FATEK

FATEK AUTOMATION CORPORATION

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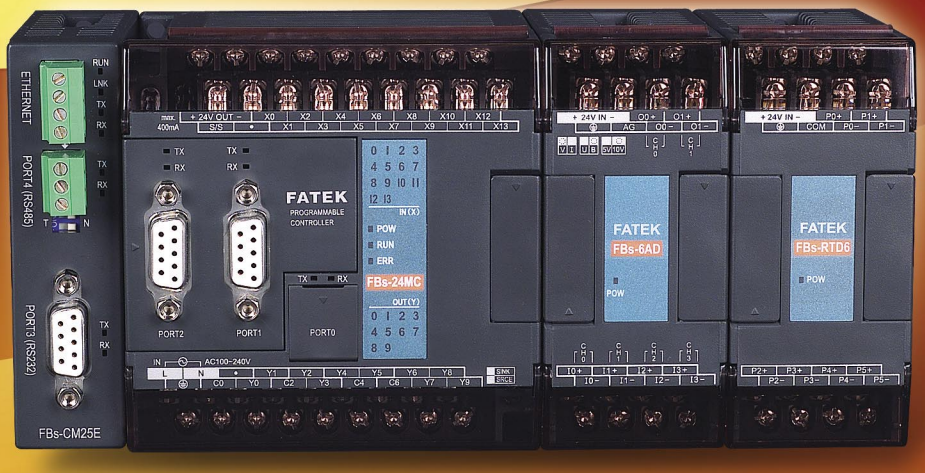
Since 1992

Advanced Functions, and more Excellent Quality

FATEK FBs Series

SoC Based Micro-PLC



FATEK FATEK AUTOMATION CORPORATION

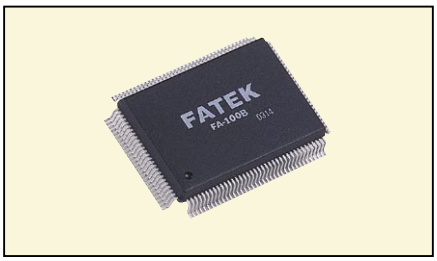
Over a decade or so,

Speak to the FATEK, the "excellent quality" comes first in mind,

The great functions of their products that have surpassed the competitors are simply setoffs.

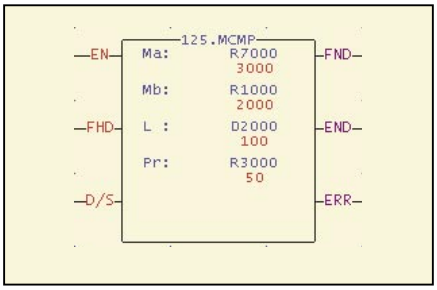
Contents

Features



High speed, high performance and low cost

FBs-PLC's design incorporates a System on Chips (SoC) developed independently by FATEK. The chip consists of over 120,000 gates which integrate powerful features such as Central Processing Unit (CPU), hardware logic processor, five high-speed communication ports, four sets of hardware high-speed counter/timer, four axes of high speed pulse output for NC positioning with linear interpolation or dynamic tracking, high speed interrupts, and captured inputs. It presents a higher speed with better functionality and more reliability. Compared to PLC of its kind, FBs-PLC is the most functional and competitive with a reasonable low price.

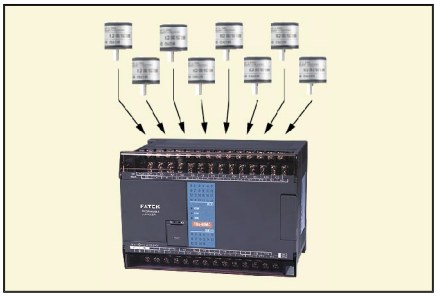


Most user friendly, most powerful instruction sets

FBs-PLC has more than 300 instructions, which adopts the most user friendly and readable multiple-input/multiple-output function structure. As shown in the left figure, with one instruction, three inputs can derive 5 kinds of functions which other brands of PLC may require a lots of instructions to achieve this. Also the operation result can acquire directly from the outputs. To increase the program readability, the inputs or outputs for each function instruction have its own mnemonic symbol attached and the content of each operand also can be shown beneath it. For high-end application, such as PLC networking(LINK),PID control and NC positioning etc, FBs-PLC provides the dedicated convenient instructions to help user to reduce barrier in usage.

Communication functions incomparable with up to 5 ports for RS232, RS485, USB, Ethernet

With the help of communication ports inside the SoC, the FBs-PLC are more than sufficient even with all five ports operating at the maximum speed (921.6KHz). Communication can be conducted using ASCII code or the double-speed binary code. Besides the FATEK standard protocol, Modbus or user-definable protocol is also available. FBs-PLC is also provided with six different communication boards and eight different communication modules for various applications. It has the most communication ports with highest speed and functionality in the PLC of its kind. Moreover, each communication port contains LED indicators for transmission (TX) and reception (Rx) to enable the user to monitor the operation and debug



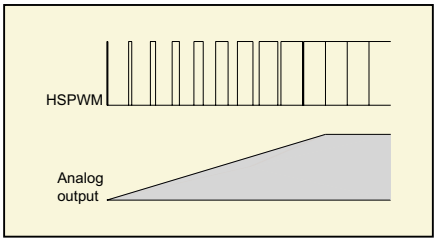
Highly integrated 8 sets of high-speed counter with counting frequency up to 920KHz

FBs-PLC, at most, can have 4 sets of hardware high-speed counter (HHSC) and 4 sets of software high-speed counter (SHSC). The highest counting frequency of HHSC is 120KHz (MC) or 920KHz (MN). Each HHSC also has clear and mask function. There are 8 counting modes including U/D, U/Dx2, K/R, K/Rx2, A/B, A/Bx2, A/Bx3 and A/Bx4 which makes the HHSC most powerful and efficient. For example, if the encoder, running at 200 pulses per revolution, adopts A/Bx4 mode can achieve the result that 800 pulses per revolution encoder can provide. Besides, the counter is implemented by hardware so do not occupy CPU time. Four sets of SHSC has three counting modes including U/D,K/R and A/B and the total counting frequency is limited to 10KHz.

```
001   SPD R0
      DRV ADR,+,R2,Ps
      WAIT TIME 50
      GOTO NEXT
002   SPD 20000
      DRV ADR,+,9999,Ut
      GOTO NEXT
003   SPD 3000
        ⋮
```

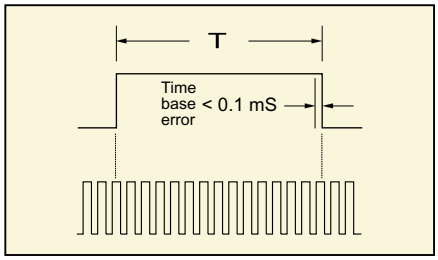
NC control+PLC in one, dedicated NC Position Language, maximum of 4 axes control for single unit with linear interpolation

The NC Position Control is incorporated into the SoC of FBs-PLC to integrate PLC+NC control into one unit in order for resources sharing and reduce the need of dada exchange. The NC position control adopts dedicated positioning command language, which allows programming by mechanical or electrical unit and changing control parameters during execution. One single unit has up to four axes of output with maximum frequency of 120KHz (MC) or 920KHz (MN) and equips with multi-axial linear interpolation and dynamic tracking. If being combined with the four sets of built-in HHSC, it can achieve positioning control of closed loop with higher precision.



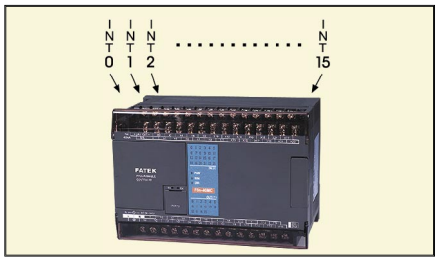
A maximum of 4 points high-speed pulse width modulation (HSPWM) output

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



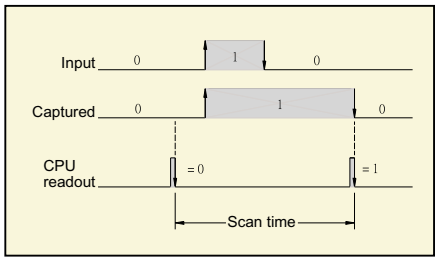
High-speed timer with 0.1mS resolution, the fastest timer that PLC ever can provide

FBs-PLC is the only PLC providing 0.1mS high-speed timer in the same grade PLC (At most, FBs-PLC has one set of 16-bit and 4 sets of 32-bit HST.).Currently, the fastest time base of the timer used in other brands of PLC only reaches 1ms, so can't work in the application requiring higher precision. Because the inaccuracy of 0.1ms time base high-speed timer of FBs-PLC is only 0.1mS, by incorporating interrupt function, FBs-PLC can easily achieve more precise speed detection or can be used as frequency meter. In most cases, expansive speed detection equipment can be replaced by this economic wise choice.



Single unit with 16 points of high-speed interrupt

FBs-PLC can provide up to 16 points of external interrupt. The interrupt is driven by edge and user can define which edge can cause interrupt, positive or negative or both edges. With interrupt can perform high speed, emergency processing which can't withstand the time jilter caused by the delay and deviation of the scan time and can be used for precision high speed position, machine home, high speed RPM measurement applications.

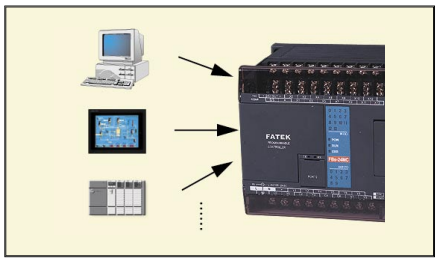


Up to 36 points of captured input in single unit

The SoC in FBs-PLC is capable of capture input, which captures and stores the external pulse input shorter than scan time for access by CPU. Compared to ordinary PLC that either lacks this capability or requires highly sophisticated interrupt function which increase the CPU overhead. FBs-PLC can handle this task easily as general input, which is carefree with high efficiency and convenience.

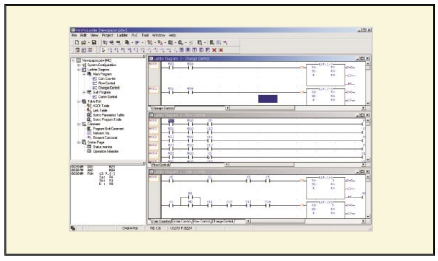
Full line peripherals

Besides 204 models of main unit can be chosen, FBs-PLC also provides 72 models of expansion I/O and peripherals 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 module. FBs-PLC also provide FB-DAP LCD data access panel which can be linked together with a single RS485 bus. FB-DAP can be simply a Timer/Counter editor and it can also be used as a simple human machine interface through the function of user definable key and message. Besides, FB-DAP can be equipped with wireless sensing module and applied to entrance control, parking equipment and elevator control.



Abundant communication driver

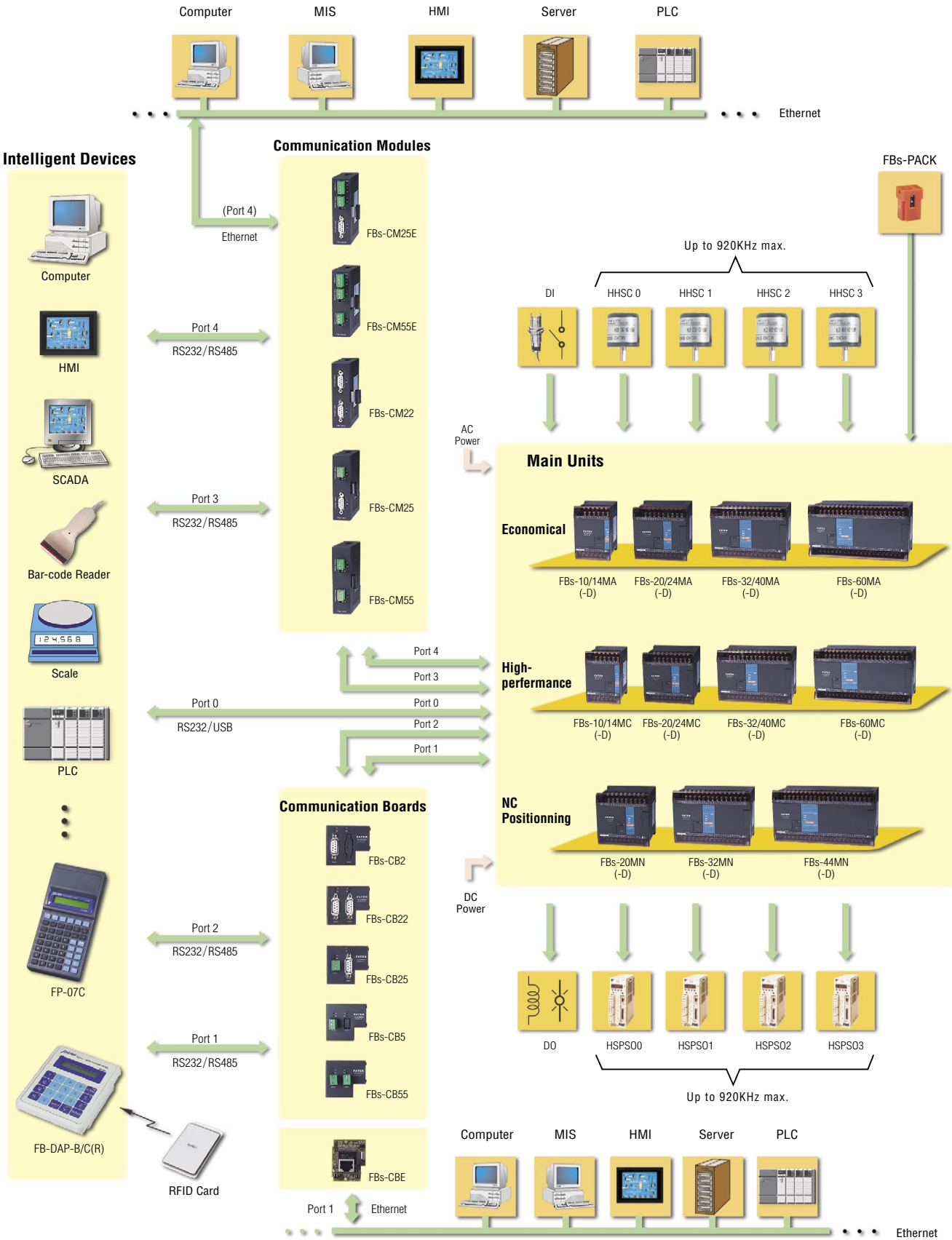
The FATEK software drivers of FBs-PLC are supported by world-famous graphic supervisory software (SCADA) and leading brands of human-machine interfaces, that can be directly connected with FBs-PLC. Moreover, FATEK also provides Modbus protocol and FATEK DDE standard communication server software for the user to easily connect FBs-PLC to various graphic control or computer systems in Office applications or self programming.

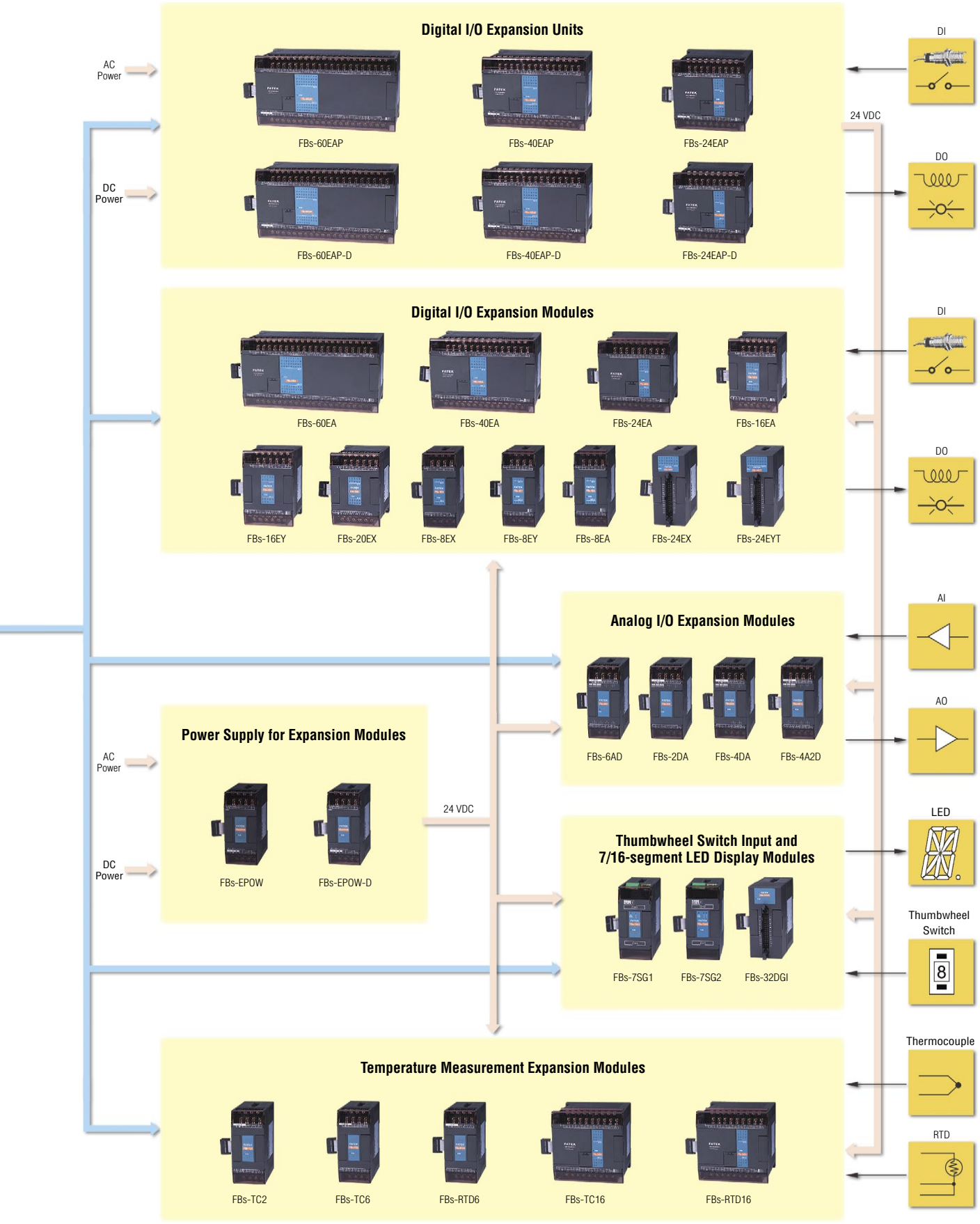


User-friendly operating environment

"WinProladder"is a Windows-based ladder diagram programming software for FBs-PLC. It provides a user-friendly operating environment. Thoughtful and considerate arrangement of editing, monitor and debugging function let user be familiar with the operation of system in short time. The powerful editing function of WinProladder, assisted with keyboard, mouse, online help of ladder instruction and operating guide, can greatly improve your working efficiency. The features which can show the register's data directly in the ladder diagram and provides multiple status page monitoring let user be able to conduct status monitoring and debugging easily.

Symtem Configuration



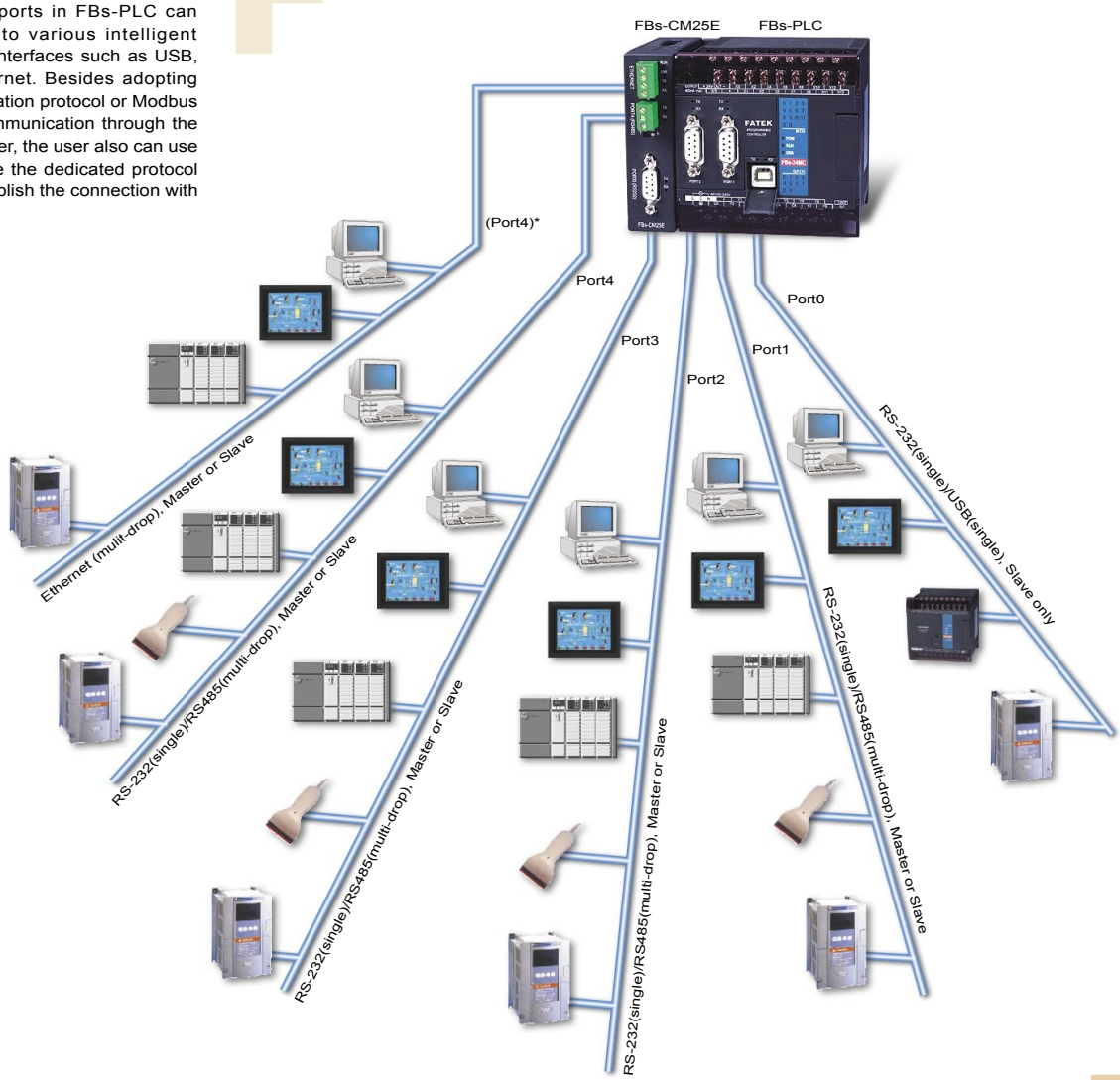

Digital I/O Expansion Units
AC Power
DC Power
FBs-60EAP
FBs-40EAP
FBs-24EAP
FBs-60EAP-D
FBs-40EAP-D
FBs-24EAP-D
DI
24 VDC
DO
Digital I/O Expansion Modules
FBs-60EA
FBs-40EA
FBs-24EA
FBs-16EA
FBs-16EY
FBs-20EX
FBs-8EX
FBs-8EY
FBs-8EA
FBs-24EX
FBs-24EYT
DI
DO
Analog I/O Expansion Modules
FBs-6AD
FBs-2DA
FBs-4DA
FBs-4A2D
AI
AO
Power Supply for Expansion Modules
AC Power
DC Power
FBs-EPOW
FBs-EPOW-D
24 VDC
Thumbwheel Switch Input and 7/16-segment LED Display Modules
FBs-7SG1
FBs-7SG2
FBs-32DGI
LED
Thumbwheel Switch
Temperature Measurement Expansion Modules
FBs-TC2
FBs-TC6
FBs-RTD6
FBs-TC16
FBs-RTD16
Thermocouple
RTD

■ Communication

Connection with intelligent peripherals:

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.

Sample application

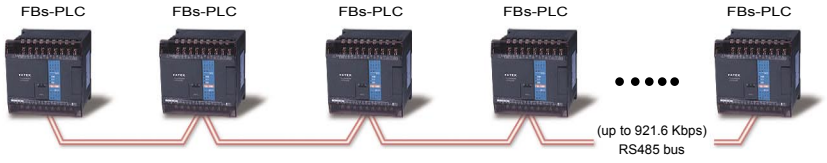


*Use the RS485 port4 to bridge the Ethernet

High-speed CPU link:

The Port 2 with optional RS485 interface can be used as the high-speed LINK between up to 254 FATEK PLC units, accomplished with merely one CLINK command at the main station. The communication speed can be up to 921.6Kbps, which is suitable to application of distributed real time control on multiple PLC units. (Only exchange the data in the high-speed common data areas, which may occupy more CPU time of PLC because of the frequently real time update.)

Sample application

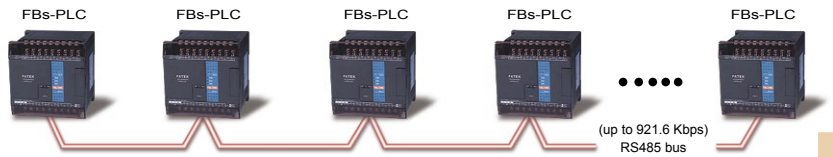


Max. 254 stations(Processed during communication interrupt)

General CPU link:

The RS485 interface in any of port1~port4 can link between up to 254 FATEK PLC units, accomplished with merely one CLINK command at the main station. It is suitable for distributed data collection and application of non-real time control. (Any data in PLC can conduct Link exchange, since non-real time update, which occupies less CPU time of PLC.)

Sample application

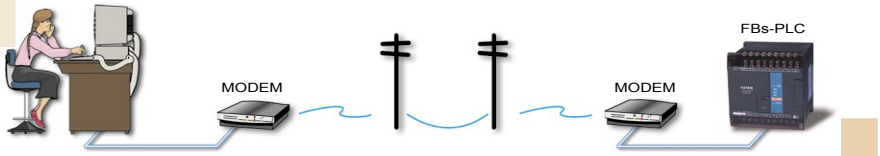


Max. 254 stations(Processed by normal scan loop)

Modem for remote communication:

Through MODEM, various functions such as remote program modification, control, diagnosis and monitoring can be performed even at the office distant from overseas.

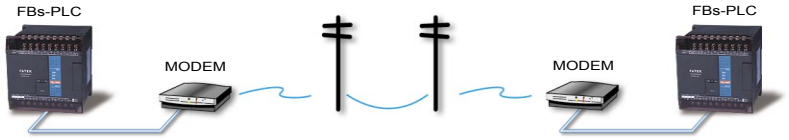
Sample application



CPU link through MODEM:

Through ladder diagram program, FBs-PLC can control MODEM to dial automatically to link with remote MODEM and PLC without the intervention of operator or computer. With this function, the headquarter of company can connect to branch factories automatically to perform the data collecting, data monitoring, alarm logging and abnormal report and etc.

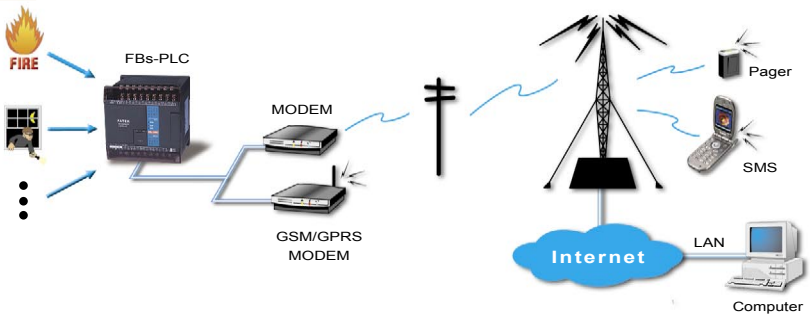
Sample application



Calling through pager or mobile phone:

In an emergency situation, before disaster happens or operator awares the situation, PLC program can detect this and call out to maintenance personnel or security personnel. So the situation can be taken care of at the first moment. The feature is especially suitable for the applications of fire alert, guard security and other application requiring high security.

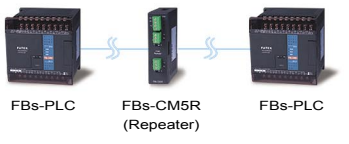
Sample application



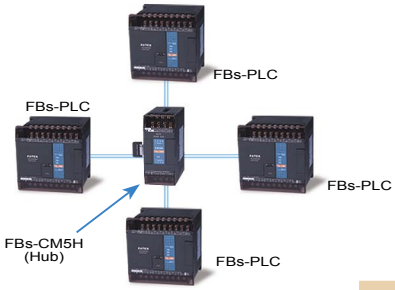
The RS485 repeater or Hub can be applied in long distance or special topological routing:

Use the Repeater or Hub of the RS485 interface to extent the coverage distance and to meet the variety of wiring topology demand (such as Bus or Star structure).

Sample application



The RS485 repeater FBs-CM5R can be used to extend the distance and expand the range of RS485 network



Star connection of RS485 can be realized by using FBs-CM5H (Hub) to meet the requirement of special topological routing.

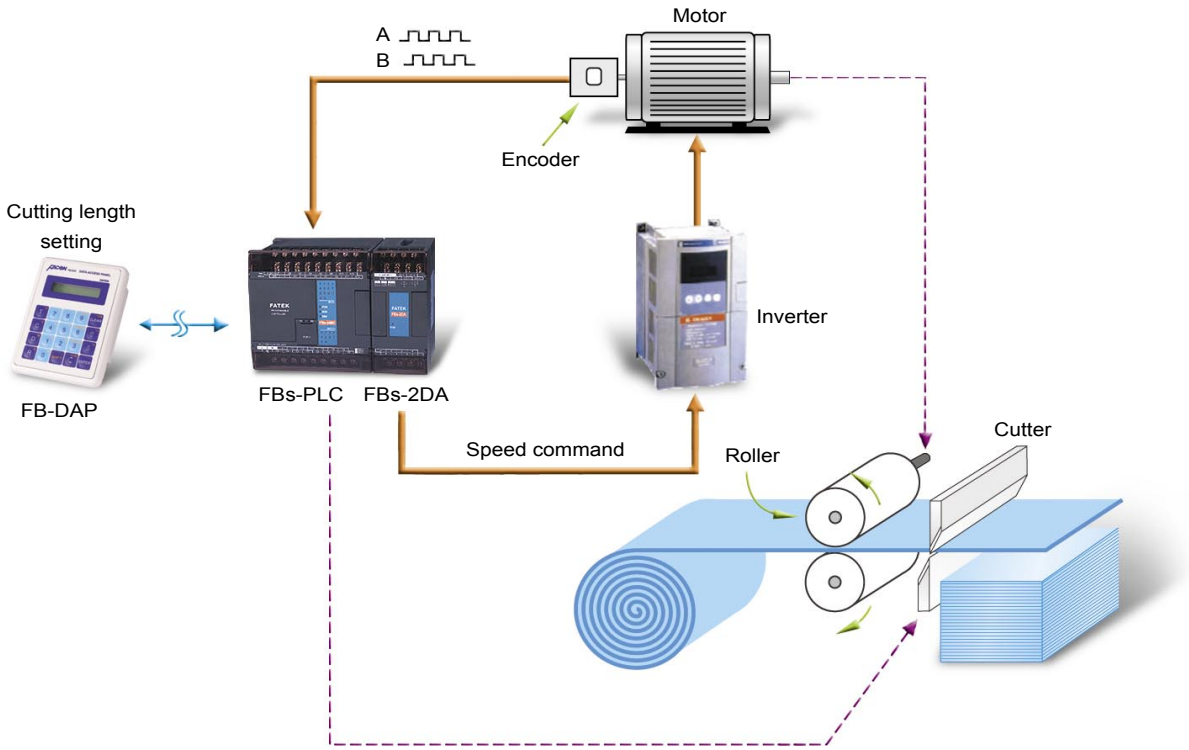
■ High-speed counter (HSC)

A FBs-PLC can have up to 8 sets of 32bits high-speed counter. Among which, 4 sets are hardware high-speed counter (HHSC) whose counting frequency can reach 120KHz (MC)or 920KHz (MN) and can operate with 8 counting modes. The other 4 sets are software high-speed counter (SHSC) whose total input frequency can reach 10KHz and can operate with three counting modes. The high-speed counters can be used in the applications required high-speed processing and precision control.

Counting (MODE)			HHSC (HSC0 ~ 3)	SHSC (HSC4 ~ 7)	Operation Waveform	
					Up count (+1)	Down count (-1)
Up/Down pulse	MD 0	U/D	O	O	U D	
	MD 1	U/Dx2	O		U D	
Pulse-Direction	MD 2	K/R	O	O	K R	
	MD 3	K/Rx2	O		K R	
A/B phase	MD 4	A/B	O	O	A B	
	MD 5	A/Bx2	O		A B	
	MD 6	A/Bx3	O		A B	
	MD 7	A/Bx4	O		A B	

Sample application

The control of cutting machine with variable length



High-speed timer (HST) / NC position control

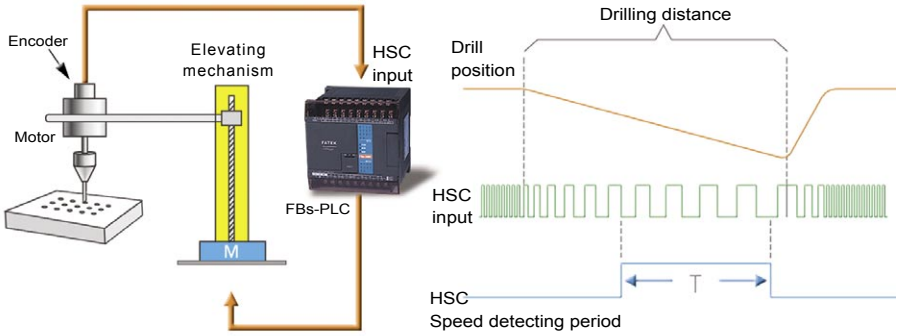
■ High-speed timer (HST)

FBs-PLC has a special design 0.1mS time base high-speed timer that can provide a timer with 0.1mS resolution and real-time time-up interrupt capability. Compared with ordinary PLC, whose best resolution is 1mS, including error of scan time, FBs-PLC is more than 10 times as precise as ordinary PLC. So FBs-PLC can easily handles precise timing or speed detection that can not be handled with other PLCs. FBs-PLC has one 16-bit 0.1mS high-speed timer. Besides that, four sets of 32-bit hardware high-speed counter(HHSC) all have software switch, can be configured as 32-bit 0.1mS high-speed timer. Therefore, FBs-PLC has maximum of 4 sets of 32-bit HST.

If a drill is running without loading, its rotating speed is 6000RPM. When drill is in normal drilling, rotating speed will be reduced to 5500RPM. When drill becomes blunt then friction force is increased, rotating speed will be further reduced to 5200RPM. When drill is broken, rotating speed is equal to the speed running without loading. When drill is pressed down, the change of rotating speed can be detected. So, the break and blunting of drill can be disposed immediately.

Sample application

Combine HSC and HST to detect the break or blunting of drill.

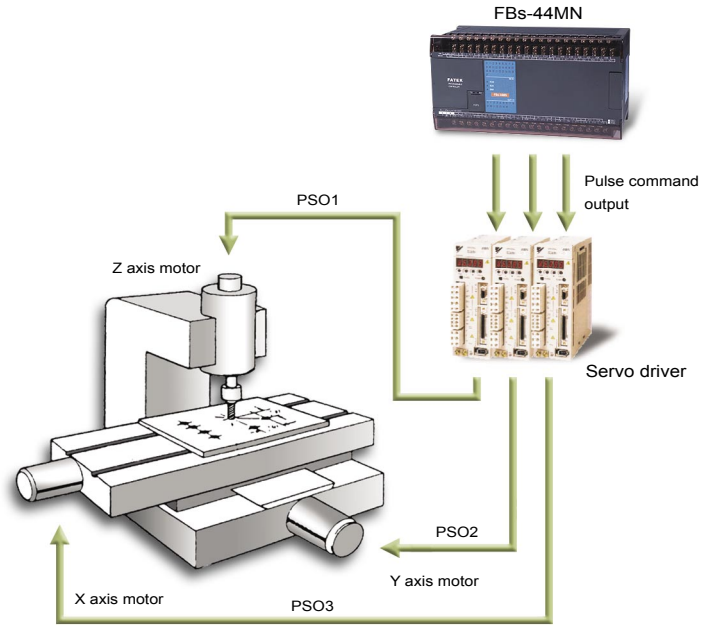


■ NC position control

High-speed pulse output (HSPSO) built in FBs-PLC can perform up to 4 axes NC servo or stepping position control. With the accelerating and decelerating function, it is easy to achieve smooth and precise multi-zone position control. If coordinating with built-in HHSC feedback, FBs-PLC can perform closed loop control to compensate the wear, aging and unconformity of component thus can obtain more precise control. Besides, FBs-PLC provides a position control language, which cooperates with the convenient instruction of ladder diagram, can facilitate the implementation of your precise position control.

Sample application

Use one PLC to perform 3 axes position control.

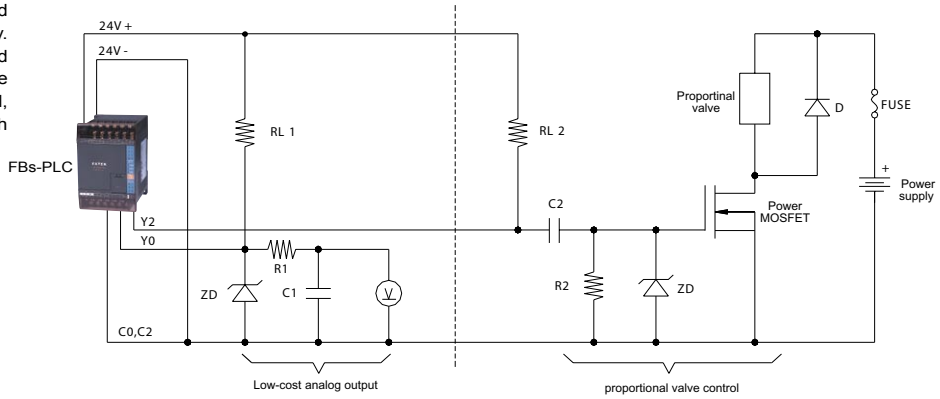


PSO2, PSO3 are used for X,Y table two dimensions position control. PSO1 is used for position control of drilling depth.

■ High-speed pulse width modulation (HSPWM)

FBs-PLC provides 4 points of hardware high-speed pulse width modulation output, with resolution as good as 0.1% (for frequency 72Hz~18.432KHz) and 1% (for frequency 720Hz~184.32KHz), respectively. Because of the high speed of hardware circuits and precision and stability, FBs-PLC can easily achieve fine temperature control, proportional valve control, or simple and yet practical D/A output made with external integration circuits.

Sample application

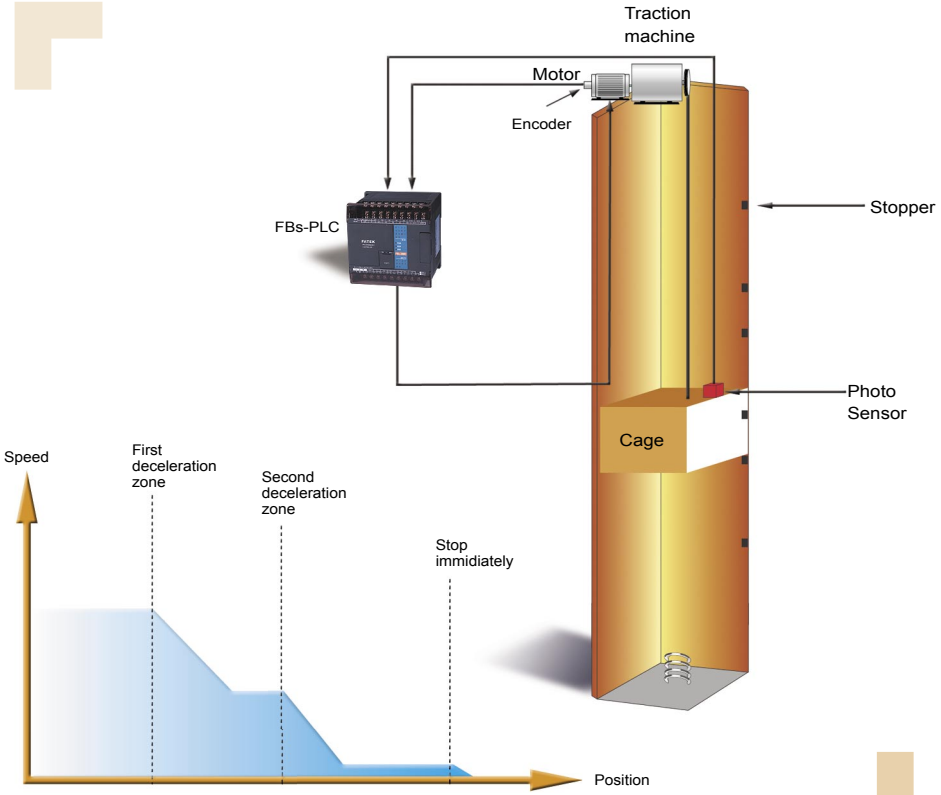


■ High-speed interrupt

A FBs-PLC can have up to 16 points of external interrupt input. The interrupt can be activated by the change of input status which can be positive edge/negative edge or both edges. When using the input interrupt function can avoid the false operation that caused by the PLC can't detect the status change of the fast input signal with normal scan.

Sample Application: Elevator position control
Incremental encoder can detect the position and the floor where the box of cage locating to do multiple sections of deceleration. Then, use photo sensor and stop plate to detect cage stop signal and issue a high-speed interrupt to immediate stop the cage precisely.

Sample application

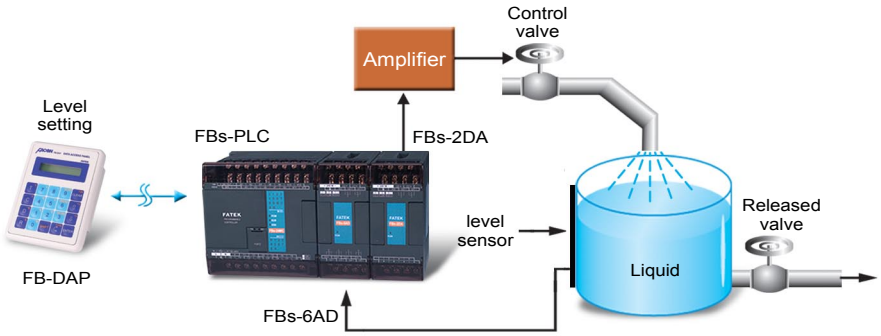


General purpose PID control / Temperature measurement and PID control

General purpose PID control

FBs-PLC provides the general purpose PID control function which compares the process variables, read from analog input (AI), with the setting value, defined by user, and perform PID calculation according to the proportional band (P), integral constant (I) and derivative constant (D). A proper output control value obtained from above execution is output through analog output (AO) to control process to stay within the range specified by user. The feature can be applied to smooth, precise control such as flow, pressure and level control

Sample application

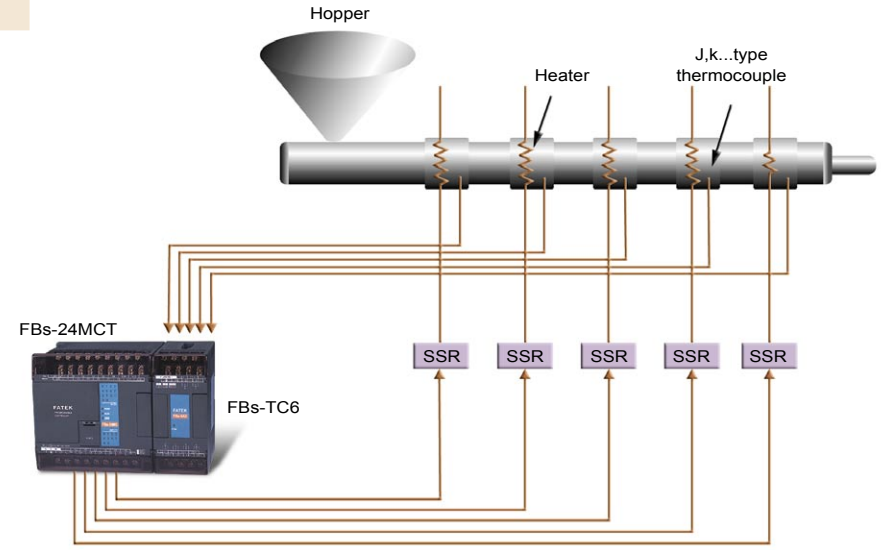


Temperature measurement and PID control

FBs-PLC provides a 8 types (J,K,R,S,E,T,B,N) of thermocouple temperature module as well as Pt-100 and Pt-1000 RTD temperature module. Thermocouple is suitable for the measurement of large temperature range such as boiler process. RTD is good for the measurement of low temperature, smaller range of temperature and higher resolution such as refrigeration and air condition application. Because of the characteristic of temperature changing slowly, adopting multiplexing scan measurement and multiple loops PID control make single FBs-PLC be able to perform up to 32 loops PID temperature control. So, can get the best cost to performance ratio. With the convenient instruction of temperature measurement and temperature PID control will drastically reduce the difficulties, cost and time for developing and testing program.

Sample application:
Injection molding machine temperature control
As shown in the right figure, FBs-TC6 can connect with 8 types (J,K,R,S,E,T,B,N) of thermocouple directly. Through the execution of temperature measurement and PID control instruction, output the control output through SSR to control heater to maintain the temperature of each zone within specified range.

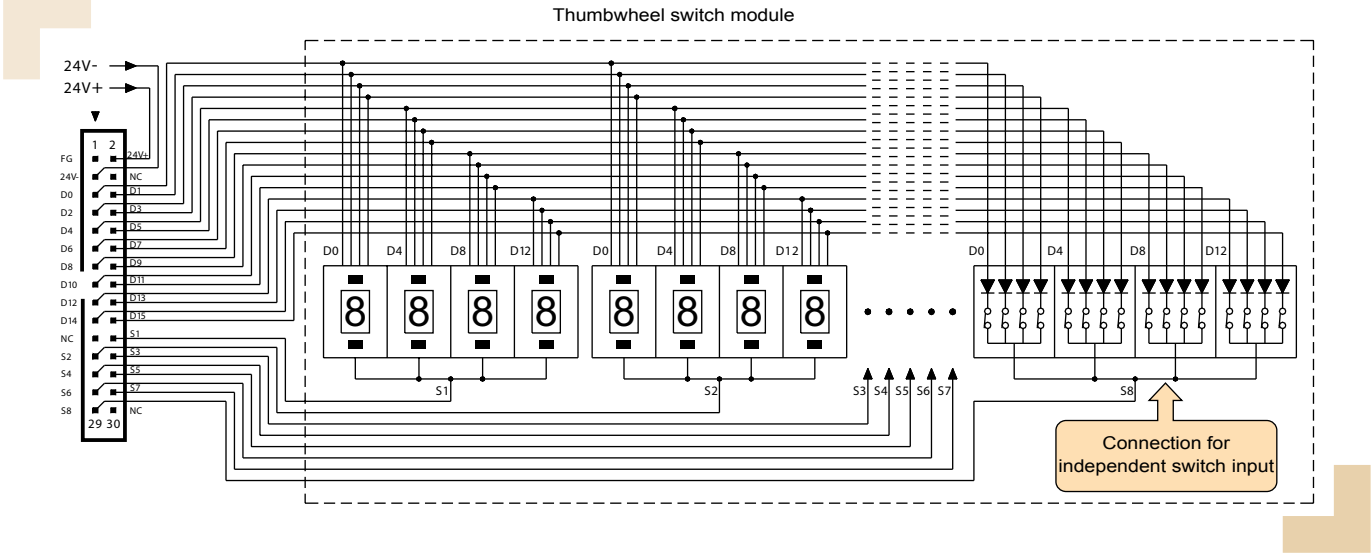
Sample application



■ Thumbwheel switch multiplex input

The FBs-32DGI thumbwheel switch multiplex input module provided in FBs-PLC conduct multiplexing input scan of the eight sets of 4 digit numbers (or 128 independent ON/OFF status) via the embedded I/O ASIC chips (special chips for the FBs-PLC I/O module). It does not occupy any CPU time and the multiplexing scan rate is about 10ms. In addition, because only 24 wires are required by multiplexing input to achieve 32 digits (or 128bit ON/OFF) input, plus that the FBs-32DGI is only 4cm in width, it turn out to be an ultra high density, lowest cost, and most labor saving solution.

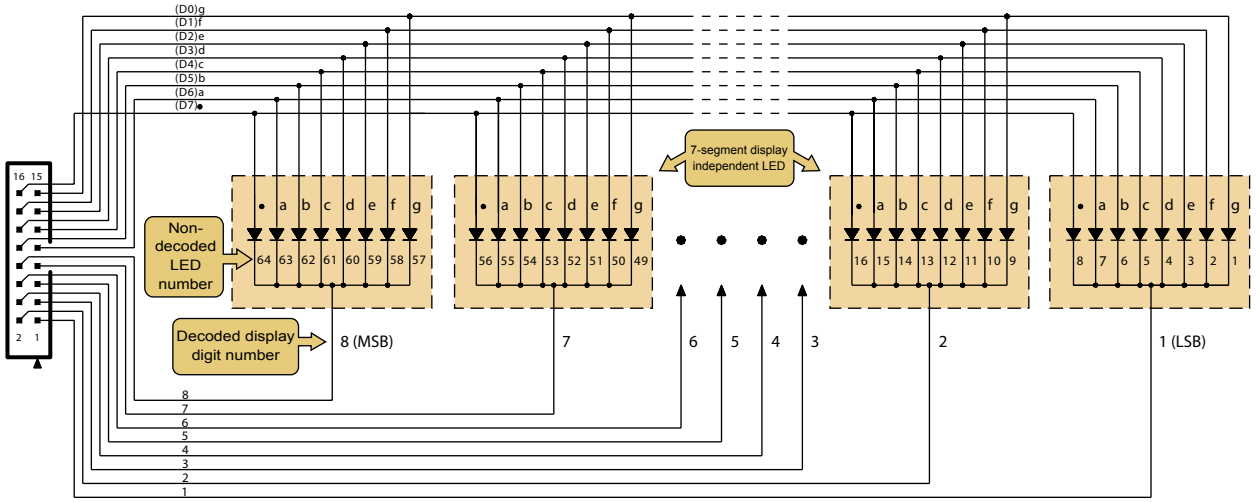
Sample application



■ 7/16-segment LED display module

The FBs-7SG is a 7/16-segment LED display module with only 4cm width. The embedded I/O ASIC chips will automatically conduct the multiplexing scan display of two sets of 8 digits (a total of 16 digits) 7-segment LED display or 8 sets of 16-segment LED display without occuping CPU time. The multiplexing scan time is 10ms. Furthermore, because of multiplexing scan, each set of 8 digits (64bit LED) only requires the 16pins ribbon cables for connection. Three different driving voltages and three voltage fine tuning are available in this module, which are capable of driving most of existing 7-segment LED displays of which the driving voltage is various. The installation distance of display can even reach up to one hundred meters. FATEK also provides 4(.56", .8", 2.3", and 4.0") 7-segment LED display boards and 2(.8 ", 2.3") 16-segment alphanumeric LED display for the choice of users.

Sample application

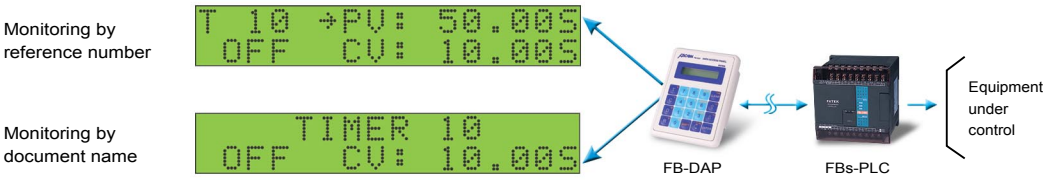


■ Simple human-machine interface and RFID card

FB-DAP can be used for setting Timer/Counter and displaying NC position. It also can be used for simple human-machine interface by using the features of user definable key and display message. The FB-DAP with -R option is equipped with wireless card reader module and can be used for the application of entrance , elevator, security control and calling car in parking tower. Besides, FB-DAP uses extra-large membrane keypad, which is easy to be distinguished and operated.

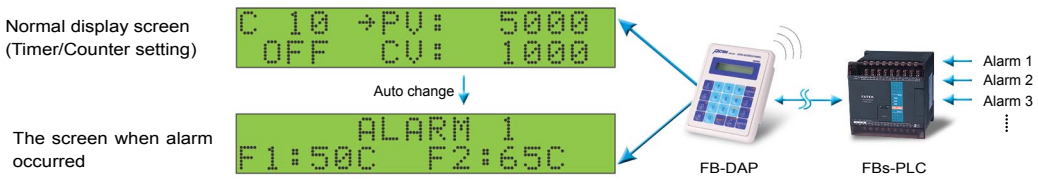
Example 1

To set Timer/Counter and to display NC position
Use reference number (T, C, R) or document name (1~16 English characters or numbers)to specify monitoring object



Example 2

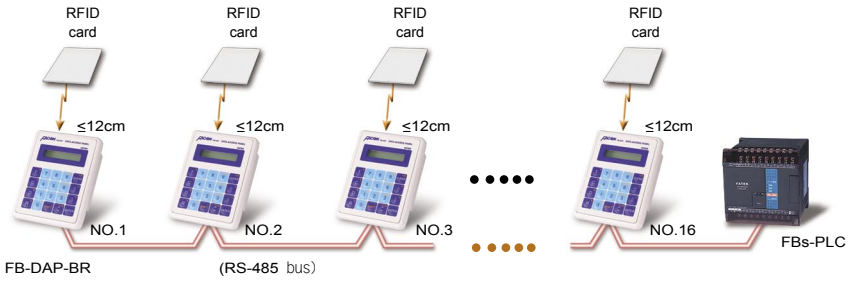
Used as alarm or message display
This mode can be as dedicated mode or a background mode. In dedicated mode, FB-DAP is only for displaying. In background mode, FB-DAP works in pre-defined working mode (such as T/C setting and entrance control etc.) while in normal situation. FB-DAP will display alarm message (predefined in program) or display event message(the message can be changed by user without modifying the program) only when alarm or special event happens. The buzzer alarm is optional.



Can set 10 grades of alarm and event display message. When the length of event display message exceeds 16 characters, FB-DAP will display the message with slow scroll.

Example 3

The application of entrance and parking control with multi-DAP link and RFID card



One FBs-PLC can connect up to 16 FB-DAPs. If the number of FB-DAP is exceeded, can use the CPU-LINK for expansion. With one PLC, can support 16 FB-DAPs. Maximum number of linked DAP station is 254x16

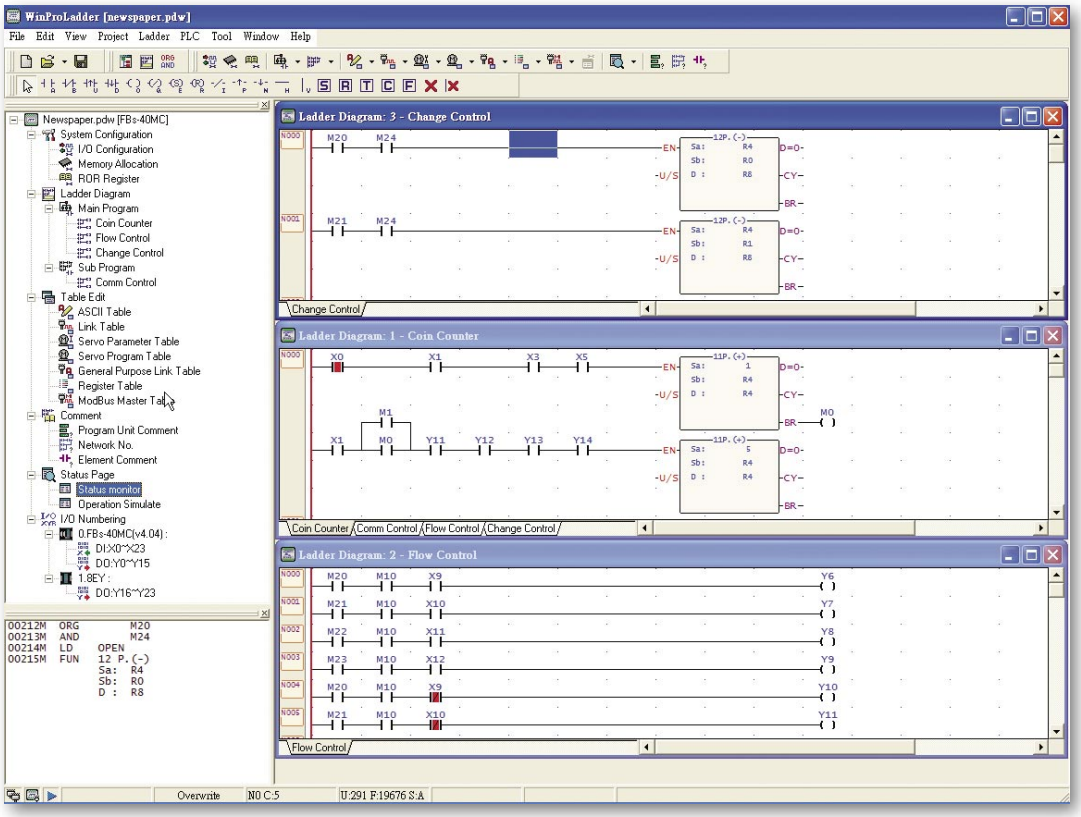
WinProladder software package

FATEK FBs-PLC Ladder Program Programming Software

■ General Feature

- Windows based application program, all the operating follow the convention of windows environment, easy for learning and operating. No matter beginner or Pro can operate with great efficient.
- Adopt project concept, which category the whole tasks of program to be developed with hierarchy tree. Through the visual effect the user can see through the whole project at first glance. No matter at program or maintenance stage all the jobs need to do can perform with intuitive.
- Thoughtful and considerate entry method design, incorporate both the keyboard and mouse for entry device. No matter at field site or office environment can operate with ease and efficient.
- Provides the connection for PLC and PC with varieties. Among the connections, there are hardware connection, Modem connection and Internet connection. For every different connection, WinProladder provide a session name to associate the setting of the communication parameters, such as port no., baud rate, IP address, phone number, etc.. With this feature can alleviate the user from the burden of the memorizing.

WinProladder



■ Program editing

- Provides the on-line program editing capability. After modify the ladder program can send the RUN command immediately without to re-download the program to PLC. With this feature can reduce the application development time dramatically comparing with other PLC without this feature.
- Ladder program can be edited without stop the PLC from running (Run time editing).
- Multiple ladder program windows, can show different fragmentation of ladder program at one time and perform the copy, paste and compare operation between these windows.
- Provides the flexible ladder network editing capability. With the help of copy, paste and delete highly efficient operation can complete a complex program with few keystrokes.
- Provides the capability to divide the whole program into many program units. User can at will partition the whole development task into many independent program units according to the functionality or other classify methodology and perform the entry, editing, testing and documentation independently. With this feature can greatly ease the maintenance of the whole application.
- Provides an individual window for mnemonic instruction display. Immediately display the equivalent mnemonic code corresponding to the ladder network pointed by the cursor.
- Provides the flexible program search capability, can search contact, register or function. Also can set a filter to narrow down the search object to ease the user from picking up the desire results among the whole bunches of search result. Most of all, just double click the interested message line can bring out the corresponding ladder program to the user.
- Provides a powerful syntax check tool. With this tool can parse the user's program and generate a parsing message in one window. In this window all the warning or error messages regard the program will be listed line by line. User just double click the interested line then the ladder program will be shown on the window with the cursor stay on the question part.

WinProladder software package

■ Program testing

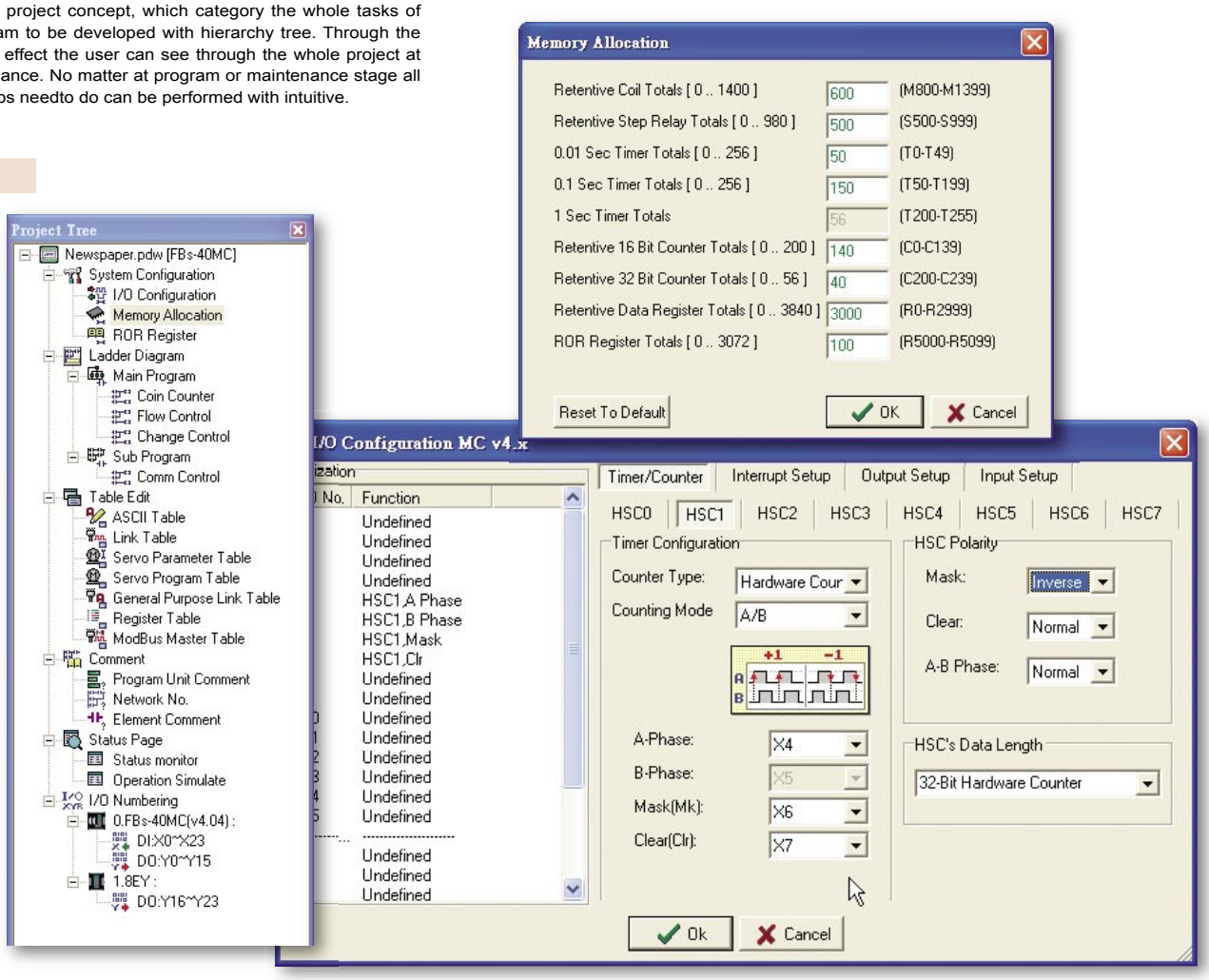
- Provides multiple pages of status monitoring. User can monitor and modify the status of discrete contacts and registers on the status page. Each discrete input and output (include the internal relay) can be disabled and forced on or off. Each register can be selected individually to show with different format such as hexadecimal, decimal and binary. Best of all, all the layout of the status pages can be stored in the project and there is no need for user to re-define the page each time when he/she wants to monitor the status.
- Multiple high lighted ladder program display windows. The conducting condition of each contact element can be revealed by the color of the element drawing. The register value embedded with the function block also can be shown currently with ladder diagram. The discrete element can be easily disabled and forced on or off directly from the ladder diagram.

■ Program documentation

- Provides discrete element, register, network, and program unit and project comment. Besides the project comment all other comments can be displayed with ladder diagram. With this feature the user can easily realize how the ladder program is working.
- Provides following report printout function:
  Ladder diagram printout can select the scope and detail level of the ladder diagram for different kind of reporting requirements.
  Used ladder element cross-reference report can list the statistics of all ladder elements used in the project.
- The comment of the contact and register can be created by this software or by using text editor that were familiar with user. Comments can be imported from the text file and also can be exported to the application software such as Excel for further processing.
- The network of ladder program can be copied to other editing software such as Word by using copy and paste function. With this feature, can facilitate the documentation of program when use the editing software.

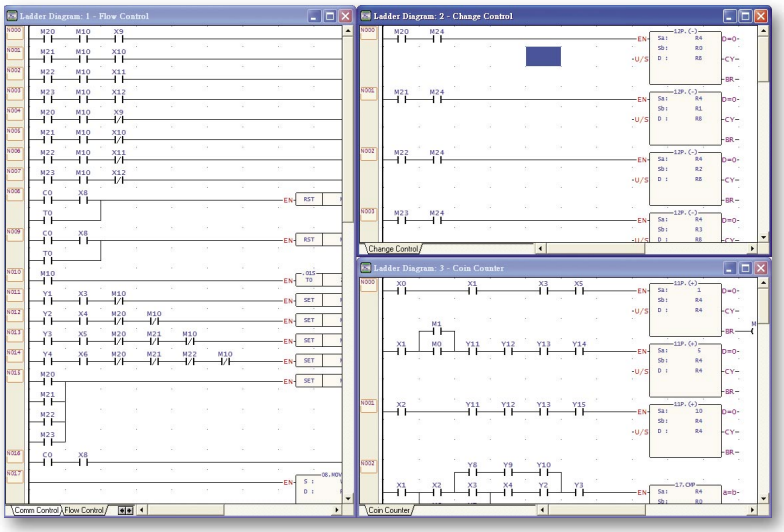
■ Project oriented program

Adopt project concept, which category the whole tasks of program to be developed with hierarchy tree. Through the visual effect the user can see through the whole project at first glance. No matter at program or maintenance stage all the jobs needto do can be performed with intuitive.



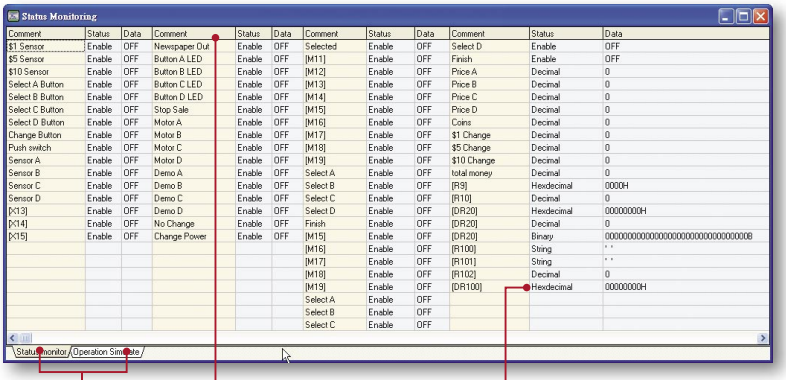
WinProladder software package

■ Ladder program editing screen

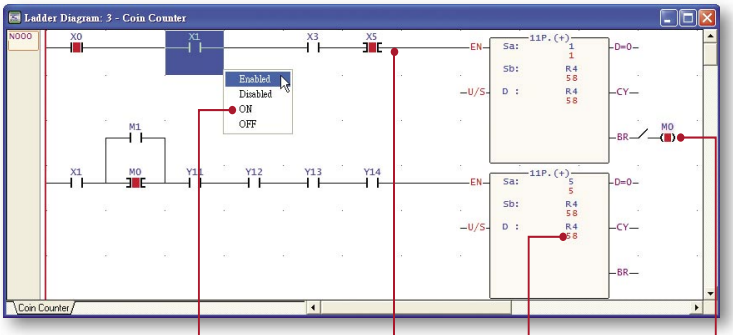


Multiple ladder windows, can perform the network copy, paste, cut and compare operations among windows.

■ Status monitor and control



Multiple status page window, can define the elements, registers to be monitoring and assign its display format. The state of the contact elements can be disabled and forced. Register value also can be entered.

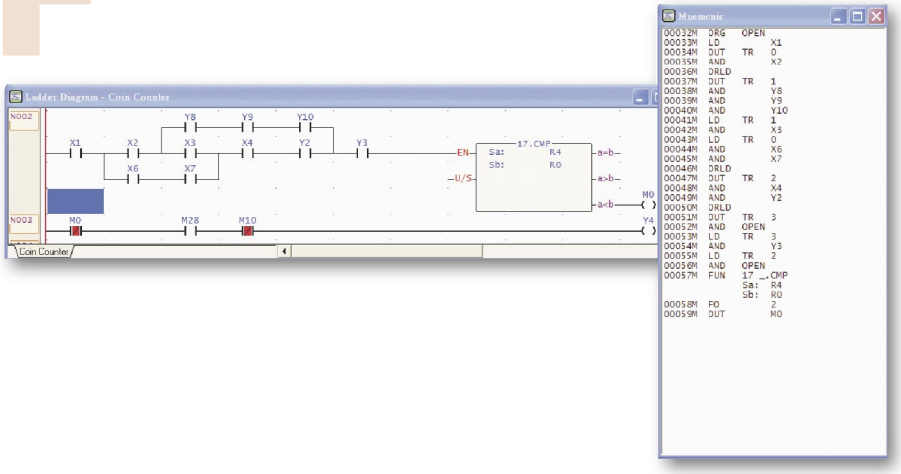


Multiple high lighted ladder program windows. The conducting condition of each contact element can be revealed by the color of the element drawing. The register value embedded with the function block also can be shown currently with ladder diagram.

WinProladder software package

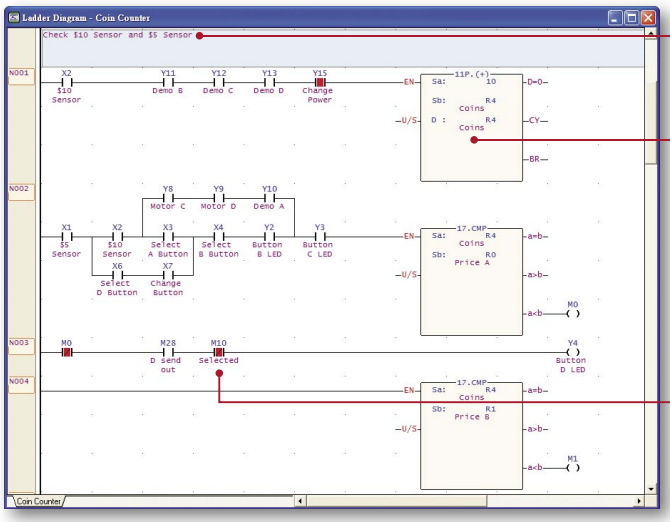
Mnemonic ladder instruction display window

Dedicate mnemonic instruction window can show the mnemonic instructions corresponding to the network pointed by the cursor. This feature can help the teaching of ladder programming by mnemonic instruction.



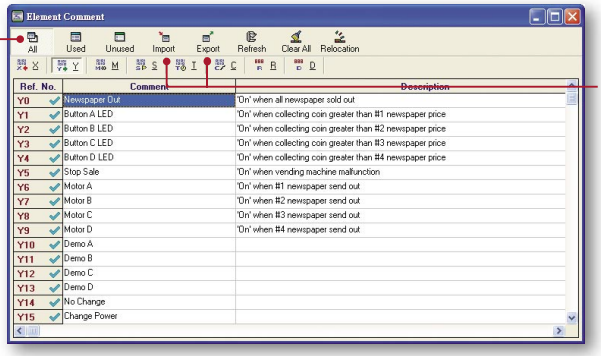
Ladder diagram with comments

Provides different detail level of comment for contact, register, network, program unit and program to facilitate the readability and maintenance of the program.



Element comment editing

With element comment window, can attach an easy for memorizing comment to the elements, detail description also can be added to facilitate the maintenance of project.



Can choose all, used, unused elements for displaying to assist the user to input the comments

The comment, through exporting and importing can be integrated with other application software.

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	(L)	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		(S)	Set a coil
RST		(R)	Reset a coil

Step ladder instructions (SFC)

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

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

Function instructions

Category	NO.	Instruction	Derivative	Function
Timer		Tnnn		General timer instruction (T0 ~ T255)
Counter		Cnnn		General counter instruction (C0 ~ C255)
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	(×)	DP	Sa × Sb → D
	14	(/)	DP	Sa / Sb → D
	15	(+1)	DP	Add 1 to D
	16	(–1)	DP	Subtract 1 from D
	23	DIV48	P	48 bits integer division Sa / Sb → D
	24	SUM	DP	Sum of N consecutive values
	25	MEAN	DP	Average of N consecutive values
	26	SQRT	DP	Square root of S
	27	NEG	DP	Two's complement of D (Negative number)
	28	ABS	DP	Absolute value of D
	29	EXT	P	Extend 16 bits into 32 bits
	30	PID	P	PID calculation

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

Function instructions

(Continues)

Category	NO.	Instruction	Derivative	Function
Move operation	8	MOV	DP	Move S to D
	9	MOV/	DP	Inverse S and move to D
	40	BITRD	DP	Move the Bit-N of S to FO
	41	BITWR	DP	Write INB input to the Bit-N of D
	42	BITMV	DP	Move the Bit-Ns of S to the Bit -Nd of D
	43	NBMV	DP	Move the Nibble-Ns of S to the Nibble-Nd of D
	44	BYMV	DP	Move the Byte-Ns of S to the Byte-Nd of D
	45	XCHG	DP	Exchange Da and Db
	46	SWAP	P	Swap the High-Byte of D with the Low-Byte of D
	47	UNIT	P	Take Nb0 of N words to form a Word
	48	DIST	P	Distribute N Nb of S to Nb0 of N Words
	49	BUNIT	P	Low byte of words re-unit
	50	BDIST	P	Words split into multi-byte
	160	RW-FR	DP	File register access
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 N_S ~ N_L of S
	58	ENCOD	P	Encode the N_S ~ N_L 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	Represent hour, minute, second by seconds
	62	→HMS	P	Represent 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 program
	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 output (PWM) instruction
	83	SPD		Speed detection instruction
	84	TDSP		7/16-segment LED display control
	86	TPCTL		PID temperature control
	139	HSPWM		Hardware PWM pulse output
Cumulative Timer	87	T.01S		0.01S time base cumulative timer
	88	T.1S		0.1S time base cumulative timer
	89	T1S		1S time base cumulative 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/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	XOR two matrixes
	123	MXNR	P	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 in matrix
NC Position control	140	HSPSO		Hardware NC 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
Interrupt control	145	EN	P	Enable external input or peripheral interrupt/operation
	146	DIS	P	Disable external input or peripheral interrupt/operation

General Specifications

Environmental specifications / Power supply specifications / Main unit 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 (built-in power supply)		21W (POW-14)	36W (POW-24)		
Inrush current		20A @ 264VAC			
Allowable power mometary interruption time		<20mS			
Fuse rating		1A, 250VAC			

- 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	24VDC -15%/+20%			
Max. power consumption (built-in power supply)	15W (DPOW-10)	24W (DPOW-16)		
Inrush current	20A @ DC24 V			
Allowable power mometary interruption time	<20mS			
Fuse rating	3.15A, 250VAC			

■ Main unit specifications

* is default,user configurable

Item		Specification	Note
Execution speed		0.33uS/Sequential instruction in average	
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	Port0 (RS232 or USB)	Communication speed 4.8Kbps ~ 921.6Kbps (9.6Kbps)*	
	Port1 ~ Port4 (RS232, RS485 or Ethernet)	Communication speed 4.8Kbps ~ 921.6Kbps (9.6Kbps)*	Port1 ~ 4 provide FATEK or Modbus master/slave communication protocol
	Maximum link stations	254	

Main unit specifications

(Continue)

* is default,user configurable

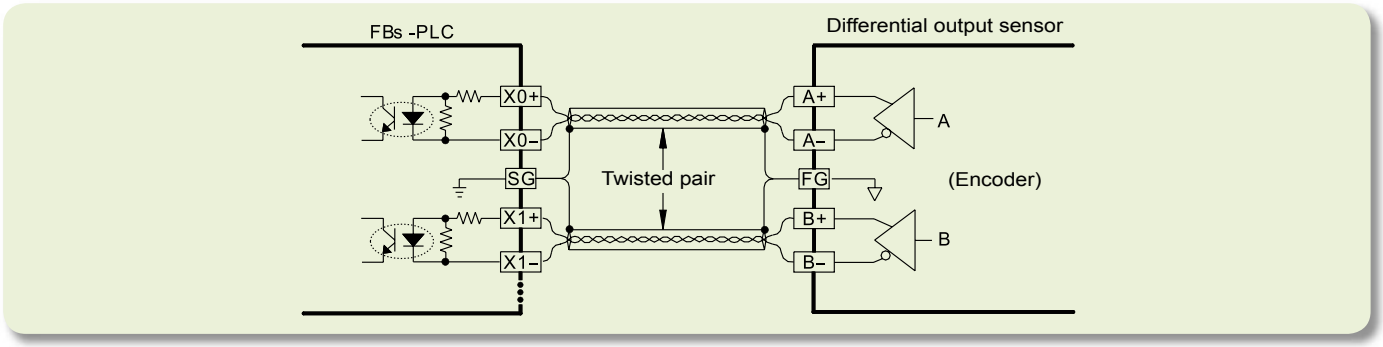
Item				Specification	Note
Digital (Bit status)	X	Input contact (DI)		X0 ~ X255 (256)	Corresponding to external digital input
	Y	Output relay (DO)		Y0 ~ Y255 (256)	Corresponding to external digital output
	TR	Temporary relay		TR0 ~ TR39 (40)	
	M	Internal relay	Non-retentive	M0 ~ M799 (800)*	Can be configured as retentive type
				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
			16-bit Non-retentive	C140 ~ C199 (60)*	Can be configured as retentive type
			32-bit Retentive	C200 ~ C239 (40)*	Can be configured as non-retentive type
			32-bit 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 ~ R8071can be set as ROR ~ default setting is (0)*	ROR is stored in special ROR area and not consume program space
			File register	F0 ~ F8191 (8192)	Must save/retrieved via special commands
	IR	Input register		R3840 ~ R3903 (64)	Corresponding to external numeric input
	OR	Output register		R3904 ~ R3967 (64)	Corresponding to external numeric output
	SR	Special system register		R3968 ~ R4167 (197), R4000 ~ R4095 (96)	Except R4152 ~ R4154
	(Special register)	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) / R4132 (month) / R4133 (year) / R4134 (week)	Not available in MA model
	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 bits), 4 (32 bits, share with HHSC)	
High-speed counter	Hardware high-speed counter (HHSC) /32bits		No. of channel	Up to 4	Total number of HHSC and SHSC is 8 HHSC can be converted into 32 bits/0.1mS time base high-speed timer
			Counting mode	8 modes (U/D, U/Dx2, K/R, K/Rx2, A/B, A/Bx2, A/Bx3, A/Bx4)	
			Counting frequency	Maximum is 120KHz (Single end input) or 920KHz (differential input)	
	Software high-speed counter (HHSC) /32bits		No. of channel	Up to 4	
			Counting mode	3 modes (U/D, K/R, A/B)	
			Counting frequency	Maximum sum up to 10KHz	
NC position pulse out (HSPSO)		Number of axis		Up to 4	
		Output frequency		Maximum is 120KHz (Single end output) or 920KHz (differential output)	Half of the maximum while A/B output
		Pulse out mode		3 modes (U/D,K/R,A/B)	
		Programming method		Dedicated position language	
		Interpolation		Maximum 4 axes linear interpolation	
HSPWM output		Number of points		Up to 4	
		Output frequency		72Hz ~ 18.432KHz (with 0.1% resolution) 720Hz ~ 184.32KHz (with 1% resolution)	
Captured input			Points	Up to 36	
			Pulse width	>10 μS (High speed)	
				>47 μS (Medium speed)	
				>470 μS (Medium low speed)	
Digital filter			X0 ~ X15	Adjustable filtering frequency 14KHz ~ 1.8MHz	Chosen by frequency at high frequency
				Adjustable time constant 0 ~ 1.5mS/0~15mS (In 0.1mS/1mS)	Chosen by time constant at low frequency
			X16 ~ X35	Time constant 1mS ~ 15mS, adjustable by step of 1mS	

■ Digital input (DI) specifications

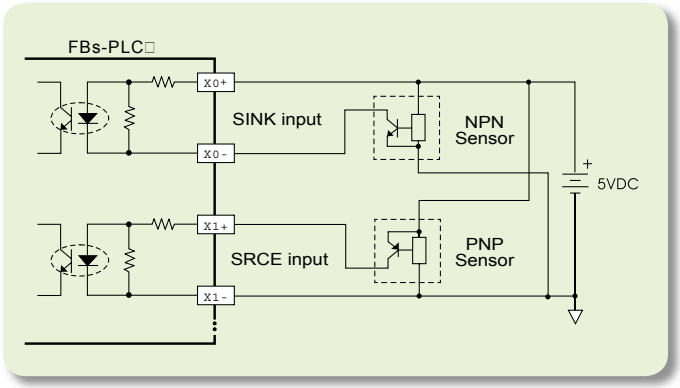
Item \ Specification		5VDC differential input	24VDC single-end input			Note
		Ultra high speed 920KHz	High speed 120KHz	Medium speed (HSC) 20KHz*1	Medium low Speed (Captured) 470μS*2	Low speed 4.7mS	
Input signal voltage		5VDC ± 10%		24VDC ± 10%			*1 Limit of input speed in MA model is 10KHz *2 For captured inputs
Threshold current	ON	> 6mA	> 4mA	> 4mA		> 2.3mA	
	OFF	< 2mA	< 1.5mA	< 1.5mA		< 0.9mA	
Maximum input current		20mA	7mA	7mA		4.2mA	
Input indication		Displayed by LED: Lit 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 (0nS ~ 15mS) +AHF (470nS)		DHF (0nS ~ 15mS) + AHF (470μS)		AHF (4.7mS)	DHF: Digital hardware filter AHF: Analog hardware filter

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

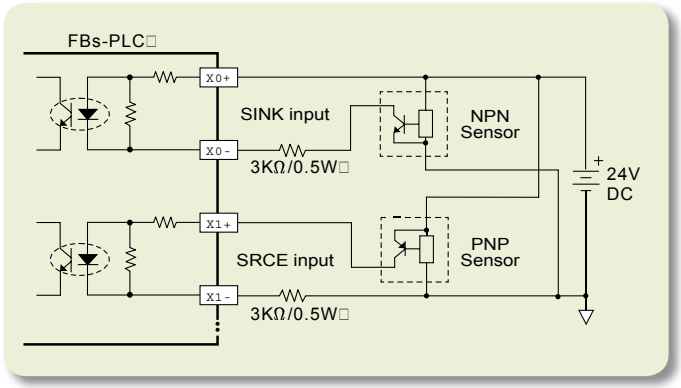
- Wiring of 5VDC differential input (with frequency up to 920KHz for high speed or high noise environments)



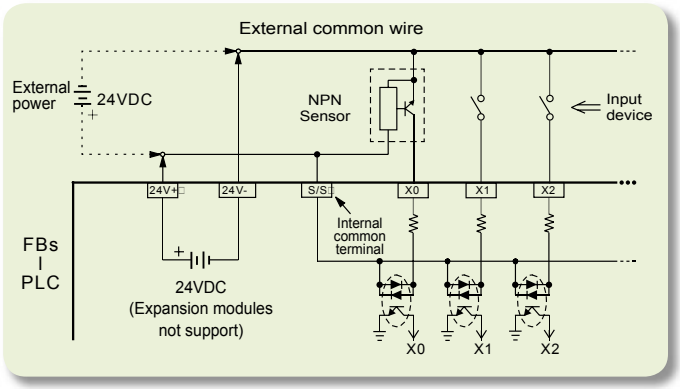
- Wiring of 5VDC differential input to 5VDC single-end SINK /SRCE input (Max. 120KHz)



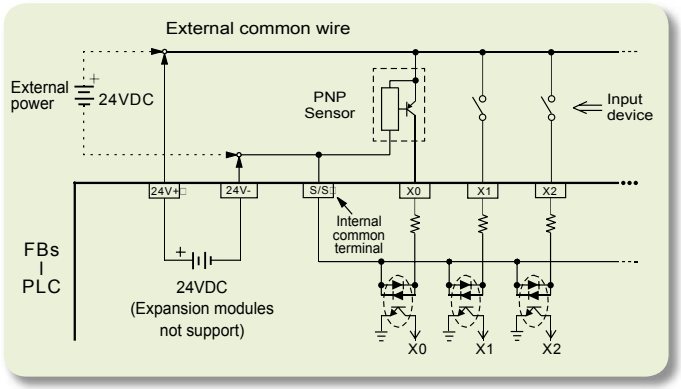
- Wiring of 5VDC differential input to 24VDC single-end SINK /SRCE input (Max. 120KHz)



- Wiring of 24VDC single-end SINK input



- Wiring of 24VDC single-end SRCE input

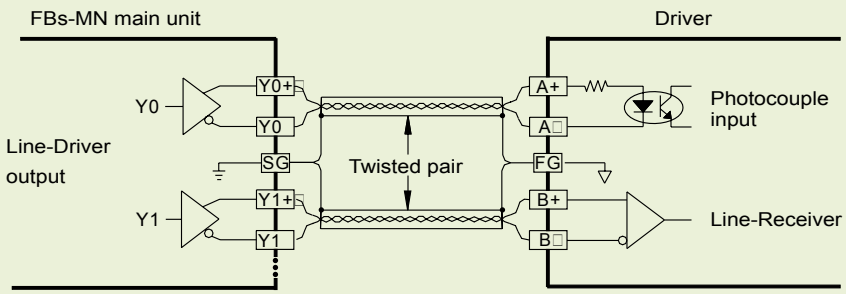


■ Digital output (DO) specifications

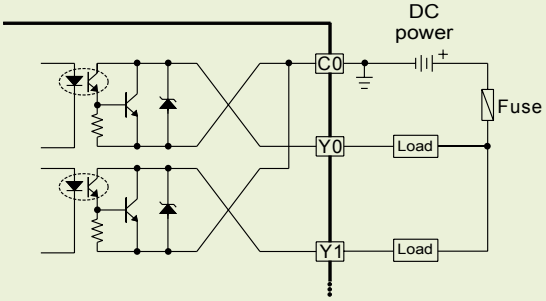
Item \ Specification		Differential output	Single-end transistor output			Single-end relay output	Single-end TRIAC output
		Ultra high speed	High speed	Medium speed	Low speed		
Maximum swicthing (working) frequency		920KHz*	120KHz*	20KHz*	200Hz	For ON/OFF, not suitable for switching frequently	
Working voltage		5VDC	5 ~ 30 VDC			< 250VAC, 30VDC	100 ~ 240VAC
Maximum load current	Resistive	50mA	0.5A	0.2A	0.5A 0.1A (24EYT)	2A/single, 4 A/common	1A
	Inductive					80VA	15VA/100VAC 30VA/200VAC
Maximum voltage drop (@ maximum load)		-	0.6V	2.2V	1.2V	0.06V (initial)	1.2Vrms
Minimum load		-	-			2mA/DC power	25mA
Leakage current		-	< 0.1mA/30VDC			-	2mA
Maximum output delay time	ON → OFF	200nS	200nS	15μS	1mS	10mS	1mS
	OFF → ON			30μS			1/2AC cycle
Output status indication		Displayed by LED: Lit when "ON", dark when "OFF"					
Over current protection		N/A					
Isolation type		Photocouple isolation				Electromagnetic isolation	Photocouple 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	

* : Half of the maximum while A/B output

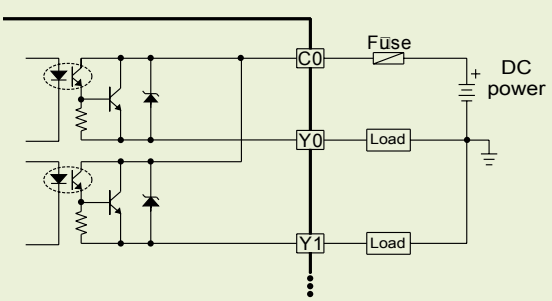
- Wiring of 5VDC differential output (Up to 920KHz for U/D/CK output; Up to 460KHz for A/B output; For high speed or high noise environments)



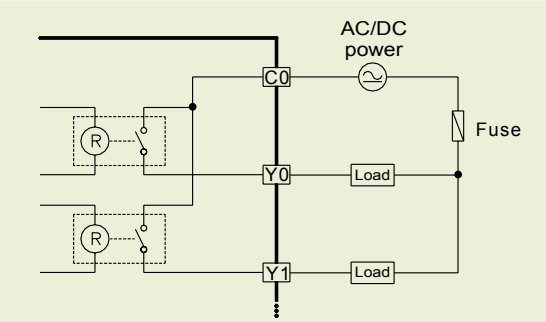
- Wiring of transistor single-end SINK output



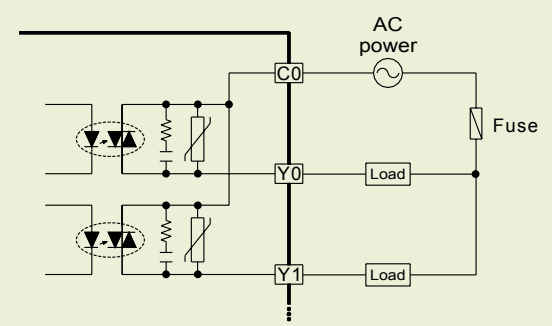
- Wiring of transistor single-end SRCE output



- Wiring of relay single-end output



- Wiring of Thyristor single-end output



NC positionning main units (MN) / High-performance main units (MC)

NC positionning main units (MN)

(7.62 mm detachable terminal block)

FBs-20MN (T,S)

FBs-32MN (T,S)

FBs-44MN (T,S)

Specification / Model number	Calendar	Comm. port: Built-in	Comm. port: Expansible	Digital input: 5VDC: Ultra high-speed (HSC) 920KHz	Digital input: 24VDC: Medium speed (HSC) 20KHz	Digital input: 24VDC: Medium low speed (Cap.) 470μS	Digital output: 5VDC differential ultra high-speed 920KHz	Digital output: Transistor (5 ~ 30VDC): Medium speed 20KHz (0.2A)	Digital output: Transistor (5 ~ 30VDC): Low speed 200Hz (0.5A)	Digital output: Relay: AC/DC (2A)	Digital output: Thyristor: AC (1A)	Dimension
FBs-20MN △-◎	Built-in	1 port (Port0, USB or RS232)	4 ports (Port1 ~ 4, RS485 or RS232)	2 points (1 axis)	10 points		2 points (1axis)			6 points		Figure 1
FBs-20MNT ◇△-◎								6 points				
FBs-20MNS △-◎											6 points	
FBs-32MN △-◎				4 points (2 axes)	12 points	4 points	4 points (2 axes)			8 points		Figure 1
FBs-32MNT ◇△-◎								4 points	4 points			
FBs-32MNS △-◎											8 points	
FBS-44MN △-◎				8 points (4 axes)	8 points	12 points	8 points (4 axes)			8 points		Figure 1
FBs-44MNT ◇△-◎									8 points			
FBs-44MNS △-◎											8 points	

△ : Port0 interface: Blank—RS232, U—USB

◇ : Transistor output type: Blank—SINK output (NPN), J—SRCE output (PNP)

◎ : Power supply: Blank—AC power supply (100 ~ 240VAC), D—DC power supply (24VDC)

High-performance main units (MC)

(7.62 mm detachable terminal block)

FBs-10MC (T,S)

FBs-14MC (T,S)

FBs-20MC (T,S)

FBs-24MC (T,S)

FBs-32MC (T,S)

FBs-40MC (T,S)

FBs-60MC (T,S)

Specification / Model number	Calendar	Comm. port: Built-in	Comm. port: Expansible	Digital input: 24VDC: High speed (HSC) 120KHz	Digital input: 24VDC: Medium speed (HSC) 20KHz	Digital input: 24VDC: Medium low speed (Cap.) 470μS	Digital output: Transistor (5 ~ 30VDC): High speed 120KHz (0.5A)	Digital output: Transistor (5 ~ 30VDC): Medium speed 20KHz (0.2A)	Digital output: Transistor (5 ~ 30VDC): Low speed 200Hz (0.5A)	Digital output: Relay: AC/DC (2A)	Digital output: Thyristor: AC (1A)	Dimension
FBs-10MC △-◎-X	Built-in	1 port (Port0, USB or RS232)	4 ports (Port1 ~ 4, RS485 or RS232)	2*~4 points	4 points					4 points		Figure 2
FBs-10MCT ◇△-◎-XY							2*~4 points	2 points				
FBs-10MCS △-◎-X											4 points	
FBs-14MC △-◎-X					6 points					6 points		Figure 2
FBs-14MCT △-◎-XY							2*~6 points	4 points				
FBs-14MCS △-◎-X											6 points	
FBs-20MC △-◎-X				2*~6 points	10 points					8 points		Figure 1
FBs-20MCT ◇△-◎-XY							2*~8 points	6 points				
FBs-20MCS △-◎-X											8 points	
FBs-24MC △-◎-X				2*~8 points	12 points					10 points		Figure 1
FBs-24MCT ◇△-◎-XY							2*~8 points	6 points	2 points			
FBs-24MCS △-◎-X											10 points	
FBs-32MC △-◎-X					14 points	4 points				12 points		Figure 1
FBs-32MCT ◇△-◎-XY							2*~8 points	6 points	4 points			
FBs-32MCS △-◎-X											12 points	
FBs-40MC △-◎-X						8 points				16 points		Figure 1
FBs-40MCT ◇△-◎-XY							2*~8 points	6 points	8 points			
FBs-40MCS △-◎-X											16 points	
FBs-60MC △-◎-X						20 points				24 points		Figure 1
FBs-60MCT ◇△-◎-XY							2*~8 points	6 points	16 points			
FBs-60MCS △-◎-X											24 points	

△ : Port0 interface : Blank—RS232, U—USB

◇ : Transistor output type : Blank—SINK output (NPN), J—SRCE output (PNP)

◎ : Power supply: Blank—AC power supply (100 ~ 240VAC), D—DC power supply (24VDC)

X: Extra high speed input (120KHz) points

Y: Extra high speed output (120KHz) points

* : The standard MC main units has the built-in 2 points of high speed input and 2 points of high speed output. For optional order, can be 1 ~ 6 points of high speed I/O expandable. I/O expanding points to be specified at column X (input number) and Y(output number) of model number. For example FBs-40MCT-21 means extra 2 points of high speed input (total 4points) and one more point of high speed output (total 3 points). Another example FBs-24MCT-03 means only 3 more points of high speed output (total 4 points).

Economical main units (MA) / Digital expansion units

Economical main units (MA)

(7.62 mm terminal block)

FBs-10MA (T,S)

FBs-14MA (T,S)

FBs-20MA (T,S)

FBs-24MA (T,S)

FBs-32MA (T,S)

FBs-40MA (T,S)

FBs-60MA (T,S)

Model number \ Specification	Calendar	Comm. port: Built-in	Comm. port: Expansible	Digital input: 24VDC: Medium Speed 10KHz	Digital input: 24VDC: Medium low (Cap.) 470μS	Digital output: Transistor (5 ~ 30VDC): Medium speed 10KHz (0.2A)	Digital output: Transistor (5 ~ 30VDC): Low speed 200Hz (0.5A)	Digital output: Relay: AC/DC (2A)	Digital output: Thyristor: AC (1A)	Dimension
FBs-10MA △-◎	No	1 port (Port0, USB or RS232)	2 ports (Port1~2, RS485 or RS232)	4 points	2 points			4 points		Figure 2
FBs-10MAT ◇△-◎						4 points				
FBs-10MAS △-◎									4 points	
FBs-14MA △-◎					4 points			6 points		Figure 2
FBs-14MAT ◇△-◎						4 points	2 points			
FBs-14MAS △-◎									6 points	
FBs-20MA △-◎					8 points			8 points		Figure 1
FBs-20MAT ◇△-◎						4 points	4 points			
FBs-20MAS △-◎									8 points	
FBs-24MA △-◎					10 points			10 points		Figure 1
FBs-24MAT ◇△-◎						4 points	6 points			
FBs-24MAS △-◎									10 points	
FBs-32MA △-◎					16 points			12 points		Figure 1
FBs-32MAT ◇△-◎						4 points	8 points			
FBs-32MAS △-◎									12 points	
FBs-40MA △-◎					20 points			16 points		Figure 1
FBs-40MAT ◇△-◎						4 points	12 points			
FBs-40MAS △-◎									16 points	
FBs-60MA △-◎					32 points			24 points		Figure 1
FBs-60MAT ◇△-◎						4 points	20 points			
FBs-60MAS △-◎									24 points	

△ : Port0 interface: Blank—RS232, U—USB
◇ : Transistor output type: Blank—SINK output (NPN), J—SRCE output (PNP)
◎ : Power supply: Blank—AC power supply (100 ~ 240 VAC), D—DC power supply (24 VDC)

Digital expansion units

(7.62 mm terminal block)

FBs-24EAP(T,S)

FBs-40EAP(T,S)

FBs-60EAP(T,S)

Model number \ Specification	Digital input: 24VDC: Low speed 4.7mS	Digital output: Transistor (5 ~ 30VDC): Low speed 200Hz (0.5A)	Digital output: Relay: AC/DC (2A)	Digital output: Thyristor: AC (1A)	Dimension
FBs-24EAP- ◎	14 points		10 points		Figure 1
FBs-24EAPT △-◎		10 points			
FBs-24EAPS- ◎				10 points	
FBs-40EAP- ◎	24 points		16 points		Figure 1
FBs-40EAPT △-◎		16 points			
FBs-40EAPS- ◎				16 points	
FBs-60EAP- ◎	36 points		24 points		Figure 1
FBs-60EAPT △-◎		24 points			
FBs-60EAPS- ◎				24 points	

△ : Transistor output type: Blank—SINK output (NPN), J—SRCE output (PNP)
◇ : Power supply: Blank—AC power supply (100 ~ 240 VAC), D—DC power supply (24 VDC)

Digital expansion modules / Power supply for expansion modules / Thumbwheel switch input module

■ Digital expansion modules


FBs-8EA(T,S)


FBs-16EA(T,S)


FBs-8EX


FBs-20EX


FBs-8EY(T,S)


FBs-16EY(T,S)


FBs-24EX


FBs-24EYT


FBs-24EA(T,S)


FBs-40EA(T,S)


FBs-60EA(T,S)

Specification / Model number	Digital input	Digital output				Wiring machanism	Dimension
	24VDC	Transistor (5 ~ 30VDC)		Relay	Thyristor		
	Low speed 4.7mS	Low speed 200Hz (0.5A)	Low speed 200Hz High density (0.1A)	AC/DC (2A)	AC (1A)		
FBs-8EA	4 points			4 points		7.62 mm pitch terminal block	Figure 4
FBs-8EAT ◇		4 points					
FBs-8EAS					4 points		
FBs-8EX	8 points						
FBs-8EY				8 points			
FBs-8EYT ◇		8 points					
FBs-8EYS					8 points		
FBs-16EA	8 points			8 points			Figure 3
FBs-16EAT ◇		8 points					
FBs-16EAS					8 points		
FBs-20EX	20 points						
FBs-16EY				16 points			
FBs-16EYT ◇		16 points					
FBs-16EYS					16 points		
FBs-24EX	24 points					30 pins header with latch	Figure 4
FBs-24EYT			24 points				
FBs-24EA	14 points			10 points		7.62 mm pitch terminal block	Figure 1
FBs-24EAT ◇		10 points					
FBs-24EAS					10 points		
FBs-40EA	24 points			16 points			Figure 1
FBs-40EAT ◇		16 points					
FBs-40EAS					16 points		
FBs-60EA	36 points			24 points			Figure 1
FBs-60EAT ◇		24 points					
FBs-60EAS					24 points		

◇ : Transistor output type: Blank—SINK output (NPN), J—SRCE output (PNP)

■ Power supply for expansion modules

(7.62 mm terminal block)


FBs-EPOW


FBs-EPOW-D

Specification / Model number	Power input	Residual capacity of output power			Dimension
		5VDC (Logic circuit)	24VDC (Input circuit)	24VDC (Output circuit)	
FBs-EPOW	100 ~ 240VAC -15%/+10%, 21W	400mA	250mA	250mA	Figure 4
FBs-EPOW-D	24VDC -15%/+20%, 12W	400mA	400mA*	250mA	

* Directly from input power, but limited by specifications of circuit and fuses, with capacity of 400mA

■ Thumbwheel switch input module

(30 pins header with latch)


FBs-32DGI

Specification / Model number	Input method	Occupied IR number	Refresh time for input	Dimension
FBs-32DGI	16-bit (4 digits) x 8 multiplexing input scan	8 words (32 digits/128 individual points)	10mS max. (IO ASIC)	Figure 4

7/16-segment LED display modules / Analog input (AI) module / Analog output (AO) modules / Analog input/output (AI/O) module

7/16-segment LED display modules

(16 pins box header)

FBs-7SG1

FBs-7SG2

Specification \ Module number			FB-7SG1	FB-7SG2
Display mode	Decoding display		4 bits to represent a character. It can display 16 kinds of pre-decoded character including 0 ~ 9, –, H, E, c, t and all blank	
	Non-decoding display		Each segment controlled by 1 individual bit	
Display number of character or points of LED			8 (4*) characters or 64 points individual LED	16 (8*) characters or 128 points individual LED
Refresh time for display			10mS max. (IO ASIC)	
LED driving specification	Driving current		40mA /segment	
	Display method		1 ~ 8 characters 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	
Wiring method			16 pins flat cable,2.54mm header connector	
Isolation method			Photocouple isolation	
Power input			24VDC –15%/+20%,static consumption is 2VA max, dynamic current is increased according to display.	
Dimensions			Figure 4	

* : For 16-segment alphanumeric character

Analog input (AI) module

(7.62 mm terminal block)

FBs-6AD

Specification \ Item		Voltage input	Current input
Number of input point		6 points / 12-bit	
Digital input value		-2048 ~ +2047 or 0 ~ 4095	
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		1.22mV (5V/4096)	2.44mA (10mA/4096)
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 input		24VDC –15%/+20%, 2VA max.	
Dimensions		Figure 4	

Analog output (AO) modules

(7.62 mm terminal block)

FBs-2DA

FBs-4DA

Specification \ Module number		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 : 0.61mA (10mA/16384)	
Accuracy		±1%	
Conversion time		Conversion once for each scan	
Maximum allowable loading		Voltage : 500Ω ~ 1 MΩ : Current : 0Ω ~ 500Ω	
Isolation method		Transformer (Power) and photocouple (signal) isolation	
Power input		24VDC –15/+20%, 2VA max	
Dimensions		Figure 4	

Analog input/output (AI/O) module

(7.62 mm terminal block)

FBs-4A2D

Item	Specification
Number of input/output point	4 points AI 12-bit + 2 points AO / 14-bit
Analog input specification	Same as FBs-6AD
Analog output specification	Same as FBs-2DA / 4DA
Dimensions	Figure 4

Model Specifications

Thermocouple modules / RTD modules / FB-DAP simple human-machine interfaces / RFID cards

■ Thermocouple modules

(7.62mm terminal block)

FBs-TC2

FBs-TC6

FBs-TC16

Specification \ Model number	FBs-TC2	FBs-TC6	FBs-TC16
Number of input points	2 points	6 points	16 points
Thermocouple type and temperature measurement range	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)		
Temperature compensation	Built-in cold junction compensation		
Resolution	0.1°C		
Temperature refresh time	2/4 seconds		
Overall Precision	± (1%+1°C)		
Isolation method	Transformer (power) and photocouple (signal) isolation (per-channel isolation)		
Power input	24VDC -15%/+20%，2VA max.		
Dimensions	Figure 4		Figure1

■ RTD modules

(7.62mm terminal block)

FBs-RTD6

FBs-RTD16

Specification \ Model number	FBs-RTD6	FBs-RTD16
Number of input points	6 points	16 points
RTD type and temperature measurement range	3-wire RTD sensor (JIS or DIN) Pt-100(-200°C~850°C) Pt-1000((-200°C~600°C)	
Resolution	0.1°C	
Temperature refresh time	2/4 seconds	
Overall Precision	± 1%	
Isolation method	Transformer (power) and photocouple (signal) isolation (no isolation between channels)	
Power input	24VDC -15%/+20%，2VA max.	
Dimensions	Figure 4	Figure1

■ FB-DAP simple human-machine interfaces

FB-DAP-B(R)

FB-DAP-C(R)

Specification \ Model number		FB-DAP-B(R)	FB-DAP-C(R)
Display		16-character × 2, 5×7dot matrix LCD display, with LED backlighting	
Key pads		20 (4×5) membrane	
Power input		24V，41mA (48mA)	5V，100mA (120mA)
Communication Interface	Electric	RS485	RS232
	Mechanism	3 pins 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	
Card reading feature		Available only in -BR/-CR models, with maximum distance of 12 ~ 18 cm	
Card writing feature		Read/Write-able CARD-2 card, specified models(-BW/-CW) only	
Dimensions		Figure 7	

■ RFID cards

CARD-1 CARD-2

Specification \ Model number	CARD-1	CARD-2
Memory	64-bit + CRC error detecting codes	
Working temperature	-25℃~ 50℃ (ISO 7810)	
Writing times	Read-only	At least 10000 times
Dimensions (mm)	86×54×1.3	
Weight (g)	12	

Memory pack / Communication modules (CM) / Communication boards (CB)

Memory pack

FBs-PACK

Item	Specification
Memory	1M bits FLASH ROM
Memory capacity	20K words program + 20K words data
Write protection	DIP switch ON/OFF protection

Communication modules (CM)

FBs-CM22

FBs-CM55

FBs-CM25

FBs-CM25E

FBs-CM55E

FBs-CM25C

FBs-CM5R

FBs-CM5H

Model/Item	Specification	Dimemsion
FBs-CM22	2 RS232 ports (Port3+Port4) with TX, RX indicators	Figure 5
FBs-CM55	2 RS485 ports (Port3+Port4) with TX, RX indicators	
FBs-CM25	1 RS232 (Port3) + 1 RS485 (Port4) with TX, RX indicators	
FBs-CM25E	1 RS232 (Port3) + 1 RS485 (Port4) with Ethernet interface and RUN,LINK,TX, RX indicators	
FBs-CM55E	2 RS485 ports (Port3+Port4) with Ethernet interface and RUN,LINK,TX, RX indicators	
FBs-CM25C	General purpose optical isolation RS232↔RS485 converter, with RX indicators	
FBs-CM5R	General purpose optical isolation RS485 repeater, with RX indicators	
FBs-CM5H	General purpose optical isolation four ports RS485 Hub, with ACT, COLLISION indicators	Figure 4

RS232 Specification	Mechanism	DB-9F standard plug
	Electric	EIA RS232 standard specifications
RS485 Specification	Mechanism	3-pin European plug-able terminal block
	Electric	EIA RS485 standard specifications with built-in termination resistor
Ethernet Specification	Mechanism	4-pin European plug-able terminal block
	Electric	10BaseT,IEEE 802.3 standard

Communication boards (CB)

FBs-CB2

FBs-CB22

FBs-CB5

FBs-CB55

FBs-CB25

FBs-CBE

Model/Item		Specification
FBs-CB2		1 RS232 port (Port2), with TX, RX indicators
FBs-CB22		2 RS232 ports (Port1+Port2), both with TX, RX indicators
FBs-CB5		1 RS485 port (Port2), with TX, RX indicators
FBs-CB55		2 RS485 ports (Port1+Port2), both with TX, RX indicators
FBs-CB25		1 RS232 port (Port1) +1 RS485 port (Port2), both with TX, RX indicators
FBs-CBE		1 Ethernet 10BaseT interface with LINK, RX and TX indicators
RS232 Specification	Mechanism	DB-9F standard plug
	Electric	EIA RS232 standard specifications
RS485 Specification	Mechanism	3-pin European plug-able terminal block
	Electric	EIA RS485 standard specifications with built-in termination resistor

Other Accessories

Model	Description
FBs-XTNR	Converter box for extension of I/O expansion cables
LED.56R	.56″ high-brightness, red color 7-segment LED display
LED.8R	.8″ high-brightness, red color 7-segment LED display
LED2.3R	2.3″ high-brightness, red color 7-segment LED display
LED4.0R	4.0″ high-brightness, red color 7-segment LED display
LEDAN.8R	.8″ high-brightness, red color 16-segment LED display
LEDAN2.3R	2.3″ high-brightness, red color 16-segment LED display
DB.56 (DB.56LEDR)	.56″ 7-segment 8 digits LED display PCB (DB.56LEDR with LED installed)
DB.8 (DB.8LEDR)	.8″ 7-segment 8 digits LED display PCB (DB.8LEDR with LED installed)
DB2.3 (DB2.3LEDR)	2.3″ 7-segment 8 digits LED display PCB (DB2.3LEDR with LED installed)
DB4.0 (DB4.0LEDR)	4.0″ 7-segment 4 digits LED display PCB (DB4.0LEDR with LED installed)
DBAN.8 (DBAN.8LEDR)	.8″ 16-segment 4 digits LED display PCB (DBAN.8LEDR with LED installed)
DBAN2.3 (DBAN2.3LEDR)	2.3″ 16-segment 4 digits LED display PCB (DBAN2.3LEDR with LED installed)
FBs-232P0-9F-150	Dedicated communication cable for FBs main unit port0(RS232) to 9pin D-sub female connector, 150cm long
FBs-232P0-9M-400	Dedicated communication cable for FBs main unit port0(RS232) to 9pin D-sub male connector, 400cm long
FBs-USBP0-180	Communication cable for FBs main unit port0 (USB) (commercial USB A←→B cable), 180cm long
HD30-22AWG-200	22AWG I/O cable with 30pins socket, 200cm long (for FBs-24EX, 24EYT and 32DGI)

FBs-XTNR

LED.56R

LED.8R

LED2.3R

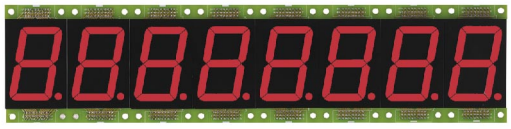
LED4.0R

LEDAN.8R

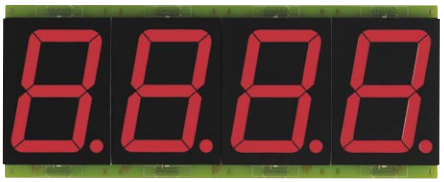
LEDAN2.3R

DB0.56LEDR

DB.8LEDR

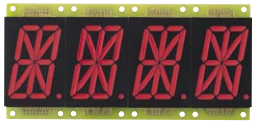


DB2.3LEDR



DB4.0LEDR

DBAN.8LEDR

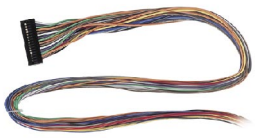


DBAN2.3LEDR

FBs-232P0-9F-150

FBs-232P0-9M-400

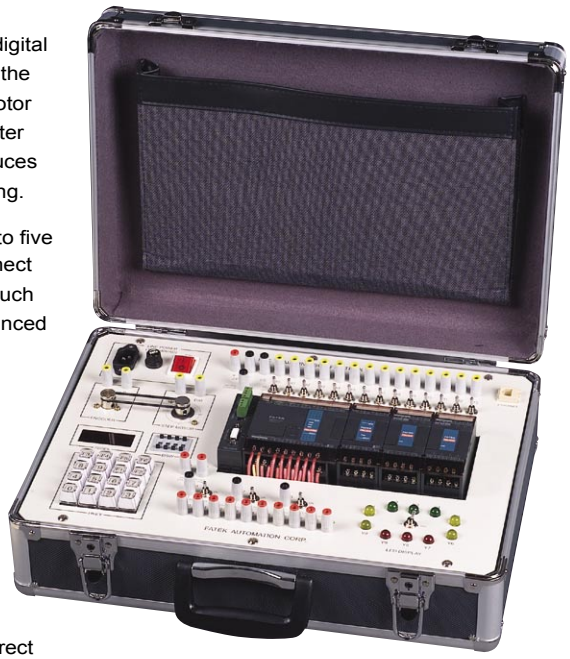
FBs-USBP0-180



HD30-22AWG-200

Features:

- It contains the basic items required by PLC digital I/O training, such as the FBs-24MCT highly functional main unit, the FBs-CM25E Ethernet module, digital input socket, simulated switches, and digital output socket. Also included in the same kit are advanced application peripherals like encoder and stepping motor (coupled with belt for transmission), seven segment display, 10 large-diameter (10mm) LED indicators, thumbwheel switches, and keyboard. It greatly reduces the time and manpower used in wiring and resource management of teaching.
- 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. Instructor also can perform monitoring, instruction and modification, and collect and save student's homework periodically with "WinProladder teaching assistant", The teaching software is especially suitable for examination and contest and is the best choice for network teaching.
- 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.



FBs-TBOX

Item		Description	
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-07C handheld programming panel, can develop program, monitor (optional)	
	Winproladder Programming Software	Instructor site: Standard WinProladder with ' teaching assistant' utility	
		Student site: Standard WinProladder	
Communication interface	**Built-in**	Port0	RS232, Mini-Din connector
	Communication board(CB) (optional)	Port1	RS232 or RS485 selectable, directly mounted on FBs-24MCT main unit
		Port2	
	FBs-CM25E	Port3	RS232, standard DB-9F connector
		Port4	RS485, 3-pin European terminal block
		(Port4)	Ethernet 10BaseT, 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	CK/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)	

FP-07C handheld programming panel

■ FP-07C handheld programming panel

Features:

- 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.
- Adopt super capacitor to keep program and data when power lose, convenient for loading data and register from multiple PLCs.

Item		Specification
Power consumption		5V/100mA
Keyboard		48 silicon rubber keys
Display		16x2 dot matrix LCD
Communication port		RS232 serial communication port
Data retention	Method	Kept by super capacitor
	Retention time	At least 7 days
Dimension		Figure 6

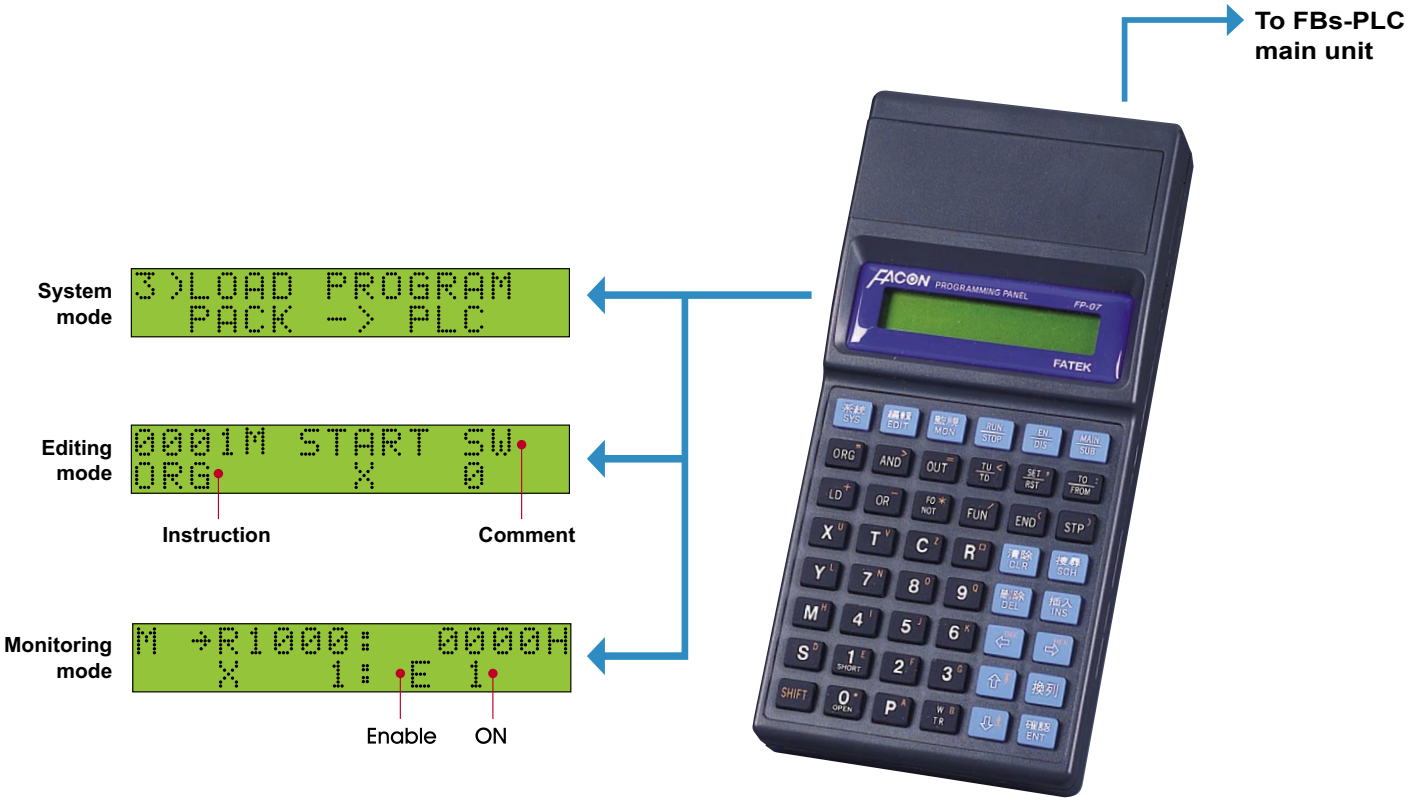
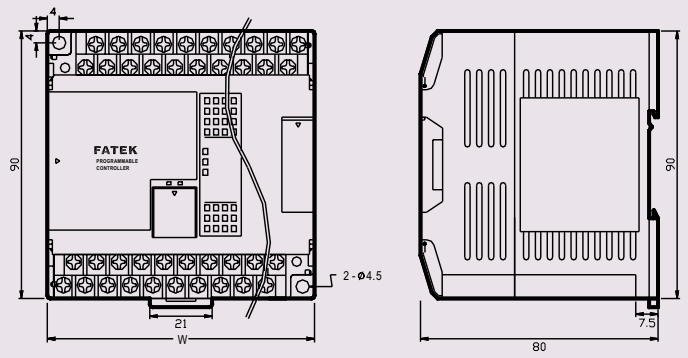


Figure 1



W	Module
90mm	FBs-20M△,FBs-24M△,FBs-24EA(P) FBs-TC16,FBs-RTD16
130mm	FBs-32M△,FBs-40M△,FBs-40EA(P)
175mm	FBs-60M△,FBs-60EA(P)

Figure 2

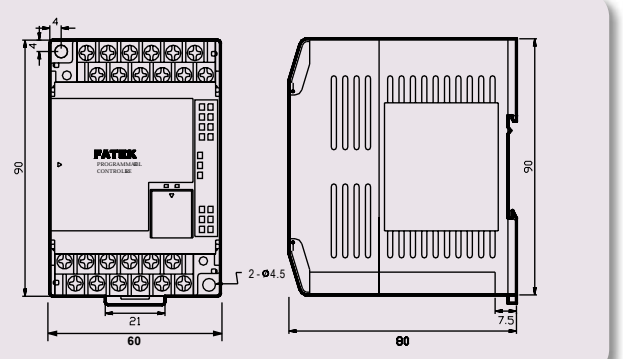


Figure 3

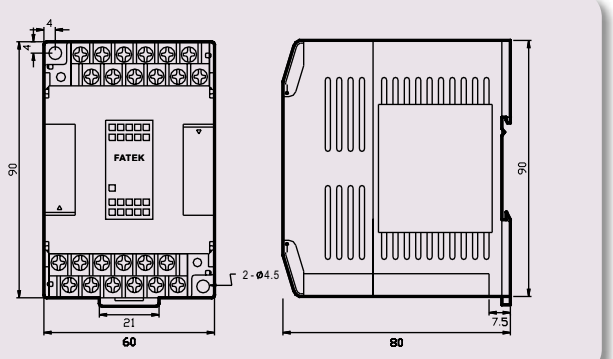


Figure 4

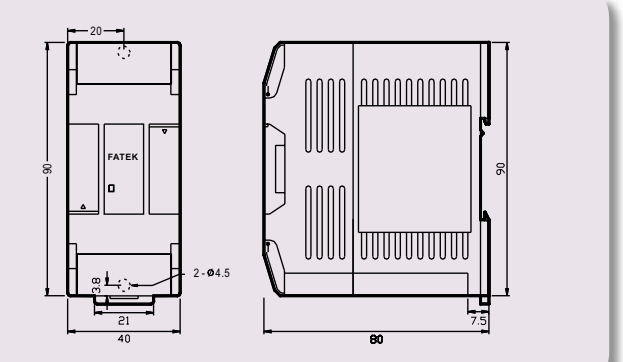


Figure 5

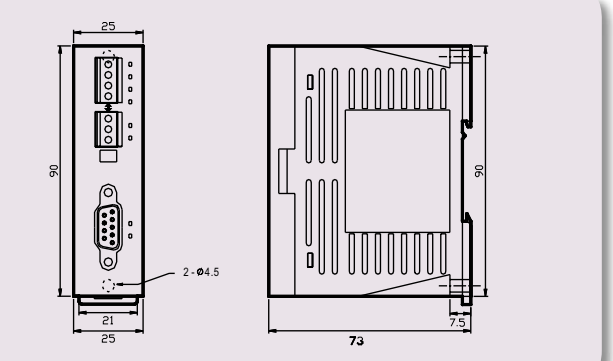


Figure 6

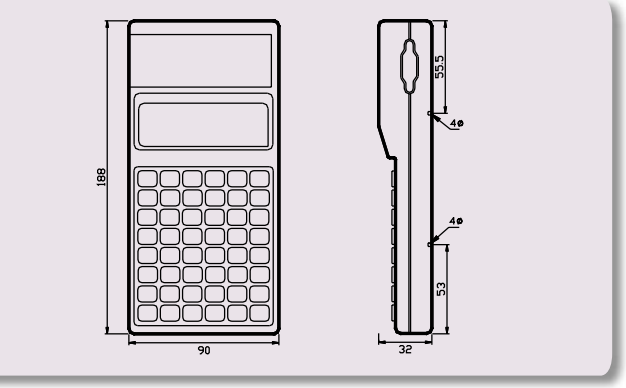
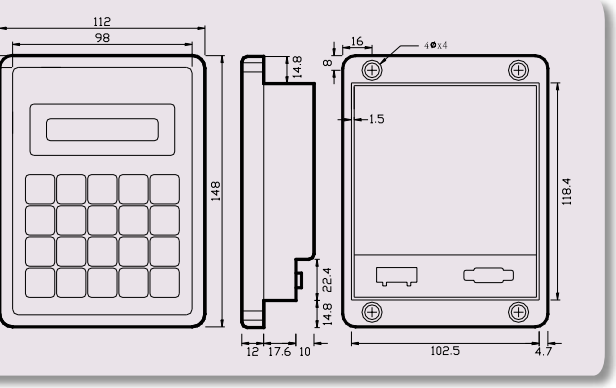


Figure 7

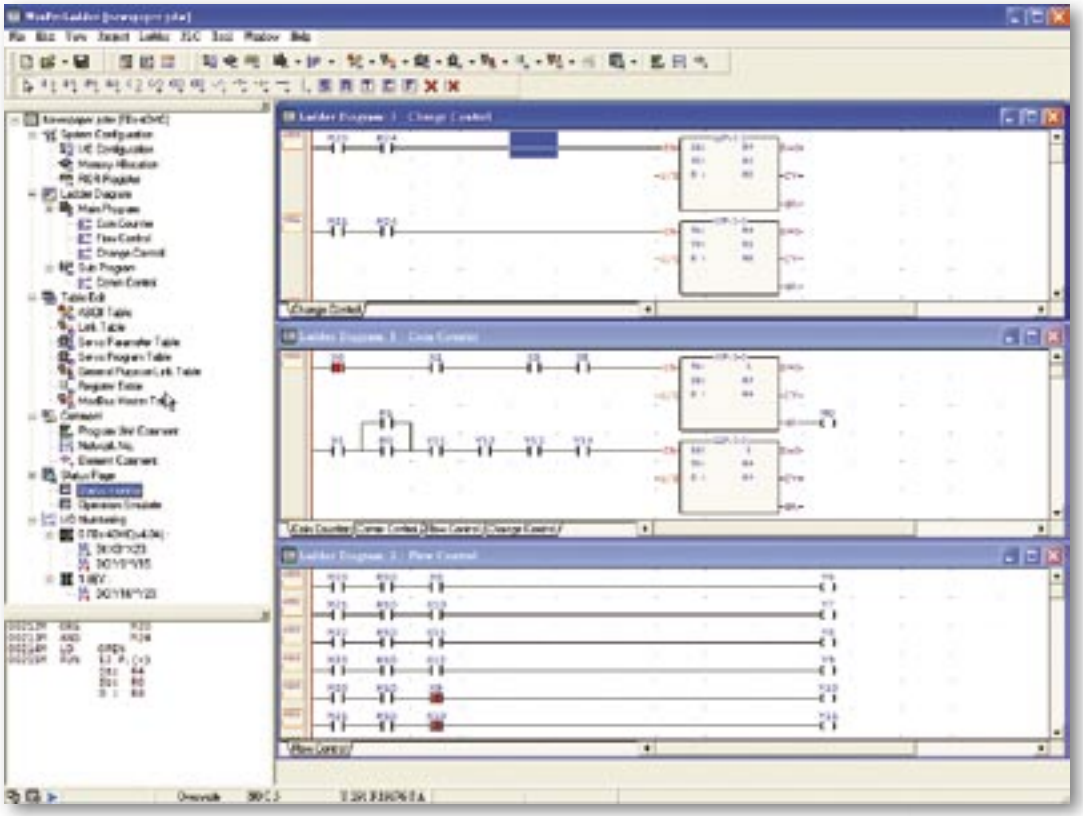


FATEK FBs-PLC Ladder Program Programming Software

■ General Feature

- Windows based application program, all the operating follow the convention of windows environment, easy for learning and operating. No matter beginner or Pro can operate with great efficient.
- Adopt project concept, which category the whole tasks of program to be developed with hierarchy tree. Through the visual effect the user can see through the whole project at first glance. No matter at program or maintenance stage all the jobs need to do can perform with intuitive.
- Thoughtful and considerate entry method design, incorporate both the keyboard and mouse for entry device. No matter at field site or office environment can operate with ease and efficient.
- Provides the connection for PLC and PC with varieties. Among the connections, there are hardware connection, Modem connection and Internet connection. For every different connection, WinProladder provide a session name to associate the setting of the communication parameters, such as port no., baud rate, IP address, phone number, etc.. With this feature can alleviate the user from the burden of the memorizing.

WinProladder



■ Program editing

- Provides the on-line program editing capability. After modify the ladder program can send the RUN command immediately without to re-download the program to PLC. With this feature can reduce the application development time dramatically comparing with other PLC without this feature.
- Ladder program can be edited without stop the PLC from running (Run time editing).
- Multiple ladder program windows, can show different fragmentation of ladder program at one time and perform the copy, paste and compare operation between these windows.
- Provides the flexible ladder network editing capability. With the help of copy, paste and delete highly efficient operation can complete a complex program with few keystrokes.
- Provides the capability to divide the whole program into many program units. User can at will partition the whole development task into many independent program units according to the functionality or other classify methodology and perform the entry, editing, testing and documentation independently. With this feature can greatly ease the maintenance of the whole application.
- Provides an individual window for mnemonic instruction display. Immediately display the equivalent mnemonic code corresponding to the ladder network pointed by the cursor.
- Provides the flexible program search capability, can search contact, register or function. Also can set a filter to narrow down the search object to ease the user from picking up the desire results among the whole bunches of search result. Most of all, just double click the interested message line can bring out the corresponding ladder program to the user.
- Provides a powerful syntax check tool. With this tool can parse the user's program and generate a parsing message in one window. In this window all the warning or error messages regard the program will be listed line by line. User just double click the interested line then the ladder program will be shown on the window with the cursor stay on the question part.

■ Program testing

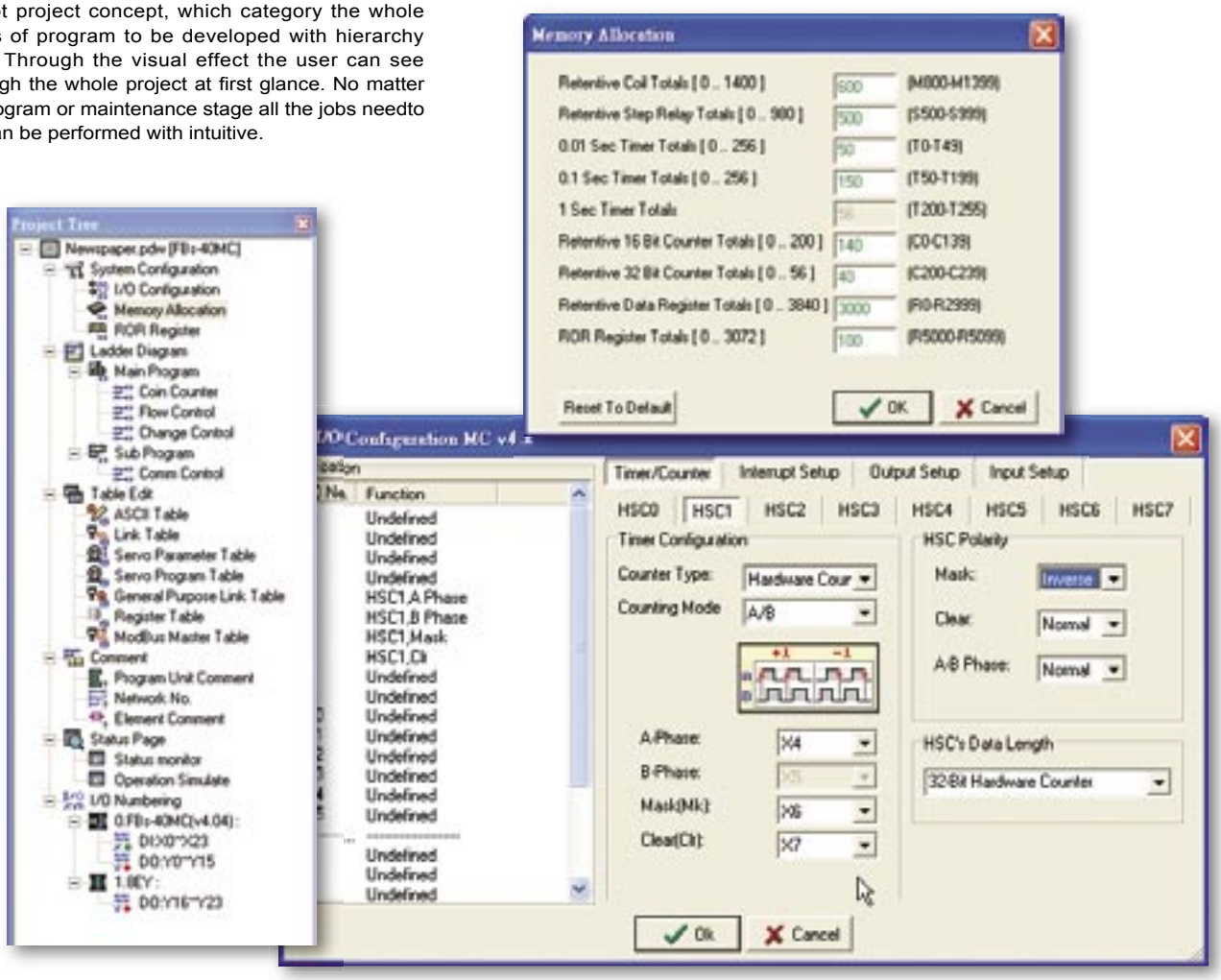
- Provides multiple pages of status monitoring. User can monitor and modify the status of discrete contacts and registers on the status page. Each discrete input and output (include the internal relay) can be disabled and forced on or off. Each register can be selected individually to show with different format such as hexadecimal, decimal and binary. Best of all, all the layout of the status pages can be stored in the project and there is no need for user to re-define the page each time when he/she wants to monitor the status.
- Multiple high lighted ladder program display windows. The conducting condition of each contact element can be revealed by the color of the element drawing. The register value embedded with the function block also can be shown currently with ladder diagram. The discrete element can be easily disabled and forced on or off directly from the ladder diagram.

■ Program documentation

- Provides discrete element, register, network, and program unit and project comment. Besides the project comment all other comments can be displayed with ladder diagram. With this feature the user can easily realize how the ladder program is working.
- Provides following report printout function:
  Ladder diagram printout can select the scope and detail level of the ladder diagram for different kind of reporting requirements.
  Used ladder element cross-reference report can list the statistics of all ladder elements used in the project.
- The comment of the contact and register can be created by this software or by using text editor that were familiar with user. Comments can be imported from the text file and also can be exported to the application software such as Excel for further processing.
- The network of ladder program can be copied to other editing software such as Word by using copy and paste function. With this feature, can facilitate the documentation of program when use the editing software.

■ Project oriented program

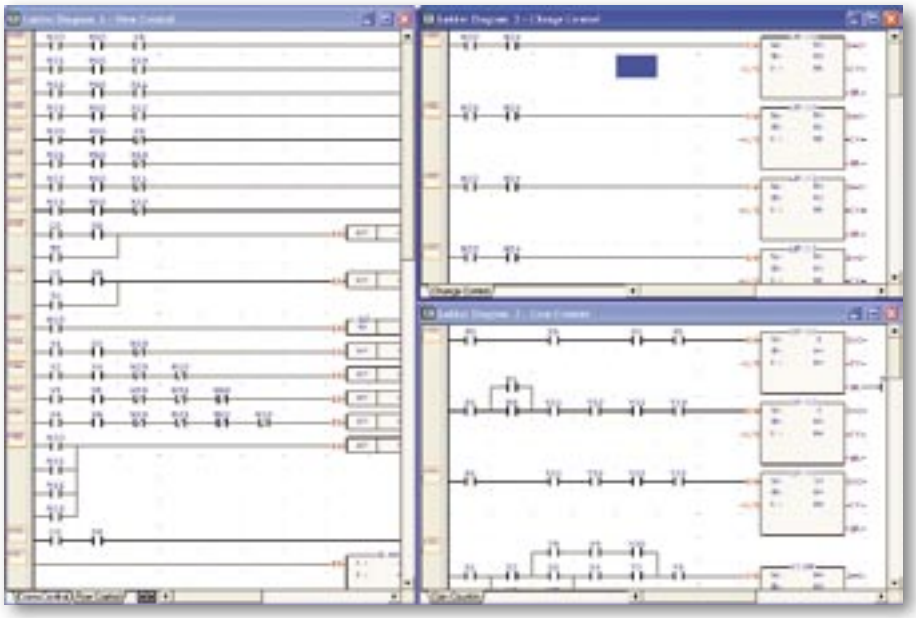
Adopt project concept, which category the whole tasks of program to be developed with hierarchy tree. Through the visual effect the user can see through the whole project at first glance. No matter at program or maintenance stage all the jobs needto do can be performed with intuitive.



WinProladder software package

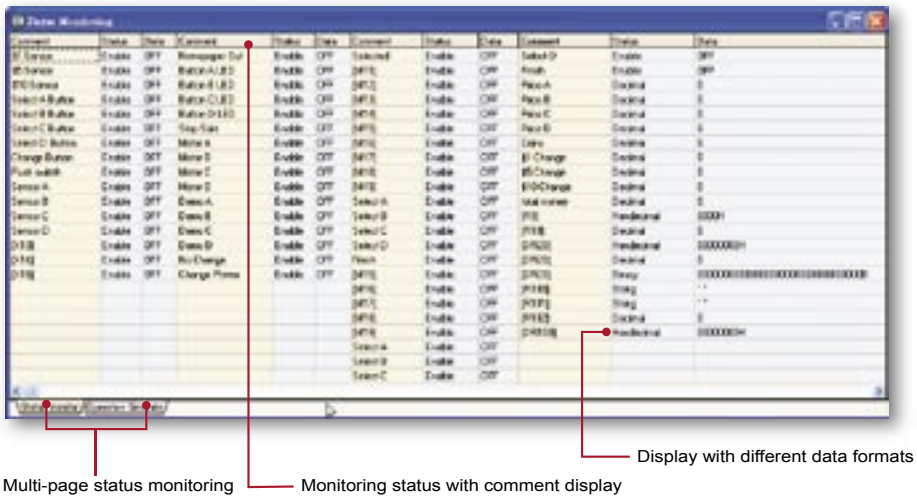
■ Ladder program editing screen

Multiple ladder windows, can perform the network copy, paste, cut and compare operations among windows.

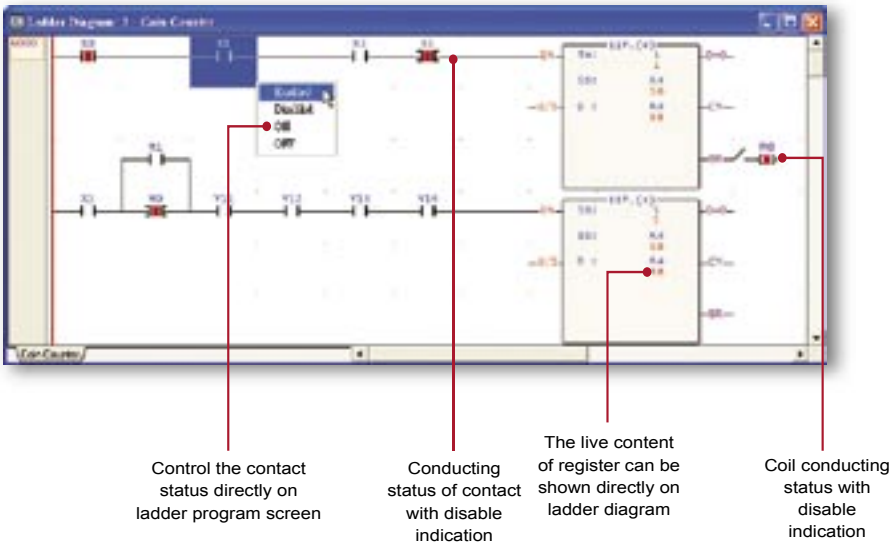


■ Status monitor and control

Multiple status page window, can define the elements, registers to be monitoring and assign its display format. The state of the contact elements can be disabled and forced. Register value also can be entered.

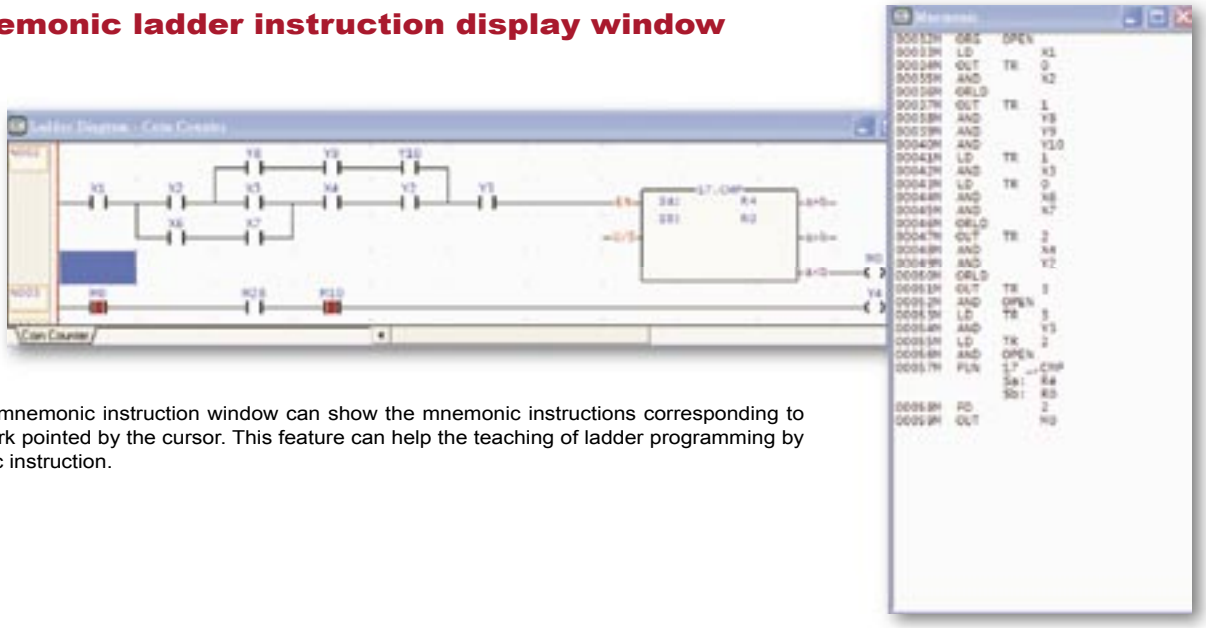


Multiple high lighted ladder program windows. The conducting condition of each contact element can be revealed by the color of the element drawing. The register value embedded with the function block also can be shown currently with ladder diagram.



WinProladder software package

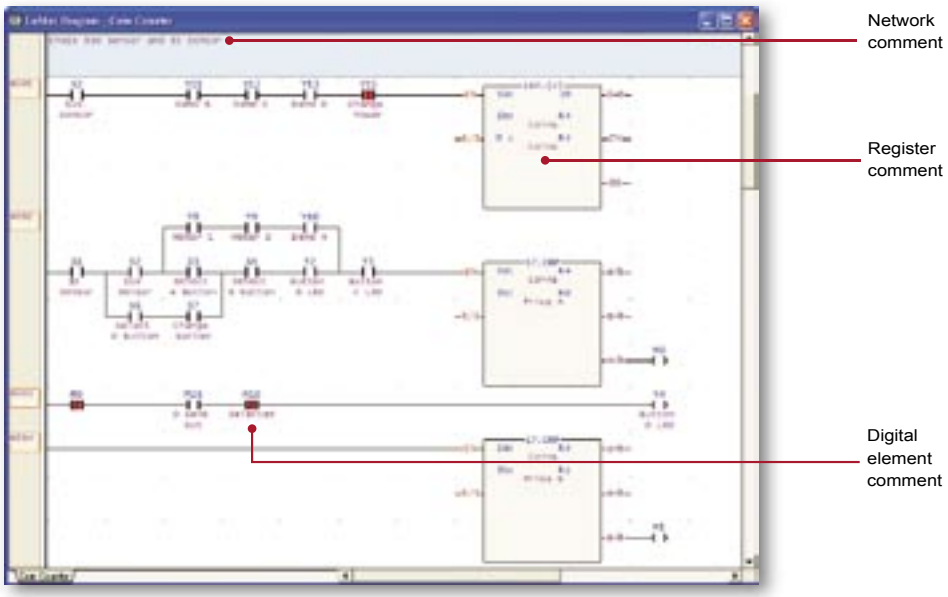
■ Mnemonic ladder instruction display window



Dedicate mnemonic instruction window can show the mnemonic instructions corresponding to the network pointed by the cursor. This feature can help the teaching of ladder programming by mnemonic instruction.

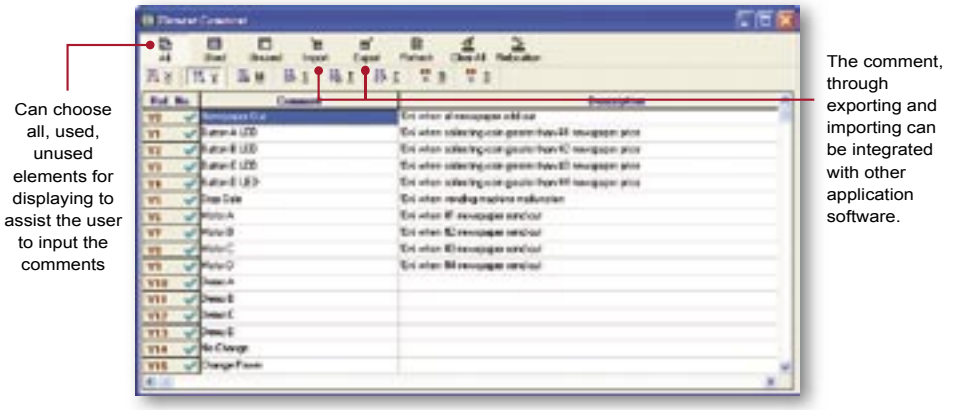
■ Ladder diagram with comments

Provides different detail level of comment for contact, register, network, program unit and program to facilitate the readability and maintenance of the program.



■ Element comment editing

With element comment window, can attach an easy for memorizing comment to the elements, detail description also can be added to facilitate the maintenance of project.



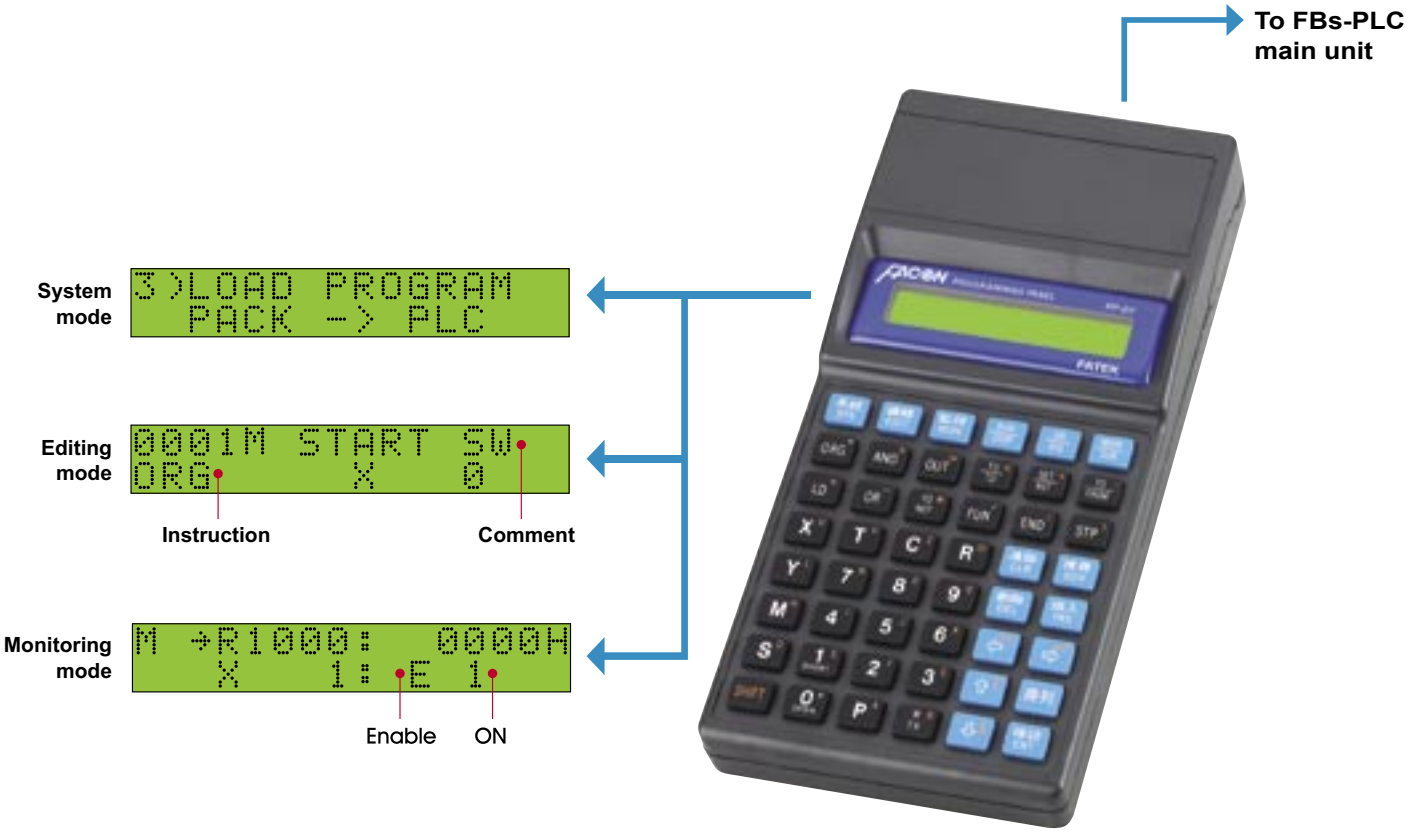
FP-07C handheld programming panel

■ FP-07C handheld programming panel

Features:

- 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.
- Adopt super capacitor to keep program and data when power lose, convenient for loading data and register from multiple PLCs.

Item		Specification
Power consumption		5V/100mA
Keyboard		48 silicon rubber keys
Display		16x2 dot matrix LCD
Communication port		RS232 serial communication port
Data retention	Method	Kept by super capacitor
	Retention time	At least 7 days
Dimension		Figure 6



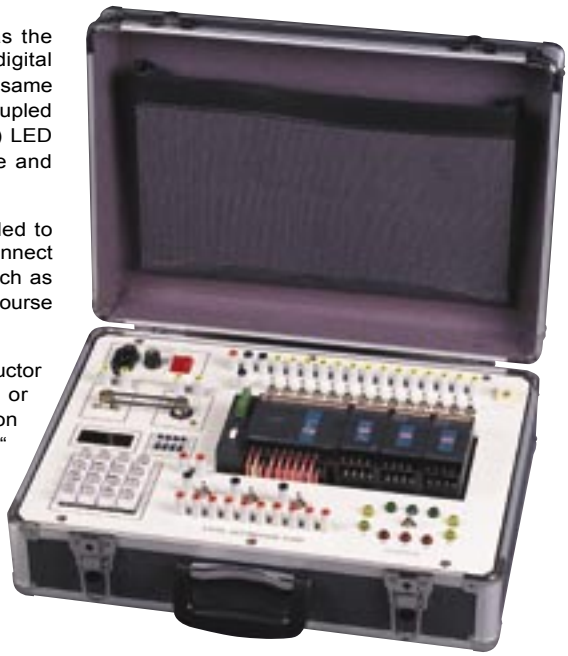
Features:

- It contains the basic items required by PLC digital I/O training, such as the FBs-24MCT highly functional main unit, the FBs-CM25E Ethernet module, digital input socket, simulated switches, and digital output socket. Also included in the same kit are advanced application peripherals like encoder and stepping motor (coupled with belt for transmission), seven segment display, 10 large-diameter (10mm) LED indicators, thumbwheel switches, and keyboard. It greatly reduces the time and manpower used in wiring and resource management of teaching.

- 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. Instructor also can perform monitoring, instruction and modification, and collect and save student's homework periodically with " WinProladder teaching assistant", The teaching software is especially suitable for examination and contest and is the best choice for network teaching.

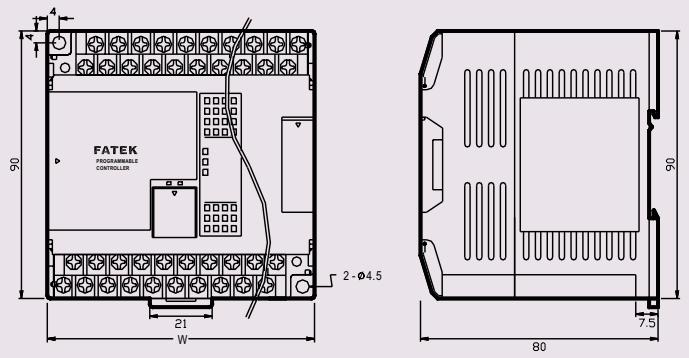
- PLC output is isolated by the relay with socket and fuse and then output to terminal. These isolations can prevent PLC from damaging caused by incorrect wiring and easy for repair and replacement.



FBs-TBOX

Item		Description	
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-07C handheld programming panel, can develop program, monitor (optional)	
	Winproladder Programming Software	Instructor site: Standard WinProladder with ' teaching assistant' utility	
		Student site: Standard WinProladder	
Communication interface	**Built-in**	Port0	RS232, Mini-Din connector
	Communication board(CB) (optional)	Port1	RS232 or RS485 selectable, directly mounted on FBs-24MCT main unit
		Port2	
	FBs-CM25E	Port3	RS232, standard DB-9F connector
		Port4	RS485, 3-pin European terminal block
		(Port4)	Ethernet 10BaseT, 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	CK/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)	

Figure 1



W	Module
90mm	FBs-20M△,FBs-24M△,FBs-24EA(P) FBs-TC16,FBs-RTD16
130mm	FBs-32M△,FBs-40M△,FBs-40EA(P)
175mm	FBs-60M△,FBs-60EA(P)

Figure 2

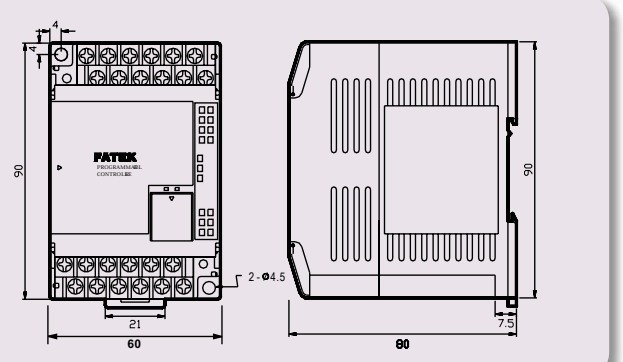


Figure 3

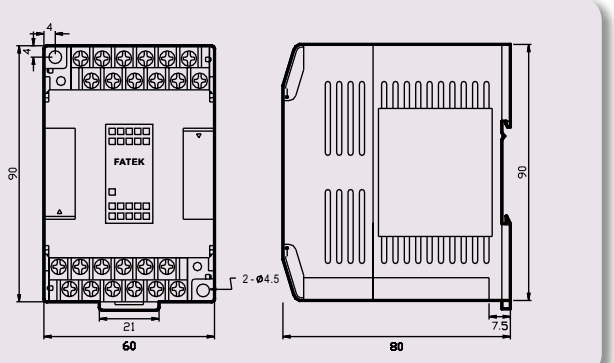


Figure 4

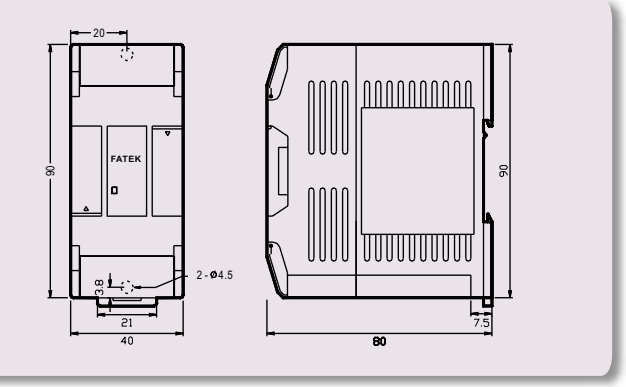


Figure 5

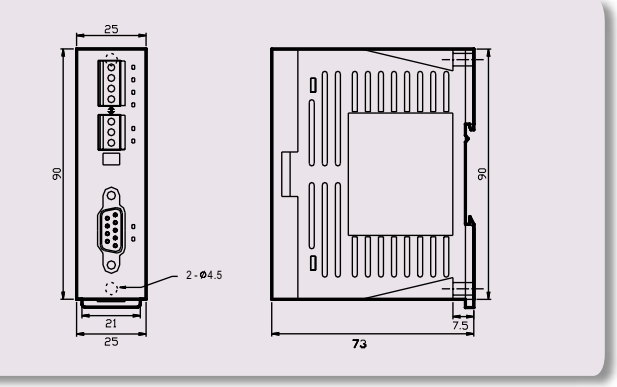


Figure 6

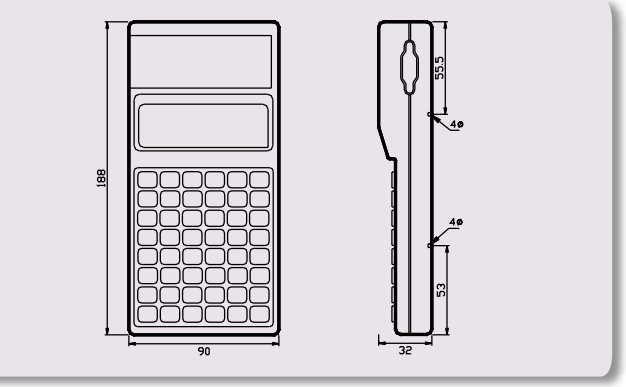


Figure 7