FATEK® The Brand You Can Rely on

Since 1992

# FBs - Series
## Programmable Logic Controller

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

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# .....more than a decade of unsurpassed


# "Quality" and "Functionality"

# Contents

# Features

## SoC-FATEK's Core Technology

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


## User friendly and powerful instruction sets

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

## Communication function (up to 5 ports including RS232, RS485, USB, Ethernet, CANopen® and GSM and ZigBee™ wireless communication)

Via the five high-speed communication ports included in the SoC, the FBs-PLC's communication capability is outstanding operating at a maximum speed of 921.6Kbps. Communications can be achieved using ASCII code or the double-speed binary code. Along with FATEK's standard protocol, Modbus ASCII/RTU/TCP or user-definable protocols are also available. The FBs-PLC also provides the option of 8 different communication boards and 10 different communication modules for various types of communication applications. With their high speed and functionality the FBs-PLC has the greatest number of communication ports than any other PLC in its class. Each communication port comes standard with LED indicators for transmission (TX) and reception (RX) to enable the user to monitor the operation.

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

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

## PLC & NC Control in one and Dedicated NC Positioning Language

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

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

The FBs-PLC includes up to 4 sets of hardware high-speed counters (HHSC) and 4 sets of software high-speed counters (SHSC). The highest counting frequency of a HHSC is 200KHz (MC) or 920KHz (MN). Each HHSC also has a clear and mask function. There are 8 counting modes including U/D, U/Dx2, P/R, P/Rx2, A/B, A/Bx2, A/Bx3 and A/Bx4 which makes the HHSC very powerful and efficient. For example, if the encoder, running at 200 pulses per revolution, adopts A/Bx4 mode the FBs-PLC can achieve the same result that 800 pulses per revolution encoder can provide. The counter is implemented in the hardware so as not to occupy CPU processing time. In addition, 4 sets of software high-speed counters (SHSC) has U/D, P/R, A/B 3 types of counting modes and the total counting frequency is 5KHz.

## High-speed timers (HST)

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

## FATEK's Powerful Communication Features

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

### Open communication driver

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

### Complete range of peripherals

In addition to over 200 models of main CPU units, the FBs-PLC also provides about 100 models of expansion I/O for selection. The expansion I/O modules include basic DI/O, AI/O and other communication modules, also include thumbwheel switch input module, 16/7 segment LED display module, 8 types (J, K, R, S, E, T, B, N) thermocouple, Pt100, Pt1000 RTD temperature measurement modules. There is also a new additions to the range including load cell module used in weighting, potential meter module used in measuring position, and a user-friendly voice module. The FBs-PLC also provides a FBs-DAP or FBs- PEP simple HMI which can be linked together with a single RS485 bus. The FBs-DAP or FBs-PEP can be a simple Timer/Counter editor or it can also be used as a simple human machine interface through the function of user definable keys and message display. The FBs-DAP or FBs-PEP can be equipped with a wireless RFID sensing module and can be applied to such applications as entrance control, parking equipment and elevator control amongst others.

### User-friendly operating environment

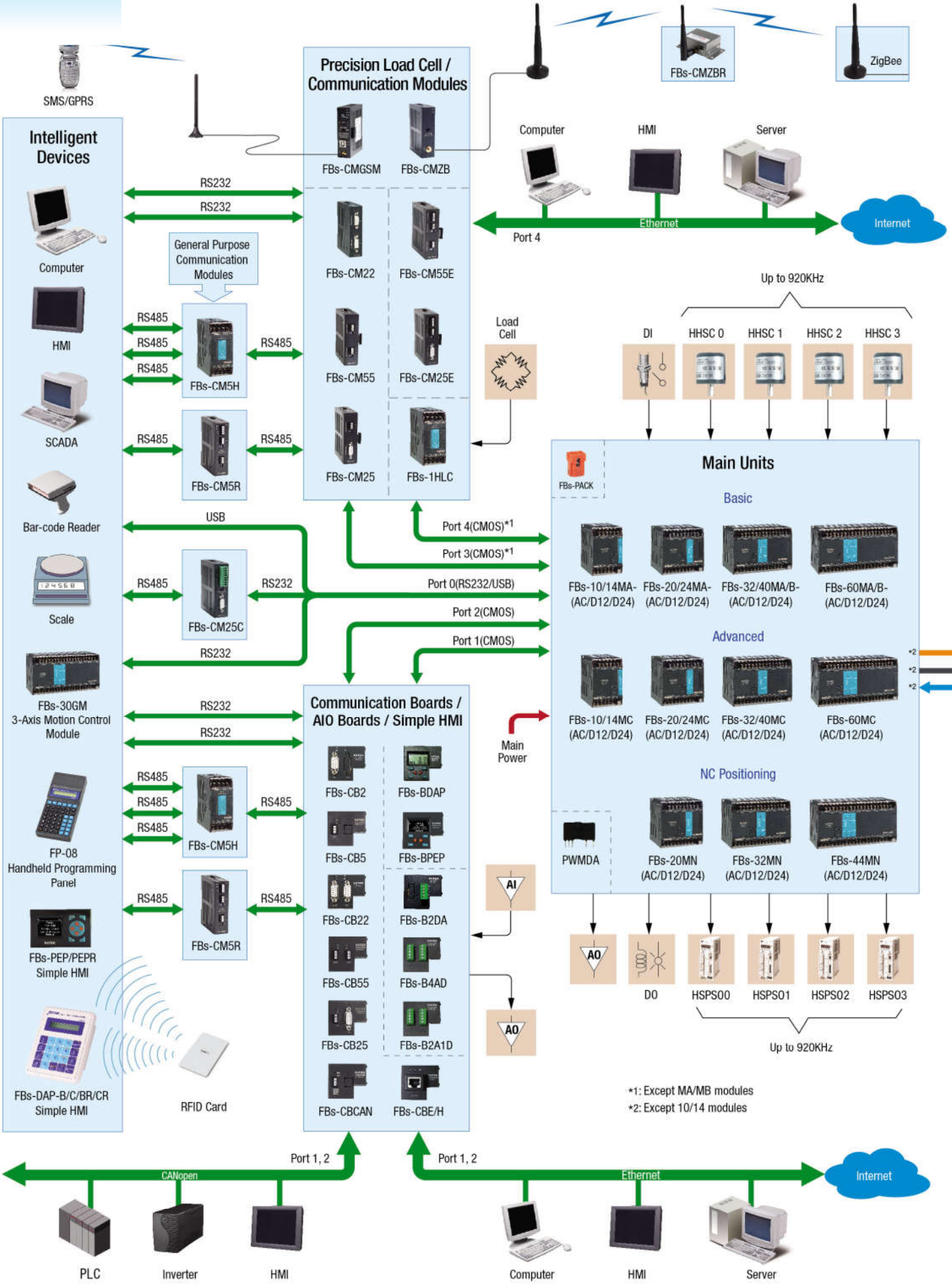
"WinProladder" is the Windows-based ladder diagram programming software for the FBs-PLC. It provides a user-friendly operating environment with editing, monitoring and debugging functions which allows the user to become familiar with the operation of the software in a very short time. The powerful editing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

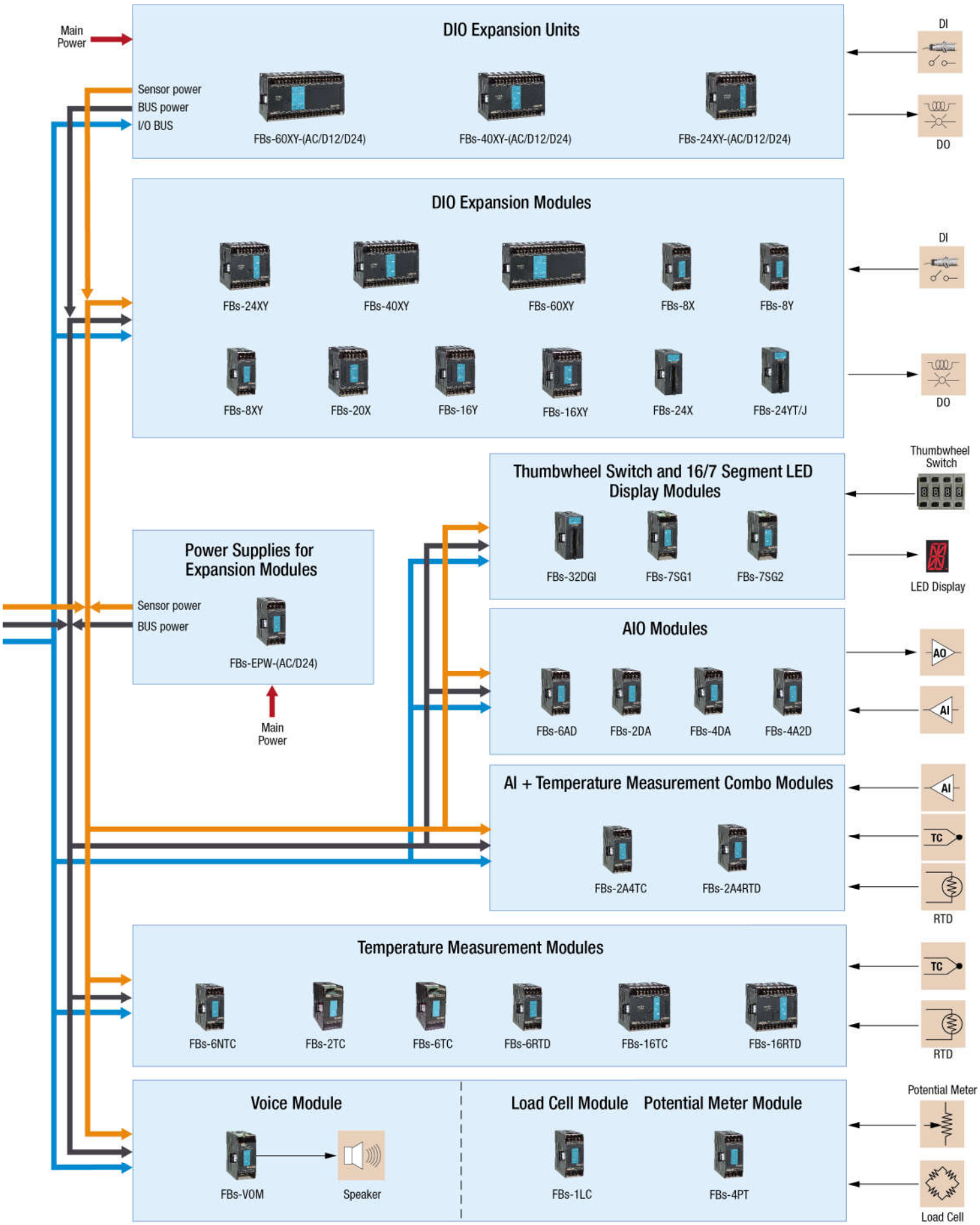
### Up to 36 points of captured input

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

### Single unit with 16 points of high-speed interrupt

The FBs-PLC provides 16 points of external interrupts. The interrupt is edge driven and the user can define which edge triggers the interrupt and can be positive, negative or both edges. The interrupts can perform high speed, emergency processing which can withstand the time jilter 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.


SMS/GPRS
FBs-CMZBR
ZigBee
Precision Load Cell / Communication Modules
FBs-CMGSM
FBs-CMZB
Intelligent Devices
Computer
HMI
Server
RS232
RS232
Port 4
Ethernet
Internet
Computer
HMI
SCADA
Bar-code Reader
Scale
FBs-30GM
3-Axis Motion Control Module
FP-08
Handheld Programming Panel
FBs-PEP/PEPR
Simple HMI
FBs-DAP-B/C/BR/CR
Simple HMI
RFID Card
General Purpose Communication Modules
FBs-CM22
FBs-CM55E
FBs-CM55
FBs-CM25E
FBs-CM25
FBs-1HLC
FBs-CM5H
FBs-CM5R
FBs-CM25C
RS485
RS232
USB
Load Cell
Up to 920KHz
DI
HHSC 0
HHSC 1
HHSC 2
HHSC 3
Main Units
FBs-PACK
Basic
FBs-10/14MA- (AC/D12/D24)
FBs-20/24MA- (AC/D12/D24)
FBs-32/40MA/B- (AC/D12/D24)
FBs-60MA/B- (AC/D12/D24)
Port 4(CMOS)*1
Port 3(CMOS)*1
Port 0(RS232/USB)
Port 2(CMOS)
Port 1(CMOS)
Advanced
FBs-10/14MC (AC/D12/D24)
FBs-20/24MC (AC/D12/D24)
FBs-32/40MC (AC/D12/D24)
FBs-60MC (AC/D12/D24)
Main Power
NC Positioning
PWMDA
FBs-20MN (AC/D12/D24)
FBs-32MN (AC/D12/D24)
FBs-44MN (AC/D12/D24)
Communication Boards / AIO Boards / Simple HMI
FBs-CB2
FBs-BDAP
FBs-CB5
FBs-BPEP
FBs-CB22
FBs-B2DA
FBs-CB55
FBs-B4AD
FBs-CB25
FBs-B2A1D
FBs-CBCAN
FBs-CBE/H
AI
AO
AO
DO
HSPS00
HSPS01
HSPS02
HSPS03
Up to 920KHz
*1: Except MA/MB modules
*2: Except 10/14 modules
Port 1, 2
CANopen
Port 1, 2
Ethernet
Internet
PLC
Inverter
HMI
Computer
HMI
Server


Main Power
DIO Expansion Units
Sensor power
BUS power
I/O BUS
FBs-60XY-(AC/D12/D24)
FBs-40XY-(AC/D12/D24)
FBs-24XY-(AC/D12/D24)
DI
DO
DIO Expansion Modules
FBs-24XY
FBs-40XY
FBs-60XY
FBs-8X
FBs-8Y
FBs-8XY
FBs-20X
FBs-16Y
FBs-16XY
FBs-24X
FBs-24YT/J
DI
DO
Thumbwheel Switch and 16/7 Segment LED Display Modules
FBs-32DGI
FBs-7SG1
FBs-7SG2
Thumbwheel Switch
LED Display
Power Supplies for Expansion Modules
Sensor power
BUS power
FBs-EPW-(AC/D24)
Main Power
AIO Modules
FBs-6AD
FBs-2DA
FBs-4DA
FBs-4A2D
AO
AI
AI + Temperature Measurement Combo Modules
FBs-2A4TC
FBs-2A4RTD
AI
TC
RTD
Temperature Measurement Modules
FBs-6NTC
FBs-2TC
FBs-6TC
FBs-6RTD
FBs-16TC
FBs-16RTD
TC
RTD
Voice Module
FBs-VOM
Speaker
Load Cell Module
FBs-1LC
Potential Meter Module
FBs-4PT
Potential Meter
Load Cell

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# 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 | | | -25~70°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 |

## AC power supply specifications

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

## DC power supply specifications

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

## Main unit specifications

* : Default, changable by user

| Item | | | Specification | Note |
|---|---|---|---|---|
| Execution speed | | | 0.33uS/Sequential instruction | |
| Program capacity | | | 20K Words | |
| Program memory | | | FLASH ROM or SRAM + Lithium battery for Back-up | |
| Sequential instruction | | | 36 instructions | |
| Function instruction | | | 326 instructions (126 kinds) | Include derivative instructions |
| Flow chart command (SFC) | | | 4 instructions | |
| Communication Interface | Port 0 (RS232 or USB) | | Communication speed 4.8k ~ 115.2Kbps (9.6Kbps)* | |
| | Port 1 ~ Port 4 (RS232, RS485 , Ethernet, CANopen or GSM) | | Communication speed 4.8k ~ 921.6Kbps (9.6Kbps)* | Port1 ~ 4 provides FATEK or Modbus RTU/ASC II or user defined communication protocol |
| | Maximum link stations | | 254 | |
| Digital (Bit status) | X | Input contact (DI) | X0~X255 (256) | Corresponding to external digital input |
| | Y | Output relay (DO) | Y0~Y255 (256) | Corresponding to external digital output |
| | TR | Temporary relay | TR0~TR39 (40) | |

(Continue)

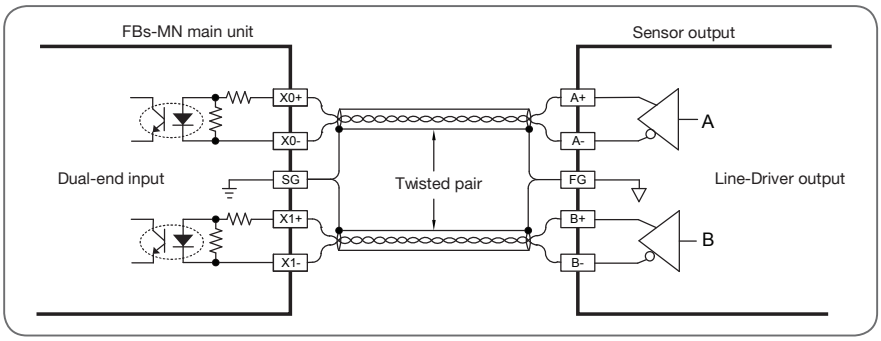
| Item | | | | | Specification | | | | Note |
|---|---|---|---|---|---|---|---|---|---|
| Digital (Bit status) | M | Internal relay | | Non-retentive | M0 ~ M799 (800)* | | | | Can be configured as retentive type |
| | | | | | M1400 ~ M1911 (512) | | | | |
| | | | | Retentive | M800 ~ M1399 (600)* | | | | Can be configured as non-retentive type |
| | | Special relay | | | M1912 ~ M2001 (90) | | | | |
| | S | Step relay | | Non-retentive | S0 ~ S499 (500)* | | | | S20 ~ S499 can be configured as retentive type |
| | | | | Retentive | S500 ~ S999 (500)* | | | | Can be configured as non-retentive type |
| | T | Timer "Time-Up" status contact | | | T0 ~ T255 (256) | | | | |
| | C | Counter "Count-Up" status contact | | | C0 ~ C255 (256) | | | | |
| Register (Word data) | TMR | Timer current value register | 0.01S Time base | | T0 ~ T49 (50)* | | | | T0 ~ T255 numbers for each time base can be adjusted. |
| | | | 0.1S Time base | | T50 ~ T199 (150)* | | | | |
| | | | 1S Time base | | T200 ~ T255 (56)* | | | | |
| | CTR | Counter current value register | 16-bit | Retentive | C0 ~ C139 (140)* | | | | Can be configured as non-retentive type |
| | | | | Non-retentive | C140 ~ C199 (60)* | | | | Can be configured as retentive type |
| | | | 32-bit | Retentive | C200 ~ C239 (40)* | | | | Can be configured as non-retentive type |
| | | | | Non-retentive | C240 ~ C255 (16)* | | | | Can be configured as retentive type |
| | HR DR | Data register | | Retentive | R0 ~ R2999 (3000)* | | | | Can be configured as non-retentive type |
| | | | | | D0 ~ D3999 (4000) | | | | |
| | | | | Non-retentive | R3000 ~ R3839 (840)* | | | | Can be configured as retentive type |
| | HR ROR | | | Retentive | R5000 ~ R8071 (3072)* | | | | When not configured as ROR, it can serve 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) | | | | Save/retrieved via dedicated instruction |
| | 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) | | | | |
| | | 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) | | | | |
| | | Calendar Register | | | R4128 (sec) | R4129 (min) | R4130 (hour) | R4131 (day) | Optional for MA model |
| | | | | | R4132 (month) | R4133 (year) | R4143 (week) | | |
| | 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 | | | | • Total number of HHSC and SHSC is 8 HHSC can be converted into 32-bit/0.1mS time base High-Speed Timer (HST)<br>• Half of maximum frequency while A/B input |
| | | | | Counting mode | 8 modes (U/D, U/Dx2, P/R, P/Rx2, A/B, A/Bx2, A/Bx3, A/Bx4) | | | | |
| | | | | Counting frequency | Maximum is 200KHz (Single-end input) or 920KHz (differential input) | | | | |
| | Software high-speed counter (SHSC) /32-bit | | | No. of channel | Up to 4 | | | | |
| | | | | Counting mode | 3 modes (U/D, P/R, A/B) | | | | |
| | | | | Counting frequency | Maximum sum up to 5KHz | | | | |
| NC position pulse out (HSPSO) | | Number of axis | | | Up to 4 | | | | |
| | | Output frequency | | | Maximum is 200KHz (Single-end output) or 920KHz (differential output) | | | | Half of the maximum while A/B output |
| | | Pulse output mode | | | 3 modes (U/D, P/R, A/B) | | | | |
| | | Programming method | | | Dedicated position language | | | | |
| | | Interpolation | | | Maximum 4 axes linear interpolation | | | | |
| HSPWM output | | Number of points | | | Up to 4 | | | | |
| | | Output frequency | | | 72Hz ~ 18.432KHz (with 0.1% resolution)<br>720Hz ~ 184.32KHz (with 1% resolution) | | | | |
| Captured input | | | | Points | Maximum 36 points (All inputs in main unit are suitable this feature) | | | | |
| | | | | Minimum capturable Pulse width | >10 µS (for ultra high speed / high speed input) | | | | |
| | | | | | >47 µS (for Medium speed input) | | | | |
| | | | | | >470 µS (for Medium low speed input) | | | | |
| Digital filter | | | | X0 ~ X15 | Adjustable frequency 14KHz ~ 1.8MHz | | | | Chosen by frequency at high frequency |
| | | | | | Adjustable time constant 0 ~ 1.5mS/0~15mS ( unit: 0.1mS/1mS ) | | | | Chosen by time constant at low frequency |
| | | | | X16 ~ X35 | Time constant 1 ~ 15mS adjustable (unit: 1ms) | | | | |

# General Specifications

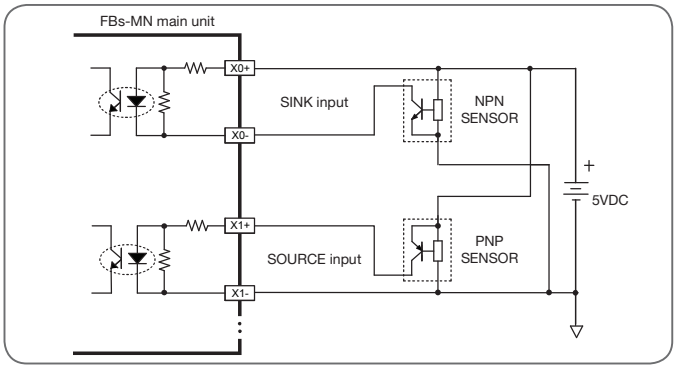
## Digital Input (DI) Specifications

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

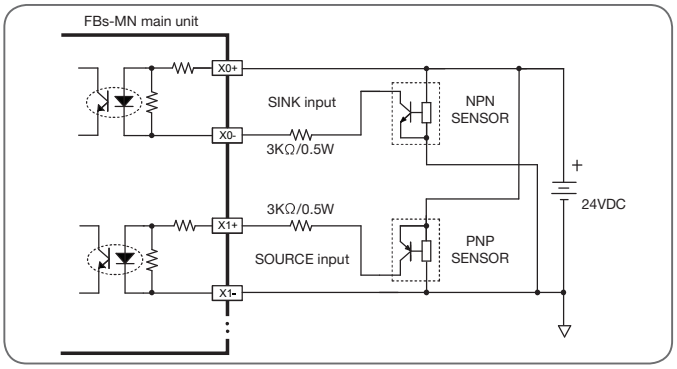
### Wiring of 5VDC differential input (with frequency up to 920KHz, for high speed or high noise environments)



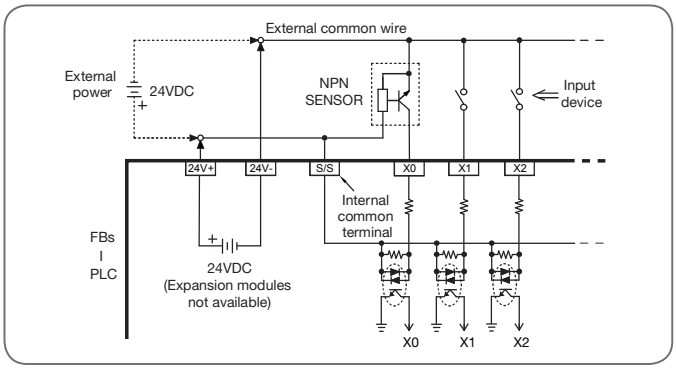

### Wiring of 5VDC differential input to 5VDC single-end SINK /SOURCE input (Max. 200KHz)



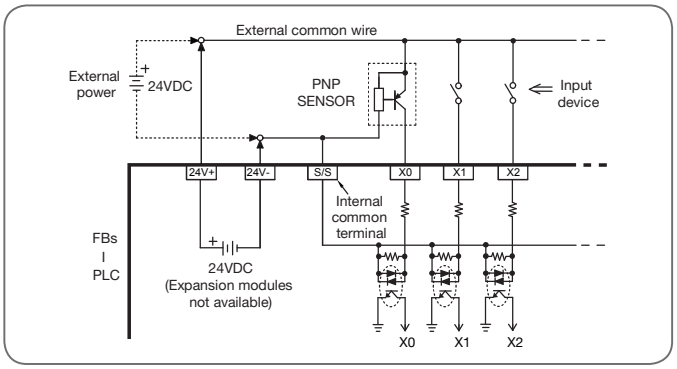

### Wiring of 5VDC differential input to 24VDC single-end SINK /SOURCE input (Max. 200KHz)




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




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

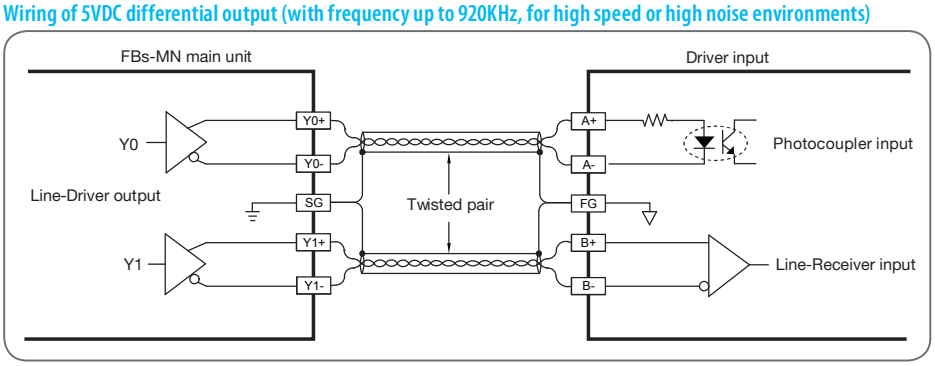


## Digital Output (DO) Specifications

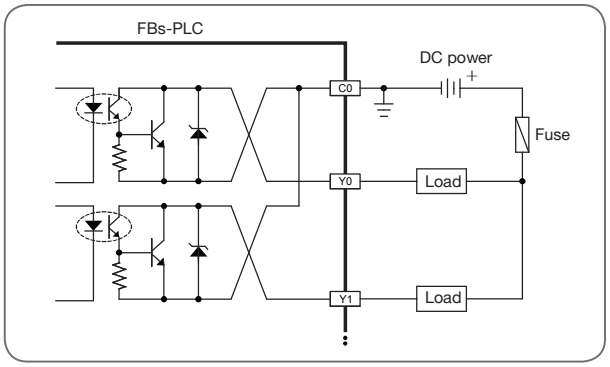
| Item / Specification | | Differential output | Single-end transistor output | | | Single-end relay output |
|---|---|---|---|---|---|---|
| | | Ultra high speed | High speed | Medium speed | Low speed | |
| Maximum output frequency* | | 920KHz | 200KHz | 20KHz | — | — |
| Working voltage | | 5VDC±10% | 5~30 VDC | | | < 250VAC/30VDC |
| Maximum load current | Resistive | 50mA | 0.5A | 0.5A | 0.5A/0.1A (24YT/J) | 2A/single, 4A/common |
| | Inductive | | | | | 80VA(AC)/24VA(DC) |
| Maximum voltage drop/ conducting resistance | | — | 0.6V | 2.2V | 2.2V | 0.06V (initial) |
| Minimum load | | — | — | | | 2mA/DC power |
| Leakage current | | — | < 0.1mA/30VDC | | | — |
| Maximum output delay time | ON→OFF | 200nS | 2μS | 15μS | | 10mS |
| | OFF→ON | | | 30μS | | |
| Output status indication | | Displayed by LED: Light when "ON", dark when "OFF" | | | | |
| Over current protection | | N/A | | | | |
| Isolation type | | Optical isolation, 500VAC, 1 minute | | | | Electromagnetic isolation 1500VAC, 1 minute |
| SINK/SOURCE output type | | Independent dual terminals for arbitrary connection | Choose SINK/SOURCE by models and non-exchangeable | | | Can be arbitrarily set to SINK/SOURCE output |

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

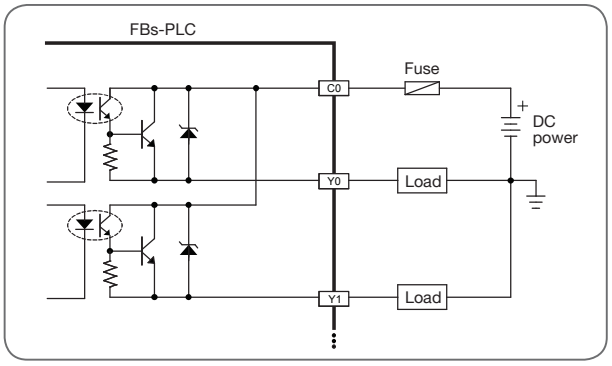
### Wiring of 5VDC differential output (with frequency up to 920KHz, for high speed or high noise environments)



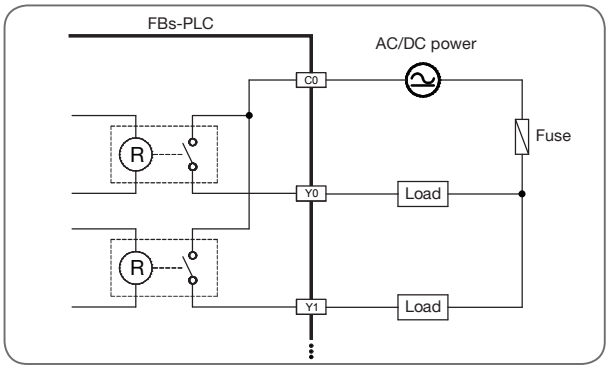

### Wiring of transistor single-end SINK output




### Wiring of transistor single-end SOURCE output




### Wiring of relay single-end output



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# Main Unit Specifications

## Basic Main Units (MA)

| Specification \ Model | | | FBs-10MAR | FBs-10MAT/J | FBs-14MAR | FBs-14MAT/J | FBs-20MAR | FBs-20MAT/J | FBs-24MAR | FBs-24MAT/J |
|---|---|---|---|---|---|---|---|---|---|---|
| Digital Input | 24VDC | High speed (100KHz) | 2 points | | | | | | | |
| | | Medium speed (20KHz) | 2 points | | | | 4 points | | 6 points | |
| | | Medium speed (Total 5KHz) | 2 points | | 4 points | | 6 points | | | |
| Digital Output | Relay | | 4 points | — | 6 points | — | 8 points | — | 10 points | — |
| | Transistor | High speed (100KHz) | 2 points | | | | | | | |
| | | Medium speed (20KHz) | — | 2 points | — | 4 points | — | 6 points | — | 6 points |
| | | Low speed | — | — | — | — | — | — | — | 2 points |
| Communication Port | | Built-in | 1 port (Port0, USB or RS232) | | | | | | | |
| | | Expandable | 2 ports (Port1~2, RS485 or RS232 or Ethernet) | | | | | | | |
| Calendar | | | built-in | | | | | | | |
| Built-in power supply | | | SPW14-AC/D12/D24 | | | | SPW24-AC/D12/D24 | | | |
| Wiring mechanism | | | 7.62mm fixed terminal block | | | | | | | |
| Dimension | | | Figure 2 | | | | Figure 1 | | | |

## Basic Main Units (MA/MB)

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

## Advanced Main Units (MC)

| Specification \ Model | | | FBs-10MCR | FBs-10MCT/J | FBs-14MCR | FBs-14MCT/J | FBs-20MCR | FBs-20MCT/J | FBs-24MCR | FBs-24MCT/J |
|---|---|---|---|---|---|---|---|---|---|---|
| Digital Input | 24VDC | High speed (200KHz) | 2 points | | | | 4 points | | | |
| | | Medium speed (20KHz) | 2 points | | | | 2 points | | 4 points | |
| | | Medium speed (Total 5KHz) | 2 points | | 4 points | | 6 points | | | |
| Digital output | Relay | | 4 points | — | 6 points | — | 8 points | — | 10 points | — |
| | Transistor | High speed (200KHz) | — | 2 points | — | 2 points | — | 4 points | — | 4 points |
| | | Medium speed (20KHz) | — | 2 points | — | 4 points | — | 4 points | — | 4 points |
| | | Low speed | — | — | — | — | — | — | — | 2 points |
| Communication Port | | Built-in | 1 port (Port0, USB or RS232) | | | | | | | |
| | | Expandable | 4 ports (Port1~4, RS485 or RS232 or Ethernet or GSM or ZigBee) | | | | | | | |
| Calendar | | | Built-in | | | | | | | |
| Built-in power supply | | | SPW14-AC/D12/D24 | | | | SPW24-AC/D12/D24 | | | |
| Wiring mechanism | | | 7.62mm fixed terminal block | | | | 7.62mm detachable terminal block | | | |
| Dimension | | | Figure 2 | | | | Figure 1 | | | |

# Main Unit Specifications



## Advanced Main Units (MC)

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

## NC Positioning Main Units (MN)

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

# Right Side Expansion Module Specifications

## DIO Expansion Units

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

# Right Side Expansion Module Specifications

## Power Supplies for Expansion Modules


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

## DIO Expansion Modules








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

(Continue)







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

(Continue)



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

## Thumbwheel Switch Module

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

# Right Side Expansion Module Specifications



## 16/7 Segment LED Display Modules


| Specification \ Model | | | FBs-7SG1 | FBs-7SG2 |
|---|---|---|---|---|
| Display mode | Decoding display | | 4 bits to represent a character. It can display 16 kinds of pre-decoded character including 0 ~ 9, -, E, H, c, t and blank | |
| | Non-decoding display | | Each segment controlled by 1 individual bit, one 7 segment digits needs 8 bits to control (including decimal), displayable any set of segments (EX: character and number display) or each LED display | |
| Display number of character (points) | | | 1 channel, 7 segment 8 words / 16 segment 4 words or 64 points individual LED | 2 channels, 7 segment 16 words/ 16 segment 8 words or 128 points individual LED |
| Refresh time for display | | | 10mS max. | |
| LED driving specification | Driving current | | 40mA / segment | |
| | Display method | | 1~8 duty multiplexing display | |
| | Driving voltage | Low voltage | 5VDC (can be 10% up) | |
| | | High voltage | 7.5V, 10V, 12.5V selectable (can be 10% up) | |
| | Fine tune of voltage drop | | 0.6V, 1.2V, 1.8V selectable | |
| Over voltage driving indication | | | Each channel has individual Over Voltage (O.V.) driving LED indication (should be under Test Mode) | |
| Isolation method | | | Transformer (power) and optical (signal) isolation, 500VAC, 1 minute | |
| Power consumption | | | 24VDC–15%/+20%, static consumption is 2W max., dynamic current is increased according to display | |
| Wiring mechanism | | | 16 pins flat cable, 2.54mm header connector | |
| Dimension | | | Figure 4 | |

## AIO Module




| Specification \ Model | | FBs-6AD | FBs-4A2D | FBs-2DA | FBs-4DA |
|---|---|---|---|---|---|
| Input point | | 6 points | 4 points | — | — |
| Output point | | — | 2 points | 2 points | 4 points |
| Input/Output value | | -8192~8191 or 0~16383 (14-bit) | | | |
| Input/output Signal range | Bipolar | Voltage: -10~10V or -5~5V Current: -20~20mA or -10~10mA | | | |
| | Unipolar | Voltage: 0~10V or 0~5V Current: 0~20mA or 0~10mA | | | |
| Maximum resolution | | Voltage: 0.3mV (5V/16384) Current: 0.61μA (10mA/16384) | | | |
| Accuracy | | ± 1% | | | |
| Conversion time | | Conversion once for each scan | | | |
| Maximum input signal | | Input voltage: ±15V Input current: ±30mA | | — | |
| Allowable load range | | — | Output voltage: 500Ω~1MΩ Output current: 0~500Ω | | |
| Input impedance | | Input voltage: 63.2KΩ Input current: 250Ω | | — | |
| Isolation method | | Transformer(power) and optical(signal) isolation, 500VAC, 1 minute, no isolation between each channel | | | |
| Power consumption | | 24VDC -15%/+20%, 3.2W max. | | | |
| Wiring mechanism | | 7.62 mm fixed terminal block | | | |
| Dimension | | Figure 4 | | | |

## Temperature Measurement Modules






| Specification \ Model | FBs-2TC | FBs-6TC | FBs-16TC | FBs-6RTD | FBs-16RTD | FBs-6NTC |
|---|---|---|---|---|---|---|
| Number of input points | 2 points | 6 points | 16 points | 6 points | 16 points | 6 points |
| Sensor type and temperature measurement range | Thermocouple Sensor: J (-200~1200˚C) E (-190~1000˚C) K (-190~1300˚C) T (-190~380˚C) R (0~1800˚C) B (350~1800˚C) S (0~1700˚C) N (-200~1000˚C) | | | 3-wire RTD sensor (JIS or DIN) Pt100(-200~850˚C) Pt1000(-200~600˚C) | | NTC sensor 10 KΩ at 25˚C, B optional -20~100˚C |
| Temperature compensation | Built-in cold junction compensation | | | — | — | — |
| Resolution | 0.1°C | | | | | |
| Temperature refresh time | 1 or 2 seconds | 2 or 4 seconds | 3 or 6 seconds | 1 or 2 seconds | 2 or 4 seconds | 2 or 4 seconds |
| Overall Precision | ± (1%+1˚C) | | | ± 1% | | ±1% of full scale at 25˚C |
| Isolation method | Transformer(power) and optical(signal) isolation, 500VAC, 1 minute, isolation between each channel | | | Transformer(power) and optical(signal) isolation, 500VAC, 1 minute, no isolation between each channel | | |
| Power consumption | 24VDC -15%/+20%, 2W max. | | | | | |
| Wiring mechanism | 3.81 mm european terminal block | | 7.62 mm fixed terminal block | | | |
| Dimension | Figure 4 | | Figure 1 | Figure 4 | Figure 1 | Figure 4 |

# Right/Left Side Expansion Module Specifications

## AI+Temperature Measurement Combo Modules


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

## Load Cell Module

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

## Voice Module

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

## Potential Meter Module

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

# Left Side Expansion Module Specifications

## General Communication Boards/Modules





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

(Continue)



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

# Left Side Expansion Module Specifications

## Ethernet Communication Boards/Modules




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

## CANopen® Communication Board

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

## ZigBee™ Communication Modules


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

## GSM Communication Module

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

## General Purpose Communication Modules



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

# Left Side Expansion Module Specifications

## AIO Boards



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

## 3-Axis Motion Control Module

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

## Precision Load Cell Module

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

## Handheld Programming Panel

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

## Simple HMI





| Specification \ Model | FBs-DAP-B/BR | FBs-DAP-C/CR | FBs-PEP/PEPR | FBs-BDAP | FBs-BPEP |
|---|---|---|---|---|---|
| Display | Two rows 16-character, dot matrix LCD display, with LED backlighting | | 128x96 points white light OLED | 128segments fixed-pattern LCD | 128x64 points white light OLED |
| Key pads | 20 buttons (4x5) membrane | | 8 operation keys (rubber) | 6 operation keys (rubber) | 6 operation keys(rubber) |
| Maximum of consumption power | 24V, 48mA | 5V, 120mA | 5V, 100mA | 5V, 100mA | 5V, 100mA |
| Communication interface – Electric | RS485 | RS232 | RS232 | Port1, CMOS | Port1, CMOS |
| Communication interface – Mechanism | 5 pins European detachable terminal block | DB9M | Mini-DIN | — | — |
| Communication interface – Number of linked station | Max. 16 stations | Single unit | Single unit | — | — |
| General features | Timer, counter, register, relay, access of contact in PLC | | | | |
| Special features | Alarm, information display, and user definable special hot keys | | Station number setup, run/stop, Control Calendar* display and setup | | |
| Card access features (RFID card) | Available only in –R models, with maximum distance of 6~12cm | | | — | — |
| Dimension (Installation position) | Figure 8 | | Figure 9 | Expansion slot of main unit | |

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

# Peripheral and Accessory Specifications



## RFID Card

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

## PWMDA


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

## Memory Pack

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

## USB-RS232 Converter Cable

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

## Communication Cable




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

## High Density DIO Connection Cable

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

## 16/7 Segment LED Display


| | DBAN.8-nR | DBAN2.3-nR |
|---|---|---|
| Features | 0.8" 4-digit 16-segment LED display, , n means R(Red) 16-segment LED characters display installed, can be 1~4 | 2.3" 4-digit 16-segment LED display, n means R(Red) 16-segment LED characters display installed, can be 1~4 |

(Continue)




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

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# Training Box

## Training Box

| Specification \ Model | | FBs-TBOX | |
|---|---|---|---|
| Case | | Aluminum suitcase. Dimension is 46x32x16cm. Top cover and box body can be separated. | |
| Power supply | | 100~240VAC / 2A fuse / power switch with indicator | |
| PLC | | FBs-24MCT(transistor output)+FBs-CM25E(Ethernet communication module) | |
| Programming tool | Programmer | FP-08 handheld programming panel, can develop program, monitor (optional) | |
| | Winproladder Programming Software | Instructor site: WinProladder with ' teaching assistant' utility | |
| | | Student site: WinProladder | |
| Communication interface | Built-in | Port0 | RS 232 Mini-DIN |
| | Communication board(CB) (optional) | Port1 | RS232 or RS485 selectable, directly mounted on FBs-24MCT main unit |
| | | Port2 | |
| | FBs-CM25E | Port3 | RS232, standard DB-9F connector |
| | | Port4 | RS485, 3-pin European terminal block |
| | | (Port4) | Ethernet 10 Base T, IEEE 802.3 standard. Use port4 to interface PLC main unit |
| Input interface | | Banana terminal and simulation switch with automatic and manual reset functions | |
| Output interface | | Banana terminal, 10 points. Transistor output(Y0~Y9). All outputs buffer with discrete relay before come to terminal. Y0 and Y1 also provide a direct output terminal for high-speed pulse output (HSPSO) application. | |
| Expansion module (optional) | | Secured by DIN Rail, 12.5cm wide slot, can accommodate three 4cm thin modules or other modules with equivalent width | |
| Application peripheral | Display module | 4 digits 7-segment display module, attached with BCD decoding circuit | |
| | Thumbwheel switch | 4 digits BCD thumbwheel switch module | |
| | Keyboard module | 4 x 4 matrix keyboard module (Wiring coordinate with convenient instruction) | |
| | Encoder | Power supply 24VDC, 200P/R, open collector, A/B phase | |
| | Stepping motor | Pules/DIR control, 200P/R | |
| | LED display | 10 of 10mmØ high-brightness LED (in red, yellow, and green), driven individually by Y0 to Y9 | |
| Number of linked stations | | Maximum 254 stations (1 station for instructor, 253 stations for student) | |

## Features:

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

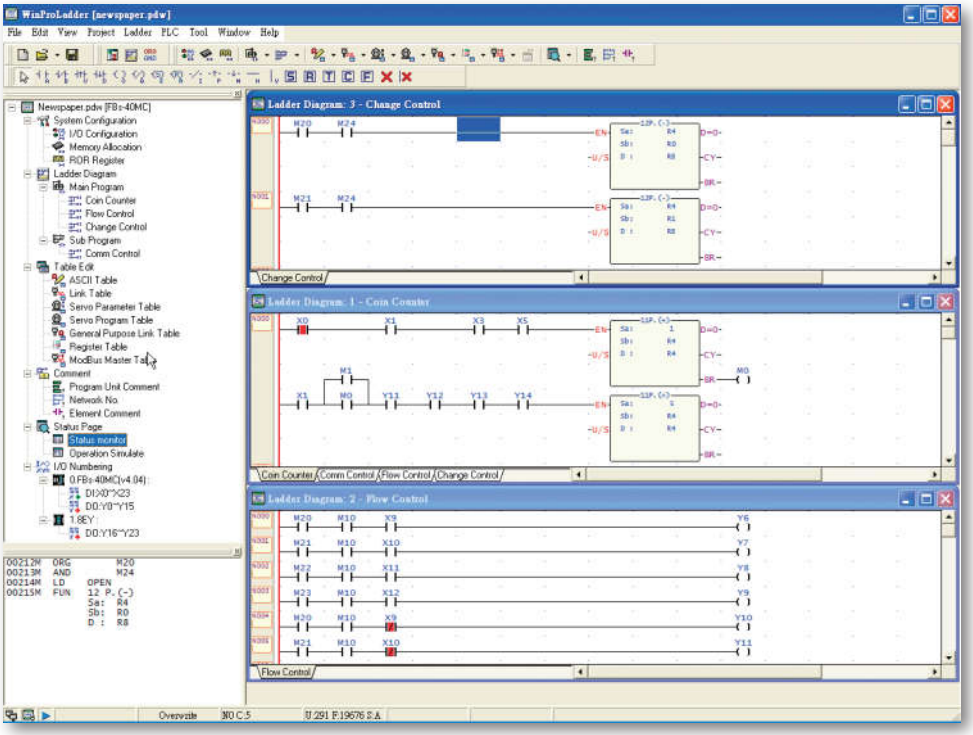
- A special designed software "WinProladder teaching assistant" can let instructor download or upload ladder program to or from the PLC of the whole class or individual through computer.
- PLC output is isolated by the Relay with socket and fuse and then output to terminal. These isolations can prevent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

# Program Development Software

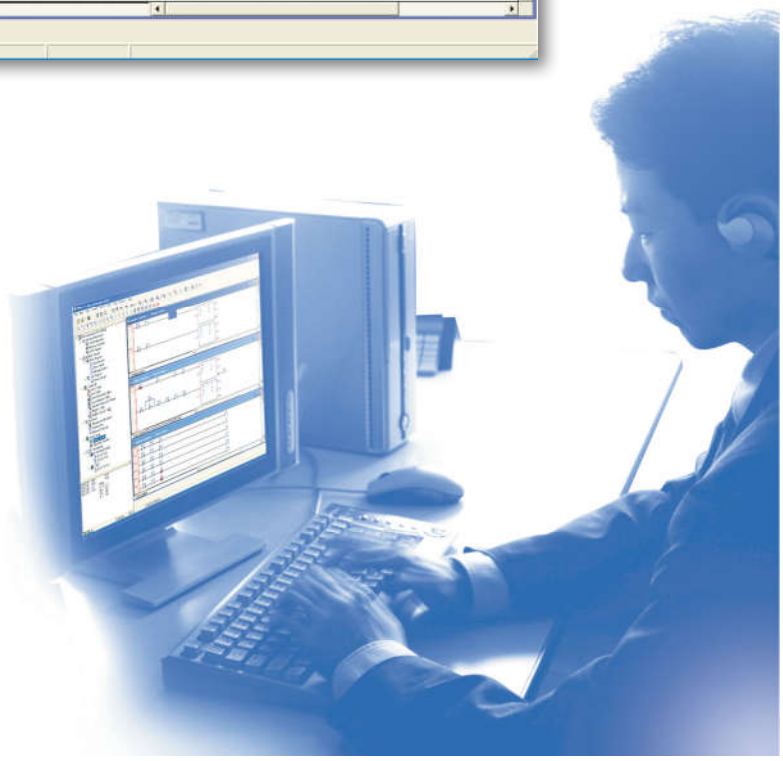


## General Features

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



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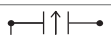
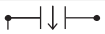
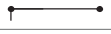
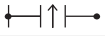
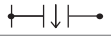
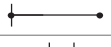
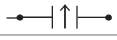
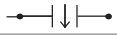
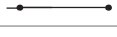
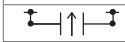
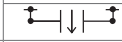
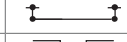
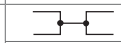
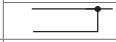
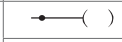
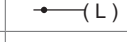
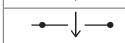
# Instruction Sets

## Sequential instructions

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

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

## Step ladder instructions (SFC)

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

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

## Function instructions

| Category | NO. | Instruction | Derivative | Function |
|---|---|---|---|---|
| Timer | | Tnnn | | General timer instruction (T0 ~ T255) |
| Counter | | Cnnn | | General counter instruction (C0 ~ C255) |
| | 7 | UDCTR | D | 16 or 32-bit up/down counter |
| Setting / Resetting | | SET | DP | Set all bits of register or a discrete point to 1 |
| | | RST | DP | Clear all bits of register or a discrete point to 0 |
| | 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 too operand |
| | 10 | TOGG | | Toggle the coil status |
| Mathematical operation | 11 | (+) | DP | Sa+Sb → D |
| | 12 | (–) | DP | Sa–Sb → D |
| | 13 | (×) | DP | Sa × Sb → D |
| | 14 | (/) | DP | Sa / Sb → D |
| | 15 | (+1) | DP | Add 1 to D |
| | 16 | (–1) | DP | Subtract 1 from D |
| | 23 | DIV48 | P | 48 bits integer division Sa / Sb → D |
| | 24 | SUM | DP | Sum of N consecutive registers |
| | 25 | MEAN | DP | Average of N consecutive registers |
| | 26 | SQRT | DP | Square root of S |
| | 27 | NEG | DP | Two's complement of D (Negative number) |
| | 28 | ABS | DP | Absolute value of D |
| | 29 | EXT | P | Extend 16 bits into 32 bits |
| | 30 | PID | P | PID calculation |
| | 31 | CRC16 | P | CRC16 calculation |
| | 32 | ADCNV | | Offset and full scale conversion for analog input |
| | 33 | LCNV | P | Linear conversion |
| | 34 | MLC | P | Multiple linear conversion |

| Category | NO. | Instruction | Derivative | Function |
|---|---|---|---|---|
| Mathematical operation | 200 | I→F | DP | Integer to floating point number conversion |
| | 201 | F→I | DP | Floating point number to integer conversion |
| | 202 | FADD | P | Addition of floating point number |
| | 203 | FSUB | P | Subtraction of floating point number |
| | 204 | FMUL | P | Multiplication of floating point number |
| | 205 | FDIV | P | Division of floating point number |
| | 206 | FCMP | P | Comparison of floating point number |
| | 207 | FZCP | P | Zone comparison of floating point number |
| | 208 | FSQR | P | Square root of floating point number |
| | 209 | FSIN | P | SIN trigonometric function |
| | 210 | FCOS | P | COS trigonometric function |
| | 211 | FTAN | P | TAN trigonometric function |
| | 212 | FNEG | P | Change sign of floating point number |
| | 213 | FABS | P | Absolute value of floating point number |
| | 214 | FLN | P | Floating point napierian logarithm |
| | 215 | FEXP | P | Floating point exponential function |
| | 216 | FLOG | P | Floating point logarithm |
| | 217 | FPOW | P | Floating point power function |
| | 218 | FASIN | P | Floating point arc sine function |
| | 219 | FACOS | P | Floating point arc cosine function |
| | 220 | FATAN | P | Floating point arc tangent function |
| Logic operation | 18 | AND | DP | Sa AND Sb |
| | 19 | OR | DP | Sa OR Sb |
| | 35 | XOR | DP | Sa XOR Sb |
| | 36 | XNR | DP | Sa XNR Sb |
| Comparison | 17 | CMP | DP | Value Compare |
| | 37 | ZNCMP | DP | Zone Compare |

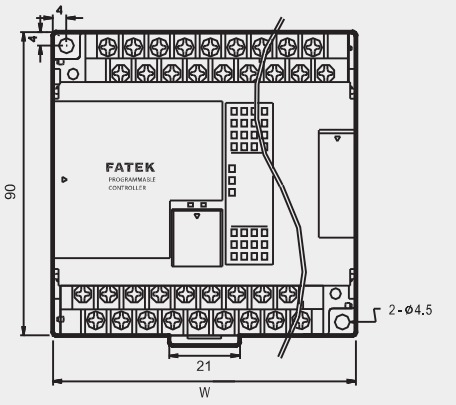
(Continue)

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

| Category | NO. | Instruction | Derivative | Function |
|---|---|---|---|---|
| Accumulative Timer | 87 | T.01S | | 0.01S time base accumulative timer |
| | 88 | T.1S | | 0.1S time base accumulative timer |
| | 89 | T1S | | 1S time base accumulative timer |
| Monitor and control | 90 | WDT | P | Set watchdog timer |
| | 91 | RSWDT | P | Reset watchdog timer |
| HSC/HST | 92 | HSCTR | P | Read CV of hardware high speed counter/timer |
| | 93 | HSCTW | P | Write CV or PV of hardware high speed counter/timer |
| Text | 94 | ASCWR | | Output ASCII message |
| Ascend/ Descend | 95 | RAMP | | Ascending/Descending convenient instruction |
| | 98 | RAMP2 | | Tracking type RAMP function for D/A output |
| Com-munication | 150 | M-BUS | | Modbus protocol communication |
| | 151 | CLINK | | Fatek CPU link/Generic protocol communication |
| Table operation | 100 | R→T | DP | Move register Rs to the table Td |
| | 101 | T→R | DP | Move the Rp of table Ts to register Rd |
| | 102 | T→T | DP | Move the Rp of table Ts to the Rp of table Td |
| | 103 | BT_M | DP | Move table Ts to table Td |
| | 104 | T_SWP | DP | Swap Ta and Tb |
| | 105 | R-T_S | DP | Search Rs from table Ts |
| | 106 | T-T_C | DP | Compare table Ta and table Tb |
| | 107 | T_FIL | DP | Fill Rs into Td table |
| | 108 | T_SHF | DP | Shift table left or right |
| | 109 | T_ROT | DP | Rotate table left or right |
| | 110 | QUEUE | DP | First in first out (Queue) instruction |
| | 111 | STACK | DP | First in last out (Stack) instruction |
| | 112 | 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 | | High-speed pulse output |
| | 141 | MPARA | | Set NC position parameters |
| | 142 | PSOFF | P | Force to stop pulse output |
| | 143 | PSCNV | P | Convert pulse count into mechanical value for display |
| | 147 | MHSPO | | Multi-Axis high speed pulse output |
| | 148 | MPG | | Manual pulse generator for positioning |
| Interrupt control | 145 | EN | P | Enable external input or peripheral interrupt |
| | 146 | DIS | P | Disable external input or peripheral interrupt |
| In Line Comparison Instructions | 170 | = | D | Equal to compare |
| | 171 | > | D | Greater than compare |
| | 172 | < | D | Less than compare |
| | 173 | <> | D | Not equal to compare |
| | 174 | >= | D | Greater than or equal to compare |
| | 175 | =< | D | Less than or equal to compare |
| Other | 190 | STAT | | Read system status |

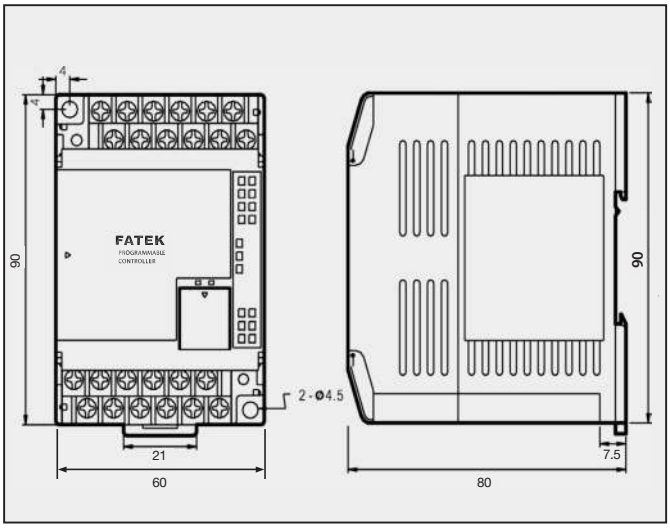
# Dimensions

## Figure 1

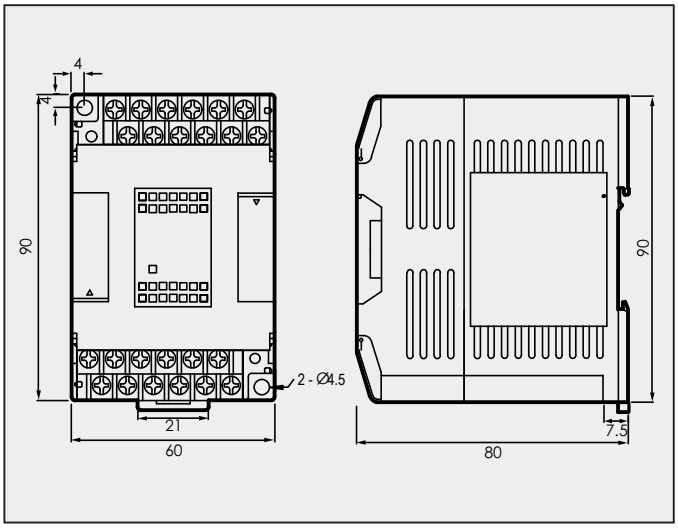



| W | Model |
|---|---|
| 90mm | FBs-20M△,FBs-24M△,FBs-24XY<br>FBs-16TC,FBs-16RTD |
| 130mm | FBs-32M△,FBs-40M△,FBs-40XY |
| 175mm | FBs-44MN△,FBs-60M△,FBs-60XY,<br>FBs-30GM |

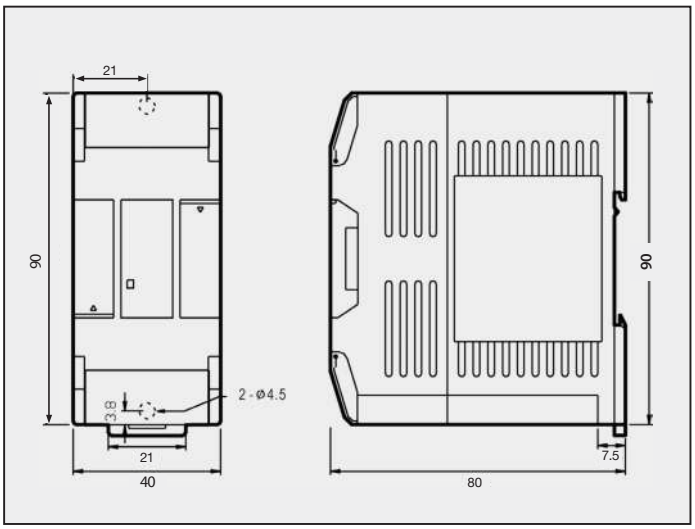
## Figure 2




## Figure 3




## Figure 4




## Figure 5

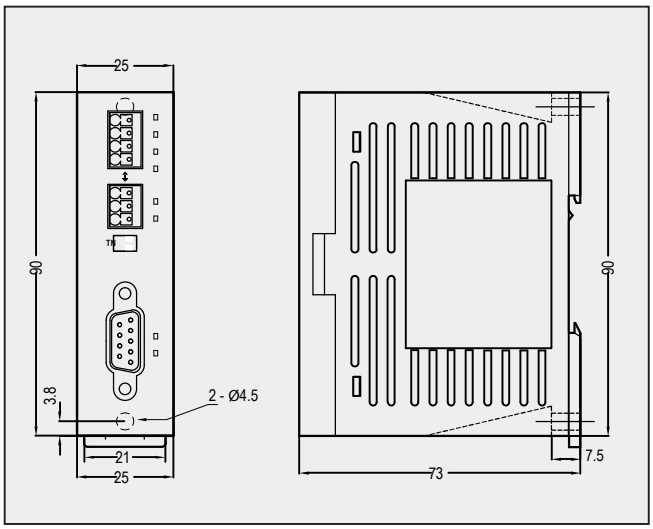


**Figure 6**

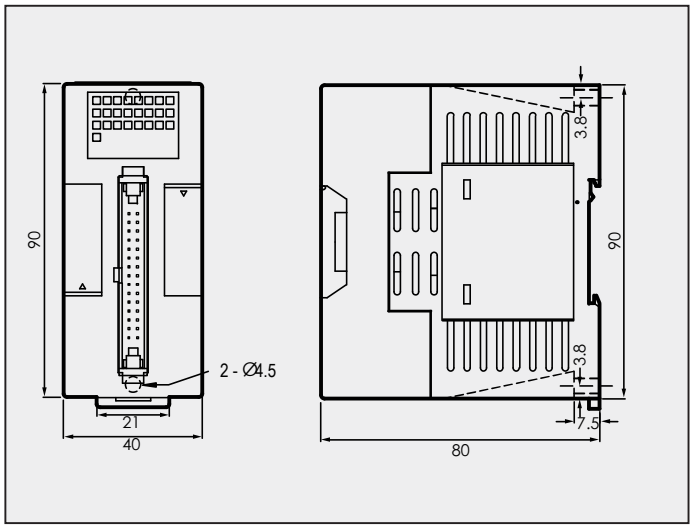



**Figure 7**

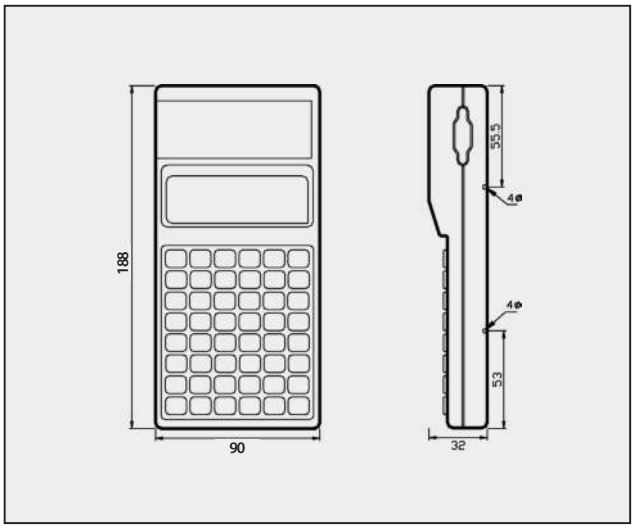



**Figure 8**

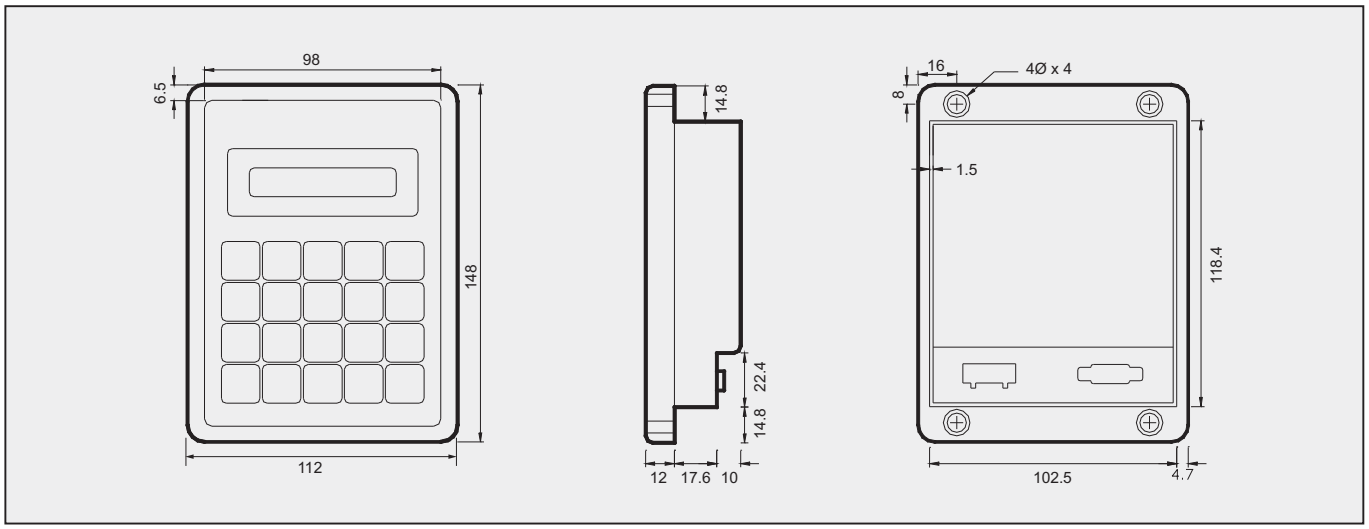
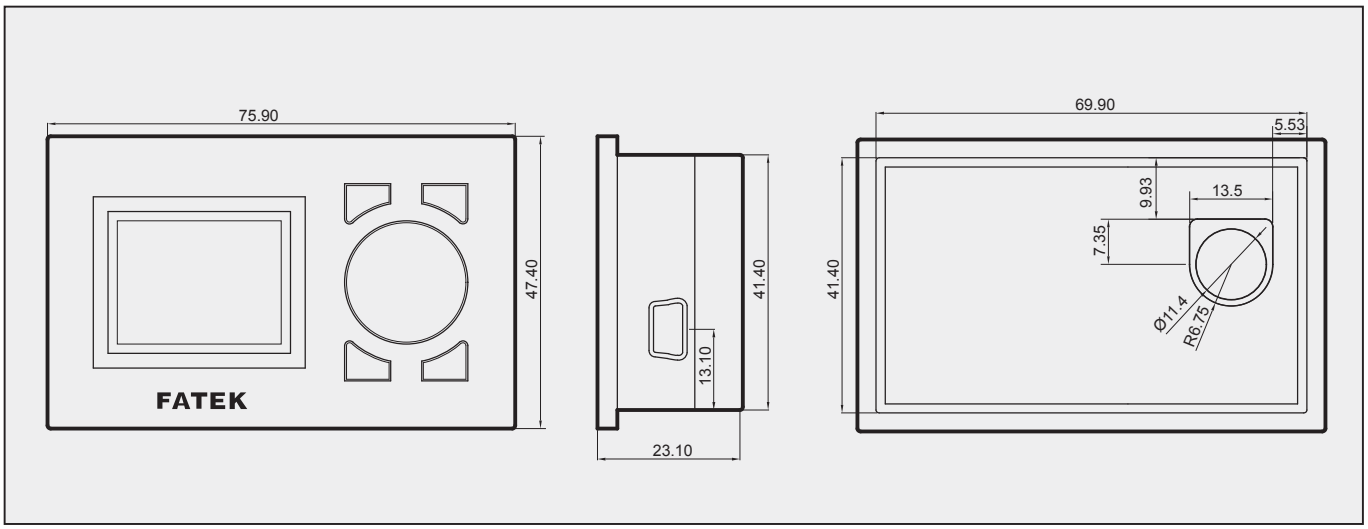



**Figure 9**



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# Model List

| | Module Name | | Specifications |
|---|---|---|---|
| Main Units | Basic Main Units | FBs-10MA◇△-◎ | 6 points 24VDC digital input (2 points high speed 100KHz, 2 points medium speed 20KHz, 2 points medium speed total 5KHz); 4 points relay or transistor output (2 points high speed 100KHz, 2 points medium speed 20KHz); 1 RS232 or USB port(expandable up to 3); built-in RTC; I/O is not expandable |
| | | FBs-14MA◇△-◎ | 8 points 24VDC digital input (2 points high speed 100KHz, 2 points medium speed 20KHz, 4 points medium speed total 5KHz); 6 points relay or transistor output (2 points high speed 100KHz, 4 points medium speed 20KHz); 1 RS232 or USB port(expandable up to 3); built-in RTC; I/O is not expandable |
| | | FBs-20MA◇△-◎ | 12 points 24VDC digital input (2 points high speed 100KHz, 4 points medium speed 20KHz, 6 points medium speed total 5KHz); 8 points relay or transistor output (2 points high speed 100KHz, 6 points medium speed 20KHz); 1 RS232 or USB port(expandable up to 3); built-in RTC |
| | | FBs-24MA◇△-◎ | 14 points 24VDC digital input (2 points high speed 100KHz, 6 points medium speed 20KHz, 6 points medium speed total 5KHz); 10 points relay or transistor output (2 points high speed 100KHz, 6 points medium speed 20KHz); 1 RS232 or USB port(expandable up to 3); built-in RTC |
| | | FBs-32MA◇△-◎<br>FBs-32MB◇△-◎ | 20 points 24VDC digital input (2 points high speed 100KHz, 6 points medium speed 20KHz, 8 points medium speed total 5KHz); 12 points relay or transistor output (2 points high speed 100KHz, 6 points medium speed 20KHz); 1 RS232 or USB port(expandable up to 3); built-in RTC; (MB is detachable terminal block) |
| | | FBs-40MA◇△-◎<br>FBs-40MB◇△-◎ | 24 points 24VDC digital input (2 points high speed 100KHz, 6 points medium speed 20KHz, 8 points medium speed total 5KHz); 16 points relay or transistor output (2 points high speed 100KHz, 6 points medium speed 20KHz); 1 RS232 or USB port(expandable up to 3); built-in RTC; (MB is detachable terminal block) |
| | | FBs-60MA◇△-◎<br>FBs-60MB◇△-◎ | 36 points 24VDC digital input (2 points high speed 100KHz, 6 points medium speed 20KHz, 8 points medium speed total 5KHz); 24 points relay or transistor output (2 points high speed 100KHz, 6 points medium speed 20KHz); 1 RS232 or USB port(expandable up to 3); built-in RTC; (MB is detachable terminal block) |
| | Advanced Main Units | FBs-10MC◇△-◎ | 6 points 24VDC digital input (2 points high speed 200KHz, 2 points medium speed 20KHz, 2 points medium speed total 5KHz); 4 points relay or transistor output (2 points high speed 200KHz, 2 points medium speed 20KHz); 1 RS232 or USB port (expandable up to 5); built-in RTC; I/O is not expandable |
| | | FBs-14MC◇△-◎ | 8 points 24VDC digital input (2 points high speed 200KHz, 2 points medium speed 20KHz, 4 points medium speed total 5KHz); 6 points relay or transistor output (2 points high speed 200KHz, 4 points medium speed 20KHz); 1 RS232 or USB port (expandable up to 5); built-in RTC; I/O is not expandable |
| | | FBs-20MC◇△-◎ | 12 points 24VDC digital input (4 points high speed 200KHz, 2 points medium speed 20KHz, 6 points medium speed total 5KHz); 8 points relay or transistor output (4 points high speed 200KHz, 4 points medium speed 20KHz); 1 RS232 or USB port (expandable up to 5); built-in RTC; detachable terminal block |
| | | FBs-24MC◇△-◎ | 14 points 24VDC digital input (4 points high speed 200KHz, 4 points medium speed 20KHz, 6 points medium speed total 5KHz); 10 points relay or transistor output (4 points high speed 200KHz, 4 points medium sped 20KHz); 1 RS232 or USB port (expandable up to 5); built-in RTC; detachable terminal block |
| | | FBs-32MC◇△-◎ | 20 points 24VDC digital input (6 points high speed 200KHz, 2 points medium speed 20KHz, 8 points medium speed total 5KHz); 12 points relay or transistor output (6 points high speed 200KHz, 2 points medium speed 20KHz); 1 RS232 or USB port (expandable up to 5); built-in RTC; detachable terminal block |
| | | FBs-40MC◇△-◎ | 24 points 24VDC digital input (6 points high speed 200KHz, 2 points medium speed 20KHz, 8 points medium speed total 5KHz); 16 points relay or transistor output (6 points high speed 200KHz, 2 points medium speed 20KHz); 1 RS232 or USB port (expandable up to 5); built-in RTC; detachable terminal block |
| | | FBs-60MC◇△-◎ | 36 points 24VDC digital input (8 points high speed 200KHz, 8 points medium speed total 5KHz); 24 points relay or transistor output (8 points high speed 200KHz); 1 RS232 or USB port (expandable up to 5); built-in RTC; detachable terminal block |
| | NC Positioning Main Units | FBs-20MN◇△-◎ | 2 sets (1 axis) 920KHz 5VDC digital differential input, 10 points 24VDC digital input (4 points high speed 200KHz, 6 points medium speed total 5KHz); 2 sets (1 axis) 920KHz 5VDC digital differential output, 6 points relay or transistor output (average high speed 200KHz); 1 RS232 or USB port (expandable up to 5); built-in RTC; detachable terminal block |
| | | FBs-32MN◇△-◎ | 4 sets (2 axes) 920KHz 5VDC digital differential input, 16 points 24VDC digital input (4 points high speed 200KHz, 8 points medium speed total 5KHz); 4 sets (2 axes) 920KHz 5VDC digital differential output, 8 points relay or transistor output (4 points high speed 200KHz); 1 RS232 or USB port (expandable up to 5); built-in RTC; detachable terminal block |
| | | FBs-44MN◇△-◎ | 8 sets (4 axes) 920KHz 5VDC digital differential input, 20 points 24VDC digital input (8 points medium speed total 5KHz); 8 sets (4 axes) 920KHz 5VDC digital differential output, 8 points relay or low speed transistor output; 1 RS232 or USB port (expandable up to 5); built-in RTC; detachable terminal block |
| Right Side Expansion Modules | Expansion Power Supply | FBs-EPW-AC/D24 | Power supply of 100~240VAC or 24VDC input for expansion module; 3 sets output power with 5VDC, 24VDC, and 24VDC, 14W capacity |
| | DIO Expansion Units | FBs-24XY◇-◎ | 14 points 24VDC digital input, 10 points relay or transistor output, built-in power supply |
| | | FBs-40XY◇-◎ | 24 points 24VDC digital input, 16 points relay or transistor output, built-in power supply |
| | | FBs-60XY◇-◎ | 36 points 24VDC digital input, 24 points relay or transistor output, built-in power supply |
| | DIO Expansion Modules | FBs-8X | 8 points 24 VDC digital input |
| | | FBs-8Y◇ | 8 points relay or transistor output |
| | | FBs-8XY◇ | 4 points 24VDC digital input, 4 points relay or transistor output |
| | | FBs-16Y◇ | 16 points relay or transistor output |
| | | FBs-16XY◇ | 8 points 24VDC digital input, 8 points relay or transistor output |
| | | FBs-20X | 20 points 24VDC digital input |
| | | FBs-24XY◇ | 14 points 24VDC digital input, 10 points relay or transistor output |
| | | FBs-40XY◇ | 24 points 24VDC digital input, 16 points relay or transistor output |
| | | FBs-60XY◇ | 36 points 24VDD digital input, 24 points relay or transistor output |
| | | FBs-24X | 24 points high-density 24VDC digital input, 30 pins header with latch |
| | | FBs-24YT/J | 24 points high-density transistor SINK(T) or SOURCE(J) output (0.1A max.), 30 pins header with latch |
| | Thumbwheel Switch Module | FBs-32DGI | 8 sets 4 digits (total 32 digits) thumbwheel switch (or 128 points independent switch) multiplex input module, 30 pins header connector |
| | 16/7 Segment LED Display Modules | FBs-7SG1 | 1 set 8 digits 7-segment/4 digits 16-segment LED display (or 64 points independent LED) output display module, 16 pins header connector |
| | | FBs-7SG2 | 2 sets 8 digits 7-segment/4 digits 16-segment LED display (or 128 points independent LED) output display module, 16 pins header connector |
| | AIO Modules | FBs-2DA | 2 channels, 14-bit analog output module (-10~10V, 0~10V or -20~20mA, 0~20mA) |
| | | FBs-4DA | 4 channels, 14-bit analog output module (-10~10V, 0~10V or -20~20mA, 0~20mA) |
| | | FBs-4A2D | 4 channels, 14-bit analog input (same specification as 6AD)+2 channels, 14-bit analog output (same specification as 2DA) combo module |
| | | FBs-6AD | 6 channels, 14-bit analog input module (-10~10V, 0~10V or -20~20mA, 0~20mA) |
| | Temperature Measurement Modules | FBs-2TC | 2 channels, thermocouple temperature input module with 0.1°C resolution. |
| | | FBs-6TC | 6 channels, thermocouple temperature input module with 0.1°C resolution. |
| | | FBs-16TC | 16 channels, thermocouple temperature input module with 0.1°C resolution. |
| | | FBs-6RTD | 6 channels, RTD temperature input module with 0.1°C resolution. |
| | | FBs-16RTD | 16 channels, RTD temperature input module with 0.1°C resolution. |
| | | FBs-6NTC | 6 channels, NTC temperature input module with 0.1°C resolution. |

# Model List



| | Module Name | | Specifications |
|---|---|---|---|
| Right Side Expansion Modules | AI + Temperature Measurement Combo Modules | FBs-2A4TC | 2 channels, 14-bit analog input (same specifications as 6AD)+ 4 channels thermocouple temperature input (same specifications as 6TC) combo module |
| | | FBs-2A4RTD | 2 channels, 14-bit analog input (same specifications as 6AD) + 4 channels RTD temperature input (same specifications as 6RTD) combo module |
| | Voice Modules | FBs-VOM | Built-in 1MB memory (play continuously up to 2 minutes), extendable 4GB SD card(play continuously up to 8,000 minutes) voice module, 245 messages, output 2W |
| | Load Cell Module | FBs-1LC | 1 channel, load cell measurement module with 16-bit resolution (including sign bit) |
| | | FBs-2LC | 2 channels, load cell measurement module with 16-bit resolution (including sign bit) |
| | Potential Meter Module | FBs-4PT | 4 channels, 14-bit potential meter input module (Impedance range: 1~10K Ω) |
| Left Side Expansion Modules | Communication Modules | FBs-CM22 | 2 ports RS232 (Port3 +Port 4) communication module |
| | | FBs-CM55 | 2 ports RS485 (Port3 +Port 4) communication module |
| | | FBs-CM25 | 1 port RS232 (Port3) + 1 port RS485 (port 4) communication module |
| | | FBs-CM25E | 1 port RS232 (Port3) + 1 port RS485 (port 4) + Ethernet network interface communication module |
| | | FBs-CM55E | 1 port RS485 (Port3) + 1 port RS485 (port 4) + Ethernet network interface communication module |
| | | FBs-CMZB | ZigBee communication module |
| | | FBs-CMZBR | ZigBee communication repeater |
| | | FBs-CMGSM | GSM wireless communication module |
| | | FBs-CM25C | General purpose RS232 to RS485/RS422 communication interface converter with optical isolation |
| | | FBs-CM5R | General purpose RS485 repeater with optical isolation |
| | | FBs-CM5H | General purpose 4 ports RS485 HUB with optical isolation, RS485 can be connected as star connection |
| | Communication Boards | FBs-CB2 | 1 port RS232 (Port 2) communication board |
| | | FBs-CB22 | 2 ports RS232 (Port 1+ Port 2) communication board |
| | | FBs-CB5 | 1 port RS485 (Port 2) communication board |
| | | FBs-CB55 | 2 ports RS485 (Port 1+ Port 2) communication board |
| | | FBs-CB25 | 1 port RS232 (Port 1) + 1 port RS485 (Port 2) communication board |
| | | FBs-CBE | 1 port 10 Base T Ethernet communication board |
| | | FBs-CBEH | 1 port 100 Base T Ethernet communication board |
| | | FBs-CBCAN | 1 port CANopen communication board |
| | AIO Boards | FBs-B2DA | 2 channels, 12-bit analog output board (0~10V or 0~20mA) |
| | | FBs-B2A1D | 2 channels, 12-bit analog input + 1 channel, 12-bit analog output combo analog board (0~10V or 0~20mA) |
| | | FBs-B4AD | 4 channels, 12-bit analog input board (0~10V or 0~20mA) |
| | Precision Load Cell Module | FBs-1HLC | 1 channel, high precision weighing control module with 24-bit resolution |
| | 3-Axis Motion Control Module | FBs-30GM | 3-Axis with linear and circular interpolation advanced motional control module, 3 sets of 200KHz high speed pulse input, 3 sets of 500KHz high speed pulse output, 14 points main unit, 16M Bytes program capacity, 20K Words retentive file register, built-in RS485 and Ethernet, 7.62mm detachable terminal block |
| | Simple HMI | FBs-BDAP | Board type Data Access Panel |
| | | FBs-BPEP | Board type Parameter Entry Panel |
| | | FBs-PEP/PEPR | Multi characters with graphics-based Parameter Entry Panel, built-in RFID Read/Write module with PEPR |
| | | FBs-DAP-B/BR | 16 X 2 LCD character display, 20 keys keyboard, 24VDC power supply, RS485 comm. port, built-in RFID Read/Write module with BR |
| | | FBs-DAP-C/CR | 16 X 2 LCD character display, 20 keys keyboard, 5VDC power supply, RS232 comm. port, built-in RFID Read/Write module with CR |
| Peripheral and Accessory | RFID Card | CARD-H | Read / Write wireless card (for FBs-DAP-BR/CR and FBs-PEPR) |
| | Programming Devices | FP-08 | FBs- Series PLC handheld programmer |
| | | Winproladder | FATEK-PLC Winproladder Programming software |
| | Memory Pack | FBs-PACK | FBs-PLC program memory pack with 20K Words program, 20K Words register, write protection switch |
| | PWMDA Module | PWMDA | 10-bit single channel pulse width modulation(PWM) 0~10V analog output (AO) module |
| | USB- RS232 Converter Cable | FBs-U2C-MD-180 | Communication converter cable with standard USB AM connector to RS232 MD4M connector (used in standard PC USB to FBs main unit Port 0 RS232), length 180cm |
| | Communication Cables | FBs-232P0-9F-150 | MD4M to DB9F communication cable (FBs main unit Port 0 RS232 connect to standard DB9M), length 150cm |
| | | FBs-232P0-9M-400 | MD4M to DB9M communication cable (FBs main unit Port 0 RS232 connect to DB9F), length 400cm |
| | | FBs-232P0-MD-200 | MD4M to MD4M communication cable (FBs main unit Port 0 RS232 connect to FBs-PEP/PEPR), length 200cm |
| | | FBs-232P0-MDR-200 | MD4M to 90° MD4M communication cable (FBs main unit Port 0 RS232 connect to FBs-PEP/PEPR), length 200cm |
| | High Density DIO Connection Cable | HD30-22AWG-200 | High density modules(FBs-24X, FBs-24YT/J, FBs-32DGI) connector 30pin Socket, 22AWG I/O cable length200cm |
| | 16/7-Segment LED Display | DBAN.8-nR | 0.8" 4-digit 16-segment LED display, n means R(Red) 16-segment LED characters display installed, can be 1~4 |
| | | DBAN.2.3-nR | 2.3" 4-digit 16-segment LED display, n means R(Red) 16-segment LED characters display installed, can be 1~4 |
| | | DB.56-nR | 0.56" 8-digit 7-segment display, n means R(Red) 7-segment LED characters display installed, can be 1~8 |
| | | DB.8-nR | 0.8" 8-digit 7-segment display, n means R(Red) 7-segment LED characters display installed, can be 1~8 |
| | | DB2.3-nR | 2.3" 8-digit 7-segment display, n means R(Red) 7-segment LED characters display installed, can be 1~8 |
| | | DB4.0-nR | 4.0" 4-digit 7-segment display, n means R(Red) 7-segment LED characters display installed, can be 1~4 |
| | Training Box | FBs-TBOX | 46cm x 32 cm x 16cm suitcase, containing FBs-24MCT main unit. FBs-CM25E communication module (RS232 + RS485 + Ethernet network), 14 simulated input switches, 10 external relay output, Doctor terminal outlet I/O, peripherals such as stepping motor, encoder, 7-segment display, 10 of 10mm LED indicator, thumbwheel switch, and 16 key keyboard. |

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

# FATEK® AUTOMATION CORPORATION


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FBs-CV4-11-2015