

**FATEK**<sup>®</sup> 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



.....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 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.

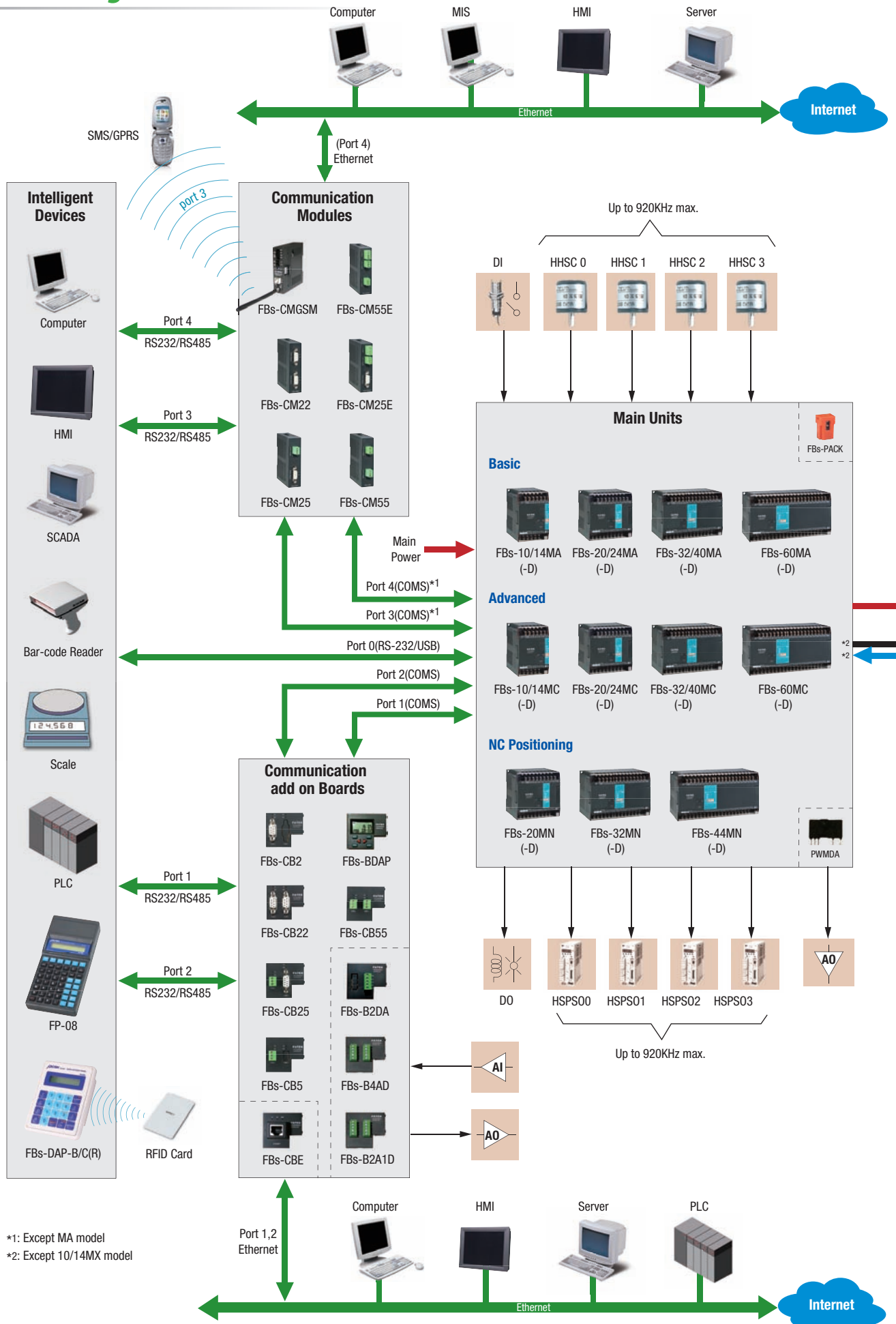
### Open communication driver

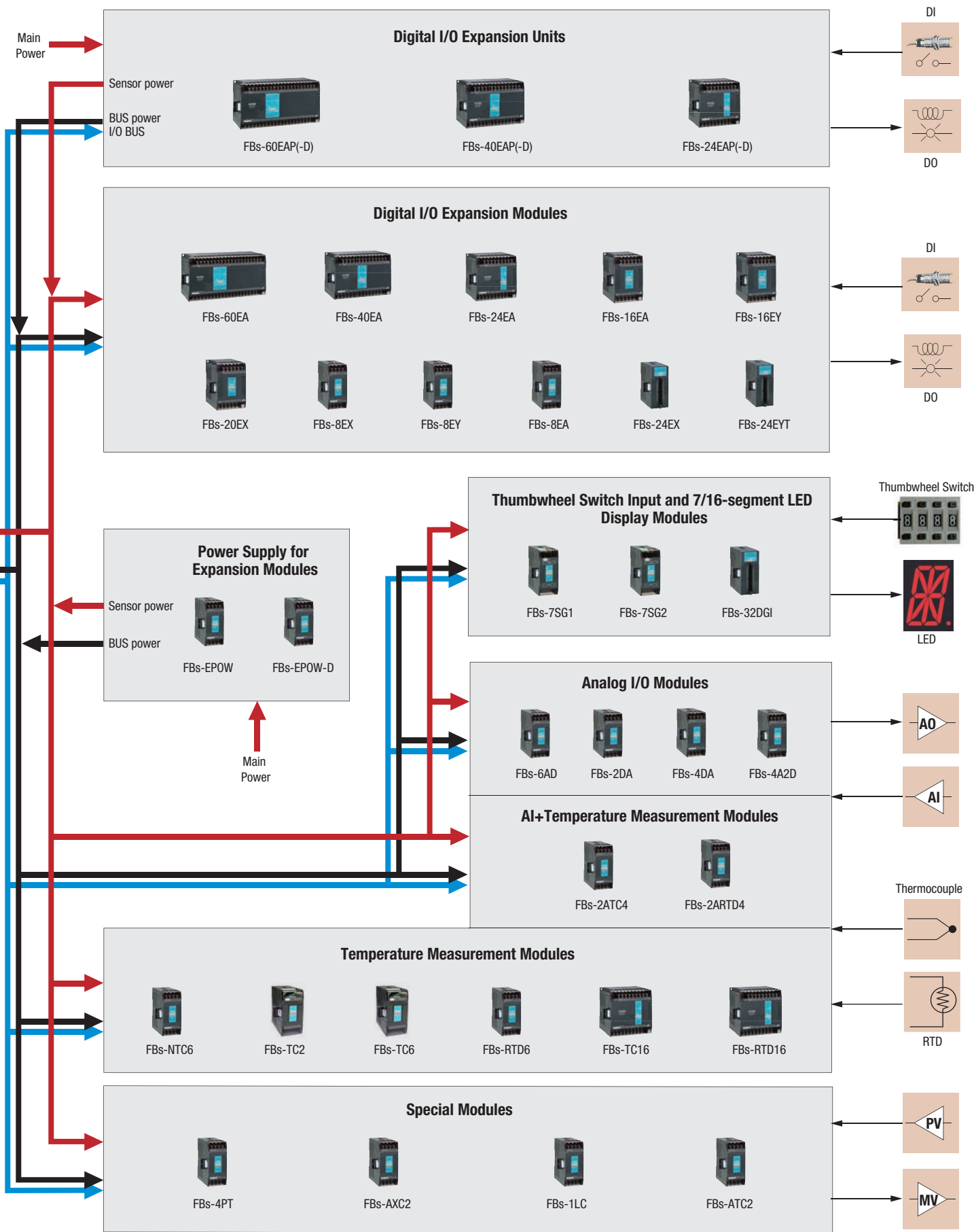
The open communication protocol of the FBs-PLC is supported by all major brands of graphic supervisory software (SCADA) and leading brands of Human-Machine Interfaces (HMI) and can be directly connected with the FBs-PLC via serial and Ethernet interface. FATEK also provides Modbus protocol and FATEK 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





# 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 (1 axis) |                   | 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<br>-15%/+10%, 21W | 15VDC/24VDC<br>-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 |
|                  | Relay                | AC/DC(2A)                     |       | 4 points               | —        | —        | 8 points | —        | 8 points | —         | —         |
| Digital output   | Transistor (5~30VDC) | Low speed (0.5A)              |       | —                      | 4 points | —        | —        | 8 points | —        | 8 points  | —         |
|                  |                      | High density Low speed (0.1A) |       | —                      | —        | —        | —        | —        | —        | —         | —         |
| 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              |           |
|                  | Relay                  | AC/DC(2A)                     |       | 16 points              | —         | —                         | —         | 10 points              | —         |
| Digital output   | 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 |           |
|                  | Relay                  | AC/DC(2A)                     |       | 16 points              | —         | 24 points | —         |
| Digital output   | Transistor (5 ~ 30VDC) | Low speed (0.5A)              |       | —                      | 16 points | —         | 24 points |
|                  |                        | High density Low speed (0.1A) |       | —                      | —         | —         | —         |
| 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.<br>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:<br>J (-200~1200°C) E (-190~1000°C)<br>K (-190~1300°C) T (-190~380°C)<br>R ( 0~1800°C) B ( 350~1800°C)<br>S ( 0~1700°C) N (-200~1000°C) |                |                        | 3-wire RTD sensor (JIS or DIN)<br>Pt100(-200°C~850°C)<br>Pt1000(-200°C~600°C) |                | NTC sensor<br>10 KΩ at 25°C, B<br>optional<br>-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<br>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<br>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<br>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) |



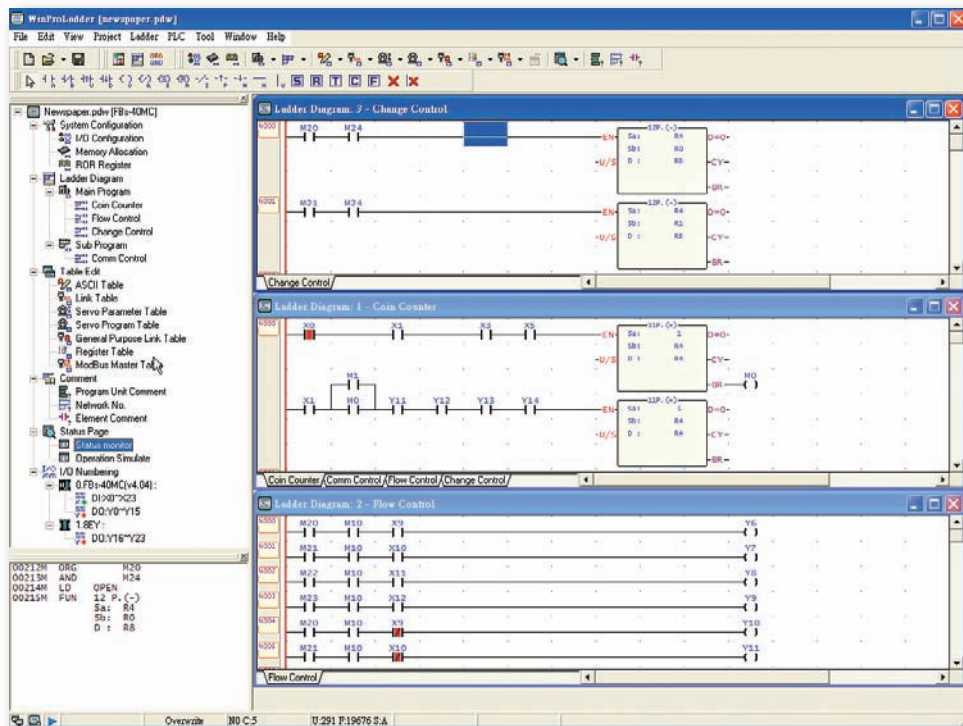
| Spec.    | Model | FBs-232P0-9F-150   | FBs-232P0-9M-400   | FBs-USBP0-180   | HD30-22AWG-200   |
|----------|-------|--|--|---|--|
| Features |       | Dedicated communication cable for FBs main unit port 0 (RS232) to 9-pin D-sub female connector, length 150cm | Dedicated communication cable for FBs 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

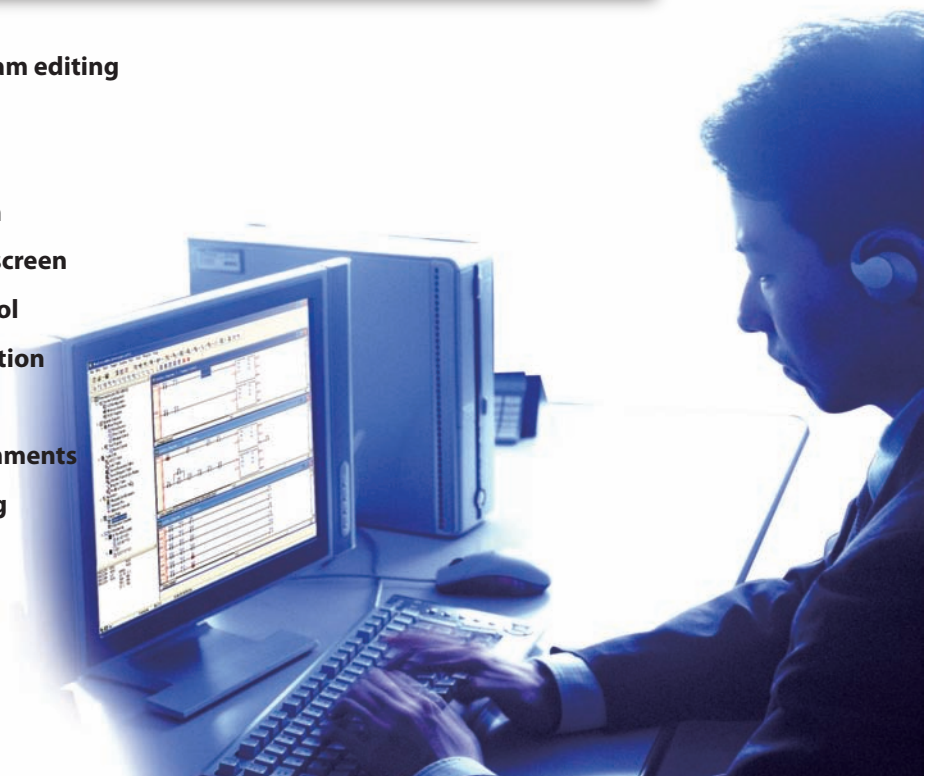
## WinProLadder programming software

### 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   |   |
|                             |                                    | Port3   |   |
|                             | FBs-CM25E                          | 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.<br>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)   |   |

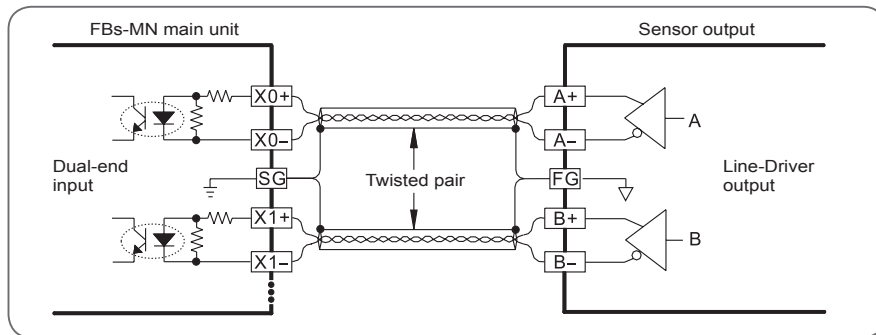
# General Specifications

## Digital Input (DI) specifications

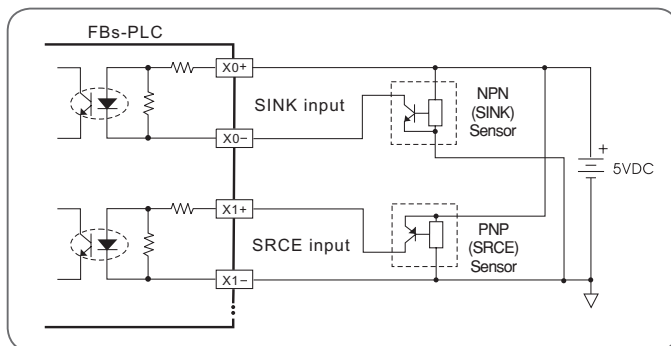
| Specification             | Item | 5VDC differential input                            |  | 24VDC single-end input            |                             |                        | Note  |
|---------------------------|------|--|--|-----------------------------------|-----------------------------|------------------------|---|
|                           |      | 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)<br>+AHF (470nS)                   |  | DHF (0mS ~ 15mS)<br>+ AHF (4.7μS) |                             | AHF (4.7mS)            | DHF: Digital Hardware Filter<br>AHF: Analog Hardware Filter |

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

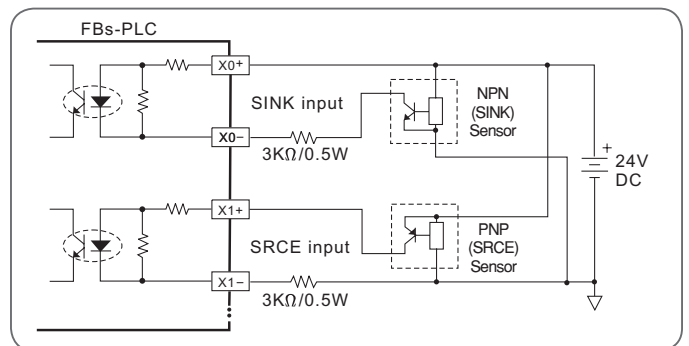
### Wiring of 5VDC differential input (with frequency up to 920KHz, for high speed or high noise environments)



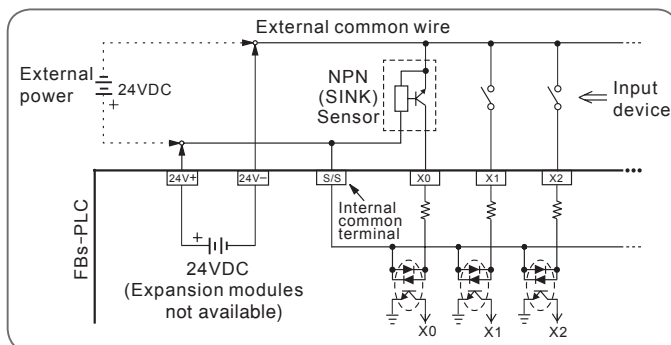
### Wiring of 5VDC differential input to 5VDC single-end SINK/SRCE input (Max. 200KHz)



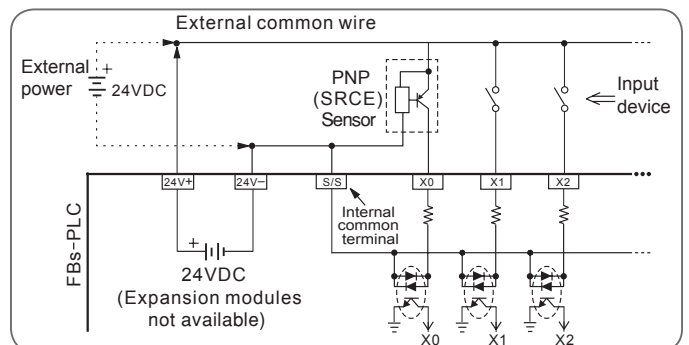
### Wiring of 5VDC differential input to 24VDC single-end SINK/SRCE input (Max. 200KHz)



### Wiring of 24VDC single-end SINK input



### Wiring of 24VDC single-end SRCE input



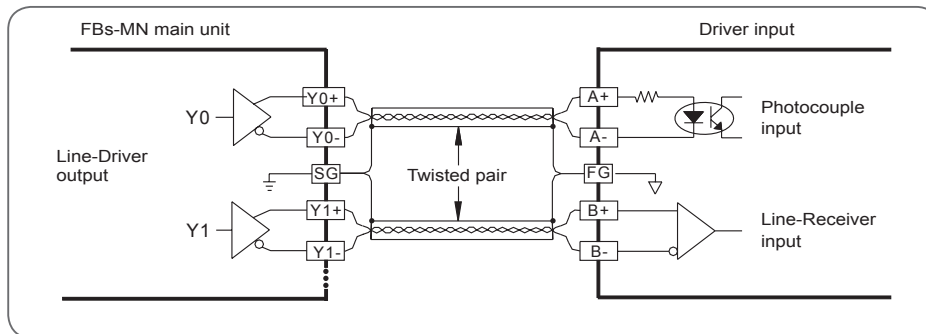
## Digital Output (DO) specifications

| 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<br>0.1A (24EYT)   | 2A/single, 4 A/common<br>80VA                                |                                      |
|   | Inductive |   |   |                        |                        |  |                                      |
| 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 |                                      |

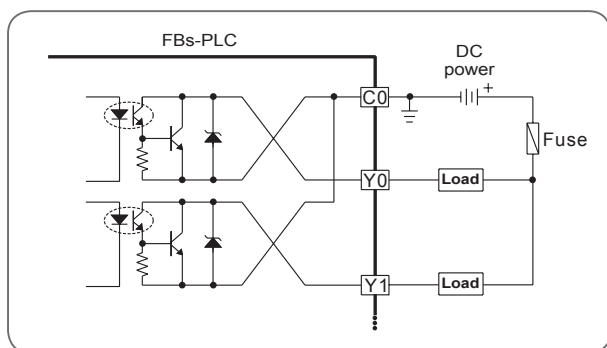
\*1 : Half of the maximum frequency while A/B phase output

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

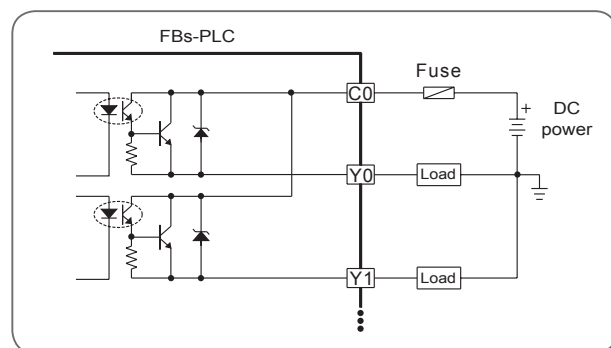
### Wiring of 5VDC differential output (with frequency up to 920KHz, for high speed or high noise environments)



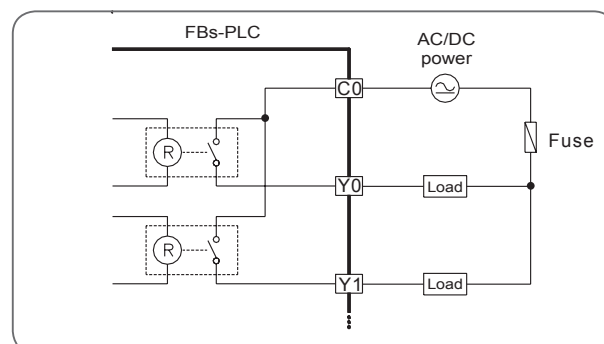
### Wiring of transistor single-end SINK output



### 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   | Permanent installation |
|   |                   | Maximum | 40°C  |                        |
|   | Open space        | Minimum | 5°C   |                        |
|   |                   | Maximum | 55°C  |                        |
| Storage temperature                     |                   |         | -25°C ~ +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    |                        |
|   | 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   |

## 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)*<br>M1400 ~ M1911 (512)   | Can be configured as retentive type                                       |   |
|                               |  |                                 | Retentive   | M800 ~ M1399 (600)*   | Can be configured as non-retentive type                                   |   |
|                               |  | Special relay                   | M1912 ~ M2001 (90)  |   |   |   |
|                               | S  | Step relay                      | Non-retentive   | S0 ~ S499 (500)*  | S20 ~ S499 can be configured as retentive type                            |   |
|                               |  |                                 | Retentive   | S500 ~ S999 (500)*  | Can be configured as non-retentive type                                   |   |
| T                             | Timer "Time-Up" status contact             | T0 ~ T255 (256)                 |   |   |   |   |
| C                             | Counter "Count-Up" status contact          | C0 ~ C255 (256)                 |   |   |   |   |
| Register (Word data)          | TMR  | 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)*<br>DO ~ D3999 (4000)   | Can be configured as non-retentive type                                   |   |
|                               |  |                                 | Non-retentive   | R3000 ~ R3839 (840)*  | Can be configured as retentive type                                       |   |
|                               | HR ROR                                     | Data register                   | Retentive   | R5000 ~ R8071 (3072)*   | When not configured as ROR, it can serve normal register (for read/write) |   |
|                               |  |                                 | Read only register  | R5000 ~ R8071 can be set as ROR ~ default setting is (0)*   | ROR is stored in special ROR area and not occupy program space            |   |
|                               |  |                                 | File register   | F0 ~ F8191 (8192)   | Must save/retrieved via special commands                                  |   |
|                               | IR   | Input register                  | R3840 ~ R3903 (64)  | Corresponding to external numeric input   |   |   |
|                               | OR   | Output register                 | R3904 ~ R3967 (64)  | Corresponding to external numeric output  |   |   |
|                               | SR   | Special system register         |   | R3968 ~ R4167 (197), 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"> <li>• Total number of HHSC and SHSC is 8</li> <li>• HHSC can be converted into 32-bit/0.1mS time base High-Speed Timer (HST)</li> <li>• Half of maximum frequency while A/B input</li> </ul> |   |   |
|                               |  | 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)<br>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)<br>>47 μS (for Medium speed input)<br>>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 )<br>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,<br>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,<br>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,<br>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,<br>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                        |  |
|                        |         | 7           | UDCTR                       | D  |
| 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  |
|                        | 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      | (x)         | DP                          | Sa x 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                                       |
| Comparison             | 36   | XNR         | DP                                      | Sa XNR Sb                                       |
|                        | 17   | CMP         | DP                                      | Value Compare                                   |
|                        | 37   | ZNCMP       | DP                                      | Zone Compare                                    |

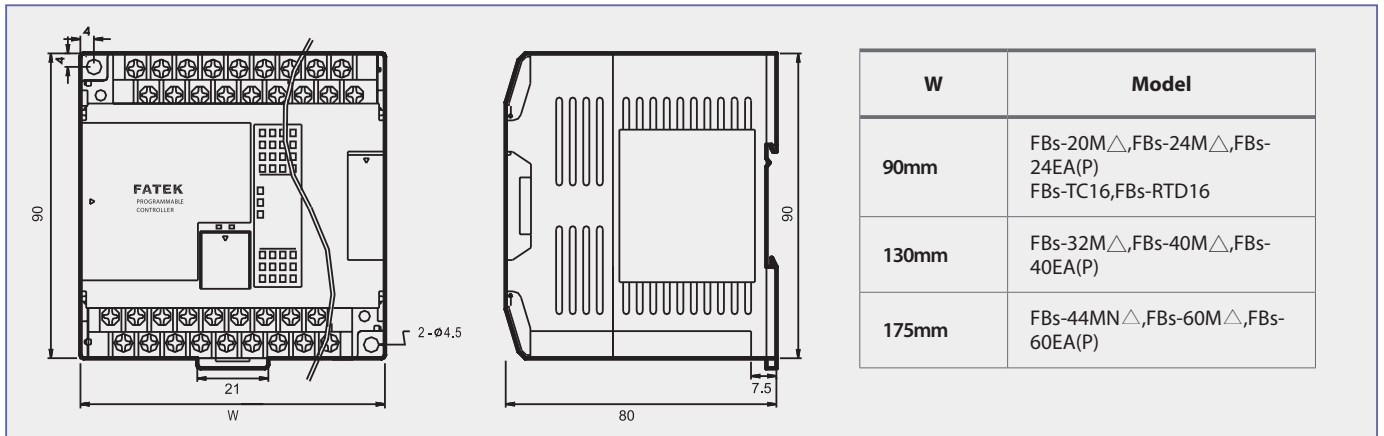
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| Category         | NO.    | Instruction | Derivative                          | Function  |
|------------------|--------|-------------|-------------------------------------|---|
| Move operation   | 8      | MOV         | DP                                  | 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 ~ NI of S                               |
|                  | 58     | ENCOD       | P                                   | Encode the Ns ~ NI 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 |

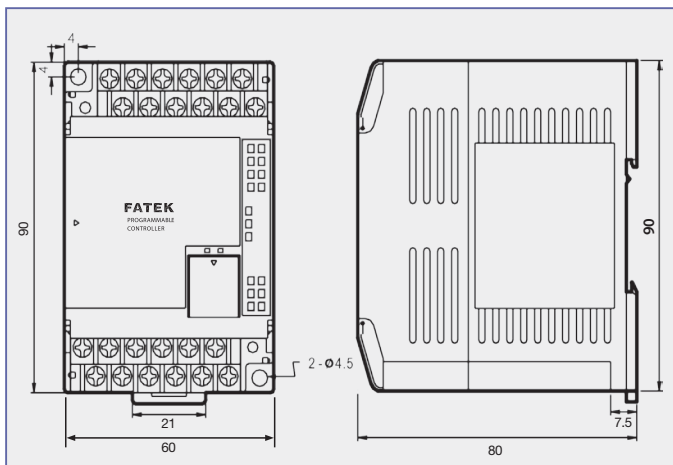
| Category            | NO.                | Instruction | Derivative  | Function   |
|---------------------|--------------------|-------------|---|--|
| I/O instruction     | 80                 | MUXI        |   | Multiplexing input convenient instruction                              |
|                     | 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   |  |
| 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_SWAP      | 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                | BKCMP       | 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                                |
| 130                 | MBCNT              | P           | Count the number of bit whose value is 1 or 0 in the matrix |  |
| NC position control | 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

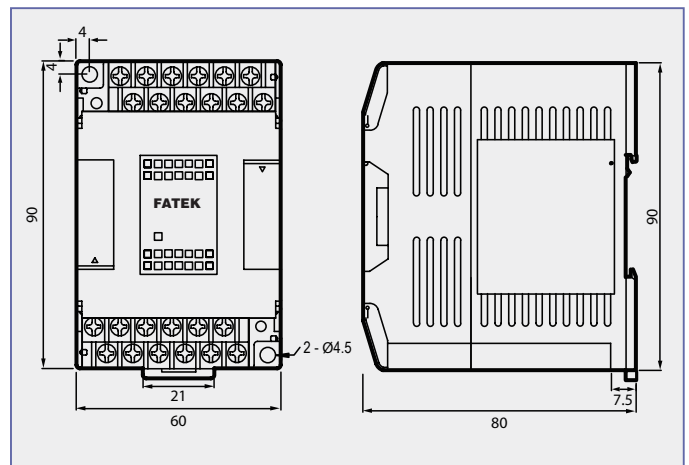
**Figure 1**



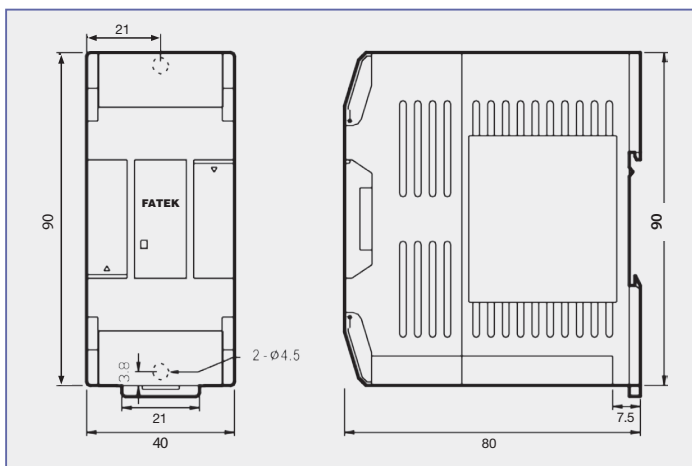
**Figure 2**



**Figure 3**



**Figure 4**



**Figure 5**

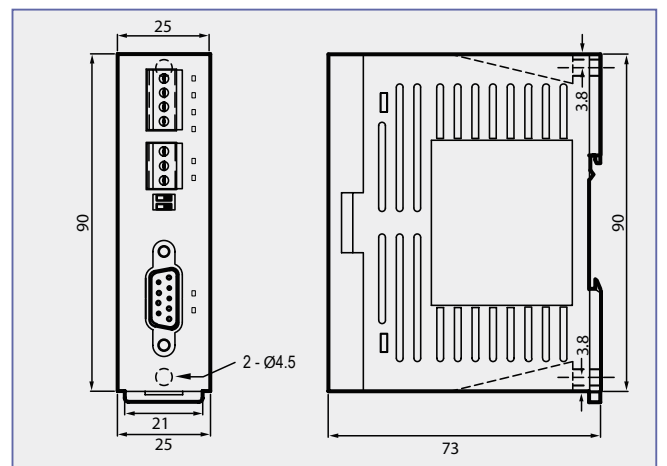




Figure 6

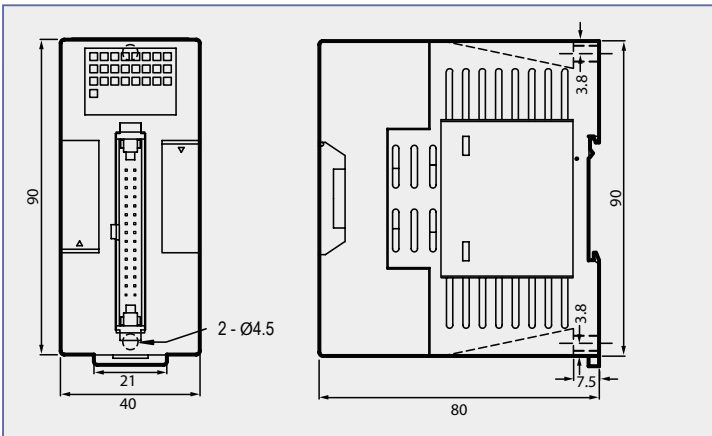


Figure 7

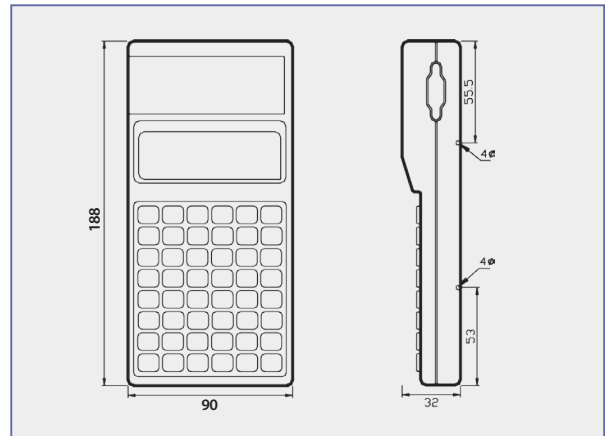
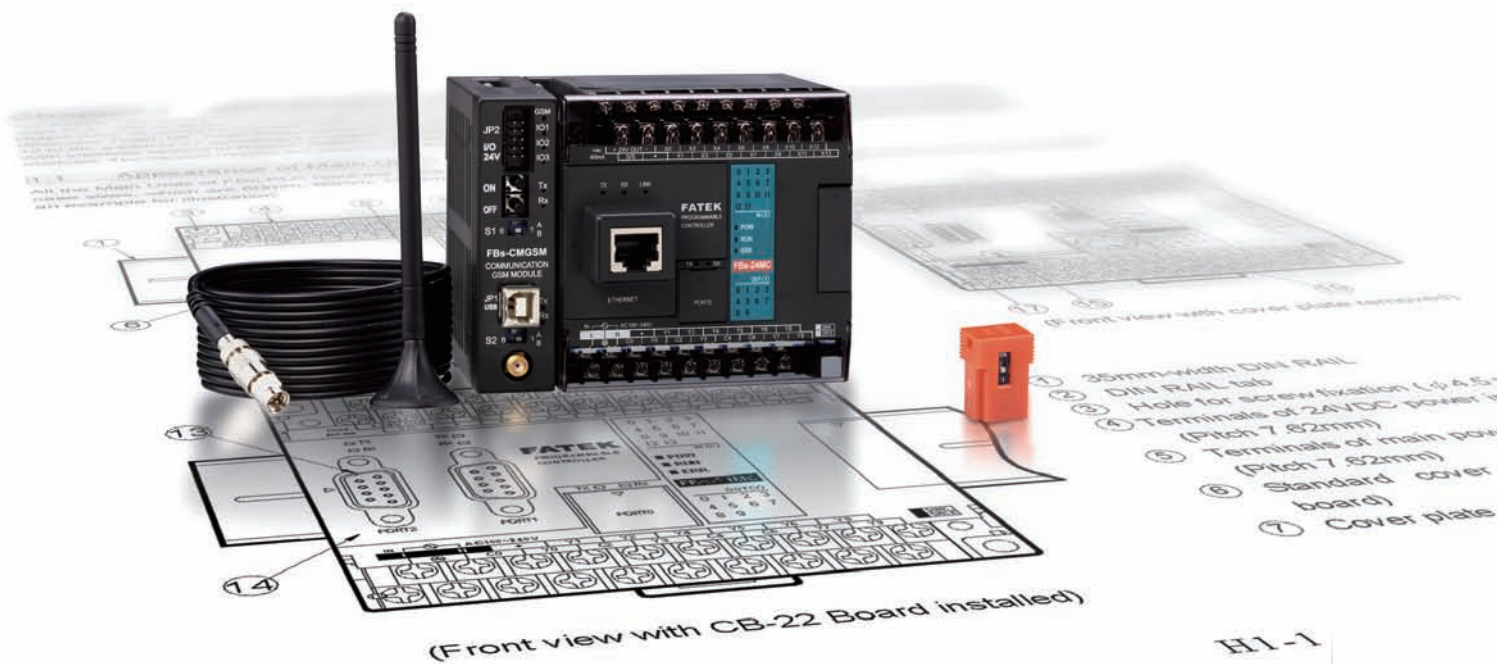
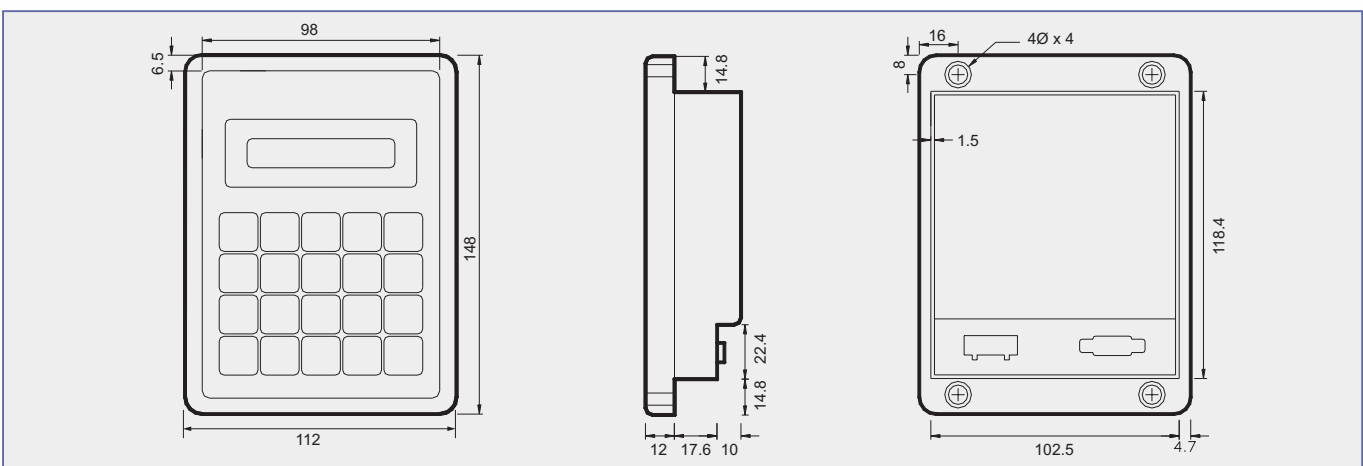


Figure 8



# 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,          |

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