e-Front runners

Fuji Instrumentation & Control

PUM Series

Multi-loop module type Temperature controller

Smart!

- Optimum multiple-zone control
- PLC function (by plug-in module)
- Program-less host communication

User friendly!

- Detachable terminal
- Simple loader operation

Fast!

- High-speed data communication (230.4kbps)
- High-speed data sampling

Fuji Electric Systems Co., Ltd.

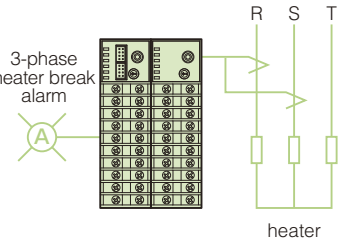
ECNO:1162

FEATURE

Smart!

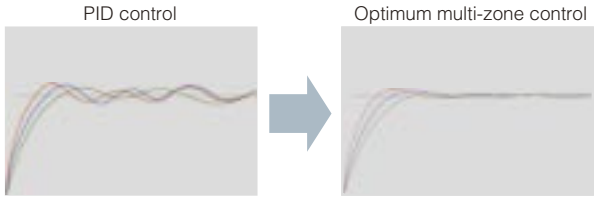
Heater break alarm CT (8 points)

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



Optimum multi-zone control

Our original algorithm maintains stable and highly precise temperature control in multiple zones where interference is unavoidable.



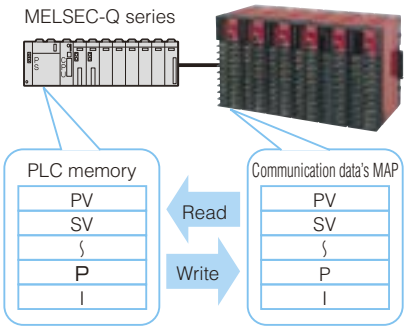
Integration of PLC function

<Now developing>

Digital I/O signal processing of up to 16-k steps and 300 points is allowed.

High-speed communication with upper device

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



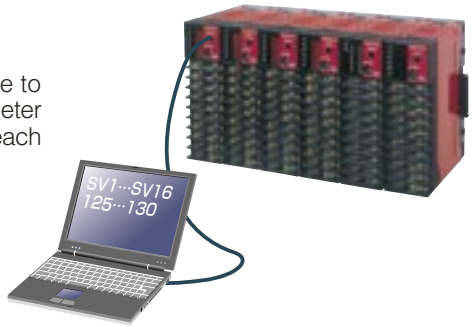
User friendly!

Detachable terminal structure

The terminal is attachable and detachable without a screw driver.
Reduction in wiring and maintenance.

Simple loader on the Personal Computer

Simple loader is available to change all module parameter setting without changing each loader connection.



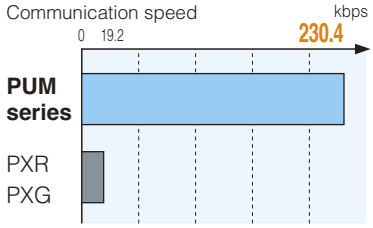
Easy attached to the DIN rail

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

Fast!

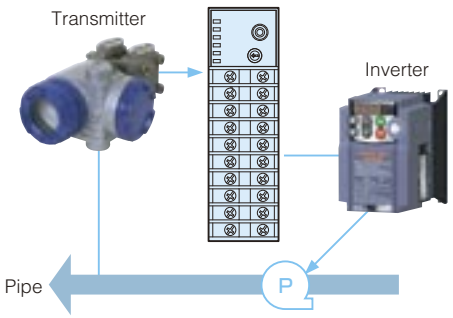
High-speed communication with upper device

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



High-speed sampling time

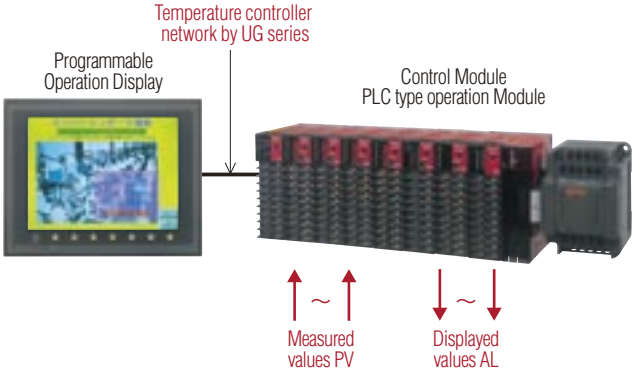
With the 200msec sampling time, other applications are possible. For example, pressure control, flow control, etc.



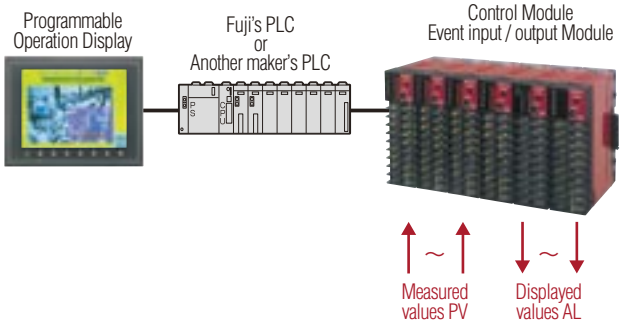
APPLICATIONS

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

<Integrated PLC type> Now developing

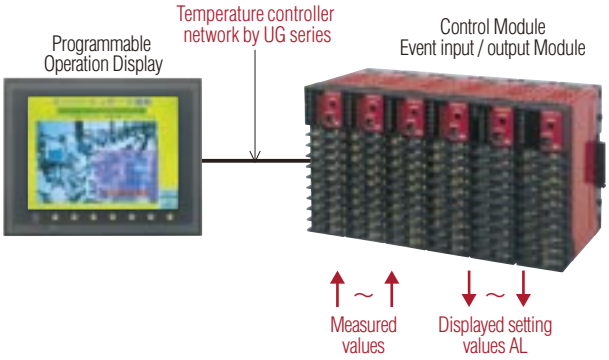


<Separated PLC type>

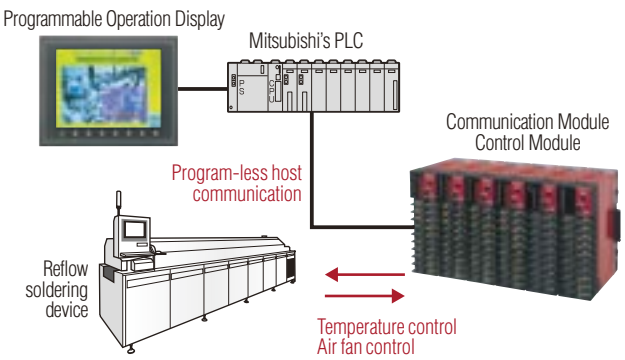


Case 2 Temperature controller

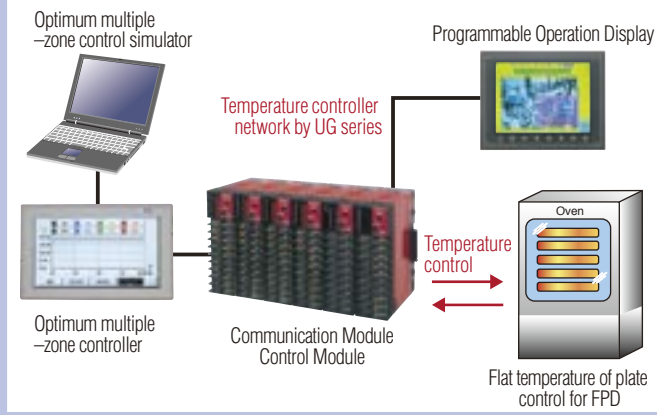
<Multi Temperature controllers type>

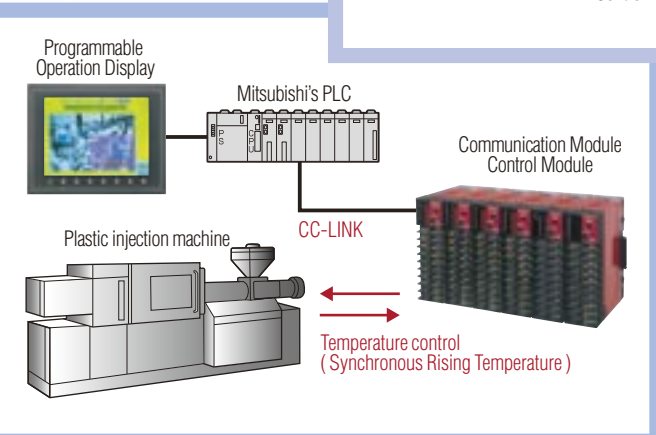


<Reflow soldering device>

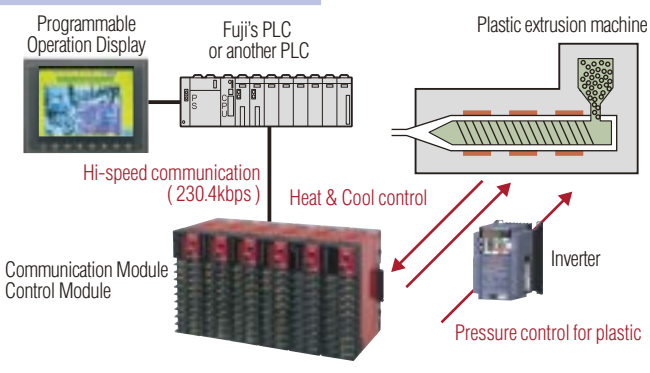


<Oven or dryer for Flat panel display of LCD>





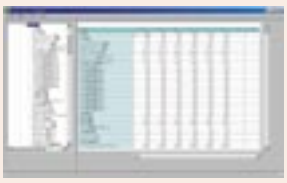
<Plastic injection machine>



<Plastic extrusion machine>

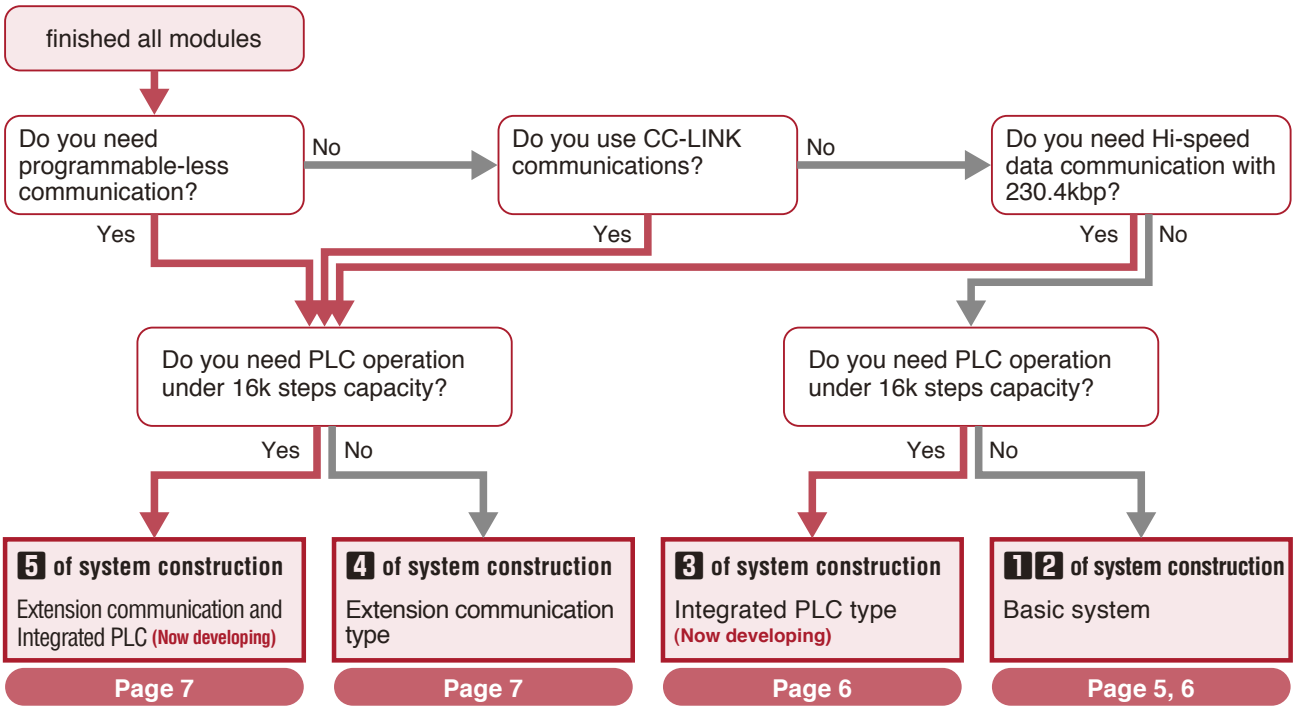
VARIATION

	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 	12
Digital input/output	**Event input/output Module** **Features** 8 points alarm DO output 8 points DI input for external switching control	PUME 	15
Analog input/output <Now developing>	**Analog input & output Module** **Features** Inputs have 4 points and Outputs have 4 points	PUMV 	16
	Analog input Module **Features** Inputs have 4 points	PUMN 	18
	Analog output Module **Features** Outputs have 4 points	PUMT 	20
Communication	**Hi-speed RS-485 Communication Module** <Now developing> **Features** Communication speed data with 230.4kbps Hi-speed original communication, Now developing	PUMCR 	21
	CC-LINK Communication Module **Features** Communication speed data with 10Mbps	PUMCL 	22
	Mitsubishi PLC's Communication Module with program-less <Now developing> **Features** Direct address map only for Mitsubishi's PLC.Reduction of your programming work for Mitsubishi's PLC.	PUMCM 	23

	Kind	Type	See page
PLC <Now developing>	**PLC operation control Module** <Now developing> **Features** 16k step programing	PUMP 	none
	Expansion digital I/O capsule **Features** 300 points maximum with Expand digital I/O	SPB Series 	none
Support Tools	**Programming Loader on Personal computer** **Features** Easy setting and user friendly		10
Original Controller <Now developing>	**Optimum multiple-zone controller** **Features** Optimum multi-zone control by Fuji's original algorithm		33
Peripheral instrument	**Programmable Operation Display** **Features** Easy connect by temperature control network		34
	Thyristor Units **Features** High performance power control units		11
	Automation Software **Features** SCADA software, example		11
Accessory	・Terminating resistance for RS-485 ・DIN rail end plate ・Connector's cover side-by-side ・Terminal cover of front	・Programming Loader for PLC operation control module <Now developing> ・Connection cable for PUM series ・Fuji's original CT input cable ・Fuji's original CT	31

SELECTION FLOW for SYSTEM CONSTRUCTION

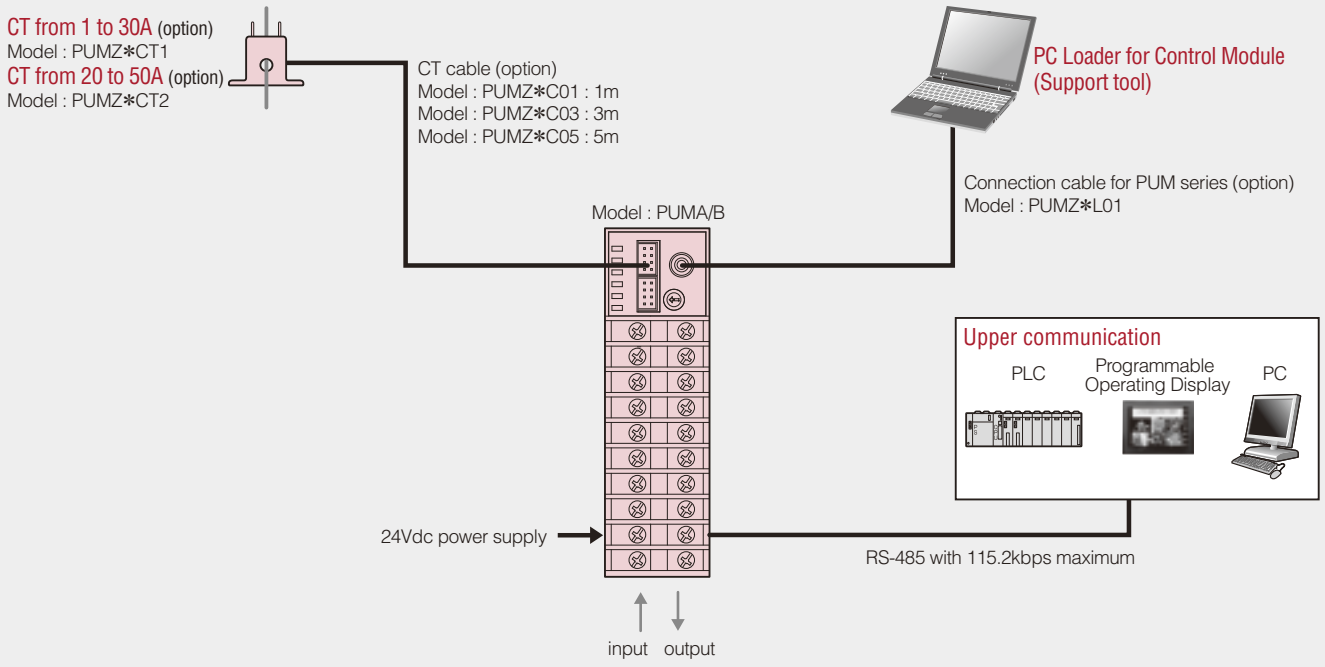
How to select the SYSTEM for your needs, below 1 to 5.



SYSTEM CONSTRUCTION FOR EXAMPLE

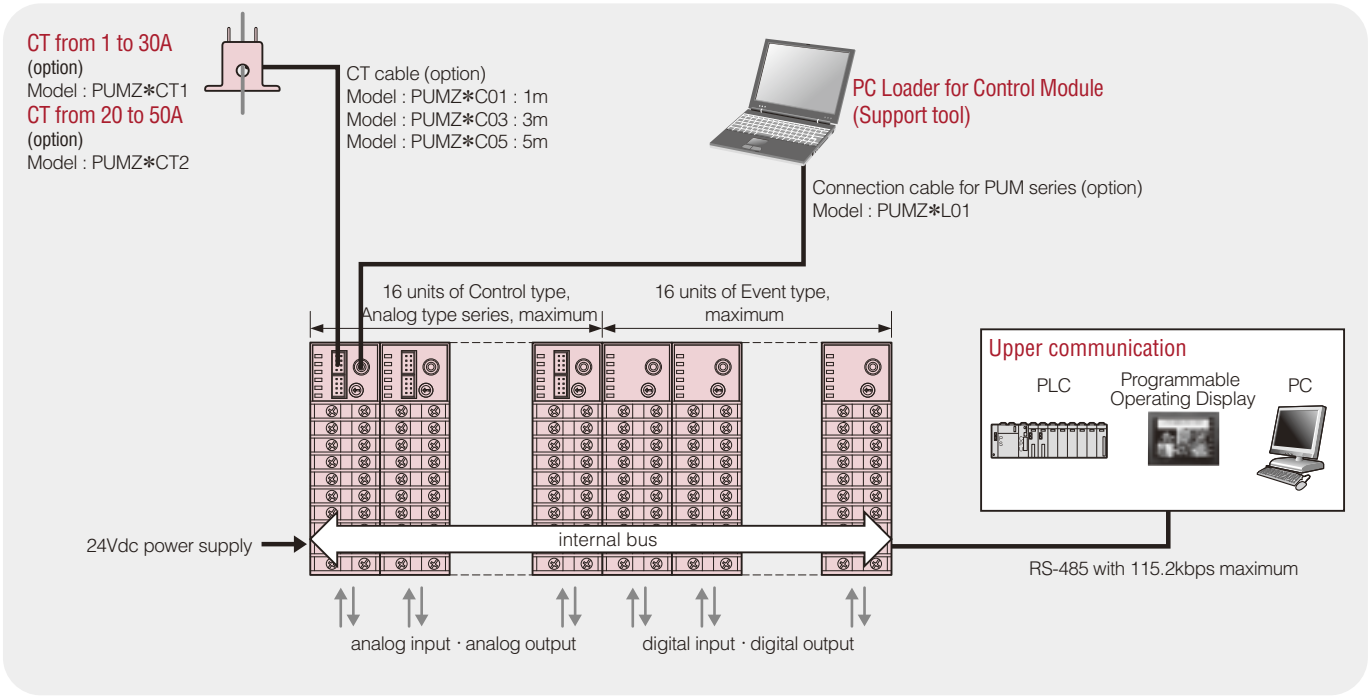
1 Basic system (minimum system construction)

- In case of minimum system construction, 4ch or 2ch
- RS-485 communication is standard, not option
  *PUMB only, for heat and cool control.



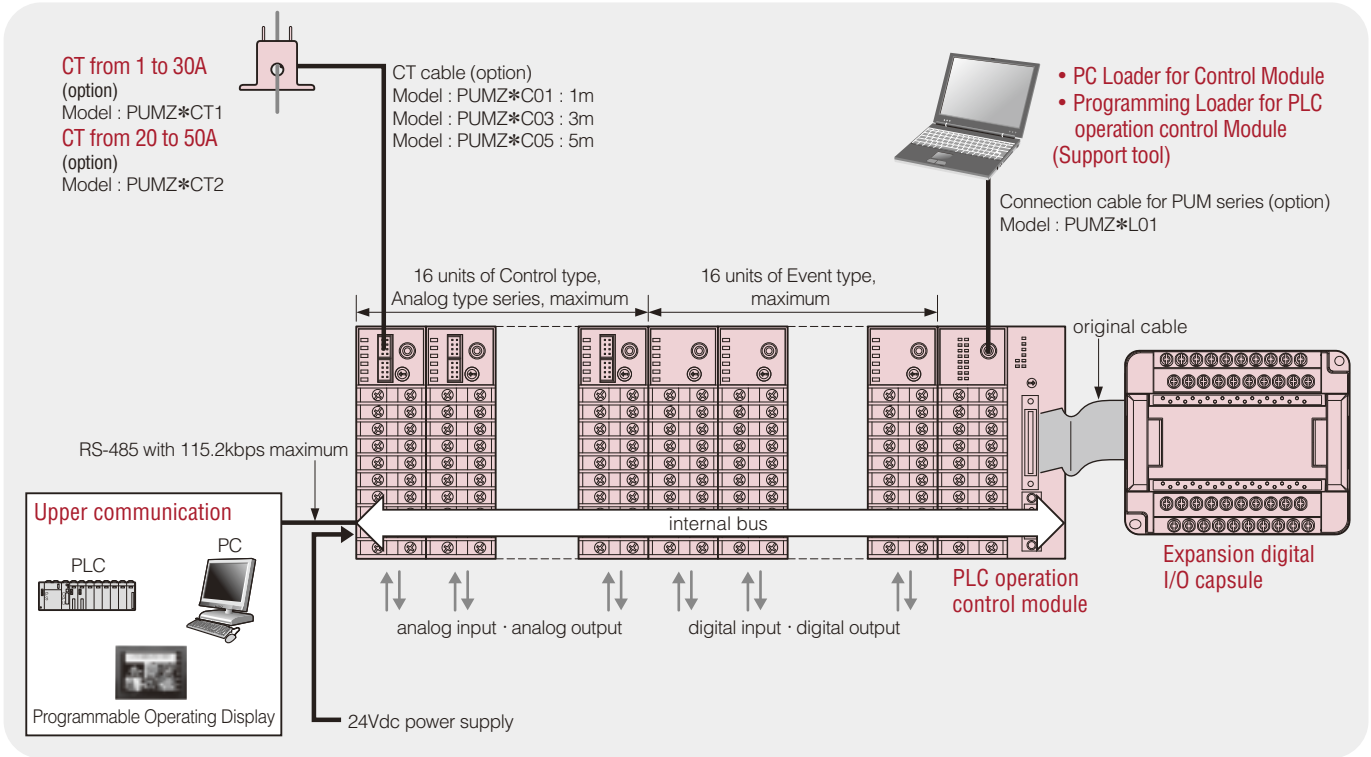
2 Basic system (maximum system construction)

- In the case of maximum system construction, contnel Module, Analog I/O Module, or Event I/O Module are mixed.
- It is possible up to 16 units of the control type, Analog type series, and 16 units of Event type.
- It is necessary that the number of Read Station Addresses add “1” to the number of rotary SW. on each module unit.



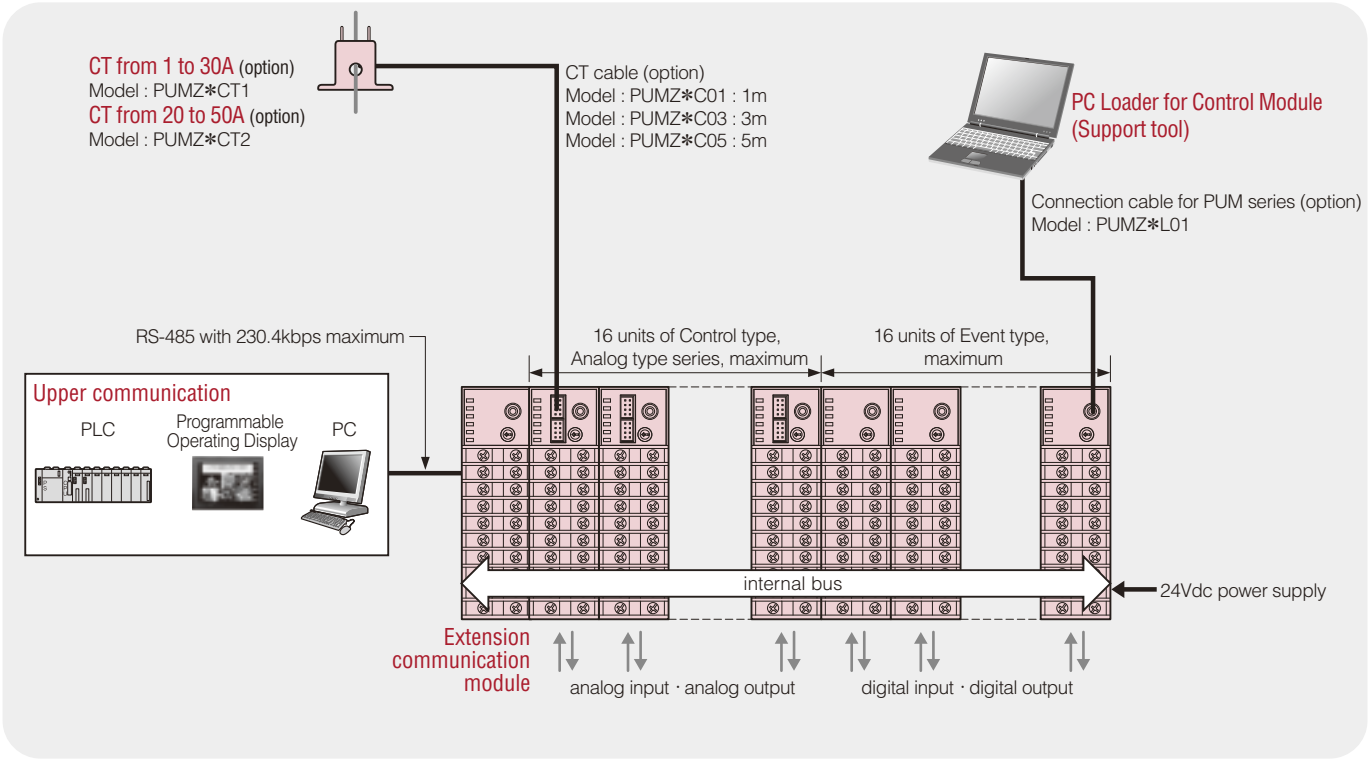
3 Integrated PLC type (Now developing)

- In the case of PLC function system construction
- It is possible to use 300 points maximum digital interface if this system has an Extension digital I/O capsule.
- It is necessary that PLC operation control Module be located at the right side in the module system.



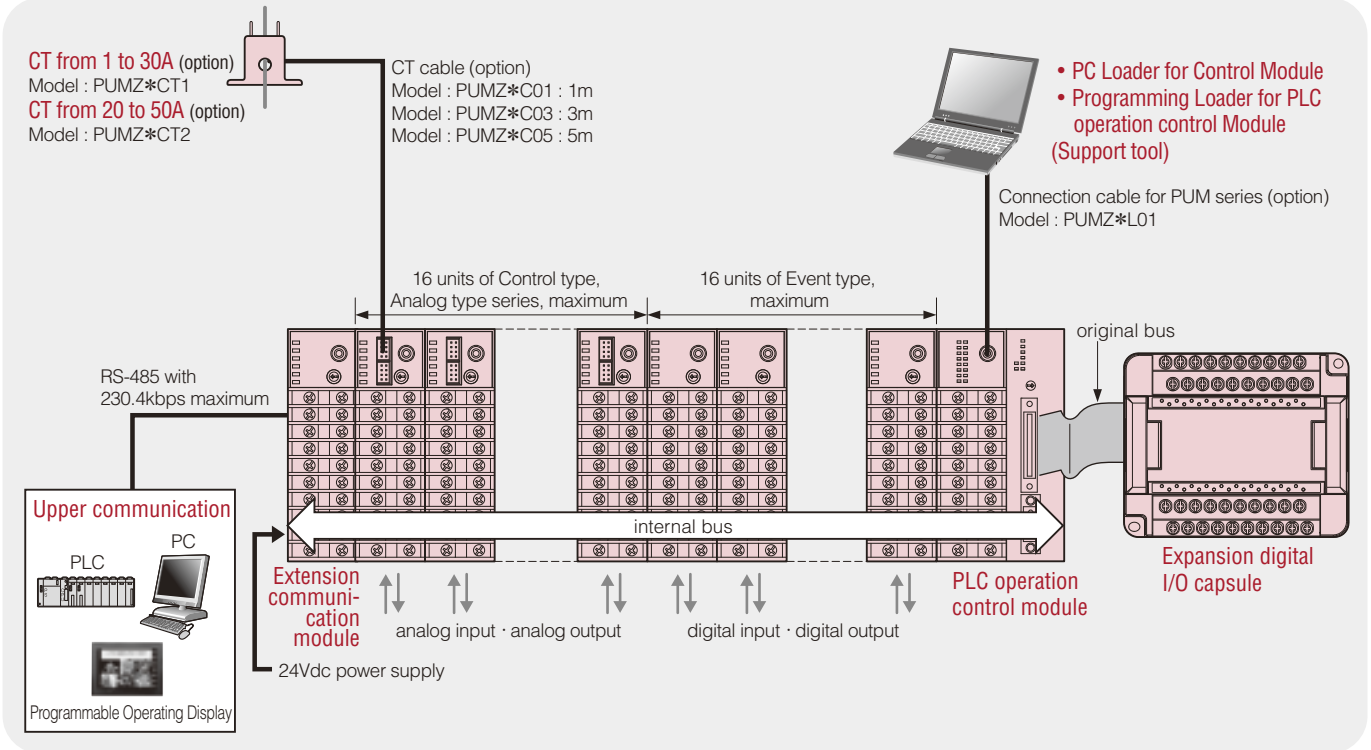
4 Extension communication type (Now developing except for CC-LINK communication type)

· In the case of Hi-speed data communication system
· It is necessary that the Extension communication Module be located at the left side in the module system.



5 Extension communication and Integrated PLC (Now developing)

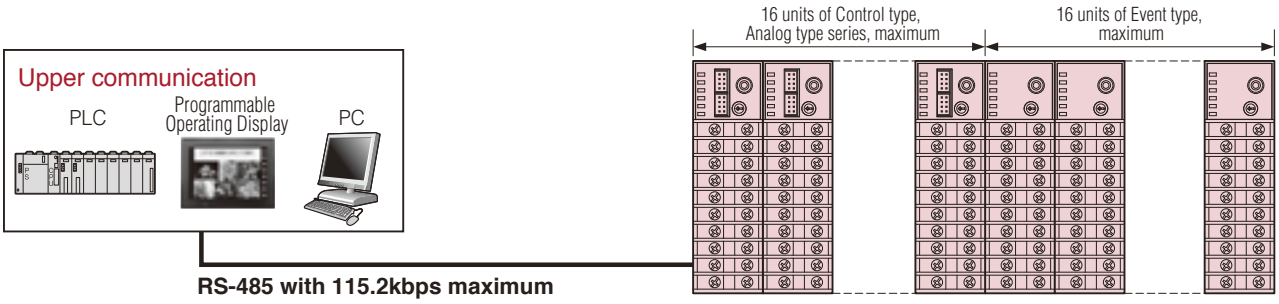
· In the case of PLC functions system construction with hi-speed data communication module
· It is necessary that the PLC operation control Module be located at the right side in the module system.
· It is necessary that Extension communication Module be located at the left side in the module system.



COMMUNICATION MODULE

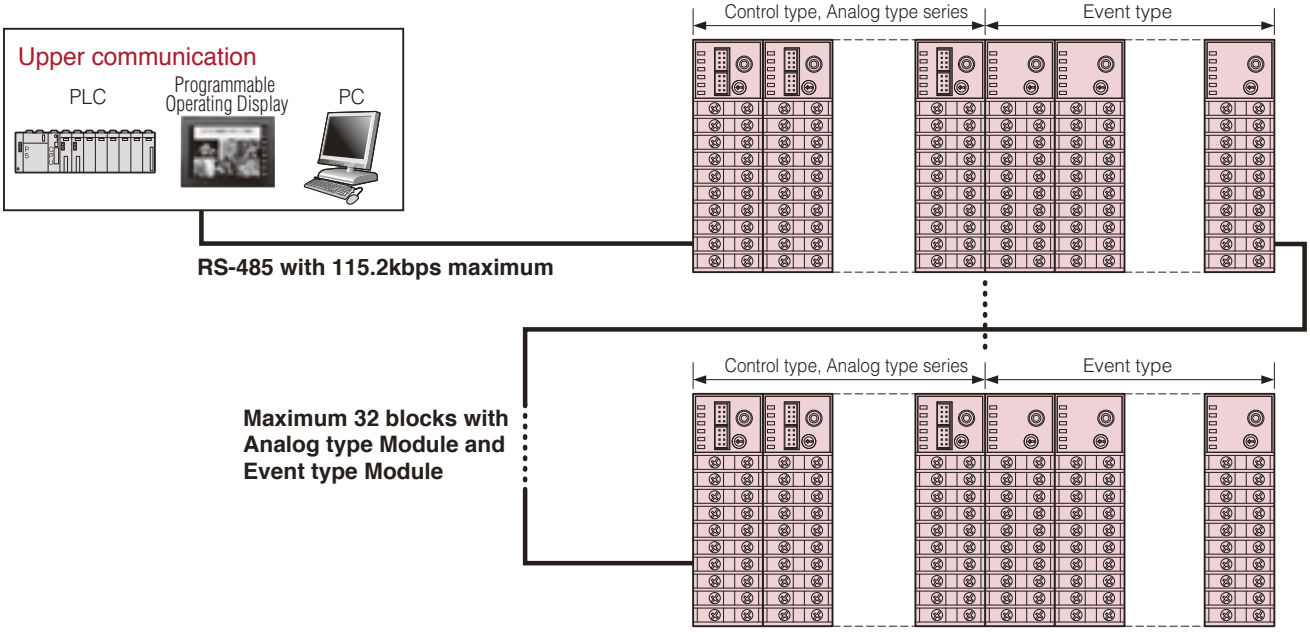
1-1 Modbus protocol Communications (continuance connections 16 modules maximum)

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



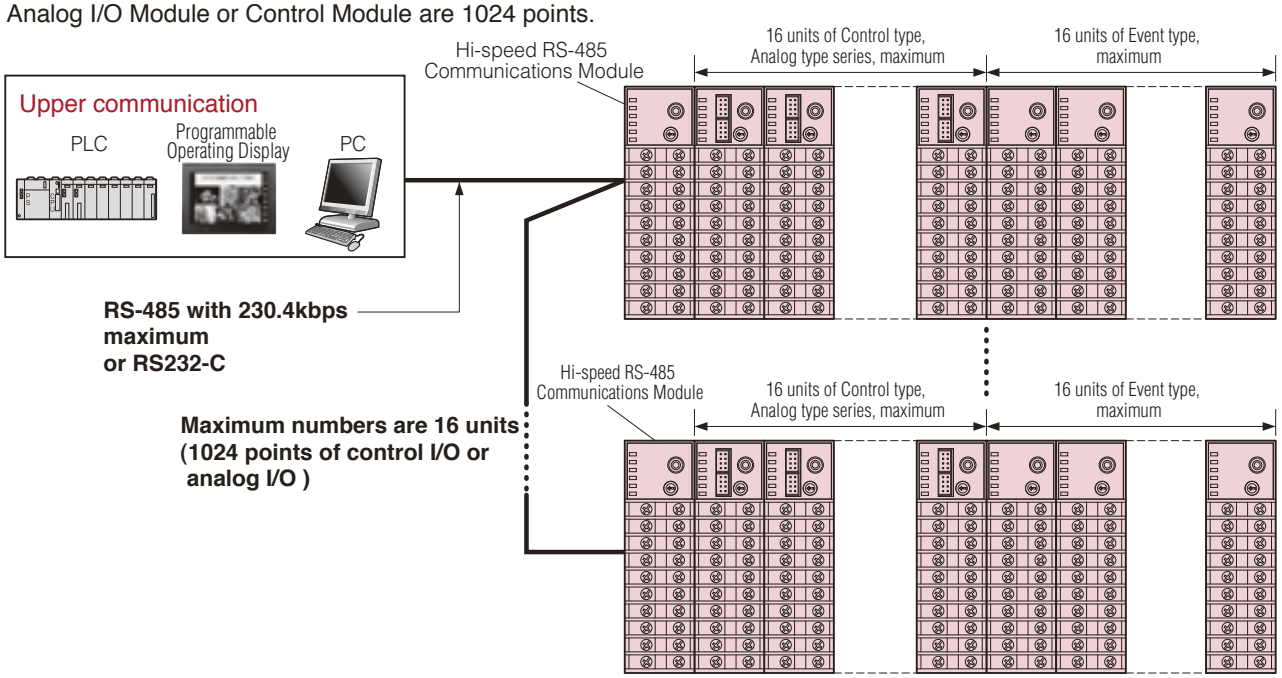
1-2 Modbus protocol Communications (distributed allocations)

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



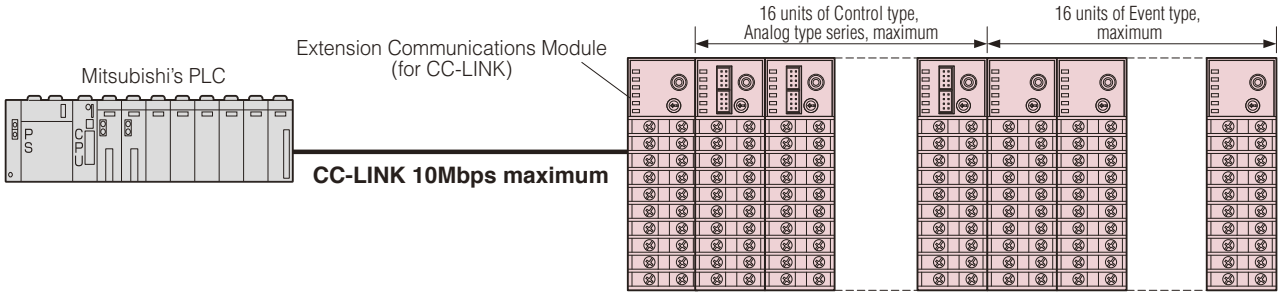
2-1 Hi-speed RS-485 Communications by Modbus protocol (Extension communication module)

Analog I/O Module or Control Module are 1024 points.



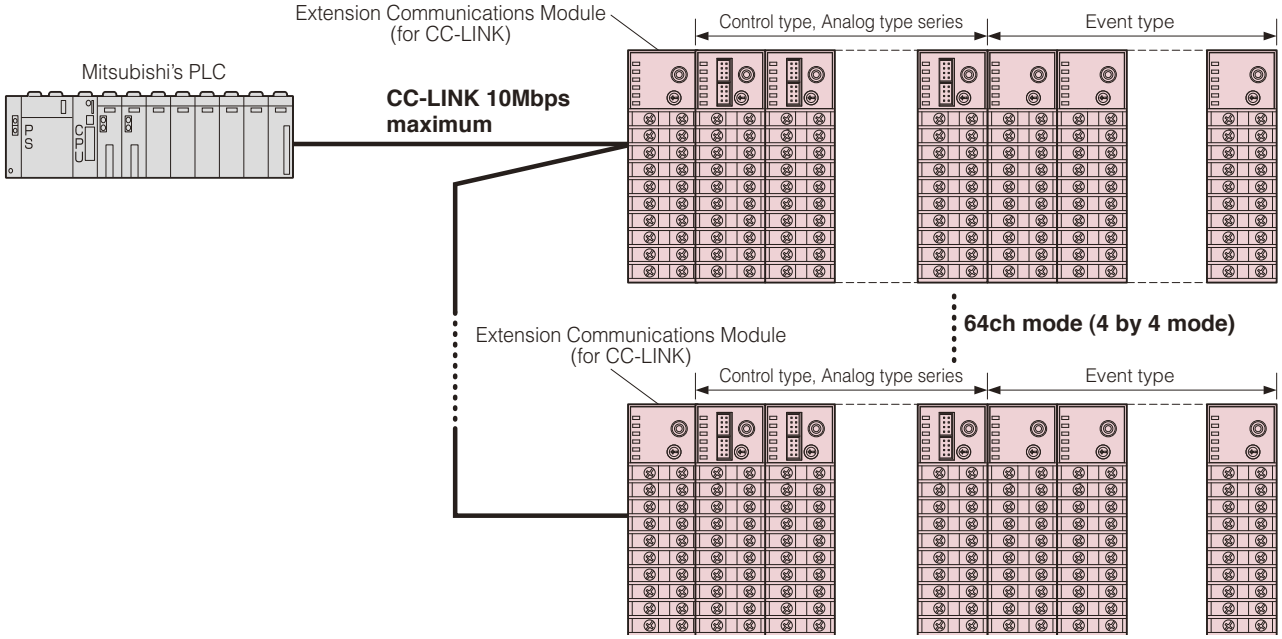
3-1 CC-Link protocol Communications (continuance connections by maximum)

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



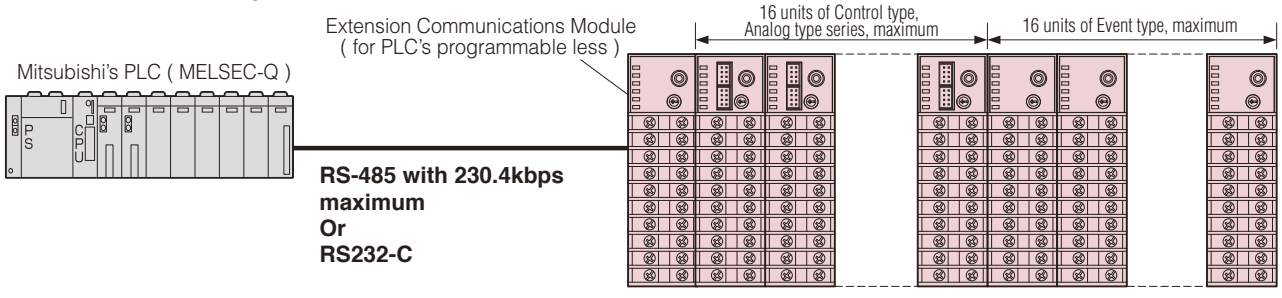
3-2 CC-Link protocol Communications (distributed allocations)

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



4-1 Communications by program-less between PLC and PUM *Now developing

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



LOADER SOFTWARE

PUM series are prepared by 2-type loader software. One is each Module, and another one is only PLC operation control module. This software is supported by windows PC.

Basic Loader for Control Module, Analog I/O Module, and Event I/O Module

It is available to download for FUJI's HP. This URL is http://www.fic-net.jp

SMART LOADER

All module can set parameters without changing each loder connection port. It is possible to take status of all modules because this software can display the parameters, setting, and monitoring.

EASY LOADER

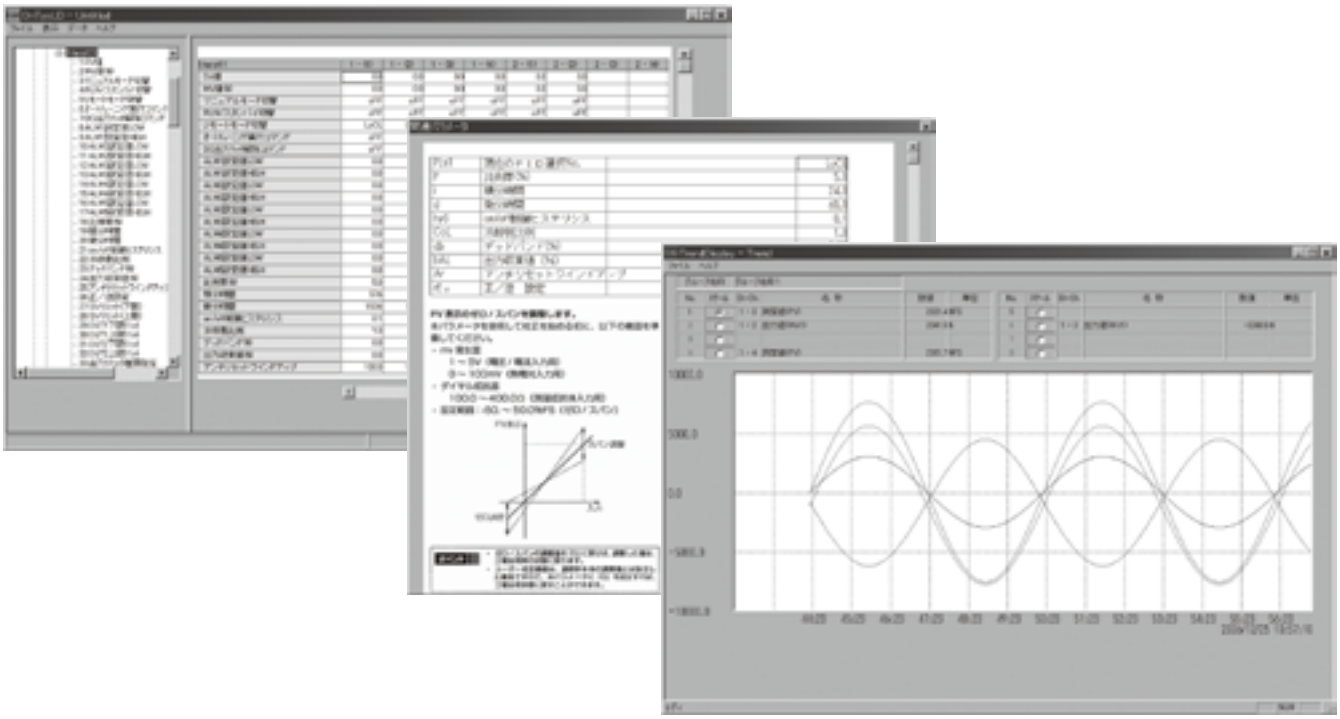
You can operate this software without having the instruction manual!
This software has PULL DOWN MENU, and detailed online help.
Editing display is tree style, and it is easy to search your parameter needs.

BILINGUAL LOADER

English version and Japanese version be selected initial configurations.

The parameter and name setting Function can optimize for customer's needs

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



Basic function	Setting, displaying, editing the parameters Display the construction of all modules DATA trending Utility function (copy the same parameters, printing, save data by CSV file) Communications (Upload, Download)
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
Recommended environment of personal computer	OS:WINDOWS 2000, WINDOWS Xp (Global version and Japanese local version) CPU: 300MHz MEMORY: 128MB over EMPTY VOLUME in Hard Disk: 500MB over CD-ROM drive : necessary MONITOR: 1024X768 over

THYRISTOR UNITS

Feature

1 All units are EC compliance. UL approval is available.
2 Outline shape is compact. You can use control panel space with minimum size.
3 Low electrical switching noise for using the burst firing control mode other control mode.
4 The front cover is same as terminal cover.
5 Digital control device because this thyristor units have micro-processor inside.
6 Light-weight plastic cover and molding structure.

Series Model

These are 3 model in this thyristor units.
<single-phase>

1	Low-end grade	PT3000S-1PH
2	Standard grade	PT3000M-1PH
3	HI-end grade	PT3200

<three-phase>

1	Low-end grade	PT3000S-3PH
2	Standard grade	PT3000M-3PH
3	HI-end grade	PT3000-E, Multidrive

Citect SACDA 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.

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 250ohm 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 400 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 ohm or more Current input : 250 ohm Voltage input : approx. 1M ohm
Influence of signal source resistance	Thermocouple: ±0.3%FS±1digit / 100 ohm Voltage input : ±0.3%FS±1digit / 500 ohm
Allowable wiring resistance	Resistance bulb: 10 ohm 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 220Vac, 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/loop)
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)

■Control output

No. of output	2 points (1 point/loop) or 4 points (2 points/loop)
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 : SPST contact - Contact capacity : 220Vac/30Vdc, 3A (resistance load) 220Vac/30Vdc, 1A (inductive load) ②SSR/SSC drive output - Proportional cycle : 1 to 150 sec. - Minimum resolution : 5ms - ON voltage : 10Vdc (8 to 12Vdc) - OFF voltage : 0.5Vdc or less - Max. current : 20mAdc (per point) - Load resistance : 500 ohm or more - Insulation : No insulation with any other output (excluding relay output) Functional insulation with others than those above ③Current output (4 to 20mAdc, 0 to 20mAdc) - Actual output range : 0mA to 20.6mAdc - 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 ohm 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 20mAdc,0 to 20mAdc)
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: 2A 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) (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
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	24Vdc±10%
Power consumption	Max. 3.2W (135mA) [when 24Vdc 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 (500Vdc)
Insulation block diagram	Power → PV1 Loader communication port RS-485 communication port CT Input (CT1A, B - CT4A,B) → PV2, PV3, PV4 OUT1 (relay contact output) → OUT1 (SSR drive, current) OUT2 (relay contact output) → OUT2 (SSR drive, current) OUT3 (relay contact output) → OUT3 (SSR drive, current) OUT4 (relay contact output) → OUT4 (SSR drive, current) —Basic insulation (1500VAC)—Functional insulation (1000VAC)—Functional insulation (500VAC)

■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
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

[Table 1] Input type and standard nput range

Input type		Input code	Measurement range [degree C]	Min. measurement [degree C]
Resistance bulb (IEC)	Pt100ohm	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		

*In case of current input, stanch I/V unit which comes with the controller to the voltage input terminal.

■Event Input/Output Module Type : PUME

■Digital Input

No. of input	8 points (4points/common × 2blocks)
Input type	Voltage contact input, sink/source com-mon (bidirectional)
Input rating	24V DS,input impedance approx. 4.7Kohm
Input judgment	ON judgment: 16 to 26.4V DC OFF judgment: 0 to 5V DC
Input read cycle (min.pulse width)	200ms
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, 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

■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
Extrenal terminal	· Digtal input / digtal 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 ateral 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	24Vdc±10%
Power consumption	Max. 3.2W (135mA) [when 24Vdc 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 (500Vdc)
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 (1000VAC)–Functional insulation (500VAC)

■Normal operating condition

Ambient temperature	-10 to 50 degrees C * "Ambient temperature" is the temperature underneath the controller inside the equpiment 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/Output Module Type : PUMV

■Analog Input

No. of input	4 points
Input signal	Select from group I or II on the model code. 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 250ohm 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 400 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 ohm or more Current input : 250 ohm Voltage input : approx. 1M ohm
Influence of signal source resistance	Thermocouple: ±0.3%FS±1digit / 100 ohm Voltage input : ±0.3%FS±1digit / 500 ohm
Allowable wiring resistance	Resistance bulb: 10 ohm 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 220Vac, 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

■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 ohm or less
Insulation	No insulation with any other output (excluding relay output) Functional insulation with others 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, 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

■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) (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
Extrenal 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	24Vdc±10%
Power consumption	Max. 3.2W (135mA) [when 24Vdc 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 (500Vdc)
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 (1000VAC)–Functional insulation (500VAC)

■Normal operating condition

Ambient temperature	-10 to 50 degrees C * "Ambient temperature" is the temperature underneath the controller inside the equpiment 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 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 250ohm 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 400 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 ohm or more Current input : 250 ohm Voltage input : approx. 1M ohm
Influence of signal source resistance	Thermocouple: ±0.3%FS±1digit / 100 ohm Voltage input : ±0.3%FS±1digit / 500 ohm
Allowable wiring resistance	Resistance bulb: 10 ohm 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 220Vac, 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

■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

■Display, configuration

Display	Status display LED (2 colors x 2 points + 4points)
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) (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
Extrenal 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	24Vdc±10%
Power consumption	Max. 3.2W (135mA) [when 24Vdc 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 (500Vdc)
Insulation block diagram	Power — PV1 Loader communication port / RS-485 communication port — PV2, PV3, PV4 =Functional insulation (1000VAC)–Functional insulation (500VAC)

■Normal operating condition

Ambient temperature	-10 to 50 degrees C * "Ambient temperature" is the temperature underneath the controller inside the equpiment 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 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 ohm or less
Insulation	No insulation with any other output (excluding relay output) Functional insulation with others 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, 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

■Display, configuration

Display	Status display LED (2 colors x 2 points + 4points)
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) (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
Extrenal 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	24Vdc±10%
Power consumption	Max. 3.2W (135mA) [when 24Vdc 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 (500Vdc)
Insulation block diagram	Power Loader communication port RS-485 communication port OUT1 (current) OUT2 (current) OUT3 (current) OUT4 (current) =Functional insulation (1000VAC)–Functional insulation (500VAC)

■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

■High-speed communication Module Type:PUMCR

■RS485 communication

Communication standards	RS-485 compatible
No. of port	2port (Port1, Port2)
Communication, synchro method	Two-wire, half-duplex, asynchronous cycle
Communication speed	9.6k, 19.2k, 38.4k, 115.2kbps, 230.4kbps
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	Start bit1, Data bit; 8, parity; even / odd / none, Stop bit1
Protocol	Modbus RTU compatible
Insulation	No insulation with port, Functional insulation with any other signal
Function	master or slave

■RS232-C communication

Communication standards	RS-232 compatible
No. of port	1port (Port1 only, Selection of the parameter setup with RS-485)
Communication, synchro method	Two-wire, half-duplex, asynchronous cycle
Communication speed	9.6k, 19.2k, 38.4k, 115.2kbps, 230.4kbps
Data format	Start bit1, Data bit; 8, parity; even / odd / none, Stop bit1
Protocol	Modbus RTU compatible
Insulation	No insulation with port, Functional insulation with any other signal
Function	master or slave

■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

■Display, configuration

Display	Status display LED (2 colors x 2 points + 4points)
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) (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
Extrenal 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	24Vdc±10%
Power consumption	Max. 3.2W (135mA) [when 24Vdc 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 (500Vdc)
Insulation block diagram	Power — RS-485 communication port (Port1) Loader communication port — RS-485 communication port (Port2) ＝Functional insulation (1000VAC)–Functional insulation (500VAC)

■Normal operating condition

Ambient temperature	-10 to 50 degrees C * "Ambient temperature" is the temperature underneath the controller inside the equpiment 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

■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	Communication speed: 156kbps / 625kbps / 2.5Mbps / 5Mbps / 10Mbps Total extension distance: 1200m or less / 900m or less / 400m or less / 200m or less / 100m or less
Shared units/ Station numbers for communication data length	Shared 4 stations / providing number 1 to 61

Shared stations / cycle	Remote I/O (RX/RY)	Remote Register (RWr/RWw)	Control Module PUMA
4 stations / 1	Each 128bit	each 16 word	2 or 4 units
4 stations / 2	Each 256bit	each 32 word	4 or 8 units
4 stations / 4	Each 512bit	each 64 word	8 or 16 units

Connection cable	CC-Link original cable for version 1.10
Connection method	M3 screw x 3 terminals base
Terminating resister	External type (110 ohm, 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	No insulation with RS-485, CT input. 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	

Setting device		Set contents
Front	Rotatory SW×2	CC-Link Setting Station numbers
Equipment interior	Rotatory SW×1	CC-Link Setting Communication speed
	Dip SW (6bit)×1	CC-Link Setting mode

■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
Extrenal 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	24Vdc±10%
Power consumption	Max. 3.2 W(135 mA) [when 24Vdc 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 (500Vdc)
Insulation block diagram	Power / SLD/FG terminal (CC-Link setting terminal) Loader communication port / CC-Link terminal —Basic insulation (1500VAC)—Functional insulation (1000VAC)—Functional insulation (500VAC)

■Normal operating condition

Ambient temperature	-10 to 50 degrees C * "Ambient temperature" is the temperature underneath the controller inside the equpiment 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

■Mitsubishi PLC program less communication Module Type:PUMCM

■RS485 communication

Communication standards	RS-485 compatible
No. of port	2port (Port1, Port2)
Communication, synchro method	Two-wire, half-duplex, asynchronous cycle
Communication speed	9.6k, 19.2k, 38.4k, 115.2kbps, 230.4kbps
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	Start bit1, Data bit; 8, parity; even / odd / none, Stop bit1
Protocol	Modbus MC (type 5)
Insulation	No insulation with port, Functional insulation with any other signal
Function	Master or Slave MELSEC-Q series of PLC and program less communication

■RS232-C communication

Communication standards	RS-232 compatible
No. of port	1port (Port1 only, Selection of the parameter setup with RS-485)
Communication, synchro method	Two-wire, half-duplex, asynchronous cycle
Communication speed	9.6k, 19.2k, 38.4k, 115.2kbps, 230.4kbps
Data format	Start bit1, Data bit; 8, parity; even / odd / none,Stop bit1
Protocol	Modbus RTU compatible
Insulation	No insulation with port, Functional insulation with any other signal
Function	Master or Slave

■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

■Display, configuration

Display	Status display LED (2 colors x 2 points + 4points)
Display contents	RUN/FAULT, RS-485 TX/RX (Port1), RS485TX/RX (Port2)
Setting device	Rotary SW x 1
Set contents	RS-485 Station No. (Station No.= setting value + 1) (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
Extrenal 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	24Vdc±10%
Power consumption	Max. 3.2W (135mA) [when 24Vdc 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 (500Vdc)
Insulation block diagram	Power — RS-485 communication port (Port1) Loader communication port — RS-485 communication port (Port2) =Functional insulation (1000VAC)–Functional insulation (500VAC)

■Normal operating condition

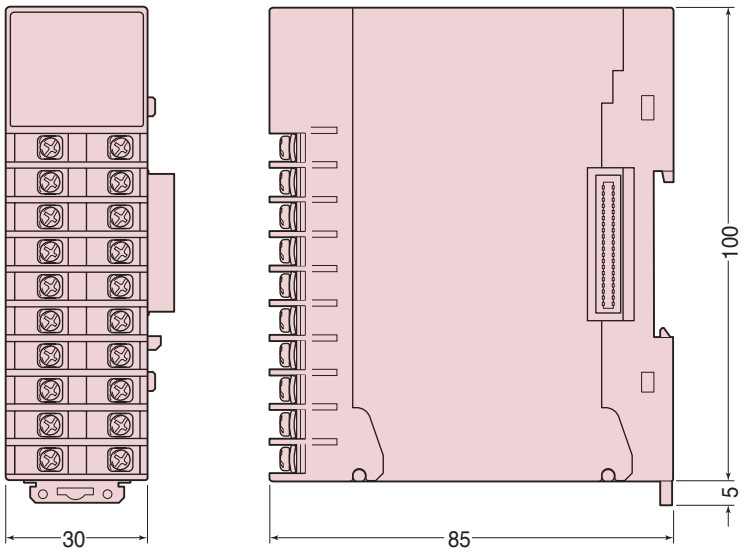
Ambient temperature	-10 to 50 degrees C * "Ambient temperature" is the temperature underneath the controller inside the equipment or the cabinet where the controller is installed.
Ambient humidity	90%RH or less (no condensing)
Vibration	10 to 70Hz, 9.8m/s^2 (1G) or less
Shock	49m/s^2 (5G) or less
Warmup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

OUTLINE DIAGRAM (Unit:mm)

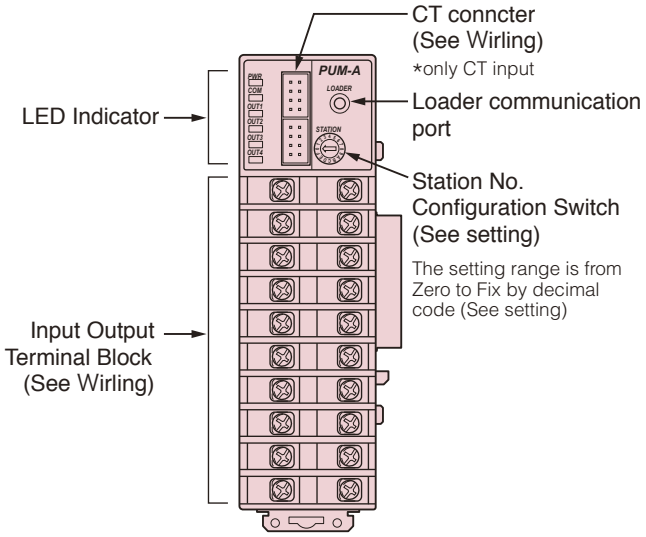
CODE: PUMA/B/V/N/T/C COMMON



PART NAMES AND FUNCTIONS

Main unit

CODE: PUMA/B

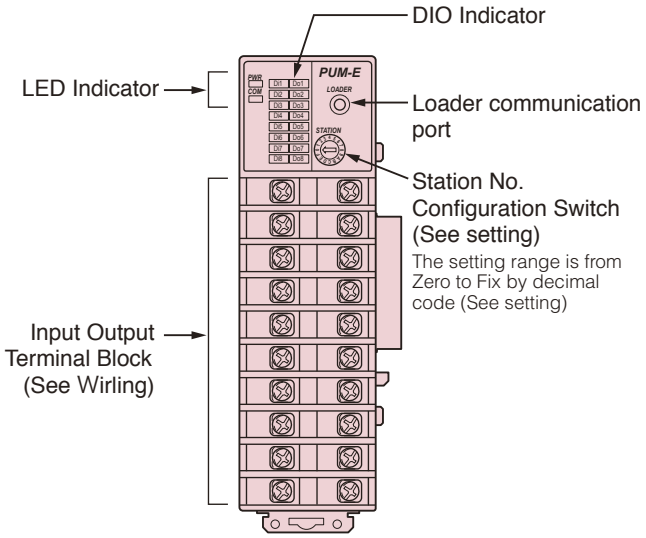


LEDindicator Six LED lamps indicate the following operational conditions

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 by programming

CODE: PUME

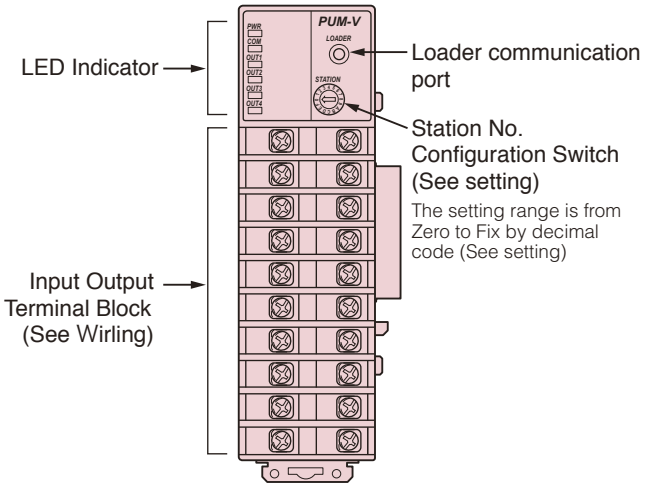


LEDindicator Six LED lamps indicate the following operational conditions

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 Di1-8 and Doi1-8 can be allocated by programming

CODE: PUMV/N/T

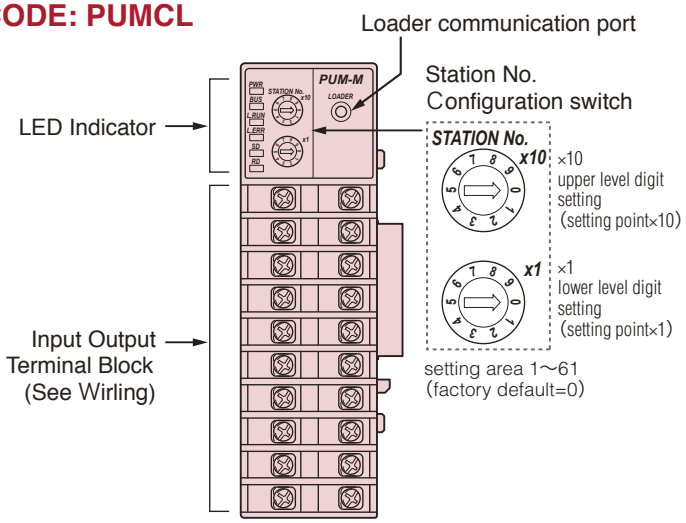


LEDindicator Six LED lamps indicate the following operational conditions

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	orresponding channel outputting *1
	Illuminated	red	Corresponding channel input error *2

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

CODE: PUMCL

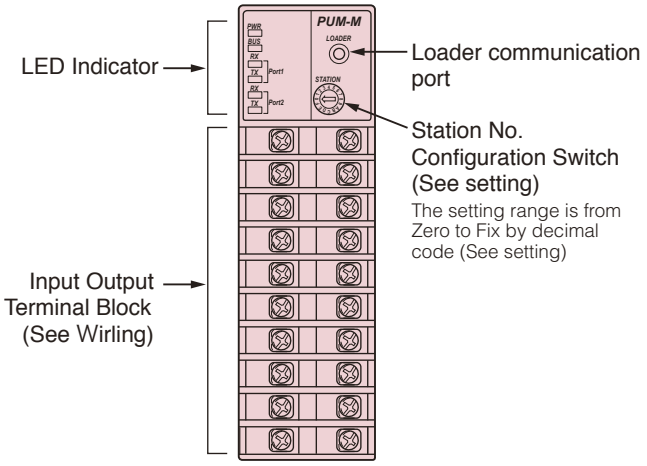


*Appearing cannot do the communication of CC-Link as factory default(0)
Set an atation No. by all means

LEDindicator Six LED lamps indicate the following operational conditions

LED	LED Status	Color	Operational condition
PWR	Illuminated	green	RUN
	Blinking	red	Error
BUS	Illuminated	green	RS485 receiving
	Illuminated	orange	RS485 transmittin
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 chang setting
SD	Illuminated	green	CC-Link receiving
RD	Illuminated	green	CC-Link transmitting

CODE: PUMCR/M



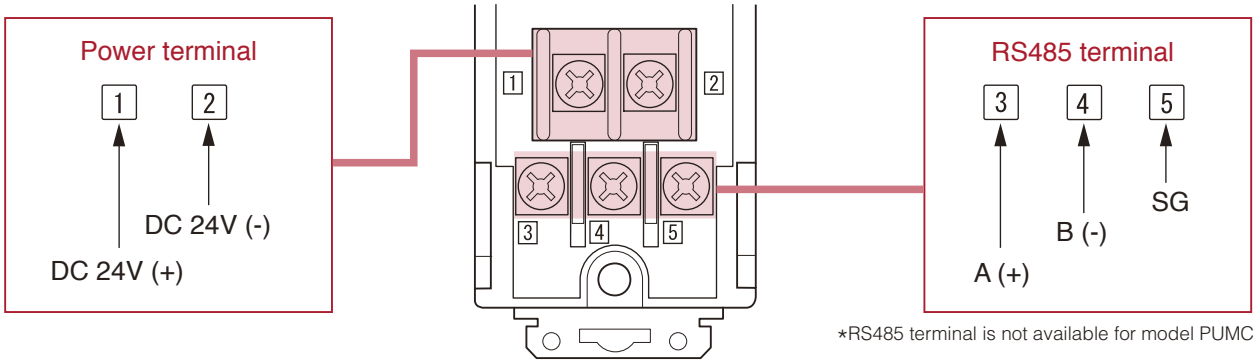
LEDindicator Six LED lamps indicate the following operational conditions

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
BUS	Illuminated	green	RS485 receiving
	Illuminated	orange	RS485 transmitting
RXPort1	Illuminated	green	Port1 receiving
TXPort1	Illuminated	orange	Port1 transmitting
RXPort2	Illuminated	green	Port2 receiving
TXPort2	Illuminated	orange	Port2 transmitting

WIRING

Base part

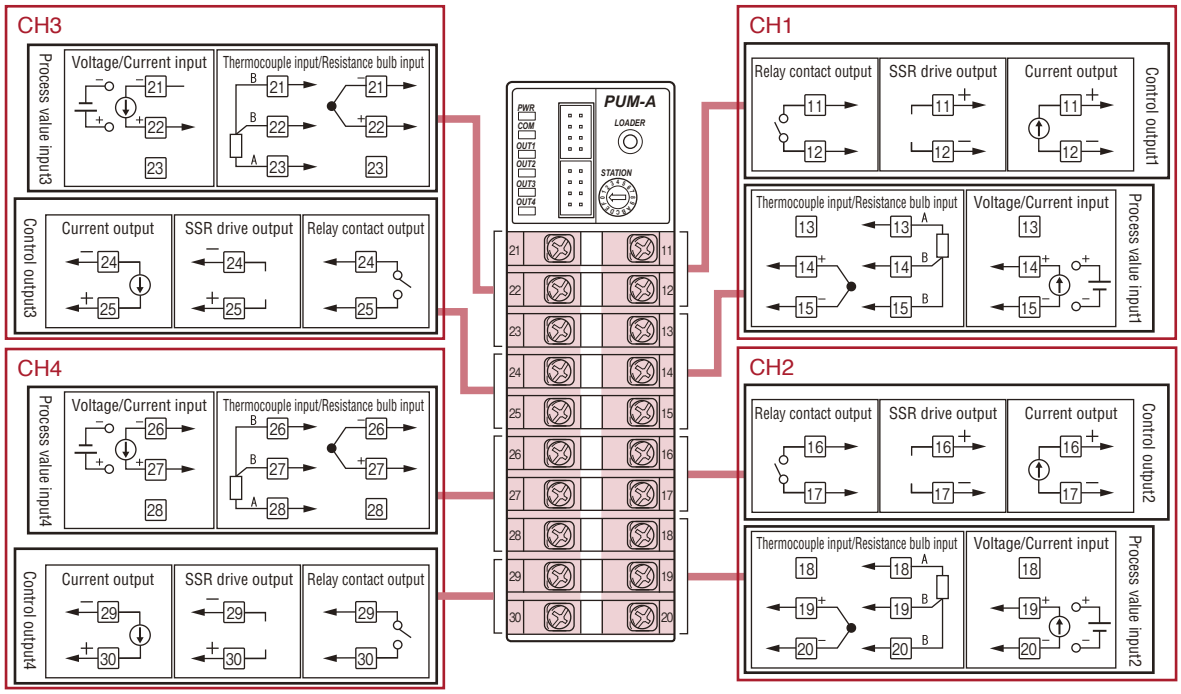
CODE: PUMA/B/V/N/T/C COMMON



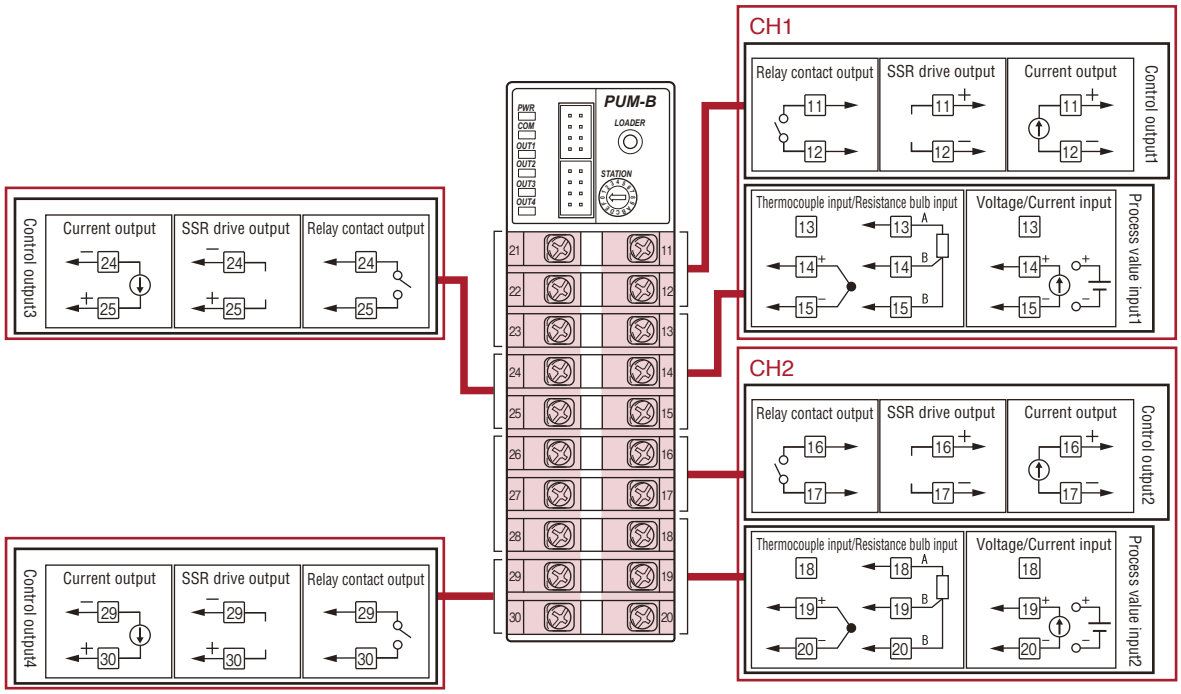
*RS485 terminal is not available for model PUMC

Front terminal block

CODE: PUMA

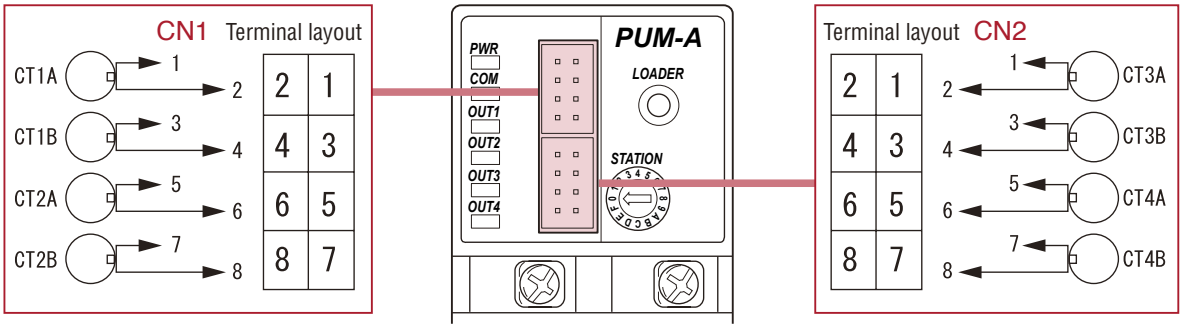


CODE: PUMB

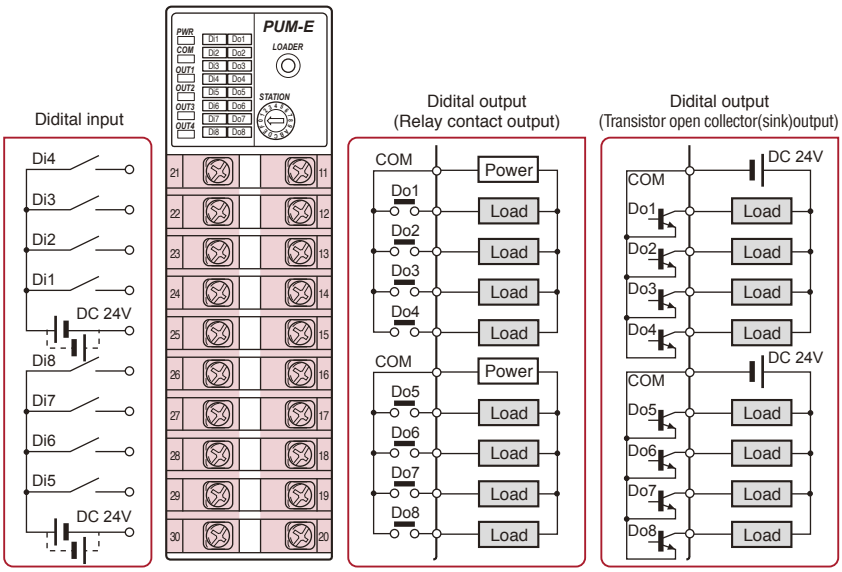


PUMA/B COMMON

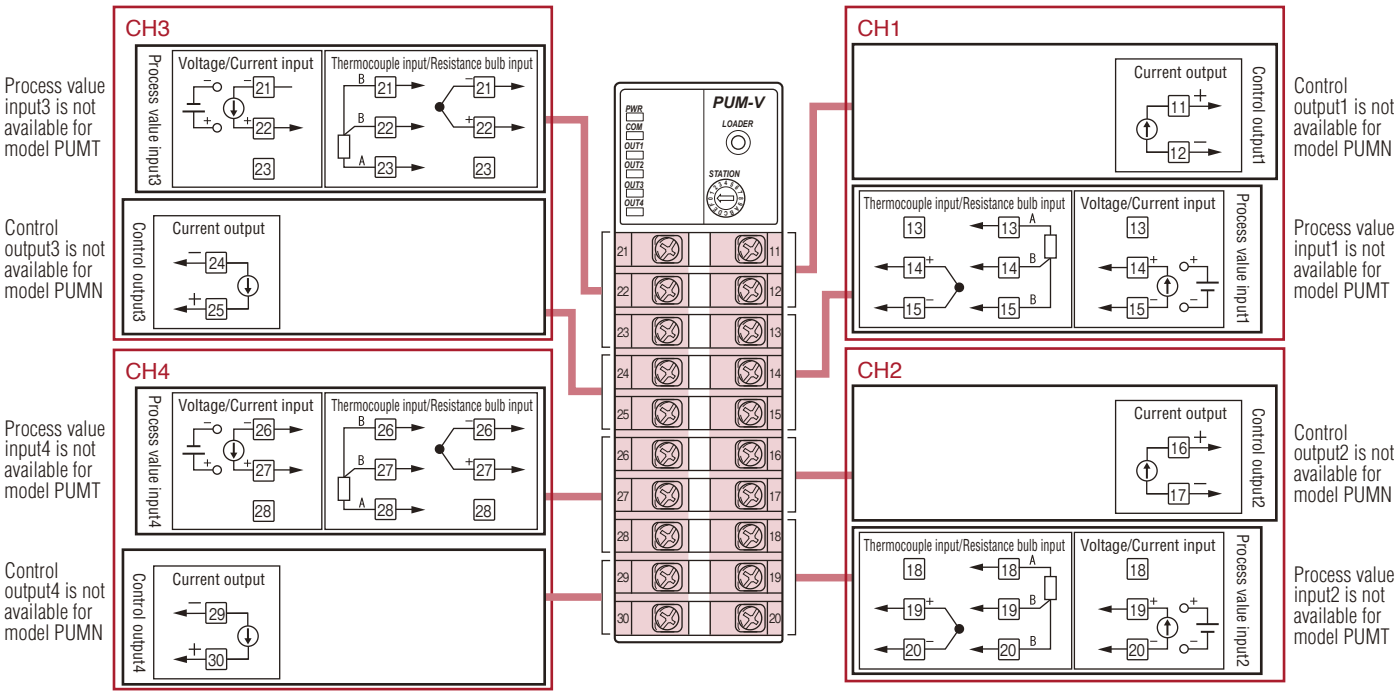
* Pin No. 2,4,6,8 of CN1 and CN2 are connected inside the equipment.
* CN2 cannot be used for PUMB



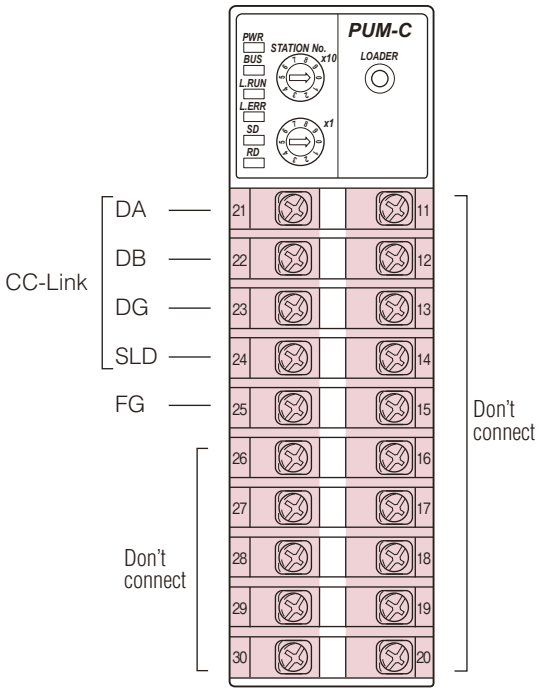
CODE: PUME



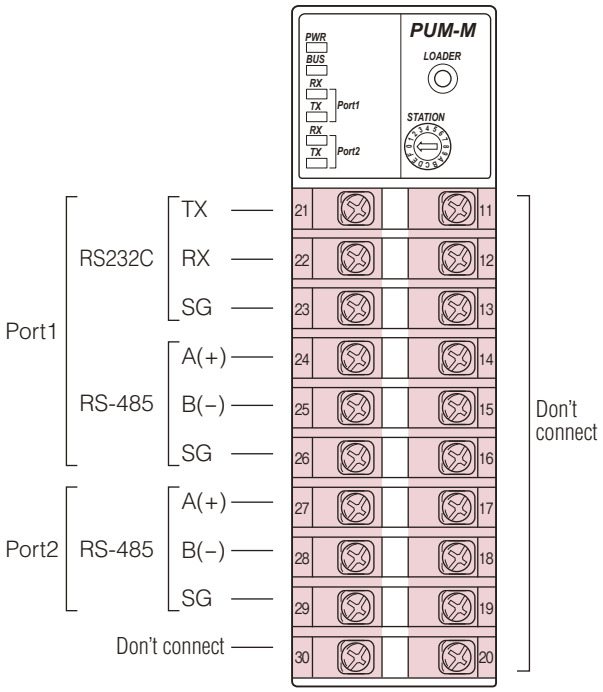
CODE: PUMV/N/T



CODE: PUMCL



CODE: PUMCR/M



SIMPLE PARAMETER LIST FOR PUMA/B

Parameter name	Read/Write date setting range	Depends on input range	Factory defalut	Registor No 1 (Ch1)	Registor No 2 (Ch2)	Registor No 3 (Ch3)	Registor No 4 (Ch4)
Operation parameters							
SV value	0 to 100%FS		0%FS	40001	40002	40003	40004
MV value (%)	-3.0 to 103.0%		—	40005	40006	40007	40008
Manual mode switch	0: Auto 1: Manual		0 (Auto)	40013	40014	40015	40016
Control (PID) parameters							
Proportional band (P)	0.0 to 999.9%		5.0%	41102	42102	43102	44102
Integration time (I)	0 to 3200sec		240sec	41103	42103	43103	44103
Devivation time (D)	0.0 to 999.9sec		60.0sec	41104	42104	43104	44104
ON/OFF contorol hysteresis	0.00 to 50.00%FS		1°C	41105	42105	43105	44105
Setup parameters							
PV1/PV2/PV3/PV4 input type	0 : JPt100 (0-150) 1 : JPt100 (-150-600) 2 : Pt100 (0-150) 3 : Pt100 (-150-300) 4 : Pt100 (-150-850) 5 : J (0-400) 6 : J (0-800) 7 : K (0-400)) 8 : K (0-800) 9 : K (0-1200) 10 : R (0-1600) 11 : B (0-1800) 12 : S (0-1600) 13 : T (-199-400) 14 : E (-199-800) 18 : N (0-1300) 19 : PL-2 (0-1300)		7	40151	40152	40153	40154
Decimal place	0: No decimal point 1: One decimal point		1	41214	42214	43214	44214
System parameters							
CH1 Output proportion cycle	1 to 120sec	2 (SSR) /30 (Relay)	30sec	40176	–	–	–
CH2 Output proportion cycle	1 to 120sec	2 (SSR) /30 (Relay)	30sec	40182	–	–	–
CH3 Output proportion cycle	1 to 120sec	2 (SSR) /30 (Relay)	30sec	40188	–	–	–
CH4 Output proportion cycle	1 to 120sec	2 (SSR) /30 (Relay)	30sec	40194	–	–	–
ON/OFF hysteresis setting	0: OFF 1: ON		1 (ON)	41292	42292	43292	44292
Communication parameters							
RS485 Parity setting	0: NONE 1: ODD 2: EVEN		0	40111	–	–	–
RS485 Communication speed	0: 9.6kbps 1: 19.2kbps 2: 38.4kbps 3: Forbidden 4: 115.2kbps 5: Forbidden		1	40115	–	–	–
RS485 Communication permission	0: Read only 1: Read/Write		1 (R/W)	40114	–	–	–
Master/slave setting in connected	0: Master 1: Slave		1 (Slave)	40117	–	–	–
Monitor parameters							
Measurement value (PV)	-5.0 to 105.0%FS		–	30002	30003	30004	30005
Set value (SV)	0.0 to 100.0%FS		–	30006	30007	30008	30009
Output value (MV1)	-3.0 to 103.0%		–	30014	30016	30018	30020

CODE SYMBOLS

Control module (4channels)

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

Digit	Description		List price
4	<Module type>	4ch control module	
5	<Input type>	Thermocouple /Resistance bulb (all channels)	
		Voltage/current (all channels)	
		Thermocouple/Resistance bulb (ch1,2), voltage/current (ch3,4)	
6	<OUT1, 2 output type>	Relay output	
		SSR drive output	
	Note 1	Current output	
7	<OUT3, 4 output type>	Relay output	
		SSR drive output	
	Note 1	Current output	
8	<Version No.>		
10	<Oeration Manual>	Japanese	
		English	
11	<Option1>	Not fitted	
	Note 2	CT input (8 points)	

Note1) It is impossible to combinate “C” of 11 digits
Note2) It is impossible to combinate “E” of 6 digits and 7 digits

Control module (2channels)

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

Digit	Description		List price
4	<Module type>	2ch control module	
5	<Input type>	Thermocouple/Resistance bulb (all channels)	
		Voltage/current (all channels)	
6	<OUT1, 2 output type>	Relay output	
		SSR drive output	
	Note 1	Current output	
7	<OUT3, Note 2	Relay output	
	4 output type>	SSR drive output	
	Note 3	Current output	
8	<Version No.>		
10	<Oeration Manual>	Japanese	
		English	
11	<Option1>	Not fitted	
	Note 4	CT input (8 points)	

Note1) It is impossible to combinate “C” of 11 digits
Note2) The “Out3” and “Out4” are necessary to use heat and cool control

Event input/output module

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

Digit	Description		List price
4	<Module type>	Event input/output module (Di 8 points/ Do 8 points)	
5	<Input type>	Transistor open collector (sink) output	
		Relay contact output	
8	<Version No.>		
10	<Oeration Manual>	Japanese	
		English	

Input/output analog module

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

Digit	Description		List price
4	<Module type>	analog input/output module AI4/AO4	
		analog input module AI4	
		analog output module AO4	
5	<Input type> Note 1	Input: Thermocouple /Resistance bulb (all channels)	
	Note 1	Input: Voltage/current (all channels)	
	Note 1	Input: Thermocouple /Resistance bulb (ch1,2)	
		Voltage/current (ch3,4)	
	Note 2	Analog output module	
6	<OUT1, Note 3	None	
	2 output type> Note2	Current output	
7	<OUT3, Note3	None	
	4 output type> Note2	Current output	
8	<Version No.>		
10	<Operation Manual>	Japanese	
		English	

Now developing
Now developing
Now developing

Note1) Select only “V” or “N” of 4 digit
Note2) Select only “V” or “T” of 4 digit
Note3) Select only “N” of 4 digit

Enhanced communication module

PUM [4][5][6][7][8] – [9][10]

Digit		Description		List price
4	<Module type>	enhanced communication modul	C	
5	<Communication module>	High-speed communication	R	Now developing
		MITUBISI –PLC Program-less communication	M	Now developing
		CC-Link communication	L	
8	<Version No.>		1	
10	<Operation Manual>	Japanese	A	
		English	B	

Accessories

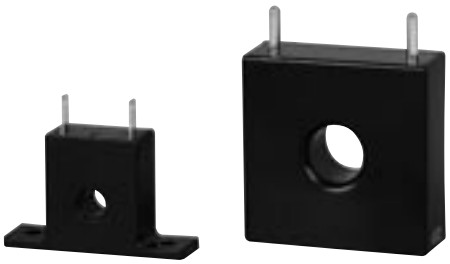
PUMZ＊ [6][7][8]

Digit		Description		List price
6		RS485 terminating resistance	A01	
7	Note1	DIN rail mounting end plate	A02	
8	Note1	Side connecting terminal cover (right & left 1set)	A03	
	Note1	Front face screw terminal cover	A04	
	Note2	Loader connecting cable (RS232C)	L01	
	Note3	CT input terminal cable (for 4 points) (l=1m)	C01	
	Note3	CT input terminal cable (for 4 points) (l=3m)	C03	
	Note3	CT input terminal cable (for 4 points) (l=5m)	C05	
		CT for 1 to 30A (CTL-6-S-H)	CT1	
		CT for 20 to 50A (CTL-12-S6-8)	CT2	

Note1) Only 10 unit for your order
Note2) It is necessary for using USB port to repairer the “USB-Serial” convert
Note3) The cable of CT imput is minimum unit that 3-phase and 2 channel

ACCESSORIES

Heater current detector (CT)

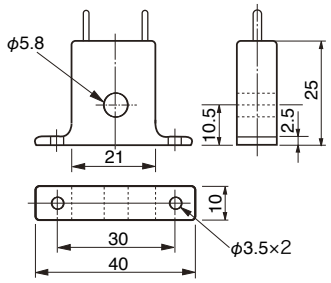


■Specification

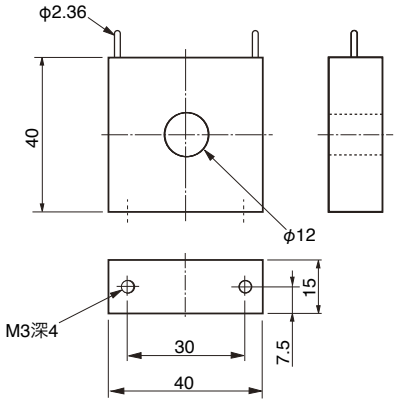
	For 1 to 30A	For 20 to 50A
Type	CTL-6-S-H	CTL-12-S36-8
Dimension (H×W×D mm)	25×40×10	40×40×15
Through-bore (mm)	φ5.8	φ12

■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			List price
UG530series 12.1型	UG530H-VS1	TFT Color liquid crystal SVGA		AC110-200V	
	UG530H-VH1		Ethernet normal deployment,option unit equipped		
	UG530H-VS4			DC24V	
	UG530H-VH4		Ethernet normal deployment,option unit equipped		
UG430series 10.4型	UG430H-TS1	TFT Color liquid crystal VGA		AC110-200V	
	UG430H-TH1		Ethernet normal deployment,option unit equipped		
	UG430H-TS4			DC24V	
	UG430H-TH4		Ethernet normal deployment,option unit equipped		
	UG430H-VS1	TFT Color liquid crystal SVGA		AC110-200V	
	UG430H-VH1		Ethernet normal deployment,option unit equipped		
	UG430H-VS4			DC24V	
	UG430H-VH4		Ethernet normal deployment,option unit equipped		
	UG430H-SS1	TFT Color liquid crystal VGA 128 colors		AC110-200V	
	UG430H-SS4			DC24V	
	UG430H-VH1B	separate-type SVGA	Ethernet normal deployment,option unit equipped	AC110-200V	
	UG430H-VH4B			DC24V	

●Thyristor Units

PT3000S-1PH ／[1st]／[2nd]／[3rd]／[4th]／[5th]／[6th]／[7th]

digit		specification	type code	List price
1st	<Nomimal current>	15A	15A	
		25A	25A	
		35A	35A	
		45A	45A	
		60A	60A	
		90A	90A	
		110A	110A	
2nd	<Nomimal voltage>	Customer specifications		
3rd	<Maximum voltage>	240V	240V	
4th	<Auxiliary voltage>	none	NONE	
		230V	230V	
		460V	460V	
5th	Input	SSR	SSR	
		110V/ON/OFF	110A	
		230V/ON/OFF	230V	
	Note1	4-20Ma loop powerd	LP4-20MA	
6th	Firing	Zero crossing	ZC	
	Note2	Bust Firing	BF	
7th	option Note3	External fuse (Less than 90A)	EF	
	Note3	Internal fuse (More than 110A)	1F	
		Heater break alarm	HB	
		Fan110V	110VFAN	

Note1) Available from 15 to 110A
Note2) Select “BF04”, ”BF08”, or “BF15”
Note3) Select “EF” or “IF”

●Automation softwear CITECT

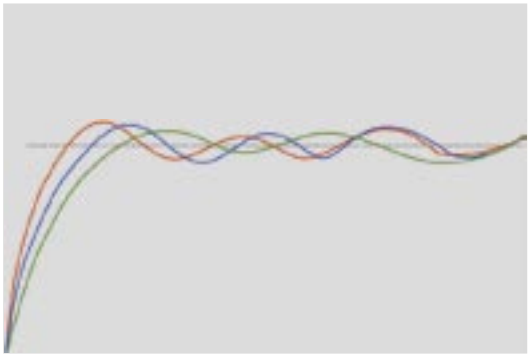
PAT [4][5][6 3][7 1][8 1] — [9 Y][10 Y][11 Y][12 Y][13 Y] — [14 Y]

digit		specification		type code	List price
4	<type of license key> Note1	softwear (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	10,000points	FK	
		full license key	15,000points	FF	
		full license key	30,000points	FJ	
		full license key	50,000points	FG	
		full license key	150,000points	FH	

Optimum multiple-zone controller (If multi 8 control zone are used, please consult with Fuji sales department.)

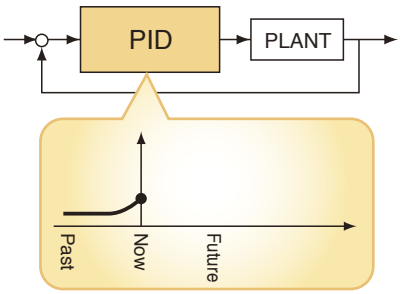
Optimum multiple-zone controller (Patent pending)

· Can be applied to control system where mutual interference of multiple-zones occurs.
· Can also be applied in the case of interference occurring in temperature control between multiple-zones, like reflow control.

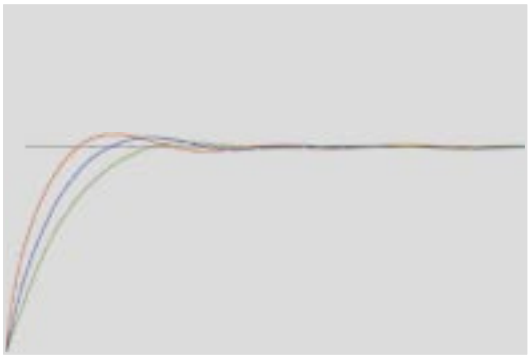


●PID contorol

I calculate based on a value of the past and present and control it

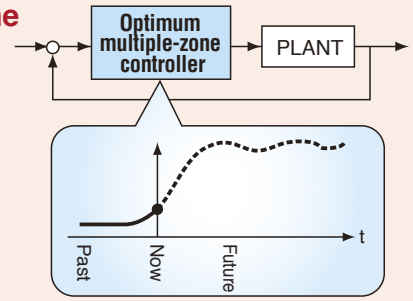


Optimum multi-zone control by Fuji' s original algorithm

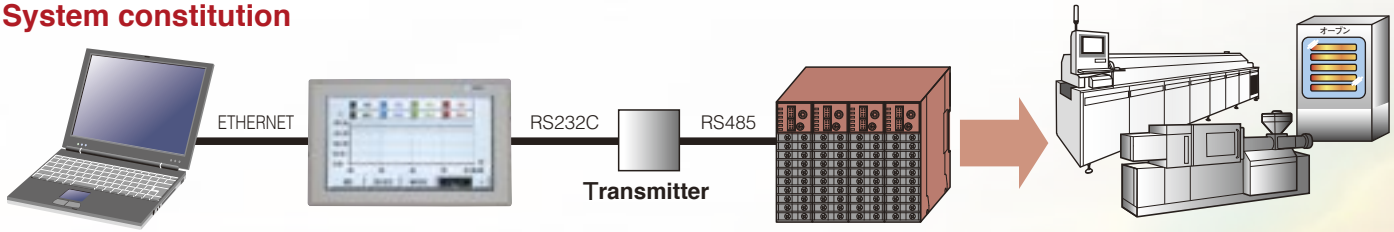


●Optimum multiple-zone controller

I have the model of the PLANT in a controller and I calculate based on a future value the past and control it



System constitution



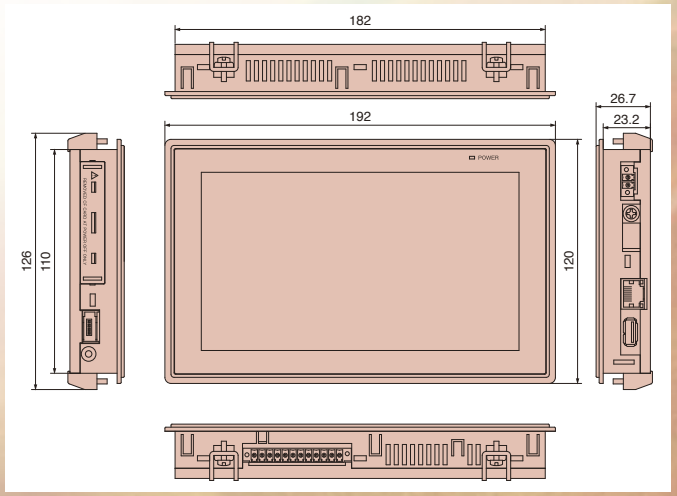
PC environment for Optimum control simulator

OS	Windows 2000/XP
CPU	more than 500MHz
HD	more than 100MB (Space capacity)
CR-ROM	Need
MONITOR	more than 1280×1024

Specifications (Optimum multiple-zone controller)

Power supply	DC24V (DC20.4V to 26.4)
Power consumption	less than 7w
OS	Linux
CPU	SH-7760 192MHz
SDRAM	64Mbyte
Higher communication	ETHERNET
Lower communication	RS232C

Outline diagram (Optimum multiple-zone controller)



PERIPHERAL INSTRUMENTS

Programmable Operation Display

POD Satisfies Varieties of Needs

Expression

Expressive

Impressive, real expression of photos and illustrations 32,768 full-color images as standard specification

Possible 32,768 full-color images for all sizes from 5.7 to 15.0 types. Improved image quality will enhance the machine and system values.

Information Management

Supportive

CF card usable for data from all sources covering the PC and PLC

Data of PC can be shared with PLC or vice versa by using the CF card. In addition, screen data and all other POD data can be saved into the CF card, and the CF card can be loaded into the POD.

Conforms to 32,768 full-color for clearer and sharper image display.
Simplifies your system as a gateway of the temperature control network that connects the PLC, temperature controllers, and inverters.
The UG series are the displays that best fit users' needs by providing clearer and sharper images and allowing simplified system configuration.

Maintenance Tool

Supporting on-site maintenance with the convenient maintenance tool

Resources

The on-site maintenance is strongly supported by the CF card for screen management and the PLC program data read/write using the ladder transfer function.

Editor

Easy creation of original screens meeting on-site needs with plentiful functions

Creative

Wizard function permits faster and sharper screen creation. The multilingual edit function easily creates not only English Date Screen but Data Screen, usable worldwide.

Network

Conforms to all types of networks, from open network to Ethernet.

Integrative

By using the Ethernet as the standard, a network system with the POD acting as the core can be easily configured. Temperature control network permits direct access to an inverter or temperature controller while connecting to the PLC; thus, reducing the PLC load.

External Connection

A variety of interfaces with external units is the standard.

Connective

Higher functions and cost reduction of machine or equipment can be achieved by the video input and RGB I/O functions. In addition to screen data transmission, connection with printer and card reader/writer is possible by using the USB master/slave interface.

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