



## **FBs - Series Programmable Logic Controller**

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



**.....more than a decade of unsurpassed**

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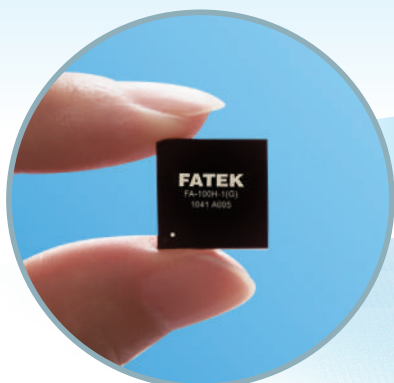


## "Quality" and "Functionality"

# Features

## SoC-FATEK's Core Technology

The FBs-PLC's design incorporates a "System on Chip" (SoC) developed in-house by Fatek Corporation. The BGA chip consists of over 120,000 gates which integrates powerful features such as a Central Processing Unit (CPU), Memory, Hardware Logic Solver (HLS), 5 high-speed communication ports, 4 sets of hardware high-speed counters/timers, 4 axes of high-speed pulse outputs for NC positioning control (with linear interpolation), 16 high-speed interrupts and captured inputs. The FBs-PLC represents high functionality and reliability with exceptional value compared to other PLC's in its class.



Real Size



## 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 this multi-input instruction structure the user 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, CANopen® and GSM and ZigBee™ wireless communication)

Via the five high-speed communication ports included in the SoC, the FBs-PLC's communication capability is outstanding 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 protocols are also available. The FBs-PLC also provides the option of 8 different communication boards and 10 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's, the hardware driven high-speed PWM in the FBs-PLC provides the user with easy control with high precision and stability.

## 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 the changing control of 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-axis linear interpolation function. If combined with the four sets of built-in HHSC, it can achieve a fully closed loop positioning control!

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

The FBs-PLC includes 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 800 pulses per revolution encoder can provide. The counter is implemented in the hardware so as not to occupy CPU processing time. In addition, 4 sets of software high-speed counters (SHSC) has U/D, P/R, A/B 3 types of counting modes and the total counting frequency is 5KHz.

## 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 various interfaces such as USB, RS232, RS485, Ethernet, CANopen® and ZigBee™. Apart from the FATEK and Modbus protocol or communication through the FATEK communication server, the user can also use the PLC's CLINK instruction for user-defined protocol to actively or passively establish connections with many intelligent peripherals.



### Open communication driver

The open communication protocol of the FBs-PLC is supported by all major brands of Supervisory Software (Scada) and Operator Terminals (HMI). Scada software such as Wonderware, Citect, Labview and LabLink! Operator terminals (HMI) such as Proface, Hitech/Beijer and Cermate can be directly connected with the FBs-PLC via serial and Ethernet interfaces. FATEK also provides 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. In addition, reputable companies such as National Instruments and KONTRON both sell FATEK OPC software package for users.

### Complete range of peripherals

In addition to over 200 models of main CPU units, the FBs-PLC also provides about 100 models of expansion I/O for selection. The expansion I/O modules include basic DI/O, AI/O and other communication modules, also include thumbwheel switch input module, 16/7 segment LED display module, 8 types (J, K, R, S, E, T, B, N) thermocouple, Pt100, Pt1000 RTD temperature measurement modules. There is also a new additions to the range including load cell module used in weighting, potential meter module used in measuring position, and a user-friendly voice module. The FBs-PLC also provides a FBs-DAP or FBs- PEP simple HMI which can be linked together with a single RS485 bus. The FBs-DAP or FBs-PEP 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 or FBs-PEP 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.

### User-friendly operating environment

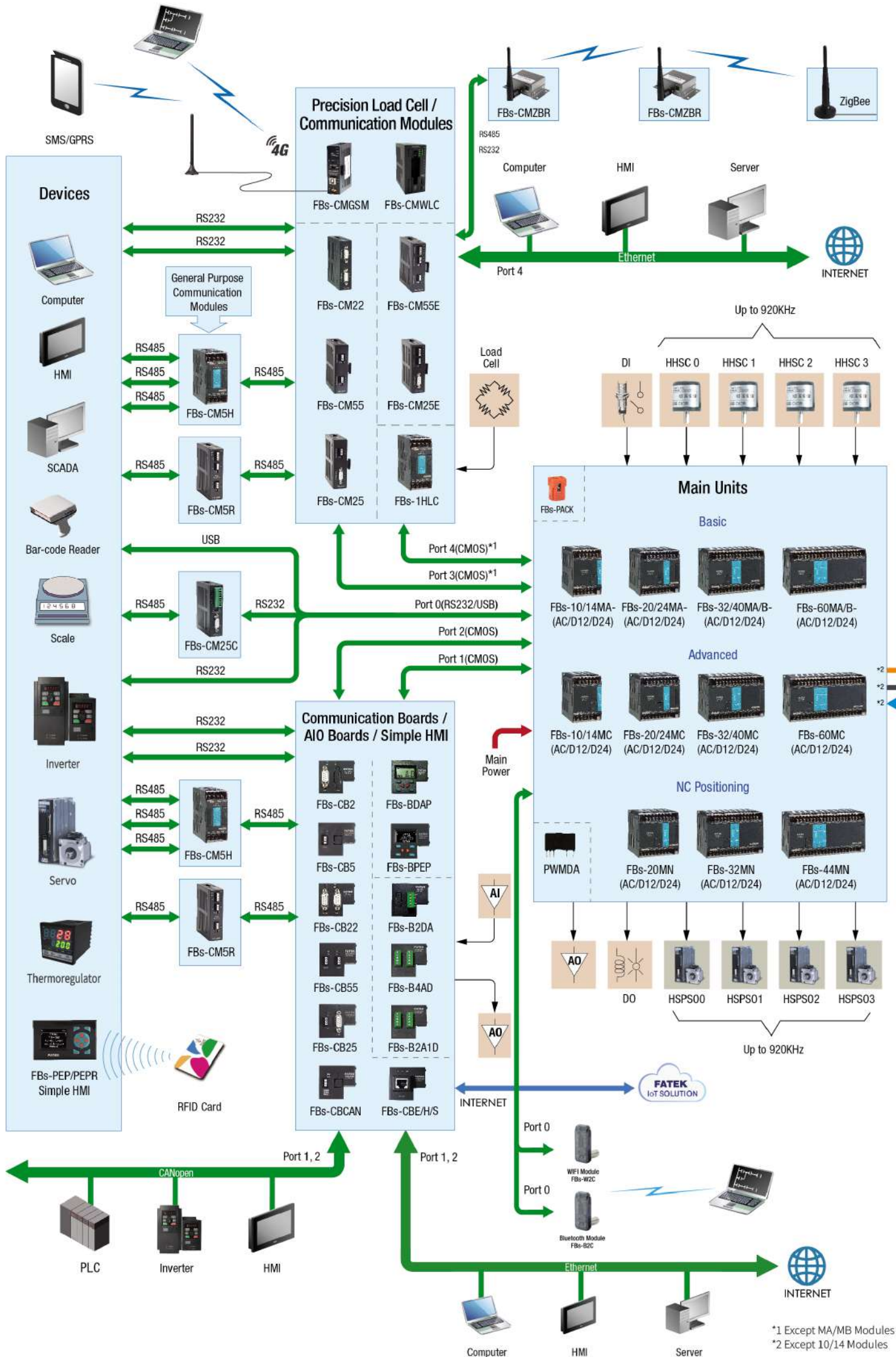
"WinProladder" is the Windows-based ladder diagram programming software for the FBs-PLC. It provides a user-friendly operating environment with editing, monitoring and debugging functions which allows the user to become familiar with the operation of the software in a very short time. The powerful editing 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 display 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.

### Up to 36 points of captured input

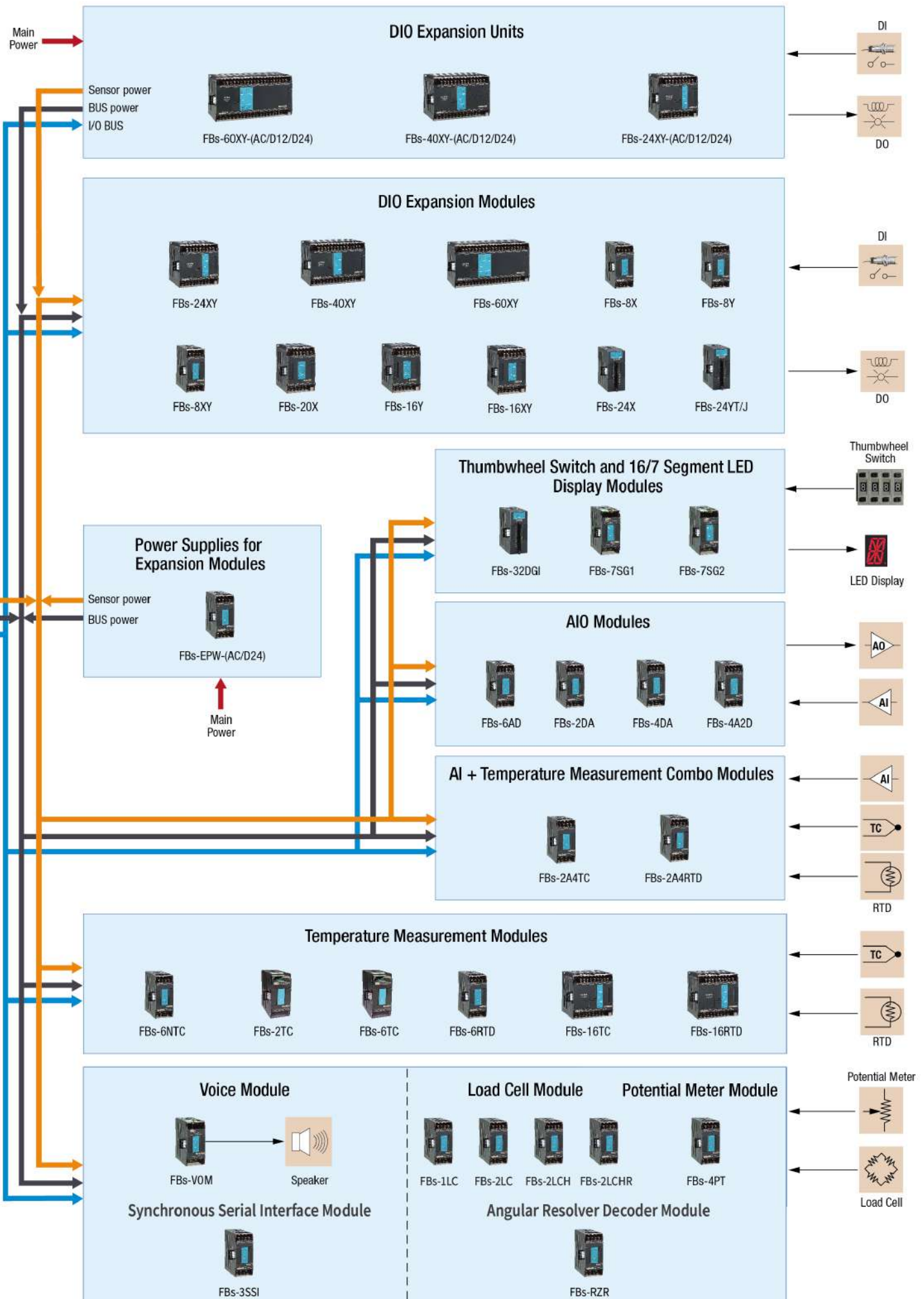
The SoC in the FBs-PLC has a captured input function, which captures and stores the external pulse of an input shorter than the scanning time of the CPU. Compared to PLC's in this class that either lack this capability or require highly sophisticated interrupt functions (which increase the CPU processing 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.

### 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.



\*1 Except MA/MB Modules  
\*2 Except 10/14 Modules



## 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		-25~70°C	
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	Permanent installation
	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	L, N to any terminal

## AC power supply specifications

Specification	Item	10/14 points main units	20/24 points main units	32/40 points main units	60 points main units
Input range	Voltage	100~240VAC, -15%/+10%			
	Frequency	50/60Hz ±5%			
Max. power consumption (built-in power supply)		21W(SPW14-AC)	36W(SPW24-AC)		
Inrush current		20A@264VAC			
Allowable power momentary interruption time		< 20mS			
Fuse rating		2A, 250V			

## DC power supply specifications

Specification	Item	10/14 points main units	20/24 points main units	32/40 points main units	60 points main units
Input voltage		12 or 24 VDC, -15%/+20%			
Max. power consumption (@ full built-in power supply)		21W(SPW14-D12/D24)	36W(SPW24-D12/D24)		
Inrush current		20A@12 or 24VDC			
Allowable power momentary interruption time		< 2mS			
Fuse rating		3A(D12)/1.5A(D24),125V	5A(D12)/2.5A(D24),125V		

## 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 4.8k ~ 115.2Kbps (9.6Kbps)*	
	Port 1 ~ Port 4 (RS232, RS485, Ethernet, CANopen or GSM)	Communication speed 4.8k ~ 921.6Kbps (9.6Kbps)*	Port1 ~ 4 provides FATEK or Modbus RTU/ASC II or user defined communication protocol
	Maximum link stations	254	
Digital (Bit status)	X	Input contact (DI)	X0~X255 (256)
	Y	Output relay (DO)	Y0~Y255 (256)
	TR	Temporary relay	TR0~TR39 (40)



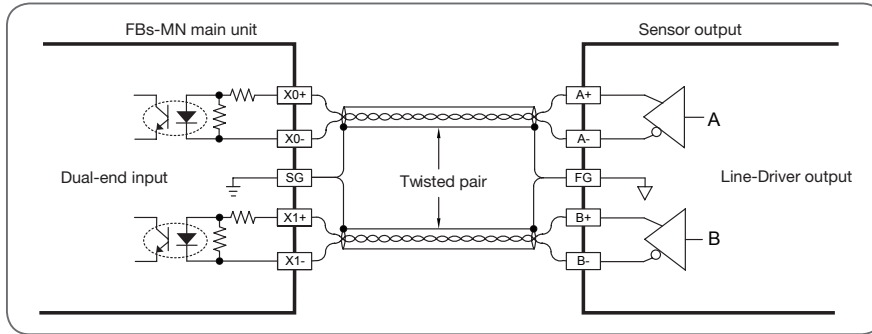
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Item				Specification				Note
Digital (Bit status)	M	Internal relay	Non-retentive	M0 ~ M799 (800)*				Can be configured as retentive type
			Retentive	M1400 ~ M1911 (512)				
		Special relay		M800 ~ M1399 (600)*				Can be configured as non-retentive type
	S	Step relay	Non-retentive	M1912 ~ M2001 (90)				
			Retentive	S0 ~ S499 (500)*				S20 ~ S499 can be configured as retentive type
	T	Timer "Time-Up" status contact		S500 ~ S999 (500)*				Can be configured as non-retentive type
C	Counter "Count-Up" status contact		T0 ~ T255 (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	Data register	Retentive	R0 ~ R2999 (3000)*			Can be configured as non-retentive type	
			Non-retentive	D0 ~ D3999 (4000)			Can be configured as retentive type	
	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	
	IR	Input register		F0 ~ F8191 (8192)			Save/retrieved via dedicated instruction	
	OR	Output register		R3840 ~ R3903 (64)			Corresponding to external numeric input	
	SR	Special system register		R3904 ~ R3967 (64)			Corresponding to external numeric output	
		0.1mS high-speed timer register		R3968 ~ R4167 (197), D4000 ~ D4095 (96)				
		High-speed counter register	Hardware (4 sets)	R4152 ~ R4154 (3)				
Software (4 sets)			DR4096 ~ DR4110 (4x4)					
Calendar Register		R4112 ~ DR4126 (4x4)	R4128 (sec)	R4129 (min)	R4130 (hour)	R4131 (day)		
XR	Index register		R4132 (month)	R4133 (year)	R4143 (week)			
			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			• 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					
	Output frequency		Maximum is 200KHz (Single-end output) or 920KHz (differential output)			Half of the maximum while A/B 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 inputs in main unit are suitable this feature)					
	Minimum capturable Pulse width	>10 μS (for ultra high speed / high speed input)						
		>47 μS (for Medium speed input)						
Digital filter	X0 ~ X15	Adjustable frequency 14KHz ~ 1.8MHz		Chosen by frequency at high frequency				
		Adjustable time constant 0 ~ 1.5mS/0~15mS ( unit: 0.1mS/1mS )		Chosen by time constant at low frequency				
	X16 ~ X35	Time constant 1 ~ 15mS adjustable (unit: 1ms)						

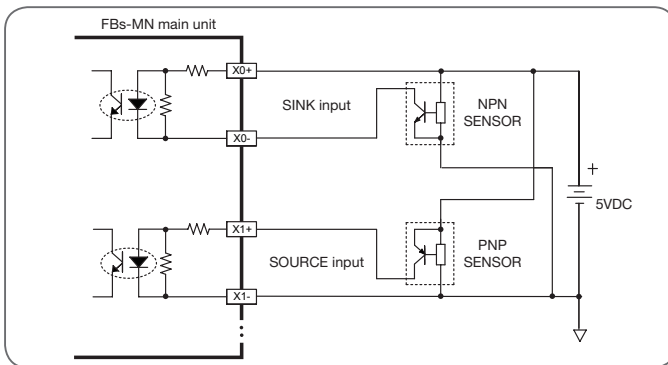
## Digital Input (DI) Specifications

Specification	Item	5VDC differential input		24VDC single-end input			Notes
		Ultra high speed	High speed	Medium speed(HSC)	Medium low speed (capture input)	Low speed	
Maximum input frequency*/ accumulated time		920KHz	200KHz	20KHz(HHSC) Total 5KHz(SHSC)	0.47mS	4.7mS	*: Half of maximum frequency while A/B phase input
Input signal voltage		5VDC ± 10%		24VDC ± 10%			
Threshold current	ON	>11mA	>8mA	>4mA		>2.3mA	
	OFF	<2mA		<1.5mA		<0.9mA	
Maximum input current		20mA	10.5mA	7.6mA		4.5mA	
Input indication		Displayed by LED: light when "ON", dark when "OFF"					
Isolation method		Optical isolation, 500VAC, 1 minute					
SINK/SOURCE wiring		Independent wiring	Via variation of internal common terminal S/S and external common wiring				
Noise filtering methods		DHF (0~15mS) +AHF (0.47μS)		DHF (0~15mS) +AHF (4.7μS)	DHF (0~15mS) +AHF (0.47mS)	AHF (4.7mS)	DHF: Digital Hardware Filter AHF: Analog Hardware Filter

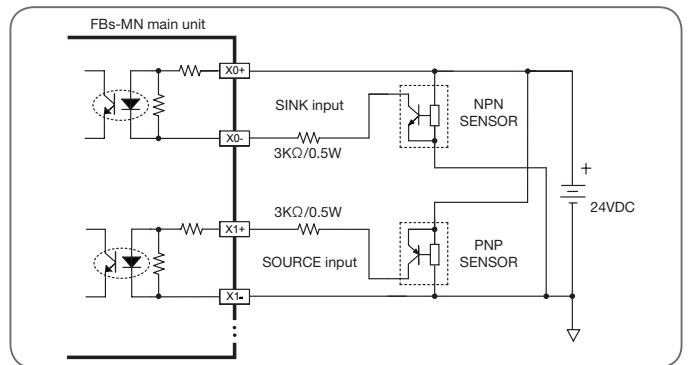
Wiring of 5VDC differential input (with frequency up to 920KHz, for high speed or high noise environments)



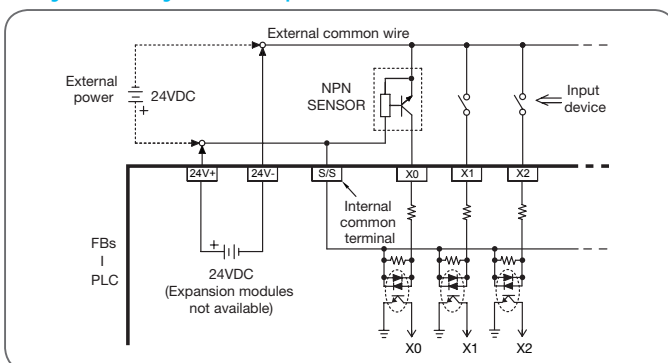
Wiring of 5VDC differential input to 5VDC single-end SINK/SOURCE input (Max. 200KHz)



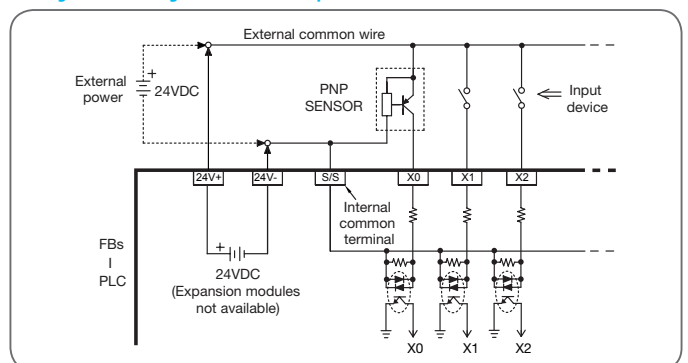
Wiring of 5VDC differential input to 24VDC single-end SINK/SOURCE input (Max. 200KHz)



Wiring of 24VDC single-end SINK input



Wiring of 24VDC single-end SOURCE input

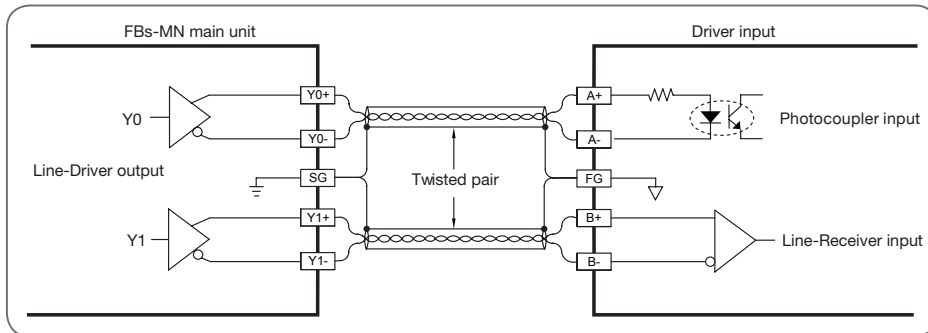


## Digital Output (DO) Specifications

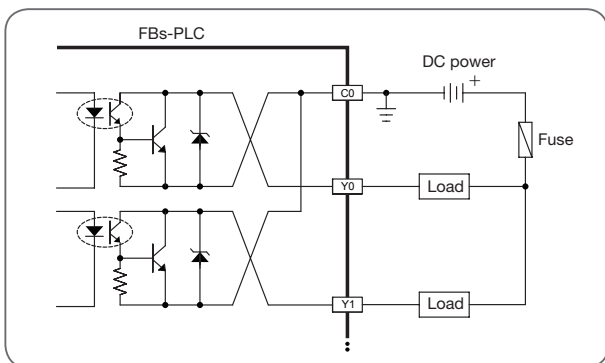
Specification	Item	Differential output	Single-end transistor output			Single-end relay output
		Ultra high speed	High speed	Medium speed	Low speed	
Maximum output frequency*		920KHz	200KHz	20KHz	—	—
Working voltage		5VDC±10%			5~30 VDC	< 250VAC/30VDC
Maximum load current	Resistive	50mA	0.5A	0.5A	0.5A/0.1A (24YT/J)	2A/single, 4A/common
	Inductive					80VA(AC)/24VA(DC)
Maximum voltage drop/ conducting resistance		—	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: Light when "ON", dark when "OFF"				
Over current protection		N/A				
Isolation type		Optical isolation, 500VAC, 1 minute			Electromagnetic isolation 1500VAC, 1 minute	
SINK/SOURCE output type		Independent dual terminals for arbitrary connection	Choose SINK/SOURCE by models and non-exchangeable			Can be arbitrarily set to SINK/SOURCE output

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

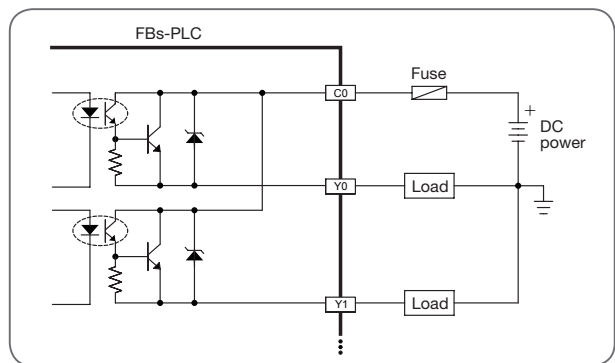
### Wiring of 5VDC differential output (with frequency up to 920KHz, for high speed or high noise environments)



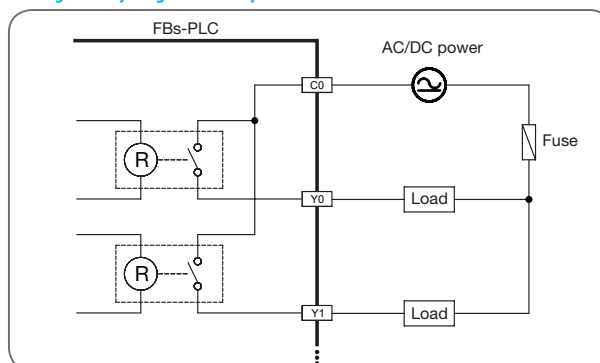
### Wiring of transistor single-end SINK output



### Wiring of transistor single-end SOURCE output



### Wiring of relay single-end output



# Main Unit Specifications



## Basic Main Units (MA)

Specification		Model	FBs-10MAR	FBs-10MAT/J	FBs-14MAR	FBs-14MAT/J	FBs-20MAR	FBs-20MAT/J	FBs-24MAR	FBs-24MAT/J
Digital Input	24VDC	High speed (100KHz)	2 points							
		Medium speed (20KHz)	2 points				4 points		6 points	
		Medium speed (Total 5KHz)	2 points		4 points		6 points			
Digital Output	Relay	High speed (100KHz)	2 points							
		Medium speed (20KHz)	2 points				4 points		6 points	
		Low speed	2 points		4 points		6 points			
Digital Output	Transistor	High speed (100KHz)	2 points							
		Medium speed (20KHz)	2 points		4 points		6 points		6 points	
		Low speed	2 points		4 points		6 points		2 points	
Communication Port	Built-in	1 port (Port0, USB or RS232)								
	Expandable	2 ports (Port1~2, RS485 or RS232 or Ethernet)								
Calendar		built-in								
Built-in power supply		SPW14-AC/D12/D24					SPW24-AC/D12/D24			
Wiring mechanism		7.62mm fixed terminal block								
Dimension		Figure 2					Figure 1			



## Basic Main Units (MA/MB)

Specification		Model	FBs-32MAR FBs-32MBR	FBs-32MAT/J FBs-32MBT/J	FBs-40MAR FBs-40MBR	FBs-40MAT/J FBs-40MBT/J	FBs-60MAR FBs-60MBR	FBs-60MAT/J FBs-60MBT/J	
Digital Input	24VDC	High speed (100KHz)	2 points						
		Medium speed (20KHz)	6 points						
		Medium speed (Total 5KHz)	8 points						
		Medium low speed	4 points		8 points		20 points		
Digital Output	Relay	High speed (100KHz)	12 points		16 points		24 points		
		Medium speed (20KHz)	6 points		6 points		6 points		
		Low speed	4 points		8 points		16 points		
Digital Output	Transistor	High speed (100KHz)	2 points						
		Medium speed (20KHz)	6 points		6 points		6 points		
		Low speed	4 points		8 points		16 points		
Communication Port	Built-in	1 port (Port0, USB or RS232)							
	Expandable	2 ports (Port1~2, RS485 or RS232 or Ethernet)							
Calendar		built-in							
Built-in power supply		SPW24-AC/D12/D24							
Wiring mechanism		7.62mm fixed terminal block(MA), 7.62mm detachable terminal block (MB)							
Dimension		Figure 1							



## Advanced Main Units (MC)

Specification		Model	FBs-10MCR	FBs-10MCT/J	FBs-14MCR	FBs-14MCT/J	FBs-20MCR	FBs-20MCT/J	FBs-24MCR	FBs-24MCT/J
Digital Input	24VDC	High speed (200KHz)	2 points				4 points			
		Medium speed (20KHz)	2 points				2 points		4 points	
		Medium speed (Total 5KHz)	2 points		4 points		6 points			
Digital Output	Relay	High speed (100KHz)	2 points							
		Medium speed (20KHz)	2 points		4 points		4 points		4 points	
		Low speed	2 points		4 points		4 points		2 points	
Communication Port	Built-in	1 port (Port0, USB or RS232)								
	Expandable	4 ports (Port1~4, RS485 or RS232 or Ethernet or GSM or ZigBee)								
Calendar		Built-in								
Built-in power supply		SPW14-AC/D12/D24					SPW24-AC/D12/D24			
Wiring mechanism		7.62mm fixed terminal block					7.62mm detachable terminal block			
Dimension		Figure 2					Figure 1			

# Main Unit Specifications

## Advanced Main Units (MC)



Specification		Model	FBs-32MCR	FBs-32MCT/J	FBs-40MCR	FBs-40MCT/J	FBs-60MCR	FBs-60MCT/J
Digital Input	24VDC	High speed (200KHz)	6 points				8 points	
		Medium speed (20KHz)	2 points				—	
		Medium speed (Total 5KHz)	8 points					
		Medium low speed (0.47ms)	4 points		8 points		20 points	
Digital output	Relay		12 points	—	16 points	—	24 points	—
	Transistor	High speed (200KHz)	—	6 points	—	6 points	—	8 points
		Medium speed (20KHz)	—	2 points	—	2 points	—	—
		Low speed	—	4 points	—	8 points	—	16 points
Communication Port	Built-in		1 port (Port0, USB or RS232)					
	Expandable		4 ports (Port1~4, RS485 or RS232 or Ethernet or GSM or ZigBee)					
Calendar		Built-in						
Built-in power supply		SPW24-AC/D12/D24						
Wiring mechanism		7.62mm detachable terminal block						
Dimension		Figure 1						

## NC Positioning Main Units (MN)



Specification		Model	FBs-20MNR	FBs-20MNT/J	FBs-32MNR	FBs-32MNT/J	FBs-44MNR	FBs-44MNT/J
Digital Input	5VDC Differential	Ultra high speed (920KHz)	2 points (1 axis)		4 points(2 axes)		8 points(4 axes)	
		High speed (200KHz)	4 points		4 points		—	
	24VDC	Medium speed (Total 5KHz)	6 points		8 points			
		Low speed	—		4 points		12 points	
Digital output	Relay		6 points	—	8 points	—	8 points	—
	5VDC Differential	Ultra high speed (920KHz)	2 points (1 axis)		4 points (2 axes)		8 points(4 axes)	
		High speed (200KHz)	—	6 points	—	4 points	—	—
	Transistor	Low speed	—	—	—	4 points	—	8 points
Communication Port	Built-in		1 port (Port0, USB or RS232)					
	Expandable		4 ports (Port1~4, RS485 or RS232 or Ethernet or GSM or ZigBee)					
Calendar		Built-in						
Built-in power supply		SPW24-AC/D12/D24						
Wiring mechanism		7.62mm detachable terminal block						
Dimension		Figure 1						

## Right Side Expansion Module Specifications



### DIO Expansion Units

Specification		Model	FBs-24XYR	FBs-24XYT/J	FBs-40XYR	FBs-40XYT/J	FBs-60XYR	FBs-60XYT/J
Digital Input	24VDC	Low speed	14 points		24 points		36 points	
Digital output	Relay		10 points	—	16 points	—	24 points	—
	Transistor	Low speed	—	10 points	—	16 points	—	24 points
Built-in power supply		SPW24-AC/D12/D24						
Wiring mechanism		7.62mm fixed terminal block						
Dimension		Figure 1						

# Right Side Expansion Module Specifications

## Power Supplies for Expansion Modules



Specification		Model	FBs-EPW-AC	FBs-EPW-D24
Capacity of output power	5VDC Bus power		400mA	
	24VDC Bus power		250mA	
	24VDC Sensor power		250mA	
Input voltage			100~240 VAC, -15%/+10%	24VDC, -15%/+20%
Maximum power consumption			21W	
Wiring mechanism			7.62mm fixed terminal block	
Dimension			Figure 4	

## DIO Expansion Modules



Specification		Model	FBs-8XYR	FBs-8XYT/J	FBs-8X	FBs-8YR	FBs-8YT/J	FBs-16XYR	FBs-16XYT/J	FBs-20X	
Digital Input	24VDC	Low Speed	4 points		8 points	—	—	8 points		20 points	
Digital Output	Relay		4 points	—	—	8 points	—	8 points	—	—	
	Transistor	Low Speed	—	4 points	—	—	8 points	—	8 points	—	
Wiring mechanism			7.62 mm fixed terminal block								
Dimension			Figure 4					Figure 3			

(Continue)



Specification		Model	FBs-16XYR	FBs-16XYT/J	FBs-24X	FBs-24YT/J	FBs-24XYR	FBs-24XYT/J	FBs-40XYR
Digital Input	24VDC	Low Speed	—	—	24 points	—	14 points		24 points
Digital Output	Relay		16 points	—	—	—	10 points	—	16 points
	High density low speed		—	—	—	24 points	—	—	—
	Transistor	Low Speed	—	16 points	—	—	—	10 points	—
Wiring mechanism			7.62 mm fixed terminal block		30 pins header with latch		7.62 mm fixed terminal block		
Dimension			Figure 3		Figure 6		Figure 1		

(Continue)



Specification		Model	FBs-40XYT/J	FBs-60XYR	FBs-60XYT/J
Digital Input	24VDC	Low Speed	24 points	36 points	
Digital Output	Relay		—	24 points	—
	Transistor	Low Speed	16 points	—	24 points
Wiring mechanism			7.62 mm fixed terminal block		
Dimension			Figure 1		

## Thumbwheel Switch Module

Specification	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

# Right Side Expansion Module Specifications

## 16/7 Segment LED Display Modules



Specification		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, -, E, H, c, t and blank	
	Non-decoding display		Each segment controlled by 1 individual bit, one 7 segment digits needs 8 bits to control (including decimal), displayable any set of segments (EX: character and number display) or each LED display	
Display number of character (points)			1 channel, 7 segment 8 words / 16 segment 4 words or 64 points individual LED	2 channels, 7 segment 16 words/ 16 segment 8 words 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 (should be under Test Mode)	
Isolation method			Transformer (power) and optical (signal) isolation, 500VAC, 1 minute	
Power consumption			24VDC -15%/+20%, static consumption is 2W max., dynamic current is increased according to display	
Wiring mechanism			16 pins flat cable, 2.54mm header connector	
Dimension			Figure 4	



## AIO Module

Specification		Model	FBs-6AD	FBs-4A2D	FBs-2DA	FBs-4DA
Input point			6 points	4 points	—	—
Output point			—	2 points	2 points	4 points
Input/Output value			-8192~8191 or 0~16383 (14-bit)			
Input/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			
Maximum input signal			Input voltage: ±15V Input current: ±30mA		—	
Allowable load range			Output voltage: 500Ω~1MΩ Output current: 0~500Ω			
Input impedance			Input voltage: 63.2KΩ Input current: 250Ω		—	
Isolation method			Transformer(power) and optical(signal) isolation, 500VAC, 1 minute, no isolation between each channel			
Power consumption			24VDC -15%/+20%, 3.2W max.			
Wiring mechanism			7.62 mm fixed terminal block			
Dimension			Figure 4			



## Temperature Measurement Modules

Specification		Model	FBs-2TC	FBs-6TC	FBs-16TC	FBs-6RTD	FBs-16RTD	FBs-6NTC
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(-200~850°C) Pt1000(-200~600°C)		NTC sensor 10 KΩ at 25°C, B optional -20~100°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 optical(signal) isolation, 500VAC, 1 minute, isolation between each channel			Transformer(power) and optical(signal) isolation, 500VAC, 1 minute, no isolation between each channel		
Power consumption			24VDC -15%/+20%, 2W max.					
Wiring mechanism			3.81 mm european terminal block			7.62 mm fixed terminal block		
Dimension			Figure 4		Figure 1	Figure 4	Figure 1	Figure 4

# Right/Left Side Expansion Module Specifications

## AI+Temperature Measurement Combo Modules



Specification	Model	FBS-2A4TC	FBS-2A4RTD
Analog input (AI) points		2 points / 14-bit	
Temperature measurement input points		4 points (thermocouple)	4 points (RTD)
Analog input specification		Same as FBS-6AD	Same as FBS-6AD
Temperature input specification		Same as FBS-6TC	Same as FBS-6RTD
Power consumption		24VDC-15%/+20%, 2W max.	
Wiring mechanism		7.62 mm fixed terminal block	
Dimension		Figure 4	



## Load Cell Module

Specification	Model	FBS-1LC
Number of channel		1 channel
Resolution		16-bit (including sign bit)
Occupied I/O points		1 IR (input register) and 8 points DO
Conversion Rate		5/10/25/30/60/80 Hz optional
Non-linearity degree		0.01% full scale @25 °C
Zero drift		0.2 μV/ °C
Gain drift		10 ppm/ °C
Excitation voltage		5V, maximum load is 250Ω
Level of sensitivity		2mV/V, 5mV/V, 10mV/V, 20mV/V
Filters		Moving averages
Isolation method		Transformer (power) and optical (signal) isolation, 500VAC, 1 minute
Power consumption		24VDC, -15%/+20%, 2W
Wiring mechanism		7.62 mm fixed terminal block
Dimension		Figure 4

# Left Side Expansion Module Specifications

## General Communication Boards/Modules



Specification	Model	FBS-CB2	FBS-CB22	FBS-CB5	FBS-CB55	FBS-CB25
RS232 Port		1 port (Port2)	2 ports (Port1, Port 2)	—	—	1 port (Port1)
RS485 Port		—	—	1 port (Port2)	2 ports (Port1, Port 2)	1 port (Port2)
Indicators		Each Port has its own TX, RX LED indicators				
Wiring mechanism		DB9F	DB9F	3 pins spring terminal		DB9F, 3 pins spring terminal
Installation position		Expansion slot of main unit				



(Continue)

Specification	Model	FBS-CM22	FBS-CM55	FBS-CM25
RS232 Port		2 ports (Port3, Port4)	—	1 port (Port3)
RS485 Port		—	2 ports (Port3, Port4)	1 port (Port4)
Indicators		Each Port has its own TX, RX LED indicators		
Wiring mechanism		DB9F	3 pins spring terminal	DB9F, 3 pins spring terminal
Installation position		Figure 5		

## Voice Module



Specification	Model	FBS-VOM
Number of recorded messages		245 messages
Sound storage device		Internal memory or external SD memory card
Maximum sound storage capacity	Internal memory	1MB, can play up to 2 minutes of sound recordings.
	External SD memory card	Maximum 4 GB memory card, up to 8000 minutes of sound recordings can be played.
Applicable sound encoding format		Mono 8 bit 8KHz sample
Signal output		Dual output 8Vp-p, 4Ω load 2W output
Sound input method		Computer editing, SD memory card
Sound playback control		PLC control or manual sequencing (test play)
Volume control		PLC control, total of 10 volumes
I/O points occupy		8 points DI and 8 points DO
Status display		3 LEDs
Power consumption		Internal 5V, 500mA (@2W output)
Dimension		Figure 4



## Potential Meter Module

Specification	Model	FBS-4PT
Number of channel		4 channels
Resolution		14 or 12 bits
Occupied I/O points		4 IR (input registers) and 1 unused OR (output register)
Conversion time		Conversion once for each scan
Accuracy		±1%
Potential meter impedance		1K~10KΩ
Voltage Input Range		0~10V
Potential meter voltage		10V
Filters		Moving averages
Isolation method		Transformer (power) and optical (signal) isolation, 500VAC, 1 minute
Power consumption		24VDC, -15%/+20%, 2W
Wiring mechanism		7.62 mm fixed terminal block
Dimension		Figure 4



# Left Side Expansion Module Specifications

## Ethernet Communication Boards/Modules



Specification	Model	FBS-CBEH	FBS-CBE	FBS-CM25E	FBS-CM55E
Network interface		10/100 Base T		10 Base T	
Network protocol		TCP/UDP/IP, ICMP, ARP			
Application protocol		FATEK client and server mode, Modbus-TCP client or server mode		FATEK client and server mode, Modbus-TCP server mode	
PLC interface		Port1, Port2		Port4	
PLC communication speed		307.2 Kbps	115.2 Kbps	9.6K / 19.2K / 38.4K / 57.6K / 115.2Kbps / 230.4Kbps	
Expansion communication interface		N/A		RS232 (Port3), RS485 (Port4)	RS485 (Port3, Port4)
Application IP port number		FATEK port number 500, Modbus-TCP 502 or customized			
Security protection		IP based access control			
Indicators		Internet RX, TX, LINK LEDs indicators			
Wiring mechanism		RJ-45		DB9F, spring terminal block 4-pin x1, 3-pin x1	Spring terminal block 4-pin x1, 3-pin x1
Dimension (Installation position)		Expansion slot of main unit		Figure 5	

## CANopen® Communication Board



Specification	Model	FBS-CBCAN
Communication standard		CAN 2.0A CANopen
Network topology		3-Phase fieldbus
Communication speed		10K / 20K / 50K / 125K / 250K / 500K / 1Mbps
Maximum number of connection station		127 stations
Method of sending signal		Event or cyclic transmission
Isolation method		Optical (signal) isolation, 500VAC, 1 minute
Number of PDO communication		RXPDO-10, TXPDO-10 total up to 80 registers
Number of SDO channels		Client -1, Server-1
Error control		Heartbeat
Wiring mechanism		3-pin spring terminal block
ID setup method		Same as PLC station number or setup by software
Working mode		Master or slave dual modes
Installation position		Expansion slot of main unit

## ZigBee™ Communication Modules



Specification	Model	FBS-CMZB	FBS-CMZBR
Standards		Based on IEEE 802.15.4 and ZigBee™ standard	
Network topology		Mesh, Star, and Cluster-tree	
Frequency		2.4GHz, Unlicensed ISM Band	
Modulation		QPSK	
Data rate		250 Kbps	
RF channels		16(5MHz)	
Data encryption		AES(option)	
Transmit power		-7~18dBm	
Transmission distance		1200m (LOS)	
Nodes		Maximum 65535	
Communication interface		Port3	—
Power consumption		24VDC, -15%/+20%, 2W	
Dimension		Figure 5	62 x 54 x 29 (mm)

## GSM Communication Module



Specification	Model	FBS-CMGSM
Function		SMS, GPRS, and dial up data transfer (CSD), and etc
Frequencies		850/900/1800/1900MHz
RF power		2W
Communication interface		Port3
Dimension		Figure 5

## General Purpose Communication Modules



Specification	Model	FBS-CM25C	FBS-CM5R	FBS-CM5H
Function		General purpose RS232 to RS485 bi-directional signal converter	General purpose RS485 repeater	General purpose 1 to 3 RS485 HUB
Indicators		Each port has its own independent TX, RX LED indicator		
External power		24VDC, -15%/+20%		
Wiring mechanism		DB9F, 3.81mm European terminal block	3 pins spring terminal block	7.62mm fixed terminal block
Dimension		Figure 5		Figure 4

# Left Side Expansion Module Specifications

## AIO Boards



Specification	Model	FBS-B2DA	FBS-B4AD	FBS-B2A1D
Input point		—	4 points	2 points
Output point		2 points	—	1 point
Input / Output value		0~16380 (14-bit representation, valid 12-bit)		
Input / Output polar		Unipolar		
Input / Output counting range		0~10V		
Conversion time		Conversion once for each scan		
Accuracy		±1%		
Isolation method		Non-isolation		
Wiring mechanism		3.81 mm European terminal block		
Installation position		The expansion slot of main unit		

## 3-Axis Motion Control Module



Specification	Model	FBS-30GM
Number of DIO points		14 points (8 inputs/6 outputs)
Program capacity		16M Bytes
Data Register		20K Words
High speed pulse Input		200KHz X,Y,Z 3-Axis A/B differential signal input
High speed pulse Output		500KHz X,Y,Z 3-Axis A/B differential signal output
Manual input		A/B differential signal input
Communication port		RS485 x1, Ethernet x1
Built-in power supply		SPW24-AC/D12/D24
Wiring mechanism		7.62mm detachable terminal block
Dimension		Figure 1

## Precision Load Cell Module



Specification	Model	FBS-1HLC
Number of channels		1 channel
Resolution		0.10 μV/1D (24-bit AD)
Filters		Digital filter, sampling rate 6.25~120Hz
Measurement range		-1~39mV
Sensor voltage		5VDC±5%
No. of sensor connections		350Ω sensor x 8
Isolation Method		Transformer (power) and optical (signal) isolation, 500VAC, 1 minute
Power consumption		24VDC, -15%/+20%, 2W
Wiring mechanism		7.62mm fixed terminal block
Dimension		Figure 4

## Handheld Programming Panel



Specification	Model	FP-08
Main function		Program editor (Mnemonic language), status monitoring, parameters setup, program/parameter import and recording, etc.
Max. of power consumption		5V/100mA
Keyboard		48 silicon rubber keys
Display		Two rows 16 characters, dot matrix LCD display, with LED backlight
Recording device		FBS-PACK read/write
Communication port		RS232 serial communication port
Connectors		DB9F, Mini-DIN
Dimension		Figure 7

## Simple HMI



Specification	Model	FBS-DAP-B/BR	FBS-DAP-C/CR	FBS-PEP/PEPR	FBS-BDAP	FBS-BPEP
Display		Two rows 16-character, dot matrix LCD display, with LED backlighting		128x96 points white light OLED	128segments fixed-pattern LCD	128x64 points white light OLED
Key pads		20 buttons (4x5) membrane		8 operation keys (rubber)	6 operation keys (rubber)	6 operation keys (rubber)
Maximum of consumption power		24V, 48mA	5V, 120mA	5V, 100mA	5V, 100mA	5V, 100mA
Communication Interface	Electric	RS485	RS232	RS232	Port1, CMOS	Port1, CMOS
	Mechanism	5 pins European detachable terminal block		Mini-DIN	—	—
	Number of linked station	Max. 16 stations	Single unit	Single unit	—	—
General features		Timer, counter, register, relay, access of contact in PLC				
Special features		Alarm, information display, and user definable special hot keys		Station number setup, run/stop, Control Calendar* display and setup		
Card access features (RFID card)		Available only in -R models, with maximum distance of 6~12cm			—	—
Dimension (Installation position)		Figure 8		Figure 9	Expansion slot of main unit	

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

# Peripheral and Accessory Specifications

## RFID Card



Specification	Model	CARD-H
Operated frequency		13.56MHz
Memory		64-bit with Cyclic Redundancy Check (CRC) on data
Working temperature		-25~50 (ISO7810)
Power source		Powered by RF
Receivable distance		6~12cm
Writable times		At least 10000 times

## PWMDA



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

## Memory Pack



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

## USB-RS232 Converter Cable



Specification	Model	FBs-U2C-MD-180
Features		Standard USB AM connector to RS232 MD4M connector (used in standard PC USB to FBs main unit Port 0 RS232), length 180cm

## Communication Cable



Specification	Model	FBs-232P0-9F-150	FBs-232P0-9M-400	FBs-232P0-MD-200	FBs-232P0-MDR-200
Features		Dedicated communication cable for FBs main unit Port 0 (RS232) to DB9F connector, length 150cm	Dedicated communication cable for FBs main unit Port 0 (RS232) to DB9M connector, length 400cm	Dedicated communication cable for FBs main unit Port 0 (RS232) to FBs-PEP/PEPR Mini-DIN male connector, length 200cm	Dedicated communication cable for FBs main unit port 0 (RS232) to FBs-PEP/PEPR 90 Mini-DIN male connector, length 200cm

## High Density DIO Connection Cable



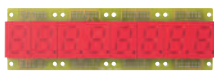
Specification	Model	HD30-22AWG-200
Features		22AWG I/O cable with 30 pins Socket, length 200 (for FBs-24X, 24YT/J and 32DGI)

## 16/7 Segment LED Display



Specification	Model	DBAN.8-nR	DBAN.2.3-nR
Features		0.8" 4-digit 16-segment LED display, , n means R(Red) 16-segment LED characters display installed, can be 1~4	2.3" 4-digit 16-segment LED display, n means R(Red) 16-segment LED characters display installed, can be 1~4

(Continue)



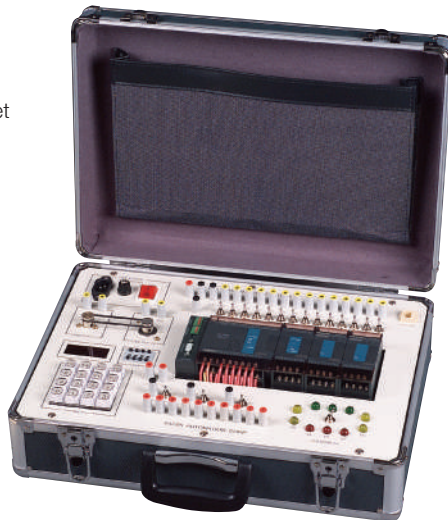
Model	DB.56-nR	DB.8-nR	DB2.3-nR	DB4.0-nR
Features	0.56" 8-digit 7-segment display, n means R(Red) 7-segment LED characters display installed, can be 1~8	0.8" 8-digit 7-segment display, n means R(Red) 7-segment LED characters display installed, can be 1~8	2.3" 8-digit 7-segment display, n means R(Red) 7-segment LED characters display installed, can be 1~8	4.0" 4-digit 7-segment display, n means R(Red) 7-segment LED characters display installed, can be 1~4

## Training Box

Specification		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	RS 232 Mini-DIN	
	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)		

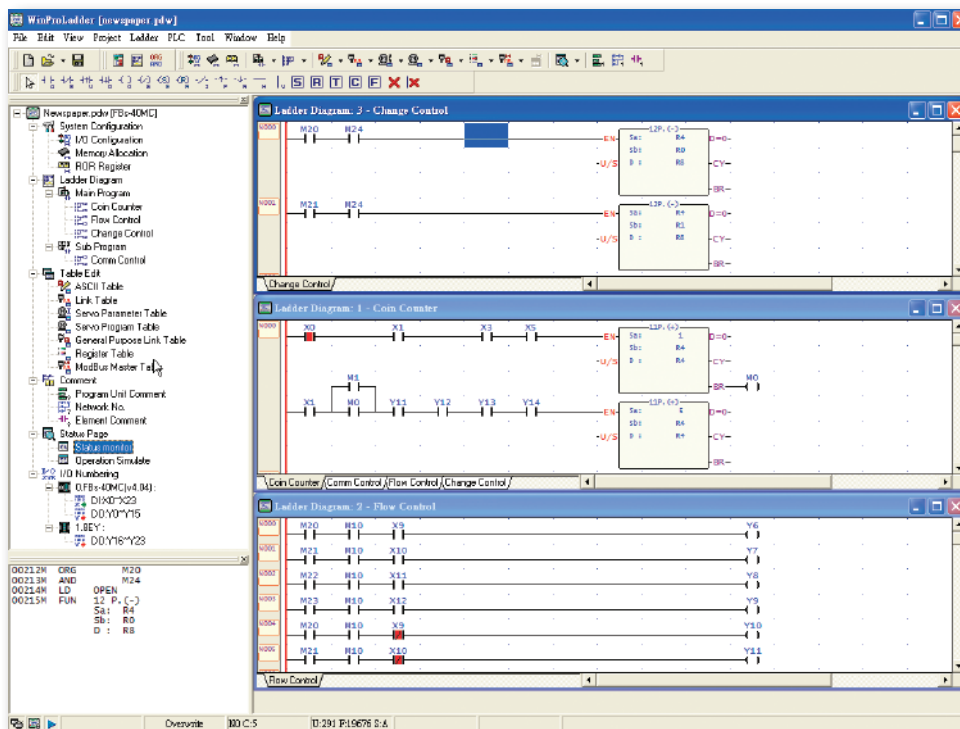
### Features:

- 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.



## 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 comments
- Project oriented program
- Ladder program editing screen
- Status monitor and control
- Mnemonic ladder instruction display window
- Ladder diagram with comments
- Element comment editing
- Off-Line Simulation



## 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
ORG TU			Network starts by a TU contact
ORG TD			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
LD TU			Branch line starts by a TU contact
LD TD			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
AND TU			Serial connect with a TU contact
AND TD			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
OR TU			Parallel connect with a TU contact
OR TD			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
OUT L	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
TD			Take differential down of 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

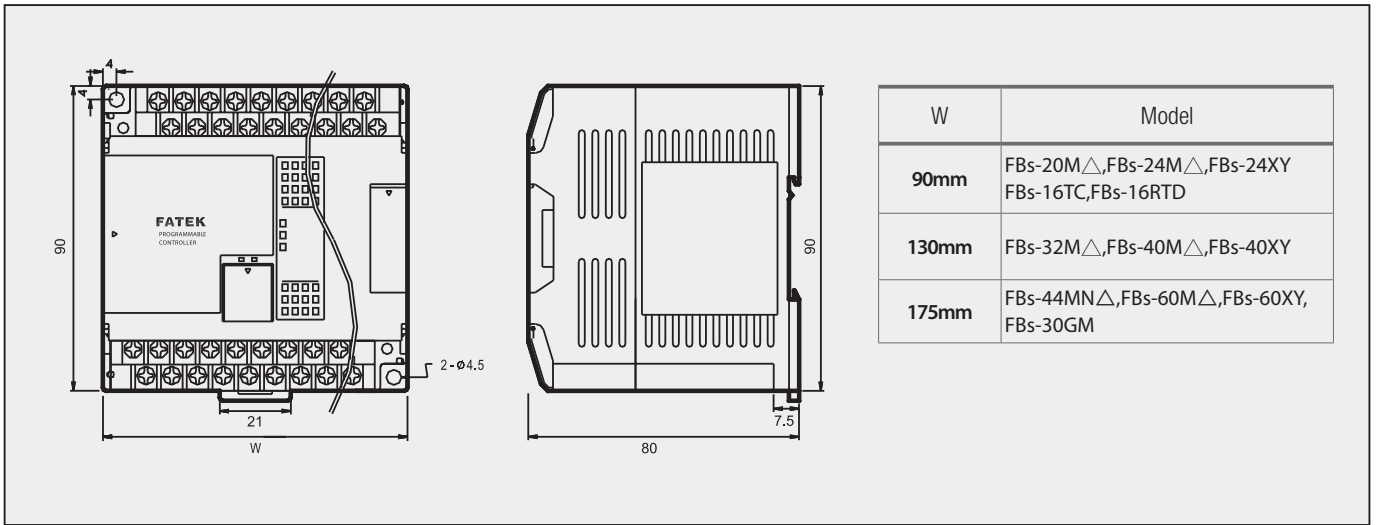
Category	NO.	Instruction	Derivative	Function
Timer		Tnnn		General timer instruction (T0 ~ T255)
		Cnnn		General counter instruction (C0 ~ C255)
Counter	7	UDCTR	D	16 or 32-bit up/down counter
		SET	DP	Set all bits of register or a discrete point to 1
Setting / Resetting		RST	DP	Clear all bits of register or a discrete point to 0
	114	Z-WR	P	Zone set or clear
Digital operation	4	DIFU		Take differential up of the node status to operand
	5	DIFD		Take differential down of the node status to operand
	10	TOGG		Toggle the coil status
Mathematical operation	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 registers
	25	MEAN	DP	Average of N consecutive registers
	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
	30	PID	P	PID calculation
	31	CRC16	P	CRC16 calculation
	32	ADCNV		Offset and full scale conversion for analog input
	33	LCNV	P	Linear conversion
34	MLC	P	Multiple linear conversion	

Category	NO.	Instruction	Derivative	Function
Mathematical operation	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
	214	FLN	P	Floating point napierian logarithm
	215	FEXP	P	Floating point exponential function
	216	FLOG	P	Floating point logarithm
217	FPOW	P	Floating point power function	
218	FASIN	P	Floating point arc sine function	
219	FACOS	P	Floating point arc cosine function	
220	FATAN	P	Floating point arc tangent function	
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

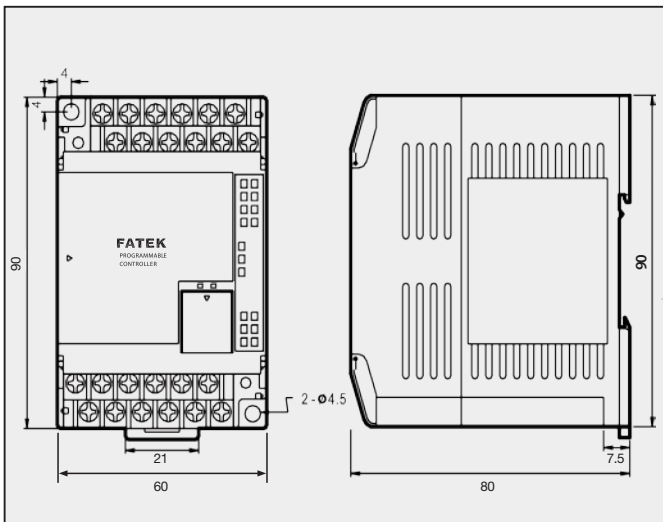
(Continue)

Category	NO.	Instruction	Derivative	Function	Category	NO.	Instruction	Derivative	Function
Move operation	8	MOV	DP	Move S to D	Accumulative Timer	87	T.01S		0.01S time base accumulative timer
	9	MOV/	DP	Inverse S and move to D		88	T.1S		0.1S time base accumulative timer
	40	BITRD	DP	Move the Bit-N of S to FO		89	T1S		1S time base accumulative timer
	41	BITWR	DP	Write INB input to the Bit-N of D	Monitor and control	90	WDT	P	Set watchdog timer
	42	BITMV	DP	Move the Bit-Ns of S to the Bit -Nd of D		91	RSWDT	P	Reset watchdog timer
	43	NBMV	DP	Move the Nibble-Ns of S to the Nibble-Nd of D	HSC/HST	92	HSCTR	P	Read CV of hardware high speed counter/timer
	44	BYMV	DP	Move the Byte-Ns of S to the Byte-Nd of D		93	HSCTW	P	Write CV or PV of hardware high speed counter/timer
	45	XCHG	DP	Exchange Da and Db	Text	94	ASCWR		Output ASCII message
	46	SWAP	P	Swap the High-Byte of D with the Low-Byte of D		Ascend/Descend	95	RAMP	
	47	UNIT	P	Take Nb0 of N words to form a Word	98		RAMP2		Tracking type RAMP function for D/A output
	48	DIST	P	Distribute N Nb of S to Nb0 of N Words	Com-munication	150	M-BUS		Modbus protocol communication
	49	BUNIT	P	Low byte of words re-unit		151	CLINK		Fatek CPU link/Generic protocol communication
	50	BDIST	P	Words split into multi-byte	Table operation	100	R→T	DP	Move register Rs to the table Td
	160	RW-FR	DP	File register access		101	T→R	DP	Move the Rp of table Ts to register Rd
	161	WR-MP		Write memory pack		102	T→T	DP	Move the Rp of table Ts to the Rp of table Td
	162	RD-MP	P	Read memory pack		103	BT_M	DP	Move table Ts to table Td
Shift / Rotation	6	BSHF	DP	Shift D right 1 bit or left 1 bit		104	T_SWP	DP	Swap Ta and Tb
	51	SHFL	DP	Shift D left N bits		105	R-T_S	DP	Search Rs from table Ts
	52	SHFR	DP	Shift D right N bits		106	T-T_C	DP	Compare table Ta and table Tb
	53	ROTL	DP	Rotate D left N bits		107	T_FIL	DP	Fill Rs into Td table
	54	ROTR	DP	Rotate D right N bits		108	T_SHF	DP	Shift table left or right
	Code conversion	20	→BCD	DP		Convert S into BCD	109	T_ROT	DP
21		→BIN	DP	Convert S into Binary		110	QUEUE	DP	First in first out (Queue) instruction
55		B→G	DP	Binary to Gray code conversion		111	STACK	DP	First in last out (Stack) instruction
56		G→B	DP	Gray code to Binary conversion		112	BKCOMP	DP	Compare Rs with zone defined by two tables
57		DECOD	P	Decode the Ns ~ Ni of S	113	SORT	DP	Sort the table	
58		ENCOD	P	Encode the Ns ~ Ni of S	Matrix operation	120	MAND	P	AND two matrixes
59		→7SG	P	Convert N+1' Nb of S into 7-segment code		121	MOR	P	OR two matrixes
60		→ASC	P	Convert character/number into ASCII code		122	MXOR	P	Exclusive OR (XOR) two matrixes
61	→SEC	P	Convert hour, minute, second by seconds	123		MXNR	P	Exclusive NOR (XNR) two matrixes	
62	→HMS	P	Convert second by hour, minute and second	124		MINV	P	Inverse matrix	
63	→HEX	P	Convert ASCII code into hexadecimal	125		MCMP	P	Compare two matrixes and find out the differences between two matrixes	
64	→ASCII	P	Convert hexadecimal into ASCII code	126		MBRD	P	Read the bit of a matrix pointed by pointer	
Flow control	0	MC		Master control loop start	127	MBWR	P	Write the bit of a matrix pointed by pointer	
	1	MCE		Master control loop end	128	MBSHF	P	Shift matrix left 1 bit or right 1 bit	
	2	SKP		The start of the skip loop	129	MBROT	P	Rotate matrix left 1 bit or right 1 bit	
	3	SKPE		The end of the skip loop	130	MBCNT	P	Count the number of bit whose value is 1 or 0 in the matrix	
		END		Terminate the execution of program (for debugging)	NC position control	140	HSPSO		High-speed pulse output
	22	BREAK	P	Exit from FOR-NEXT loop		141	MPARA		Set NC position parameters
	65	LBL		Define the string as label		142	PSOFF	P	Force to stop pulse output
	66	JMP	P	Jump instruction		143	PSCNV	P	Convert pulse count into mechanical value for display
	67	CALL	P	Call instruction		147	MHSPO		Multi-Axis high speed pulse output
	I/O instruction	68	RTS		Subroutine return instruction	148	MPG		Manual pulse generator for positioning
		69	RTI		Interrupt return instruction	Interrupt control	145	EN	P
70		FOR		The start of the FOR loop	146		DIS	P	Disable external input or peripheral interrupt
71		NEXT		Return point of FOR loop	In Line Comparison Instructions	170	=	D	Equal to compare
74		IMDIO	P	Refresh I/O immediately		171	>	D	Greater than compare
76		TKEY	D	10 keys input convenient instruction		172	<	D	Less than compare
77		HKEY	D	16 keys input convenient instruction		173	<>	D	Not equal to compare
78		DSW	D	Thumbwheel switch input convenient instruction		174	>=	D	Greater than or equal to compare
79		7SGDL	D	7-segment multiplexing display convenient instruction		175	=<	D	Less than or equal to compare
80		MUXI		Multiplexing input convenient instruction	Other	190	STAT		Read system status
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		High speed PWM pulse output						

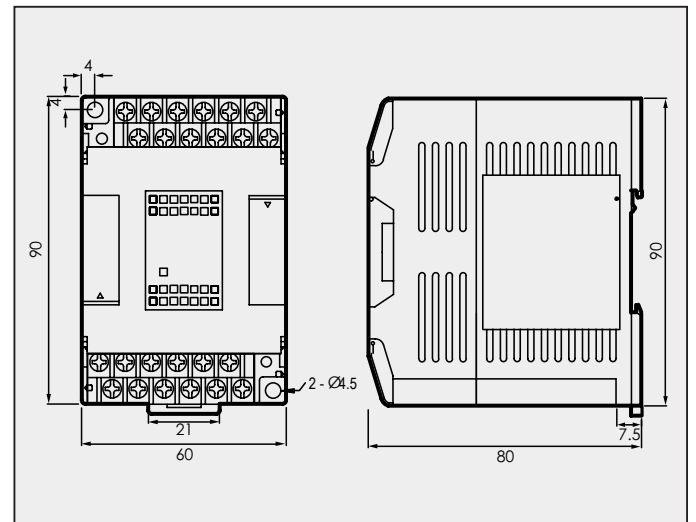
**Figure 1**



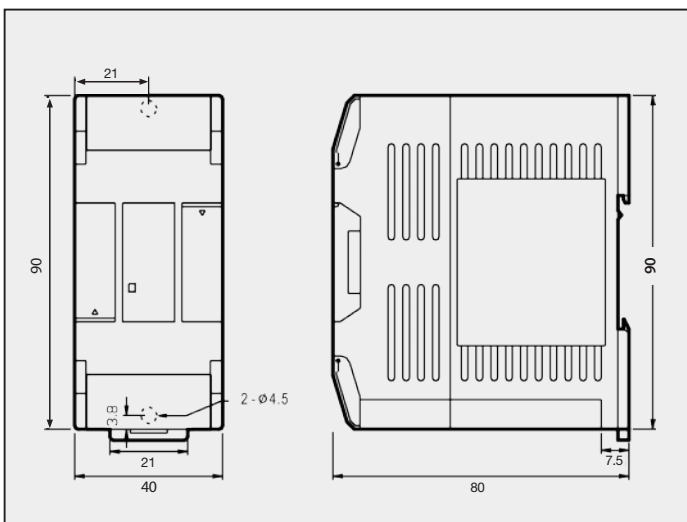
**Figure 2**



**Figure 3**



**Figure 4**



**Figure 5**

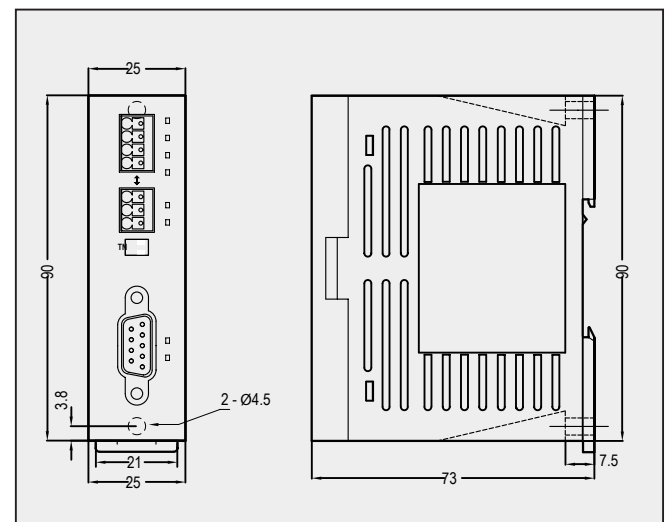




Figure 6

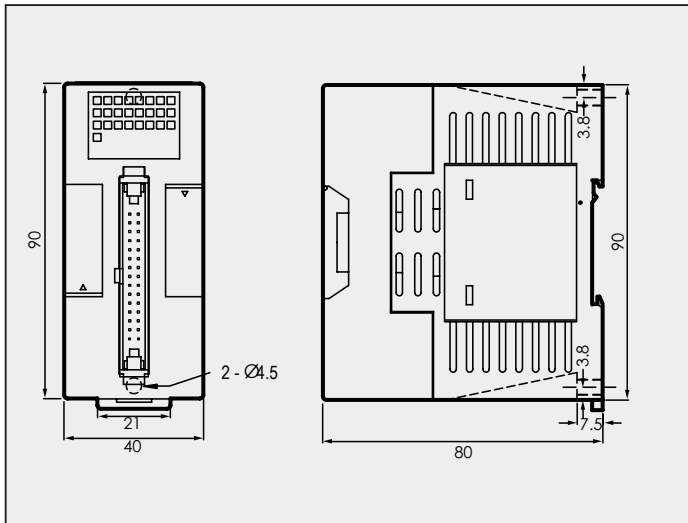


Figure 7

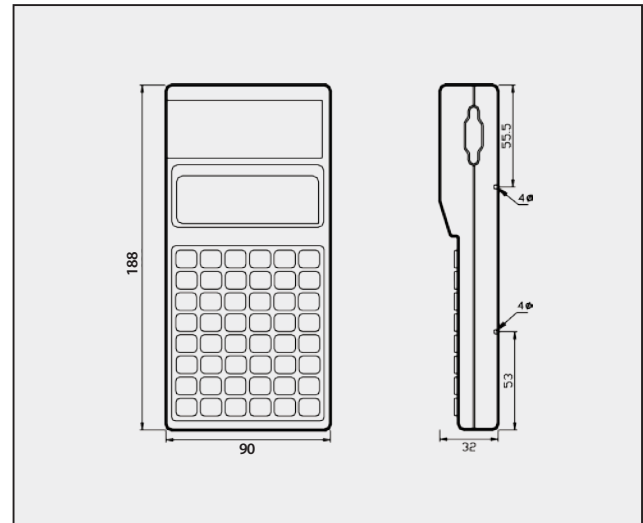


Figure 8

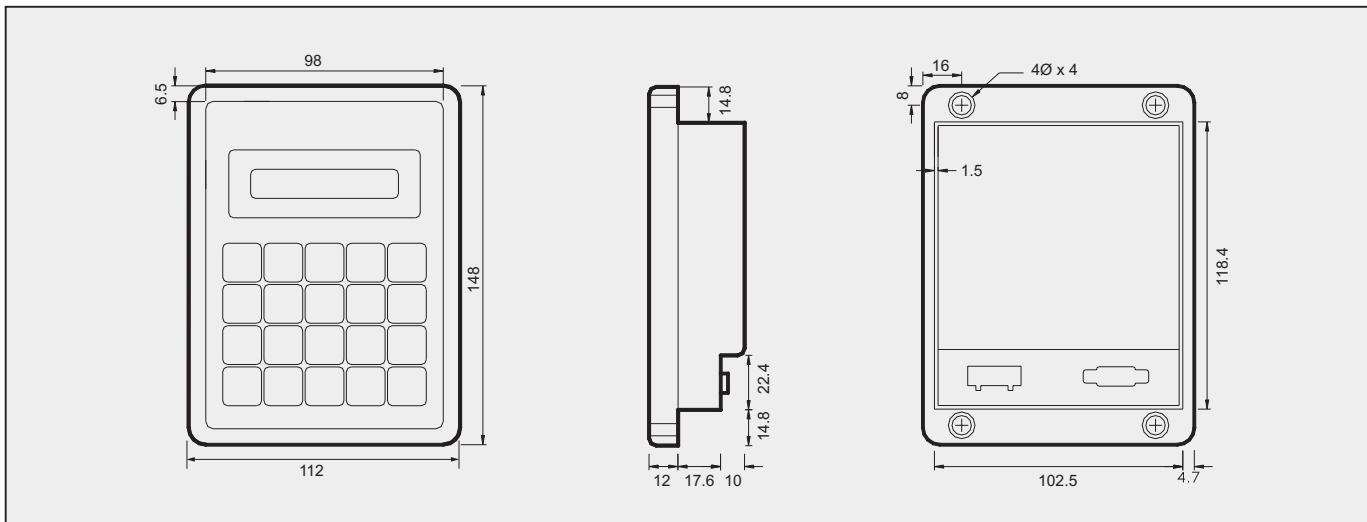
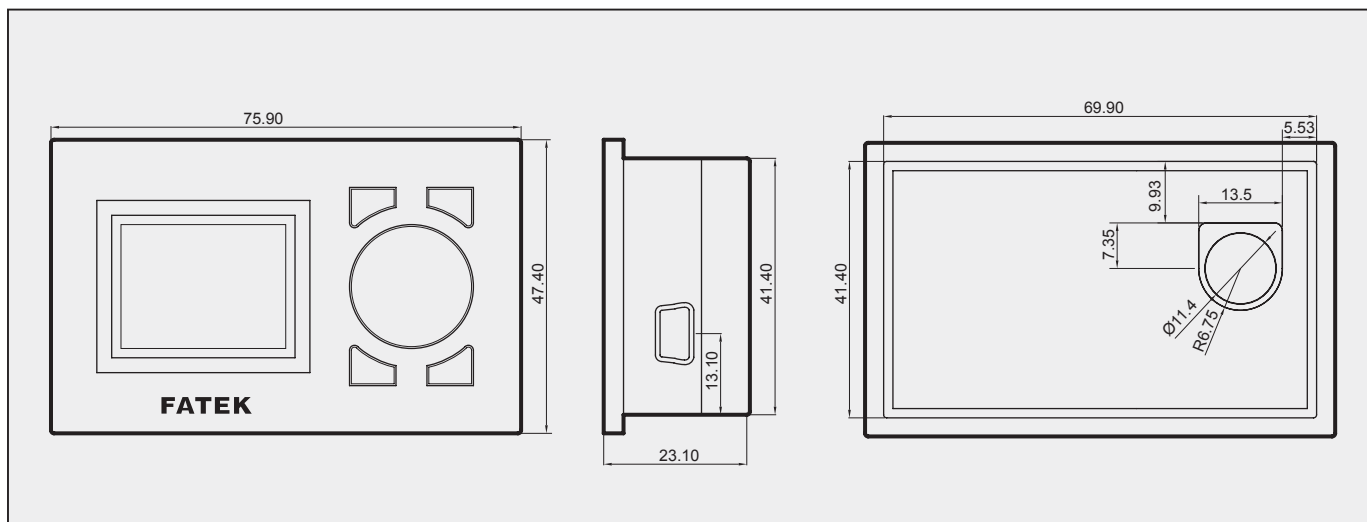


Figure 9



Module Name		Specifications	
Basic Main Units	FBs-10MA◇△-◎	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); built-in RTC; I/O is not expandable	
	FBs-14MA◇△-◎	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 points high speed 100KHz, 4 points medium speed 20KHz); 1 RS232 or USB port(expandable up to 3); built-in RTC; I/O is not expandable	
	FBs-20MA◇△-◎	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); built-in RTC	
	FBs-24MA◇△-◎	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); built-in RTC	
	FBs-32MA◇△-◎ FBs-32MB◇△-◎	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); built-in RTC; (MB is detachable terminal block)	
	FBs-40MA◇△-◎ FBs-40MB◇△-◎	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); built-in RTC; (MB is detachable terminal block)	
	FBs-60MA◇△-◎ FBs-60MB◇△-◎	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); built-in RTC; (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 (4 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, 6 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-4Y◇	4 points relay or transistor output
		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	
	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.		
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	
Potential Meter Module	FBs-4PT	4 channels, 14-bit potential meter input module (Impedance range: 1~10K Ω)	
Synchronous Serial Interface Module	FBs-3SSI	3 channels, Synchronous Serial Interface Module	

Module Name		Specifications	
Right Side Expansion Modules	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
	Load Cell Module	FBs-1LC	1 channel, load cell measurement module with 16-bit resolution (including sign bit)
		FBs-2LC	2 channels, load cell measurement module with 16-bit resolution (including sign bit)
		FBs-2LCH	2 channels, high speed load cell measurement module with 120Hz, 16-bit resolution (including sign bit)
FBs-2LCHR	2 channels, high speed load cell measurement module with 5Hz, 18-bit resolution (including sign bit)		
Angular Resolver Decoder Module	FBs-RZR	Angular Resolver Decoder Module	
Left Side Expansion Modules	Communication Modules	FBs-B2C	Bluetooth to RS232 wireless data communication converter
		FBs-W2C	Wi-Fi to RS232 wireless data communication converter
		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-CMECAT	EtherCAT master communication module
		FBs-CMZBR	ZigBee communication repeater
		FBs-CMGSM	GSM wireless communication module(2G)
		FBs-CM25C	General purpose RS232 to RS485/RS422 communication interface converter with optical isolation
		FBs-CM5R	General purpose RS485 repeater with optical isolation
		FBs-CM5H	General purpose 4 ports RS485 HUB with photocouple isolation, RS485 connect as star cnnction
		FBs-CMEH	Multi-function Ethernet-to-485 communication module
		FBs-CM5EH	Multi-function Ethernet-to-485 communication module
		FBs-CMWLC	Wireless communication module
	FBs-CM55I	Isolated RS485 communication module	
	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-CBES	1 port 10/100 Base T Ethernet communication board
		FBs-CBEH	1 port 100 Base T Ethernet communication board
		FBs-CBEH2A	Multi-function Ethernet communication board with 2 channels Analog input
		FBs-CBCAN	1 port CANopen communication board
		FBs-CBCANH	1 port CANopen master gatewayd
		FBs-BSSI	2 channels, Synchronous Serial Interface 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
		FBs-1HLC5	1 channel, high precision weighing control module with 24-bit resolution
	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		16 X 2 LCD character display, 20 keys keyboard, 24VDC power supply, RS485 communication interface	
FBs-DAP-C	16 X 2 LCD character display, 20 keys keyboard, 5VDC power supply, RS232 communication interface		
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-DR-200	MD4M to 90° MD4M communication cable (FBs main unit Port 0 RS232 connect to FBs-PEP/PEPR), length 200cm	
High Density DIO Connection 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.	

1. ◊ : R— Relay output ; T — Transistor SINK(NPN) output  
J — Transistor SOURCE (PNP) output

2. Δ : 2 — built-in RS232 port ; U — built-in USB port (non-standard)

3. © : AC — 100-240VAC power supply  
D12 — 12VDC power supply  
D24 — 24VDC power supply

4. The unmarked frequencies of Digital Input (DI) or Digital Output (DO) are low speed.



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