to 9-pin D-sub male connector, length 400cm	Communication cable for FBs main unit port 0 (USB) (commercial USB A↔B cable), length 180cm	22AWG I/O cable with 30pins socket, length 200cm (for FBs-24EX, 24EYT and 32DGI)

Program Development Software

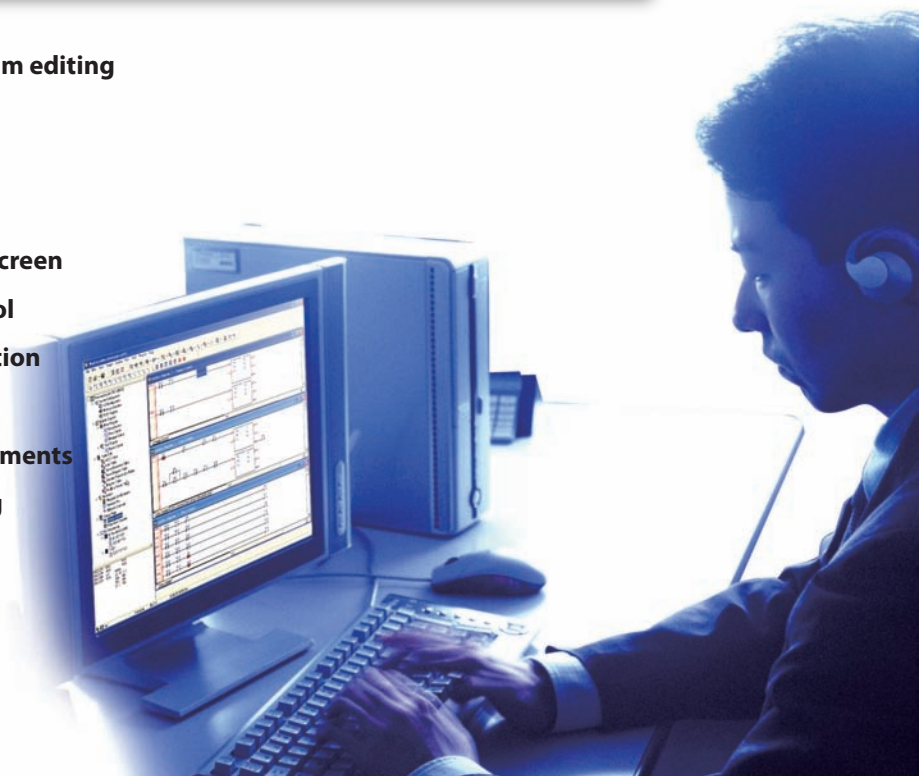
WinProLadder programming software

General Features

- Windows based application program following the standard conventions of a windows environment for ease of learning and operation regardless of whether the user is a beginner or frequent user.
- Application environment for project development is via a hierarchical tree. All the elements of the project can be activated by directly clicking the mouse button on the tree object providing comprehensive access and views of the working project.
- Easy entry methods which incorporate both the keyboard and mouse as entry devices. No matter whether on site or in an office environment the software can be operated with ease and efficiency.
- Provides various types of connections to the PLC via a PC. Connections include serial, USB, Ethernet / Internet and Modem. For every different connection WinProLadder provides a session name to associate the setting of the communication parameters, such as port no., baud rate, IP address, phone number, etc.



- **On-Line, Run-Time program editing**
- **Program testing**
- **Program documentation**
- **Project oriented program**
- **Ladder program editing screen**
- **Status monitor and control**
- **Mnemonic ladder instruction display window**
- **Ladder diagram with comments**
- **Element comment editing**





Training Box

Features:

- It contains the basic items required by PLC digital I/O training, such as the FBs-24MCT advanced main unit, the FBs-CM25E Ethernet module, digital input socket, simulated switches, and digital output socket.
- The built-in RS232, RS485 and the Ethernet three ports (can be expanded to five with communication boards) not only enable the teacher's computer to connect with the training kits of all students to conduct networking on-line teaching such as loading, monitoring, modifying, and storing, but also can be used in advanced course such as computer connection, intelligent ASCII peripherals as well.



- A special designed software "WinProladder teaching assistant" can let instructor download or upload ladder program to or from the PLC of the whole class or individual through computer.
- PLC output is isolated by the Relay with socket and fuse and then output to terminal. These isolations can prevent PLC from damaging caused by incorrect wiring and easy for repair and replacement.

Spec.	Model	FBs-TBOX	
Case	Aluminum suitcase. Dimension is 46x32x16cm. Top cover and box body can be separated.		
Power supply	100~240VAC / 2A fuse / power switch with indicator		
PLC	FBs-24MCT(transistor output)+FBs-CM25E(Ethernet communication module)		
Programming tool	Programmer	FP-08 handheld programming panel, can develop program, monitor (optional)	
	Winproladder Programming Software	Instructor site: WinProladder with 'teaching assistant' utility	
		Student site: WinProladder	
Communication interface	Built-in	Port0	USB B type connector
	Communication board(CB) (optional)	Port1	RS232 or RS485 selectable, directly mounted on FBs-24MCT main unit
		Port2	
	FBs-CM25E	Port3	RS232, standard DB-9F connector
		Port4	RS485, 3-pin European terminal block
		(Port4)	Ethernet 10 Base T, IEEE 802.3 standard. Use port4 to interface PLC main unit
Input interface	Banana terminal and simulation switch with automatic and manual reset functions		
Output interface	Banana terminal, 10 points. Transistor output(Y0~Y9). All outputs buffer with discrete relay before come to terminal. Y0 and Y1 also provide a direct output terminal for high-speed pulse output (HSPSO) application.		
Expansion module (optional)	Secured by DIN Rail, 12.5cm wide slot, can accommodate three 4cm thin modules or other modules with equivalent width		
Application peripheral	Display module	4 digits 7-segment display module , attached with BCD decoding circuit	
	Thumbwheel switch	4 digits BCD thumbwheel switch module	
	Keyboard module	4 x 4 matrix keyboard module (Wiring coordinate with convenient instruction)	
	Encoder	Power supply 24VDC 、 200P/R 、 open collector 、 A/B phase	
	Stepping motor	Pules/DIR control 、 200P/R	
	LED display	10 of 10mmØ high-brightness LED (in red, yellow, and green), driven individually by Y0 to Y9	
Number of linked stations	Maximum 254 stations (1 station for instructor, 253 stations for student)		

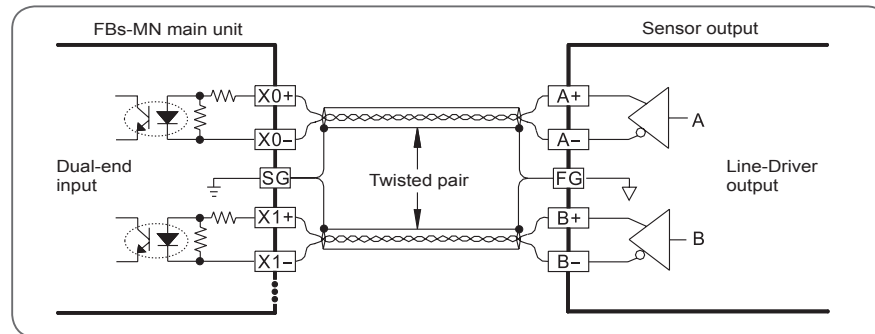
General Specifications

Digital Input (DI) specifications

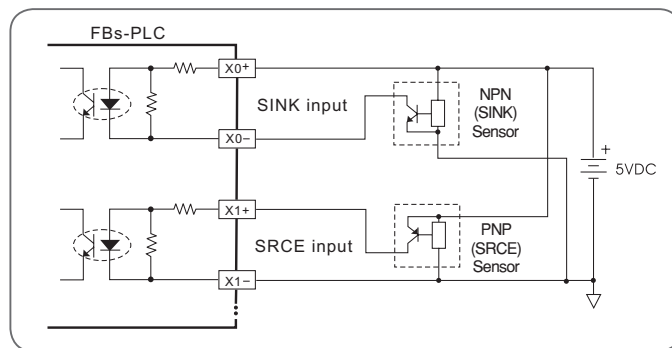
Specification	Item	5VDC differential input		24VDC single-end input			Note
		Ultra high speed (for HHSC)	High speed (for HHSC)	Medium speed (for HHSC)	Medium low speed (for SHSC)	Low speed (for ON/OFF)	
Maximum input frequency*		920KHz	200KHz	20KHz	total 5KHz	—	*:Half of maximum frequency while A/B phase input
Input signal voltage		5VDC ± 10%					
Threshold current	ON	> 6mA		> 4mA		> 2.3mA	
	OFF	< 2mA		< 1.5mA		< 0.9mA	
Maximum input current		20mA		7mA		4.2mA	
Input indication		Displayed by LED: Light when "ON", dark when "OFF"					
Isolation method		Photocouple isolation					
SINK/SRCE wiring		Independent wiring	Via variation of internal common terminal S/S and external common wiring				
Noise filtering methods		DHF (0mS ~ 15mS) +AHF (470nS)		DHF (0mS ~ 15mS) + AHF (4.7μS)		AHF (4.7mS)	DHF: Digital Hardware Filter AHF: Analog Hardware Filter

Note: In this catalog, All the In/Out type of "Source" is denoted by its abbreviation "SRCE"

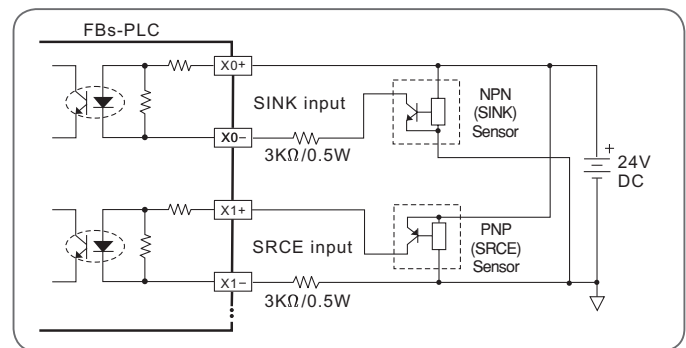
Wiring of 5VDC differential input (with frequency up to 920KHz, for high speed or high noise environments)



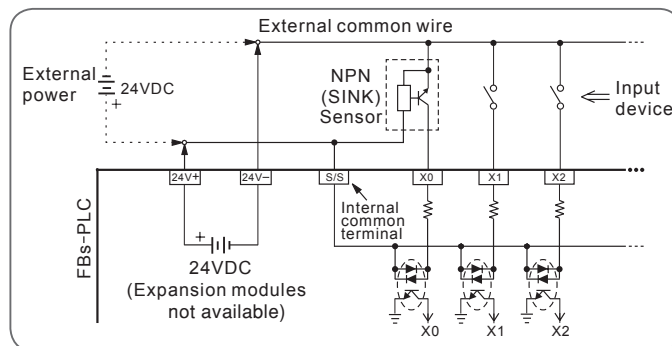
Wiring of 5VDC differential input to 5VDC single-end SINK/SRCE input (Max. 200KHz)



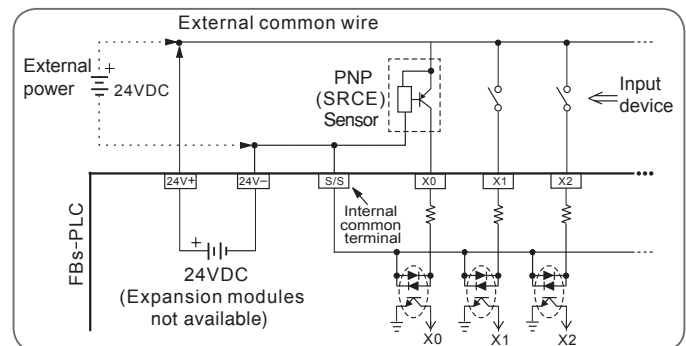
Wiring of 5VDC differential input to 24VDC single-end SINK/SRCE input (Max. 200KHz)



Wiring of 24VDC single-end SINK input



Wiring of 24VDC single-end SRCE input



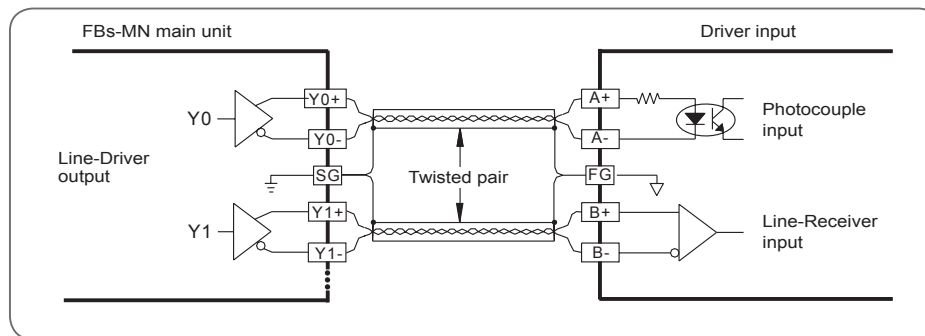
Digital Output (DO) specifications

Specification	Item	Differential output	Single-end transistor output			Single-end relay output (for ON/OFF)
		Ultra high speed (for PSO)	High speed (for PSO)	Medium speed (for PSO)	Low speed (for ON/OFF)	
Maximum switching (working) frequency*1		920KHz	200KHz	20KHz/10KHz*2	—	—
Working voltage		5VDC±10%	5 ~ 30 VDC			< 250VAC, 30VDC
Maximum load current	Resistive	50mA	0.5A	0.5A	0.5A 0.1A (24EYT)	2A/single, 4 A/common
	Inductive					80VA
Maximum voltage drop (@ maximum load)		—	0.6V	2.2V	2.2V	0.06V (initial)
Minimum load		—	—			2mA/DC power
Leakage current		—	< 0.1mA/30VDC			—
Maximum output delay time	ON → OFF	200nS	2μS	15μS		10mS
	OFF → ON			30μS		
Output status indication		Displayed by LED: Lit when "ON", dark when "OFF"				
Over current protection		N/A				
Isolation type		Photocouple isolation			Electromagnetic isolation	
SINK/SRCE output type		Independent dual terminals for arbitrary connection	Choose SINK/SRCE by models and non-exchangeable			Bilateral device, can be arbitrarily set to SINK/SRCE output

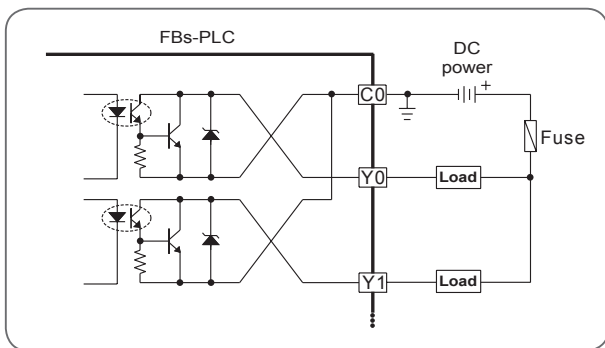
*1 : Half of the maximum frequency while A/B phase output

*2 : Frequency limited by "MA" model's software

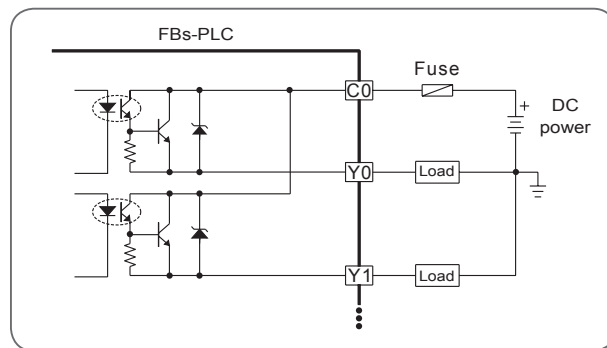
Wiring of 5VDC differential output (with frequency up to 920KHz, for high speed or high noise environments)



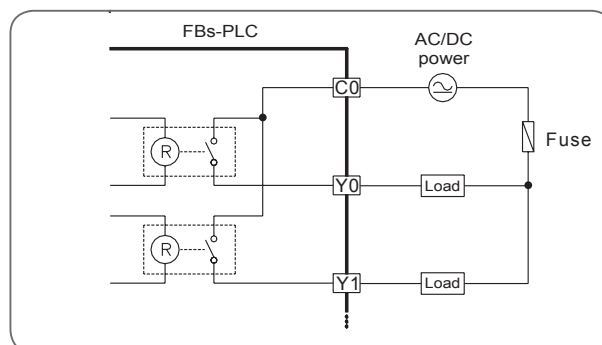
Wiring of transistor single-end SINK output



Wiring of transistor single-end SRCE output



Wiring of relay single-end output



General Specifications

Environmental specifications

Item		Specification	Note
Operating ambient temperature	Enclosure space	Minimum	5°C
		Maximum	40°C
	Open space	Minimum	5°C
		Maximum	55°C
Storage temperature		-25°C ~ +70°C	Permanent installation
Relative humidity(non-condensing, RH-2)		5% ~ 95%	
Pollution resistance		Degree II	
Corrosion resistance		Base on IEC-68 standard	
Altitude		≤2000m	
Vibration resistance	Fixed by DIN RAIL	0.5G, 2 hours for each direction of 3 axes	
	Fasten by screw	2G, 2 hours for each direction of 3 axes	
Shock resistance		10G, Three times for each direction of 3 axes	
Noise resistance		1500 Vp-p, pulse width 1μS	
Withstand voltage		1500VAC, 1 minute	

Power supply specifications — AC power supply

Item		Specification	10/14 points main unit	20/24 points main unit	32/40 points main unit	60 points main unit
Input range	voltage		100 ~ 240VAC -15%/+10%			
	Frequency		50/60Hz ±5%			
Max. power consumption			21W (POW-14)		36W (POW-24)	
Inrush current			20A @ 264VAC			
Allowable power momentary interruption time			<20mS			
Fuse rating			2A, 250VAC			

Power supply specifications — DC power supply

Item		Specification	10/14 points main unit	20/24 points main unit	32/40 points main unit	60 points main unit
Input range			12VDC/24VDC -15%/+20%			
Max. power consumption			15W (DPOW-10)		24W (DPOW-16)	
Inrush current			20A @ DC24 V			
Allowable power momentary interruption time			<20mS			
Fuse rating			3.15A, 250VAC			

Main unit specifications

* : Default, changable by user

Item		Specification	Note
Execution speed		0.33uS/Sequential instruction	
Program capacity		20K Words	
Program memory		FLASH ROM or SRAM + Lithium battery for Back-up	
Sequential instruction		36 instructions	
Function instruction		326 instructions (126 kinds)	Include derivative instructions
Flow chart command (SFC)		4 instructions	
Communication Interface	Port 0 (RS232 or USB)	Communication speed 4.8Kbps ~ 921.6Kbps (9.6Kbps)*	
	Port 1 ~ Port 4 (RS232, RS485, Ethernet or GSM)	Communication speed 4.8Kbps ~ 921.6Kbps (9.6Kbps)*	Port1 ~ 4 provides FATEK or Modbus RTU/ASC II or user defined communication protocol
	Maximum link stations	254	



(Continue)

Item			Specification	Note		
Digital (Bit status)	X	Input contact (DI)	X0 ~ X255 (256)	Corresponding to external digital input		
	Y	Output relay (DO)	Y0 ~ Y255 (256)	Corresponding to external digital output		
	TR	Temporary relay	TR0 ~ TR39 (40)			
	M	Internal relay	Non-retentive	M0 ~ M799 (800)*	Can be configured as retentive type	
			Retentive	M1400 ~ M1911 (512)		
		Special relay	M800 ~ M1399 (600)*	Can be configured as non-retentive type		
			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	Timer current value register	0.01S Time base	T0 ~ T49 (50)*	T0 ~ T255 numbers for each time base can be adjusted.	
			0.1S Time base	T50 ~ T199 (150)*		
			1S Time base	T200 ~ T255 (56)*		
	CTR	Counter current 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		Retentive	R0 ~ R2999 (3000)*	Can be configured as non-retentive type	
			Non-retentive	D0 ~ D3999 (4000)		
	HR ROR	Data register	Retentive	R3000 ~ R3839 (840)*	Can be configured as retentive type	
			Read only register	R5000 ~ R8071 (3072)*	When not configured as ROR, it can serve normal register (for read/write)	
			File register	R5000 ~ R8071 can be set as ROR ~ default setting is (0)*	ROR is stored in special ROR area and not occupy program space	
				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), D4000 ~ D4095 (96)	Except R4152 ~ R4154	
0.1mS high-speed timer register		R4152 ~ R4154 (3)				
High-speed counter register		Hardware (4 sets)	DR4096 ~ DR4110 (4x4)			
		Software (4 sets)	DR4112 ~ DR4126 (4x4)			
XR	Index register	V · Z (2), P0 ~ P9 (10)				
Interrupt control	External interrupt control		32 interrupts (16 points input positive/negative edge)			
	Internal interrupt control		8 interrupts (1, 2, 3, 4, 5, 10, 50, 100mS)			
0.1mS high speed timer(HST)			1 (16-bit), 4 (32-bit, share with HHSC)			
High-speed counter (HSC)	Hardware high-speed counter (HHSC) /32-bit	No. of channel	Up to 4	<ul style="list-style-type: none"> Total number of HHSC and SHSC is 8 HHSC can be converted into 32-bit/0.1mS time base High-Speed Timer (HST) Half of maximum frequency while A/B input 		
		Counting mode	8 modes (U/D, U/Dx2, P/R, P/Rx2, A/B, A/Bx2, A/Bx3, A/Bx4)			
		Counting frequency	Maximum is 200KHz (Single-end input) or 920KHz (differential input)			
	Software high-speed counter (SHSC) /32-bit	No. of channel	Up to 4			
		Counting mode	3 modes (U/D, P/R, A/B)			
		Counting frequency	Maximum sum up to 5KHz			
NC position pulse out (HSPSO)	Number of axis		Up to 4	Half of the maximum while A/B output		
	Output frequency		Maximum is 200KHz (Single-end output) or 920KHz (differential output)			
	Pulse output mode		3 modes (U/D, P/R, A/B)			
	Programming method		Dedicated position language			
	Interpolation		Maximum 4 axes linear interpolation			
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		Maximum 36 points (All main unit is suitable this feature)			
	Minimum capturable Pulse width		>10 μS (for ultra high speed / high speed input) >47 μS (for Medium speed input) >470 μS (for Medium low speed input)			
	Digital filter	X0 ~ X15		Adjustable frequency 14KHz ~ 1.8MHz	Chosen by frequency at high frequency	
X16 ~ X35		Adjustable time constant 0 ~ 1.5mS/0~15mS (unit: 0.1mS/1mS) Time constant 1mS ~ 15mS adjustable (unit: 1ms)	Chosen by time constant at low frequency			

Instruction Sets

Sequential instructions

Instruction	Operand	Ladder symbol	Function
ORG	X,Y,M, S,T,C		Network starts by an A contact
ORG NOT			Network starts by a B contact
ORGTU			Network starts by a TU contact
ORGTD			Network starts by a TD contact
ORG OPEN			Network starts by an open contact
ORG SHORT			Network starts by a short contact
LD	X,Y,M, S,T,C		Branch line starts by an A contact
LD NOT			Branch line starts by a B contact
LDTU			Branch line starts by a TU contact
LDTD			Branch line starts by a TD contact
LD OPEN			Branch line starts by an open contact
LD SHORT			Branch line starts by a short contact
AND	X,Y,M, S,T,C		Serial connect with an A contact
AND NOT			Serial connect with a B contact
ANDTU			Serial connect with a TU contact
ANDTD			Serial connect with a TD contact
AND OPEN			Serial connect with an open contact
AND SHORT			Serial connect with a short contact

Instruction	Operand	Ladder symbol	Function
OR	X,Y,M, S,T,C		Parallel connect with an A contact
OR NOT			Parallel connect with a B contact
ORTU			Parallel connect with a TU contact
ORTD			Parallel connect with a TD contact
OR OPEN			Parallel connect with an open contact
OR SHORT			Parallel connect with a short contact
ANDLD			Concatenate two blocks in series
ORLD			Merge two blocks in parallel
OUT	Y,M,S		Output result to coil
OUT NOT			Output the inverse of result to a coil
OUTL	Y		Output result to a retentive coil
OUT	TR		Store node status in temporary relay
LD			Retrieve node status from temporary relay
TU			Take differential up of node status to node status
TD			Take differential down of node status to node status
NOT			Inverse node status
SET			Set a coil
RST			Reset a coil

Step ladder instructions (SFC)

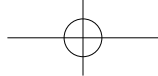
Instruction	Operand	Ladder symbol	Function
STP	Snnn		Define STEP program
STPEND			STEP program end

Instruction	Operand	Ladder symbol	Function
TO	Snnn		STEP divergence
FROM			STEP convergence

Function instructions

Category	NO.	Instruction	Derivative	Function
Timer		Tnnn		General timer instruction (T0 ~ T255)
Counter		Cnnn		General counter instruction (C0 ~ C255)
	7	UDCTR	D	16 or 32-bit up/down counter
Setting / Resetting		SET	DP	Set all bits of register or a discrete point to 1
		RST	DP	Clear all bits of register or a discrete point to 0
Digital operation	114	Z-WR	P	Zone set or clear
	4	DIFU		Take differential up of the node status to operand
	5	DIFD		Take differential down of the node status to operand
Mathematical operation	10	TOGG		Toggle the coil status
	11	(+)	DP	Sa+Sb → D
	12	(-)	DP	Sa-Sb → D
	13	(×)	DP	Sa × Sb → D
	14	(/)	DP	Sa / Sb → D
	15	(+1)	DP	Add 1 to D
	16	(-1)	DP	Subtract 1 from D
	23	DIV48	P	48 bits integer division Sa / Sb → D
	24	SUM	DP	Sum of N consecutive values
	25	MEAN	DP	Average of N consecutive values
	26	SQRT	DP	Square root of S
	27	NEG	DP	Two's complement of D (Negative number)
	28	ABS	DP	Absolute value of D
	29	EXT	P	Extend 16 bits into 32 bits

Category	NO.	Instruction	Derivative	Function
Mathematical operation	30	PID	P	PID calculation
	31	CRC16	P	CRC16 calculation
	32	ADCNV		Offset and full scale conversion for analog I/O
	33	LCNV	P	Linear conversion
	200	I→F	DP	Integer to floating point number conversion
	201	F→I	DP	Floating point number to integer conversion
	202	FADD	P	Addition of floating point number
	203	FSUB	P	Subtraction of floating point number
	204	FMUL	P	Multiplication of floating point number
	205	FDIV	P	Division of floating point number
	206	FCMP	P	Comparison of floating point number
	207	FZCP	P	Zone comparison of floating point number
	208	FSQR	P	Square root of floating point number
	209	FSIN	P	SIN trigonometric function
	210	FCOS	P	COS trigonometric function
211	FTAN	P	TAN trigonometric function	
212	FNEG	P	Change sign of floating point number	
213	FABS	P	Absolute value of floating point number	
Logic operation	18	AND	DP	Sa AND Sb
	19	OR	DP	Sa OR Sb
	35	XOR	DP	Sa XOR Sb
	36	XNR	DP	Sa XNR Sb
Comparison	17	CMP	DP	Value Compare
	37	ZNCMP	DP	Zone Compare



(Continues)

Category	NO.	Instruction	Derivative	Function
Move operation	8	MOV	DP	Move S to D
	9	MOV/	DP	Inverse S and move to D
	40	BITRD	DP	Move the Bit-N of S to FO
	41	BITWR	DP	Write INB input to the Bit-N of D
	42	BITMV	DP	Move the Bit-Ns of S to the Bit -Nd of D
	43	NBMV	DP	Move the Nibble-Ns of S to the Nibble-Nd of D
	44	BYMV	DP	Move the Byte-Ns of S to the Byte-Nd of D
	45	XCHG	DP	Exchange Da and Db
	46	SWAP	P	Swap the High-Byte of D with the Low-Byte of D
	47	UNIT	P	Take Nb0 of N words to form a Word
	48	DIST	P	Distribute N Nb of S to Nb0 of N Words
	49	BUNIT	P	Low byte of words re-unit
	50	BDIST	P	Words split into multi-byte
	160	RW-FR	DP	File register access
	161	WR-MP		Write memory pack
162	RD-MP	P	Read memory pack	
Shift / Rotation	6	BSHF	DP	Shift D right 1 bit or left 1 bit
	51	SHFL	DP	Shift D left N bits
	52	SHFR	DP	Shift D right N bits
	53	ROTL	DP	Rotate D left N bits
	54	ROTR	DP	Rotate D right N bits
Code conversion	20	→BCD	DP	Convert S into BCD
	21	→BIN	DP	Convert S into Binary
	55	B→G	DP	Binary to Gray code conversion
	56	G→B	DP	Gray code to Binary conversion
	57	DECOD	P	Decode the Ns ~ Nl of S
	58	ENCOD	P	Encode the Ns ~ Nl of S
	59	→7SG	P	Convert N+1' Nb of S into 7-segment code
	60	→ASC	P	Convert character/number into ASCII code
	61	→SEC	P	Convert hour, minute, second by seconds
	62	→HMS	P	Convert second by hour, minute and second
63	→HEX	P	Convert ASCII code into hexadecimal	
64	→ASCII	P	Convert hexadecimal into ASCII code	
Flow control	0	MC		Master control loop start
	1	MCE		Master control loop end
	2	SKP		The start of the skip loop
	3	SKPE		The end of the skip loop
		END		Terminate the execution of program (for debugging)
	22	BREAK	P	Exit from FOR-NEXT loop
	65	LBL		Define the string as label
	66	JMP	P	Jump instruction
	67	CALL	P	Call instruction
	68	RTS		Subroutine return instruction
	69	RTI		Interrupt return instruction
70	FOR		The start of the FOR loop	
71	NEXT		Return point of FOR loop	
I/O instruction	74	IMDIO	P	Refresh I/O immediately
	76	TKEY	D	10 keys input convenient instruction
	77	HKEY	D	16 keys input convenient instruction
	78	DSW	D	Thumbwheel switch input convenient instruction
	79	7SGDL	D	7-segment multiplexing display convenient Instruction

Category	NO.	Instruction	Derivative	Function
I/O instruction	80	MUXI		Multiplexing input convenient instruction
	81	PLSO	D	Pulse output(PSO) instruction
	82	PWM		Pulse Width Modulation (PWM) output instruction
	83	SPD		Pulse speed detection instruction
	84	TDSP		7/16-segment LED display control
	86	TPCTL		PID temperature control
	139	HSPWM		Hardware PWM pulse output
Accumulative Timer	87	T.01S		0.01S time base accumulative timer
	88	T.1S		0.1S time base accumulative timer
	89	T1S		1S time base accumulative timer
Monitor and control	90	WDT	P	Set watchdog timer
	91	RSWDT	P	Reset watchdog timer
HSC/ HST	92	HSCTR		Read CV of hardware high speed counter/timer
	93	HSCTW		Write CV or PV of hardware high speed counter/timer
Text	94	ASCWR		Output ASCII message
Ascend/ Descend	95	RAMP		Ascending/Descending convenient instruction
Communication	150	M-BUS		Modbus protocol communication
	151	CLINK		Fatek CPU link/Generic protocol communication
Table operation	100	R→T	DP	Move register Rs to the table Td
	101	T→R	DP	Move the Rp of table Ts to register Rd
	102	T→T	DP	Move the Rp of table Ts to the Rp of table Td
	103	BT_M	DP	Move table Ts to table Td
	104	T_SWP	DP	Swap Ta and Tb
	105	R-T_S	DP	Search Rs from table Ts
	106	T-T_C	DP	Compare table Ta and table Tb
	107	T_FIL	DP	Fill Rs into Td table
	108	T_SHF	DP	Shift table left or right
	109	T_ROT	DP	Rotate table left or right
	110	QUEUE	DP	First in first out (Queue) instruction
	111	STACK	DP	First in last out (Stack) instruction
	112	BKCOMP	DP	Compare Rs with zone defined by two tables
113	SORT	DP	Sort the table	
Matrix operation	120	MAND	P	AND two matrixes
	121	MOR	P	OR two matrixes
	122	MXOR	P	Exclusive OR (XOR) two matrixes
	123	MXNR	P	Exclusive NOR (XNR) two matrixes
	124	MINV	P	Inverse matrix
	125	MCMP	P	Compare two matrixes and find out the differences between two matrixes
	126	MBRD	P	Read the bit of a matrix pointed by pointer
	127	MBWR	P	Write the bit of a matrix pointed by pointer
	128	MBSHF	P	Shift matrix left 1 bit or right 1 bit
	129	MBROT	P	Rotate matrix left 1 bit or right 1 bit
NC position control	130	MBCNT	P	Count the number of bit whose value is 1 or 0 in the matrix
	140	HSPSO		Hardware NC high-speed pulse output
	141	MPARA		Set NC position parameters
	142	PSOFF	P	Force to stop HSPSO
	143	PSCNV	P	Convert pulse count into mechanical value for display
147	MHSPO		Multi-Axis high speed pulse output	
Interrupt control	145	EN	P	Enable external input or peripheral interrupt
	146	DIS	P	Disable external input or peripheral interrupt

Dimensions

Figure 1

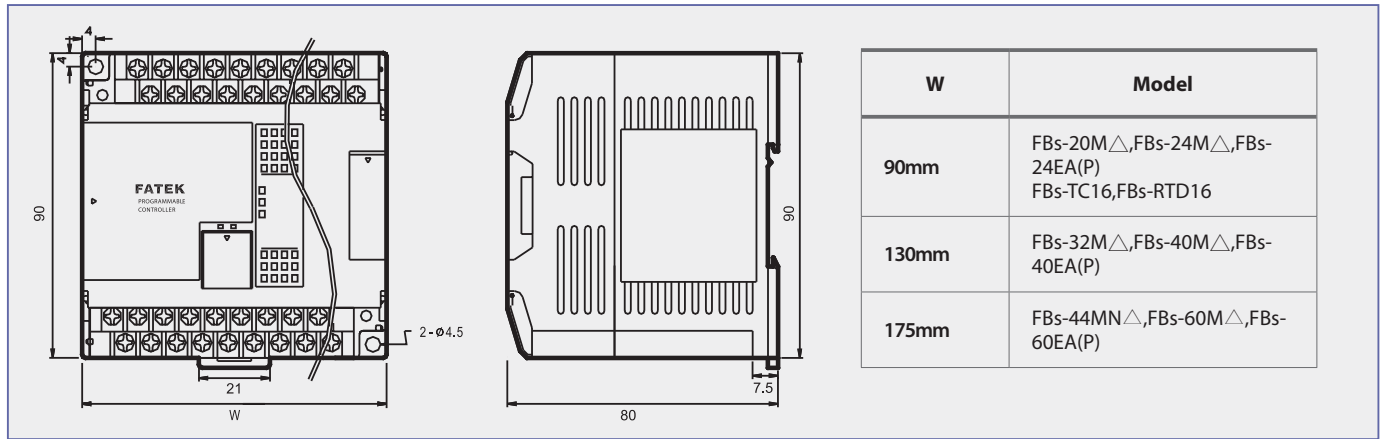


Figure 2

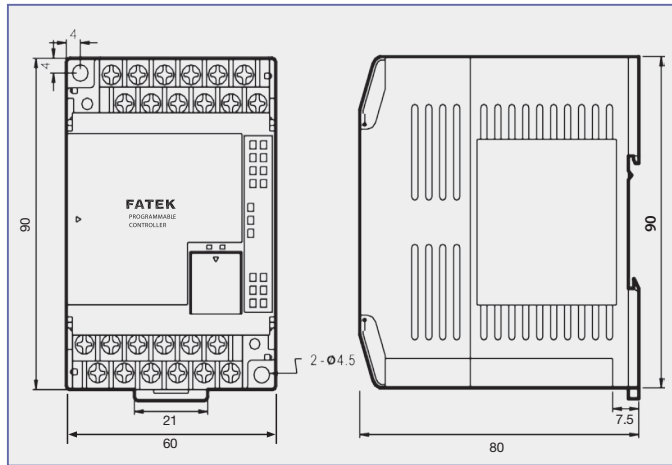


Figure 3

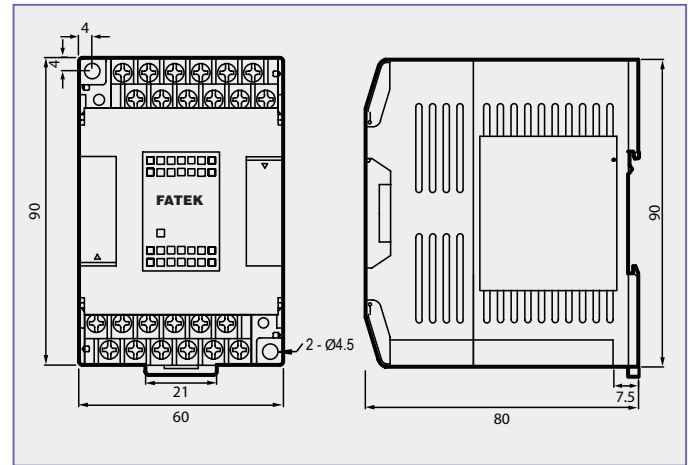


Figure 4

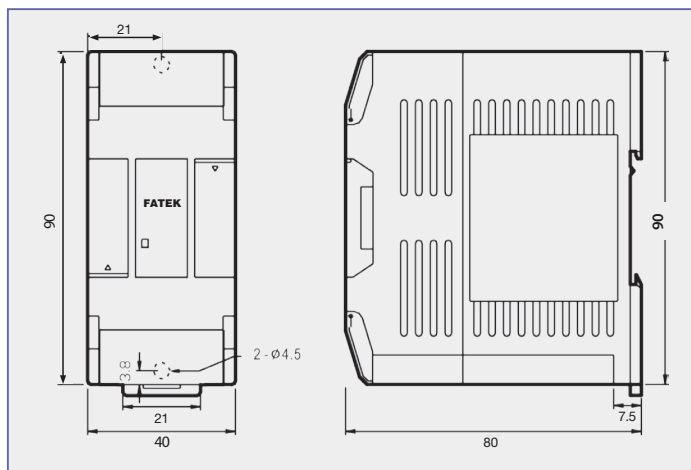


Figure 5

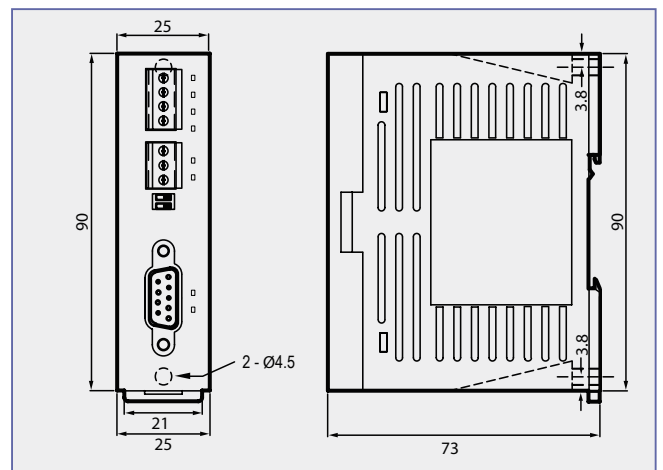




Figure 6

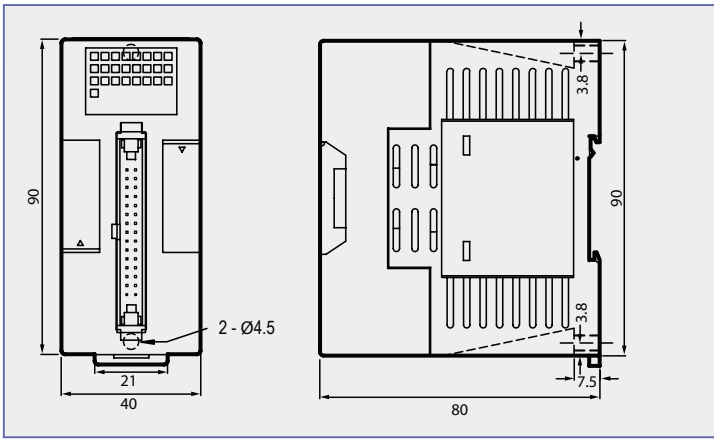


Figure 7

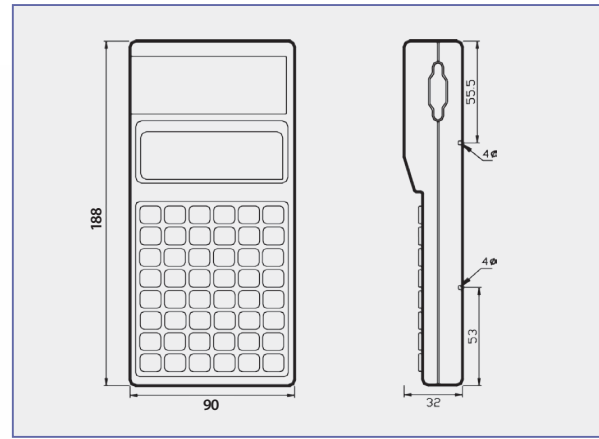
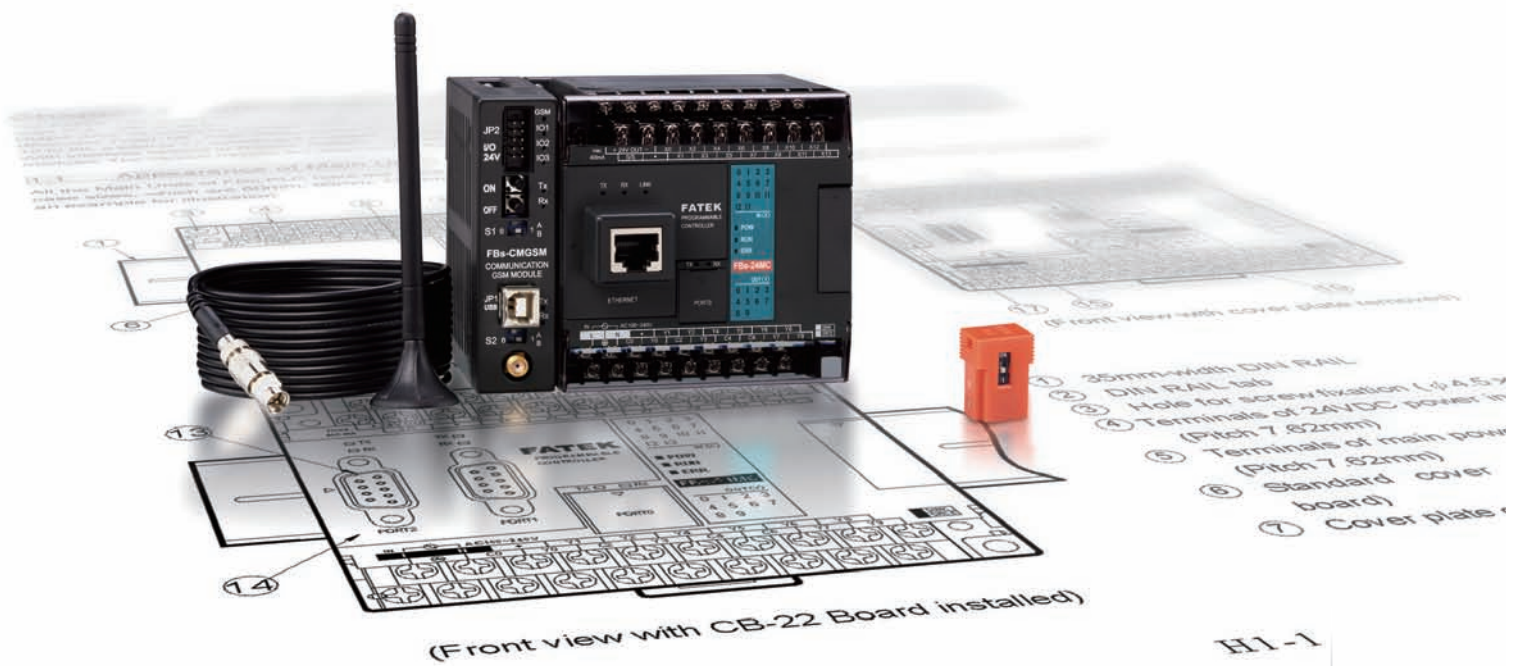
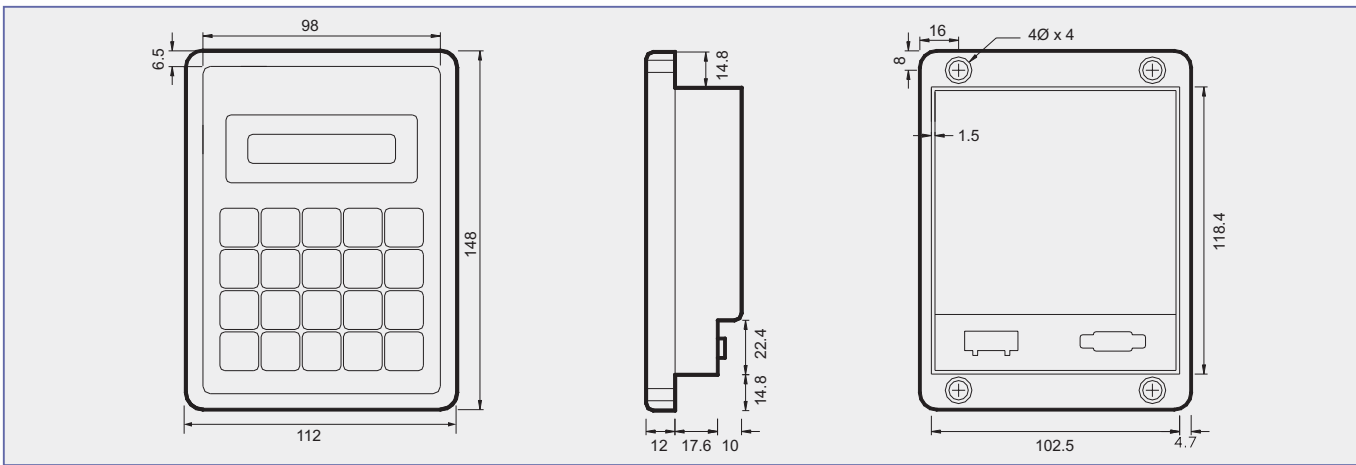


Figure 8



(Front view with CB-22 Board installed)

H1-1

Model list

Item Name	Model Number	Specifications
Basic main units	FBs-10MA□◇△ - ◎	6 points 24VDC digital input (4 points total 5KHz), 4 points relay output or 10KHz transistor output, 1 RS232 or USB port (expandable up to 3), I/O is not expandable
	FBs-14MA□◇△ - ◎	8 points 24VDC digital input (4 points total 5KHz), 6 points relay output or transistor output (4 points 10KHz), 1 RS232 or USB port (expandable up to 3), I/O is not expandable
	FBs-20MA□◇△ - ◎	12 points 24VDC digital input (4 points total 5KHz), 8 points relay output or transistor output (4 points 10KHz), 1 RS232 or USB port (expandable up to 3)
	FBs-24MA□◇△ - ◎	14 points 24VDC digital input (4 points total 5KHz), 10 points relay output or transistor output (4 points 10KHz), 1 RS232 or USB port (expandable up to 3)
	FBs-32MA□◇△ - ◎	20 points 24VDC digital input (4 points total 5KHz), 12 points relay output or transistor output (4 points 10KHz), 1 RS232 or USB port (expandable up to 3)
	FBs-40MA□◇△ - ◎	24 points 24VDC digital input (4 points total 5KHz), 16 points relay output or transistor output (4 points 10KHz), 1 RS232 or USB port (expandable up to 3)
	FBs-60MA□◇△ - ◎	36 points 24VDC digital input (4 points total 5KHz), 24 points relay output or transistor output (4 points 10KHz), 1 RS232 or USB port (expandable up to 3)
Advanced main units	FBs-10MC□◇△ - ◎ - XY	6 points 24VDC digital input (2 points 200KHz, 2 points 20KHz, 2 points total 5KHz), 4 points relay or 200KHz transistor output, 1 RS232 or USB port (expandable up to 5), built-in RTC, I/O is not expandable
	FBs-14MC□◇△ - ◎ - XY	8 points 24VDC digital input (2 points 200KHz, 2 points 20KHz, 4 points total 5KHz), 6 points relay output or transistor output (4 points 200KHz, 2 points 20KHz), 1 RS232 or USB port (expandable up to 5), built-in RTC, I/O is not expandable
	FBs-20MC□◇△ - ◎ - XY	12 points 24VDC digital input (2 points 200KHz, 4 points 20KHz, 6 points total 5KHz), 8 points relay output or transistor output (4 points 200KHz, 4 points 20KHz), 1 RS232 or USB port (expandable up to 5), built-in RTC, detachable terminal block
	FBs-24MC□◇△ - ◎ - XY	14 points 24VDC digital input (2 points 200KHz, 6 points 20KHz, 6 points total 5KHz), 10 points relay output or transistor output (4 points 200KHz, 4 points 20KHz), 1 RS232 or USB port (expandable up to 5), built-in RTC, detachable terminal block
	FBs-32MC□◇△ - ◎ - XY	20 points 24VDC digital input (2 points 200KHz, 6 points 20KHz, 8 points total 5KHz), 12 points relay output or transistor output (4 points 200KHz, 4 points 20KHz), 1 RS232 or USB port (expandable up to 5), built-in RTC, detachable terminal block
	FBs-40MC□◇△ - ◎ - XY	24 points 24VDC digital input (2 points 200KHz, 6 points 20KHz, 8 points total 5KHz), 16 points relay output or transistor output (4 points 200KHz, 4 points 20KHz), 1 RS232 or USB port (expandable up to 5), built-in RTC, detachable terminal block
	FBs-60MC□◇△ - ◎ - XY	36 points 24VDC digital input (2 points 200KHz, 6 points 20KHz, 8 points total 5KHz), 24 points relay output or transistor output (4 points 200KHz, 4 points 20KHz), 1 RS232 or USB port (expandable up to 5), built-in RTC, detachable terminal block
NC positioning main units	FBs-20MN□◇△ - ◎	2 points 920KHz 5VDC digital differential input, 10 points 24VDC digital input (4 points 20KHz, 6 points total 5KHz), 2 points 920KHz 5VDC differential output, 6 points relay output or 20KHz transistor output, 1 RS232 or USB port (expandable up to 5), built-in RTC, detachable terminal block
	FBs-32MN□◇△ - ◎	4 points 920KHz 5VDC digital differential input, 16 points 24VDC digital input (4 points 20KHz, 8 points total 5KHz), 4 points 920KHz 5VDC digital differential output, 8 points relay output or transistor output (4 points 20KHz, 4 points low-speed), 1 RS232 or USB port (expandable up to 5), built-in RTC, detachable terminal block
	FBs-44MN□◇△ - ◎	8 points 920KHz 5VDC digital differential input, 20 points 24VDC digital input (8 points total 5KHz), 8 points 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
Expansion power supply	FBsS-EPOW-◎	Power supply for expansion module, with single 5VDC and dual 24VDC voltage output and up to 20VA capacity
Digital I/O expansion units	FBs-24EAP□◇ - ◎	14 points 24VDC digital input, 10 points relay or transistor output, built-in power supply
	FBs-40EAP□◇ - ◎	24 points 24VDC digital input, 16 points relay or transistor output, built-in power supply
	FBs-60EAP□◇ - ◎	36 points 24VDC digital input, 24 points relay or transistor output, built-in power supply
Digital I/O expansion modules	FBs-8EA□◇	4 points 24VDC digital input, 4 points relay or transistor output
	FBs-8EX	8 points 24VDC digital input
	FBs-8EY□◇	8 points relay or transistor output
	FBs-16EA□◇	8 points 24VDC digital input, 8 points relay or transistor output
	FBs-16EY□◇	16 points relay or transistor output
	FBs-20EX	20 points 24VDC digital input
	FBs-24EA□◇	14 points 24VDC digital input, 10 points relay or transistor output
	FBs-40EA□◇	24 points 24VDC digital input, 16 points relay or transistor output
High-density DI/O modules	FBs-24EX	24 points high-density 24VDC digital input, 30 pins header with latch
	FBs-24EYT	24 points high-density transistor output (0.1A max.), 30 pins header with latch

- : Default - Relay output · T - Transistor output
- ◇ : Default - Sink (NPN) · J - Source (PNP)
- △ : Default - built-in RS232 port · U - built-in USB port
- ◎ : Default - 100~240VAC power supply · D - 24VDC power supply
D12 - 12VDC power supply
- The DI or DO without frequency specified are low-speed

- XY : (optional), The expanding 200KHz inputs(X) and outputs(Y), only for MCT model's X4, X5, X8, X9, X12, X13, and Y4~Y7.
Example : FBs-24MCT-21, Its means expanding 2 points of 200KHz input(total 4 points) and 1 point of 200 KHz output(total 5 points).
And FBS-24MCT-02 means only expanding 2 points of 200KHz output(total 6 points).

(Continue)

Item name	Model Number	Specification
Numeric I/O expansion modules	FBs-7SG1	1 set (8 digits) 7-segment LED display (or 64 points independent LED) output display module, 16 pins header connector
	FBs-7SG2	2 sets (16 digits) 7-segment LED display (or 128 points independent LED) output display module, 16 pins header connector
	FBs-32DG1	8 sets X 4 digits (total 32 digits) Thumbwheel switch(or 128 points independent switch) multiplex input module, 30 pins header connector
Analog expansion modules	FBs-6AD	6 channels, 14-bit analog input module (-10V~0V~+10V or -20mA~0mA~+20mA)
	FBs-2DA	2 channels, 14-bit analog output module (-10V~0V~+10V or -20mA~0mA~+20mA)
	FBs-4DA	4 channels, 14-bit analog output module (-10V~0V~+10V or -20mA~0mA~+20mA)
Analog expansion boards	FBs-B4AD	4 channels, 12-bit analog input board (0V~10V or 0mA~20mA)
	FBs-B2DA	2 channels, 12-bit analog output board (0V~10V or 0mA~20mA)
	FBs-B2A1D	2 channels, 12-bit analog input + 1 channel, 12-bit analog output combo analog board (0V~10V or 0mA~20mA)
Temperature measurement modules	FBs-TC2	2 channels, thermocouple temperature input module with 0.1°C resolution.
	FBs-TC6	6 channels, thermocouple temperature input module with 0.1°C resolution.
	FBs-RTD6	6 channels, RTD temperature input module with 0.1°C resolution.
	FBs-TC16	16 channels thermocouple temperature input module with 0.1°C resolution.
	FBs-RTD16	16 channels RTD temperature input module with 0.1°C resolution.
	FBs-NTC6	6 channels, NTC temperature input module with 0.1°C resolution.
Communication expansion 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-CM25C	General purpose RS232↔RS485/RS422 converter with optical isolation
	FBs-CM5R	General purpose RS485 repeater with optical isolation
	FBs-CM5H	General purpose 4 ports RS485 HUB with optical isolation
Communication expansion 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 Ethernet communication board
AI/AO/ Temperature combo modules	FBs-4A2D	4 channels, 14-bit analog input (same as 6AD)+2 channels, 14-bit analog output (same as 2DA) combo module
	FBs-2ATC4	2 channels, 14-bit analog input (same as 6AD)+ 4 channels thermocouple temperature input (same as TC6) combo module
	FBs-2ARTD4	2 channels, 14-bit analog input (same as 6AD) + 4 channels RTD temperature input (same as RTD6) combo module
Special modules	FBs-4PT	4 channels, 16-bit potential meter input module (Impedance range: 1K~10K Ω)
	FBs-ATC2	2 channels, auto. tuning temperature control module with 0.1°C resolution
	FBs-1LC	1 channel, load cell control module with 20-bit resolution
	FBs-AXC2	2 axes, motion control module
	FBs-CMGSM	GPRS/GSM wireless communication module
Communication cables	FBs-232P0-9F-150	FBs main unit port 0 RS232 to 9 pins female D-Sub communication cable, length 150cm
	FBs-232P0-9M-400	FBs main unit port 0 RS232 to 9 pins male D-Sub communication cable, length 400cm
	FBs-USBP0-180	FBs main unit port 0 USB communication cable (standard USB A↔ B), length 180cm
Memory Pack programming devices	FBs-PACK	FBs-PLC program memory pack with 20K words program, 20K words register, write protection switch
	FP-08	Handheld programmer for FBs-PLC
	Winproladder	WinProladder Programming software for Windows
16 / 7 Segment LED display boards	DBAN.8(DBAN.8LEDR)	0.8" X 4 of 16-segment display board (with red LED installed)
	DBAN2.3(DBAN2.3LEDR)	2.3" X 4 of 16-segment display board (with red LED installed)
	DB.56(DB.56LEDR)	0.56" X 8 of 7-segment display board (with red LED installed)
	DB.8(DB.8LEDR)	0.8" X 8 of 7-segment display board (with red LED installed)
	DB2.3(DB2.3LEDR)	2.3" X 8 of 7-segment display board (with red LED installed)
	DB4.0(DB4.0LEDR)	4.0" X 4 of 7-segment display board (with red LED installed)
Data Access Panels	FBs-BDAP	Board type Data Access Panel
	FBs-DAP-B(R)	16 x 2 LCD character display, 20 keys keyboard, 24VDC power supply, RS485 communication interface (suffixed R means wireless card read/write module included)
	FBs-DAP-C(R)	16 x 2 LCD character display, 20 keys keyboard, 5VDC power supply, RS485 communication interface (suffixed R means wireless card read/write module included)
RFID Card	CARD-H	Read / write wireless card (for FBs-DAP-BR/CR)
Training kit	FBs-TBOX	46cm x 32 cm x 16cm suitcase, containing FBs-24MCT main unit. FBs-CM25E communication module, 14 simulated input switches, 10 external relay output,