



POWERTRAN[®]
Industrial Automation



POWERTRAN **PLCS**

Programmable Logic Controller

J.K.Fenner (India) Limited offers innovative automation services from simple to complex machinery control applications in various industrial environment.

POWERTRAN[®], your complete automation partner is designed to provide solutions through wide range of control and monitoring devices such as SCADA, PLC, HMI, AC Drives and Servo Systems with high performance and uncompromising reliability.

PROGRAMMABLE LOGIC CONTROLLER

SLIM, SMART, STRONG

The compact all-around PLC

POWERTRAN PLC-S series is designed to be the most cost-effective unit in the PLC world. It provides high performance and rock-solid reliability for small sized industrial automation systems.

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PLCS PERFORMANCE

POWERTRAN PLC-S provides extremely high reliability and expandability with various network modules, allowing easy maintenance of the process control systems.



SLIM

- Slim, without compromising strong performance
- Special instructions, programs, and function blocks available
- Supports flexible expansion



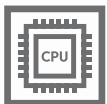
SIMPLE

- Easy to install with simple design
- Optimized usage of space with its compact size



SPEED

- Max. 32 PID loop control
- Equipped with 16Kpps high-speed counter



SMART

- Provides various network solutions
- Supports floating point arithmetic and automatically recognizes protocols



CPU PERFORMANCE

PLC-S CPU

MODEL	INPUT	OUTPUT	RS-232C	RS485	ETHERNET	NOTE
CM3-SP32MDT	16pts	TR Sink type 16pts	O	X	X	SD/MMC (Optional)
CM3-SP32MDTV			O	O	X	
CM3-SP32MDTE			O	X	O	
CM3-SP32MDTF			O	O	O	
CM3-SP32MDC	16pts	TR Source type 16pts	O	X	X	SD/MMC (Optional)
CM3-SP32MDCV			O	O	X	
CM3-SP32MDCE			O	X	O	
CM3-SP32MDCF			O	O	O	
CM3-SP16MDR	8pts	Relay type 8pts	O	X	X	-
CM3-SP16MDRV			O	O	X	
CM3-SP16MDRE		Relay type 6pts	O	X	O	
CM3-SP16MDRF			O	O	O	

TYPE	MODULE	DESCRIPTION
Digital I/O Module	CM3-SP32EDO	DC24V Input 32 pts
	CM3-SP32EOT/EOC	TR(Sink) Output 32 pts
	CM3-SP16EOR	DO 16 pts (Relay) / expandable up to 4 modules
	CM3-SP32EDT	DI 16 pts (DC24V), DO 16 pts (TR(SINK))
	CM3-SP16EDR	DI 8 pts (DC24V), DO 8 pts (Relay)
Analog Module	CM3-SP04EAO	4ch for current / voltage input, 14bit
	CM3-SP04EAA	2ch for current / voltage input + 2ch for current / voltage Output, option for 16 bit or 14 bit
	CM3-SP04EOAI	4ch for current output, 14bit
	CM3-SP04EOAV	4ch for voltage output, 14bit
	CM3-SP04ERO	AI 4ch RTD
	CM3-SP04ETO	AI 4ch TC
	CM3-SP04EAM	Input signal MUX module (4x1) : RTD, compatible with TC module
Communication Module	CM3-SP01EET	Ethernet 1ch, 10/100Mbps
	CM3-SP02ERS	RS-232C 1ch, RS-485 1ch
	CM3-SP02ERR	RS-232C 2ch
	CM3-SP02ERSC	1ch for CDMA communication (RS232C) / 1ch for universal communication (RS-485)
	CM3-SP02ERRC	1ch for CDMA communication (RS232C) / 1ch for universal communication (RS232C)
	CM3-SP01OPC	OPC UA server, 10/100Mbps, UA TCP(opc,tcp)

CPU MODULE

• SPECIFICATION



CM3-SP32MDT
CM3-SP32MDC



CM3-SP16MDR

GENERAL IN PLC-S CPU CM3-SP32MDT/V/E/F I CM3-SP32MDC/V/E/F I CM3-SP16MDR/V/E/F

ITEM		DESCRIPTION	NOTE
Power		DC12V~24V	-
Program Control		Repetitive operation, Time Driven interrupt	-
Method for Controlling Input Output		Indirect method, Direct method by instruction	-
Program Language		IL(Instruction List), LD(Ladder Diagram), SFC(Sequential Function Chart) , FB (Function Block)	-
Data Processing		32 Bit	-
Number of Instruction	Sequence	55 Instructions	-
	Application	389 Instructions	-
Execution Processing Speed(Basic Instruction)		300 ns/Step	-
Program Memory		10k Step	-
Number of I/O Points		1024 pts	-
Run Mode		Remote Run, Remote Stop	-
Data Preservation Against Power Failure		Setting data and conservation (Latch) in K device	-
Number of Program Block		128	-
Type of Program	Scan	5 types including standard scan program (Subroutine, COLD / HOT initialization, periodic interrupts)	-
	Periodic Interrupts	Able to register for scan program form up to 16 (Minimum period: 10ms)	-
	Special Configuration	6 types including PID control program (High-speed counter, Positioning control, Input module filtering, Initializing special card)	-
		8 types including user protocol (Serial) communication (MODBUS/RTU Master, MODBUS/TCP Master, User protocol (Ethernet), Ethernet High (PLC Link), Security, Web Server)	-
	Etc.	SFC program, FBD (Function Block Diagram)	-
Self-diagnosis		Monitoring delay of processing, problems of memory, I/O / Battery / Power error	-
Restarting		COLD, HOT Restart	-
Expansion		1 CPU block + Maximum 11 expansion blocks	-
Memory Device	X	1024 pts (X0000-X063F)	Bit
	Y	1024 pts (Y0000-Y063F)	Bit
	M	8192 pts (M0000-M511F)	Bit
	L	4096 pts (L0000-L255F)	Bit
	K	4096 pts (K0000-K255F)	Bit
	F	2048 pts (F0000-F127F)	Bit
	T	512 pts (T0000-T0511)	Word
	C	512 pts (C0000-C0511)	Word
	S	100 states x 100 set (00.00-99.99)	-
	D	10000 words (D0000-D9999)	Word
	Z	1,024 words(Call Stack: Z0000-Z0063, Z1000-Z1063)	Word
	Q	8192 pts (Q0000-Q511F)	Bit
R	16 pts (Index)	-	

ITEM	DESCRIPTION	NOTE
High-speed Counter	Maximum count speed: 16kpps (Maximum 4kpps when using 2 phase 2 channels)	-
Positioning	X-axis: Position / Velocity control 100kpps	-
	Y-axis: Position control 5kpps, Velocity control 100kpps	-
PID	32 channels, Auto-Tuning	-
RTC	Built-in battery (CR2032)	-
Communication Channel	[Basic] USB : 1 channel (POWERTRAN Loader) / RS232C : 1 channel (Universal communication)	-
	[Option (Universal communication)] RS485 : 1ch / Ethernet : 1ch (10/100Mbps automatic identification)	-
Etc.	Real number arithmetic, modification of program during Run status	-

• FEATURES

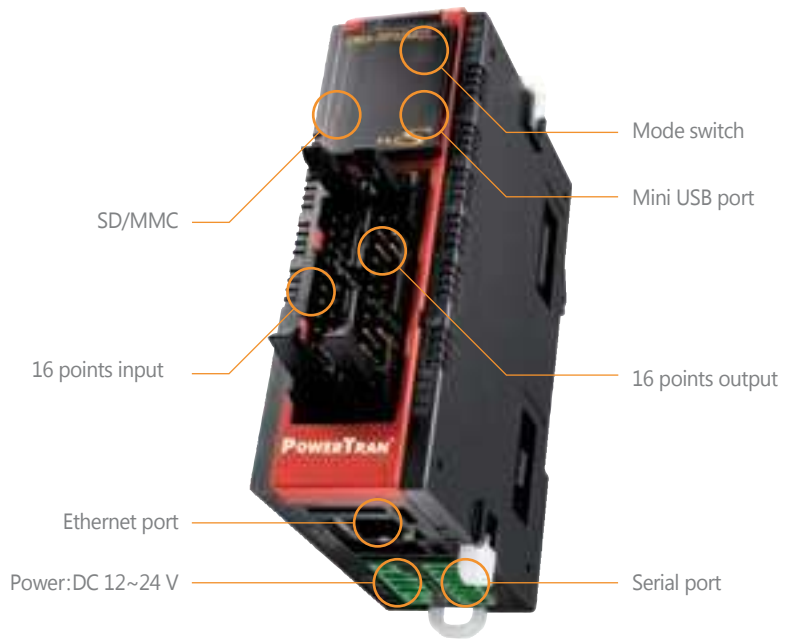
BUILT-IN FUNCTIONS

- PID Control
 - PID operation can be executed without an additional PID module.
- RTC
 - Reads the time from the RTC module and stores the value at F device memory location.
- I/O Reservation
 - Checks if a correct card was mounted in the assigned slot. Additionally, when expanding or exchanging parts, reservation to writing a program can be made without making changes to the I/O.
- Modification of program during RUN mode
 - Program can be modified while PLC is in the RUN mode.

CHARACTERISTICS

- SD/MMC memory function has embedded - Scan program and firmware upgrade is available via SD memory card.
(After installing the memory card, set the operation mode switch to STOP. Turn the operation mode switch to RUN within 5 seconds of powering up. The firmware upgrade will proceed for 20 seconds and will indicate completion when the LEDs (RUN, STOP, and ERR) are turned on. Remove the SD memory and restore the power.)
- Contains 2 channels of high-speed counter
 - 16kpps as Maximum count speed (Maximum 4kpps when using 2 phase 2 channels)
 - Adopted the photocoupler insulation method
- Positioning control by 2-axis pulse output in 100kpps
 - Supports pulse + direction output, Position / velocity / velocity – position / position- velocity control
- Simultaneous communication via Ethernet and serial (RS232, RS485)
 - Supports various protocols such as POWERTRAN HMI, MODBUS RTU/TCP, PLC Link, user protocol and loader protocol.
 - Program upload/download and remote access is available.
- Large capacity for program data
 - 10k steps of program memory is available for scan programs.
- Preserving data during power outage
 - Since the flash memory is used as the internal memory, any extra memory card or battery change is not necessary.

CPU MODULE



TR OUTPUT (DC POWER) SINK TYPE

CM3*

MODEL	SP32MDT	SP32MDT-SD	SP32MDTV	SP32MDTV-SD
Digital I/O	Digital input 16pts Digital output 16pts	Digital input 16pts Digital output 16pts	Digital input 16pts Digital output 16pts	Digital input 16pts Digital output 16pts
Mini USB	-	-	-	-
SD/MMC Card Slot	N/A	-	N/A	-
RS232C 1ch	-	-	-	-
RS485 1ch	N/A	N/A	-	-
Ethernet 1ch	N/A	-	N/A	N/A

MODEL	SP32MDTE	SP32MDTE-SD	CM3-SP32MDTF	SP32MDTF-SD
Digital I/O	Digital input 16pts Digital output 16pts	Digital input 16pts Digital output 16pts	Digital input 16pts Digital output 16pts	Digital input 16pts Digital output 16pts
Mini USB	-	-	-	-
SD/MMC Card Slot	N/A	-	N/A	-
RS232C 1ch	-	-	-	-
RS485 1ch	N/A	N/A	-	-
Ethernet 1ch	-	-	-	-

RELAY OUTPUT (DC POWER)

MODEL	SP16MDR	SP16MDRV	SP16MDRE	SP16MDRF
Digital I/O	Digital input 16pts Digital output 16pts	Digital input 16pts Digital output 16pts	Digital input 16pts Digital output 16pts	Digital input 16pts Digital output 16pts
Mini USB	-	-	-	-
SD/MMC Card Slot	N/A	N/A	N/A	N/A
RS232C 1ch	-	-	-	-
RS485 1ch	N/A	-	N/A	-
Ethernet 1ch	N/A	N/A	-	-

POWER MODULE

• SPECIFICATION



ITEM		CM3-SP24PWR
Input	Input Voltage	AC88~264V, 50/60HZ
	Input Current	0.3A(110V), 0.2A(220V)
	Inrush Current	60A Peak
	Efficiency	60%
	Power Disturbance	10ms
Output	Output Voltage(Output Current)	+24V(0.4A)
	Voltage Indicator	LED ON when output voltage is normal

- Receives AC 88 ~ 264V power (DC 19 ~ 28V in CM1-SP2B, DC 70 ~ 130V in CM1-SPW) and supplies DC +5V, +24V, +15V and -24V for each PLC.
- Detects temporary power outage to prevent system malfunction and data corruption.

CURRENT CONSUMPTION

TYPE	MODEL	CURRENT CONSUMPTION (MAIN POWER)	CURRENT CONSUMPTION (AUXILIARY POWER)	LIMIT NUMBER OF EXPANSION
Main Block	CM3-SP32MDT	2.16W	-	-
	CM3-SP32MDT-SD	2.16W	-	-
	CM3-SP32MDTV	2.64W	-	-
	CM3-SP32MDTV-SD	2.64W	-	-
	CM3-SP32MDTE	2.64W	-	-
	CM3-SP32MDTE-SD	2.64W	-	-
	CM3-SP32MDTF	3.12W	-	-
	CM3-SP32MDTF-SD	3.12W	-	-
	CM3-SP16MDR	2.88W	-	-
	CM3-SP16MDRV	3.12W	-	-
	CM3-SP16MDRE	3.36W	-	-
	CM3-SP16MDRF	3.6W	-	-
Digital Expansion Block	CM3-SP32EDO	0.48W	-	-
	CM3-SP32EOT	0.48W	-	-
	CM3-SP32EOC	0.48W	-	-
	CM3-SP32EOR	2.16W	-	4ea
Analog Expansion Block	CM3-SP04EAO	0.36W	1.44W	-
	CM3-SP04EAA	0.36W	1.68W	-
	CM3-SP04EOAI	0.36W	1.68W	-
	CM3-SP04EOAV	0.36W	1.44W	-
	CM3-SP04ERO	0.48W	0.72W	-
	CM3-SP04ETO	0.48W	0.72W	-
Communication Block	CM3-SP02ERR	0.48W	-	-
	CM3-SP02ERS	0.48W	-	-
	CM3-SP01EET	0.72W	-	5ea

- CM3-SP16EOR can be used with up to 4 modules. The required capacity of SMPS (Switched mode power supply) is 24VDC 20W.
- Please be sure to check each PLC-S module's current consumption to ensure that it does not exceed the 10W limit.
- Please make sure to check safety factor of current consumption when using SMPS.

DIGITAL I/O

• SPECIFICATION



ITEM	CM3-SP32EDO	CM3-SP32EOT	CM3-SP32EOC
I/O Type	Input 32pts	TR output 32pts	TR output 32pts
Input Voltage	DC 24 V	N/A	N/A
Output Voltage	N/A	DC 12 V / 24 V	DC 12 V / 24 V
Input Current	4 mA	N/A	N/A
Output Current	N/A	1 point 0.2A COM 2A	1 point 0.2A COM 2A
On Voltage / On Current	DC 19V / 3mA	N/A	N/A
Off Voltage / Off Current	DC 6V / 1mA	N/A	N/A
Response Time	Less than 3 ms	Less than 1 ms	Less than 1 ms
Operation Indication	LED On	LED On	LED On
Insulation Type	Photocoupler	Photocoupler	Photocoupler
Input method	SINK/SRC Compatibility	N/A	N/A
Output method	N/A	Sink	Source

ITEM	CM3-SP16EOR	CM3-SP32EDT	CM3-SP32EDR
I/O Type	Relay output 16pts	Input 16pts TR output 16pts	Input 8pts Relay output 8pts
Input Voltage	N/A	DC 24 V	DC 24 V
Output Voltage	AC220V / DC24V	DC 12 V / 24 V	DC 12 V / 24 V
Input Current	N/A	4 mA	4 mA
Output Current	1 point 2A COM 5A	1 point 0.2A COM 2A	1 point 2A COM 5A
On Voltage / On Current	N/A	N/A	DC19V / 3mA
Off Voltage / Off Current	N/A	N/A	DC6V / 1mA
Response Time	Less than 10 ms	Less than 1 ms	Less than 3 ms
Operation Indication	LED On	LED On	LED On
Insulation Type	Relay	Photocoupler	Photocoupler
Input method	N/A	SINK / SRC / Compatibility	SINK / SRC / Compatibility
Output method	Relay	Sink	Relay

- Relay output in PLC-S series cannot use more than 64 points.
Ex) CM3-SP16EOR cannot be expanded with more than 4 modules.

ITEM	CM3-SP32PWM
Range of Pulse Frequency (DUTY Cycle preservation)	1pps ~ 4000pps
Maximum Frequency	65Kpps
DUTY Cycle Performance	0.0 ~ 100.0% (1/1000 Resolution)
RAMP Function	Available of simultaneous operation frequency RAMP and DUTY cycle RAMP

- CM3-SP32PWM has the same specifications as a CM3-SP32EOC when used as a general digital output.
- Easy terminal block connection allows for easier maintenance.
- Photocoupler or relay insulation method can be used in the CM3-SP32PWM.
- Note: Please be sure not to exceed 64 points of relay output.

• FEATURES

ANALOG I/O

• SPECIFICATION



INPUT (AD CONVERSION)

ITEM		CM3-SP04EAO
Number of Analog Input		4 channels
Analog Input	Voltage	0 ~ 5 V / 1 ~ 5 V / 0 ~ 10 V / -10 ~ 10 V
	Current	0 ~ 20 mA / 4 ~ 20 mA
Digital Output		14 bit (0 ~ 16000)
Rated Voltage / Current	0V ~ 5 V	312.5 mV
	1V ~ 5 V	250 mV
	0V ~ 10 V	625 mV
	-10V ~ 10 V	1250 mV
	0mA ~ 20 mA	1.25 nA
	4mA ~ 20 mA	1 nA
Accuracy		±0.1% (full scale)
Conversion Speed		2.1 ms / 4 channels
Absolute Max. Input		Voltage : ±15V, Current : ±30mA Photocoupler between input terminal and PLC (No insulation between channels)
Insulation Method		24VDC
Power Supply		50mA

- Provides various input types and range.
- High reliability demonstrated by ±0.05% error.
- Photocoupler insulation protects operation from interference.

OUTPUT (DA CONVERSION)

ITEM	CM3-SP04EOAV	CM3-SP04EOAI
Number of Analog Output	4 channels	4 channels
Analog Output	-10V ~ 10V / 0V ~ 10V (Selection with DIP switch)	4mA ~ 20mA
Digital Output	14 bit (0 ~ 16000)	
Rated Voltage / Current	1.25 mV	1.25 µA
Accuracy	±0.1 %	
Conversion Speed	10ms	
Absolute Max. Input	Voltage : ±15V	Current : ±24mA
Insulation Method	Photocoupler between input terminal and PLC	
Power Supply	24VDC	

- Provides various input types and range.
- High reliability demonstrated by ±0.05% error
- Photocoupler insulation protects operation from interference.

• SPECIFICATION



I/O (AD/DA MODULE)

ITEM		CM3-SP04EAA
Number of Analog Input		Input : 2 Channels, Output: 2 Channels
Analog Input	Voltage	0 ~ 5 V / 1 ~ 5 V / 0 ~ 10 V / -10 ~ 10 V
	Current	0 ~ 20 mA / 4 ~ 20 mA
Digital Output		Selection between 14 bit (0 ~ 16000) / 16 bit (0 ~ 64000)
Rated Voltage / Current	0V ~ 5 V	78.1 μ V
	1V ~ 5 V	62.5 μ V
	0V ~ 10 V	156.3 μ V
	-10V ~ 10 V	312.5 μ V
	0mA ~ 20 mA	312.5 nA
	4mA ~ 20 mA	250 nA
Accuracy		± 0.05 % (full scale)
Conversion Speed		2.1 ms / 4 channels
Absolute Max. Input		Voltage : ± 15 V, Current: ± 30 mA
Insulation Method		Photocoupler between input terminal and PLC (No insulation between channels)
Power Supply		24VDC

- Provides various input types and range.
- High resolution of 16 bit digital conversion is available.
- High reliability demonstrated by $\pm 0.05\%$ error.
- Photocoupler insulation protects operation from interference.

• FEATURES

- wCM3-SP04EAO is the AD module used to input 4 channels of voltage and current.
- CM3-SP04EOAV is the DA module used to output 4 channels of voltage (-10 ~ 10V, 0~10V).
- CM3-SP04EOAI is the DA module used to output 4 channels of current (4 ~ 20mA).
- CM3-SP04EAA is the AD / DA module used to input 2 channels of voltage and current, and output 2 channels of voltage and current.
- The DA module is used to convert digital value into the analog signal (voltage or current output). It converts the digital value of 0~16000(-8000~8000) / 0~64000(-32000~32000) into the analog value of 0~20mA, 4~20mA, -10~10V, 0~5V, 0~10V and 1~5V.
- There are two AD conversion methods that the user can choose: average processing and digital filtering.
- With the Hold/Clear setting the user can select what should happen when the operation mode changes from RUN to STOP mode. The Clear selection will change the output signal of the 4mA or 10V signal to its offset value. The Hold selection will maintain the 4mA or 10V signal to the last known value.
- The channel on which conversion is prohibited outputs the minimum value in each output mode (0mA, 4mA, -10V, 0V, 1V).
- The LED lights on normal condition and blinks at 0.5 second intervals in error condition.

TEMPERATURE

• SPECIFICATION



RTD MODULE

ITEM	CM3-SP04ERO
Available RTD	PT100, JPT100, PT1000, NI1000 (DIN 43760), NI1000 (TCR 5000)
Range of Temperature Input	PT100 : -200.0 ° to 600 ° (18.48 to 313.59 Ω) JPT100 : -200.0 ° to 600 ° (17.14 to 317.28 Ω) PT1000 : -200.0 ° to 600 ° (184.8 to 3135.9 Ω) NI1000 (DIN 43760): -50.0 ° to 160 ° (742.6 to 1986.3 Ω) NI1000 (TCR 5000): -50.0 ° to 160 ° (790.9 to 1799.3 Ω)
Digital Output	Digital Value : 0 ~ 16,000 (-8000 ~ 8000) Temp : -200.0 ° ~ 600.0 ° (floating point x 10)
Detecting Broken Wires	3 wires for each channel
Accuracy	± 0.1 % (full scale)
Max. Conversion Speed	50 ms / 4 Channels
Number of Temperature Input	4 channels
Insulation Method	Photocoupler between input terminal and PLC (No insulation between channels)
Power Supply	24VDC
Internal Current Consumption (mA)	+24V 60
External Current Consumption (mA)	+5V 30

- The module can detect a broken wire and out of range measurement.
- The module supports most resistance temperature detectors.
- The module provides full scale accuracy.
- Digital temperature measurement in 0.1°C increments is possible.
- The temperature value can be converted into a 14-bit digital value.

• FEATURES

- By using the platinum resistance temperature sensor, Pt100, JPt100 or Pt1000, Ni1000, the temperature value (°C or °F) can be processed as digital values (0~16000) with one decimal point.
- RTD module converts temperature from -200°C to 600°C (PT100/1000/JPT100) or from - 50°C to 160°C (Ni1000) into digital value of 0~16000 (-8000~8000).
- It can show temperature -250°C~650°C(PT100/PT1000/JPT100) or -60°C~170°C(Ni1000). These values may change into digital value in -192~16191(-8192~8191).
- If the operator sets the minimum and the maximum temperature values, it converts the minimum temperature value to 0 (-8000) and the maximum temperature value to 16000 (8000).
- Wire disconnection and exceeding measurement range can be detected by each channel.
- A single module has 4 channels for thermocouples.
- The LED lights on normal condition and blinks at 0.2 second intervals in error condition.
- The temperature-sensing resistance is a sensor that measures temperature in the form of resistance.
- The platinum temperature-sensing resistance PT100 and JPT100 outputs 100.00Ω for 0°C. PT1000 outputs 1000.00Ω for 0°C. The nickel temperature-sensing resistance Ni1000 outputs 1000.00Ω for 0°C.

• SPECIFICATION



TC MODULE

ITEM	CM3-SP04ETO	
Available TC	Type K,J,E,T,B,R,S,N	
Digital Output	Converted digital value: 0 ~ 16,000 (-8000 ~ 8000) Converted temperature value: °C, °F (0.1°C Resolution)	
Detecting Broken Wires	3 wires per each channel	
Accuracy	±0.3 % (Full Scale) ±1°C (Error for base compensation)	
Max. Conversion Speed	50ms / 4 Channels	
Compensation Type	Automatic compensation	
Number of Input Channel	4 channels / 1 module	
Insulation Method	Photocoupler between input terminal and PLC (No insulation between channels)	
Power Supply	24VDC	
Internal Current Consumption (mA)	+24V	60
External Current Consumption (mA)	+5V	30

RANGE OF INPUT TEMPERATURE

TYPE OF TC	STANDARD	RANGE OF MEASURED TEMP. (°C)	RANGE OF MEASURED VOLTAGE (MV)
K	ITS-90	-200.0 ~ 1200.0	-5891 ~ 48828
J		-200.0 ~ 800.0	-7890 ~ 45498
E		-200.0 ~ 600.0	-8824 ~ 45085
T		-200.0 ~ 400.0	-5602 ~ 20869
B		400.0 ~ 1800.0	786 ~ 13585
R		0.0 ~ 1750.0	0 ~ 21006
S		0.0 ~ 1750.0	0 ~ 18612
N		-200.0 ~ 1250.0	-3990 ~ 43846

- TC module can measure high temperature values.
 - The module supports various thermocouples.
 - The module provides ±0.3% of accuracy.
 - Digital temperature measurement in 0.1°C increments is possible.
 - Wire disconnection and exceeding measurement range can be detected.
 - Channels in TC module are uninsulated. FG is commonly used in the module installation.
 - FG reinforcement is strongly recommended when the measured values highly fluctuate.
 - Simultaneous connection with TC sensor and another device is not recommended as abnormal measurements and/or diminished performance can occur.
- ※ If you have to use TC module with third-party device, FG must be connected between the products.

ANALOG MUX

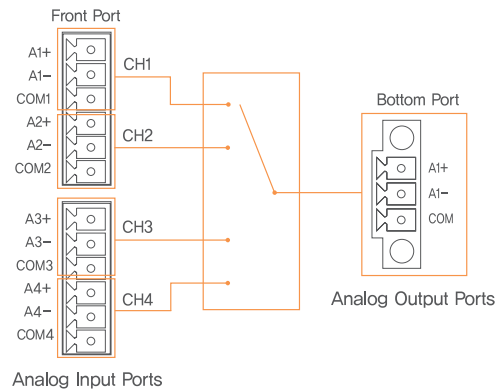
• SPECIFICATION



ITEM	CM3-SP04EAM
Number of Analog Input	3 wire, 4 channels
Analog Input	Voltage, RTD, TC
Relay Min/Max ON TIME	Min.: 0.1sec, Max.: 1000sec
Insulation Method	Relay
Capacity	16pts
Access Terminal	Input: 12pts terminal block, Output: 3pts terminal block
Relay Life-Expectancy	Number of operation of 10 ⁸

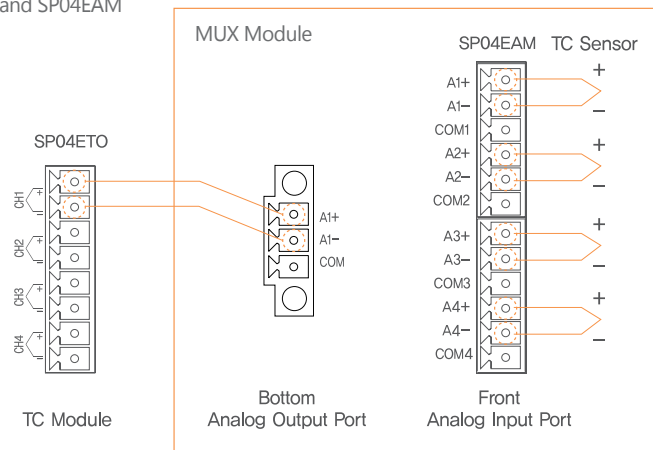
CONCEPT DIAGRAM

Concept Diagram of SP04EAM



WIRING EXAMPLE

Wiring Diagram Between SP04ETO and SP04EAM



• FEATURES

- Analog MUX module receives 4 channel analog signals and switches them sequentially to an output port by a set time interval.
- Channels can be enabled or disabled and channel information can be easily checked.
- Relay ON time can be selected by 0.1 ~ 1000.0sec intervals.
- Relay life expectancy can be checked through the relay counter function.
- User can select automatic or manual mode.
- The LED blinks at 0.5 second intervals in error condition.
- The Analog MUX module is not suitable for current signals since the signal switches repeatedly.

COMMUNICATION

• SPECIFICATION



ITEM		CM3-SP01EET
Standard		10BASE-T 100BASE-TX
Transmission Speed		10/100 M
Max. Distance (Node to Node)		100 m
Service Capacity		UDP, TCP : 12 Service
Service	Loader	Yes (UDP)
	HMI Protocol	Yes (TCP, UDP)
	MODBUS TCP Slave	Yes
	MODBUS TCP Master	Yes
	Protocol Special Program	Yes (TCP, UDP)
	High-Speed PLC Link	Yes
	DHCP	Yes

• FEATURES

- This module follows IEEE 802.3 and supports ARP, ICMP, IP, TCP, and UDP protocols.
- The module provides POWERTRAN DHCP server allowing dynamic IP address allocation.
- MODBUS TCP Master special program allows communication with various devices.
- High-speed linkage to the POWERTRAN PLCs to simultaneously communicate with up to 64 stations.

• SPECIFICATION



SERIAL MODULE

CM3*

ITEM		SP02ERS	SP02ERR	SP02ERC	SP02ERSC
Interface		RS232C:1CH RS422/485:1CH	RS232C: 2CH	RS232C: 1CH	RS232C:1CH RS422/485:1CH
Communication Method	Null Modem	○	○	○	○
	Leased Line Modem	○	○	○	○
	CDMA Modem	○	○	○	○
Operation Mode	Protocol Special Program	Communication via user-defined protocol program			
	HMI Protocol	Communication via POWERTRAN-PLC HMI protocol			
	MODBUS Protocol	Communication via Modbus RTU protocol			
	Graphic Loader Protocol	Controlling PLC through connection function in POWERTRAN software			
	MODBUS Master Protocol	Communicate with slave device that using MODBUS RTU protocol			
Data Type	Data Bit	8 bit			
	Stop Bit	1 or 2 bit			
	Parity	Even / Odd / None			
Synchronization Mode		Asynchronous			
Transmission Speed (bps)		300 / 600 / 1200 / 2400 / 4800 / 9600 / 19200 / 38400			
Insulation Method		RS232C: No insulation, RS422/485: photocoupler			

- Independent operations are possible for each channel by creating third party protocols for RS-232C and RS422 / 485 channels.
- Data can be read or written via the HMI protocol.
- Maximum of 32 units for HMI communication are supported (RS422/485)
- Modem communication is built into some serial modules to control the PLC remotely. (RS232C)
- Provides a wide range of communication speed (1200bps ~ 38400bps)
- RS232C and RS422/485 communication port can be used as independent channel or linked channel.
- 1:1 / 1:N / n:M (in case of RS422/485) communication is available.
- RS422 supports Full-Duplex, and RS485 supports Half-Duplex (RS485).
- Setting RS485 as default will enable a multi-drop communication channel.
- The module supports universal protocols.
- MODBUS RTU Master function helps data acquisition from third party device (MODBUS Slave).
- The RS422/485 channels are isolated from the internal circuitry to prevent communication quality degradation due to noise.
- This module follows IEEE 802.3 and supports ARP, ICMP, IP, TCP, UDP, and DHCP protocols.
- Ethernet communication module can be expanded on a single base without limits.
- The communication module can be installed on the extension base.
- The module provides DHCP system by communicating with POWERTRAN-SCADA.
- MODBUS TCP Master function provides full compatibility with various devices.
- High-speed linkage to the POWERTRAN PLCs to simultaneously communicate with up to 64 stations.
- Up to 4 Ethernet modules can be expanded for PLC link communication.

• FEATURES

• SPECIFICATION



OPC UA

ITEM		CM3-SP01OPC
Standard		10BASE-T, 100BASE-TX
Transmission Speed		10/100M
Max. Distance		100m
Number of Nodes		2,000 (default, Max : 4,000)
Max. Monitoring Nodes		100
Configuration Tool		POWERTRAN software
Service	Protocol	UA TCP (opc.tcp)
	Max. Connections	12
	Max. Sessions	5
	Max. Security Channels	11
Max. Message Size		65535

FEATURES IN THE MODULE

ITEM		CM3-SP01EET
Standard		10BASE-T, 100BASE-TX
Transmission Speed		10/100Mbps
Max. Distance		100m
Service Capacity		UDP, TCP : 12 Service
Service	Loader	Yes (UDP)
	HMI Protocol	Yes (TCP, UDP)
	MODBUS/TCP SI.	Yes
	MODBUS/TCP Ms.	Yes
	PLC Link (Private)	No
	PLC Link (Public)	No
	High-speed PLC Link	Yes
	DHCP	Yes

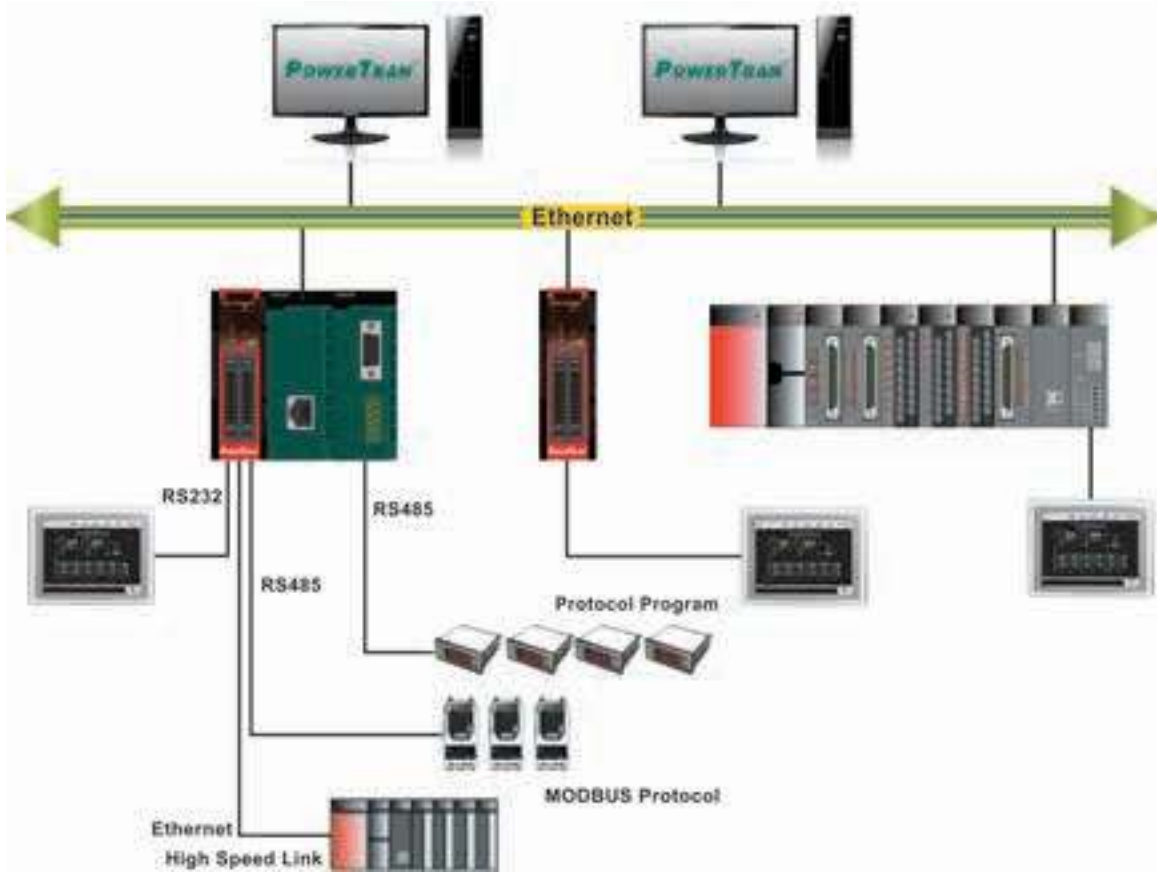
CABLE – TWISTED PAIR (UTP)

ITEM	UNIT		VALUE
Conductor Resistance (Max)	Ω / km		93.5
Insulation Resistance (Min)	M Ω / km		2500
Withstanding Voltage	V / min		AC 500
Impedance	Ω (1 ~ 100MHz)		100±15
Attenuation	dB / 100m	10	6.5
		16	8.2
		20	9.3
Near-end Crosstalk Attenuation	dB / 100m	10	47
		16	44
		20	42

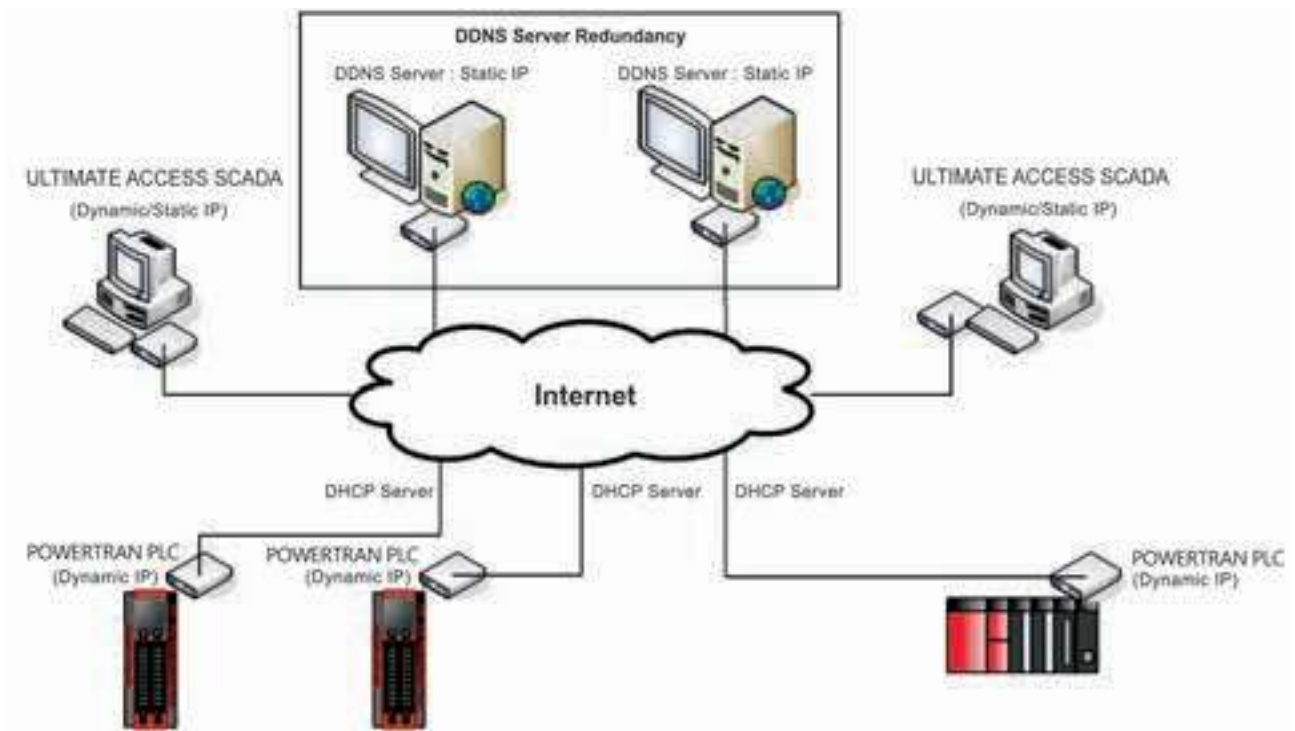
※ Since the cable type can differ depending on the system configuration and environment, please contact an expert for establishing a connection.

PLC-S SERIES

»» TOTAL NETWORK SOLUTION



»» DYNAMIC IP SYSTEM



PLC-S SERIES

Micro-S PLC

CM3-SB16MDT & CM3-SB16MDTV

» THE BLOCK TYPE OF PLC-S SERIES, IS DESIGNED FOR SMALL SIZE APPLICATIONS AND SIMPLE SYSTEMS SUCH AS MACHINE LEVEL CONTROL APPLICATIONS.

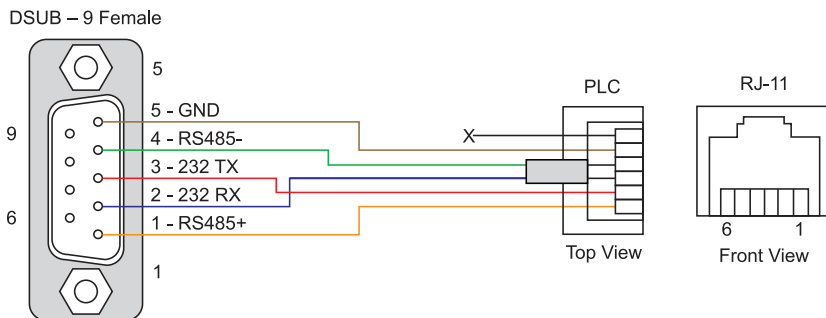
- TR Output (DC24V)
- 10K step Program memory
- Flash memory built-in
- Floating point arithmetic
- High Speed Counter 20Kpps (2 Channels)
- Expansion is not possible
- Built in serial communication port



» CPU SPECIFICATION

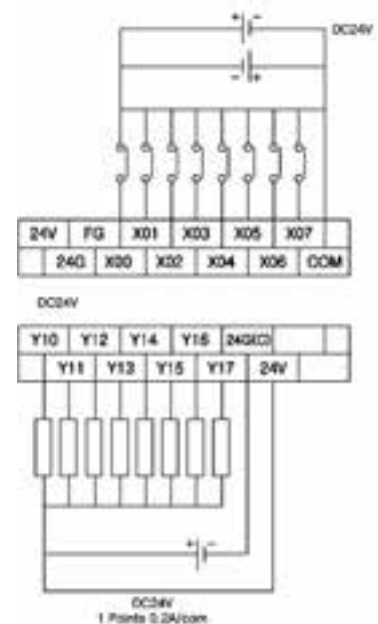
SPECIFICATION		
Model	CM3-SB16MDT	CM3-SB16MDTV
Digital I/O	DI8 / DO8	
USB Loader	1 port	
RS232C	1CH	
RS422/485	N/A	1CH
Expansion	Not expandable	

» COMMUNICATION WIRING



DSUB-9		PLC	
PIN	NAME	PIN	NAME
1	RS485+	1	RS485+
2	232 RX	2	232 TX
3	232 TX	3	232 RX
4	RS485-	4	RS485-
5	GND	5	GND
6	N.C	6	N.C

» WIRING



» CM3-SB16MDT CPU SPECIFICATIONS

ITEMS		SPECIFICATION	REMARK
Power		DC12-24V / 2.16W (In case of maximum expansion)	
Program Control Method		Cyclic execution of stored program, Time Driven Interrupt	
I/O Control Method		Indirect method, Directed by program instruction	
Program language		LD (Ladder Diagram), IL (Instruction List), SFC (Sequential Function Chart)	
Data Processing Method		32 Bit	
Instructions	Sequence	55 Instruction	
	Application	389 Instruction	
Processing speed (Sequence)		300ns / Step	
Program capacity		15K Step	
Maximum I/O points		DI 8points / DO 8points	
Operation mode		Run, Stop, Remote Run, Remote Stop	
Back-up method		K address by (Latch) parameter	
Total program		128	
Program types	Scan	Scan, Subroutine, Periodic Interrupts	
	Periodic Interrupts	Maximum 16 scan program (Minimum period: 10ms)	
	Special	HSC, I/O Input Filter	
	Communication	Serial, Ethernet, MODBUS/RTU Master, MODBUS TCP, High Speed Link	
	Etc.	SFC, FBD (Function Block Diagram: under development)	
Self-diagnosis function		Detects delay of scan time, memory, I/O, Battery, Power supply	
Device memory	X	8 points (X00 – X07)	Bit
	Y	8 points (Y10 – Y17)	Bit
	M	8192 points (M0000 – M511F)	Bit
	L	4096 points (L0000 – L255F)	Bit
	K	4096 points (K0000 – K255F)	Bit
	F	2048 points (F0000 – F127F)	Bit
	T	512 points (T0000 – T0511)	Word
	C	512 points (C0000 – C0511)	Word
	S	100 states x 100 set (00.00 - 99.99)	
	D	10000 words (D0000 - D9999)	Word
	Z	1024 words (Call Stack : Z0000 - Z0063, Z1000 - Z1063)	Word
R	16 points (Index)		
High Speed Counter		20Kpps, 2 Phase 2Ch. (in case of operating 2 Ch simultaneously 10kpps) 1Phase pulse Input + Direction signal	
Comm. Channel		Standard : USB Loader, Serial (RS232C) Option : Serial 1Ch (RS485)	

ACCESSORIES

CM0-DM



Dummy Module for Empty slot

CM1-FM512



Flash Memory Pack

CM0-BAT



CPU battery for Data back up

RP-DPC014



Remote I/O Connector

CM0-CBL15/30



Loader Cable

CM0-CBE05/10/15



Expansion Cable for XP/CP Series

CM0-SCM15M



IO 16/16 Cable for PLC-S

CM0-SCB15E



IO 16/16 Cable for PLC-S

CM0-SCB15I



I/O 32points Cable for XP/CP Series

CM0-TB32M



32points Terminal

CM0-CBHE05/10/15



Expansion Cable for XP/CP Series



» CABLE CONFIGURATIONS

CABLE MODEL	APPLIED MODULE	TERMINAL BLOCK
CM0-SCB15M	CM3-SP32MDT	CM0-TB32M
	CM3-SP32EDT	
CM0-SCB15E	CM3-SP32EDO	
	CM3-SP32EOT	
CM0-SCB15I	CM1-XD32C	
	CM1-YT32A	
	CM1-YT32B	
	CM1-HS02*	

PLC SPECIFICATIONS

»» POWERTRAN PLC GENERAL SPECIFICATIONS

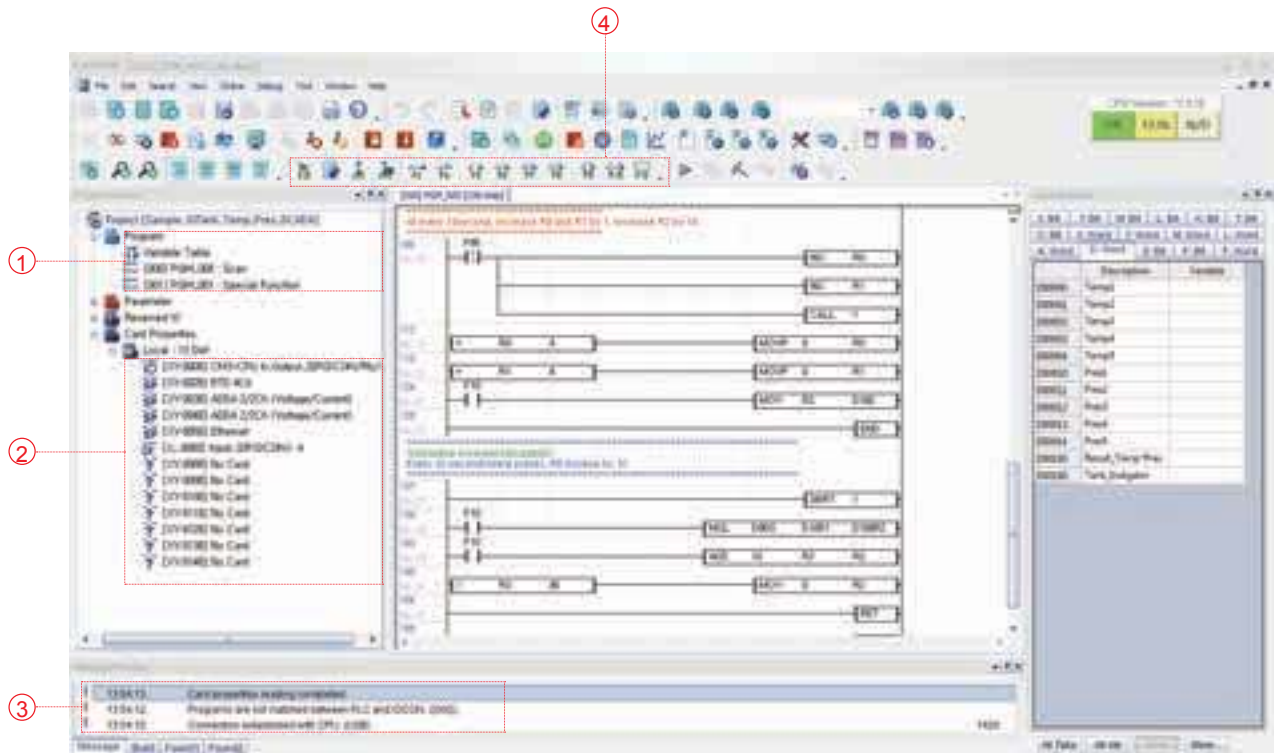
NO.	ITEMS	SPECIFICATION			STANDARDS	
1	Ambient Temp.	-10°C~70°C			-	
2	Storage Temp.	-25°C~80°C			-	
3	Ambient Humidity	5~95%RH, (Non-condensing)			-	
4	Storage Humidity	5~95%RH, (Non-condensing)			-	
5	Vibration	For discontinuous vibration				IEC 61131-2
		Frequency	Acceleration	Amplitude	Times	
		10≤f<57Hz	-	0.075mm	X,Y,Z Each direction, 10 times	
		57≤f≤150Hz	9.8m/s2 {1G}	-		
		Continuous vibration				
		Frequency	Acceleration	Amplitude		
		10≤f<57Hz	-	0.035mm		
57≤f≤150Hz	4.9m/s2 {1G}	-				
6	Shocks	· Max. impact acceleration: 147m/S2 (15G) · Authorized time : 11ms · Pulse wave : Sign half-wave pulse (3 times each in X, Y, Z)			IEC 61131-2	
7	Noise	Square wave impulse noise	± 2,000V		POWERTRN standard	
		Electrostatic discharge	Voltage : 4kV (contact discharging)		IEC 61131-2 IEC 1000-2	
		Radiated electromagnetic field noise	27~500 MHz,10V/m		IEC 61131-2 IEC 1000-4-3	
		Fast Transient Burst noise	Power module	Digital I/O (24V or more)	Digital I/O (less than 24V) Analog I/O Comm. interface	IEC 61131-2 IEC 1000-4-4
			2 kV	2 kV	0.25 kV	
Voltage	2 kV/1min		0.5 kV/1min			
8	Ambient conditions	No corrosive gas or dust				
9	Cooling type	Natural air cooling				

»» REFERENCE

- IEC (International Electrotechnical Commission) : The IEC is the world's leading organization that publishes international standards for all electrotechnical and related technologies
- Pollution degree 2 is nonconductive pollution of the sort where occasionally a temporary conductivity caused by condensation must be expected.

POWERTRAN ENGINEERING SOFTWARE

- User-friendly interface for editing and modifying the programs
- Supports RS232C/422/485 and Ethernet communications
- Debugging function and system diagnosis



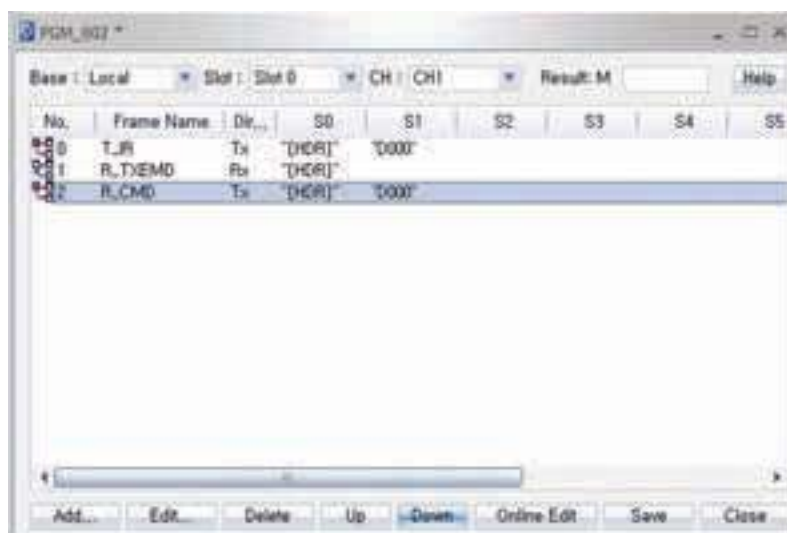
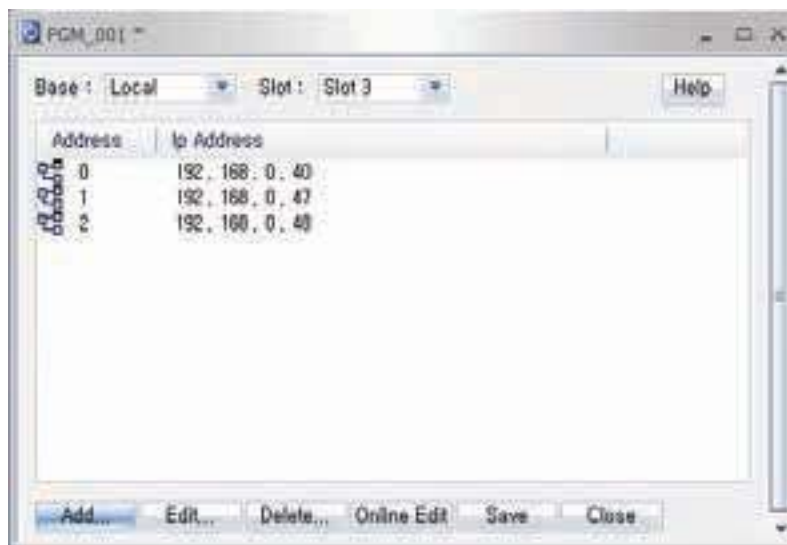
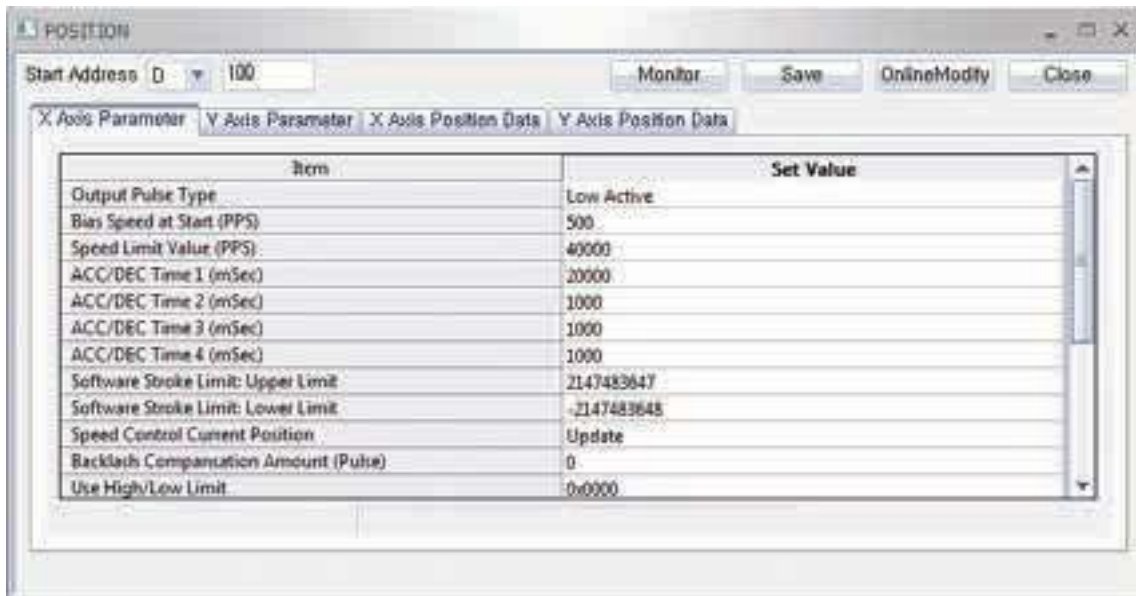
- ① Easy management of project files
- ② Automatically detects special cards info
- ③ Present processing condition shown in the message window
- ④ Convenient editing by keyboard shortcuts



Program conversion
between IL-LD

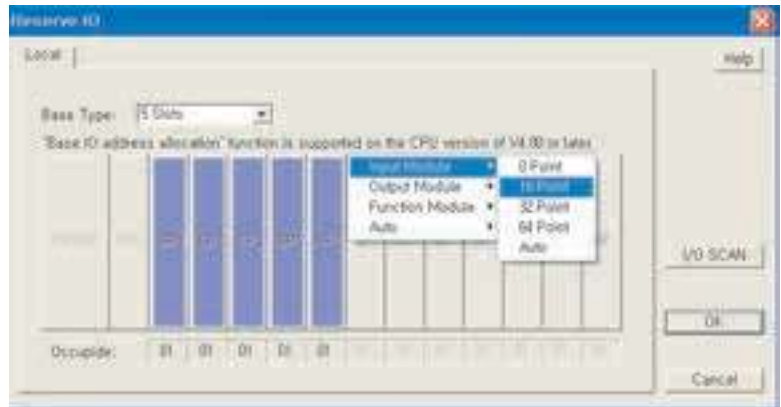


- Easy to use programming, simply set up a dialog box for special functions instead of writing a complicated ladder program. (communication set-up, positioning, PID, protocol program, etc.)

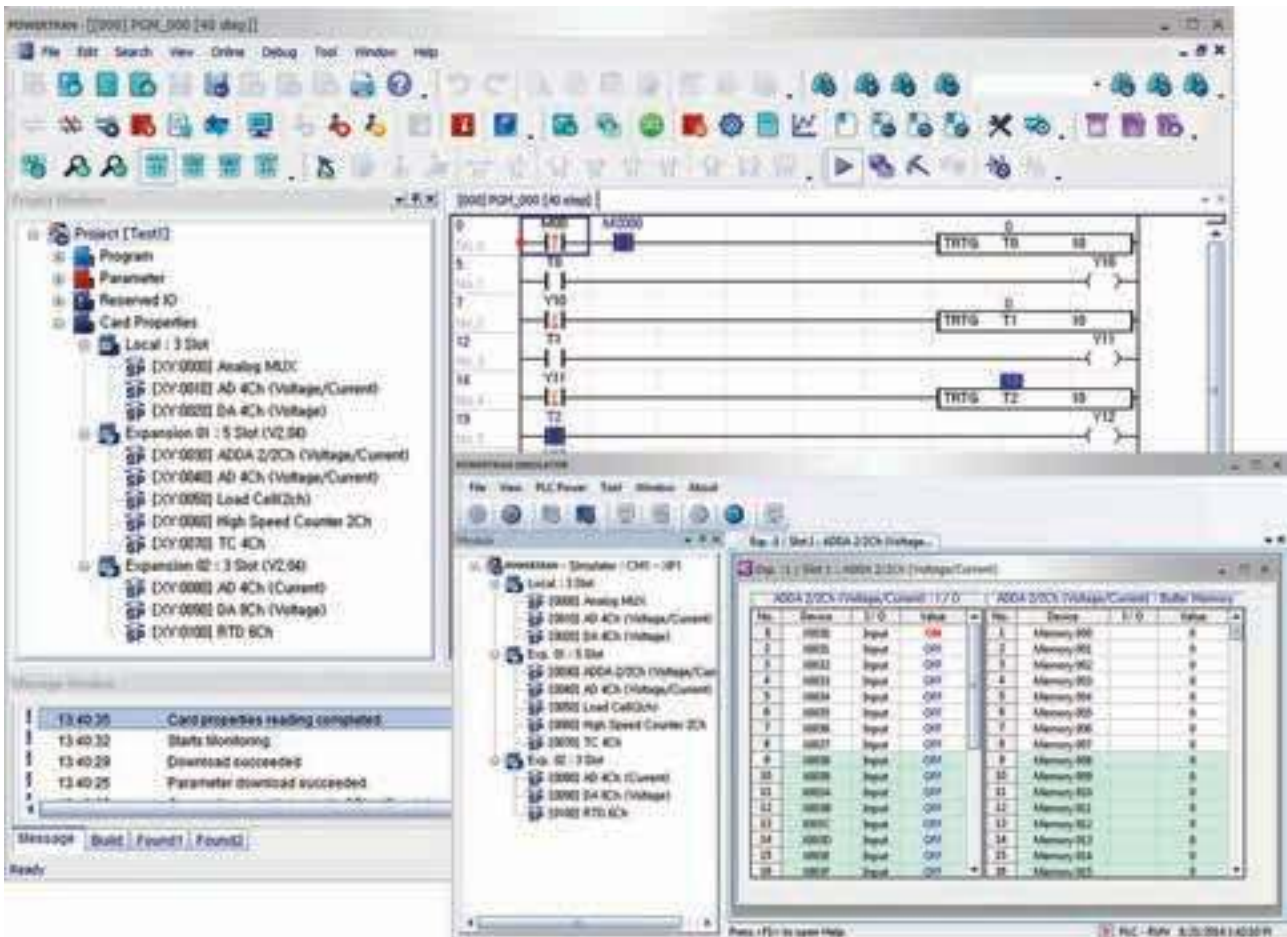


POWERTRAN ENGINEERING SOFTWARE

- Constant monitoring of the PLC status
- Fast and accurate error detection for each cards
- Reserving the I/O
Compares and detects a card and checks if the card is inserted or not



- Testing functions and programs are possible without connecting to a physical PLC by POWERTRAN Simulator



- PID auto tuning
Check PID input and current values constantly in dialog box

The screenshot shows a software window titled 'PID_02'. It contains a table of PID parameters and their current values. Below the table are several status indicators represented by radio buttons.

Index	Device	Set Value	Current Value
Path Calc(0-Forward 1-Reverse)	D00002	Forward	
Sampling Time(0.01 - 60 sec)	D00003	1.00	
Kp(0 - 65535)	D00004	10	
Ki(0.0 - 2000 sec)	D00005	300.0	
Kd(0.00 - 300 sec)	D00006	0.00	
Fiber(0 - 1.00)	D00007	0.00	
MV Low Limit(0 - 16000)	D00008	0	
MV High Limit(0 - 16000)	D00009	16000	
MV Change Rate Limit(0 - 16000)	D00010	16000	
MV Auto-Apply(0-Disabled 1-Enabled)	D00011	Disable	
SV Ramp(0 - 1000 0-Disabled)	D00012	0	
On/OFF Time(0.00 - 60.00)	D00014	0.00	
SV(Set Value)	D00300	16364	
PV(Process Value)	D00001		
MV(Manipulation Value)	D00302		
PVnt(After Fiber)	D00303		
MVman(Mv Manual)	D00304	8000	
(0:Auto 1:Manual)	D00305	Auto	
Self Learning Enable(1) / Disable(0)	D00305	Disable	
Kp x 100 (1)	D00305	-	
PID Error Code	D00015	0	
PID Status Code	D00016		

Below the table, there are several status indicators with radio buttons:

- PID Loop Initialized
- Auto-tune Processing
- ON/OFF Ctrl Output
- Self Learn Data Ready
- Stable Status
- PID - 2 Control

- PID operation condition shows as a trend type
- PID tuning is available by controlling ON-OFF

The screenshot shows a software window titled 'PID Monitoring - PGM_001'. It features a trend graph, a table of PID parameters, and several status indicators.

Loop Information:
Total loops : 2 / Current : 1
Loops/Scan : 1

Status(Error Code):
Normal Operating(0)

Tuning Parameters:
On/Off Time: 0.00
Kp: 29763, SV: 500
Ki: 20.0, PV: 323
Kd: 0.00, MV: 16000
Ts: 1.00

Description:
Click "Edit Mode" Button to modify PID Parameter.

Status Flag:
15 6 5 4 3 2 1 0

Trend Graph:
The graph shows 'Magnitude' on the y-axis (0 to 16000) and time on the x-axis (2014/08/21 13:08:17 to 2014/08/21 13:09:17). The scale is 1 (min). The graph shows a sharp rise in magnitude followed by a gradual decay.

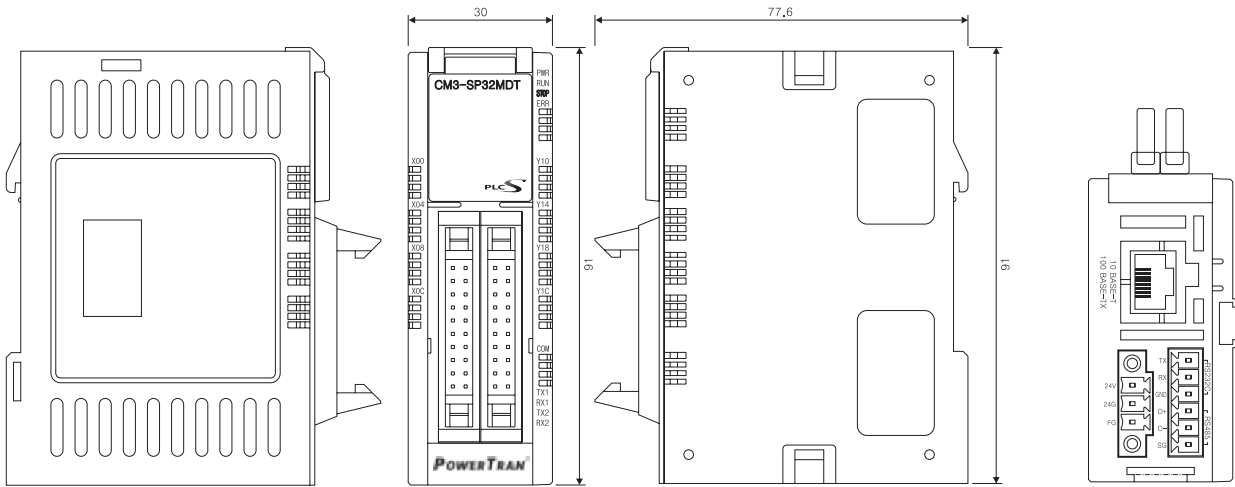
Table:

Device	Desc	Min Value	Max Value	Current	Data Cursor
D00100	SV	0	16000	500	0
D00101	PV	0	16000	323	0
D00102	MV	0	16000	16000	0

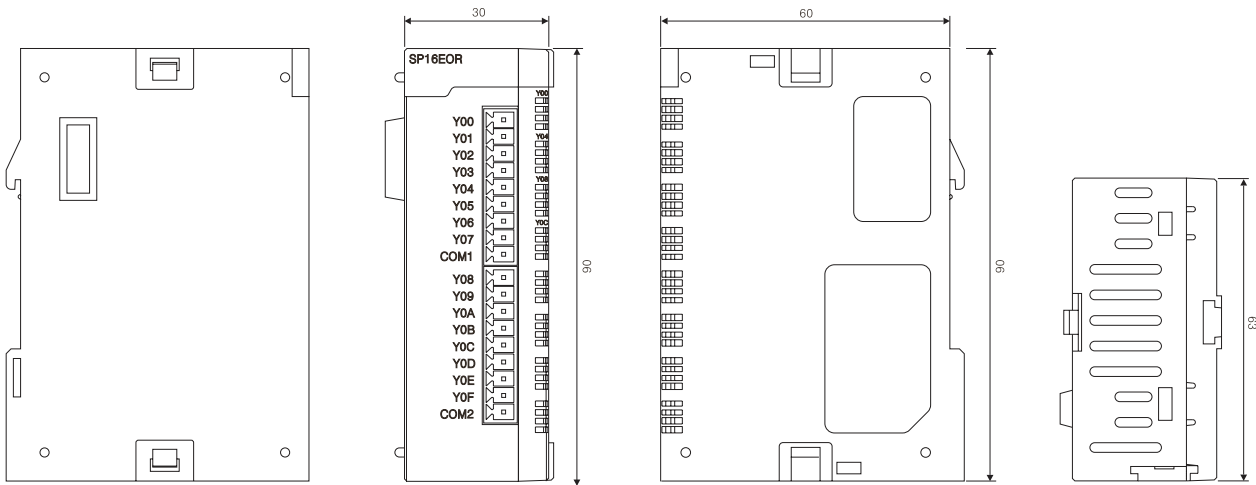
Status Indicators:

- PID Loop Initialized
- Auto-Tuning Processing
- On/Off Control Output
- Self Learning Data Ready
- Stable Status
- PID-2 Control Processing

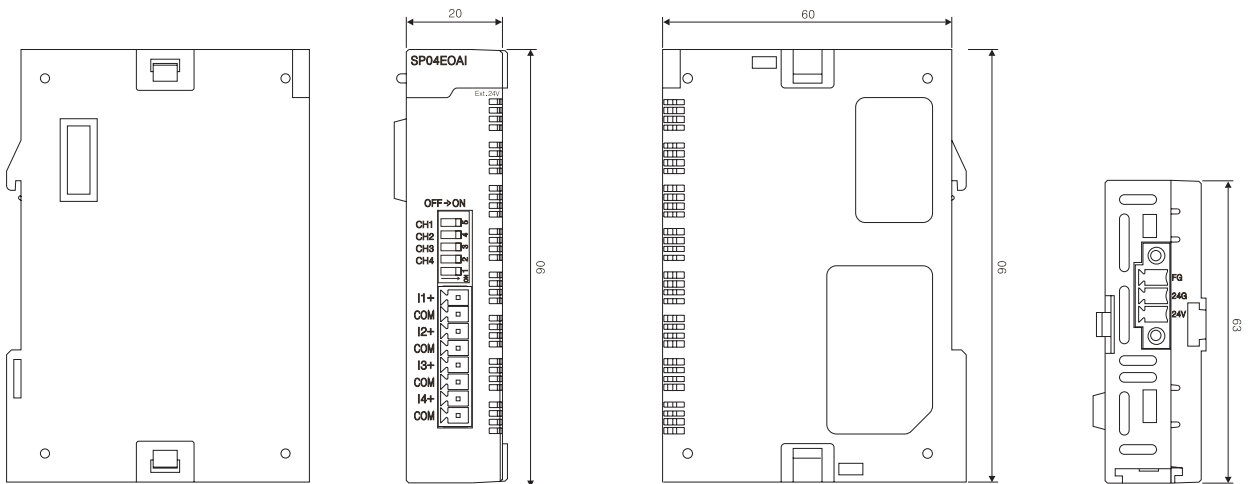
DIMENSIONS



※ CM3-SP32MDT / CM3-SP32MDO (Sizes are the same in the CPU line.)



※ CM3-SP16EOR (Sizes are the same in the Digital I/O line.)



※ CM3-SP04EOAI (Sizes are the same in the Analog I/O line.)

※ Dimensions are in mm

POWERTRAN-PLCS LINE-UP

ITEM		MODEL	SPECIFICATION
Power Base	Power Supply TR Output (DC Power)	CM3-SP24PWRH	Input:100-240VAC, 36W, Output:24V, 1.5A
		CM3-SP32MDT/MDC	DI16/DO16, USB Loader, RS232C 1ch, SFC Language
		CM3-SP32MDT-SD	DI16/DO16, USB Loader, SD/MMC Card Slot, RS232C 1ch, SFC Language, Web Server
		CM3-SP32MDTV	DI16/DO16, USB Loader, RS232C 1Ch, RS485 1ch, SFC Language
		CM3-SP32MDTV-SD	DI16/DO16, USB Loader, SD/MMC Card Slot, RS232C 1ch, RS485 1ch, SFC Language, Web Server
		CM3-SP32MDTE	DI16/DO16, USB Loader, RS232C 1Ch, Ethernet 1ch, SFC Language
		CM3-SP32MDTE-SD	DI16/DO16, USB Loader, SD/MMC Card Slot, RS232C 1ch, Ethernet 1ch, SFC , Web Server
		CM3-SP32MDTF	DI16/DO16, USB Loader, RS232C 1ch, Ethernet 1ch, RS485 1ch, SFC Language
		CM3-SP32MDTF-SD	DI16/DO16, USB Loader, SD/MMC Card Slot, RS232C 1ch, Ethernet 1ch, RS485 1ch, SFC Language, Web Server
	Relay Output (DC Power)	CM3-SP16MDR	DI 8/DO 8(Relay), USB Loder/RS232 1ch
		CM3-SP16MDRV	DI 8/DO 8, USB Loder, RS232 1ch, RS485 1ch
		CM3-SP16MDRE	DI 8/DO 6, USB Loader, RS232C 1ch, Ethernet 1ch
		CM3-SP16MDRF	DI 8/DO 6, USB Loader, RS232C 1ch, Ethernet1ch, RS485 1ch
Digital Expansion	DI-32	CM3-SP32EDO	DI 32pts, DC 24V
	DO-32	CM3-SP32EOT	DO 32pts, DC 24V (TR)Sink
	DO-32	CM3-SP32EOC	DO 32pts. DC 24V (TR)Source
	DO-16	CM3-SP16EOR	DO 16pts, Relay Output
	DI-8 / DO-8	CM3-SP16EDR	DI 8pts, Relay Output
	DI-16 / DO-16	CM3-SP32EDT	DI 16pts, DO 16pts, (TR)Sink
Analog Expansion	AI-4	CM3-SP04EAO	AI 4ch voltage and current, 14bit
	AIO-2/2	CM3-SP04EAA	AI 2ch voltage and current /AO 2ch voltage and current, 16bit, 14bit
	AO-4	CM3-SP04EOAI	AO 4ch current, 14bit
		CM3-SP04EOAV	AO 4ch voltage, 14bit
	MUX	CM3-SP04EAM	AI 4ch(RTD,TC Available)
Temperature	AI-4	CM3-SP04ERO	AI 4ch RTD
		CM3-SP04ETO	AI 4ch TC
Communication Block	Ethernet	CM3-SP01EET	Ethernet 1ch, 10/100Mbps
	Serial	CM3-SP01ERC	RS232C 1ch CDMA
	Serial	CM3-SP02ERRC	RS232C 1ch CDMA / RS232C 1ch
	Serial	CM3-SP02ERS	RS232C 1ch, RS422/485 1ch
	OPCUA	CM3-SP01OPC	OpCUA server, 10/100Mbps, UA TCP(opc,tcp)
	Serial	CM3-SP02ERR	RS232C 2ch
Accessories	SP32MDT	CM0-TB32M	Multi-Terminal
	SP32MDT	CM0-SCB15M	Main Block 1.5M Cable
	SP32EDO	CM0-SCB15E	I/O 32pts. 1.5M Cable
	SP32EOT		

※ Firmware upgrade is available for all PLC-S models

AUTOMATION APPLICATIONS



POWERTRAN[®]

Industrial Automation



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