Fuji Electric

Innovating Energy Technology

PUM Series

Multi-loop module type Temperature controller

Smart!

- Heater break alarm CT (8 points)
- Program-less host communication

User friendly!

- Detachable terminal
- Simple loader operation

Fast!

- High-speed data communication
- High-speed data sampling

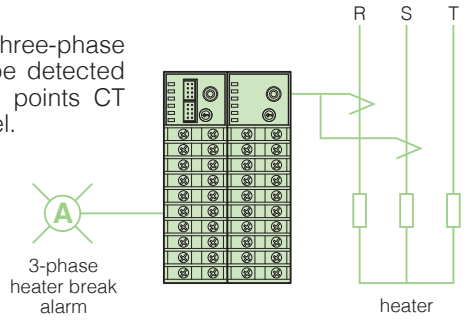
21B1-E-0054

FEATURES

Smart!

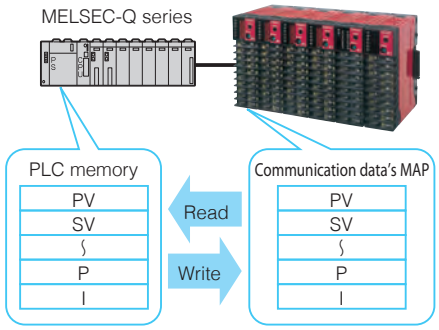
Heater break alarm CT (8 points)

A break in a three-phase heater can be detected with using 2 points CT per 1-channel.



Programless communication with upper device

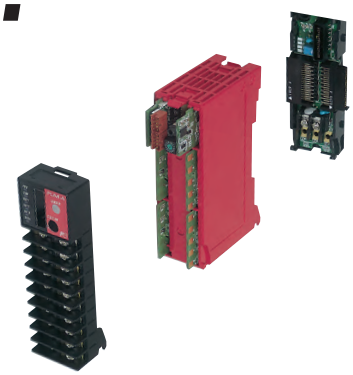
High-speed communication is possible because it is only assigned important data.



User friendly!

Detachable terminal structure

The terminal is attachable and detachable without using a screw driver.
Wiring time for maintenance is reduced substantially.



Simple loader on the Personal Computer

Simple loader is available to change all module parameter setting without changing each loader connection.
If "favorite function" is used, the frequently-used parameter can be edited preferentially.

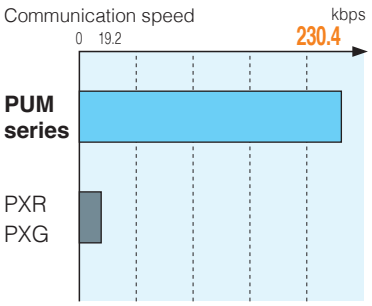
Easy to attach to the DIN rail

It is easy to attached the DIN rail by backside lock-tab.
The backside lock-tab can connect each multi-loop controller.

Fast!

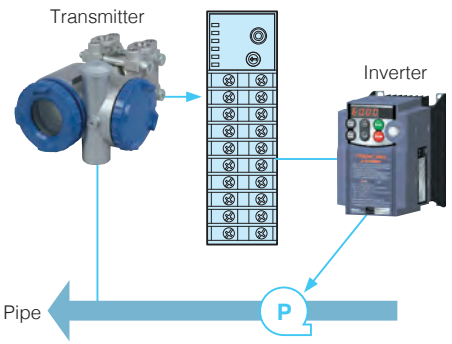
High-speed communication with upper device

You can rest easy with the multi-loop controller because hi-speed communication with 230.4kbps and no time-lag.



High-speed sampling time

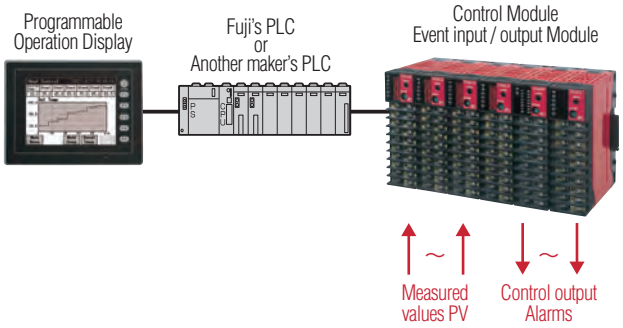
200msec sampling time enable it to apply to not only temperature measurement but also process measurement such as pressure control and flow control, etc.



APPLICATIONS

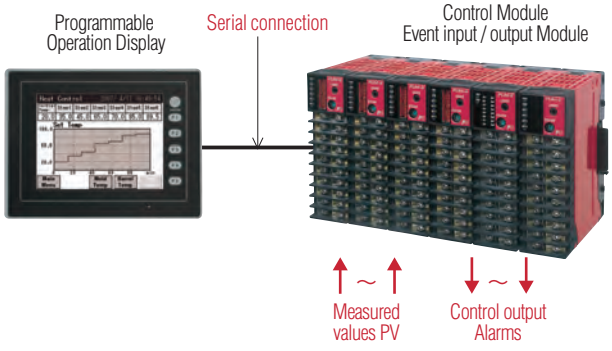
Case 1 Input/output device of I/O units in programmable logic controller

<Separated PLC type>

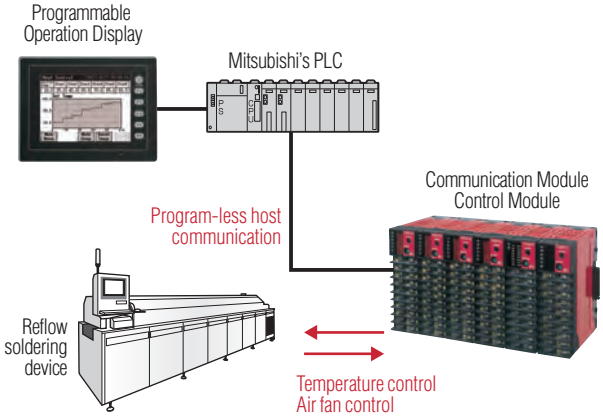


Case 2 Temperature controller

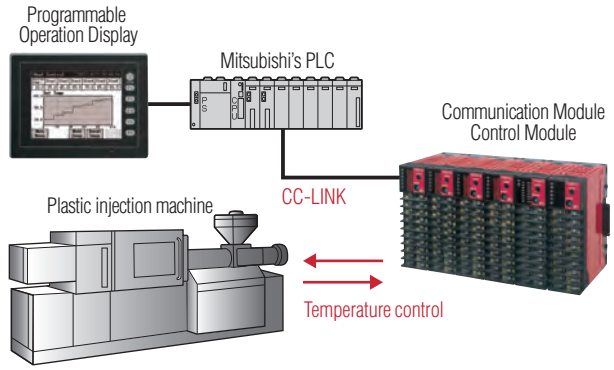
<Multi Temperature controllers type>



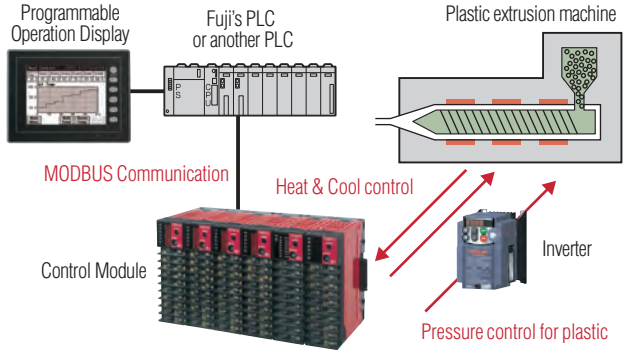
<Reflow soldering device>



<Plastic injection machine>

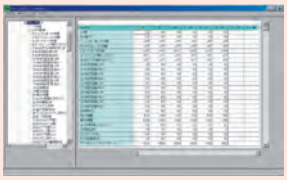


<Plastic extrusion machine>



VARIATIONS

	Kind	Type	See page
Temperature control	**Control Module** **Features** Inputs have 2ch or 4ch type 3-phase Heater break detections have each ch. (option)	PUMA/B 	11
Digital input/output	**Event input/output Module** **Features** 8 points alarm DO output 8 points DI input for external switching control	PUME 	13
Analog input/output	**Analog input & output Module** **Features** Inputs have 4 points and Outputs have 4 points	PUMV 	14
	Analog input Module **Features** Inputs have 4 points	PUMN 	16
	Analog output Module **Features** Outputs have 4 points	PUMT 	18
Communication	**CC-LINK Communication Module** **Features** Communication speed data with 10Mbps	PUMCL 	19
	Mitsubishi PLC's Module with programless communications **Features** Direct address map only for Mitsubishi's PLC.Reduction of your programming work for Mitsubishi's PLC.	PUMCM 	20
	PROFIBUS Communication Module **Features** PROFIBUS DP-V0 (Slave device) Communication speed data with 12Mbps	PUMCP 	21

	Kind	Type	See page
Communication	**Ethernet Communication Module** **Features** 10BASE-T/100BASE-TX Compatible	PUMCE 	22
Support Tools	**Programming Loader on Personal computer** **Features** Easy setting and user friendly		9
Peripheral instrument	**Programmable Operation Display** **Features** Easy connect by serial connection		10
	Automation Software **Features** SCADA software, example		10
Accessory	・Terminating resistance for RS-485 ・DIN rail end plate ・Connector's cover side-by-side ・Terminal cover of front ・Connection cable for PUM series ・Fuji's original CT input cable ・Fuji's original CT		30

Applicable standards

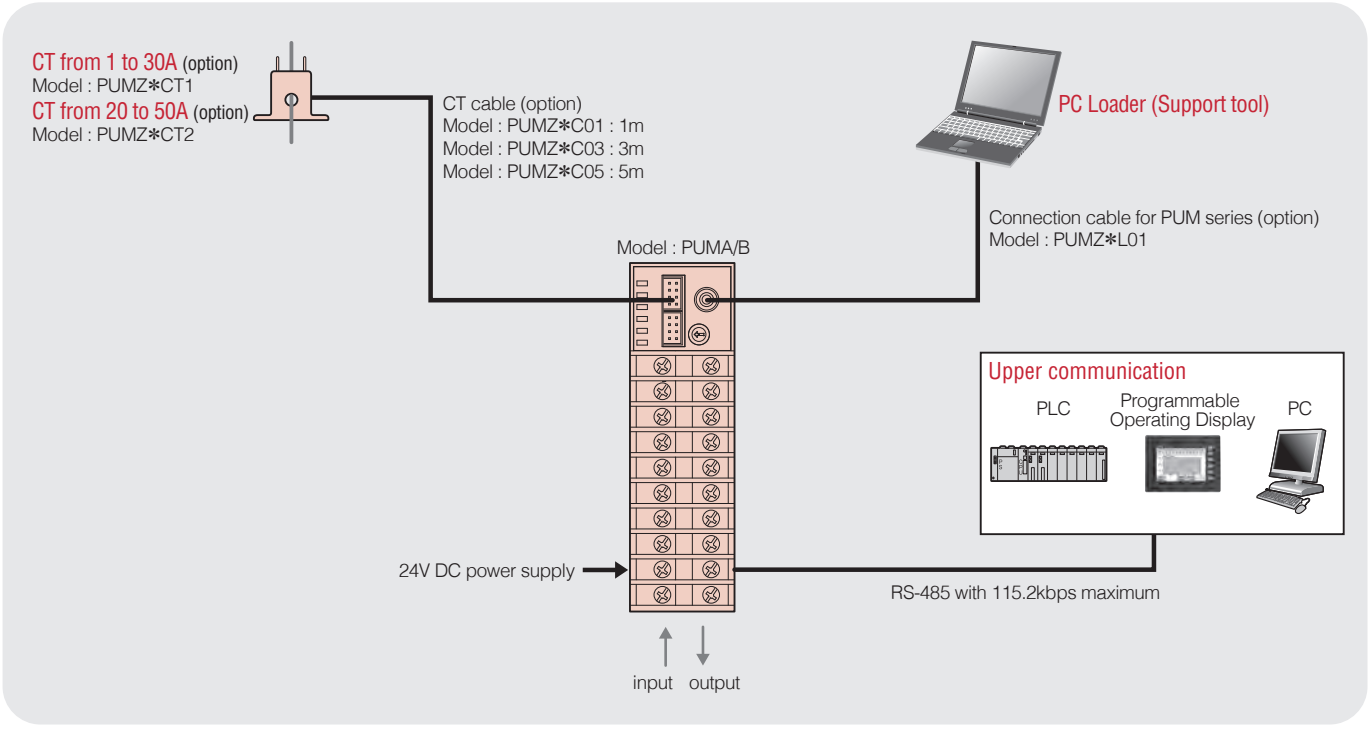
	c UL us LISTED	CE	RoHS
PUMA/B	○	○	○
PUME	○	○	○
PUMV	○	○	○
PUMN	○	○	○
PUMT	○	○	○
PUMCL	○	○	○
PUMCM	○	○	○
PUMCP	—	○	○
PUMCE	—	○	○

○: Compatible, —: Incompatible

SYSTEM CONSTRUCTION FOR EXAMPLE

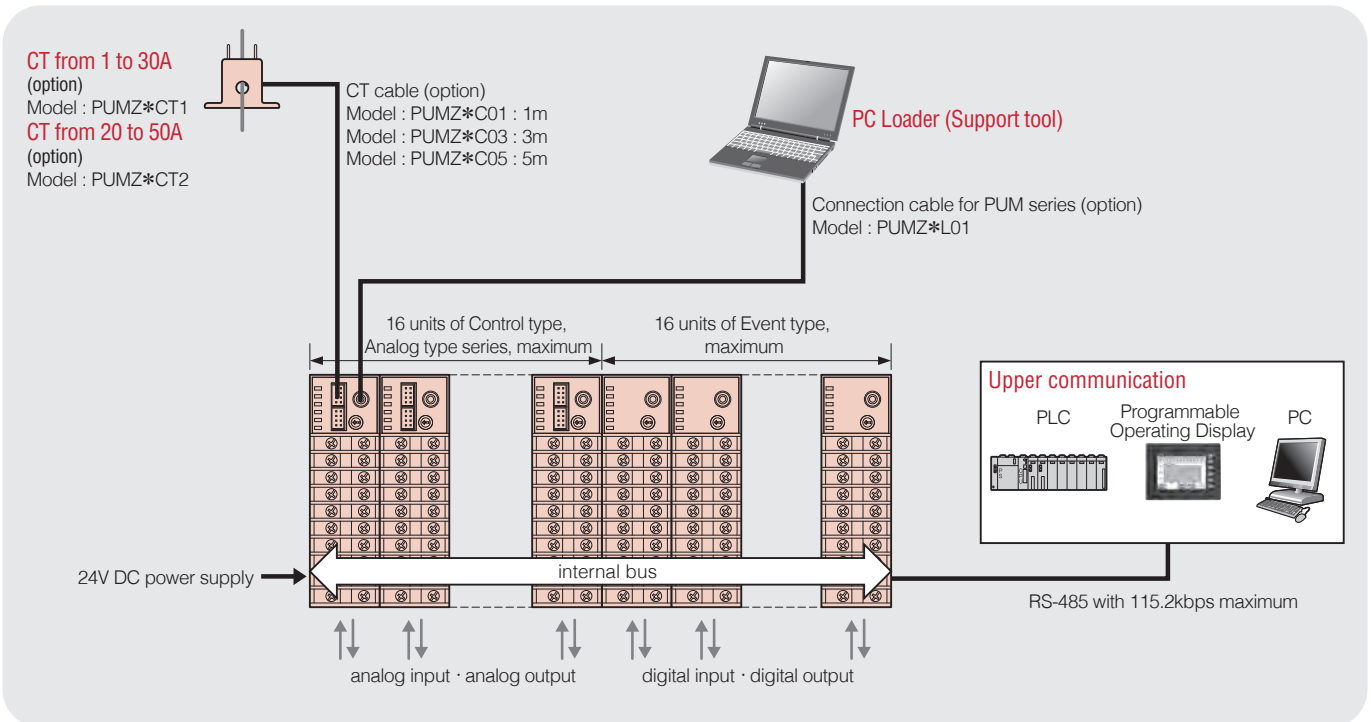
1 Basic system (minimum system construction)

· In case of minimum system construction, 4ch or 2ch
· RS-485 communication is standard, not option
*When you use the heating and cooling control, PUMA can control max. 2 channels and PUMB can control max.1 channel.



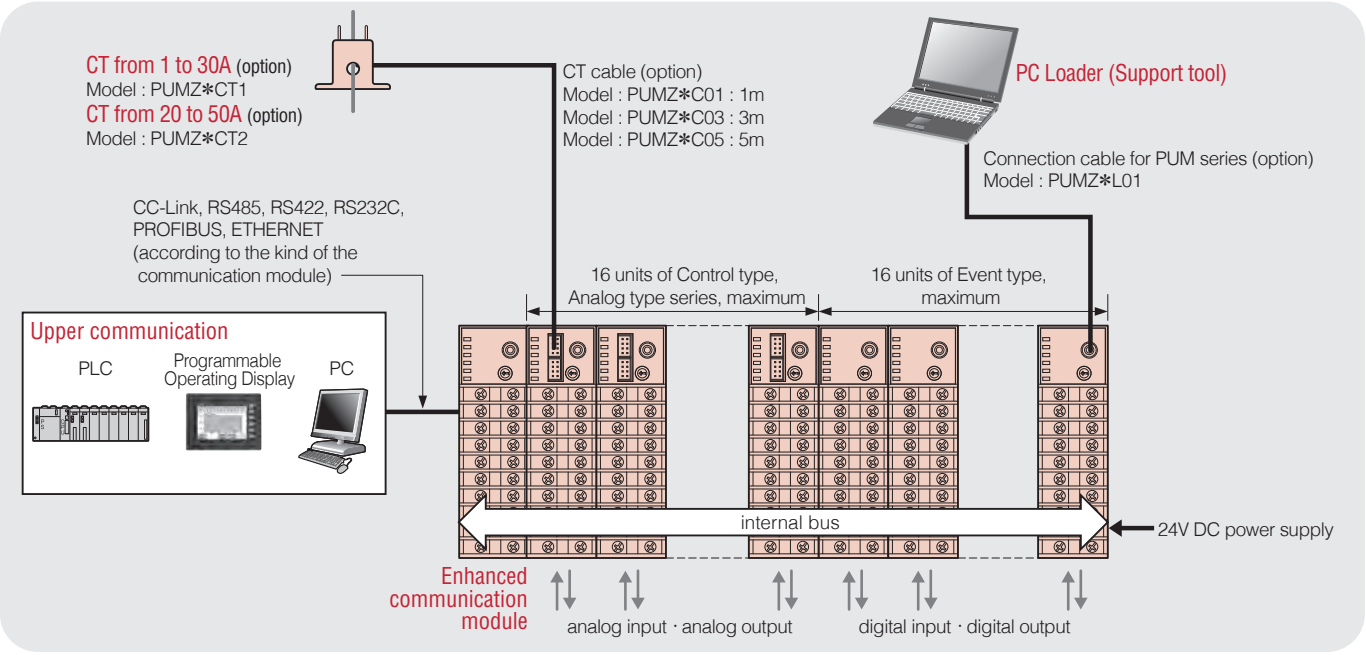
2 Basic system (maximum system construction)

· When you use analog input/output, or digital input/output in addition to 4ch/2ch control module.
· You can construct up to 16 units for control, and analog input/output type (control module, analog input/output) plus up to 16 units for digital input/output type (event module).
· Setting St. numbers is necessary for internal communications. (Station No.= setting value of Station No. configuration switch +1)
Make sure that there is no duplicate station number (0 to 15) in control type, analog type series.
Make sure that there is no duplicate station number (0 to 15) in event type series.
You can use the duplicate station number between control type, analog type series and event type.



3 Enhanced communication type

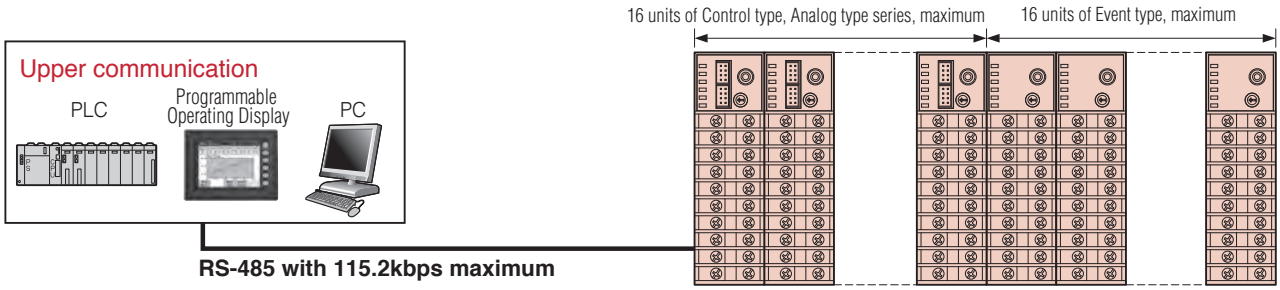
· Performing CC-LINK communication, PLC program-less communication, PROFIBUS, and ETHERNET communication. Enhanced communication module is connected to the left end of control type, analog type series and event type.



COMMUNICATION MODULE

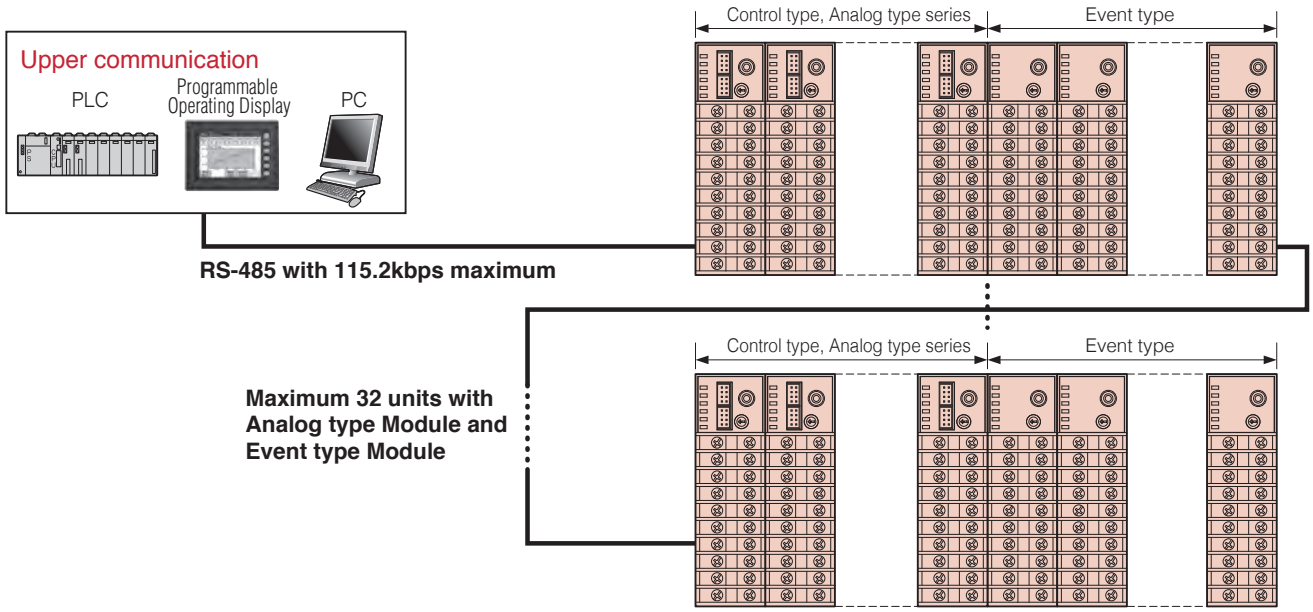
1-1 Modbus protocol Communications (lateral connections of a maximum of 16 modules)

Control Module, Analog I/O Module are 16 units maximum and Event I/O Module are 16 units maximum.



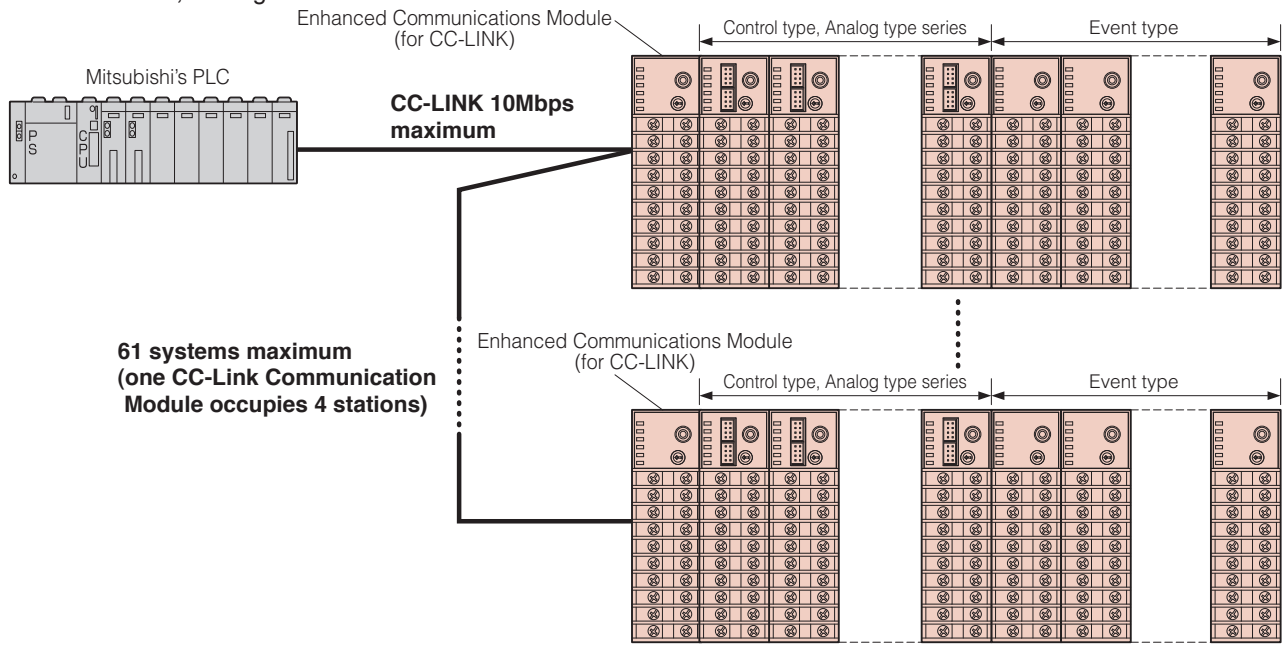
1-2 Modbus protocol Communications (distributed allocations)

Control Module, Analog I/O Module are 16 units maximum and Event I/O Module are 16 units maximum.



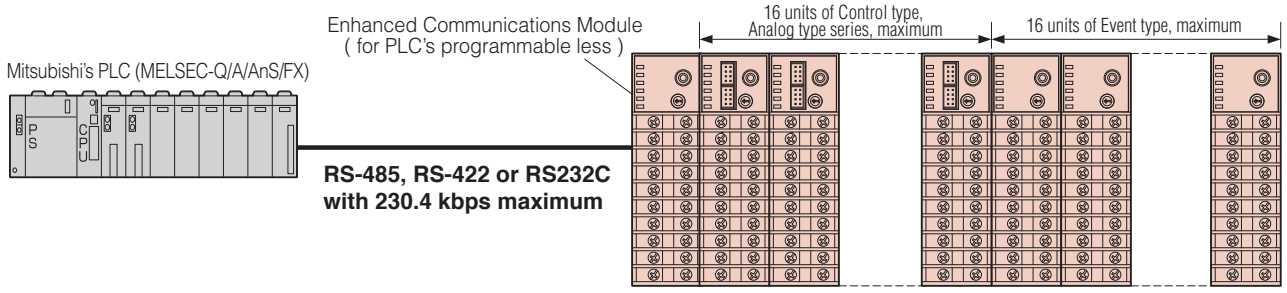
2-1 CC-Link protocol Communications (distributed allocations)

Control Module, Analog I/O Module are 64ch maximum



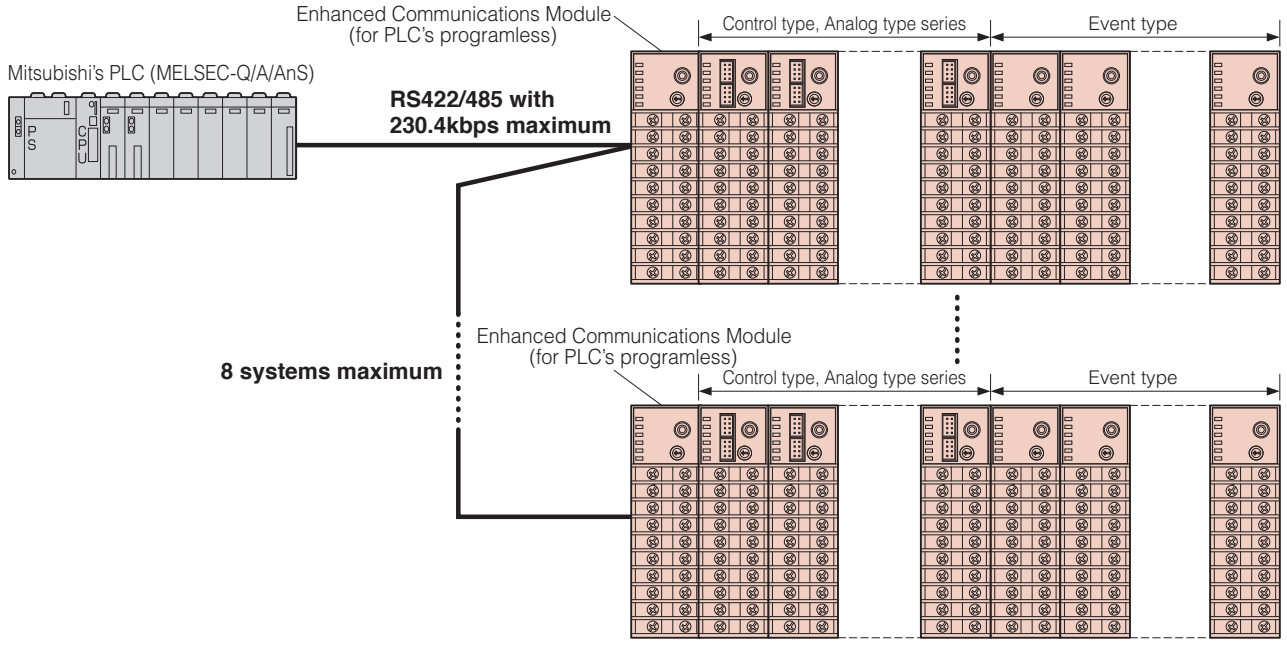
3-1 Mitsubishi's PLC with programless communications (Continuance connections by maximum)

Control Module, Analog I/O Module are 16 units maximum and Event I/O Module are 16 units maximum.



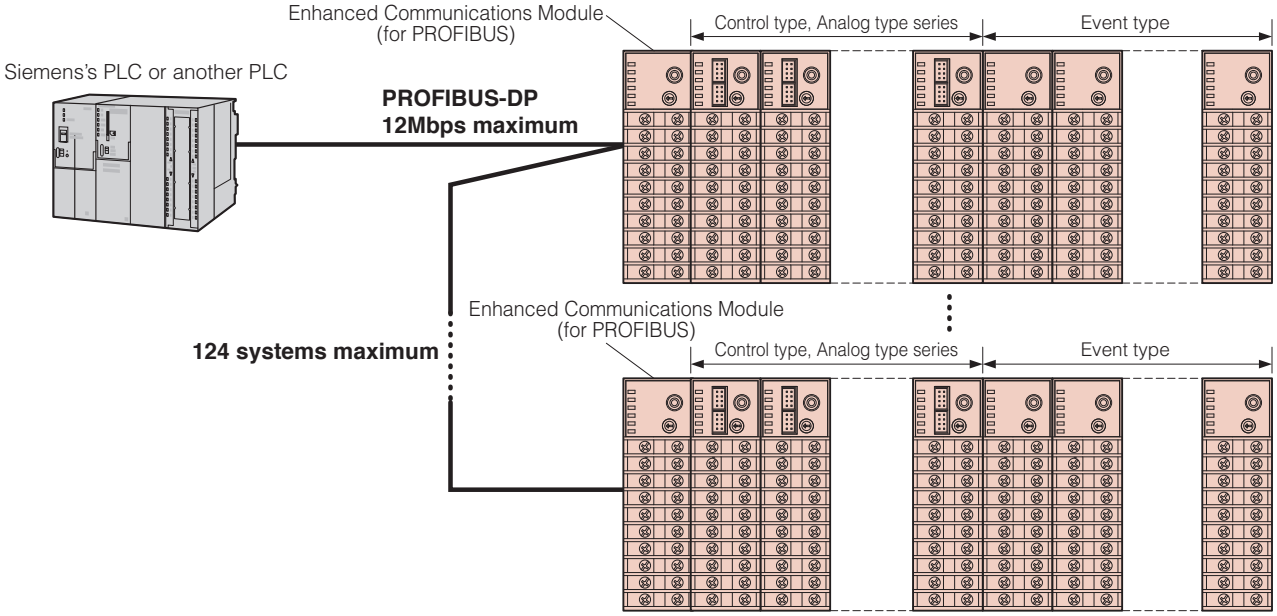
3-2 Mitsubishi's PLC with programless communications (distributed allocations)

Control Module, Analog I/O Module are 128 units (512ch) maximum and Event I/O Module are 128 units maximum



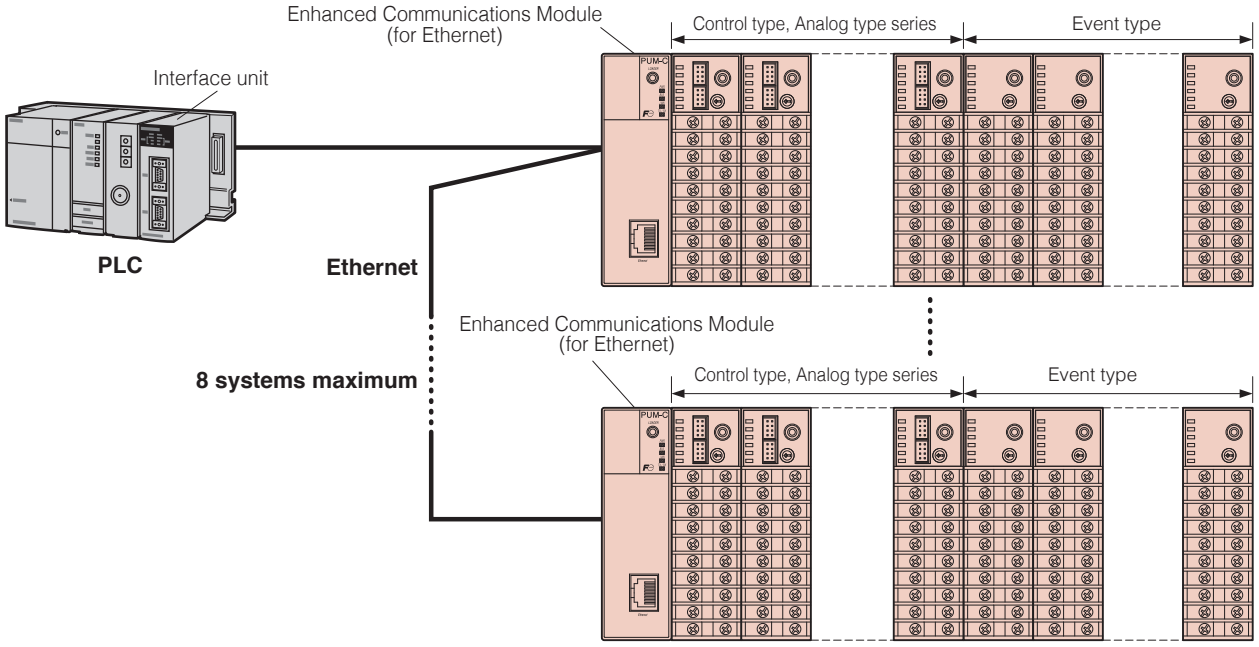
4-1 PROFIBUS Communications (distributed allocations)

124 system maximum (Control Module, Analog I/O Module are 16 units maximum and Event I/O Module are 16 units maximum for one system)



5-1 Ethernet Communications (distributed allocations)

8 system maximum (Control Module, Analog I/O Module are 16 units maximum and Event I/O Module are 16 units maximum for one system)



LOADER SOFTWARE

PUM series are prepared by loader software. This software is supported by windows PC.

Basic Loader for Control Module, Analog I/O Module, and Event I/O Module and Enhanced Communication Module (except for CC-Link communication type)

Free software　It is available to download for Fuji's HP. This URL is http://www.fujielectric.com/products/instruments/products/z_series/top.html

SMART LOADER

You can set the all modules with the loader ports on the control modules without replacing cables. There are two kinds of modules; the master and the slave. (All modules are set to slave in shipping, and they can be set as master by the loader software) Only the master is capable of setting and display of all modules, and those of slave is individual. Only 1 unit can be set as the master in all modules. When two or more master exists, correct operation is not performed. When operating the parameters of the enhanced communication module, connect the loader connecting cable to the loader communication port of the enhanced communication module. You can grasp the whole control conditions easily by monitoring parameter display, setting, and control conditions.

EASY LOADER

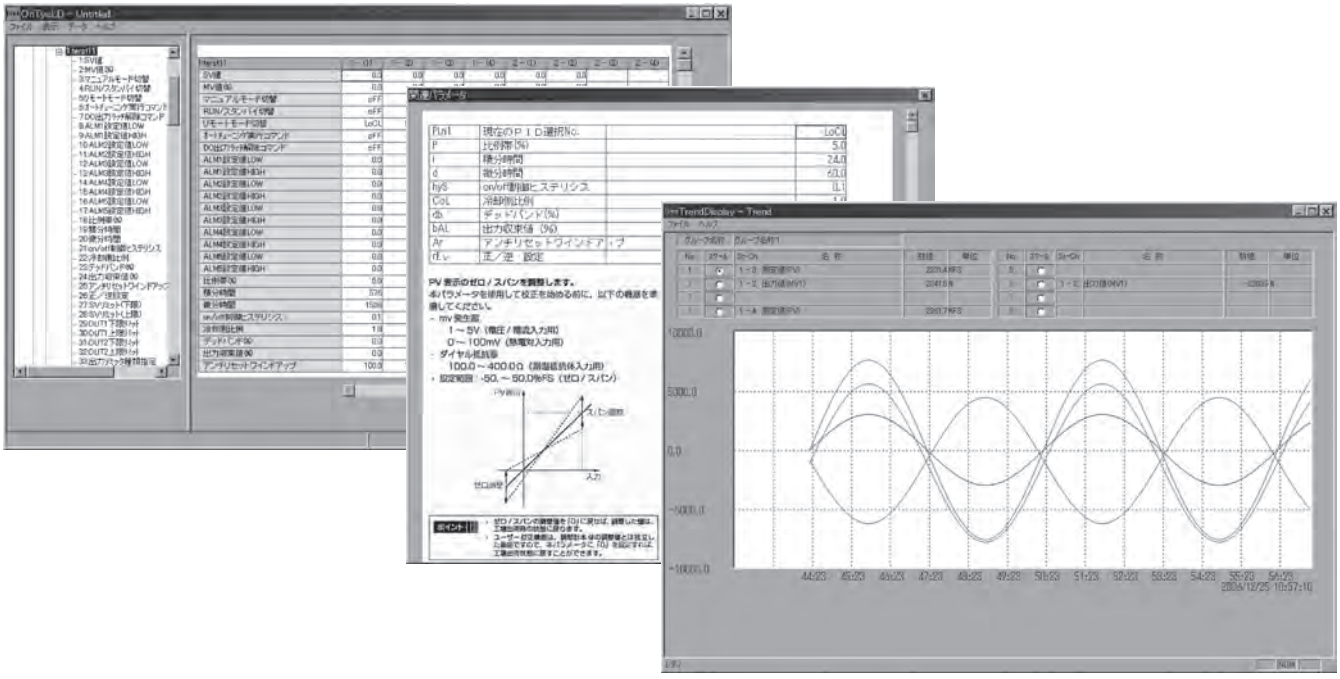
You can operate this software without having the instruction manual!
This software has PULL DOWN MENU, and detailed online help.
Editing display is tree style, and it is easy to search your parameter needs.

BILINGUAL LOADER

English version and Japanese version be selected initial configurations.

PARAMETER SETTINGS and NAMES OPTIMIZE TO MEET CUSTOMER'S REQUIREMENT

If you can use "favorite function" on software, it is easy to access time important parameters. It can change the name of each parameters at any time.



Basic function	Setting, displaying, editing the parameters Display the construction of all modules DATA trending (data trend display function, trend data display function in CSV format) Utility function (copy the same parameters, printing and saving data by CSV files) Communications (Upload, Download, Saving in files, Opening files)
Connection	Only original connection cable, but it is same as PXH or PXG cable. Original cable : MODEL PUMZ∗L01, Pin-jack 3-pole, D-sub 9pin

Handling model	CONTROL MODULE : MODEL PUMA/PUMB ANALOG I/O MODULE : MODEL PUMV/PUMN/PUMT EVENT I/O MODULE : MODEL PUME ENHANCED COMMUNICATION MODULE : MODEL PUMCM/PUMCP/PUMCE
Recommended environment of personal computer	OS:WINDOWS 2000, WINDOWS XP/7 (Global version and Japanese local version) CPU: 300MHz MEMORY: 128MB over FREE SPACE in Hard Disk: over 500MB CD-ROM drive : necessary MONITOR: over 1024 × 768

Citect SCADA SOFTWARE

Feature

1 Citect can support your system development by expanding function, reliability, great visual.
2 The perfect redundant functions, HMI, Server client, duplication of LAN, these functions are standard.
3 Hi-speed access to huge data-base with low load of CPU working.
4 The small system for 75 points below is matching, and the large system for 400,000 points over is possible.
5 It is not need to stop the operating system now for change expansion function.
6 License's up-grade is available

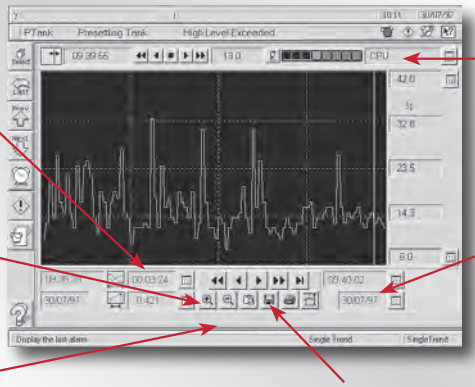
Trend display

It is possible for trend sampling method that cyclic type or situation of event causing type.
The sampling interval is setting from 10ms to 24 hours.

It is possible to change the area and graphic mode until execute the trending.

If you can push "zoom button", expand the your selecting area.

Clip-board copy function can be pasted the spread-sheet data on third-party software.



Trending display of Citect SCADA can add more trend-pen when the project is now executing.

If you can push "trend statistics button", display the minimum, maximum, average, and standard deviation.

The trending data is able to be printed that the color is direct impression display, or mono-tone display. It is possible to compose the trending figure on the Citect's report.

MONITOUCH V8 series

For optimal performance, connectivity and usability.
The MONITOUCH V8 series has expanded the potential of programmable operator interface panels.

Realize the Ideal

High Performance

The new MONITOUCH series has realized the best possible performance with a newly developed high-speed algorithm and a high level of visibility for efficient operation.

Connectivity

8-way communication with up to eight kinds of devices and two USB channels ensure high compatibility and expandability of your system.

Usability

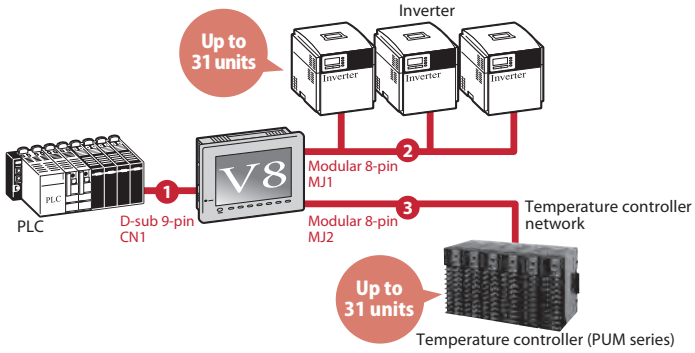
User-friendly component parts and functional switches enable simple and speedy display configuration.

Network Examples

Serial connection with PUM series (three ports)

• Making a network linked with various automation devices
• PLCs and peripherals of up to three kinds of units can be connected by serial connection.

Even though two or more types of temperature controllers and inverters are used, they can be connected with one V8.



Specifications of PUM series

■Control Module Type : PUMA/B

■Process value input

No. of input	2 or 4 points (1 point/channel)
Input signal	Select from group I or II on the model code. (setting can be done according to channel with in group) Group I : Thermocouple Resistance bulb (3-wire): Pt100, JPt100 Group II : DC voltage, current DC0 to 5V, DC1 to 5V, DC0 to 10V, DC2 to 10V DC0 to 20mA, DC4 to 20mA *The power current input is external in 250Ω resistance. It's input of DC0 to 5V or DC1 to 5V Range.
Measurement range and input type	See table 1
Measurement accuracy (Ta=23°C)	Thermocouple : ±0.3%FS±1digit±1 degree C or ±3 degrees C whichever is greater *Unless B thermocouple 0 to 500 degrees C : ±5%FS±1digit±1 degree C R thermocouple 0 to 500 degrees C : ±1%FS±1digit±1 degree C T thermocouple -200 to 0 degree C : ±0.5%FS±1digit±1 degree C Resistance bulb input : ±0.3%FS±1digit or ±1 degree C whichever is greater Voltage / Current input : ±0.3%FS±1digit
Resolution	See table 1
Temperature fluctuation	±0.3%FS/10 degrees C
Input sampling cycle	200ms
Input impedance	Thermocouple: 1M Ω or more Current input : 250 Ω Voltage input : approx. 1M Ω
Influence of signal source resistance	Thermocouple: ±0.3%FS±1digit / 100 Ω Voltage input : ±0.3%FS±1digit / 500 Ω
Allowable wiring resistance	Resistance bulb: 10 Ω or less (per wire)
Allowable input voltage	DC voltage input: within ±15V Current input: within ±25mA Thermocouple/resistance bulb: within ±5V
Noise rejection ratio	Normal mode: 30dB or more (50/60Hz) Common mode: 120dB or more (50/60Hz) between process value input and earth ground, power supply, output 220V AC, 50/60Hz
Input compensation	a) User adjustment: zero point, span point ±50%FS b) PV shift: ±10%FS c) First order lag filter : 0.0 to 120.0 sec.
Over range, under range	Out of range of -5 to 105%FS (Accuracy cannot be ensured for -5 to 0, 100 to 105%FS)
Insulation	Functional insulation between channels, and with any other input/output

■Heater break detector (CT) input

No. of input	4 or 8 points (2 points/control ch.)
Input type	Single-phase type CT /point 1 to 30A: CTL-6-S-H 20 to 50A: CTL-12-S36-8
Current detection accuracy	Input value ±10% or ±2A, whichever is greater
Time required for detection	ON detection: 800 ms or more OFF detection: 2 sec. or more
Connection method	Connector for heater break detector [on the front of module]
Insulation	No insulation between channels No insulation with communication port (RS-485, loader) Function insulation with any other input/output

■Control output

No. of output	2 points (1 point/ch.) or 4 points (2 points/ch.)
Control output behavior	Heat (reverse action) or cool (direct action), or heat/cool (control output 2 points/loop required)
Output type	Selected from ① to ③ (by 2 channels) ①Relay contact output - Proportional cycle : 1 to 150 sec. - Contact structure : 1a (SPST) contact - Contact capacity : 220V AC/30V DC, 3A (resistance load) 220V AC/30V DC, 1A (inductive load) - Min. switching current: 100mA (24V DC) - Mechanical life: 20,000,000 switching or more(100/min.) - Electric life: 100,000 switching or more (rated load) - Insulation: Basic insulation with any other input/output ②SSR/SSC drive output - Proportional cycle : 1 to 150 sec. - Minimum resolution : 5ms - ON voltage : 10V DC (8 to 12V DC) - OFF voltage : 0.5V DC or less - Max. current : 20mA DC (per point) - Load resistance : 500 Ω or more - Insulation : No insulation with any other output (excluding relay output) Functional insulation with others than those above ③Current output (4 to 20mA DC, 0 to 20mA DC) - Actual output range : 0mA to 20.6mA DC - Accuracy : ±0.3%FS (less than 1mA : ±5%FS) - Linearity : ±0.3%FS (less than 1mA : ±5%FS) - Resolution : 5,000 or more - Ripple current : P-P 0.3mA or less - Load resistance : 300 Ω or less - Insulation : No insulation with any other output (excluding relay output) Functional insulation with others than those above

■Analog re-transmission output

No. of output	2 points (OUT3, OUT4 applied)
Output type	Current output (4 to 20mA DC,0 to 20mA DC)
Option	Output scaling

■RS-485 interface

Communication standards	RS-485 compatible
No. of port	1 port
Communication, synchro method	Two-wire, half-duplex, asynchronous cycle
Communication speed	9.6k, 19.2k, 38.4k, 115.2kbps
Communication distance	1km (38.4kbps or less), 250m (115.2kbps)
Recommended cable	KPEV-SB 0.5sq-equivalent
No. of connectable units	33 units (master and slave)(32 units if any modules other than PUM series are included in slaves.)
Data format	Data bit; 8, parity; even / odd / none
Protocol	Modbus RTU compatible
Insulation	No insulation with loader communication port, CT input. Functional insulation with any other input / output

■Loader communication (RS-232C) interface

Communication standards	RS-232C compatible
No. of port	1 port
Communication, synchro method	Half-duplex, asynchronous cycle
Communication speed	19.2kbps (fixed)
Data format	Data bit 8, no parity
Protocol	Modbus RTU compatible
Connection method	2.5 diameter mini-plug/jack [on the front of the module] (Common cable with PXG, PXH)
Insulation	No insulation with RS-485, CT input. Functional insulation with any other input / output

■Control functions

Control methods	(1) PID control (including FUZZY PID control)-PID constant : Set by auto tuning (2) PID 2 (Heat /cool) control (including FUZZY PID control)-PID constant : Set by auto tuning
Control parameter	Proportional band (P) : 0.0 to 999.9%, P=0: 2 position control ON Integration time (I): 0 sec to 3200 sec. I=0 : Integration OFF Derivation time (D): 0.0 to 999.9 sec. D=0: Derivation OFF Control cycle: 200ms
Control mode	Mode type: Auto / Manual / Remote Mode switching: Auto ⇔ Manual : balance less / bump less transfer Auto/Manual ⇒ Remote : balance/bump less transfer Auto/Manual ⇐ Remote : balance/bump less transfer

■Alarm function

Alarm type	PV value (Lower/upper limit, absolute / deviation value, range) Loop burnout alarm, Error alarm, etc. (Non-excitation, delay, latch, timer function also available)
Alarm output	Data output via communication or output from event input / output module

■Heater break alarm

No. of alarm set-points	4 or 8 points (2 points/control channel)
Alarm type	Detect when output ON (break detection) Detect when output OFF (leakage current detection) (setting can be done separately by point)
Heater current alarm	Detectable current range: 1A to 50A Detected current resolution: 0.1A Setting resolution: 0.1A Operation dead band: 0.0 to 50.0A
Alarm output	Data output via communication or output from event input / output module

■Display, configuration

Display	Status display LED (2 colors x 6 points)
Display contents	RUN/FAULT, RS-485 TX/RX, OUT / ERR by loop (4 loops)
Setting device	Rotary SW x 1
Set contents	RS-485 Station No. (Station No.= setting value + 1)

■Structure

Case material	Polyphenylene oxide (flame retardant grade : UL94V-0 equivalent)
Case color	Case ; red ,Terminal, base part ; black
Protection	Body : IP20 grade protection (ventilation slits on the top and the bottom of the body) Terminal : IP00 grade protection, terminal cover is available as an option
Dimensions	30 (W) ×100 (H) ×85 (D) mm (excluding terminal cover and projected part)
Weight	Approx. 200 g
Installation method	DIN rail mounting or mounting with M3 screws inside a cabinet
Extend terminal	· Process value input / control output : Detachable terminal block (M3 screw x 20 terminals) · Power supply connection: Terminal block on the base part (M3 screw x 2 terminals) Power is supplied via side connectors in the case of lateral connecting. (Max. 33 units) · RS-485 communication connection : Terminal block on the base part (M3 screw x 3 terminals) RS-485 communication is connected via side connectors in the case of lateral connecting. · CT input : Special connectors (8pin×2 pcs.) [on the front of the module] · Loader communication port : 2.5 diameter mini-plug / jack [on the front of the module]

■General specification

Power supply	24V DC±10%
Power consumption	Max. 3.2W (135mA) [when 24V DC is applied]
Effect of power outage	Outage of 2ms or less ; no impact
Memory backup	Nonvolatile memory (EEPROM) No. of update ; 100,000
Insulation resistance	20MΩ or more (500V DC)
Insulation block diagram	Power Loader communication port RS-485 communication port CT Input (CT1A, B - CT4A,B) PV1 PV2 PV3 PV4 OUT1 (relay contact output) OUT2 (relay contact output) OUT3 (relay contact output) OUT4 (relay contact output) OUT1 (SSR drive, current) OUT2 (SSR drive, current) OUT3 (SSR drive, current) OUT4 (SSR drive, current) —Basic insulation (1500V AC)—Functional insulation (1000V AC)—Functional insulation (500V AC)

■Normal operating condition

Ambient temperature	-10 to 50 degrees C * "Ambient temperature" is the temperature underneath the controller inside the equipment or the cabinet where the controller is installed.
Ambient humidity	90% RH or less (non condensing)
Vibration	10 to 70Hz, 9.8m/s^2 (1G) or less
Warmup time	30 min. or more

■Transporting, storage conditions (packing conditions)

Storage temperature	-20 to 60 degrees C
Ambient humidity	90%RH or less (no condensing)
Vibration	10 to 70Hz, 9.8m/s^2 (1G) or less
Shock	294m/s^2 (30G) or less

[Table 1] Input type and standard input range

Input type		Input code	Measurement range [degree C]	Min. measurement [degree C]
Resistance bulb (IEC)	Pt100 Ω	2	0 to 150	0.1
		3	-150 to 300	0.1
		4	-150 to 850	1
Thermocouple	J	5	0 to 400	0.1
		6	0 to 800	0.1
	K	7	0 to 400	0.1
		8	0 to 800	0.1
		9	0 to 1200	1
	R	10	0 to 1600	1
	B	11	0 to 1800	1
	S	12	0 to 1600	1
	T	13	-199 to 400	0.1
	E	14	-199 to 800	0.1
	N	18	0 to 1300	1
	PL-Ⅱ	19	0 to 1300	1
DC voltage	DC0-5V	21	-1999 to 9999 (scaling range)	–
	DC1-5V	22		
	DC0-10V	23		
	DC2-10V	24		

■Event Input/Output Module Type : PUME

■Digital Input

No. of input	8 points (4points/common × 2blocks)
Input type	Voltage contact input, sink/source common (bidirectional)
Input rating	24V DS,input impedance approx. 4.7KΩ
Input judgment	ON judgment: 16 to 26.4V DC OFF judgment: 0 to 5V DC
Input read cycle	200ms (min.pulse width)
Insulation	Functional insulation with internal circuit
Option	NOT/AND/OR logic operation, Latch action

■Digital Output

No. of output	8 points (4points/common × 2blocks)
Output type	Select from a) and b) according to model type specification a) Relay contact output - Contact structure: SPST contact - Contact capacity: 220V AC/30V DA,1A - Insulation: Functional insulation with internal circuit b) Transistor open collector (sink) output - Rating: 24V DC, 100mA (Residual voltage when power is ON: 1.5V DC or less) - Insulation: Functional insulation with internal circuit
Option	Control output/Event output selection, NOT/AND/OR logic operation, Latch action

■RS-485 interface

Communication standards	RS-485 compatible
No. of port	1 port
Communication, synchro method	Two-wire, half-duplex, asynchronous cycle
Communication speed	9.6k, 19.2k, 38.4k, 115.2kbps
Communication distance	1km (38.4kbps or less), 250m (115.2kbps)
Recommended cable	KPEV-SB 0.5sq-equivalent
No. of connectable units	33 units (master and slave)(32 units if any modules other than PUM series are included in slaves.)
Data format	Data bit; 8, parity; even / odd / none
Protocol	Modbus RTU compatible
Insulation	No insulation with loader communication port. Functional insulation with any other input/output

■Loader communication (RS-232C) interface

Communication standards	RS-232C compatible
No. of port	1 port
Communication, synchro method	Half-duplex, asynchronous cycle
Communication speed	19.2kbps (fixed)
Data format	Data bit 8, no parity
Protocol	Modbus RTU compatible
Connection method	2.5 diameter mini-plug/jack [on the front of the module] (Common cable with PXG, PXH)
Insulation	No insulation with RS-485 Functional insulation with any other input/output

■Display, configuration

Display	Status display LED (2 colors x 2 points +16 points)
Display contents	RUN/FAULT, RS-485 TX/RX, input ×8 points output ×8 points
Setting device	Rotary SW x 1 [on the front of the module]
Set contents	RS-485 Station No. (Station No.= setting value + 17)

■Structure

Case material	Polyphenylene oxide (flame retardant grade : UL94V-0 equivalent)
Case color	Case ; red , Terminal, base part ; black
Protection	Body : IP20 grade protection (ventilation slits on the top and the bottom of the body) Terminal : IP00 grade protection, terminal cover is available as an option
Dimensions	30(W)×100(H)×85(D) mm(excluding terminal cover and projected part)
Weight	Approx. 200 g
Installation method	DIN rail mounting or mounting with M3 screws inside a cabinet
External terminal	· Digital input / digital output : Detachable terminal block (M3 screw x 20 terminals) · Power supply connection: Terminal block on the base part (M3 screw x 2 terminals) Power is supplied via side connectors in the case of lateral connecting. (Max. 33 units) · RS-485 communication connection : Terminal block on the base part (M3 screw x 3 terminals) RS-485 communication is connected via side connectors in the case of lateral connecting. · Loader communication port : 2.5 diameter mini-plug / jack [on the front of the module]

■General specification

Power supply	24V DC±10%
Power consumption	Max. 3.2W (135mA) [when 24V DC is applied]
Effect of power outage	Outage of 2ms or less ; no impact
Memory backup	Nonvolatile memory (EEPROM) No. of update ; 100,000
Insulation resistance	20MΩ or more (500V DC)
Insulation block diagram	Power — Di1 to 4 Loader communication port / RS-485 communication port — Di5 to 8 Do1 to 4 Do5 to 8 =Functional insulation (1000V AC)–Functional insulation (500V AC)

■Normal operating condition

Ambient temperature	-10 to 50 degrees C * "Ambient temperature" is the temperature underneath the controller inside the equipment or the cabinet where the controller is installed.
Ambient humidity	90%RH or less (no condensing)
Vibration	10 to 70Hz, 9.8m/s^2 (1G) or less
Warmup time	30 min. or more

■Transporting, storage conditions (packing conditions)

Storage temperature	-20 to 60 degrees C
Ambient humidity	90%RH or less (no condensing)
Vibration	10 to 70Hz, 9.8m/s^2 (1G) or less
Shock	294m/s^2 (30G) or less

■Analog Input/Output Module Type : PUMV

■Analog Input

No. of input	4 points
Input signal	Select from the group I or II depending on the model code. Group I: Thermocouple: K, J, T, E, R, B, S, N, PL-II Resistance bulb (3-wire): Pt100, JPt100 Group II : DC voltage, current DC0 to 5V, DC1 to 5V, DC0 to 10V, DC2 to 10V DC0 to 20mA, DC4 to 20mA *The power current input is external in 250Ω resistance. It's input of DC0 to 5V or DC1 to 5V Range.
Measurement range and input type	See table 1
Measurement accuracy (Ta=23°C)	Thermocouple input: : ±0.3%FS±1digit±1 degree C or ±3 degrees C whichever is greater *Unless B thermocouple 0 to 500 degrees C : ±5%FS±1digit±1 degree C R thermocouple 0 to 500 degrees C : ±1%FS±1digit±1 degree C T thermocouple -200 to 0 degree C : ±0.5%FS±1digit±1 degree C Resistance bulb input : ±0.3%FS±1digit or ±1 degree C whichever is greater Voltage input : ±0.3%FS±1digit
Resolution	See table 1
Temperature fluctuation	±0.3%FS/10 degrees C
Input sampling cycle	200ms
Input impedance	Thermocouple: 1M Ω or more Current input : 250 Ω Voltage input : approx. 1M Ω
Influence of signal source resistance	Thermocouple: ±0.3%FS±1digit / 100 Ω Voltage input : ±0.3%FS±1digit / 500 Ω
Allowable wiring resistance	Resistance bulb input: 10 Ω or less (per wire)
Allowable input voltage	DC voltage input: within ±15V Current input: within ±25mA Thermocouple/resistance bulb: within ±5V
Noise rejection ratio	Normal mode: 30dB or more (50/60Hz) Common mode: 120dB or more (50/60Hz) between earth, power supply, output 220V AC, 50/60Hz
Input compensation	a) User adjustment: zero point, span point ±50%FS b) PV shift: ±10%FS c) First order lag filter : 0.0 to 120.0 sec. (Filter off when setting is 0.0)
Over range, under range	Out of range of -5 to 105%FS (Accuracy cannot be ensured for -5 to 0, 100 to 105%FS)
Insulation	Functional insulation between channels, and with any other input/output

■Analog Output

No. of output	4 points
Output type	Current output DC 4 to 20mA, DC 0 to 20mA
Actual output range	DC 0mA to 20.6mA
Accuracy	±0.3%FS (less than 1mA : ±5%FS)
Linearity	±0.3%FS (less than 1mA : ±5%FS)
Resolution	5,000 or more
Ripple current	P-P 0.3mA or less
Loading resistance	300 Ω or less
Insulation	No insulation with any other output Function insulation with others (power supply, analog input, RS485 communication, and loader port) than those above

■RS-485 interface

Communication standards	RS-485 compatible
No. of port	1 port
Communication, synchro method	Two-wire, half-duplex, asynchronous cycle
Communication speed	9.6k, 19.2k, 38.4k, 115.2kbps
Communication distance	1km (38.4kbps or less), 250m (115.2kbps)
Recommended cable	KPEV-SB 0.5sq-equivalent
No. of connectable units	33 units (master and slave)(32 units if any modules other than PUM series are included in slaves.)
Data format	Data bit; 8, parity; even / odd / none
Protocol	Modbus RTU compatible
Insulation	No insulation with loader communication port, Functional insulation with any other input / output

■Loader communication (RS-232C) interface

Communication standards	RS-232C compatible
No. of port	1 port
Communication, synchro method	Half-duplex, asynchronous cycle
Communication speed	19.2kbps (fixed)
Data format	Data bit 8, no parity
Protocol	Modbus RTU compatible
Connection method	2.5 diameter mini-plug/jack [on the front of the module] (Common cable with PXG, PXH)
Insulation	No insulation with RS-485, Functional insulation with any other input / output

■Display, configuration

Display	Status display LED (2 colors x 6 points)
Display contents	RUN/FAULT, RS-485 TX/RX, OUT / ERR by loop (4 loops)
Setting device	Rotary SW x 1
Set contents	RS-485 Station No. (Station No.= setting value + 1)

■Structure

Case material	Polyphenylene oxide (flame retardant grade : UL94V-0 equivalent)
Case color	Case ; red , Terminal, base part ; black
Protection	Body : IP20 grade protection (ventilation slits on the top and the bottom of the body) Terminal : IP00 grade protection, terminal cover is available as an option
Dimensions	30 (W) × 100 (H) × 85 (D) mm (excluding terminal cover)
Weight	Approx. 200 g
Installation method	DIN rail mounting or mounting with M3 screws inside a cabinet
External terminal	· Process value input / control output : Detachable terminal block (M3 screw x 20 terminals) · Power supply connection: Terminal block on the base part (M3 screw x 2 terminals) Power is supplied via side connectors in the case of lateral connecting. (Max. 33 units) · RS-485 communication connection : Terminal block on the base part (M3 screw x 3 terminals) RS-485 communication is connected via side connectors in the case of lateral connecting. · Loader communication port : 2.5 diameter mini-plug / jack [on the front of the module]

■General specification

Power supply	24V DC±10%
Power consumption	Max. 3.2W (135mA) [when 24V DC is applied]
Effect of power outage	Outage of 2ms or less ; no impact
Memory backup	Nonvolatile memory (EEPROM) No. of update ; 100,000
Insulation resistance	20MΩ or more (500V DC)
Insulation block diagram	Power / Loader communication port RS-485 communication port / PV1 / PV2 / PV3 / PV4 / OUT1 (current) OUT2 (current) OUT3 (current) OUT4 (current) =Functional insulation (1000V AC)–Functional insulation (500V AC)

■Normal operating condition

Ambient temperature	-10 to 50 degrees C * "Ambient temperature" is the temperature underneath the controller inside the equipment or the cabinet where the controller is installed.
Ambient humidity	90%RH or less (no condensing)
Vibration	10 to 70Hz, 9.8m/s^2 (1G) or less
Shock	49m/s^2 (5G) or less
Warmup time	30 min. or more

■Transporting, storage conditions (packing conditions)

Storage temperature	-20 to 60 degrees C
Ambient humidity	90%RH or less (no condensing)
Vibration	10 to 70Hz, 9.8m/s^2 (1G) or less
Shock	294m/s^2 (30G) or less

■Analog Input Module Type : PUMN

■Analog Input

No. of input	4 points
Input signal	Select from group I or II on the model code. Group I: Thermocouple: K, J, T, E, R, B, S, N, PL-II Resistance bulb (3-wire) : Pt100, JPt100 Group II : DC voltage, current DC0 to 5V, DC1 to 5V, DC0 to 10V, DC2 to 10V DC0 to 20mA, DC4 to 20mA *The power current input is external in 250Ω resistance. It's input of DC0 to 5V or DC1 to 5V Range.
Measurement range and input type	See table 1
Measurement accuracy (Ta=23°C)	Thermocouple input: : ±0.3%FS±1digit±1 degree C or ±3 degrees C whichever is greater *Unless B thermocouple 0 to 500 degrees C : ±5%FS±1digit±1 degree C R thermocouple 0 to 500 degrees C : ±1%FS±1digit±1 degree C T thermocouple -200 to 0 degree C : ±0.5%FS±1digit±1 degree C Resistance bulb input : ±0.3%FS±1digit or ±1 degree C whichever is greater Voltage input : ±0.3%FS±1digit
Resolution	See table 1
Temperature fluctuation	±0.3%FS/10 degrees C
Input sampling cycle	200ms
Input impedance	Thermocouple: 1M Ω or more Current input : 250 Ω Voltage input : approx. 1M Ω
Influence of signal source resistance	Thermocouple: ±0.3%FS±1digit / 100 Ω Voltage input : ±0.3%FS±1digit / 500 Ω
Allowable wiring resistance	Resistance bulb input: 10 Ω or less (per wire)
Allowable input voltage	DC voltage input: within ±15V Current input: within ±25mA Thermocouple/resistance bulb: within ±5V
Noise rejection ratio	Normal mode: 30dB or more (50/60Hz) Common mode: 120dB or more (50/60Hz) between process value input and earth ground, power supply, output 220V AC, 50/60Hz
Input compensation	a) User adjustment: zero point, span point ±50%FS b) PV shift: ±10%FS c) First order lag filter : 0.0 to 120.0 sec. (filter off when setting is 0.0)
Over range, under range	Out of range of -5 to 105%FS (Accuracy cannot be ensured for -5 to 0, 100 to 105%FS)
Insulation	Functional insulation between channels, and with any other input/output

■RS-485 interface

Communication standards	RS-485 compatible
No. of port	1 port
Communication, synchro method	Two-wire, half-duplex, asynchronous cycle
Communication speed	9.6k, 19.2k, 38.4k, 115.2kbps
Communication distance	1km (38.4kbps or less), 250m (115.2kbps)
Recommended cable	KPEV-SB 0.5sq-equivalent
No. of connectable units	33 units (master and slave)(32 units if any modules other than PUM series are included in slaves.)
Data format	Data bit; 8, parity; even / odd / none
Protocol	Modbus RTU compatible
Insulation	No insulation with loader communication port Functional insulation with any other input/output

■Loader communication (RS-232C) interface

Communication standards	RS-232C compatible
No. of port	1 port
Communication, synchro method	Half-duplex, asynchronous cycle
Communication speed	19.2kbps (fixed)
Data format	Data bit 8, no parity
Protocol	Modbus RTU compatible
Connection method	2.5 diameter mini-plug/jack [on the front of the module] (Common cable with PXG, PXH)
Insulation	No insulation with RS-485 Functional insulation with any other input/output

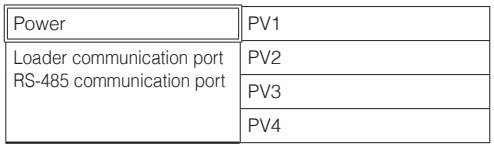
■Display, configuration

Display	Status display LED (2 colors x 2 points + 4points)
Display contents	RUN/FAULT, RS-485 TX/RX, Input ERR/Output by loop
Setting device	Rotary SW x 1
Set contents	RS-485 Station No. (Station No.= setting value + 1)

■Structure

Case material	Polyphenylene oxide (flame retardant grade : UL94V-0 equivalent)
Case color	Case ; red , Terminal, base part ; black
Protection	Body : IP20 grade protection (ventilation slits on the top and the bottom of the body) Terminal : IP00 grade protection, terminal cover is available as an option
Dimensions	30 (W) × 100 (H) × 85 (D) mm (excluding terminal cover)
Weight	Approx. 200 g
Installation method	DIN rail mounting or mounting with M3 screws inside a cabinet
External terminal	・Process value input / control output : Detachable terminal block (M3 screw x 20 terminals) ・Power supply connection: Terminal block on the base part (M3 screw x 2 terminals) Power is supplied via side connectors in the case of lateral connecting. (Max. 33 units) ・RS-485 communication connection : Terminal block on the base part (M3 screw x 3 terminals) RS-485 communication is connected via side connectors in the case of lateral connecting. ・Loader communication port : 2.5 diameter mini-plug / jack [on the front of the module]"

■General specification

Power supply	24V DC±10%
Power consumption	Max. 3.2W (135mA) [when 24V DC is applied]
Effect of power outage	Outage of 2ms or less ; no impact
Memory backup	Nonvolatile memory (EEPROM) No. of update ; 100,000
Insulation resistance	20MΩ or more (500V DC)
Insulation block diagram	 =Functional insulation (1000V AC)–Functional insulation (500V AC)

■Normal operating condition

Ambient temperature	-10 to 50 degrees C * "Ambient temperature" is the temperature underneath the controller inside the equipment or the cabinet where the controller is installed.
Ambient humidity	90%RH or less (no condensing)
Vibration	10 to 70Hz, 9.8m/s^2 (1G) or less
Warmup time	30 min. or more

■Transporting, storage conditions (packing conditions)

Storage temperature	-20 to 60 degrees C
Ambient humidity	90%RH or less (no condensing)
Vibration	10 to 70Hz, 9.8m/s^2 (1G) or less
Shock	294m/s^2 (30G) or less

■Analog Output Module Type : PUMT

■Analog Output

No. of output	4 points
Output type	Current output DC 4 to 20mA, DC 0 to 20mA
Actual output range	DC 0mA to 20.6mA
Accuracy	±0.3%FS (less than 1mA : ±5%FS)
Linearity	±0.3%FS (less than 1mA : ±5%FS)
Resolution	5,000 or more
Ripple current	P-P 0.3mA or less
Loading resistance	300 Ω or less
Insulation	No insulation with any other output Functional insulation with others (power source, analog input, RS485 communication and loader port) than those above

■RS-485 interface

Communication standards	RS-485 compatible
No. of port	1 port
Communication, synchro method	Two-wire, half-duplex, asynchronous cycle
Communication speed	9.6k, 19.2k, 38.4k, 115.2kbps
Communication distance	1km (38.4kbps or less), 250m (115.2kbps)
Recommended cable	KPEV-SB 0.5sq-equivalent
No. of connectable units	33 units (master and slave)(32 units if any modules other than PUM series are included in slaves.)
Data format	Data bit; 8, parity; even / odd / none
Protocol	Modbus RTU compatible
Insulation	No insulation with loader communication port Functional insulation with any other input/output

■Loader communication (RS-232C) interface

Communication standards	RS-232C compatible
No. of port	1 port
Communication, synchro method	Half-duplex, asynchronous cycle
Communication speed	19.2kbps (fixed)
Data format	Data bit 8, no parity
Protocol	Modbus RTU compatible
Connection method	2.5 diameter mini-plug/jack [on the front of the module] (Common cable with PXG, PXH)
Insulation	No insulation with RS485 Functional insulation with any other input/output

■Display, configuration

Display	Status display LED (2 colors x 2 points + 4points)
Display contents	RUN/FAULT, RS-485 TX/RX, Input ERR/Output by loop
Setting device	Rotary SW x 1
Set contents	RS-485 Station No. (Station No.= setting value + 1)

■Structure

Case material	Polyphenylene oxide (flame retardant grade : UL94V-0 equivalent)
Case color	Case ; red , Terminal, base part ; black
Protection	Body : IP20 grade protection (ventilation slits on the top and the bottom of the body) Terminal : IP00 grade protection, terminal cover is available as an option
Dimensions	30 (W) × 100 (H) × 85 (D) mm (excluding terminal cover)
Weight	Approx. 200 g
Installation method	DIN rail mounting or mounting with M3 screws inside a cabinet
External terminal	· Process value input / control output : Detachable terminal block (M3 screw x 20 terminals) · Power supply connection: Terminal block on the base part (M3 screw x 2 terminals) Power is supplied via side connectors in the case of lateral connecting. (Max. 33 units) · RS-485 communication connection : Terminal block on the base part (M3 screw x 3 terminals) RS-485 communication is connected via side connectors in the case of lateral connecting. · Loader communication port : 2.5 diameter mini-plug / jack [on the front of the module]"

■General specification

Power supply	24V DC±10%
Power consumption	Max. 3.2W (135mA) [when 24V DC is applied]
Effect of power outage	Outage of 2ms or less ; no impact
Memory backup	Nonvolatile memory (EEPROM) No. of update ; 100,000
Insulation resistance	20MΩ or more (500V DC)
Insulation block diagram	Power Loader communication port RS-485 communication port OUT1 (current) OUT2 (current) OUT3 (current) OUT4 (current) =Functional insulation (1000V AC)–Functional insulation (500V AC)

■Normal operating condition

Ambient temperature	-10 to 50 degrees C * "Ambient temperature" is the temperature underneath the controller inside the equipment or the cabinet where the controller is installed.
Ambient humidity	90%RH or less (no condensing)
Vibration	10 to 70Hz, 9.8m/s^2 (1G) or less
Warmup time	30 min. or more

■Transporting, storage conditions (packing conditions)

Storage temperature	-20 to 60 degrees C
Ambient humidity	90%RH or less (no condensing)
Vibration	10 to 70Hz, 9.8m/s^2 (1G) or less
Shock	294m/s^2 (30G) or less

■CC-Link Communication Module Type:PUMCL

■CC-Link Communication

Version	CC-Link Ver. 2.00/1.10
Kind of device	Remote device
Communication speed or Communication distance	<table><tr><td>Communication speed</td><td>156kbps</td><td>625kbps</td><td>2.5Mbps</td><td>5Mbps</td><td>10Mbps</td></tr><tr><td>Total extension distance</td><td>1200m or less</td><td>900m or less</td><td>400m or less</td><td>200m or less</td><td>100m or less</td></tr></table> Refer to the CC-Link Cable Wiring manual (issued by CC-Link partner association) about details
Shared units/ Station numbers for communication data length	Shared 4 stations / providing number 1 to 61 <table><tr><td>Shared stations/ extended cyclic</td><td>Remote I/O (RX/RY)</td><td>Remote Register (RWr/RWw)</td><td>Control Module PUMA</td></tr><tr><td>4 stations × 1</td><td>Each 128bit</td><td>16 word</td><td>2 or 4 units</td></tr><tr><td>4 stations × 2</td><td>Each 256bit</td><td>32 word</td><td>4 or 8 units</td></tr><tr><td>4 stations × 4</td><td>Each 512bit</td><td>64 word</td><td>8 or 16 units</td></tr></table>
Connection cable	CC-Link original cable for version 1.10
Connection method	Detachable terminal block (M3 screw)
Terminating resister	External type (110 Ω, 1/2W)

■Loader communication (RS-232C) interface

Communication standards	RS-232C compatible
No. of port	1 port
Communication, synchro method	Half-duplex, asynchronous cycle
Communication speed	19.2kbps (fixed)
Data format	Data bit 8, no parity
Protocol	Modbus RTU compatible
Connection method	2.5 diameter mini-plug/jack [on the front of the module] (Common cable with PXG, PXH)
Insulation	Functional insulation with any other input/output

■Display, configuration

Display	Status display LED (2 colors x 2 points + 4points)
Display contents	RUN/FAULT Control Module Connection status (TX/RX) CC-Link status (L.RUN, L.ERR, SD, RD)
Setting device or Set contents	<table><tr><td colspan="2">Setting device</td><td>Set contents</td></tr><tr><td>Front</td><td>Rotary SW×2</td><td>CC-Link Setting Station numbers</td></tr><tr><td rowspan="2">Equipment interior</td><td>Rotary SW×1</td><td>CC-Link Setting Communication speed</td></tr><tr><td>Dip SW (6bit)×1</td><td>CC-Link Setting mode</td></tr></table>

■Structure

Case material	Polyphenylene oxide (flame retardant grade : UL94V-0 equivalent)
Case color	Case ; red ,Terminal, base part ; black
Protection	Body : IP20 grade protection (ventilation slits on the top and the bottom of the body) Terminal : IP00 grade protection, terminal cover is available as an option
Dimensions	30 (W) × 100 (H) × 85 (D) mm (excluding terminal cover)
Weight	Approx. 200 g
Installation method	DIN rail mounting or mounting with M3 screws inside a cabinet
External terminal	· CC-Link communication terminal: Detachable terminal block (M3 screw x 20 terminals) · Power supply connection: Terminal block on the base part (M3 screw x 2 terminals) Power is supplied via side connectors in the case of lateral connecting. (Max. 33 units) · Loader communication port : 2.5 diameter mini-plug / jack [on the front of the module]"

■General specification

Power supply	24V DC±10%
Power consumption	Max. 3.2 W(135 mA) [when 24V DC is applied]
Effect of power outage	Outage of 2ms or less ; no impact
Memory backup	Nonvolatile memory (EEPROM) No. of update ; 100,000
Insulation resistance	20MΩ or more (500V DC)
Insulation block diagram	<table><tr><td>Power</td><td>SLD/FG terminal (CC-Link connecting terminal)</td></tr><tr><td>Loader communication port</td><td>CC-Link communication</td></tr></table> =Basic insulation (1000V AC)–Functional insulation (500V AC)–Functional insulation (50V AC)

■Normal operating condition

Ambient temperature	-10 to 50 degrees C * "Ambient temperature" is the temperature underneath the controller inside the equipment or the cabinet where the controller is installed.
Ambient humidity	90%RH or less (no condensing)
Vibration	10 to 70Hz, 9.8m/s^2 (1G) or less
Warmup time	30 min. or more

■Transporting, storage conditions (packing conditions)

Storage temperature	-20 to 60 degrees C
Ambient humidity	90%RH or less (no condensing)
Vibration	10 to 70Hz, 9.8m/s^2 (1G) or less
Shock	294m/s^2 (30G) or less

■Mitsubishi PLC program less communication Module Type:PUMCM

■RS-485 / RS422 communication

Communication standards	RS-485/RS422 compatible
No. of port	1port
Communication, synchro method	RS-485 interface; 2-wire, half-duplex, asynchronous cycle RS-422 interface; 4-wire, half duplex, asynchronous cycle
Communication speed	9.6k, 19.2k, 38.4k, 57.6k, 115.2k, 230.4kbps
Communication distance	MELSEC-Q series 1000m or less MELSEC-A series 500m or less MELSEC-FX series 500m or less
Recommended cable	KFPEV-SB2P 0.5sq /FUJI ELECTRIC CABLE CO., LTD
Data format	Start bit 1, Data bit; 8 parity; even/odd/none Stop bit 1
Protocol	MC protocol (type2, 4, 5)
Insulation	No insulation with any communication interface other than loader interface, Functional insulation with loader communication interface and other all signals
Function	MELSEC-Q/A/AnS/FX series of PLC and program less communication
1:N Connection	Usable PLC is MELSEC-Q/A/AnS series. Configuration by using FX series is not possible.

■RS232-C communication

Communication standards	RS-232C compatible
No. of port	1port
Communication, synchro method	Half-duplex, asynchronous cycle
Communication speed	9.6k,19.2k,38.4k,57.6k,115.2k,230.4kbps
Data format	Start bit 1, Data bit; 8 parity; even/odd/none Stop bit 1
Protocol	MC protocol(type2, 4, 5)
Insulation	No insulation with any communication interface other than loader communication interface, Functional insulation with loader communication interface and other all signals
Function	MELSEC-Q/A/AnS/FX series of PLC and program less communication
1:N Connection	Unusable

■Loader communication (RS-232C) interface

Communication standards	RS-232C compatible
No. of port	1 port
Communication, synchro method	Half-duplex, asynchronous cycle
Communication speed	19.2kbps (fixed)
Data format	Data bit 8, no parity
Protocol	Modbus RTU compatible
Connection method	2.5 diameter mini-plug/jack [on the front of the module] (Common cable with PXG, PXH)
Insulation	Functional insulation with any other signals

■Display, configuration

Display	Status display LED (2 colors x 2 points + 4points)
Display contents	RUN/FAULT,internal communication status Communication TX/RX (Port1), Communication TX/RX (Port2)
Setting device and setting contents	Setting device: Front face — Rotary SW x 1 — Programless communication station setting Setting device: Within the device — DIP SW (6bit) x 1 — RS-232C/RS-422/RS485 Opetarion mode

■Setting

Communicable combination of MC protocol and MC protocol frame type

Communication object	I/F	QnA compatible 4C frame	A compatible 1C frame	
		Type 5	Type 2	Type4
Q series	RS-232C	○	○	○
	RS-422	◎	◎	×
	RS-485	×	◎	○
A series	RS-232C	×	○	○
	RS-422	×	◎	×
	RS-485	×	◎	○
FX series	RS-232C	×	×	○
	RS-485	×	×	○

◎ : 1:1 connection + 1:N connection is available
○ : 1:1 connection is available
× : Any connection are not available

When using 1:N connection, the settings of every connected programless communication modules should be the same.

■Structure

Case material	Polyphenylene oxide (flame retardant grade : UL94V-0 equivalent)
Case color	Case ; red ,Terminal, base part ; black
Protection	Body : IP20 grade protection (ventilation slits on the top and the bottom of the body) Terminal : IP00 grade protection, terminal cover is available as an option
Dimensions	30 (W) × 100 (H) × 85 (D) mm (excluding terminal cover)
Weight	Approx. 200 g
Installation method	DIN rail mounting or mounting with M3 screws inside a cabinet
External terminal	· Programless communication interface: Detachable terminal block (M3 screw x 20 terminals) · Power supply connection: Terminal block on the base part (M3 screw x 2 terminals) Power is supplied via side connectors in the case of lateral connecting. (Max. 33 units) · Loader communication port : 2.5 diameter mini-plug / jack [on the front of the module]"

■General specification

Power supply	24V DC±10%
Power consumption	Max. 3.2W (135mA) [when 24V DC is applied]
Effect of power outage	Outage of 2ms or less ; no impact
Memory backup	Nonvolatile memory (EEPROM) No. of update ; 100,000
Insulation resistance	20MΩ or more (500V DC)
Insulation block diagram	Power — RS-232C Loader communication port — RS-422 / RS-485 =Functional insulation (1000V AC) - Functional insulation (500V AC)

■Normal operating condition

Ambient temperature	-10 to 50 degrees C * "Ambient temperature" is the temperature underneath the controller inside the equipment or the cabinet where the controller is installed.
Ambient humidity	90%RH or less (no condensing)
Vibration	10 to 70Hz, 9.8m/s^2 (1G) or less
Warmup time	30 min. or more

■Transporting, storage conditions (packing conditions)

Storage temperature	-20 to 60 degrees C
Ambient humidity	90%RH or less (no condensing)
Vibration	10 to 70Hz, 9.8m/s^2 (1G) or less
Shock	294m/s^2 (30G) or less

■PROFIBUS communication Module Type:PUMCP

■PROFIBUS communication

Compliant version	PROFIBUS DP-V0 (Cyclic communication)
Station type	Slave device
Communication speed and distance	Speed: 9.6, 19.2, 93.75 kbps / 187.5 kbps / 500 kbps / 1.5M bps / 3M, 6M, 12M bps Dis-tance: 1200m or less / 1000m or less / 400m or less / 200m or less / 100m or less
Station number	Settable station number by rotary SW: 1 to 99 Settable station number by parameters: 1 to 125(If rotary SW is set to "0")
Communication data length (Cyclic communication)	The number of words for input and output can respectively be selected for the table below.

No	communication setting for "input area"	Communication setting for "output area"
1	8 words	8 words
2	16 words	16 words
3	32 words	32 words
4	64 words	64 words
5	108 words	108 words

Connecting cable	Type A compatible cable for PROFIBUS
Connecting method	M3 screw terminal block
Termination resistance	External (220Ω, 1/2W) or depends on the internal SW setting.

■Loader communication (RS-232C) interface

Communication standards	RS-232C compatible
No. of port	1 port
Communication, synchro method	Half-duplex, asynchronous cycle
Communication speed	19.2kbps (fixed)
Data format	Data bit 8, no parity
Protocol	Modbus RTU compatible
Connection method	2.5 diameter mini-plug/jack [on the front of the module] (Common cable with PXG, PXH)
Insulation	Functional insulation with any other input/output

■Display, configuration

Display	Status display LED (2 colors x 2 points + 1point)
Display contents	RUN/FAULT,control module connection status (TX/RX) PROFIBUS status (ONL)
Setting device and setting contents	Front: Rotary SW x 2 — PROFIBUS Station No. setting Inside: Dip SW (3bits) x 1 — Word setting of date exchange

■Structure

Case material	Polyphenylene oxide (flame retardant grade : UL94V-0 equivalent)
Case color	Case ; red ,Terminal, base part ; black
Protection	Body : IP20 grade protection (ventilation slits on the top and the bottom of the body) Terminal : IP00 grade protection, terminal cover is available as an option
Dimensions	30 (W) × 100 (H) × 85 (D) mm (excluding terminal cover and projected part)
Weight	Approx. 200 g
Installation method	DIN rail mounting or mounting with M3 screws inside a cabinet
External terminal	• PROFIBUS communication: Detachable terminal block(M3 screw × 20 terminals) • Power supply connection: Terminal block on the base part (M3 screw x 2 terminals) Power is supplied via side connectors in the case of lateral connecting. (Max. 33 units) • Loader communication port : 2.5 diameter mini-plug / jack [on the front of the module]

■General specification

Power supply	24V DC±10%
Power consumption	Max. 3.2W (135mA) [when 24V DC is applied]
Impact of power outage	Outage of 2ms or less ; no impact
Memory backup	Nonvolatile memory (EEPROM) No. of update ; 100,000
Insulation resistance	20MΩ or more (500V DC)
Insulation block diagram	Power | PROFIBUS communication Loader communication port =Functional insulation (1000V AC) - Functional insulation (500V AC)

■Normal operating condition

Ambient temperature	-10 to 50 degrees C * "Ambient temperature" is the temperature underneath the controller inside the equipment or the cabinet where the controller is installed.
Ambient humidity	90%RH or less (no condensing)
Vibration	10 to 70Hz, 9.8m/s^2 (1G) or less
Warmup time	30 min. or more

■Transporting, storage conditions (packing conditions)

Storage temperature	-20 to 60 degrees C
Ambient humidity	90%RH or less (no condensing)
Vibration	10 to 70Hz, 9.8m/s^2 (1G) or less
Shock	294m/s^2 (30G) or less

■Ethernet communication Modul Type:PUMCE

■Ethernet communication

Communication speed	10/100Mbps
Interface	10BASE-T/100BASE-TX, Auto-negotiation function
The number of simultaneously communicable nodes	1 station
Network topology	star
Communication distance	100m (between hub and node)
Communication protocol	conforms to IEEE802.3/IEEE802.3u
Recommended hub	Industrial hub
Hub cascade connection	depends on the specification of Industrial hub
Connecting method	RJ-45
IP address	IPv4 supported (IPv6 not supported)
DHCP	unsupported
Multiple operation	Full and Half duplex
Relay router	Max. 8
Port number	502

■Communication function

Bridge communication	PUMs can connect to Ethernet network with PUMCE which functions as a converter between Modbus/TCP and Modbus/RTU. A host device can monitor or configure most of the parameters of connected PUMA/B, PUMV/N/T, and PUME by designating the station numbers and the register numbers of these devices.
Mapping communication	PUMs can connect to Ethernet network with PUMCE which functions as a repeater between Modbus/TCP and Modbus/RTU. PUMCE periodically updates designated parameters (station numbers and register numbers) of PUMA/B, PUMV/N/T, and PUME. A host device can monitor or configure parameters of PUMA/B, PUMV/N/T, and PUME by accessing the register of PUMCE. Monitoring area and setting area can be set within 712 words(*1) each.
Micrex-SX programless communication	PUMCE can communicate with Micrex-SX without program, by controlling Micrex-SX loader commands. In programless communication, by changing registers in Micrex-SX you can monitor or configure parameters (station numbers and register numbers) of PUMA/B, PUMV/N/T, and PUME that have been set in PUMCE. Since this function requires no communication program for Micrex-SX, it can save memory and reduce workload. Monitoring area and setting area can be set within 712 words(*1) each. Connectable devices CPU unit SPH2000 series NP1PM-48R/NP1PM-48E/NP1PM-256E SPH3000 series NP1PU-048E/NP1PU-256E Number of connectable devices: Max. 10 Communication module NP1L-ET1 Number of connectable devices: Max. 8 *1 PUMA/B, PUMV/N/T: 32 words per unit PUME: 8 words per unit

■Loader communication (RS-232C) interface

Communication standards	RS-232C compatible
No. of port	1 port
Communication, synchro method	Half-duplex, asynchronous cycle
Communication speed	19.2kbps (fixed)
Data format	Data bit 8, no parity
Protocol	Modbus RTU compatible
Connection method	2.5 diameter mini-plug/jack [on the front of the module] (Common cable with PXG, PXH)
Insulation	Functional insulation with any other input/output

■Display, configuration

Display	Status display LED (2 colors × 2 points + 1 point)		
Display contents	RUN/FAULT (PWR), connection status between modules (BUS), Ethernet status (LINK), Ethernet communication data transmission/reception (TX/RX)		
Setting device and set contents	Setting device		Set contents
	Inside	Dip SW (6bits) × 1	Setting of communication

■Structure

Case material	Polyphenylene oxide (flame retardant grade : UL94V-0 equivalent)
Case color	Body ; black Terminal, base part ; black
Protection	- Body: IP20 grade protection (ventilation slits on the top and the bottom of the body) - Terminal: IP00 grade protection
Dimensions	30 (W) × 100 (H) × 85 (D) mm (excluding terminal cover and projected part)
Weight	Approx. 110 g
Installation method	DIN rail mounting or mounting with M3 screws inside a cabinet
Extrenal terminal	- Ethernet connection: RJ-45 connector on front panel - Power supply connection: Terminal block on the base part (M3 screw × 2 terminals) Power is supplied via side connectors in case of lateral connecting. (Max. 33 units) - Loader communication port: 2.5 diameter mini-plug/jack [on the front of the module]

■General specification

Power supply	24V DC ±10%
Power consumption	Max. 3.2W (135mA) [when 24V DC is applied]
Insulation resistance	20MΩ or more (500V DC)
Withstand voltage	Power supply ↔ loader communication 1000V AC 1 min. Power supply ↔ Ethernet communication 500V AC 1 min.

■Normal operating condition

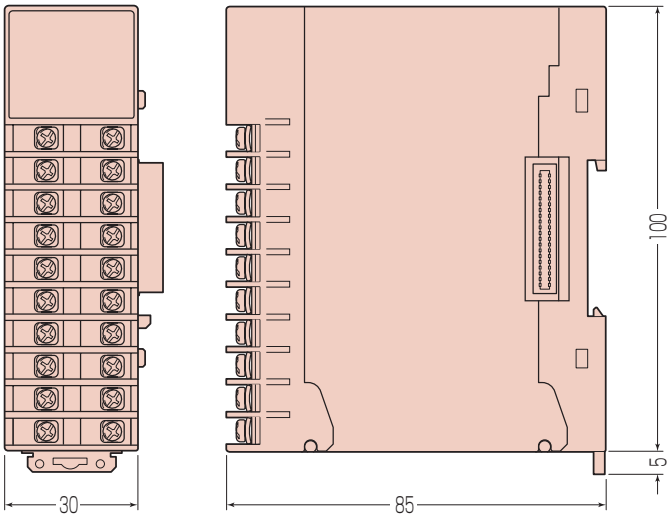
Ambient temperature	-10 to 50 degrees C * "Ambient temperature" is the temperature underneath the controller inside the equipment or the cabinet where the controller is installed.
Ambient humidity	90%RH or less (no condensing)
Vibration	10 to 70Hz, 9.8m/s^2 (1G) or less

■Transporting, storage conditions (packing conditions)

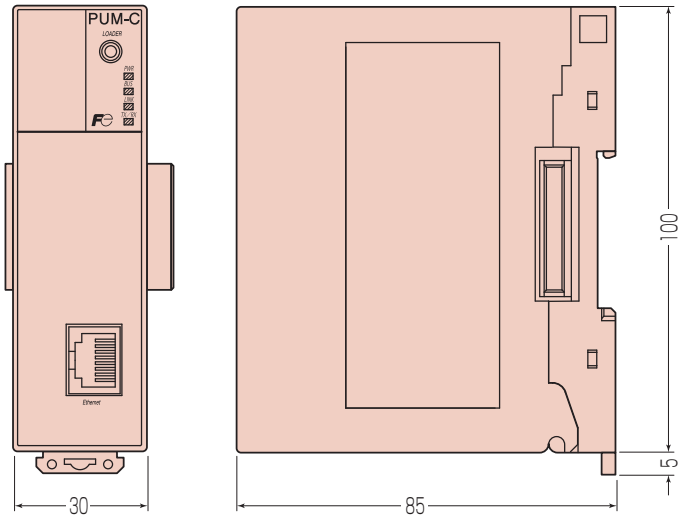
Storage temperature	-20 to 60 degrees C
Ambient humidity	90%RH or less (no condensing)
Vibration	10 to 70Hz, 9.8m/s^2 (1G) or less
Shock	294m/s^2 (30G) or less

OUTLINE DIAGRAM (Unit:mm)

CODE: PUMA/B/E/V/N/T/C



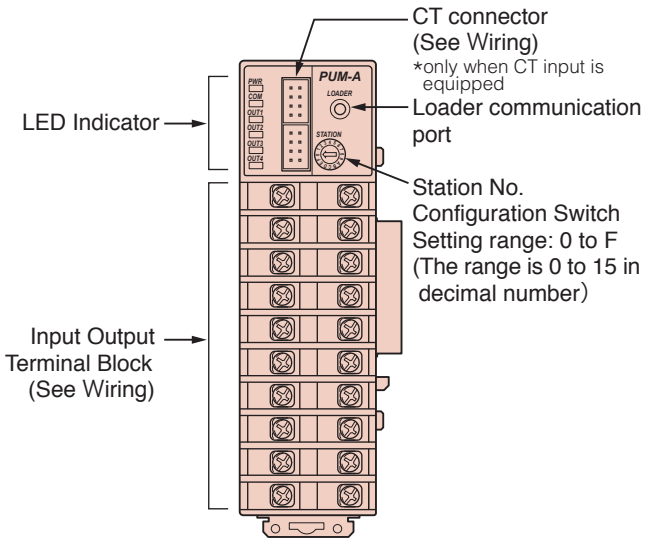
CODE: PUMCE



PART NAMES AND FUNCTIONS

Main unit

CODE: PUMA/B

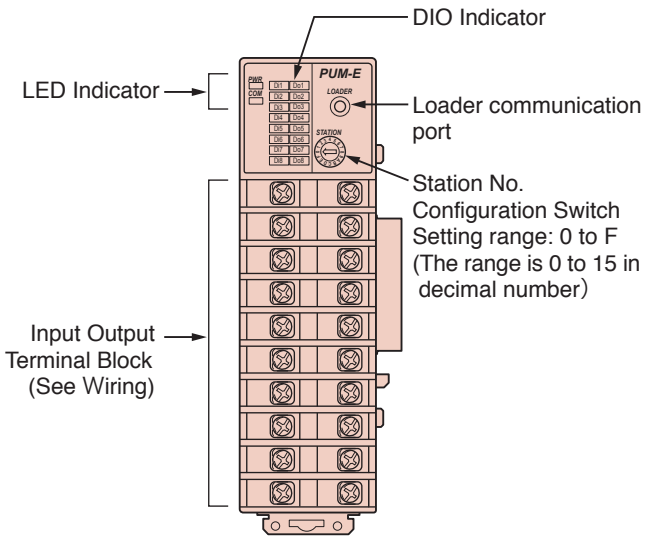


LEDindicator Six LED lamps indicate the following operational conditions

LED	LED Status	Color	Operational condition
PWR	Illuminated	green	Normal operation (Slave station of internal communication)
	Blinking	green	Normal operation (Master station of internal communication)
	Illuminated	red	System fault (A/D converter error, internal communication error)
	Blinking	red	Input error
COM	Illuminated	green	RS485 receiving
	Illuminated	orange	RS485 transmitting
OUT1-4	Illuminated	green	Corresponding channel outputting
	Illuminated	red	Corresponding channel input error

Actions to be displayed for COM and OUT1-4 can be allocated with using parameter

CODE: PUME

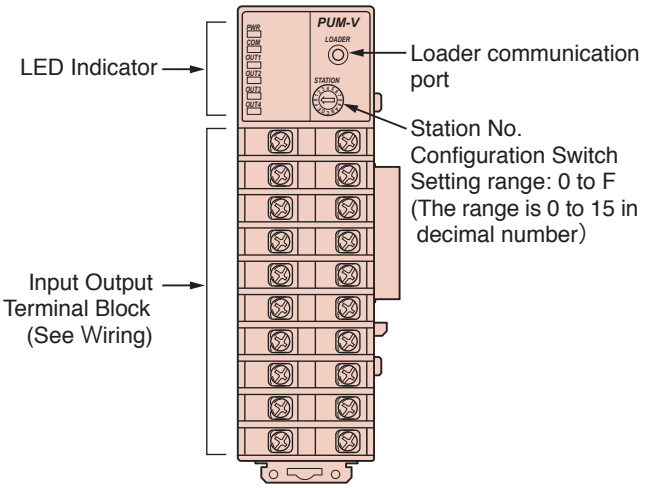


LEDindicator Eighteen LED lamps indicate the following operational conditions

LED	GREEN	RED	ORANGE
PWR	RUN	Error	—
COM	RS485 receiving	Error	RS485 transmitting
Di1-8	Digital inputting		
Do1-8	Digital outputting		

Actions to be displayed for COM can be allocated with using parameter

CODE: PUMV/N/T

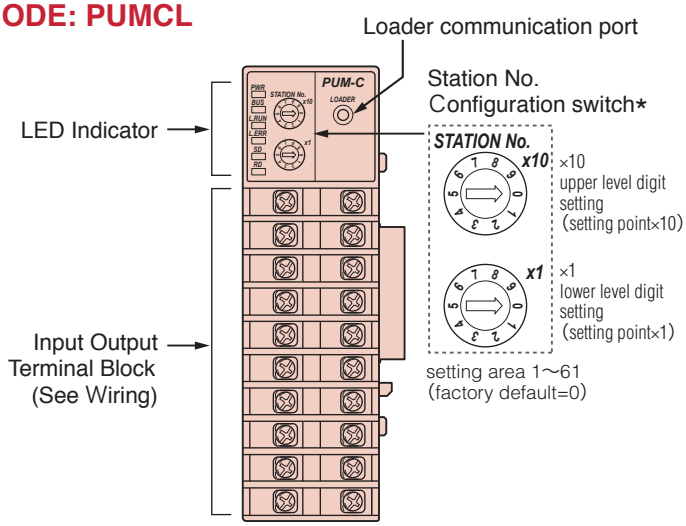


LEDindicator Six LED lamps indicate the following operational conditions

LED	LED Status	Color	Operational condition
PWR	Illuminated	green	Normal operation (Slave station of internal communication)
	Blinking	green	Normal operation (Master station of internal communication)
	Illuminated	red	System fault (A/D converter error, internal communication error)
	Blinking	red	Input error
COM	Illuminated	green	RS485 receiving
	Illuminated	orange	RS485 transmitting
OUT1-4	Illuminated	green	Corresponding channel outputting *1
	Illuminated	red	Corresponding channel input error *2

Actions to be displayed for COM and OUT1-4 can be allocated with using parameter
*1 Illuminated green is not available for model PUMN
*2 Illuminated red is not available for model PUMT

CODE: PUMCL

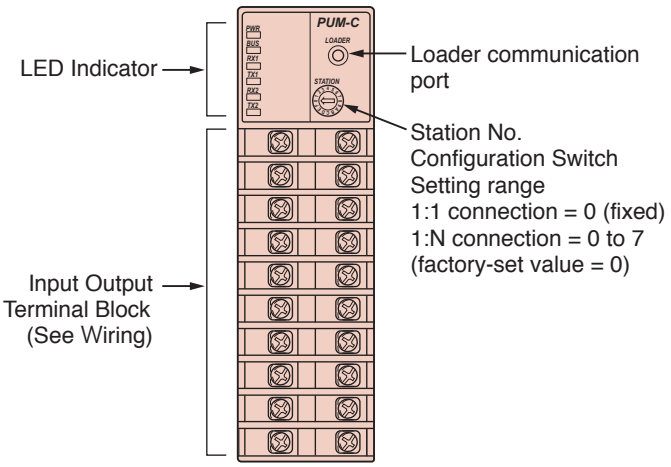


*Appearing cannot do the communication of CC-Link as factory default (0)
Set an station No. by all means

LEDindicator Six LED lamps indicate the following operational conditions

LED	LED Status	Color	Operational condition
PWR	Illuminated	green	RUN
	Illuminated	red	Error
BUS	Illuminated	green	Internal bus receiving
	Illuminated	orange	Internal bus transmitting
LRUN	Illuminated	green	CC-Link normal operation
	Slow Blinking	green	CC-Link error
	Fast Blinking	green	CC-Link communication initialization
LERR	Illuminated	red	CC-Link setting error
	Slow Blinking	red	CC-Link operation error
	Fast Blinking	red	CC-Link change setting
SD	Illuminated	green	CC-Link transmitting
RD	Illuminated	green	CC-Link receiving

CODE: PUMCM

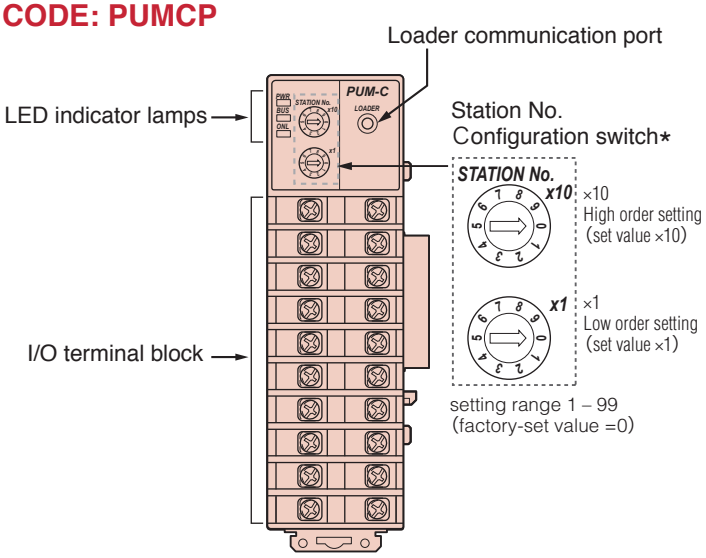


LEDindicator Six LED lamps indicate the following operational conditions

LED	LED Status	Color	Operational condition
PWR	Illuminated	green	RUN
	Slow Blinking	green	No communications with any modules (inter-module communication FAULT)
	Fast Blinking	green	Executing initial polling Waiting communication during 1:N connection
	Illuminated	red	No communication with PLC (inter-PLC communication FAULT)
	Blinking	red	System FAULT *1
BUS	Illuminated	green	Inter-module communication being received
	Illuminated	orange	Inter-module communication being sent
RX1	Illuminated	green	RS-232C/RS-485 being received
TX1	Illuminated	orange	RS-232C/RS-422/RS-485 being sent
RX2	Illuminated	green	RS-422 being received
TX2	–	–	(Unused)

*Note 1: Sources of system faults: EEPROM FAULT, Station No. configuration SW FAULT, DIP SW FAULT

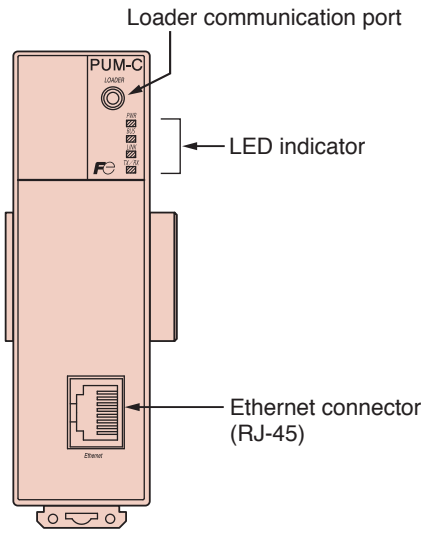
CODE: PUMCP



LEDindicator Three LED lamps indicate the following operational conditions

LED	LED Status	Color	Operational condition
PWR	Illuminated	green	Normal operation
	Slow Blinking	green	Waiting initial polling
	Fast Blinking	green	During initial polling
	Illuminated	red	PROFIBUS Error
	Slow Blinking	red	Parameter/SW setting registered on communication module is invalid value
	Fast Blinking	red	All of temperature control modules dropped out
BUS	Illuminated	green	Inter-module communication being sent
	Illuminated	orange	Inter-module communication being received
ONL	Illuminated	green	During PROFIBUS communication
	Blinking	green	PROFIBUS communication is in a standby state

CODE: PUMCE



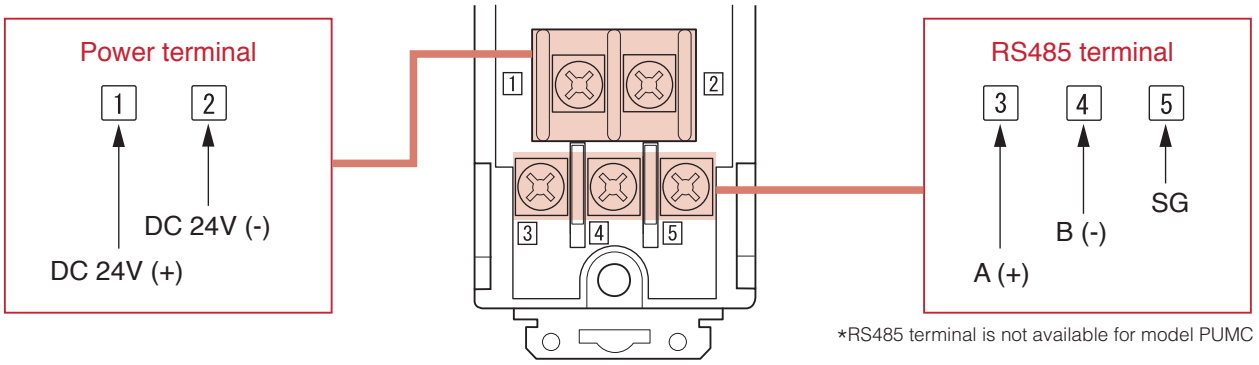
LEDindicator LED lamps indicate the following operational conditions

LED	LED Status	Color	Operational condition
PWR	Illuminated	green	RUN
	Blinking (1Hz)	green	No communication with any modules (inter-module communication FAULT)
	Blinking (2Hz)	green	Performing initial polling with PUM
	Illuminated	red	System FAULT, or abnormal connection with Micrex-SX
	Blinking (1Hz)	red	Set value for parameter or switch is invalid
	Blinking (2Hz)	red	No communication with PUM
BUS	Illuminated	green	Inter-module communication (receiving)
	Illuminated	orange	Inter-module communication (transmitting)
LINK	Illuminated	green	Normal Ethernet communication link
TX/RX	Illuminated	orange	Ethernet communication data receiving or transmitting

WIRING

Base part

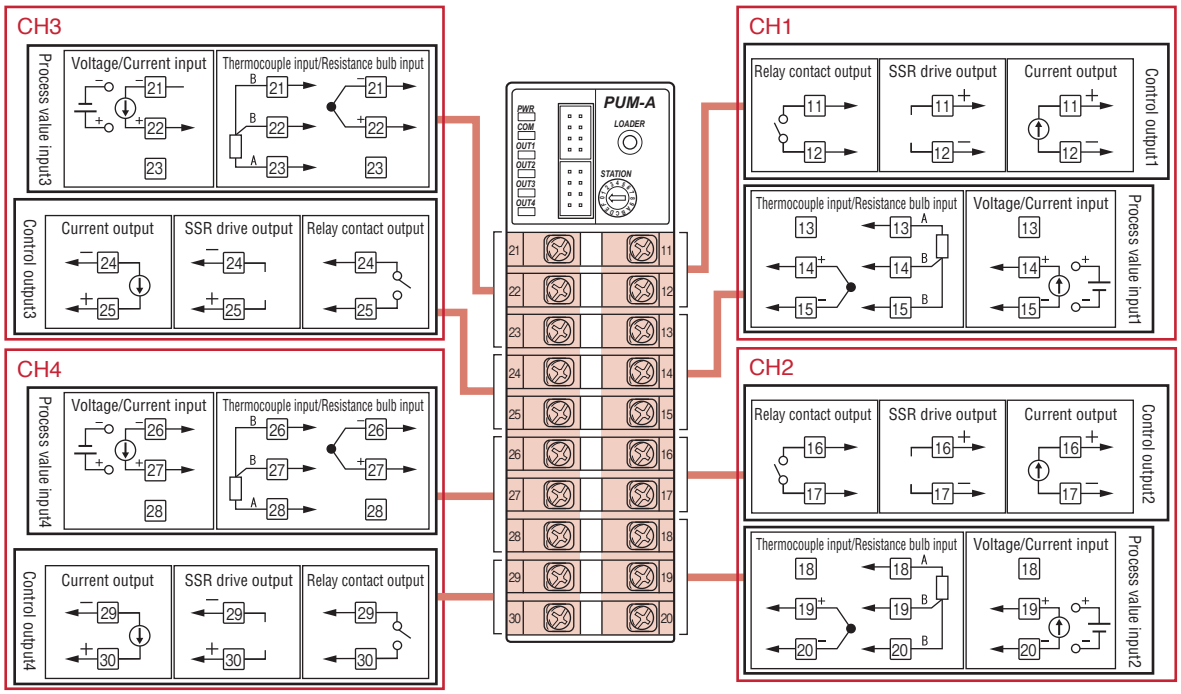
CODE: PUMA/B/E/V/N/T/C COMMON



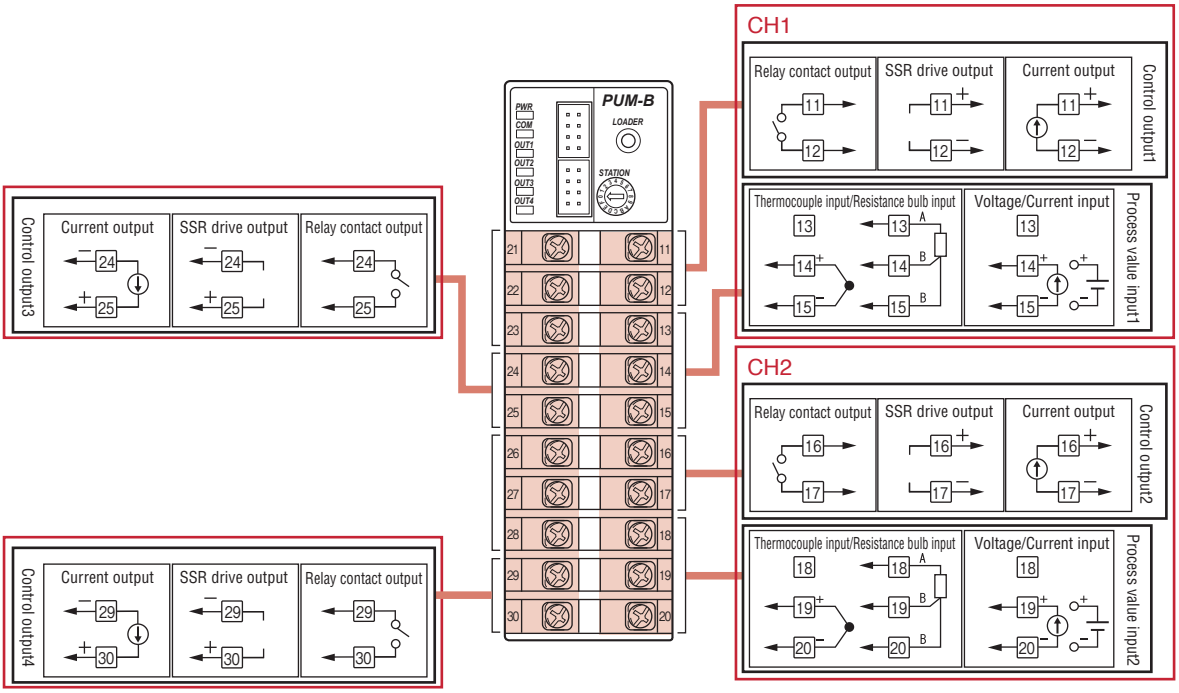
*RS485 terminal is not available for model PUMC

Front terminal block

CODE: PUMA

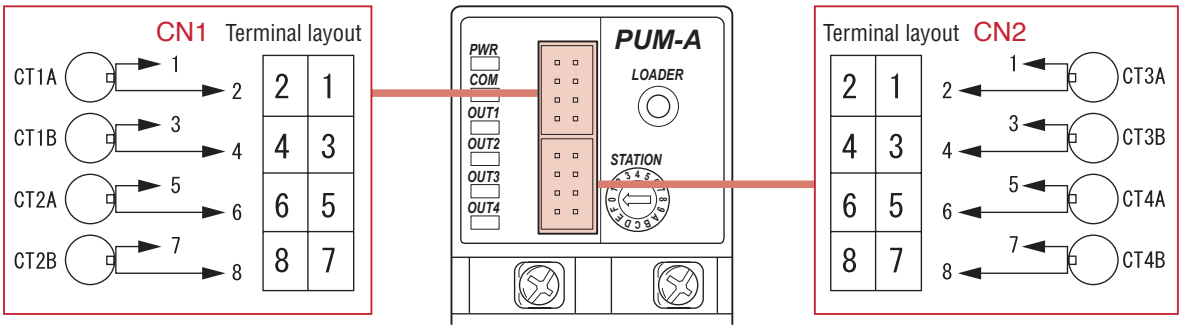


CODE: PUMB

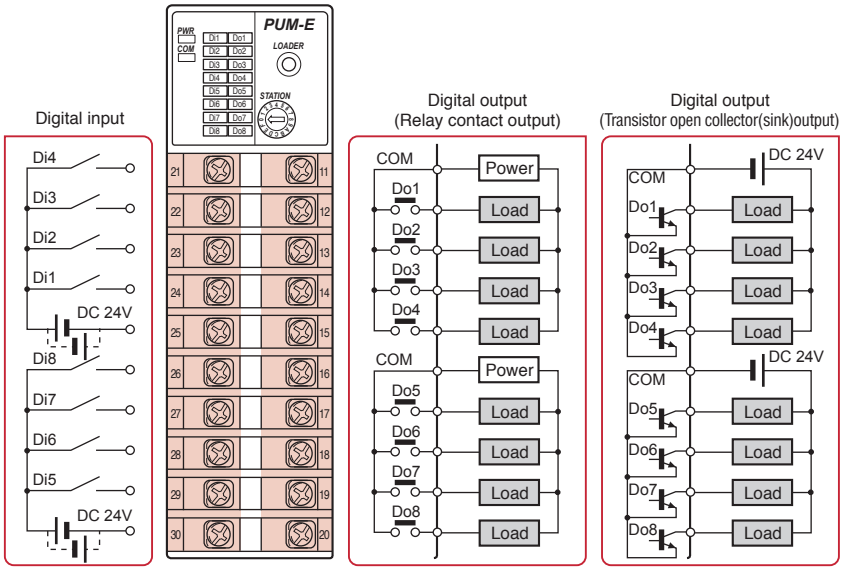


PUMA/B COMMON

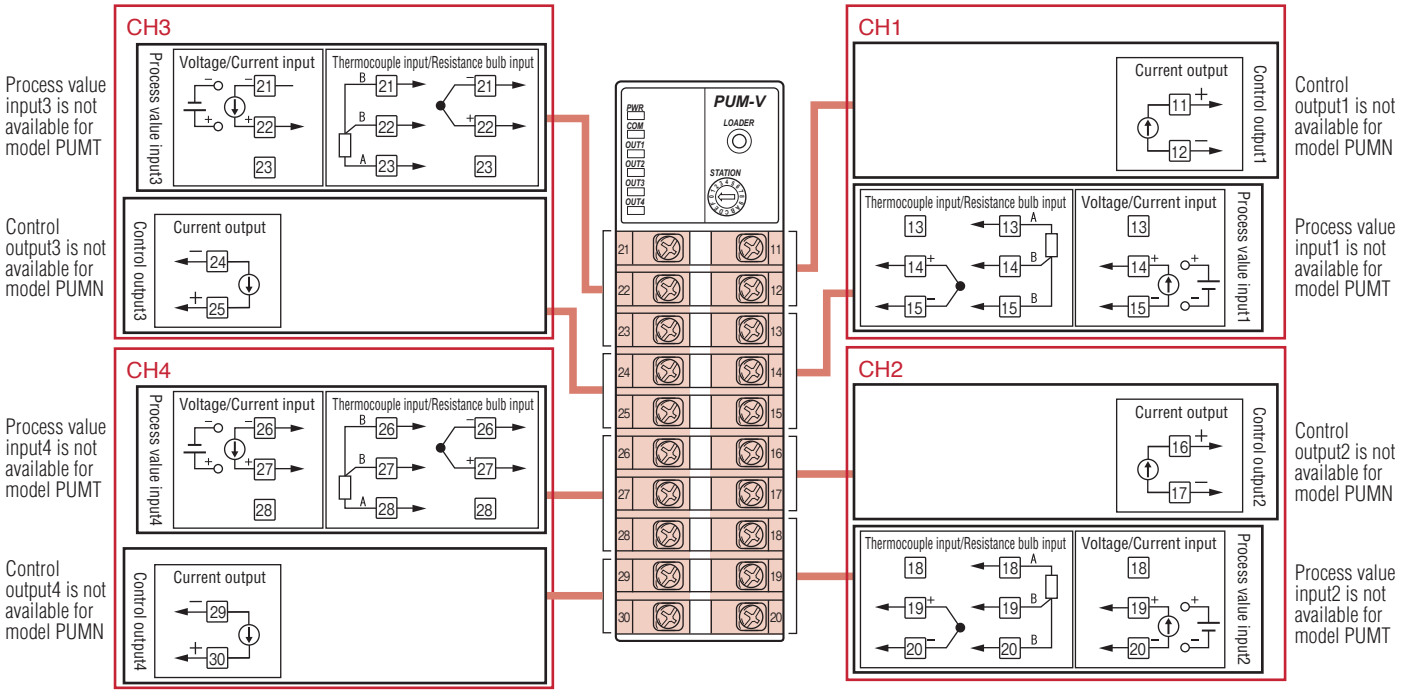
* Pin No. 2,4,6,8 of CN1 and CN2 are connected inside the equipment.
* CN2 cannot be used for PUMB



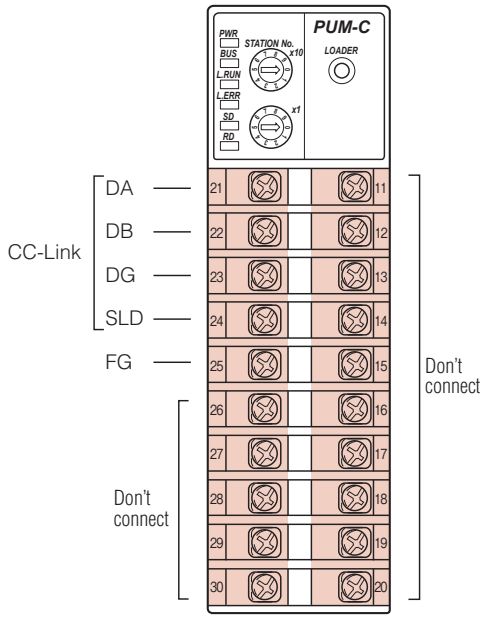
CODE: PUME



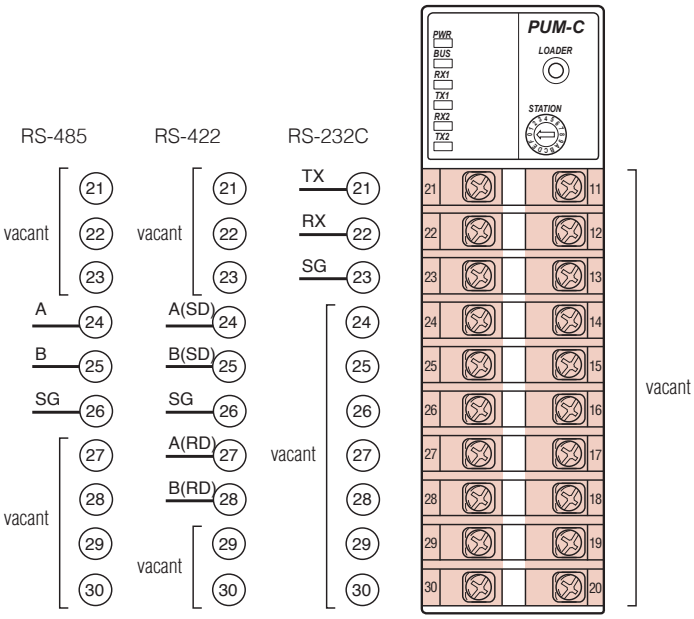
CODE: PUMV/N/T



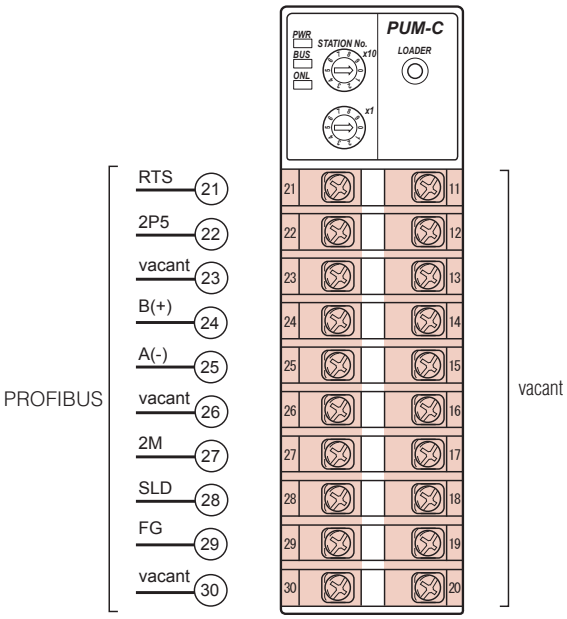
CODE: PUMCL



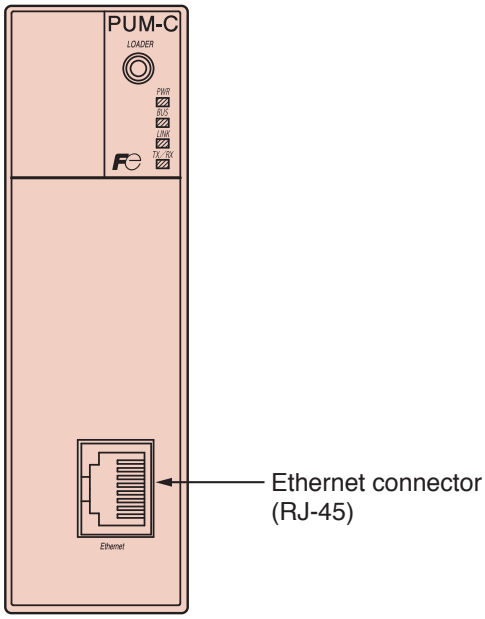
CODE: PUMCM



CODE: PUMCP



CODE: PUMCE



CODE SYMBOLS

Control module (4channels)

PUM 4 5 6 7 8 – 9 10 11 12 13 = 1 – 0 _ _ 0 0

Digit	Description		
4	<Module type>	4ch control module	A
5	<Input type>	Thermocouple /Resistance bulb (all channels)	T
		Voltage/current (all channels)	A
		Thermocouple/Resistance bulb (ch1,2), voltage/current (ch3,4)	C
6	<OUT1, 2 output type>	Relay output	A
		SSR drive output	C
	Note 1	Current output (4 to 20mA)	E
7	<OUT3, 4 output type>	Relay output	A
		SSR drive output	C
	Note 1	Current output (4 to 20mA)	E
8	<Version No.>		1
10	<Operation Manual>	Japanese	A
		English	B
11	<Option>	Not fitted	Y
	Note 2	CT input (8 points)	C

Note1) It is impossible to combine “C” in the 11th digits
Note2) It is possible to combine “E” in the 6th/7th digits

Control module (2channels)

PUM 4 5 6 7 8 – 9 10 11 12 13 = 1 – 0 _ _ 0 0

Digit	Description		
4	<Module type>	2ch control module	B
5	<Input type>	Thermocouple/Resistance bulb (all channels)	T
		Voltage/current (all channels)	A
6	<OUT1, 2 output type>	Relay output	A
		SSR drive output	C
	Note 1	Current output (4 to 20mA)	E
7	<OUT3, Note 2 4 output type>	None	Y
		Relay output	A
		SSR drive output	C
	Note 3	Current output (4 to 20mA)	E
8	<Version No.>		1
10	<Operation Manual>	Japanese	A
		English	B
11	<Option>	Not fitted	Y
	Note 4	CT input (4 points)	C

Note1) It is impossible to combine “C” in the 11th digits
Note2) You need OUT3/OUT4 for the heating/ cooling control
Note3) You need to set the current output to use transfer output
Note4) It is impossible to combine “E” in the 6th digits

Event input/output module

PUM 4 5 6 7 8 – 9 10 = Y Y 1 – 0 _

Digit	Description		
4	<Module type>	Event input/output module (Di 8 points/ Do 8 points)	E
5	<Input type>	Transistor open collector (sink) output	C
		Relay contact output	R
8	<Version No.>		1
10	<Operation Manual>	Japanese	A
		English	B

Input/output analog module

PUM 4 5 6 7 8 – 9 10 11 12 13 = 1 – 0 _ 0 0 0

Digit	Description		
4	<Module type>	analog input/output module AI4/AO4	V
		analog input module AI4	N
		analog output module AO4	T
5	<Input type> Note 1	Input: Thermocouple /Resistance bulb (all channels)	T
	Note 1	Input: Voltage/current (all channels)	A
	Note 1	Input: Thermocouple /Resistance bulb (ch1,2) Voltage/current (ch3,4)	C
	Note 2	Analog output module	Y
6	<OUT1, Note 3 2 output type> Note4	None	Y
		Current output (4 to 20mA)	E
7	<OUT3, Note3 4 output type> Note4	None	Y
		Current output (4 to 20mA)	E
8	<Version No.>		1
10	<Operation Manual>	Japanese	A
		English	B

Note1) You can select only “V, N” in the 4th
Note2) You can select only “T” in the 4th
Note3) You can select only “N” in the 4th
Note4) You can select only “V, T” in the 4th

Enhanced communication module

PUM [4][5][6][7][8] – [9][10]

Digit	Description		
	<Module type>	enhanced communication modul	C
4 5	<Communication module>	CC-Link communication	L
		MITSUBISHI –PLC Program-less communication	M
		PROFIBUS communication	P
		Ethernet communication	E
8	<Version No.>		1
10	<Operation Manual>	Japanese	A
		English	B
		Japanese / English / Chinese (Select "C" for Ethernet communicatuion)	C

Accessories

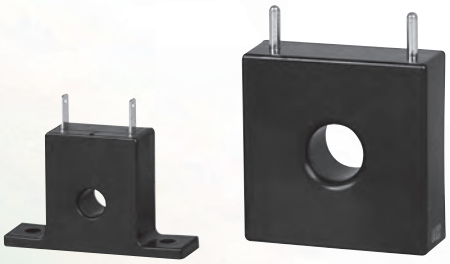
PUMZ＊ [6][7][8]

Digit		Description	
6		RS485 terminating resistance	A 0 1
7	Note1	DIN rail mounting end plate	A 0 2
8	Note1	Side connecting terminal cover (right & left 1set)	A 0 3
	Note1	Front face screw terminal cover	A 0 4
	Note2	Loader connecting cable (RS232C)	L 0 1
	Note3,4	CT input terminal cable (for 4 points) (l=1m)	C 0 1
	Note3,4	CT input terminal cable (for 4 points) (l=3m)	C 0 3
	Note3,4	CT input terminal cable (for 4 points) (l=5m)	C 0 5
		CT for 1 to 30A (CTL-6-S-H)	C T 1
		CT for 20 to 50A (CTL-12-S36-8)	C T 2

Note1) Only 10 unit for your order
Note2) It is necessary for using USB port to repairer the "USB-Serial" convert
Note3) A single CT input cable is for 3-phase and 2channels (CT 4 points) or single-phase and 2 channels (CT 2 points)
Note4) Connection of the cable to CT sensor should be arranged by user

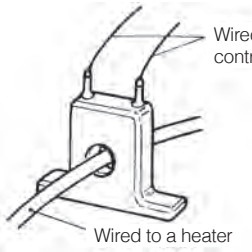
ACCESSORIES

Heater current detector (CT)



■General specification

	For 1 to 30A	For 20 to 50A
Type	CTL-6-S-H	CTL-12-S36-8
Dimension (H×W×D mm)	25×40×10	40×40×15
Through-bore (mm)	φ5.8	φ12

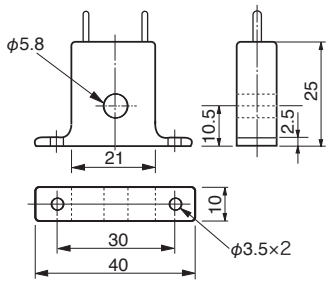


Put a wire through the hole of a dedicated CT
There is no polarity in wiring from a CT to a temperature controller

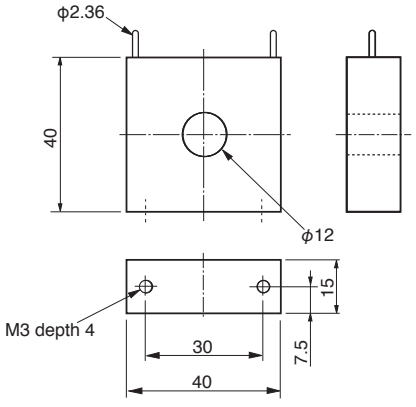
- Set the "Current at alarm action point" according to the heater to be used.
  Ex.) In the case of parallel use of 2 heaters with 2,000W/115V, if tried to detect heater break of one of them: Rated current = 34.8A In the case of one heater break; Current = 17.4A
  Set the "Alarm action point" to "26.1A", which is between the rated current and broken state.
  (Note) Set the "alarm action point" of over 15% of the rated current. Detection of "alarm action point" less than 15% may not be performed correctly.
- This cannot be used when the heater is controlled by thyristor phase angle control system.

■Outline Diagram (unit:mm)

Type CTL-6-S-H (1 to 30A)



Type CTL-12-S36-8 (20 to 50A)



PERIPHERAL INSTRUMENTS

●Programmable Operation Display

Name	type	specification		
V815 15.0inch	V815iX	TFT Color LCD XGA	Built-in LAN / video · RGB · sound unit compatible (optional)	100-240V AC
	V815iXD		Built-in LAN / video · RGB · sound unit compatible (optional)	24V DC
V812 12.1inch	V812S	TFT Color LCD SVGA		100-240V AC
	V812iS		Built-in LAN / video · RGB · sound unit compatible (optional)	
	V812SD			24V DC
	V812iSD		Built-in LAN / video · RGB · sound unit compatible (optional)	
V810 10.4 inch	V810S	TFT Color LCD SVGA		100-240V AC
	V810iS		Built-in LAN / video · RGB · sound unit compatible (optional)	
	V810SD			24V DC
	V810iSD		Built-in LAN / video · RGB · sound unit compatible (optional)	
	V810T	TFT Color LCD VGA		100-240V AC
	V810iT		Built-in LAN / video · RGB · sound unit compatible (optional)	
	V810TD			24V DC
	V810iTD		Built-in LAN / video · RGB · sound unit compatible (optional)	
	V810C			100-240V AC
	V810iC		Built-in LAN	
	V810CD			24V DC
	V810iCD		Built-in LAN	
V808 8.4inch	V808SD	TFT Color LCD SVGA		24V DC
	V808iSD		Built-in LAN / video · RGB · sound unit compatible (optional)	
	V808CD	TFT Color LCD VGA		
	V808iCD		Built-in LAN	
V806 5.7inch	V806TD	TFT Color LCD QVGA		
	V806iTD		Built-in LAN	
	V806CD	STN Color LCD QVGA		
	V806iCD		Built-in LAN	
	V806MD	STN monochrome LCD QVGA		
	V806iMD		Built-in LAN	

●Automation software CITECT SCADA

	4	5	6	7	8		9	10	11	12	13		14
PAT			3	1	1	—	Y	Y	Y	Y	Y	—	Y

digit		specification		type code
4	<type of license key>	software (no license key)		YY
5	<I/O points>	full license key	75points	FA
		full license key	150points	FB
		full license key	500points	FC
		full license key	1,500points	FD
		full license key	5,000points	FE
		full license key	15,000points	FF
		full license key	Unrestricted	FM

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