



# Instruction Manual

## Digital Controller Model: PXH

Fuji Electric Co., Ltd.

International Sales Div  
Sales Group

Gate City Ohsaki, East Tower, 11-2, Osaki 1-chome,  
Shinagawa-ku, Tokyo 141-0032, Japan  
http://www.fujielectric.com  
Phone: 81-3-5435-7280, 7281 Fax: 81-3-5435-7425  
http://www.fujielectric.com/products/instruments/

INP-TN1PXHc-E

Thank you for purchasing the Fuji Digital Controller.

Once you have confirmed that this is the product you ordered, please use it in accordance with the following instructions.

For detailed information on operating this equipment, please refer to the separate operations manual (User's manual) in the supplied CD-ROM.

In addition, please keep this instruction manual within easy reach of the actual person using this equipment.

### CAUTION

The content of this manual is subject to change without notice.

The greatest care has been taken with the content of this manual to ensure accuracy; however, Fuji Electric shall not be held liable for damages, including indirect damages, caused by typographical errors, absence of information or use of information in this manual.

## CONTENTS

PLEASE READ FIRST .....	3	ChF <i>Pfb</i> (motorized valve definition) .....	37
For Proper Usage .....	9	[ Heating/cooling control type exclusive parameter list ]	
1. Installation/mounting .....	10	Ch2 <i>Pcd</i> (Control parameter) .....	38
2. Wiring Connection .....	11	Ch4 <i>PLF</i> (Control palette) .....	39
3. Usage (Read before using) .....	12	Ch7 <i>Mon</i> (Monitor) .....	41
4. Displays and Operation Methods .....	16	Ch8 <i>SEF</i> (Input/output definition) .....	41
5. Switching parameters .....	17	Ch9 <i>SY5</i> (System definition) .....	41
[ Basic type, Motorized control type, Heating/ cooling control type common parameter list ]		6. Digital Controller Functions .....	42
Ch1 <i>oPE</i> (Operation parameter) .....	18	6-1 Alarm functions .....	42
Ch2 <i>Pcd</i> (Control parameter) .....	20	[Table 1] Alarm Operation Type Codes .....	43
Ch3 <i>PLF</i> (Control palette) .....	22	7. Setup Procedures of the Controller .....	44
Ch7 <i>Mon</i> (Monitor) .....	23	[Table 2] Input Codes .....	46
Ch8 <i>SEF</i> (Input/output definition) .....	25	[Table 3] Input Range Table (Standard Range) .	47
Ch9 <i>SY5</i> (System definition) .....	28	[Table 4] Output Type Code Table .....	48
ChA <i>ALn</i> (Alarm setting) .....	30	[Table 5] Di Input Assignments (Di1 to Di15) ....	50
ChB <i>LoM</i> (Communication) .....	31	[Table 6] Do and LED display Assignments .....	51
ChC <i>Linr</i> (Linearize) .....	32	[Table 7] Standby Operation .....	51
ChD <i>LLC</i> (Mathematical Calculation) .....	32	[Table 8] User Assignable Function keys .....	52
ChE <i>Rf</i> (Tuning) .....	32	[Table 9] Type of Math function .....	53
ChG <i>Fof</i> (Totalizer) .....	33	[Table 10] Control template .....	54
ChX <i>rCP</i> (Recipe) .....	35	8. Troubleshooting	
[ Motorized control type exclusive parameter list ]		[Please read when the display does not make sense] .....	55
Ch7 <i>Mon</i> (Monitor) .....	36	Model Specification .....	56
Ch8 <i>SEF</i> (Input/output definition) .....	36	PXH Model Code .....	56
Ch9 <i>SY5</i> (System definition) .....	36	Specifacaitons .....	59

# Confirming Specifications and Accessories

Before using the product, confirm that it matches the type ordered.

(For model code, please refer to pages 56 to 58.)

Confirm that all of the following accessories are included.

- |  |
|--|
| <ul style="list-style-type: none"> <li>• Digital Controller ..... 1 unit</li> <li>• Instruction Manual ..... 1 copy</li> <li>• Mounting fixture ..... 2 pcs.</li> <li>• Waterproof packing .... 1 pc.</li> <li>• Unit nameplate ..... 1 pc.</li> <li>• Terminating resistance*1 ..... 1 pc.</li> </ul> |
|--|

\*1) Supplied only when the communications function (RS485) is selected with this model.

## Option

Name	Order No.
PC loader communication cable	ZZPPXH1*TK4H4563
Terminal covers *2	ZZPPXR1-B230

\*2) Two pieces are required per unit.

# Related Information

Refer to the following reference materials for details about the items described in this manual.

Content	Document	Reference Number
Specifications	Catalogue	ECNO: 1152
Operation Method	User's Manual (Basic control type)	INP-TN514206-E
	User's Manual (Motorized valve type)	INP-TN514357-E
	User's Manual (Heating/cooling type)	INP-TN514557-E
Communication Functions	Communication Functions Instruction Manual (Modbus) for Digital Controller (type: PXH)	INP-TN514207-E
Loader Functions	Parameter Loader Instruction Manual for Digital Controller (type: PXH)	INP-TN514208-E

The latest materials can also be downloaded at the following

URL: <http://www.fujielectric.com/products/instruments/>

Please read the section “Safety Warnings” thoroughly before using.

Please observe the warnings stated here as they contain important safety details. The safety warning items are divided into “WARNING” and “CAUTION” categories.

 <b>Warning</b>	Mishandling may lead to death or serious injury.
 <b>Caution</b>	Mishandling may cause injury to the user or property damage.

## 1. WARNING

### 1.1 Limitations in Use

This product was developed, designed and manufactured on the premise that it would be used for general machinery.

In particular, if this product is to be used for applications that require the utmost safety as described below, please take into consideration the safety of the entire system and the machine by adopting such means as a fail-safe design, a redundancy design as well as the conducting of periodical inspections.

- Safety devices for the purpose of protecting the human body
- Direct control of transportation equipment
- Airplanes
- Space equipment
- Atomic equipment, etc

Please do not use this product for applications which directly concern human lives.

## 1.2 Installation and Wiring

- This equipment is intended to be used under the following conditions.

Ambient temperature	-10°C to 50°C	
Ambient humidity	90% RH or below (with no condensation)	
Installation category	II	by IEC1010-1
Pollution level	2	

- Between the temperature sensor and the location where the voltage reaches the values described below, secure clearance space and creepage distance as shown in the table below. If such space cannot be secured, the EN61010 safety compliance may become invalid.

Voltage used or generated by any assemblies	Clearance Space [mm]	Creepage Space [mm]
Up to 50 Vrms or Vdc	0.2	1.2
Up to 100 Vrms or Vdc	0.2	1.4
Up to 150 Vrms or Vdc	0.5	1.6
Up to 300 Vrms or Vdc	1.5	3.0
Above 300 Vrms or Vdc	Please consult our distributor	

} hazardous voltage

- For the above, if voltage exceeds 50Vdc (called danger voltage), grounding and basic insulation for all terminals of the equipment and auxiliary insulation for warning outputs is required. Note that the insulation class for this equipment is as follows. Before installing, please confirm that the insulation class for equipment meets usage requirements.

Power source	Internal Circuit
Digital output 1, 2	PC Loader interface
	Measurement value input 1 (PV1)
Digital output 3	Measurement value input 2 (PV2)
Digital output 4	Auxiliary analog Input 1 (Ai1)
Digital output 11 to 15	Output 1 (Current / SSR driver)
	Output 2 (Current / SSR driver)
———— Basic insulation (1500VAC)	----- Digital input 1 to 4
	----- Digital input 11 to 15
———— Functional insulation (500VAC)	Transmitter power supply
----- No insulation	RS485

- In cases where damage or problems with this equipment may lead to serious accidents, install appropriate external protective circuits.
- As this equipment does not have a power switch or fuses, install them separately as necessary. (Main power switch: 2point Breaker, fuse rating: 250V 1A)
- For power supply wiring, use wire equal to 600V vinyl insulation or above.
- To prevent damage and failure of the equipment, provide the rated power voltage.
- To prevent shock and equipment failure, do not turn the power ON until all wiring is complete.
- Before feeding power, confirm that clearance space has been secured to prevent shock and fire with the equipment.
- Do not touch the terminal while the machine is on. Doing so risks shock or equipment errors.
- Never disassemble, convert, modify or repair this equipment. Doing so carries the risk of abnormal operation, shock and fire.

## 1.3 Maintenance

- When installing and removing the equipment, turn the power OFF. Failing to do so may cause shock operational errors or failures.
- Periodic maintenance is recommended for continuous and safe use of this equipment. Some components used on this equipment have a limited life and/or may deteriorate over time.
- The warranty period for this unit (including accessories) is one year, if the product is used properly.

## 2. **Caution**

### 2.1 Cautions when Installing

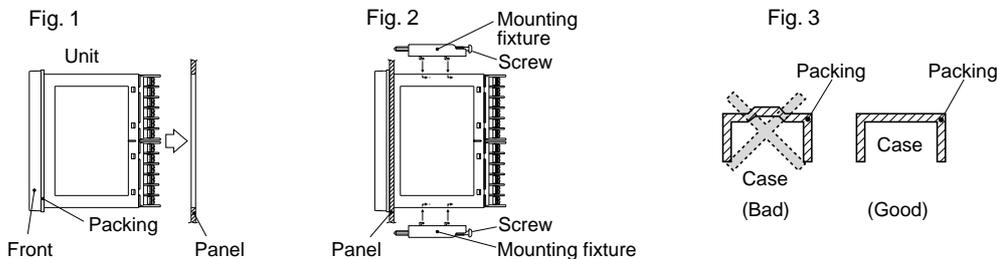
Please avoid installing in the following locations.

- Locations in which the ambient temperature falls outside the range of  $-10$  to  $50^{\circ}\text{C}$  when equipment is in use. (If the power supply is AC200V, the recommended maximum ambient temperature is  $45^{\circ}\text{C}$ .)
- Locations in which the ambient humidity falls outside the range of 0 to 90% RH when equipment is in use
- Locations with rapid temperature changes, leading to dew condensation
- Locations with corrosive gases (especially sulfide gas, ammonia, etc.) or flammable gases
- Locations in contact with water, oil, chemicals, steam or hot water  
(If the equipment gets wet, there is a risk of electric shock or fire, so have it inspected by the distributor.)
- Locations with high concentrations of atmospheric dust, salt or iron particles
- Locations with large inductive interference, resulting in static electricity, magnetic fields or noise
- Locations in direct sunlight.
- Locations that build up heat from radiant heat sources, etc.

## 2.2 Cautions when Attaching the Panels

- Please attach the PXH with the included Fixtures (2 pieces) to the top and bottom, and tighten with a screwdriver.  
The clamp torque is approximately 0.15 N·m (1.5 kg·cm)  
(However, do exercise caution in not applying too much torque because the casing is made of plastic.)
- The front of this equipment is waterproof in compliance with NEMA-4X standards (IP66-equivalent). However, regarding waterproofing between the equipment and the panel, use the included packing to ensure waterproofing and attach it according to the guidelines below. (Incorrect attachment may cause the equipment to lose its waterproof capabilities.)
  - ① As shown in Fig. 1, insert the panel after attaching the packing to the equipment case.
  - ② As shown in Fig. 2, tighten the fixture screws so that no gaps can remain between the equipment face, the packing and the panels. Once finished, confirm that there are no changes in shape such as displaced or improperly-fitted packing, etc. as shown in Fig. 3.
- Please exercise caution if the panel strength is weak and gaps develop between the packing and the panel, as this will result in the loss of its waterproofing capabilities.

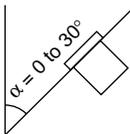
### Mounting method



Standard: vertical panel attachment (horizontal position installing)

If attached at an angle, the maximum gradient is a 30° downslope.

Fig. 4



### (Caution)

- In order not to hamper heat radiation, do not block the sides of the equipment.
- Do not block the air vents on the upper part of the terminal.
- For the PXH9, please attach the Fixtures to the attachment holes in the center of the main unit.

## 2.3 Cautions for Wire Connections

- Perform wiring beginning from the left-side terminals (No. 1 to No. 12).
- Do not connect anything to the unused terminals. (Do not use them as relay terminals.)
- For thermocouple input use the appropriate compensating cable; for resistance bulb sensors, use wires with small resistance and without any resistance difference among the three wires.
- To avoid noise conductor effects, do not use input signal wires in close proximity with electric power lines or load lines.
- Use input signal lines and output signal lines that are separated from each other and are shielded.
- If there is a lot of noise from the power source, adding an insulation transducer and using a noise filter is recommended.

(Example: TDK ZMB22R5-11 noise filter)

Always attach a noise filter to a panel that is grounded securely, and keep the wiring between the noise filter output side and the measuring equipment power terminal wiring to a minimum length. Please do not attach fuses and switches, etc. to the noise filter output wiring since doing so will decrease the filter's effectiveness.

- Twisting the measuring instrument wiring is effective when connecting the wires. (The shorter the pitch of the twist, the more effective the connection is against noise.)
- It takes preparation time before operation starts for the contact output when power is turned on. If using it as a signal to an external interlock circuit, please couple it with a delayed relay.
- Concerning the output relay, connecting the maximum rated load will shorten the relay's life; so please attach an auxiliary relay. If the output operation frequency is high, selecting a SSR/SSC drive output type is recommended.

[Proportional cycles] Relay output: 30 seconds or more,  
SSR/SSC drive output: 1 second or more

- When inductive loads such as magnetic opening/closing equipment, etc. as relay output equipment are connected, use of "Zetrap," manufactured by Fuji Device Technology, Co. Ltd., is recommended in order to protect the connection points against opening/closing surges and to ensure long-term use.

Model names : ENC241D-05A (For 100V power voltage)  
ENC471D-05A (For 200V power voltage)

Attachment position : Please connect between the relay control output connection points. (Refer to Fig. 5.)

- If using a thermocouple input, make sure that an RCJ module is connected as shown in Fig 5. (If an RCJ module is not connected, the temperature measurement cannot function.)  
To use resistance bulb input instead of thermocouple input, remove RCJ module. Keep the removed RCJ module, and do not forget to mount it back again when input is changed.
- Take wiring resistance into consideration when using a Zener barrier.
- In applying mV voltage, do not remove the RCJ module.
- It is dangerous to make an SSR connection when the output is set at 4-20mA, because the output will be kept "ON" even when the MV display shows -5%. Make sure to confirm the setting and the wiring before making the SSR connection.
- When the transmitter power supply model is selected, the external wiring will be connected as Fig. 6.

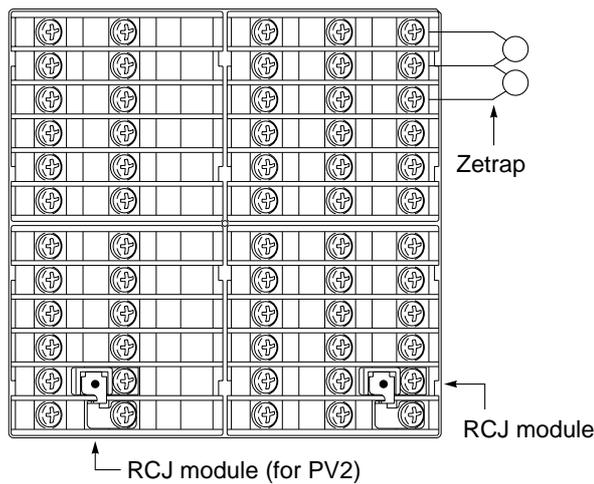


Fig. 5 Attachment position of Zetrap and RCJ module

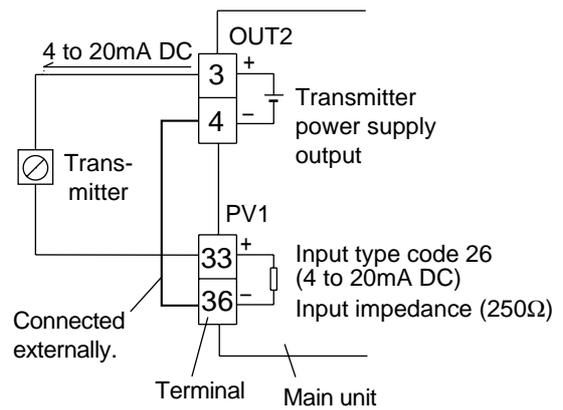


Fig. 6 External wiring for the model with the transmitter power supply

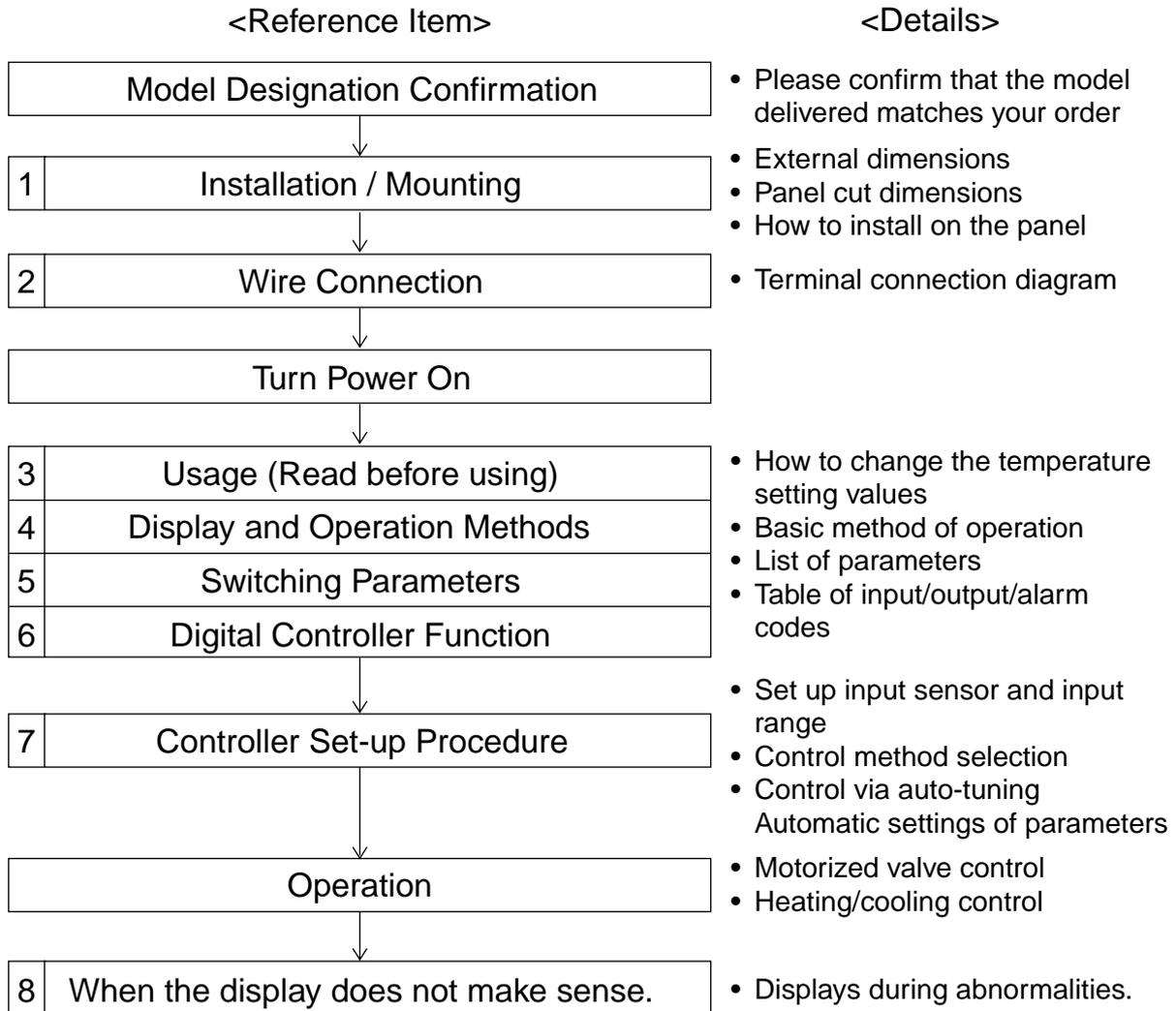
## 2.4 Key Operation Cautions/Operations during Abnormality

- The alarm function does not work properly when an abnormality takes place unless the settings are made correctly. Always verify its setting before operation.
- If the input wiring breaks, the display will read UUUU. When replacing the sensor, always turn the power OFF.
- The PV display will read UUUU or LLLL when over range or under range during input. However, if the display limit is smaller than the over-range/under-range, the fixed number -19999 or 99999 will be displayed.

## 2.5 Others

- Please do not wipe the equipment with organic solvents such as alcohol or benzene, etc. If wiping is necessary, do so with a neutral cleaning agent.
- Do not use mobile phones near this instrument (within 50 cm). Otherwise a malfunction may occur.
- Trouble may occur if the instrument is used near a radio, TV, or wireless device.

# For Proper Usage



※ Since about 15 minutes is needed until the unit becomes thermally stable, wait for 15 minutes or more after turning the power on before making measurements, etc.

※ It takes about 7 seconds from power ON to establish a stable output.

# 1

# Installation/mounting

## External/Panel Cut Dimensions

Outline Dimensions	Panel Cutout Dimensions
<p>Outline dimensions drawing (96mm type) (unit: mm)</p> <p>Waterproof packing Panel Terminal screw M3 RCJ module RCJ module (for PV2)</p> <p>PC Loader interface</p> <p>(37-48) (49-60) (61-72) (1-12) (13-24) (25-36)</p> <p>In case of using the packing in installation, please note the below procedure. (The overtightening condition may occur and it makes the enclosure strained.) ◆ Turn the screw until the center of mounting fixture splits into right and left and clanking sounds heard approx. 5 times. *The clamping torque will be fitted automatically in this condition.</p>	<p>(Unit: mm)</p> <p>Note: In the case where a paint finish will be applied after panel hole-punching, take care of the finished dimensions.</p>

- \* Depending on the models, some terminals will remain unused (terminals 37 to 60). A terminal block should not be installed onto these unused terminals. (A dummy cover will be installed.)
- \* Use a PC loader interface when using the parameter loader. An optional PC loader communication cable is required to use the parameter loader.

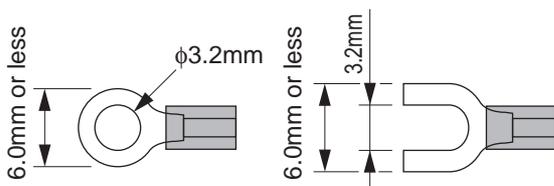
- Use wires and Crimp-style terminals of the size shown below for connections.

### Wire size

Parts	Size
Thermocouple (Compensation wire)	1.25mm <sup>2</sup> or smaller
Wire	1.25mm <sup>2</sup> or smaller

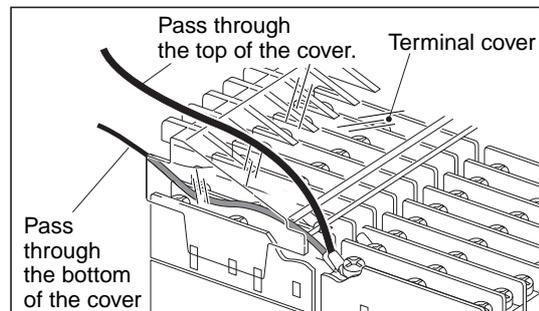
### Crimp-style terminal

Compatible wire size	Fastening torque
0.25 to 1.25mm <sup>2</sup>	0.8N·m



### Connection using terminal cover

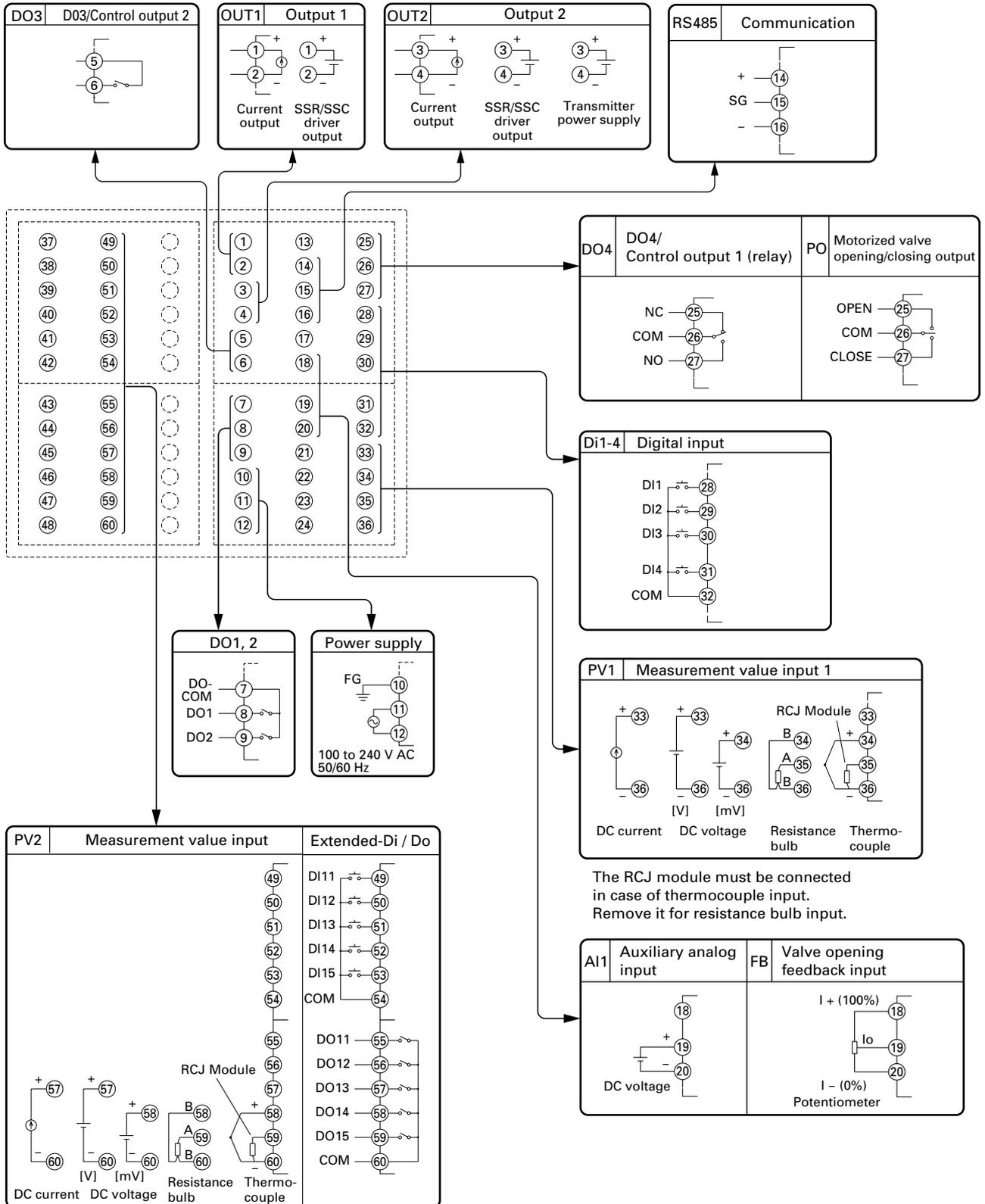
- Connect 2 wires of 1.25mm<sup>2</sup> or smaller in size together to the same terminal as shown below.



# 2

# Wiring Connection

## Terminal Connection Diagram

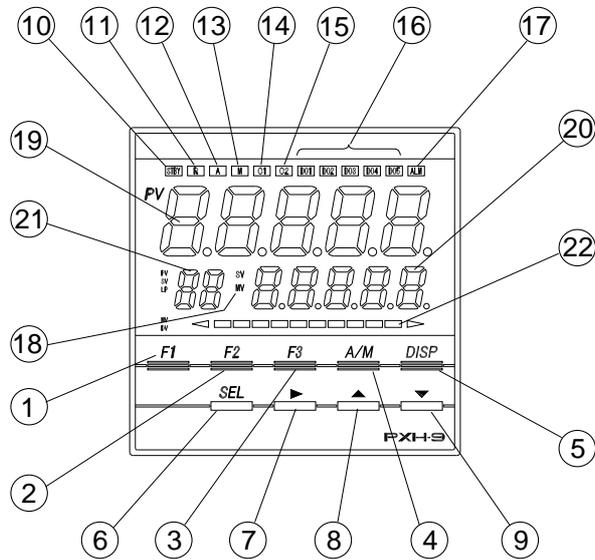


The RCJ module must be connected in case of thermocouple input. Remove it for resistance bulb input.

# 3

# Usage (Read before using)

## Operating parts and their functions

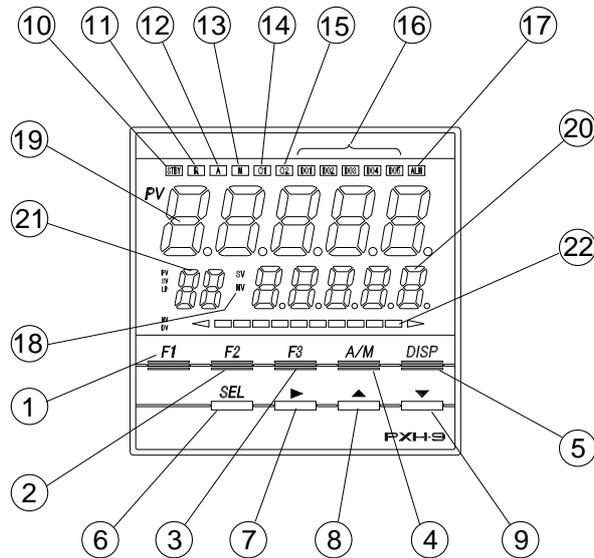


### Operation Part

Name	Function	
	Basic type, Heating/cooling control type	Motorized control type
① F1 key	Assignable by the user.	Assignable by the user.
② F2 key	Assignable by the user.	Assignable by the user.
③ F3 key	Assignable by the user.	Assignable by the user.
④ A/M key (AUTO/MANUAL switch key)	Switches between AUTO mode and MANUAL mode	Switches between AUTO mode and MANUAL mode
⑤ DISP key (switch display key)	Switches display between the set value (SV) / control output (MV). Press the key to return from the setting mode to the operation mode (operation screen).	Switches the display between set value (SV) / control output (MV) and valve opening feedback (MVRB). Press the key to return from the setting mode to the operation mode (operation screen).
⑥ SEL key (Select key)	For parameter block selection, parameter selection, and parameter setting change.	For parameter block selection, parameter selection, and parameter setting change.
⑦ ► key (Digit selection key)	Select a digit of data value for a desired setting change.	Select a digit of data value for a desired setting change.

Name	Function	
	Basic type, Heating/cooling control type	Motorized control type
⑧ ▲ key (Up key)	Increases the data value of a desired setting change. Changes the value of a set value (SV) when in operation. Used to select channels and parameters and change parameter settings in the setting mode.	Increases the data value of a desired setting change. Increases the setting when the set value (SV) is displayed on the operation screen. Manual valve operation is allowed when the control output value (MV) is displayed on the manual mode operation screen. (An opening signal is output while the key is pressed.) Used also for channel selection, parameter selection, and parameter setting change.
⑨ ▼ key (Down key)	Decreases the data value of a desired setting change. · Decreases the setting when the set value (SV) is displayed on the operation screen. · Decreases the setting when the control output value (MV) is displayed on the operation screen in manual mode. Used also for channel selection, parameter selection, and parameter setting change.	Decreases the data value of a desired setting change. · Decreases the setting when the set value (SV) is displayed on the operation screen. · Manual valve operation is allowed when the control output value (MV) is displayed on the manual mode operation screen. (A closing signal is output while the key is pressed.) Used also for channel selection, parameter selection, and parameter setting change.
⑩ STBY Lamp	Lamp lights when in standby mode.	Lamp lights when in standby mode.
⑪ R Lamp	Lamp lights when in REMOTE mode.	Lamp lights when in REMOTE mode.
⑫ A Lamp	Lamp lights when in AUTO mode.	Lamp lights when in AUTO mode.
⑬ M Lamp	Lamp lights when in MANUAL mode.	Lamp lights when in MANUAL mode.

\* During the electrical current output, the lamp will not light.



## Display

Name	Function	
	Basic type, Heating/cooling control type	Motorized control type
⑭ C1 Lamp	Lamp lights when control output 1 is ON. *	Kept on while valve open output (OPEN) is ON.
⑮ C2 Lamp	Lamp lights when control output 2 is ON. *	Kept on while valve close output (CLOSE) is ON.
⑯ DO1 Lamp DO2 Lamp DO3 Lamp DO4 Lamp DO5 Lamp	Lamp lights when digital output 1 to output 4 (DO1 to DO4) is on. The lamp functions are assignable by the user.	Lamp lights when digital output 1 to output 4 (DO1 to DO4) is on. The lamp functions are assignable by the user.
⑰ ALM Lamp	Lamp lights when alarm is activated.	Lamp lights when alarm is activated.
⑱ SV / MV Lamp	Indicates the status shown in the sub-segment display. SV : Set value MV : Control output value	Display the type of data appearing in the lower 5-digit display section. SV lights : Set value MV lights : Control output (MV) MV lights + * lights : Valve opening feedback (MVRB) MV lights + * blink : Estimated valve opening (estimated MVRB)

Name	Function	
	Basic type, Heating/cooling control type	Motorized control type
⑲ Measurement value (PV) display (red)	Displays the measurement value (PV) during operation. Also displays the parameter name when setting parameters.	Displays measurement value (PV) on the operation screen. Displays channel name when channel is selected. Displays parameter name while parameter selection/setting is in progress.
⑳ Set value (SV) control output (MV) or valve opening (MVRB) display section (orange)	Displays the set values (SV) or control output value (MV) during operation.  Displays lower 5 digits of the totalized value in totalized value display.	Displays set values (SV), control output (MV), or valve opening feedback (MVRB) on the operation screen. Displays parameter setting while parameter selection/setting is in progress. Display switching between control output and valve opening can be set with parameter dSPT (ch9-78). Displays lower 5 digits of the totalized value in totalized value display.
㉑ Sub-segment display	During operation : When TPLT (ch8-92) is set at 10, 13, 16, 50 or 53, the loop number is displayed. When TPLT (ch8-92) is set at 11, 14, 51, 54, the SV number is displayed. Setting parameters : Parameter number is displayed. Display higher 2 digits of the totalized value in totalized value display.	During operation : When TPLT (ch8-92) is set at 30 or 33, the loop number is displayed. When TPLT (ch8-92) is set at 31 or 34, the SV number is displayed. Setting parameters : Parameter number is displayed. Display higher 2 digits of the totalized value in totalized value display.
㉒ Bar graph display	Displays a bar graph of control output (MV) during operation.	Displays control output (MV) or valve opening feedback (MVRB) with a bar graph during operation.

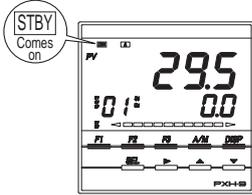
\* During the electrical current output, the lamp will not light.

# 4

# Displays and Operation Methods

## When in Standby Operation

- To Operate standby mode : set STbY (ch1 to 5) to ON.



- Operation during standby mode:  
No alarm will be activated.  
Control output will be produced in accordance with the PMv1 (ch2 to 22) parameter.

**Caution** Be aware that in standby mode, the unit's warning alarm will not be activated either.

(Display) STBY LED stays ON. (PV/SV display can be kept OFF.)

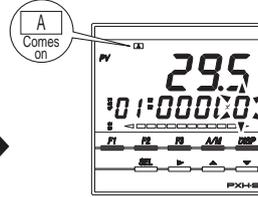
	During standby	Return from standby
Operation output	Outputs value designated by PMv1.	Bumpless restart from PMv1.
Alarm output	All outputs are OFF.	—
Timer operation	All operations are OFF.	Zero start
Hold operation	—	Initial start
Latch operation	All operations are OFF.	Initial start (released)
Non-excitation output operation	All outputs are OFF. (Non-excitation operations are invalid)	Work in non-excitation operation
Communication	Not affected by standby status.	
Analog re-transmission output	0mA	
Digital output (Do)	All outputs are OFF.	—
Digital input (Di)	—	Status detection: Operated Edge detection: Not operated.
Control mode	Not affected by standby status.	
Display	Can be selected from ON/OFF	ON

STbY(ch1-5)=OFF

## During Operation Mode

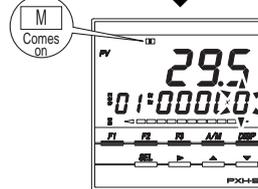
- To change the setting values (SV)

**Caution** If the key operation is not performed for 10 seconds while the SV value is flickering, the value returns to the previous setting value (SV).



Press the key to enter the setting value (SV) change mode.

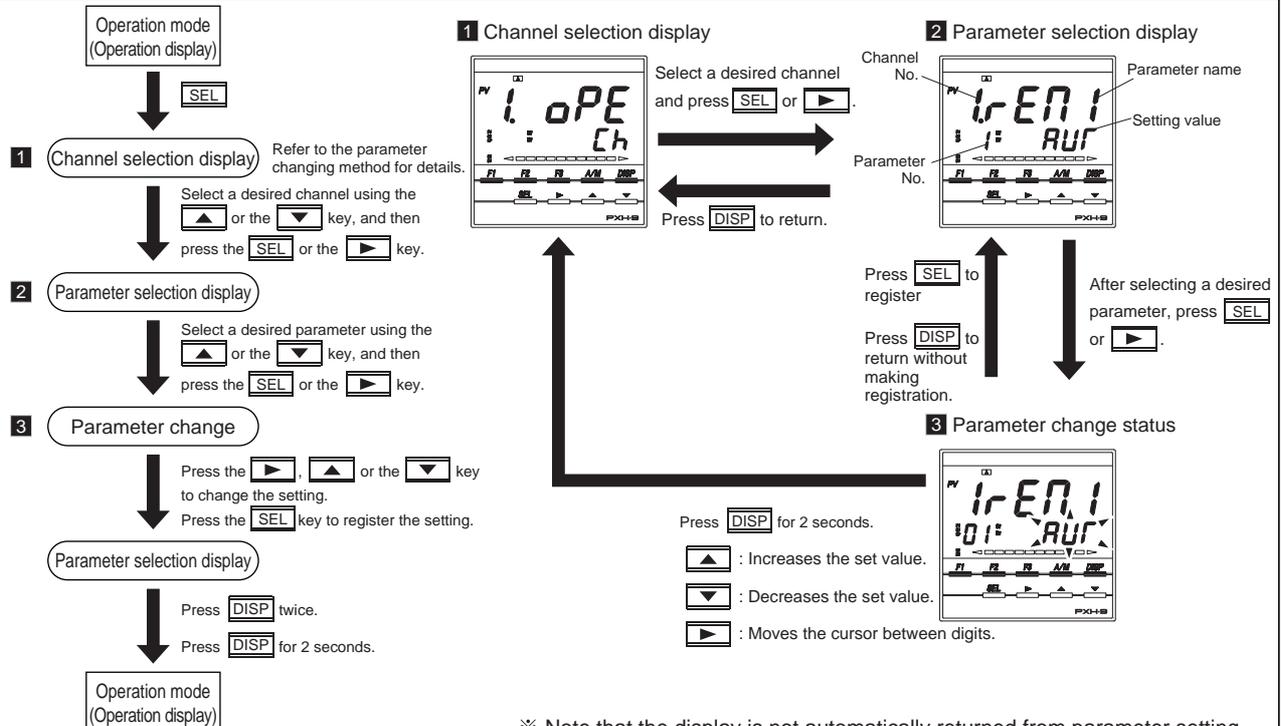
- To change the output value (MV)



Press the key to enter the output value (MV) change mode.

Switch by key

## Parameter Setting



※ Note that the display is not automatically returned from parameter setting display, etc. to the operation display.

※ Parameter display in the text

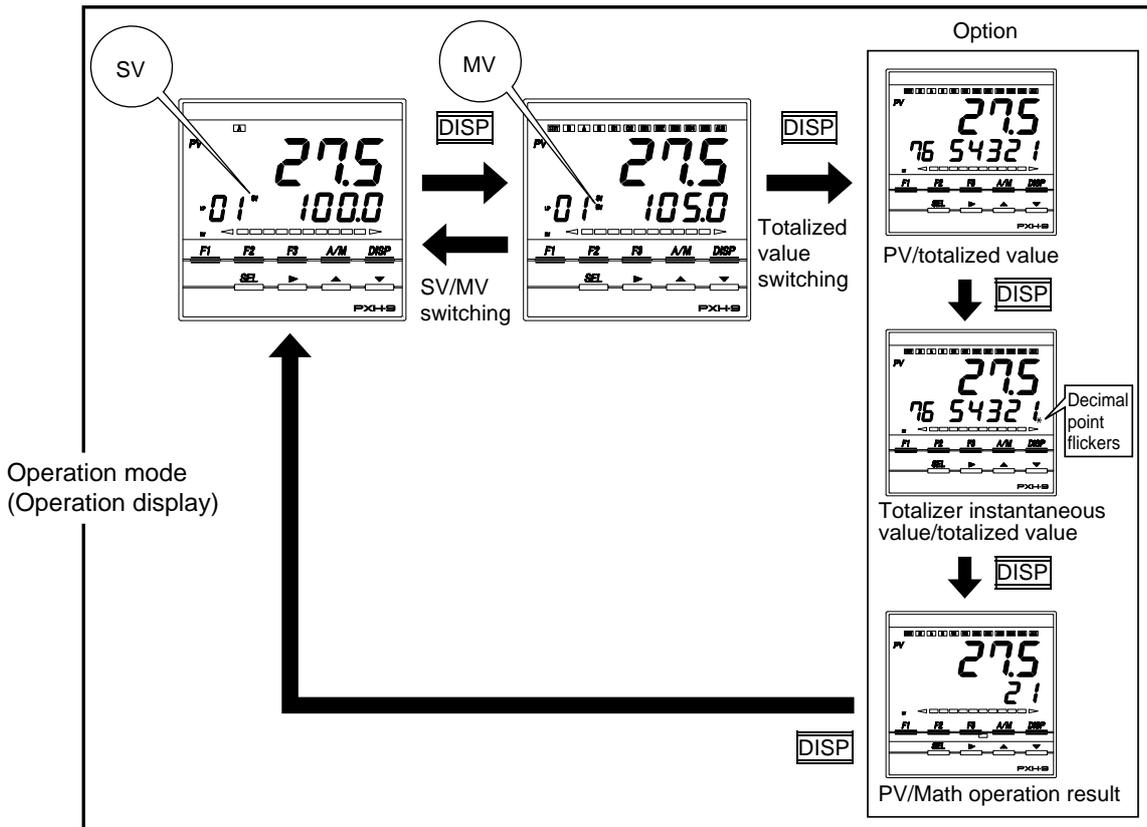
Example) STbY (ch1-5)

Parameter symbol

Channel No.

Parameter No.

# 5 Switching parameters



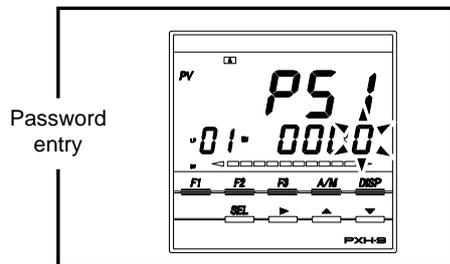
SEL ↓ ↑ DISP

Password 1	Ch1	Password 2	Ch2	Ch3	Ch4	Ch7	Ch8	Ch9
PS1	oPE	PS2	Pcd	PLF	PLF	Non	SEF	SY5
ChA	ChB	ChC	ChD	ChE	ChF	ChG	ChX	
ALN	CoN	Lnr	CLC	AR	PFb	Γof	rCP	

Press SEL or ▶ in PS1 or PS2

Press SEL to confirm

Press DISP to confirm



After selecting a desired channel, press SEL or ▶.

Note:

Ch4 **PLF** is displayed only when "F" is specified for the 5th digit of the code symbols. "A", "D", "S" displays only Ch3.

ChF **PFb** is displayed only when "D", "S" is specified for the 5th digit of the code symbols.

If the value entered does not allow PS1=PAS1 (Ch9-1) or PS2=PAS2 (Ch9-2) to hold, the later channels cannot be selected.

Parameter selection

Parameter No.	Parameter name		Parameter No.	Parameter name
01	IrEN1		01	HrCPO
⋮	⋮	⋮	⋮	⋮
37	lJP3		90	H.d79

# [ Basic type, Motorized control type, Heating/cooling control type common parameter list ]

## Ch1 $\alpha$ PE (Operation parameter)

Parameter				Content Explanation	Factory default	Parameter mask	Notes																																							
No.	Display	Symbol	Name																																											
1	<i>rEM1</i>	rEM1	Remote mode	Switches setting between remote/auto mode operation. REM: Remote mode AUT: Auto mode	AUT	01-1																																								
5	<i>STbY</i>	STbY	Standby command	Switches controller to RUN/Standby. ON: Control standby (output OFF, alarm OFF) OFF: Control RUN	OFF	01-5	Refer to Table 7.																																							
7	<i>AT</i>	AT	Auto-tuning command	Sets auto-tuning. OFF: non-action ON1: start auto-tuning.	OFF	01-7																																								
8	<i>LACl</i>	LACl	Alarm latch clear command	Disables alarm 1 - 8 latch. OFF: non-action CLR: Latch clear	OFF	01-8																																								
9	<i>PLTn</i>	PLTn	Palette selection	Selects a PID palette to be used to control. (Setting range: 0 to 7)	0	01-10																																								
10	<i>AL1</i>	AL1	Alarm settings 1	Alarm 1 operation value setting. Setting possible within the input range	10%FS	02-1	Displayed when alarm operation type 1TP (chA-1) is set to 1 to 11. (See table 1.)																																							
11	<i>A1-L</i>	A1-L	Alarm lower limit settings 1	Alarm 1 lower limit operation value setting. Setting possible within the input range	10%FS	02-1	Displayed when alarm operation type 1TP (chA-1) is set to 16 to 31. (See table 1.)																																							
12	<i>A1-h</i>	A1-h	Alarm upper limit settings 1	Alarm 1 upper limit operation value setting. Setting possible within the input range	10%FS	02-1	Displayed when alarm operation type 1TP (chA-1) is set to 16 to 31. (See table 1.)																																							
}																																														
31	<i>AL8</i>	AL8	Alarm settings 8	Alarm 8 operation value setting. Setting possible within the input range	10%FS	02-8	Displayed when alarm operation type 8TP (chA-36) is set to 1 to 11. (See table 1.)																																							
32	<i>A8-L</i>	A8-L	Alarm lower limit settings 8	Alarm 8 lower limit operation value setting. Setting possible within the input range	10%FS	02-8	Displayed when alarm operation type 8TP (chA-36) is set to 16 to 31. (See table 1.)																																							
33	<i>A8-h</i>	A8-h	Alarm upper limit settings 8	Alarm 8 upper limit operation value setting. Setting possible within the input range	10%FS	02-8	Displayed when alarm operation type 8TP (chA-36) is set to 16 to 31. (See table 1.)																																							
34	<i>LoC</i>	LoC	Keylock	Selects parameter lock type (Setting range: 0 to 5) <table border="1" style="margin: 10px auto; width: 80%;"> <thead> <tr> <th rowspan="2">No.</th> <th colspan="2">Key operation</th> <th colspan="2">Communication</th> </tr> <tr> <th>All Parm.</th> <th>SV/MV</th> <th>All Parm.</th> <th>SV/MV</th> </tr> </thead> <tbody> <tr> <td>0</td> <td style="text-align: center;">○</td> <td style="text-align: center;">○</td> <td style="text-align: center;">○</td> <td style="text-align: center;">○</td> </tr> <tr> <td>1</td> <td style="text-align: center;">×</td> <td style="text-align: center;">×</td> <td style="text-align: center;">○</td> <td style="text-align: center;">○</td> </tr> <tr> <td>2</td> <td style="text-align: center;">×</td> <td style="text-align: center;">○</td> <td style="text-align: center;">○</td> <td style="text-align: center;">○</td> </tr> <tr> <td>3</td> <td style="text-align: center;">○</td> <td style="text-align: center;">○</td> <td style="text-align: center;">×</td> <td style="text-align: center;">×</td> </tr> <tr> <td>4</td> <td style="text-align: center;">×</td> <td style="text-align: center;">×</td> <td style="text-align: center;">×</td> <td style="text-align: center;">×</td> </tr> <tr> <td>5</td> <td style="text-align: center;">×</td> <td style="text-align: center;">○</td> <td style="text-align: center;">×</td> <td style="text-align: center;">×</td> </tr> </tbody> </table> ○: Can be set    ×: Cannot be set	No.	Key operation		Communication		All Parm.	SV/MV	All Parm.	SV/MV	0	○	○	○	○	1	×	×	○	○	2	×	○	○	○	3	○	○	×	×	4	×	×	×	×	5	×	○	×	×	0	01-11	
No.	Key operation		Communication																																											
	All Parm.	SV/MV	All Parm.	SV/MV																																										
0	○	○	○	○																																										
1	×	×	○	○																																										
2	×	○	○	○																																										
3	○	○	×	×																																										
4	×	×	×	×																																										
5	×	○	×	×																																										

## Ch1 *oPE* (Operation parameter)

Parameter				Content Explanation	Factory default	Parameter mask	Notes
No.	Display	Symbol	Name				
35	<i>JP1</i>	JP1	Parameter jump setting 1	Press the function key (when 60 is selected), and the display jumps to the specified parameter. (Setting range: I-01 to Z-Z9)	2-01	01-12	
36	<i>JP2</i>	JP2	Parameter jump setting 2	Press the function key (when 61 is selected), and the display jumps to the specified parameter. (Setting range: I-01 to Z-Z9)	2-02	01-12	
37	<i>JP3</i>	JP3	Parameter jump setting 3	Press the function key (when 62 is selected), and the display jumps to the specified parameter. (Setting range: I-01 to Z-Z9)	2-03	01-12	

## Ch2 $P\bar{L}d$ (Control parameter)

No.	Parameter			Content Explanation	Factory default	Parameter mask	Notes																	
	Display	Symbol	Name																					
1	$P\bar{I}$	P1	Proportional band	Setting range: 0.0 to 999.9% ON/OFF control at setting = 0.	5.0	03-1																		
2	$\bar{I}$	i1	Integral time	Setting range: 0.0 to 3200.0 seconds Integral control OFF at setting = 0.	240.0	03-1																		
3	$d\bar{I}$	d1	Derivative time	Setting range: 0.0 to 999.9 seconds Derivative control OFF at setting = 0.	60.0	03-1																		
5	$Arh\bar{I}$	Arh1	Anti - reset windup Upper limit setting value	Integration cut point upper limit setting value (Setting range: 0 to 100%FS)	100%FS	03-3	Sets by deviation from SV.																	
6	$ArL\bar{I}$	ArL1	Anti - reset windup Lower limit setting value	Integration cut point lower limit setting value (Setting range: 0 to 100%FS)	100%FS	03-3	Sets by deviation from SV.																	
7	$Sh\bar{I}$	Sh1	SV value upper limit	Sets upper limit SV (Setting range: -25 to 125%FS)	100%FS	03-4																		
8	$SL\bar{I}$	SL1	SV value lower limit	Sets lower limit SV (Setting range: -25 to 125%FS)	0%FS	03-4																		
9	$Mvh\bar{I}$	Mvh1	MV value upper limit	Sets upper limit MV (Setting range: -25.0 to 125.0%FS)	105.0	03-5																		
10	$MvL\bar{I}$	MvL1	MV value lower limit	Sets lower limit MV (Setting range: -25.0 to 125.0%FS)	-5.0	03-5																		
13	$dMv\bar{I}$	dMv1	MV change ratio limit	Sets the limit value of deviation of MV (DMV) in one control cycle (50ms.) (Setting range: 0.0 to 150.0%) 0.0: No limit	0.0%	03-7	Limit is not applied to the deviation of MV by EX-MV operation.																	
14	$dT\bar{I}$	dT1	Sampling cycle	Sets sampling cycle for PID operation. (Setting range: 5 to 1000)	5	03-8	The actual cycle is (dT1 × 10) ms.																	
15	$hS\bar{I}$	hS1	Hysteresis setting	Hysteresis value during ON/OFF control time. (Setting range: 0 to 50%FS)	0.3%FS	03-9																		
18	$bAL\bar{I}$	bAL1	Operation output convergence value	Sets output convergence value (Setting range: -100.0 to 100.0%)	0.0%	03-12																		
19	$TC\bar{I}$	TC1	Cycle time of Control output (MV1)	Sets proportional cycle for control output. (Setting range: 1 to 150 sec)	By designation at the time of ordering	03-13	Effective only for RY output and SSR drive output																	
20	$rEv\bar{I}$	rEv1	Control action setting	Sets a control action method. NRML: Normal (Direct) action REV: Reverse action	REV	03-14																		
22	$PMv\bar{I}$	PMv1	Preset value for control output	Sets MV for stanby mode. (Setting range: -25.0 to 125.0%)	0.0	03-16	Refer to Table 7.																	
23	$ALP\bar{I}$	ALP1	Alpha	Sets 2 degrees of freedom coefficient $\alpha$ . (Setting range: -300.0 to 300.0%)	40.0	40-1																		
24	$bET\bar{I}$	bET1	Beta	Sets 2 degrees of freedom coefficient $\beta$ . (Setting range: 0.0 to 999.9%)	100.0	40-1																		
38	$Ld\bar{I}$	Ld1	Output limiter type setting	Sets whether the value should be limited at the output limit setting or the limit should be exceeded (125%, 25%) when the output reaches the output limit setting. <table border="1" data-bbox="662 1886 981 2065"> <thead> <tr> <th rowspan="2">LD1</th> <th colspan="2">Output operation</th> </tr> <tr> <th>Upper side</th> <th>Lower side</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>125.0%</td> <td>-25.0%</td> </tr> <tr> <td>1</td> <td>125.0%</td> <td>Limit</td> </tr> <tr> <td>2</td> <td>Limit</td> <td>-25.0%</td> </tr> <tr> <td>3</td> <td>Limit</td> <td>Limit</td> </tr> </tbody> </table>	LD1	Output operation		Upper side	Lower side	0	125.0%	-25.0%	1	125.0%	Limit	2	Limit	-25.0%	3	Limit	Limit	3	40-9	
LD1	Output operation																							
	Upper side	Lower side																						
0	125.0%	-25.0%																						
1	125.0%	Limit																						
2	Limit	-25.0%																						
3	Limit	Limit																						

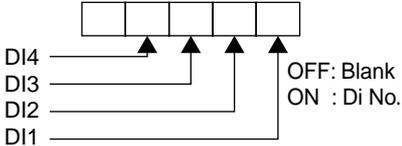
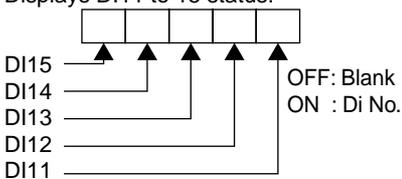
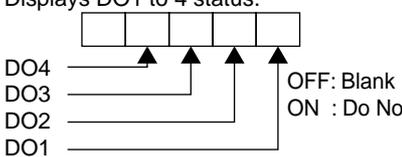
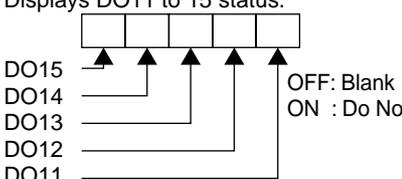
## Ch2 $P\bar{L}d$ (Control parameter)

No.	Parameter			Content Explanation	Factory default	Parameter mask	Notes
	Display	Symbol	Name				
97	$E\bar{H}\bar{N}1$	EXM1	External manipulated value	Sets external output value. (Setting range: -25.0 to 125.0%)	0.0	07-1	
99	$\bar{t}F1$	kF1	FF gain	Sets Feed Forward gain and bias 1, bias 2. [FF = KF1 × (Input - B1F) + B2F] (Setting range: -1000.0 to 1000.0)	0.0	40-2	
A0	$b1F1$	b1F1	FF bias1		0.0	40-2	
A1	$b2F1$	b2F1	FF bias2		0.0	40-2	

## Ch3 *PLF* (Control palette)

No.	Parameter			Content Explanation	Factory default	Parameter mask	Notes
	Display	Symbol	Name				
1	<i>Sv1</i>	Sv1	Setting value 1	palette 1 SV (Setting range: SV lower limit value to SV upper limit value)	0%FS	08-1	
2	<i>P-1</i>	P-1	Proportional band 1	palette 1 proportional band (Setting range: 0.0 to 999.9%) ON/OFF control at setting = 0.	5.0	08-1	
3	<i>i-1</i>	i-1	Integral time 1	palette 1 integral time (Setting range: 0.0 to 3200.0 sec) Integral control OFF at setting = 0.	240.0	08-1	
4	<i>d-1</i>	d-1	Derivative time 1	palette 1 derivative time (Setting range: 0.0 to 999.9 sec) Derivative control OFF at setting = 0.	60.0	08-1	
6	<i>Arh1</i>	Arh1	Anti - reset windup upper limit value 1	palette 1 Anti - reset windup upper limit value setting. (Setting range: 0 to 100%FS)	100%FS	08-1	
7	<i>ArL1</i>	ArL1	Anti - reset windup lower limit value 1	palette 1 Anti - reset windup lower limit value setting. (Setting range: 0 to 100%FS)	100%FS	08-1	
8	<i>hYS1</i>	hYS1	Hysteresis setting 1	palette 1 hysteresis setting (Setting range: 0 to 50%FS)	0.3%FS	08-1	
11	<i>bL-1</i>	bL-1	Output convergence value 1	palette 1 Output convergence value (Setting range: -100.0 to 100.0%)	0.0%	08-1	
}							
67	<i>Sv7</i>	Sv7	Setting value 7	palette 7 SV (Setting range: SV lower limit value to SV upper limit value)	0%FS	14-1	
68	<i>P-7</i>	P-7	Proportional band 7	palette 7 proportional band (Setting range: 0.0 to 999.9%) ON/OFF control at setting = 0.	5.0	14-1	
69	<i>i-7</i>	i-7	Integral time 7	palette 7 integral time (Setting range: 0.0 to 3200.0 sec) Integral control OFF at setting = 0.	240.0	14-1	
70	<i>d-7</i>	d-7	Derivative time 7	palette 7 derivative time (Setting range: 0.0 to 999.9 sec) Derivative control OFF at setting = 0.	60.0	14-1	
72	<i>Arh7</i>	Arh7	Anti - reset windup upper limit value 7	palette 7 Anti - reset windup upper limit value setting. (Setting range: 0 to 100%FS)	100%FS	14-1	
73	<i>ArL7</i>	ArL7	Anti - reset windup lower limit value 7	palette 7 Anti - reset windup lower limit value setting. (Setting range: 0 to 100%FS)	100%FS	14-1	
74	<i>hYS7</i>	hYS7	Hysteresis setting 7	palette 7 hysteresis setting (Setting range: 0 to 50%FS)	0.3%FS	14-1	
77	<i>bL-7</i>	bL-7	Output convergence value 7	palette 7 Output convergence value (Setting range: -100.0 to 100.0%)	0.0%	14-1	
78	<i>rEF1</i>	rEF1	PID switch point 1	palette 1 PID switch point (Setting range: -25 to 125%FS)	0%FS	08-1	
}							
84	<i>rEF7</i>	rEF7	PID switch point 7	palette 7 PID switch point (Setting range: -25 to 125%FS)	0%FS	14-1	

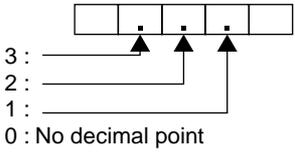
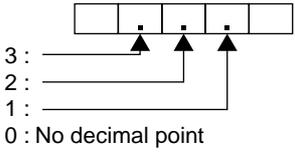
# Ch7 Non (Monitor)

Parameter				Content Explanation	Factory default	Parameter mask	Notes
No.	Display	Symbol	Name				
1	PV1	Pv1	PV1 monitor	Displays Process value 1 input.	-	17-1	Reading of the signal input to the terminal (before input correction)
2	PV2	Pv2	PV2 monitor	Displays Process value 2 input.	-	17-2	
4	AI1	Ai1	AI1 monitor	Displays Analog input 1 input.	-	17-5	
6	rSV1	rSv1	RSV1 monitor	Displays remote set value 1.	-	17-9	Control RSV value (after input correction)
10	LSV1	LSV1	Local SV1 monitor	Display Local set value 1	-	17-9	
14	RCJ1	RCJ1	RCJ1 monitor	Displays RCJ1 input.	-	17-1	
15	RCJ2	RCJ2	RCJ2 monitor	Displays RCJ2 input.	-	17-2	
17	Ao1	Ao1	AO1 monitor	Displays Analog output 1 output value.	-	18-1	
18	Ao2	Ao2	AO2 monitor	Displays Analog output 2 output value.	-	18-1	
21	dI01	DI01	DI monitor 1	Displays DI1 to 4 status. 	-	19-1	
22	dI11	DI11	DI monitor 2	Displays DI11 to 15 status. 	-	19-1	
24	do01	DO01	DO monitor 1	Displays DO1 to 4 status. 	-	19-1	
25	do11	DO11	DO monitor 2	Displays DO11 to 15 status. 	-	19-1	
27	ACN	AiM	Math result monitor	Displays result of Math operation.	-	19-3	
28	TM1	TM1	Alarm delay remaining time monitor	Displays the remaining time for the alarm delay of ALM1 to ALM8.	-	34-1	The alarm option will select the unit.
29	TM2	TM2				34-2	
30	TM3	TM3				34-3	
31	TM4	TM4				34-4	
32	TM5	TM5				34-5	
33	TM6	TM6				34-6	
34	TM7	TM7				34-7	
35	TM8	TM8				34-8	
36	AMV1	AMV1	EXMV monitor	Displays EXMV.	-	17-9	
40	FFV1	FFV1	Feed Forward value	Displays the value of Feed Forward element.	-	17-9	

# Ch7 Non (Monitor)

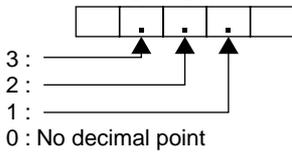
Parameter				Content Explanation	Factory default	Parameter mask	Notes
No.	Display	Symbol	Name				
100		DiC1	Communication Di monitor (1-5)	Displays the status of communication Di1-5. 	-	19-4	
101		DiC2	Communication Di monitor (6-8)	Displays the status of communication Di6-8. 	-	19-4	

## Ch8 SET (Input/output definition)

Parameter				Content Explanation	Factory default	Parameter mask	Notes
No.	Display	Symbol	Name				
1	<i>Pv1F</i>	Pv1F	PV1 full-scale	Sets the full-side scale of PV1 input. (Setting range: -19999 to 99999)	As ordered	20-1	For details see Table 3.
2	<i>Pv1b</i>	Pv1b	PV1 base scale	Sets the base-side scale of PV1 input. (Setting range: -19999 to 99999)	As ordered	20-1	For details see Table 3.
3	<i>Pv1d</i>	Pv1d	PV1 decimal point position	Specifies the decimal point position of PV1 input. (Setting range: 0 to 3) 	As ordered	20-1	
4	<i>Pv1T</i>	Pv1T	PV1 input type	Sets the type of PV1 input. (Setting range: 0 to 27)	As ordered	20-1	For details see Table 2.
5	<i>Pv1U</i>	Pv1U	Pv1 unit	Sets the measurement unit. non : No unit °F : °F unit °C : °C unit	As ordered	20-2	
6	<i>Pv1Z</i>	Pv1Z	PV1 input zero point adjustment	Sets the correction value of a zero point for PV1 input. (Setting range: -50 to 50%FS)	0%FS	20-3	
7	<i>Pv1S</i>	Pv1S	PV1 input span point adjustment	Sets the correction value of a span point for PV1 input. (Setting range: -50 to 50%FS)	0%FS	20-3	
11	<i>P1CU</i>	P1CU	PV1 input cut point	Sets the cut point of square-root extraction calculation for PV1 input. In case of OFF, the square-root extraction is not calculated. (Setting range: OFF, 0.0 to 125.0%)	OFF	20-7	
12	<i>P1TF</i>	P1TF	Pv1 input filter	Sets the time constant for PV1 input filter. (Setting range: 0.0 to 900.0 sec)	0.0	20-8	
13	<i>P1Ln</i>	P1Ln	PV1 linearize setting	PV1 input linearize enable/disable setting (Setting range: OFF, nrML, hi-C, Lo-C)	OFF	20-9	
14	<i>Pv2F</i>	Pv2F	PV2 full-scale	Sets the full-side scale of PV2 input. (Setting range: -19999 to 99999)	As ordered	20-1	For details see Table 3.
15	<i>Pv2b</i>	Pv2b	PV2 base scale	Sets the base-side scale of PV2 input. (Setting range: -19999 to 99999)	As ordered	20-1	For details see Table 3.
16	<i>Pv2d</i>	Pv2d	PV2 decimal point position	Specifies the decimal point position of PV2 input. (Setting range: 0 to 3) 	1	20-1	
17	<i>Pv2T</i>	Pv2T	PV2 input type	Sets the type of PV2 input. (Setting range: 0 to 27)	3	20-1	For details see Table 2.
18	<i>Pv2U</i>	Pv2U	Pv2 unit	Sets the measurement unit for PV2 input. non : No unit °F : °F unit °C : °C unit	°C	20-2	
19	<i>Pv2Z</i>	Pv2Z	PV2 input zero point adjustment	Sets the correction value of a zero point for PV2 input. (Setting range: -50 to 50%FS)	0%FS	20-3	
20	<i>Pv2S</i>	Pv2S	PV2 input span point adjustment	Sets the correction value of a span point for PV2 input. (Setting range: -50 to 50%FS)	0%FS	20-3	
24	<i>P2CU</i>	P2CU	PV2 input cut point	Sets the cut point of square-root extraction calculation for PV2 input. In case of OFF, the square-root extraction is not calculated. (Setting range: OFF, 0.0 to 125.0%)	OFF	20-7	
25	<i>P2TF</i>	P2TF	Pv2 input filter	Sets the time constant for PV2 input filter. (Setting range: 0.0 to 900.0 sec)	0.0	20-8	
26	<i>P2Ln</i>	P2Ln	PV2 linearize setting	PV2 input linearize enable/disable setting (Setting range: OFF, nrML, hi-C, Lo-C)	OFF	21-9	

Note) Be sure to reset or turn on the power after the parameter setting is changed.

## Ch8 SET (Input/output definition)

Parameter				Content Explanation	Factory default	Parameter mask	Notes
No.	Display	Symbol	Name				
40	<i>ACIF</i>	Ai1F	Ai1 full scale	Sets the full-side scale of analog (Ai1) input. (Setting range: -19999 to 99999)	As ordered	23-1	
41	<i>ACIb</i>	Ai1b	Ai1 base scale	Sets the scale of base-side analog (Ai1) input. (Setting range: -19999 to 99999)	As ordered	23-1	
42	<i>ACId</i>	Ai1d	Ai1 decimal point position	Specifies the decimal point position for analog (Ai1) input. (Setting range: 0 to 3) 	1	23-1	
43	<i>ACIT</i>	Ai1T	Ai1 input type	Sets the type of Ai1 input. (Setting range: 16 to 18)	16	23-1	For details see Table 2.
45	<i>ACIZ</i>	Ai1Z	Ai1 input zero point adjustment	Sets the correction value of a zero point for Ai1 input. (Setting range: -50 to 50%FS)	0%FS	23-3	
46	<i>ACIS</i>	Ai1S	Ai1 input span point adjustment	Sets the correction value of a span point for Ai1 input. (Setting range: -50 to 50%FS)	0%FS	23-3	
49	<i>ACUC</i>	A1CU	Ai1 input cut point	Sets the cut point of the square-root extraction calculation for Ai1 input. In case of OFF, the square-root extraction is not calculated. (Setting range: OFF, 0.0 to 125.0%)	OFF	23-7	
50	<i>ACIF</i>	A1TF	Ai1 input filter	Sets the time constant for Ai1 input filter. (Setting range: 0.0 to 900.0sec)	0.0	23-8	
51	<i>ACLn</i>	A1Ln	Ai1 linearize setting	Ai1 input linearize enable/disable setting (Setting range: OFF, nrML, hi-C, Lo-C)	OFF	23-9	
64	<i>AOIT</i>	Ao1T	AO1 output type	Switches the AO1 (re-transmission output) signal. Setting range: PV, SV, MV, DV, AiM, MVRB, TV	PV	25-1	It is invalid when the control output is chosen.
66	<i>AOIH</i>	Ao1h	AO1 output scale upper limit	Sets the scale upper limit value of the AO1 output. (Setting range: -130.0 to 130.0%)	100.0%	25-1	
67	<i>AOIL</i>	Ao1L	AO1 output scale lower limit	Sets the scale lower limit value of the AO1 output. (Setting range: -130.0 to 130.0%)	0.0%	25-1	
68	<i>AILh</i>	A1Lh	AO1 output limit upper limit	Sets the upper limit value of the AO1 output limit. (Setting range: -25.0 to 105.0%)	105.0%	25-1	
69	<i>AILL</i>	A1LL	AO1 output limit lower limit	Sets the lower limit value of the AO1 output limit. (Setting range: -25.0 to 105.0%)	-5.0%	25-1	
70	<i>AO2T</i>	Ao2T	AO2 output type	Switches the AO2 (re-transmission output) signal. Setting range: PV, SV, MV, DV, AiM, MVRB, TV	PV	25-2	It is invalid when the XPS is attached.
72	<i>AO2h</i>	Ao2h	AO2 output scale upper limit	Sets the scale upper limit value of the AO2 output. (Setting range: -130.0 to 130.0%)	100.0%	25-2	
73	<i>AO2L</i>	Ao2L	AO2 output scale lower limit	Sets the scale lower limit value of the AO2 output. (Setting range: -130.0 to 130.0%)	0.0%	25-2	
74	<i>A2Lh</i>	A2Lh	AO2 output limit upper limit	Sets the upper limit value of the AO2 output limit. (Setting range: -25.0 to 105.0%)	105.0%	25-2	
75	<i>A2LL</i>	A2LL	AO2 output limit lower limit	Sets the lower limit value of the AO2 output limit. (Setting range: -25.0 to 105.0%)	-5.0%	25-2	
88	<i>CALC</i>	CALC	Calculation setting	Math function type setting. (Setting range: 0 to 40)	0	25-9	For details see Table 9.
89	<i>UCF1</i>	UCF1	Math function full scale	Sets the scale on the full side which is utilized for mathematical calculations. (Setting range: -19999 to 99999)	As ordered	25-9	

Note) Be sure to reset or turn on the power after the parameter setting is changed.

## Ch8 SET (Input/output definition)

No.	Parameter			Content Explanation	Factory default	Parameter mask	Notes
	Display	Symbol	Name				
90	UCb1	UCb1	Math function base scale	Sets the scale on the base side which is utilized for mathematical calculations. (Setting range: -19999 to 99999)	As ordered	25-9	
91	UCd1	UCd1	Math function decimal point position	Sets the decimal point position for mathematical calculations. (Setting range: 0 to 3)	1	25-9	
92	TPLT	TPLT	Template	Specifies the template. The range of effective setting. 10 : Single-loop basic PID control (with Math function) 11 : Single-loop SV selection PID control (with Math function) 13 : Single-loop basic PID control 14 : Single-loop SV selection PID control 16 : Single-loop input selection PID control (with Math function) Setup other than the above is forbidden.	13	25-10	
93	oTYP	oTYP	Output type	Selects the control output selector type. (Setting range: 10 to 13)	As ordered	25-11	For details see Table 4.
98	CN01	CN01	System constant 1	Sets a constant value used for templates. The meaning of the value varies depending on template. Make the setting after checking the description of each template. (Setting range: -19999 to 99999)	0	25-15	
b3	CN16	CN16	System constant 16				

Note) Be sure to reset or turn on the power after the parameter setting is changed.

## Ch9 545 (System definition)

Parameter				Content Explanation	Factory default	Parameter mask	Notes
No.	Display	Symbol	Name				
1	PAS1	PAS1	Password 1	Sets security (passwords). (Setting range: 0000 to FFFF)	0000	26-1	
2	PAS2	PAS2	Password 2	Sets security (password). (Setting range: 0000 to FFFF)	0000	26-2	
3	PAS3	PAS3	Password 3	Sets security (password). (Setting range: 0000 to FFFF)	0000	26-3	
7	rih1	rih1	Remote mode inhibiting	Prevents switching to the REMOTE mode. (Setting range: ON/OFF)	OFF	27-1	
11	rAC1	rAC1	R_ACK use selection	Selects use or non-use of R_ACK. (Setting range: INH, ENA)	INH	27-5	
15	A-M1	A-M1	A/M mode	Selects the A/M mode. (Setting range: A-M, A)	A-M	27-9	
19	Cnd1	Cnd1	Mode settings when the power turns ON.	Sets the mode when the power turns ON. (Setting range: A, R, M)	A	28-1	
23	Trk1	Trk1	Tracking method selection (SV)	Selects ON or OFF for tracking the local set value (SV)	ON	28-9	
30	STBo	STBo	Operation settings when in standby mode	Sets the front display operation in the standby mode. (Setting range: 0: lighting, 1: extinction)	0	29-4	For details see Table 7.
31	PLTS	PLTS	palette switching method selection	Selects a palette switching factor. (Setting range: PLTn, SV, PV)	PLTn	29-6	
32	F1	F1	User designation key-1 (F1)	Sets user assignments for function keys. [F1] - [F3]. (Setting range: 0 to 27)	0	29-7	For details see Table 8.
33	F2	F2	User designation key-2 (F2)		0	29-8	
34	F3	F3	User designation key-3 (F3)		0	29-9	
35	brd1	brd1	Burnout direction specification (MV1)	Specifies the direction of the control output during a burnout. (Setting range: HOLD, LO, UP, EXMV)	Lo	30-1	
39 } 42	di01 } di04	di01 } di04	Assignment for digital input 1 } Assignment for digital input 4	Sets assignments for DI1-DI4, DI11-DI15. (Setting range: 0 to 255)	di01 : 60 di02 : 70 di03 : 0 di04 : 103	31-1	For details see Table 5.
43 } 47	di11 } di15	di11 } di15	Assignment for digital input 11 } Assignment for digital input 15		0	31-2	
53 } 56	do1 } do4	do1 } do4	Assignment for digital output 1 } Assignment for digital output 4		do1 : 1 do2 : 2 do3 : 3 do4 : 4	31-9	
57 } 61	do11 } do15	do11 } do15	Assignment for digital output 11 } Assignment for digital output 15	0	31-10		

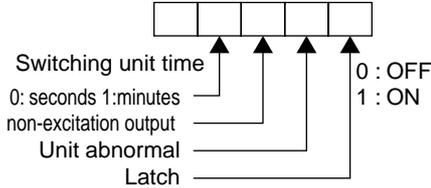
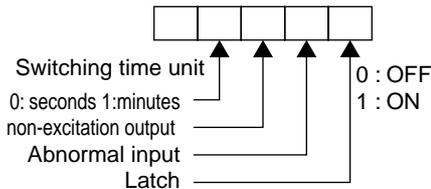
Note) Be sure to reset or turn on the power after the parameter setting is changed.

## Ch9 545 (System definition)

Parameter				Content Explanation	Factory default	Parameter mask	Notes
No.	Display	Symbol	Name				
67		C1	LED C1 assignment	Allocates indicator LEDs. (Setting range: 0 to 255)	21	32-1	For details see Table 6.
68		C2	LED C2 assignment				
69		Ldo1	LED DO1 assignment				
73		Ldo5	LED DO5 assignment				
74		LALM	LED ALM assignment				
79		odSP	Operation display setting	Sets display items during operation. (Setting range: 000 to 111) 	000	32-15	
80 C3	 	dS00 dS43	Parameter mask setting	Skips (not display) unnecessary parameters.	-	0-1 0-15	
E3		rES	Reset command	Resets the main unit. ON : Reset OFF : RUN	OFF	33-1	

Note) Be sure to reset or turn on the power after the parameter setting is changed.

# ChA ALN (Alarm setting)

Parameter				Content Explanation	Factory default	Parameter mask	Notes
No.	Display	Symbol	Name				
1	1TP	1TP	Alarm 1 type setting	Sets the alarm type for alarm 1. (Setting range: 0 to 38)	0	34-1	For details see Table 1.
2	1oP	1oP	Alarm 1 option setting	Sets alarm options for alarm 1. (Setting range: 0000 to 1111)  	0000	34-1	
3	1hYS	1hYS	Alarm 1 hysteresis setting	Sets alarm hysteresis for alarm 1. (Setting range: 0.00 to 50.00%FS)	0.3%FS	34-1	
4	1dLY	1dLY	Alarm 1 delay time setting	Sets delay time for alarm 1. (Setting range: 0 to 9999) * Sets alarm options for time units. The unit of time is selected by alarm options.	0	34-1	
}							
36	8TP	8TP	Alarm 8 type setting	Sets the alarm type for alarm 8. (Setting range: 0 to 38)	0	34-8	
37	8oP	8oP	Alarm 8 option setting	Sets alarm options for alarm 8. (Setting range: 0000 to 1111)  	0000	34-8	
38	8hYS	8hYS	Alarm 8 hysteresis setting	Sets alarm hysteresis for alarm 8. (Setting range: 0.00 to 50.00%FS)	0.3%FS	34-8	
39	8dLY	8dLY	Alarm 8 delay time setting	Sets delay time for alarm 8. (Setting range: 0 to 9999) * Sets alarm options for time units. The unit of time is selected by alarm options.	0	34-8	

# ChB Conf (Communication)

No.	Parameter			Content Explanation	Factory default	Parameter mask	Notes												
	Display	Symbol	Name																
2	STn4	STn4	RS485 station No.	Specifies the RS485 communication station No. (Setting range: 0 to 255) * does not operate with STn4=0.	1	36-2													
3	SPd4	SPd4	RS485 communication speed	Selects the communication speed for RS485 communication. (Setting range) 96 : 9600 bps 192 : 19200 bps 384 : 38400 bps	384	36-3													
4	bit4	bit4	RS485 bit format	Selects the bit format for RS485 communication. (Setting range) <table border="1" style="margin-left: 20px;"> <thead> <tr> <th></th> <th>Data length</th> <th>Parity</th> </tr> </thead> <tbody> <tr> <td>8n</td> <td>8</td> <td>None</td> </tr> <tr> <td>8o</td> <td>8</td> <td>Odd</td> </tr> <tr> <td>8E</td> <td>8</td> <td>Even</td> </tr> </tbody> </table>		Data length	Parity	8n	8	None	8o	8	Odd	8E	8	Even	8o	36-4	
	Data length	Parity																	
8n	8	None																	
8o	8	Odd																	
8E	8	Even																	
7	SPd2	SPd2	PC Loader communication speed	Selects the communication speed for PC Loader communication. (Setting range) 96 : 9600 bps 192 : 19200 bps 384 : 38400 bps	384	36-9													
8	bit2	bit2	PC Loader bit format	Selects the bit format for PC Loader communication. (Setting range) <table border="1" style="margin-left: 20px;"> <thead> <tr> <th></th> <th>Data length</th> <th>Parity</th> </tr> </thead> <tbody> <tr> <td>8n</td> <td>8</td> <td>None</td> </tr> <tr> <td>8o</td> <td>8</td> <td>Odd</td> </tr> <tr> <td>8E</td> <td>8</td> <td>Even</td> </tr> </tbody> </table>		Data length	Parity	8n	8	None	8o	8	Odd	8E	8	Even	8o	36-10	
	Data length	Parity																	
8n	8	None																	
8o	8	Odd																	
8E	8	Even																	
51	Ci01	Ci01	Communication Di1 function setting	Sets the function of communication Di1.	0	36-16													
52	Ci02	Ci02	Communication Di2 function setting	Sets the function of communication Di2.	0	36-16													
53	Ci03	Ci03	Communication Di3 function setting	Sets the function of communication Di3.	0	36-16													
54	Ci04	Ci04	Communication Di4 function setting	Sets the function of communication Di4.	0	36-16													
55	Ci05	Ci05	Communication Di5 function setting	Sets the function of communication Di5.	0	36-16													
56	Ci06	Ci06	Communication Di6 function setting	Sets the function of communication Di6.	0	36-16													
57	Ci07	Ci07	Communication Di7 function setting	Sets the function of communication Di7.	0	36-16													
58	Ci08	Ci08	Communication Di8 function setting	Sets the function of communication Di8.	0	36-16													

Note) Be sure to reset or turn on the power after the parameter setting is changed.

## ChC *Lnr* (Linearize)

Parameter				Content Explanation	Factory default	Parameter mask	Notes
No.	Display	Symbol	Name				
1	<i>P 1X0</i>	P1X0	Linearize table P1X0	Linearize table X0 for PV1 input (Setting range: -25% to 125%FS)	-25%FS	37-1	See 5-26.
}							
32	<i>P 1YF</i>	P1YF	Linearize table P1YF	Linearize table YF for PV1 input (Setting range: -25% to 125%FS)	125%FS	37-1	
33	<i>P 2X0</i>	P2X0	Linearize table P2X0	Linearize table X0 for PV2 input (Setting range: -25% to 125%FS)	-25%FS	37-2	
}							
64	<i>P 2YF</i>	P2YF	Linearize table P2YF	Linearize table YF for PV2 input (Setting range: -25% to 125%FS)	125%FS	37-2	
97	<i>R 1X0</i>	A1X0	Linearize table A1X0	Linearize table X0 for Ai1 input (Setting range: -25% to 125%FS)	-25%FS	37-4	
}							
128	<i>R 1YF</i>	A1YF	Linearize table A1YF	Linearize table YF for Ai1 input (Setting range: -25% to 125%FS)	125%FS	37-4	

Note) Be sure to reset or turn on the power after the parameter setting is changed.

## ChD *CLC* (Mathematical Calculation)

Parameter				Content Explanation	Factory default	Parameter mask	Notes					
No.	Display	Symbol	Name									
1	<i>t 01</i>	k01	Constant for Math function	Sets the constant used for mathematical expressions.	0.0000	38-1 } 38-4	Floating-point setting					
}												
16	<i>t 16</i>	k16										

## ChE *AT* (Tuning)

Parameter				Content Explanation	Factory default	Parameter mask	Notes
No.	Display	Symbol	Name				
1	<i>ATP 1</i>	ATP1	Auto tuning type	Specifies the auto-tuning method. (Setting range) NRML : Standard type AT LPV : Low PV type AT	NRML	39-1	

## ChG Tot (Totalizer)

No.	Parameter			Content Explanation	Factory default	Parameter mask	Notes
	Display	Symbol	Name				
1	<i>TrUn</i>	TrUn	Totalizer command/status	Starts/stops/latches totalizer. (Setting range: HoLd/rUn/LATcH)	HOLD	45-1	
2	<i>TrES</i>	TrES	Totalizer reset command	Resets totalizer value. (on/oFF)	oFF	45-1	
3	<i>ToIn</i>	ToIn	Totalizer input selection	Selects input used for totalizer. (Setting range: Pv1, Pv2, Ai1, AiM) * Math function scale (Ch8-89, 90, 91) is adopted when "(3) AiM" is selected.	Pv1	45-2	
4	<i>TdP</i>	TdP	Totalized value display decimal point position	Sets decimal point position of totalized value display. (Setting range: 0 to 4)	0	45-3	
5	<i>TCuT</i>	TCUT	Totalizer cut point	Sets totalizer cut point for totalizer input. The input lower than the totalizer cut point is not added. (Setting range: 0% to 100%FS)	0%FS	45-4	
6	<i>A1TP</i>	A1TP	Totalizer alarm 1 type	Sets alarm type of totalizer alarm 1. Setting range: 0: No alarm 1: Integrated value alarm 2: Totalizer batch output 3: Totalizer batch output (with auto reset)	0	45-5	
7	<i>A1on</i>	A1on	Totalizer alarm 1 ON pulse width	Sets ON pulse width for batch control batch output alarm for totalizer alarm 1. Setting range: 0: Continuous 1: 100ms 2: 200ms 3: 500ms 4: 1 sec.		45-5	
8	<i>A1oP</i>	A1oP	Totalizer alarm 1 excitation/non-excitation setting	Sets excitation/non-excitation output for totalizer alarm 1 (Setting range: 0: Excitation, 1; Non-excitation)	0	45-3	
9	<i>A2TP</i>	A2TP	Totalizer alarm 2 type	Sets alarm type of totalizer alarm 2. Setting range: 0: No alarm 1: Totalized value alarm 2: Totalizer batch output 3: Totalizer batch output (with auto reset)	0	45-6	
10	<i>A2on</i>	A2on	Totalizer alarm 2 ON pulse width	Sets ON pulse width for totalized value batch output alarm for totalizer alarm 2. Setting range: 0: Continuous 1: 100ms 2: 200ms 3: 500ms 4: 1 sec.	0	45-6	
11	<i>A2oP</i>	A2oP	Totalizer alarm 2 excitation/non-excitation setting	Sets excitation/non-excitation output of totalizer alarm 2. (Setting range: 0; Excitation, 1; Non-excitation)	0	45-6	

## ChG *rOf* (Totalizer)

No.	Parameter			Content Explanation	Factory default	Parameter mask	Notes
	Display	Symbol	Name				
12	<i>rMod</i>	TMod	Operation mode	Selects operation mode from Japanese and European modes. [Japanese mode] Calculation is made using totalize factor. [European mode] Calculation is made based on totalizer reference time and totalizer divisor. Setting range: (0) JpN: Japanese mode (1) EnG: European mode		45-7	
13	<i>rOPr</i>	ToPT	Totalizer option setting	0bit: Sets flickering of the totalized value at the occurrence of totalized value over. (Totalizer is suspended while the display flickers.) 1bit: Totalizer operation at standby 0: Continue, 1: Stop 2bit: Command at power ON 0: Stop, 1: Start 3bit: Totalizer operation at the occurrence of erroneous input 0: Add, 1: Not add (bit setting: 0000 to 1111)		45-8	
14	<i>rTb</i>	Tb	Totalizer reference time	Sets reference unit time for totalizer. (Setting range: SEC, Min, hour, dAY)	hoUr	45-9	
15	<i>rSCL</i>	SCL	Totalizer divisor	Divisor for totalized value scale conversion Note: Addition is not performed when 0 is selected. (Setting range: 0 to 1000000)	10000	45-9	
16	<i>rMUL</i>	MUL	Totalizer multiplier	Multiplier for totalized value scale conversion (Setting range 0 to 1000000)	1	45-9	
17	<i>rTCF</i>	TCF	Totalizer factor	Totalized value display when 100% input is continued for 1 hour (Setting range: 20 to 9999999. The decimal point appears according to TdP setting.)	10000	45-10	
18	<i>rTinT</i>	TinT	Totalizer initial value	The following relation holds when the value different from the current setting is selected as the initial value of totalizer. Totalized value = Initial value of totalizer (Setting range: 1999999 to 9999999. The decimal point appears according to TdP setting.)	0	45-11	
19	<i>rA1SP</i>	A1SP	Totalizer alarm 1 setting	Sets the operation value of totalizer alarm 1. (Setting range: 1999999 to 9999999. The decimal point appears according to TdP setting.)	10000	45-5	
20	<i>rA2SP</i>	A2SP	Totalizer alarm 2 setting	Sets the operation value of totalizer alarm 2. (Setting range: 1999999 to 9999999. The decimal point appears according to TdP setting.)	10000	45-6	
21	<i>rTSc</i>	rTSc	Re-transmission output source scale	Sets the totalized value that allows re-transmission output to be 100%. (Setting range: 1999999 to 9999999. The decimal point appears according to TdP setting.)	10000	45-12	

# ChX rCP (Recipe)

No.	Parameter			Content Explanation	Factory default	Parameter mask	Notes
	Display	Symbol	Name				
1	rCP0	rCP0	Recipe allocation 1	Sets parameter to be allocated as recipe 1 (Setting range 0-00 to W-Z9)	0-00	46-1	
}							
10	rCP9	rCP9	Recipe allocation 10	Sets parameter to be allocated as recipe 10 (Setting range: 0-00 to W-Z9)	0-00	46-10	
11	d00	d00	Recipe setting 0	Recipe parameter 1 setting for palette 0 (when palette is not used) (Setting range: According to rCP0 setting)	0	46-15	
}							
20	d09	d09	Recipe setting 9	Recipe parameter 10 setting for palette 0 (when palette is not used) (Setting range: According to rCP9 setting)	0	46-15	
21	d10	d10	Recipe setting 10	Recipe parameter 1 setting for palette 1 (Setting range: According to rCP0 setting)	0	46-1	
}							
30	d19	d19	Recipe setting 19	Recipe parameter 10 setting for palette 1 (Setting range: According to rCP9 setting)	0	46-10	
31	d20	d20	Recipe setting 20	Recipe parameter 1 setting for palette 2 (Setting range: According to rCP0 setting)	0	46-1	
}							
40	d29	d29	Recipe setting 29	Recipe parameter 10 setting for palette 2 (Setting range: According to rCP9 setting)	0	46-10	
41	d30	d30	Recipe setting 30	Recipe parameter 1 setting for palette 3 (Setting range: According to rCP0 setting)	0	46-1	
}							
50	d39	d39	Recipe setting 39	Recipe parameter 10 setting for palette 3 (Setting range: According to rCP9 setting)	0	46-10	
51	d40	d40	Recipe setting 40	Recipe parameter 1 setting for palette 4 (Setting range: According to rCP0 setting)	0	46-1	
}							
60	d49	d49	Recipe setting 49	Recipe parameter 10 setting for palette 4 (Setting range: According to rCP9 setting)	0	46-10	
61	d50	d50	Recipe setting 50	Recipe parameter 1 setting for palette 5 (Setting range: According to rCP0 setting)	0	46-1	
}							
70	d59	d59	Recipe setting 59	Recipe parameter 10 setting for palette 5 (Setting range: According to rCP9 setting)	0	46-10	
71	d60	d60	Recipe setting 60	Recipe parameter 1 setting for palette 6 (Setting range: According to rCP0 setting)	0	46-1	
}							
80	d69	d69	Recipe setting 69	Recipe parameter 10 setting for palette 6 (Setting range: According to rCP9 setting)	0	46-10	
81	d70	d70	Recipe setting 70	Recipe parameter 1 setting for palette 7 (Setting range: According to rCP0 setting)	0	46-1	
}							
90	d79	d79	Recipe setting 79	Recipe parameter 10 setting for palette 7 (Setting range: According to rCP9 setting)	0	46-10	

# [ Motorized control type exclusive parameter list ]

## Ch7 *non* (Monitor)

Parameter				Content Explanation	Factory default	Parameter mask	Notes
No.	Display	Symbol	Name				
50	<i>nonrb</i>	MVrb	Valve monitor	Displays the valve opening degree feedback value.	-	17-5	

## Ch8 *SET* (Input/output definition)

Parameter				Content Explanation	Factory default	Parameter mask	Notes
No.	Display	Symbol	Name				
43	<i>AI1F</i>	Ai1T	Ai1 input type	Sets the type of Ai1 input. (Setting range: 16 to 18, 23, 24) Sets 23 or 24 when used as valve opening feedback.	As ordered	23-1	
92	<i>TPLT</i>	TPLT	Template	Specifies the template. The range of effective setting. 30 : 1-loop motor-operated valve controller (with input Math) 31 : 1-loop SV selection type motor-operated valve controller (with input Math) 33 : 1-loop motor-operated valve controller 34 : 1-loop SV selection type motor-operated valve controller	33	25-10	
93	<i>oTYP</i>	oTYP	Output type	Selects the control output selector type. (Setting range: 30 to 31)	As ordered	25-11	

Note) Be sure to reset or turn on the power after the parameter setting is changed.

## Ch9 *555* (System definition)

Parameter				Content Explanation	Factory default	Parameter mask	Notes
No.	Display	Symbol	Name				
35	<i>brd1</i>	brd1	Designates output at burnout	Designates control output at input error or valve opening degree feedback anomaly. HOLD : Outputs to follow MV Lo : Turns on CLOSE signal UP : Turns on OPEN signal EXMV : Controls to join EXMV setting Poff : Turns off OPEN, and CLOSE signals, allowing MV to join MVRB.	Lo	30-1	
67	<i>C1</i>	C1	LED C1 assignment	Allocates indicator LEDs. (Setting range: 0 to 255)	19	32-1	
68	<i>C2</i>	C2	LED C2 assignment		20	32-2	
76	<i>brG1</i>	brG1	Bar graph display type	Select value to display on bar graph. MON : No display MV : Control output MVRB : Valve opening degree feedback value (MVRB)	MV	32-10	
78	<i>dSPT</i>	dSPT	Operation screen display type	Select value to indicate at 5-digit display on bottom of operation screen. 0 : Control output (MV) 1 : Valve opening degree feedback value (MVRB)	0	32-14	

Note) Be sure to reset or turn on the power after the parameter setting is changed.

## ChF Pfb (motorized valve definition)

Parameter				Content Explanation	Factory default	Parameter mask	Notes
No.	Display	Symbol	Name				
1	VYP	VTYP	Valve type	Sets control type of motorized valve. Fb : PFB control Fb-Sr : PFB + estimation control Sr1 : Estimation control 1 Sr2 : Estimation control 2 (Turning on power closes valve all the way)	Fb	44-1	
2	TrVL	TrVL	Travel time	Sets time required for valve to move over full stroke. Automatically set in case of automatic adjust of valve. (Setting range: 5.0 to 300.0 sec)	30.0S	44-2	
3	PGP	PGP	Dead band of valve operation	Sets dead band of OPEN/CLOSE signals. (Setting range: 0.5 to 100.0%)	10.0%	44-3	
6	AdPC	AdPC	Calibration value at which valve is fully closed	Value at which valve is closed all the way. (Setting range: 0 to FFFFF)	-	44-6	
7	AdPO	AdPO	Calibration value at which valve is fully open	Value at which valve is open all the way. (Setting range: 0 to FFFFF)	-	44-7	
8	CALb	CALb	Valve calibration command	Allows to adjust the valve. OFF : Termination of calibration CLOSE : Manual calibration of fully closed position OPEN : Manual calibration of fully open position AUTO : Automatic calibration	OFF	44-8	

# [ Heating/cooling control type exclusive parameter list ]

## Ch2 $P_{Ld}$ (Control parameter)

No.	Parameter			Content Explanation	Factory default	Parameter mask	Notes
	Display	Symbol	Name				
11	$hh-1$	hh1	MV upper limit value on heating side	Sets the upper limit value of operation output (MV). (Heating side) (Setting range: -25 to 125%)	100.0	40-8	
12	$Lh-1$	Lh1	MV lower limit value on cooling side	Sets the lower limit value of operation output (MV). (Heating side) (Setting range: -25 to 125%)	0.0	40-8	
17	$db1$	db1	Dead band	Sets the dead band and overlap band for heating/cooling control. (Setting range: -100.0 to 50.0%)	0.0	03-11	
25	$PC1$	PC1	Proportional band on cooling side	Sets the proportional band (cooling side). (Setting range: 0.0 to 999.9%)	5.0	40-3	
26	$iC1$	iC1	Integral time on cooling side	Sets the integral time (cooling side). (Setting range: 0.0 to 3200.00 sec)	240.0	40-3	
27	$dC1$	dC1	Derivative time on cooling side	Sets the derivative time (cooling side). Derivative operation is set to OFF when setting=0. (Setting range: 0.0 to 999.9 sec)	60.0	40-3	
28	$hC1$	hC1	MV upper limit value on cooling side	Sets the upper limit value of operation output (MV) (cooling side). (Setting range: -25.0 to 125.0%)	100.0	03-6	
29	$Lc1$	LC1	MV lower limit value on cooling side	Sets the lower limit value of operation output (MV) (cooling side). (Setting range: -25.0 to 125.0%)	0.0	03-6	
34	$TCC1$	TCC1	Control output proportion cycle on cooling side	Sets the proportion cycle of control output (cooling side) (Setting range: 1 to 150 sec)	30.0 (RY) 2.0 (SSR-d)	40-4	
35	$rVC1$	rVC1	Control actuation system on cooling side	Sets the automatic system of control output (cooling side). NRML: Normal actuation REV: Reverse actuation	NRML	40-5	
37	$PMC1$	PMC1	Control output volume on cooling side	Sets the output value at control standby (cooling side) (Setting range: -25.0 to 125.0%)	0.0	40-7	
39	$LdC1$	LdC1	Output limiter type setting on cooling side	Sets whether the output value on cooling side should be limited or exceeded (scale off) when the limit setting is reached (125%, -25%) (Setting range: 0 to 3)	3	03-6	

## Ch4 *PLF* (Control palette)

No.	Parameter			Content Explanation	Factory default	Parameter mask	Notes
	Display	Symbol	Name				
1	<i>SV1</i>	Sv1	Setting value 1	Palette 1 SV (Setting range: SV lower limit value to SV upper limit value)	0%FS	08-1	
2	<i>P-1</i>	P-1	Proportional band 1	Palette 1 proportional band (Setting range: 0.0 to 999.9%) ON/OFF control at setting = 0.	5.0	08-1	
3	<i>I-1</i>	i-1	Integral time 1	Palette 1 integral time (Setting range: 0.0 to 3200.0 sec) Integral control OFF at setting = 0.	240.0	08-1	
4	<i>D-1</i>	d-1	Derivative time 1	Palette 1 derivative time (Setting range: 0.0 to 999.9 sec) Derivative control OFF at setting = 0.	60.0	08-1	
6	<i>Arh1</i>	Arh1	Anti - reset windup upper limit value 1	Palette 1 Anti - reset windup upper limit value setting. (Setting range: 0 to 100%FS)	100%FS	08-1	
7	<i>ArL1</i>	ArL1	Anti - reset windup lower limit value 1	Palette 1 Anti - reset windup lower limit value setting. (Setting range: 0 to 100%FS)	100%FS	08-1	
10	<i>Mh-1</i>	Mh-1	MV upper limit value 1	Palette 1 upper limit value of operation output (MV). (Setting range: -25.0 to 125.0%)	105.0	08-1	
11	<i>ML-1</i>	ML-1	MV lower limit value 1	Palette 1 lower limit value of operation output (MV). (Setting range: -25.0 to 125.0%)	-5.0	08-1	
12	<i>hh-1</i>	hh-1	MV upper limit value 1 on heating side	Palette 1 upper limit value on heating side of operation output (MV). (Setting range: -25.0 to 125.0%)	100.0	08-1	
13	<i>Lh-1</i>	Lh-1	MV lower limit value 1 on heating side	Palette 1 lower limit value on heating side of operation output (MV). (Setting range: -25.0 to 125.0%)	0.0	08-1	
16	<i>hYS1</i>	hYS1	Hysteresis 1	Palette 1 hysteresis. (Setting range: 0 to 50%)	0.3%FS	08-1	
18	<i>db-1</i>	db-1	Dead band 1	Palette 1 dead band and overlap band for heating/cooling control. (Setting range: -100.0 to 50%)	0.0	08-1	
19	<i>bL-1</i>	bL-1	Output convergence value 1	Palette 1 output convergence value. (Setting range: -100.0 to 100%)	0.0	08-1	
26	<i>PC-1</i>	PC-1	Proportional band 1 on cooling side	Palette 1 proportional band on cooling side. (Setting range: 0.0 to 999.9%) Two-position operation is allowed when setting = 0.	5.0	08-1	
27	<i>IC-1</i>	IC-1	Integral time 1 on cooling side	Palette 1 integral time on cooling side. (Setting range: 0.0 to 3200.0 sec) The integral operation is set to OFF when setting = 0.	240.0	08-1	
28	<i>dC-1</i>	dC-1	Derivative time 1 on cooling side	Palette 1 derivative time on heating side. (Setting range: 0.0 to 999.9 sec) The derivative operation is set to OFF when setting = 0.	60.0	08-1	
29	<i>hC-1</i>	HC-1	MV upper limit value 1 on cooling side	Palette 1 upper limit value on cooling side of operation output (MV). (Setting range: -25.0 to 125.0%)	100.0	08-1	
30	<i>LC-1</i>	LC-1	MV lower limit value 1 on cooling side	Palette 1 lower limit value on cooling side of operation output (MV). (Setting range: -25.0 to 125.0%)	0.0	08-1	
}							

## Ch4 *PLF* (Control palette)

No.	Parameter			Content Explanation	Factory default	Parameter mask	Notes
	Display	Symbol	Name				
o1	<i>Sv-7</i>	Sv7	Setting value 7	Palette 7 SV. (Setting range: SV lower limit value to SV upper limit value)	0%FS	14-1	
o2	<i>P-7</i>	P-7	Proportional band 7 on heating side	Palette 7 proportional band on heating side. (Setting range: 0.0 to 999.9%) Two-position operation is allowed when setting = 0.	5.0	14-1	
o3	<i>i-7</i>	i-7	Integral time 7 on heating side	Palette 7 integral time on heating side. (Setting range: 0.0 to 3200.0 sec.) The integral operation is set to OFF when setting = 0.	240.0	14-1	
o4	<i>d-7</i>	d-7	Derivative time 7 on heating side	Palette 7 derivative time on heating side. (Setting range: 0.0 to 999.9 sec.) Derivative operation is set to OFF when setting = 0.	60.0	14-1	
o6	<i>Arh7</i>	Arh7	Integration cut point upper limit value 7	Palette 7 upper limit value of integration cut point. (Setting range: 0 to 100%FS)	100%FS	14-1	
o7	<i>ArL7</i>	ArL7	Integration cut point lower limit value 7	Palette 7 lower limit value of integration cut point. (Setting range: 0 to 100%FS)	100%FS	14-1	
P0	<i>Mh-7</i>	Mh-7	MV upper limit value 7	Palette 7 upper limit value of operation output (MV). (Setting range: -25.0 to 125.0%)	105.0	14-1	
P1	<i>ML-7</i>	ML-7	MV lower limit value 7	Palette 7 lower limit value of operation output (MV). (Setting range: -25.0 to 125.0%)	-5.0	14-1	
P2	<i>hh-7</i>	hh-7	MV upper limit value 7 on heating side	Palette 7 upper limit value on heating side of operation output (MV). (Setting range: -25.0 to 125.0%)	100.0	14-1	
P3	<i>Lh-7</i>	Lh-7	MV lower limit value 7 on heating side	Palette 7 lower limit value on heating side of operation output (MV). (Setting range: -25.0 to 125.0%)	0.0	14-1	
P6	<i>hYS7</i>	hYS7	Hysteresis 7	Palette 7 hysteresis. (Setting range: 0 to 50%FS)	0.3%FS	14-1	
P8	<i>db-7</i>	db-7	Dead band 7	Palette 7 dead band and overlap band for heating/cooling control. (Setting range: -100.0 to 50.0%)	0.0	14-1	
P9	<i>bl-7</i>	BL-7	Output convergence value 7	Palette 7 output convergence value. (Setting range: -100.0 to 100.0%)	0.0	14-1	
q6	<i>PC-7</i>	PC-7	Proportional band 7 on cooling side	Palette 7 proportional band on cooling side. (Setting range: 0.0 to 999.9%) Two-position operation is allowed when setting = 0.	5.0	14-1	
q7	<i>iC-7</i>	iC-7	Integral time 7 on cooling side	Palette 7 proportional band on cooling side. (Setting range: 0.0 to 3200.0 sec) Integral operation is set to OFF when setting = 0.	240.0	14-1	
q8	<i>dC-7</i>	dC-7	Derivative time 7 on cooling side	Palette 7 derivative time on cooling side. (Setting range: 0.0 to 999.9 sec.) Derivative operation is set to OFF when setting = 0.	60.0	14-1	
q9	<i>hC-7</i>	HC-7	MV upper limit value 7 on cooling side	Palette 7 upper limit value on cooling side of operation output (MV). (Setting range: -25.0 to 125.0%)	100.0	14-1	
r0	<i>LC-7</i>	LC-7	MV lower limit value 7 on cooling side	Palette 7 lower limit value on cooling side of operation output (MV). (Setting range: -25.0 to 125.0%)	0.0	14-1	

## Ch4 *PLF* (Control palette)

Parameter				Content Explanation	Factory default	Parameter mask	Notes
No.	Display	Symbol	Name				
T1	<i>rEF1</i>	rEF1	PID switch point 1	Palette 1 PID switch point (Setting range: -25 to 125%FS)	0%FS	08-1	
	}						
T7	<i>rEF7</i>	rEF7	PID switch point 7	Palette 7 PID switch point (Setting range: -25 to 125%FS)	0%FS	14-1	See 5-6.

## Ch7 *Mon* (Monitor)

Parameter				Content Explanation	Factory default	Parameter mask	Notes
No.	Display	Symbol	Name				
44	<i>HMV1</i>	HMV1	MV on heating side	MV monitor on heating	-	18-3	
48	<i>CMV1</i>	CMV1	MV on cooling side	MV monitor on cooling	-	18-3	

## Ch8 *SEF* (Input/output definition)

Parameter				Content Explanation	Factory default	Parameter mask	Notes
No.	Display	Symbol	Name				
92	<i>rPLT</i>	TPLT	Template	Specifies control template. The range of effective setting. 50 : Single-loop heating/cooling control (with math function) 51 : Single-loop SV selection heating/ cooling control (with math function) 53 : Single-loop heating/cooling control 54 : Single-loop SV selection heating/ cooling control	53	25-10	
93	<i>oTYP</i>	oTYP	Output type	Selects the control output selector type. (Setting range: 50 to 55)	As ordered	25-11	

Note) Be sure to reset or turn on the power after the parameter setting is changed.

## Ch9 *SY5* (System definition)

Parameter				Content Explanation	Factory default	Parameter mask	Notes
No.	Display	Symbol	Name				
68	<i>C2</i>	C2	LED C2 assignment	Allocates indicator LEDs. (Setting range: 0 to 255)	25 (Cooling output)	32-2	

Note) Be sure to reset or turn on the power after the parameter setting is changed.

# 6 Digital Controller Functions

## 6-1 Alarm functions

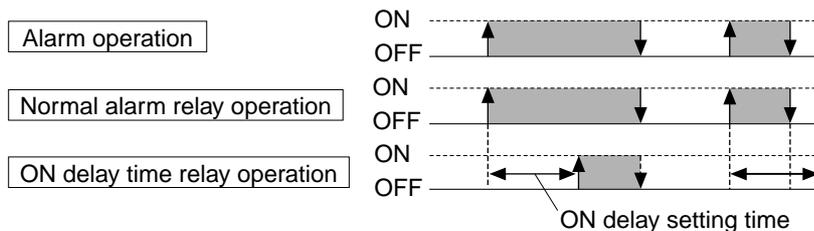
### 1) Alarm Types

- The alarm types are an absolute value alarm, a deviation alarm, an upper/lower limit alarm and a range alarm. (For details see [Table 1 Alarm Operation Type Codes])

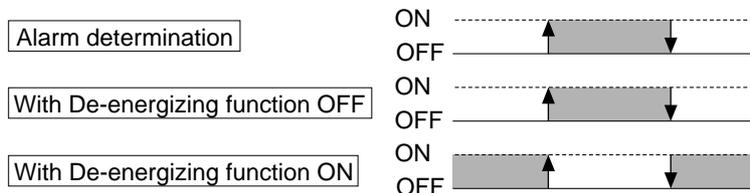
### 2) Alarm function

No.	Function Name	Function	Parameter set
①	Hysteresis function	Alarm operation can be set for operation dead band (hysteresis).	alarm 1: 1hYS (chA-3) } alarm 8: 8hYS (chA-38)
②	ON delay function	After alarm ON conditions are established, the alarm is ON after the ON delay setting time.	alarm 1: 1dLY (chA-4) } alarm 8: 8dLY (chA-39)
③	Alarm latch function	Alarm goes ON once, and alarm ON function status is maintained. To release the alarm latch, the following methods are used.	alarm 1: 1oP (chA-2) } alarm 8: 8oP (chA-37)
		I) Turns power ON again on the controller.	
		II) Turns alarm latch settings OFF once.	
		III) Releases latch on the alarm latch release screen.	LACH (ch1-8)
		IV) Executes release with DI input.	di01 (ch9-39) to di04 (ch9-42)
	V) Executes release with communication.		
④	Abnormal alarm function	Sets alarm relay to ON when abnormality occurs in equipment. (For unit abnormalities, see the page on "Troubleshooting".)	alarm 1: 1oP (chA-2) } alarm 8: 8oP (chA-37)
⑤	De-energizing function	Transmits to the alarm relay by excitation/non-excitation of an alarm output. (When function is ON, output will be by non-excitation.)	alarm 1: 1oP (chA-2) } alarm 8: 8oP (chA-37)

#### ON delay function



#### De-energizing function



**Caution** When the power is off, even when the non-excitation function is ON, there will be no output during standby. (Function will be OFF.)

# [Table 1] Alarm Operation Type Codes

Parameter: 1TP (chA-1) to 8TP (chA-36)

	1TP to 8TP	Alarm Type	Operation Diagram
	0	No alarm	
Absolute value Alarm	1	Upper limit absolute	
	2	Lower limit absolute	
	3	Upper limit absolute (with hold)	
	4	Lower limit absolute (with hold)	
Deviation Alarm	5	Upper limit deviation	
	6	Lower limit deviation	
	7	Upper/lower limit deviation	
	8	Upper limit deviation (with hold)	
	9	Lower limit deviation (with hold)	
	10	Upper/lower limit deviation (with hold)	
Range Alarm	11	Range upper/lower limit deviation	
Upper/lower limit Alarm	16	Upper/lower limit absolute	
	17	Upper/lower limit deviation	
	18	Upper limit absolute Lower limit deviation	
	19	Lower limit absolute Upper limit deviation	
	20	Upper/lower limit absolute (with hold)	
	21	Upper/lower limit deviation (with hold)	
	22	Upper limit absolute Lower limit deviation (with hold)	
23	Upper limit deviation Lower limit absolute (with hold)		

	1TP to 8TP	Alarm Type	Operation Diagram
Range Alarm	24	Range upper/lower limit absolute	
	25	Range upper limit/lower limit deviation	
	26	Range upper limit absolute Lower limit deviation	
	27	Range upper limit deviation Lower limit absolute	
Range Alarm	28	Range upper limit/lower limit absolute (with hold)	
	29	Range upper limit/lower limit deviation (with hold)	
	30	Range upper limit absolute Lower limit deviation (with hold)	
	31	Range upper limit deviation Lower limit absolute (with hold)	
Limit	32	SV upper/lower limit	
Rate of change	35	PV rate of change Upper/lower limit	
Timer	36	ON delay timer	
	37	OFF delay timer	
	38	ON/OFF delay timer	

### Caution The Hold Function:

This is an alarm for situations when the alarm does not turn ON immediately, and the value goes outside the range once and then reenters within the range, even when the measured value is within the range of the alarm at the time the power is turned on.

### Notes)

- After changing the alarm type, confirm the alarm setting values. Alarm setting values may change by changing the alarm type, but this is normal.
- Caution: The alarm latch function cannot be used when using the OFF delay timer.
- ALn : Indicates the AL1 (ch1-10) to AL8 (ch1-31) alarm setting values.
- An-H : Indicates the A1-H (ch1-12) to A8-H (ch1-33) alarm setting values.
- An-L : Indicates the A1-L (ch1-11) to A8-L (ch1-32) alarm setting values.
- dLYn : Indicates the 1dLY (chA-4) to 8dLY (chA-39) alarm ON delay setting values.

# 7

## Setup Procedures of the Controller

### 1 Input settings

\* Not necessary if input was specified when ordered.

① Does the input sensor type match the sensor in use?

Select the sensor in use from Table 2 and set to PV1T (ch8-4).

(Example) Set Pv1T (ch8-4) to "7" in the case of a T thermocouple.



② Are the input range settings in the appropriate range for the sensor in use?

The standard ranges for each sensor are shown in Table 2. Select the appropriate temperature range for the equipment in use and set the upper and lower limit values. Lower limit → Pv1b (ch8-2), Upper limit → Pv1F (ch8-1).

(Example) If the temperature range is 0 to 800 [°C]:  
Set 0 → Pv1b (ch8-2), 800 → Pv1F (ch8-1)

(Note) While it is possible to set outside the standard range, the standard range settings are recommended.

(Note) There are no standard ranges for DC Volt (and DC Current) input. Set the upper and lower limits as you wish. (within the range -19999 to 99999, lower limit < upper limit)

Note 1) Set input sensor type PV1T (ch8-4) and input range settings (Pv1b (ch8-2), Pv1F (ch8-1), and Pv1U (ch8-5)) in advance of all the other settings, and then reset the instrument without fail. Other parameters may change when these parameters are changed, but this is normal. Confirm all parameter values. Be sure to reset the instrument after setting the input range. Otherwise improper values may be displayed. Be sure to check the setting after the reset.

## 2 Control Settings

\* Please read if controls are not responding as you expect.

### ① What is the control purpose? (To heat? To cool?)

Objective	Operation Method	Explanation	Method
To heat	Reverse operation	Raising the measurement value will reduce operation output.	Set rEv1 (ch2-20) to REV.
To cool	Direct operation	Raising the measurement value will increase operation output.	Set rEv1 (ch2-20) to NRML.



### ② What kind of control is it? (PID, ON/OFF)

Control Type	Explanation	Method
PID control	The output signal changes within the range of 0 to 100% according to PID calculation. A stable control without a control offset can be achieved.	Please execute auto-tuning manually. The optimal P.I.D will be calculated automatically. (The PID value may also be set manually.)
ON/OFF control (2-position control)	Output is either ON (100%) or OFF (0%). (Suitable when frequent output switching is inconvenient.)	Set ch2 P1 (ch2-1) to "0.0".

## [Table 2] Input Codes

Parameter: PV1T, PV2T, AI1T

Input Type	Code
Resistance bulb	1
• Pt100Ω (IEC)	
Thermocouple	2 3 4 5 6 7 8 9
• J	
• K	
• R	
• B	
• S	
• T	
• E	
• PR40/20	

Input Type	Code
• N	12
• PL-II	13
• WRe5-26	14
DC voltage	16 17 18 19 20
• 1 to 5V DC	
• 0 to 5V DC	
• 0 to 10V DC	
• 0 to 10mV DC	
• 0 to 50mV DC	20
DC current	26 27
• 4 to 20mA DC	
• 0 to 20mA DC	27
Potentiometer	23 24
• Valve opening feedback (with moving average filter)	
• Valve opening feedback	24

Note 1) For PV1, and PV2, the potentiometer code ("23", "24") can not be selected.

Note 2) • If with PFB (PILC 5th digit = D), Ai1 can be set to potentiometer code "23", "24" only.

• If without PFB (PILC 5th digit = S), Ai1 can be set to DC current code "16", "18" only.

Note 3) If, on account of noise, ect., the valve opening degree feedback input suffers from an abrupt change, select Ai1T = 23 (with moving average filter).

# [Table 3] Input Range Table (Standard Range)

Parameter: PV1F/PV1B, PV2F/PV2B, AI1F/AI1B

Input Type		Measurement Range (°C)	Measurement Range (°F)
Resistance bulb (RTD) IEC	Pt100Ω	0 to 150	32 to 302
		0 to 300	32 to 572
		0 to 500	32 to 932
		0 to 600	32 to 1112
		-50 to 100	-58 to 212
		-100 to 200	-148 to 392
		-150 to 600	-238 to 1112
		-150 to 850	-238 to 1562

Input Type		Measurement Range (°C)	Measurement Range (°F)
Thermocouple	J	0 to 400	32 to 752
	J	0 to 1000	32 to 1832
	K	0 to 400	32 to 752
	K	0 to 800	32 to 1472
	K	0 to 1200	32 to 2192
	R	0 to 1600	32 to 2912
	B	0 to 1800	32 to 3272
	S	0 to 1600	32 to 2912
	T	-200 to 200	-328 to 392
	T	-200 to 400	-328 to 752
	E	0 to 800	32 to 1472
	E	-200 to 800	-328 to 1472
	PR40/20	0 to 1800	32 to 3272
	N	0 to 1300	32 to 2372
	PL-II	0 to 1300	32 to 2372
WRe5-26	0 to 2300	32 to 4172	
DC voltage	1 to 5V DC	-19999 to 99999 ( Scaling is possible )	
	0 to 5V DC		
	0 to 10V DC		
	0 to 10mV DC		
	0 to 50mV DC		
DC current	4 to 20mA DC		
	0 to 20mA DC		

• To use the Zener barrier for RTD input, user adjustment (section 5-9) is required.

Note 1)

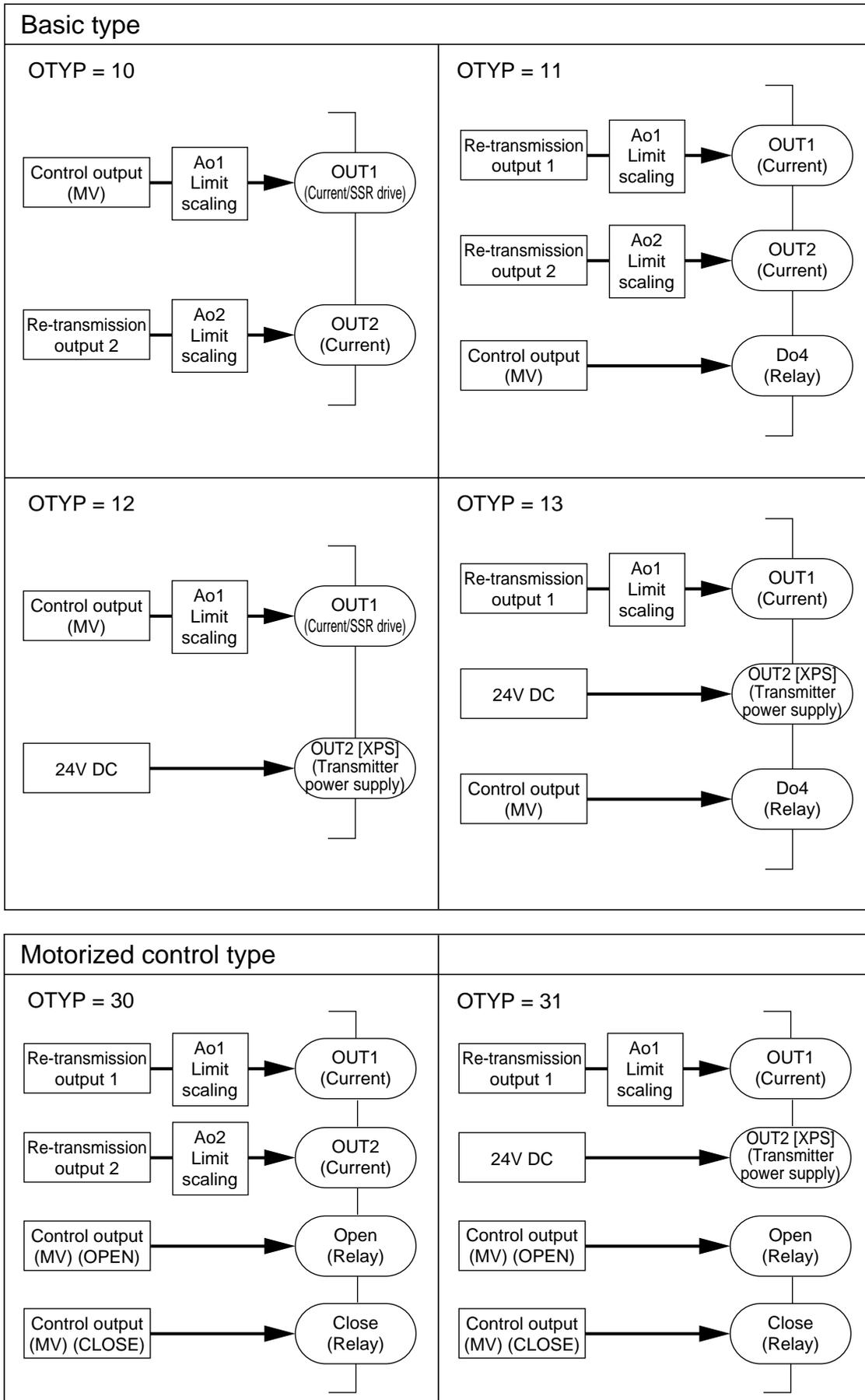
R thermocouple 0 to 500°C } Proper values may not  
 B thermocouple 0 to 400°C } be displayed within  
 these ranges due to the  
 sensor's characteristics.

Note 2) When using at the setting below the minimum range stated in the table above, the input accuracy is not guaranteed.

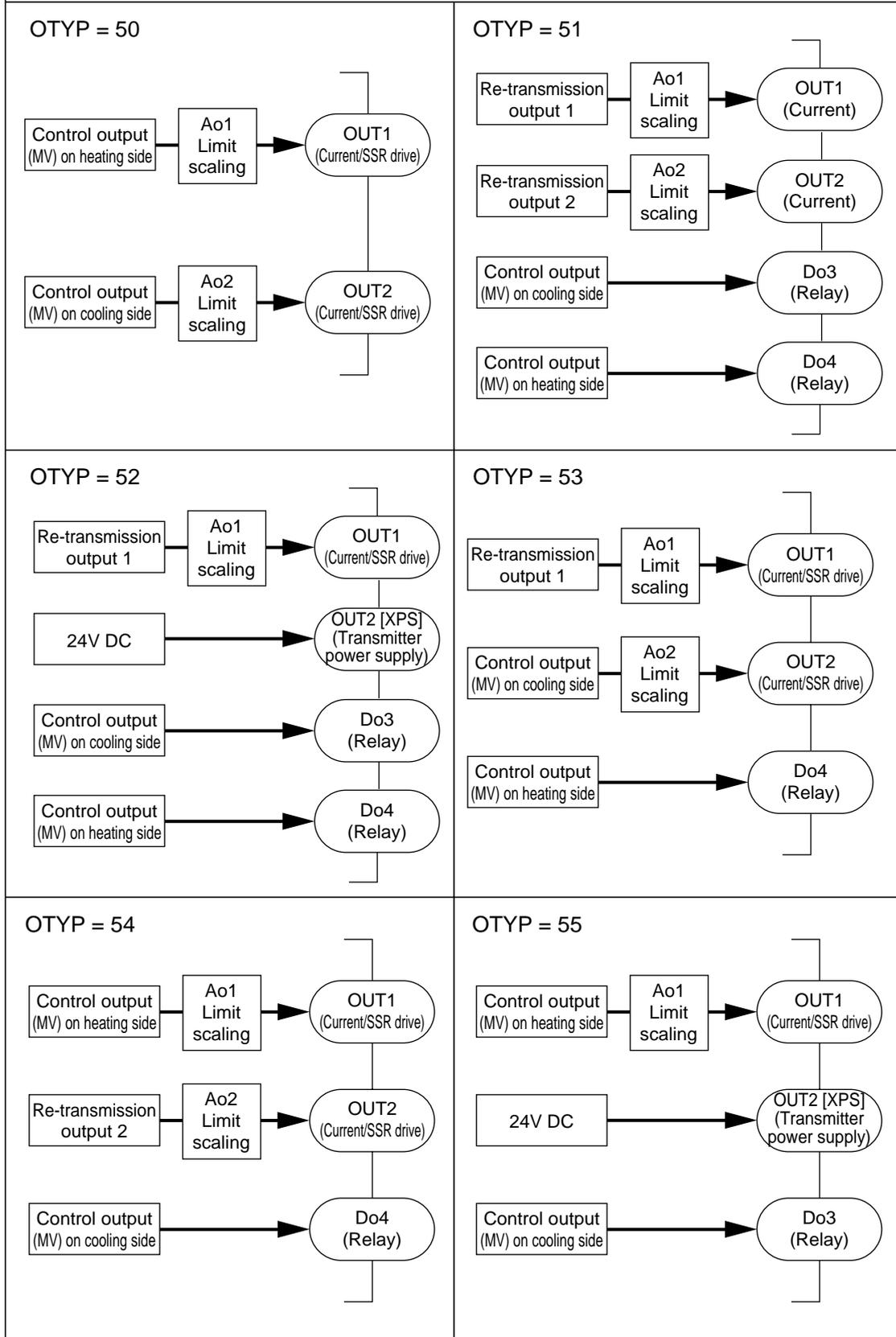
Note 3) In the -50%FS to +50%FS display, values under -199.99 will not be displayed.

# [Table 4] Output Type Code Table

Parameter: OTYP



## Heating / cooling control type



# [Table 5] Di Input Assignments (Di1 to Di15)

Di1 to Di15 Setting Value	Function	Operating Conditions			
		Status detection		Edge detection	
		ON	OFF		
0	None	–	–	–	–
1	STBY (standby)	Standby	RUN	–	–
30	AT (Auto tuning)	–	–	AT start	AT stop
40	Alarm latch reset (Alarm1) to (Alarm 8) Release all	–	–	Release all	Latch hold
50 to 57	Timer operating (Alarm1) to (Alarm 8)	ON	OFF	–	–
60	R-ACK (Remote acknowledgement)	Remote	Local	–	–
70	SMV (Manual command)	Manual mode	Auto mode	–	–
80	PV-TRK command (PV tracking)	ON	OFF	–	–
103	EX-MV (External control amount)	EX-MV	MV	–	–
140	Switching of the active expression for Math function	Hi selector expression	Lo selector expression	–	–
160	Totalizer start/stop, reset	HOLD	Run	–	–
161		LATCH	Run	–	–
162		Reset	–	–	–
200 to 249	Binary data setting to constant parameter CN01 to CN05 1st digit : Bit position 10th digit : Parameter No.	1 (1bit)	0 (1bit)	–	–

## [Table 6] DO and LED display Assignments

DO output	LED display	Type
DO01 to DO04 DO11 to DO15	C1, C2 LDO1 to LDO5	
0	0	No setting
1	1	ALM1
2	2	ALM2
3	3	ALM3
4	4	ALM4
5	5	ALM5
6	6	ALM6
7	7	ALM7
8	8	ALM8
17	17	OR of ALMs
–	21	Output (MV) 1
–	22	Output (MV) 2
29	29	System fault
41	41	Totalizer ALM1
42	42	Totalizer ALM2
80	80	Manual MV (status)
81	81	EX-MV command (status)
82	82	Remote SV (status)
83	83	Local SV (status)
84	84	PV tracking (status)
85	85	Normal (Direct) action (status)
86	86	Auto tuning (AT) (status)
87	87	Remote request (status)
88	88	Remote acknowledge (R-ACK) (Status)
89	89	Not-Auto (status)
90	90	Mode OR output 1
91	91	Mode OR output 2

\*3)

\*3)

\*1) Contents of OR operation: Manual + Auto

\*2) Contents of OR operation: Manual + EX-MV

\*3) The lamp does not come ON for current (4 to 20mA) output type.

## [Table 7] Standby operation

STBY setting value	STBO setting value	Operation during standby		
		MV output	Output other than MV	Screen display
ON	0	Value of PMv1 Value of PMC1 (-25% to 125%)	OFF or -25%	Lighting
	1	Value of PMv1 Value of PMC1 (-25% to 125%)	OFF or -25%	Extinction
OFF	—	Normal	Normal	Lighting

# [Table 8] User Assignable Function Keys

F key setting (Function key code)	Key operation
0	No function
1	dSV display Changeover between Remote and Auto (Press for 2 seconds.) <span style="float: right;">Note 1</span>
2	Standby/RUN changeover
3	Alarm latch reset
10	AT (Auto tuning) START/STOP
20	Timer operation start/stop (ALM 1)
21	Timer operation start/stop (ALM 2)
22	Timer operation start/stop (ALM 3)
23	Timer operation start/stop (ALM 4)
24	Timer operation start/stop (ALM 5)
25	Timer operation start/stop (ALM 6)
26	Timer operation start/stop (ALM 7)
27	Timer operation start/stop (ALM 8)
30	Totalizer RUN/HOLD
31	Totalizer RUN/LATCH
32	Totalizer RESET
41	Transfer of SV1 to local SV
42	Transfer of SV2 to local SV
43	Transfer of SV3 to local SV
44	Transfer of SV4 to local SV
45	Transfer of SV5 to local SV
46	Transfer of SV6 to local SV
47	Transfer of SV7 to local SV
50	Selection of palette 0
51	Selection of palette 1
52	Selection of palette 2
53	Selection of palette 3
54	Selection of palette 4
55	Selection of palette 5
56	Selection of palette 6
57	Selection of palette 7
60	Parameter jump 1
61	Parameter jump 2
62	Parameter jump 3

Note 1: Do not use this setting when TPLT (Ch8-92) is set to 11 or 14.

# [Table 9] Type of Math function

CALC setting	Name of operation	Arithmetic expression
0	No math operation	M1 = PV1 input
1	Mathematical expression 1 (Flow rate compensation with temperature and pressure)	$M1 = k01 \times \sqrt[1]{PV1} \times \sqrt[2]{\frac{Ai1 + k02}{k03} \times \frac{k04}{PV2 + k05}}$ PV1: Flow rate (differential pressure), PV2: Temperature, Ai1: Pressure
2	Mathematical expression 2 (Flow rate compensation with temperature and pressure)	$M1 = k01 \times PV1 \times \sqrt[1]{\frac{Ai1 + k02}{k03}} \times \frac{k04}{PV2 + k05}$ PV1: Flow rate (differential pressure), PV2: Temperature, Ai1: Pressure
3	Mathematical expression 3 (Flow rate compensation with temperature and pressure)	$M1 = k01 \times PV1 \times \frac{Ai1 + k02}{k03} \times \frac{k04}{PV2 + k05}$ PV1: Flow rate (differential pressure), PV2: Temperature, Ai1: Pressure
4	Mathematical expression 4	$M1 = \frac{(k01 \times (k02 \times PV1 + k03 \times PV2 + k04 \times Ai1) + k05)}{(k06 \times (k07 \times PV1 + k08 \times PV2 + k09 \times Ai1) + k10)}$
5	Mathematical expression 5	$M1 = \frac{(k01 \times ((k02 \times PV1 + k03) \times (k04 \times PV2 + k05) \times (k06 \times Ai1 + k07)) + k08)}{(k09 \times ((k10 \times PV1 + k11) \times (k12 \times PV2 + k13) \times (k14 \times Ai1 + k15)) + k16)}$
6	Mathematical expression 6	$M1 = k01 \times PV1 \times (k02 \times PV2 + k03 \times Ai1) + k04 \times Ai1 + k05$
7	H selector (2 points)	M1 = Max (PV1, PV2) PV1 or PV2, whichever is larger, is selected.
8	L selector (2 points)	M1 = Min (PV1, PV2) PV1 or PV2, whichever is smaller, is selected.
9	H selector (3 points)	M1 = Max (PV1, PV2, Ai1) PV1, PV2, or Ai1, whichever is largest, is selected.
10	L selector (3 points)	M1 = Min (PV1, PV2, Ai1) PV1, PV2, or Ai1, whichever is smallest, is selected.
11	Input switching (2 points)	M1 = PV1 when $PV1 \leq k01$ , M1 = PV2 when $PV1 > k01$
12	H/L selector (2 points) (with Di switching function)	Expression 7 or 8 is used by Di switching. (Specify "140" for Di function for switching.)
13	H/L selector (3 points) (with Di switching function)	Expression 9 or 10 is used by Di switching. (Specify "140" for Di function for switching.)
20	Flow rate compensation with temperature and pressure [% value operation]	$M1 = \sqrt{PV1} \times \frac{(Ai1 + k01) + k02}{(PV2 \times k03) + k04}$ PV1: Differential pressure (flow rate) % value, k01: Pressure compensation constant 1, k04: Temperature compensation constant 2 PV2: Fluid temperature % value, k03: Temperature compensation constant 1 Ai1: Differential pressure % value, k02: Pressure compensation constant 2, k05: Square-root extractor cut point *Input data: % value (0 (0%) to 100000 (100.000%))
21	Flow rate compensation with temperature and pressure [% value operation] (without square-root extraction)	$M1 = PV1 \times \frac{(Ai1 \times k01) + k02}{(PV2 \times k03) + k04}$ All the inputs and constants are of the same specifications as mathematical expression 20.
27	H selector (2 points) (with coefficient)	M1 = max ((PV1 X k01 + k02), (PV2 X k03 + k04))
28	L selector (2 points) (with coefficient)	M1 = min ((PV1 X k01 + k02), (PV2 X k03 + k04))
29	H selector (3 points) (with coefficient)	M1 = max ((PV1 X k01 + k02), (PV2 X k03 + k04), (Ai X k05 + k06))
30	L selector (3 points) (with coefficient)	M1 = min ((PV1 X k01 + k02), (PV2 X k03 + k04), (Ai X k05 + k06))
31	Input switching (2 points) (with coefficient)	M1 = (PV1 X k02 + k03) when $k01 > (PV1 \times k02 + k03)$ M1 = (PV2 X k04 + k05) when $k01 \leq (PV1 \times k02 + k03)$
32	H/L selector (2 points) (with Di switching function)	Expression 27 or 28 is used by Di switching. (Specify "140" for Di function for switching.)
33	H/L selector (3 points) (with Di switching function)	Expression 29 or 30 is used by Di switching. (Specify "140" for Di function for switching.)
34	Input switching (2 points) (with coefficient and interpolation function)	When $PV1 \leq k05$ : $M1 = (PV1 \times k01) + k02$ When $PV2 \leq k06$ : $M1 = (PV2 \times k03) + k04$ When $PV1 > k05$ and $PV2 < k06$ : Interpolation shown below, is executed. $M1 = \left(1 - \frac{(PV1 \times k01 + k02) - k05}{k06 - k05}\right) \times (PV1 \times k01 + k02) - k05 - \left(\frac{(PV1 \times k01 + k02) - k05}{k06 - k05}\right) \times (PV2 \times k03 + k04)$ * note) k05: Input switching upper value k06: Input switching lower value
40	Calorie calculation	$M1 = ((PV1 \times k01 + k02) - (PV2 \times k03 + k04)) \times (Ai1 \times k05 + k06)$

\*1: Square-root extraction cut point can be set with k06.

\*2: Square-root extraction cut point can be set with k07.

# [Table 10] Control template

TPLT	Control template	SV selection	Math function	Function
10	1-loop basic PID control (with Math function)	—	○	Basic type
11	1-loop basic SV selection PID control (with Math function)	○	○	
13	1-loop basic PID control	—	—	
14	1-loop basic SV selection PID control	○	—	
16	1-loop input selection PID control (with Math function)	—	○	
30	1-loop motorized valve control (with Math function)	—	○	Motorized control type
31	1-loop SV selection motorized valve control (with Math function)	○	○	
33	1-loop motorized valve control	—	—	
34	1-loop SV selection motorized valve control	○	—	
50	1-loop heating/cooling control (with Math function)	—	○	Heating/cooling control type
51	1-loop SV selectable heating/cooling control (with Math function)	○	○	
53	1-loop heating/cooling control	—	—	
54	1-loop SV selectable heating/cooling control	○	—	

# 8

## Troubleshooting

[Please read when the display does not make sense]

### Error indications

This Controller has a display function to notify when the equipment is not functioning properly.

When a problem occurs, remove the cause immediately.

Once the cause has been removed, turn the power OFF then ON again.

Display	Cause	Control Output
<b>UUUU</b>	① Thermocouple sensor wire broken ② RTD wiring broken ③ PV value above upper limit +5%FS or more ④ RCJ sensor not attached (thermocouple input)	The value of brd1 (CH9-35) is to be the control output (MV). (Kind of output) ① HOLD, ② LO (OFF or lower limit value of the AO) ③ UP (ON or upper limit value of the AO), ④ EXMV
<b>LLLL</b>	① RTD sensor (between A-B) short circuited ② The PV value is at the lower limit of -5%FS or lower.	
<b>LLLL</b>	① When PV value is under -199.99. Note) When a resistance bulb is used, "LLLL" is not displayed even if under -150°C.	Control continues Note) Control continues until below -5%FS. Burnout occurs at below -5%FS.
PV not displaying	Standby mode (STbo (ch9-30) = 1)	The value of PMv1 (CH2-22) is to be the control output (MV).
<b>-19999</b> or <b>99999</b>	Display limit is smaller than over range or under range value.	Control continues Note) Control continues until under -5%FS or 105%FS.
Correct PV not displayed	The main unit was not reset or the power was not turned on after the scale setting was changed.	_____

### When the key operation is not functioning properly.

Key operation may not be performed in the following cases.

Status	Remedy
LoC setting does not allow the parameter the display.	Set LoC (ch1-34) at "0."
Forgot password.	Set the parameter of PS1 at "F1C3." ※ Set parameters PAS1 and PAS2 (ch9:1-2) at 0000 to reset the password.

※ Setting the parameter to "F1C3" displays all parameters.

Please do not change the parameters unnecessarily. It may cause a failure of this main unit.

# Model Specification

## PXH Model Code

[Basic type]

Digit → 1 2 3 4 5 6 7 8 9 10 11 12 13

Digit	Description	Notes	1	2	3	4	5	6	7	8	9	10	11	12	13
			P	X	H	9	A			1	-	V			0
4	<Dimension of front face H x W> 96 x 96 mm						9								
5	<Number of control loops/Function> 1-loop basic controller						A								
6	<Measurement value input> Universal input: 1 point Universal input: 2 points	*1						1	2						
7	<Auxiliary input> Not fitted DC voltage: 1 point							0	1						
8	<Version No.>									1					
9	<Output> OUT1                      OUT2 ----- Current                      Not fitted Current                      Current Current                      Transmitter supply SSR/SSC driver              Not fitted SSR/SSC driver              Current	*3										1	2	5	A
10	<Power supply> 100 to 240 V AC												V		
11	<Communication interface> Not fitted RS-485													0	R
12	<Digital input/output> Digital input                      Digital output (Including relay control output) ----- 4 points (Di1 to Di4)              2 points (Do3, Do4) 4 points (Di1 to Di4)              4 points (Do1 to Do4) 9 points (Di1 to Di4, Di11 to Di15)      9 points (Do1 to Do4, Do11 to Do15)	*2   *1													0 A B
13	<Additional specifications> Not fitted.														0

\*1: "2" for the 6th digit and "B" for the 12th digit cannot be specified at the same time.

\*2: One digital output (Do4) is occupied when relay is allocated as control output.

\*3: Explanation of the 9th digit of type code and output terminal function is below.

Code	Terminal	Do4	OUT1		OUT2	
	Output Kind	Relay	Current (4 to 20 mA)	SSR/SSC driver	Current (4 to 20 mA)	Transmitter power supply
	Function *	Control output or Digital output	Control output or Re-transmission output	Control output	Re-transmission output	
9th digit	1	○	○	—	—	—
	2	○	○	—	○	—
	5	○	○	—	—	○
	A	○	—	○	—	—
	B	○	—	○	○	—

— : Not fitted

○ : Fitted

\* The selection of "Function" is specified according to the parameter.

[Motorized valve control type]

Digit → 1 2 3 4 5 6 7 8 9 10 11 12 13  
 P X H 9 | | | | 1 - | V | | 0

Digit	Description	Notes	1	2	3	4	5	6	7	8	9	10	11	12	13
4	<Dimension of front face H x W> 96 x 96 mm						9								
5	<Number of control loops/Function> 1-loop motorized valve controller (with PFB) 1-loop motorized valve controller (without PFB)						D	S							
6	<Measurement value input> Universal input: 1 point Universal input: 2 points	*1							1	2					
7	<Auxiliary input> Not fitted DC voltage: 1 point								0	1					
8	<Version No.>									1					
9	<Output> OUT1                      OUT2 <hr/> Current                      Not fitted Current                      Current Current                      Transmitter supply	*2										1	2	5	
10	<Power supply> 100 to 240 V AC											V			
11	<Communication interface> Not fitted RS-485													0	R
12	<Digital input/output> Digital input                      Digital output (Including relay control output) <hr/> 4 points (Di1 to Di4)                      2 points (Do3, Do4) 4 points (Di1 to Di4)                      4 points (Do1 to Do4) 9 points (Di1 to Di4, Di11 to Di15)                      9 points (Do1 to Do4, Do11 to Do15)	*3   *1													0 A B
13	<Additional specifications> Not fitted.														0

- \*1: Two universal input points and "B" for the 12th digit cannot be specified at the same time. Select 2 universal input points when using external setting input (RSV).
- \*2: "D" for the 5th digit and "1" for the 7th digit cannot be specified at the same time.
- \*3: Use Do4 for control output. If 2 or 3 Do points are required for event output, specify code A, and if 4 to 8 Do points are required, specify code B.

Terminal	Do4	OUT1	OUT2	
			Current (4 to 20 mA)	Transmitter power supply
Output Kind	Relay	Current (4 to 20 mA)	Current (4 to 20 mA)	Transmitter power supply
Function *	Used for valve open/close output.	Re-transmission output	Re-transmission output	Transmitter power supply
Code	1	○	○	—
	2	○	○	—
	5	○	○	○

— : Not fitted  
 ○ : Fitted

\* The selection of "Function" is specified according to the parameter.

[Heating/cooling control type]

Digit → 1 2 3 4 5 6 7 8 9 10 11 12 13  
 P X H 9 F 1 - V 0

Digit	Description	Notes	1	2	3	4	5	6	7	8	9	10	11	12	13
4	<Dimension of front face H x W> 96 x 96 mm														
5	<Number of control loops/Function> 1-loop heating/cooling controller									F					
6	<Measurement value input> Universal input: 1 point Universal input: 2 points	*1								1 2					
7	<Auxiliary input> Not fitted DC voltage: 1 point									0 1					
8	<Version No.>									1					
9	<Output> OUT1                      OUT2 <hr/> Current                      Not fitted Current                      Current Current                      SSR/SSC drive Current                      Transmitter supply SSR/SSC driver              Not fitted SSR/SSC driver              Current SSR/SSC driver              SSR/SSC drive	*3												1 2 3 5 A B C	
10	<Power supply> 100 to 240 V AC														V
11	<Communication interface> Not fitted RS-485														0 R
12	<Digital input/output> Digital input                      Digital output (Including relay control output) <hr/> 4 points (Di1 to Di4)              2 points (Do3, Do4) 4 points (Di1 to Di4)              4 points (Do1 to Do4) 9 points (Di1 to Di4, Di11 to Di15)      9 points (Do1 to Do4, Do11 to Do15)	*2  *1													0 A B
13	<Additional specifications> Not fitted.														0

- \*1: "2" for the 6th digit and "B" for the 12th digit cannot be specified at the same time.
- \*2: One digital output (Do4) or 2 points (Do3 and 4) is occupied when relay is allocated as control output.
- \*3: Explanation of the 9th digit of type code and output terminal function is below.

Code	Terminal	Do3	Do4	OUT1		OUT2		Transmitter power supply
	Output Kind	Relay	Relay	Current (4 to 20 mA)	SSR/SSC driver	Current (4 to 20 mA)	SSR/SSC driver	
	Function *	Control output or Digital output	Control output or Digital output	Control output or Re-transmission output	Control output	Control output or Re-transmission output	Control output	
9th digit	1	○	○	○	—	—	—	—
	2	○	○	○	—	○	—	—
	3	○	○	○	—	—	○	—
	5	○	○	○	—	—	—	○
	A	○	○	—	○	—	—	—
	B	○	○	—	○	○	—	—
	C	○	○	—	○	—	○	—

\* The selection of "Function" is specified according to the parameter.                      — : Not fitted  
 ○ : Fitted

# Specifications

<b>(1) Power voltage</b>	100 (-15%) to 240V AC (+10%) 50/60Hz
<b>(2) Power consumption</b>	100V AC : 15VA or less
	220V AC : 20VA or less
<b>(3) Normal operation conditions</b>	Ambient temperature : -10°C to 50°C
	Ambient humidity : 90%RH or less (no dew condensation)
	Storage temperature : -20°C to 60°C
	Warm-up time : 15 min. or longer
	Input signal : RTD, thermocouple, DC voltage, DC current (multi input) Refer to Table 3.
<b>(4) Input</b>	Input indication accuracy
	Thermocouple : $\pm 0.1\%$ of FS $\pm 1$ digit $\pm 1^\circ\text{C}$ or $\pm 1.5^\circ\text{C}$ whichever is higher. however, Thermocouple B : 0 to 400°C, $\pm 5\%$ of FS $\pm 1$ digit $\pm 1^\circ\text{C}$ Thermocouple R : 0 to 500°C, $\pm 1\%$ of FS $\pm 1$ digit $\pm 1^\circ\text{C}$
	Resistance bulb : $\pm 0.1\%$ of FS $\pm 1$ digit or $\pm 0.25^\circ\text{C}$ whichever is higher
	DC voltage, DC current : $\pm 0.1\%$ of FS 1digit
	Input sampling cycle : 50ms
	Input impedance
	Thermocouple/voltage (mV) : 1M $\Omega$ or more
	Voltage : 1M $\Omega$
	Current : 250 $\Omega$
	Allowance input voltage
	Voltage (V) : +35V/-10V DC
	Current : $\pm 25\text{mA}$ DC Thermocouple/resistance bulb/voltage (mV) : $\pm 5\text{V}$
Noise reduction ratio	Normal mode : 40dB (50/60Hz) or more
	Common mode : 120dB (50/60Hz) or more
	Input value correction
	User adjustment : $\pm 50\%$ of FS each at zero, span
	Square-root extraction : 0.0 to 125.0 at OFF or cut point
	First-order lag filter : 0.0 to 900.0 seconds
Effect of source resistance/permissible wiring resistance	Thermocouple, voltage input (mV) : 0.1% FS per 100 $\Omega$
	Power supply input (V) : 0.1%FS per 500 $\Omega$
	Resistance bulb input : 10 $\Omega$ or less (per cable)
	Relay contact output
<b>(5) Relay contact output</b>	Contact capacity : 220V AC / 30V DC, 3A (resistance load) 220V AC / 30V DC, 1A (induction load)
	ON : 12V DC (10 to 15V DC)
	OFF : 0.5V DC or less
	Max. current : 20mA DC
	Load resistance : 600 $\Omega$ or over
<b>(6) SSR/SSC drive output (voltage pulse output)</b>	ON : 12V DC (10 to 15V DC)
	OFF : 0.5V DC or less
	Max. current : 20mA DC
	Load resistance : 600 $\Omega$ or over

<b>(7) DC output (4 to 20mA DC)</b>	No. of points	: Max. 2 points (with re-transmission output)
	Accuracy	: $\pm 0.2\%$ FS
	Linearity	: $\pm 0.2\%$ FS
	Load resistance	: under 600 $\Omega$
<b>(8) Motorized valve operation pulse output</b>	Contact structure	: 1a (SPST) contact $\times$ 2 (with interlock circuit)
	Contact capacity	: 220V AC/30V DC, 1A (resistance load) 220V AC/30V DC, 0.3A (inductive load)
	Contact durability	: 100,000 times or more (under rated load)
<b>(9) Digital input</b>	No. of Input	: Max. 9 points
	Specifications	: Non-voltage contact or transistor input
	Contact capacity	: 12V DC, 2mA
	Input pulse width	: 200ms or more
<b>(10) Digital output</b>	Digital output1 to 3	: 1a (SPST) contact, 220V AC / 30V DC, 1A (resistance load)
	Digital output 4	: 1c (SPDT) contact, 220V AC / 30V DC, 1A (resistance load)
	Digital output 11 to 15	: 1a (SPST) contact, 220V AC / 30V DC, 1A (resistance load)
<b>(11) Auxiliary analog input</b>	[General type]	
	No. of Input	: 1 point
	Input signal	: 1 to 5V DC / 0 to 5V DC / 0 to 10V DC
	Input accuracy	: $\pm 0.2\%$ FS
	[Motor-operated valve control type]	
	Number of input points	: 1
	Input signal	: Valve opening feedback signal [potentiometer]
	Input accuracy	: $\pm 1.0\%$ FS
<b>(12) Analog re-transmission output</b>	No. of output	: 2 point at max.
	Output signal	: Current output (4 to 20mA DC)
	Accuracy	: $\pm 0.2\%$ FS
	Linearity	: $\pm 0.2\%$ FS
	Load resistance	: under 600 $\Omega$
	Output contents	: PV, SV, DV, MV, AiM, MVRB, TV
	Scaling function	: Provided
<b>(13) Transmitter power supply output</b>	No. of output	: 1 point
	Rating	: 24V DC (17 to 30V DC), max. current 23mA (short circuit protection)
<b>(14) Communications functions</b> *1	RS-485 Interface	
	Protocol	: Modbus-RTU standard
	Transmission speed	: 9600bps, 19200bps, 38400bps
	Transmission distance	: Max. 500m (total connected length)
	Transmission method	: Asynchronous (Half-duplex bit serial)
	Data format	: Data length: 8 bits odd/even/none

\*1 Recommended converter

RC-77 (insulted) from RA Systems Corp. <http://www.ras.co.jp>

K3SC-10 (insulted) from Omron Corp. <http://www.omron.co.jp>

Modbus RTU is a trademark of Modicom.