

User's Manual

Models UT450 / UT420

Digital Indicating Controllers

User's Manual

Installation

IM 05D01C12-01E

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YOKOGAWA
Yokogawa Electric Corporation

This manual describes installation, wiring, and other tasks required to make the controller ready for operation.

Contents

- Safety Precautions
- Model and Suffix Codes
- How to Install
- How to Connect Wires
- Hardware Specifications
- Terminal Wiring Diagrams

Introduction

Thank you for purchasing the UT450/UT420 digital indicating controller. The controller is shipped from the factory with 4 hardcopy user's manuals (A2 size) and 1 user's manual on CD-ROM. The 4 user's manuals in hardcopy format describe the operating procedures required for basic use. It is recommended that you refer to these user's manuals to understand [1] installation, [2] initial settings, and [3] operating procedures of the controller. The CD-ROM contains an User's Manual (Reference) with descriptions of various functions and setting ranges that can be set as necessary. Moreover, the use of an optional parameter setting tool (model: LL100-E10) allows you to easily perform settings and adjustments with a PC.

Purpose	Manual Title	Description	Media
Setup	Installation	Describes the tasks (installation, wiring, and others) required to make the controller ready for operations.	A2-size paper, back and front
Basic operation	Initial Settings	Describes examples of setting PV input types, control output types, and alarm types. Making settings described herein allows you to carry out basic control.	A2-size paper, back and front
Operating procedures and troubleshooting	Operations	Describes key operation sequences. For operation control through external contact inputs, see the back of Installation User's Manual.	A2-size paper, back and front
Brief operation and setpoint recording	Parameters	Contains the parameter map used as a guideline for setting parameters and lists of parameters for recording User Settings.	A2-size paper, back and front
Detailed description of functions	User's Manual (Reference)	Explains more advanced applications than those found in the 4 hardcopy user's manuals (A2 size).	CD-ROM

1. Safety Precautions

The following symbol is indicated on the controller to ensure safe use.

CAUTION

This symbol on the controller indicates that the operator must refer to an explanation in the user's manual in order to avoid the risk of injury or death of personnel or damage to the instrument. The manual describes how the operator should exercise special care to avoid electric shock or other dangers that may result in injury or loss of life.

The following symbols are used in the hardcopy user's manuals and in the user's manual supplied on the CD-ROM.

NOTE

Indicates that operating the hardware or software in a particular manner may damage it or result in a system failure.

IMPORTANT

Draws attention to information that is essential for understanding the operation and/or features of the controller.

Exemption from Responsibility

Make sure that all of the precautions are strictly adhered to. Yokogawa Electric Corporation assumes no liability for any damage resulting from use of the instrument in contradiction to the precautions. Also, Yokogawa Electric Corporation assumes no liability to any party for any loss or damage, direct or indirect, caused by the use of or any unpredictable defect of the instrument.

Regarding Protection, Safety, and Prohibition Against Unauthorized Modification

- In order to protect the product and the system controlled by it against damage and ensure its safe use, make certain that all of the instructions and precautions relating to safety contained in this document are strictly adhered to. Yokogawa does not guarantee safety if products are not handled according to these instructions.
- Modification of the product is strictly prohibited.

2. Model and Suffix Codes

Before using the controller, check that the model and suffix codes match your order.

Model	Suffix Code	Description
UT450		Digital indicating controller (provided with retransmission output and 15 V DC loop power supply as standard)
Type	-0	Standard type
	-1	Position proportional type
	-2	Heating/cooling type
	-3	Standard type (with 24 V DC loop power supply)
Optional functions	0	None
	1	With communication, remote input, 5 additional DIs, and 1 additional Alarm
	2	With communication, remote input, and 1 additional DI
	3	With 4 additional DIs and 1 additional Alarm
4	With remote input and 1 additional DI	
UT420		Digital indicating controller (provided with retransmission output and 15 V DC loop power supply as standard)
Type	-0	Standard type
	7	None
Optional functions	0	None
	8	With communication, remote input, and 2 additional DIs

Check that the following items are provided:

- Digital indicating controller (of ordered model): 1
- Brackets (mounting hardware): 1 pair
- Unit label: 1
- User's Manuals: 4 (A2 size)
- User's Manual (Reference) (CD-ROM version): 1

Correspondence between the Model and Suffix Codes, and the Contact Input/Output Terminals Provided

Check the model ordered and the presence/absence of contact inputs and outputs in the following table.

✓ indicate that the contacts are available.

Model and Suffix Codes	Contact input terminals						Alarm output terminals				
	DI1	DI2	DI3	DI4	DI5	DI6	R/L	AL1	AL2	AL3	AL4
UT450-00	✓	✓						✓	✓	✓	✓
UT450-01	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
UT450-02	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
UT450-03	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
UT450-04	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

* For the contact input functions, see "Terminal Wiring Diagrams" on the back of the Manual.

✓ indicate that the contacts are available.

Model and Suffix Codes	Contact input terminals						Alarm output terminals				
	DI1	DI2	DI3	DI4	DI5	DI6	R/L	AL1	AL2	AL3	AL4
UT420-00	✓	✓						✓	✓	✓	✓
UT420-07	✓	✓	✓				✓	✓	✓	✓	✓
UT420-08	✓	✓	✓				✓	✓	✓	✓	✓

* For the contact input functions, see "Terminal Wiring Diagrams" on the back of the Manual.

3. How to Install

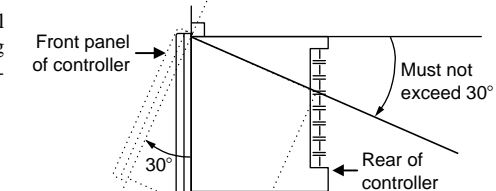
NOTE

- To install the controller, select a location where:
- no one may accidentally touch the terminals,
 - mechanical vibrations are minimal,
 - corrosive gas is minimal,
 - temperature can be maintained at about 23°C and the fluctuation is minimal,
 - no direct radiant heat is present,
 - no magnetic disturbances are caused,
 - no wind blows against the terminal board (reference junction compensation element),
 - no water is splashed,
 - no flammable materials are around,

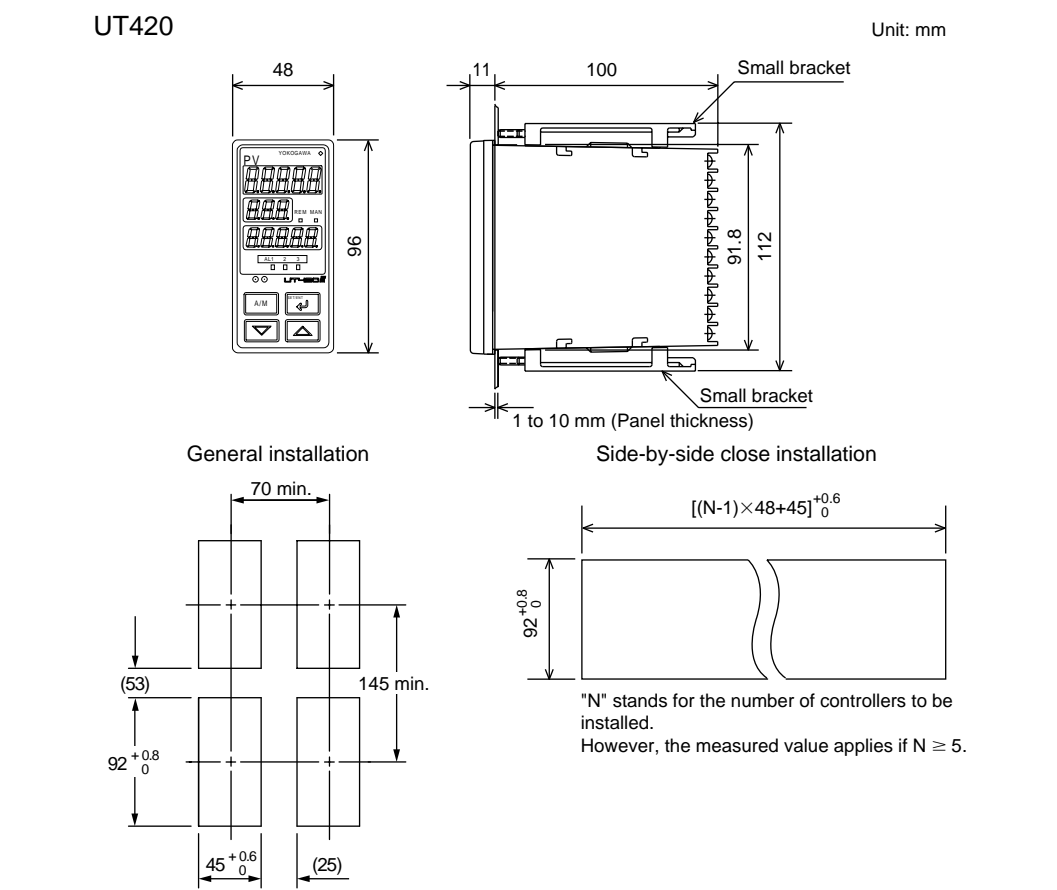
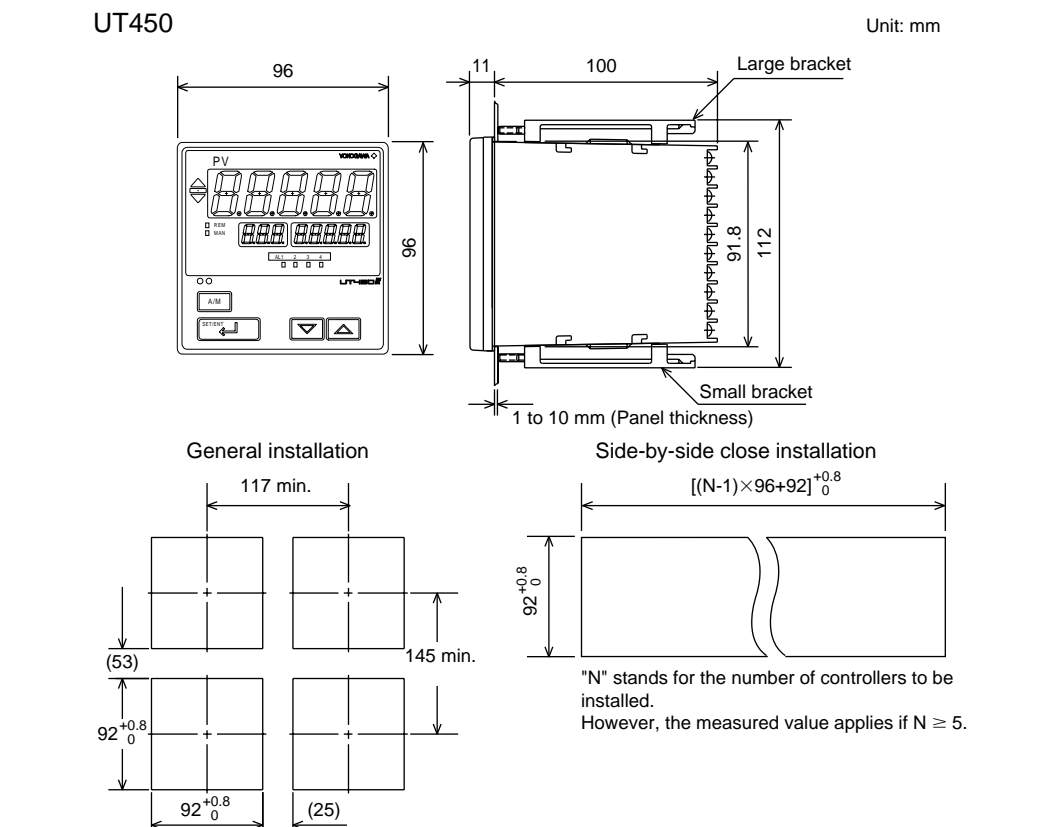
Never place the controller directly on flammable items or equipment. If the controller has to be installed close to flammable items or equipment, be sure to provide shielding panels all around the controller, at least 150mm away from every side; the panels should be made of either 1.43mm-thick metal-plated steel plates or 1.6mm-thick uncoated steel plates.

Installation Position

Install the controller at an angle within 30° from horizontal with the front panel facing upward. Do not install it facing downward. The position of right and left sides should be horizontal.



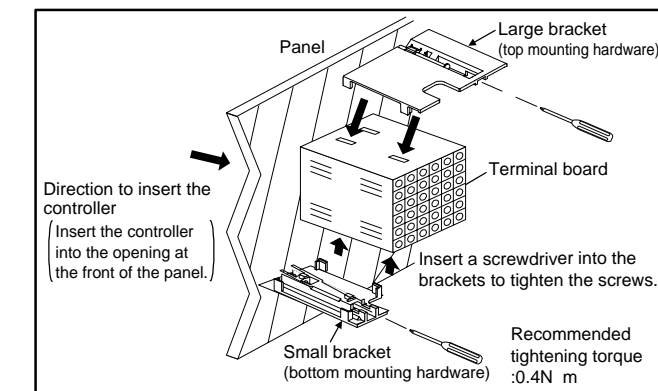
External Dimensions and Panel Cutout Dimensions



How to Install

CAUTION

Turn off the power to the controller before installing it on the panel because there is a possibility of electric shock.



- After opening the mounting hole on the panel, follow the procedures below to install the controller:
- Insert the controller into the opening from the front of the panel so that the terminal board on the rear is at the far side.
 - Set the brackets in place on the top and bottom of the controller as shown in the figure on the left, then tighten the screws of the brackets. Take care not to over-tighten them.

4. How to Connect Wires

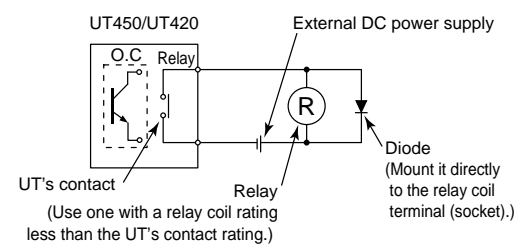
CAUTION

- Before carrying out wiring, turn off the power to the controller and check that the cables to be connected are not alive with a tester or the like because there is a possibility of electric shock.
- For the protection and safe use of the controller, be sure to place a circuit breaker (conforms with IEC60947, 5A, 100V or 220V AC) near the controller where the breaker can easily be operated. In addition, be sure to indicate that it is the instrument to cut the power supply of the controller.
- Wiring must be carried out by personnel who have basic electrical knowledge and practical experience.

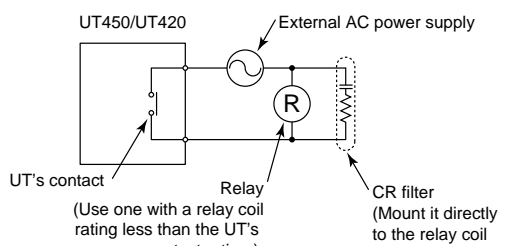
NOTE

- Provide power from a single-phase instrument power supply. If there is a lot of noise in the power line, insert an insulating transformer into the primary side of the line and use a line filter (recommended part: ZAC2205-00U from TDK) on the secondary side. As a countermeasure against noise, do not place the primary and secondary power cables close to each other. For thermocouple input, use shielded compensating lead wires for wiring. For RTD input, use shielded wires that have low conductor resistance and cause no significant differences in resistance between the three wires. The cables to be used for wiring, terminal specifications, and recommended parts are as shown below.
- Control output relays may be replaced. However, because they have a life of 100,000 times that of the resistance load, use auxiliary relays to turn on/off a load.
- The use of inductance (L) loads such as auxiliary relays, motors and solenoid valves causes malfunction or relay failure; always insert a CR filter for use with alternating current or a diode for use with direct current, as a spark-removal surge suppression circuit, into the line in parallel with the load.
- When there is the possibility of being struck by external lightning surge, use the arrester to protect the instrument.

For DC Relay Wiring



For AC Relay Wiring

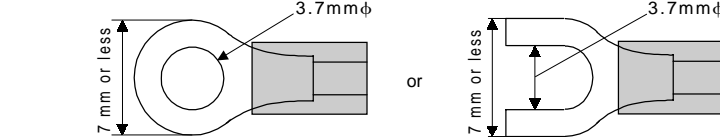


Cable Specifications and Recommended Cables

Purpose	Name and Manufacturer
Power supply, grounding, relay contact outputs	600 V PVC insulated wires, JIS C 3307, 0.9 to 2.0 mm ²
Thermocouple	Shielded compensating lead wires, JIS C 1610, □X-□, □-□ (See Yokogawa Electric's GS 6B1U1-E.)
RTD	Shielded wires (three conductors), UL2482 (Hitachi Cable)
Other signals	Shielded wires

Recommended Terminal Lugs

Applicable wire size	Tightening torque
0.3 to 1.65 mm ²	0.8 N·m or less



Terminal Covers (Optional parts)

Target Model	Part Number	Sales Unit
For UT450	T9115YD	1
For UT420	T9115YE	1

5. Hardware Specifications

PV Input Signals

- Number of inputs: 1 (terminals ①-③)
- Input type: Universal input system. The input type can be selected with the software.
- Sampling period: 200 ms
- Burnout detection: TC, RTD, standard signal
 - Functions at 0.4 to 2 V or 1 to 5 V
 - Upscale, downscale, and off can be specified.
 - For standard signal, burnout is determined to have occurred if it is 0.1 V or less.
- Input bias current: 0.05 μA (for TC or RTD b-terminal)
- Measurement current (RTD): About 0.2 mA
- Input resistance: 1 MΩ or more for thermocouple or mV input
 - About 1 MΩ for DC voltage input
 - Effects of signal source resistance: 250 Ω or less for thermocouple or mV input
 - Effects of signal source resistance: 0.1 μV/Ω or less 2 kΩ or less for DC voltage input
 - Effects of signal source resistance: About 0.01%/100 Ω
- Allowable wiring resistance: for RTD input
 - Maximum 150 Ω/wire: Conductor resistance between three wires should be equal
 - However, 10 Ω/wire for a maximum range of -150.0 to 150.0°C
 - Wire resistance effect: $\pm 0.1^\circ\text{C}/10\ \Omega$
- Allowable input voltage: $\pm 10\ \text{V DC}$ for thermocouple, mV, or RTD input
 - $\pm 20\ \text{V DC}$ for DC voltage input
- Noise rejection ratio: 40 dB (50/60 Hz) or more in normal mode
 - 120 dB (50/60 Hz) or more in common mode
- Reference junction compensation error: $\pm 1.0^\circ\text{C}$ (15 to 35°C)
 - $\pm 1.5^\circ\text{C}$ (0 to 15°C, 35 to 50°C)
- Applicable standards: JIS, IEC, DIN (ITS-90) for thermocouples and RTD

Remote Input Signals

- Available only for controllers with remote input terminals
- Number of inputs: 1 (terminals ④-⑥)
- Input type: Settable in a range of 0-2, 0-10, 0.4-2.0, or 1-5 V DC
- Sampling period: 200 ms
- Input resistance: About 1 MΩ
- Input accuracy: $\pm 0.3\% \pm 1$ digit of input span for 0 to 2 V DC
 - $\pm 0.2\% \pm 1$ digit of input span for 0 to 10 V DC
 - $\pm 0.375\% \pm 1$ digit of input span for 0.4 to 2.0 V DC
 - $\pm 0.3\% \pm 1$ digit of input span for 1 to 5 V DC
- Under standard operating conditions (23 \pm 2°C, 55 \pm 10% RH, power frequency of 50/60 Hz)

Feedback Resistance Input

- Provided for position proportional type only (terminals ⑦-⑨)
- Slide resistance value: 100 Ω to 2.5 kΩ of overall resistance (burnout detection for sliding wire provided)
- Measuring resolution: $\pm 0.1\%$ of overall resistance

Loop Power Supply

- Power is supplied to a two-wire transmitter.
- 15 V DC: terminals ⑩-⑪; 24 V DC: terminals ⑫-⑬
- A resistor (10 to 250 Ω) connected between the controller and transmitter converts a current signal into a voltage signal, which is then read via the PV input terminal.
- Supply voltage: 14.5 to 18.0 V DC, max. 21 mA (provided with a protection circuit against a field short-circuit); 21.6 to 28.0 V DC, max. 30 mA (only for models with 24 V DC loop power supply)

Retransmission Output

- Either PV, target setpoint, or control output is output. The instrument continues to operate at a measuring accuracy of within $\pm 20\%$ of the range during tests.
- Number of outputs: 1 (terminals ⑭-⑯)
- Output signal: 4-20 mA DC
- Load resistance: 600 Ω or less
- Output accuracy: $\pm 0.1\%$ of span ($\pm 5\%$ of span for 1 mA or less) under standard operating conditions (23 \pm 2°C, 55 \pm 10% RH, power frequency of 50/60 Hz)

Control Output

- Universal output system. The output type can be selected with the software.
 - Relay contact output(s) for the position proportional type
 - Current output
 - (Standard type: terminals ⑰-⑱; heating-side: terminals ⑲-⑳, cooling-side: terminals ㉑-㉒)
- | Number of outputs | 1 or 2 (two for heating/cooling type), switched between a voltage pulse output and current output. |
|-------------------|--|
| Output signal | 4-20 mA DC |
| Load resistance | 600 Ω or less |
| Output accuracy | $\pm 0.1\%$ of span under standard operating conditions (23 \pm 2°C, 55 \pm 10% RH, power frequency of 50/60 Hz) |

- Voltage pulse output
 - (Standard type: terminals ㉓-㉔; heating-side: terminals ㉕-㉖, cooling-side: terminals ㉗-㉘)

Number of outputs	1 or 2 (two for heating/cooling type), switched between a voltage pulse output and current output.
Output signal	On-voltage = 12 V or more (load resistance: 600 Ω or more) Off-voltage = 0 V or less
Resolution	10 ms or 0.1% of output, whichever is larger

- Relay contact output
 - (Standard type: terminals ㉙-㉚, heating-side: terminals ㉛-㉜, cooling-side: terminals ㉝-㉞, position proportional type: terminals ㉟-㊱)
- | Number of outputs | 1 or 2 (two for heating/cooling type) |
|-------------------|--|
| Output signal | Three terminals (NC, NO, and common) |
| Contact rating | 250 V AC or 30 V DC, 3 A (resistance load) |
| Resolution | 10 ms or 0.1% of output, whichever is larger |

Contact Inputs

- Purpose: Target setpoint selection, remote/local mode switching, and run/stop switching.
- Number of inputs: Differs with model and suffix codes as shown in the table below.

Model and Suffix Codes	Number of Inputs
UT450-□0	2
UT450-□1	7
UT450-□2	3
UT450-□3	6
UT450-□4	3
UT420-00	2
UT420-07	4
UT420-08	4

- Input type: Non-voltage contact or transistor open collector input
- On/off determination: For non-voltage contact input, contact resistance of 1 kΩ or less is determined as "on" and contact resistance of 20 kΩ or more as "off."
- For transistor open collector input, input voltage of 2 V or less is determined as "on" and leakage current must not exceed 100 μA when "off."
- Minimum status detection hold time: 0.6 second

Contact Outputs

- Purpose: Alarm output, FAIL output, and others
 - Number of outputs: Differs with the model and suffix code as shown in the table below.
- | Model and Suffix Codes | Number of Outputs |
|------------------------|-------------------|
| UT450-□0 | 3 |
| UT450-□1 | 4 |
| UT450-□2 | 3 |
| UT450-□3 | 4 |
| UT450-□4 | 3 |
| UT420-00 | 3 |
| UT420-07 | 3 |
| UT420-08 | 3 |

- Relay contact rating: 240 V AC, 1 A, or 30 V DC, 1 A ; 1 a. (FAIL output : 1b)
- Transistor contact rating: 24 V DC, 50 mA

Display Specifications

- PV display:
 - UT450 — 5-digit, 7-segment, red LEDs, character height of 20 mm
 - UT420 — 5-digit, 7-segment, red LEDs, character height of 12 mm
- Setpoint display: 3-digit and 5-digit, 7-segment, red LEDs, character height of 9.3 mm (for both UT450 and UT420)
- Status indicating lamps: LEDs

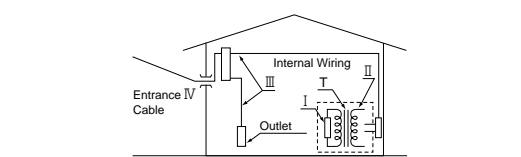
Safety and EMC Standards

- Safety: Compliant with IEC/EN61010-1: 2001, approved by CSA1010, approved by UL508.
 - Installation category : CAT. II (IEC/EN61010, CSA1010)
 - Pollution degree : 2 (IEC/EN61010, CSA1010)
- Measurement category : 1 (CAT. I : IEC/EN61010)
- Rated measurement input voltage : 10V DC max.(across terminals), 300V AC max.(across ground)
- Rated transient overvoltage : 1500V (Note)
- Note : It is a value on the safety standard which is assumed by IEC/EN61010-1 in measurement category I, and is not the value which guarantees an apparatus performance.

CAUTION

This equipment has Measurement category I, therefore do not use the equipment for measurements within measurement categories II, III and IV.

Measurement category	Description	Remarks
I	CAT. I	For measurements performed on circuits not directly connected to M.A.I.N.S.
II	CAT. II	For measurements performed on circuits directly connected to the low-voltage installation.
III	CAT. III	For measurements performed on circuits directly connected to the low-voltage installation.
IV	CAT. IV	For measurements performed at the source of the low-voltage installation.



- EMC standards: Complies with EN61326.
 - The instrument continues to operate at a measuring accuracy of within $\pm 20\%$ of the range during tests.
- ### Construction, Installation, and Wiring
- Construction: Dust-proof and drip-proof front panel conforming to IP55.
 - For side-by-side close installation the controller loses its dust-proof and drip-proof protection.
 - Material: ABS resin and polycarbonate
 - Case color: Black
 - Weight: About 1 kg or less
 - Dimensions:
 - UT450 — 96 (W) × 96 (H) × 100 (depth from panel face) mm
 - UT420 — 48 (W) × 96 (H) × 100 (depth from panel face) mm
 - Installation: Panel-mounting type. With top and bottom mounting hardware (1 each)
 - Panel cutout dimensions:
 - UT450 — 92^{-0.8} (W) × 92^{-0.8} (H) mm
 - UT420 — 45^{-0.6} (W) × 92^{-0.8} (H) mm
 - Installation position: Up to 30° upward facing (not designed for facing downward)
 - Wiring: M3.5 screw terminals (for signal wiring and power/ground wiring as well)

Power Supply Specifications</

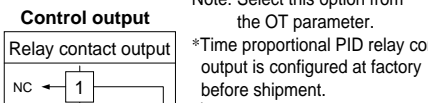
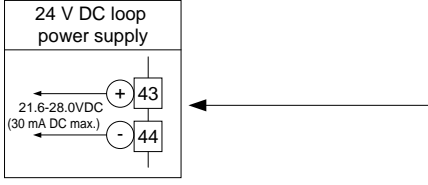
6. Terminal Wiring Diagrams

NOTE

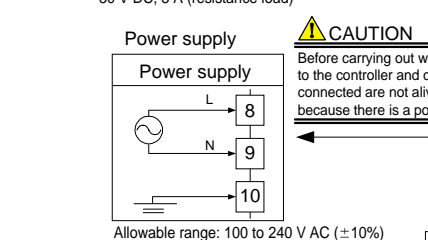
Do not use unassigned terminals as relay terminals.

UT450 Standard Type (Model UT450-0□ or UT450-3□) or Heating/Cooling Type (Model UT450-2□)

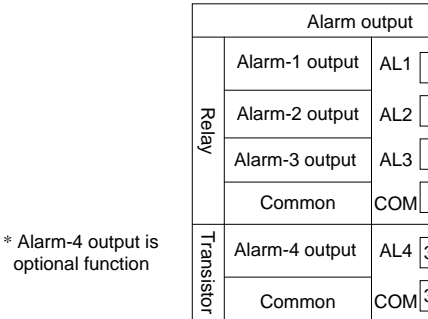
*Wiring can only be carried out for controllers with 24 V DC loop power supply.



Note: Select this option from the OT parameter.
*Time proportional PID relay contact output is configured at factory before shipment.



Allowable range: 100 to 240 V AC (±10%) (free voltage)
50/60 Hz shared



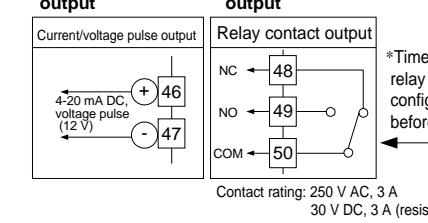
* Alarm-4 output is optional function

* OT is a setup parameter. You can change the settings of the parameter OT to change the control output type. See **Initial Settings User's Manual** for more information.

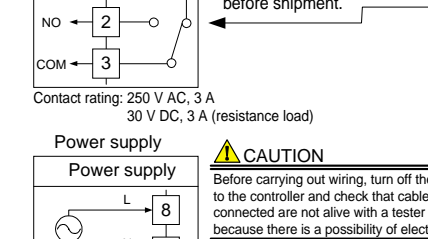
Correspondence between parameter OT and control output types			
OT=0 (factory-set default)	OT=1	OT=2	OT=3
Time proportional control Relay output (terminals ①, ② and ③)	Time proportional control Voltage pulse output (terminals ④ and ⑦)	Current output (terminals ④ and ⑦)	On-off control Relay output (terminals ①, ② and ③)

UT450 Heating/Cooling Type (Model UT450-2□)

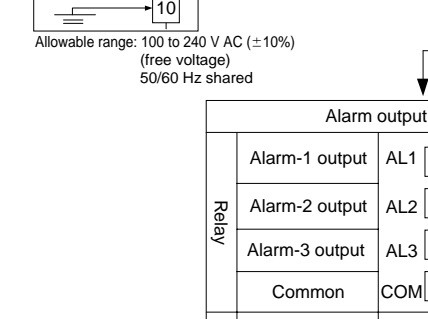
Note: Select this option from the OT parameter.



Note: Select this option from the OT parameter.
*Time proportional PID relay contact output is configured at factory before shipment.



Allowable range: 100 to 240 V AC (±10%) (free voltage)
50/60 Hz shared

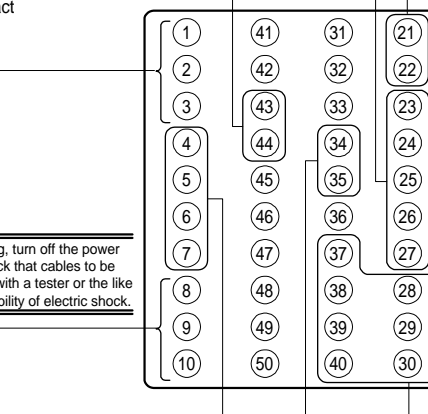
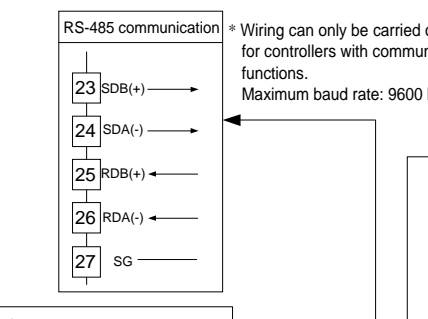


* Alarm-4 output is optional function

* OT is a setup parameter. You can change the settings of the parameter OT to change the control output type. See **Initial Settings User's Manual** for more information.

Correspondence between parameter OT and heating-side/cooling-side output types						
OT=4 (factory-set default)	OT=5	OT=6	OT=7	OT=8	OT=9	OT=10
Heating side: Relay output (terminals ①, ② and ③) Cooling side: Relay output (terminals ④, ⑤ and ⑥)	Heating side: Voltage pulse output (terminals ④ and ⑦) Cooling side: Voltage pulse output (terminals ④ and ⑦)	Heating side: Current output (terminals ④ and ⑦) Cooling side: Current output (terminals ④ and ⑦)	Heating side: Relay output (terminals ①, ② and ③) Cooling side: Voltage pulse output (terminals ④ and ⑦)	Heating side: Voltage pulse output (terminals ④ and ⑦) Cooling side: Voltage pulse output (terminals ④ and ⑦)	Heating side: Current output (terminals ④ and ⑦) Cooling side: Current output (terminals ④ and ⑦)	Heating side: Relay output (terminals ①, ② and ③) Cooling side: Current output (terminals ④ and ⑦)

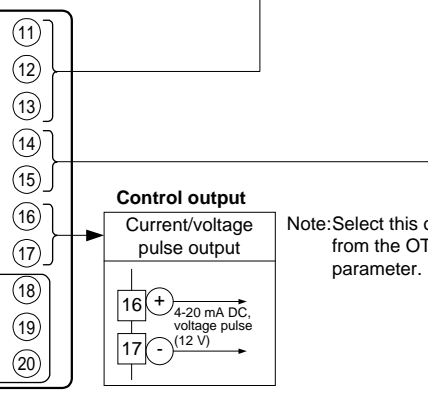
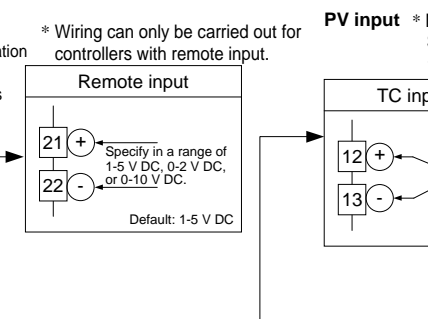
The control output types, "relay output" and "voltage pulse output" shown in the table above refer to those of time proportional control. To change the type to a relay output for on-off control, select "Relay Terminals" and change the setpoint of the proportional band to "0."



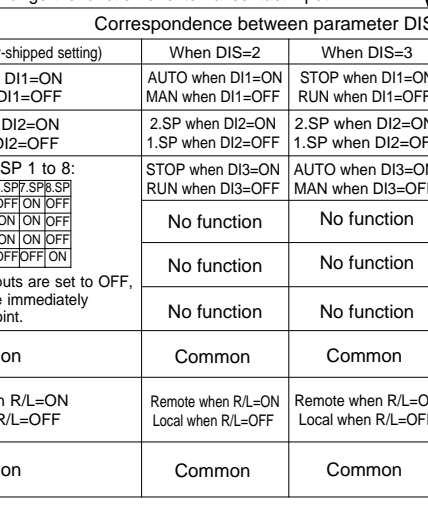
* DIS is a setup parameter. Changing DIS setpoint allows you to change the function of external contact input.

Correspondence between parameter DIS and external contact input functions					
When DIS=0	When DIS=1 (Factory-shipped setting)	When DIS=2	When DIS=3	When DIS=4	When switching target SP 1 to 8:
No function	AUTO when DI1=ON MAN when DI1=OFF	AUTO when DI1=ON STOP when DI1=OFF	STOP when DI1=ON RUN when DI1=OFF	STOP when DI3=ON MAN when DI3=OFF	STOP when DI3=ON RUN when DI3=OFF
No function	STOP when DI2=ON RUN when DI2=OFF	2.SP when DI2=ON 1.SP when DI2=OFF	2.SP when DI2=ON 1.SP when DI2=OFF	AUTO when DI4=ON MAN when DI4=OFF	AUTO when DI4=ON MAN when DI4=OFF
No function	No function	No function	No function	No function	No function
No function	No function	No function	No function	No function	No function
No function	Common	Common	Common	Common	Common
Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF
Common	Common	Common	Common	Common	Common

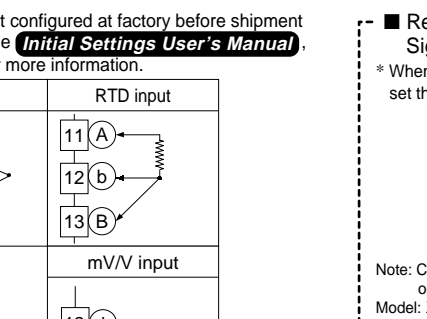
NOTE: External Contact Input
If the power is turned on when the external contact input is OFF, the mode (SPN, R/L, or A/M) existing before the power is turned off will be continued. (except for RUN/STOP)



* PV retransmission is configured at factory before shipment.



Load resistance: 600 Ω or less
* If 15 V DC loop power supply is used, retransmission output cannot be used.



Note: Connecting a 250 Ω resistor to the terminals is optional.
Model: X010-250-2 (resistor with M3.5 crimp-on terminal lugs)

* Not configured at factory before shipment. See **Initial Settings User's Manual** for more information.

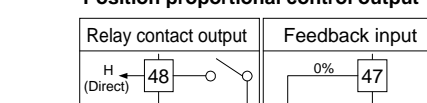
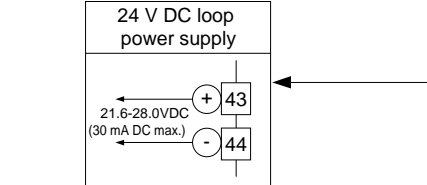
* Wiring can only be carried out for controllers with communication functions. Maximum baud rate: 9600 bps.

* Wiring can only be carried out for controllers with remote input.

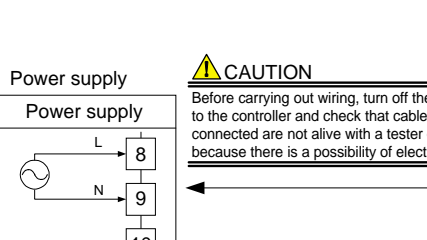
Specify in a range of 1.5 V DC, 0.2 V DC, or 0-10 V DC.
Default: 1.5 V DC

UT450 Position Proportional Type (Model UT450-1□ or UT450-4□)

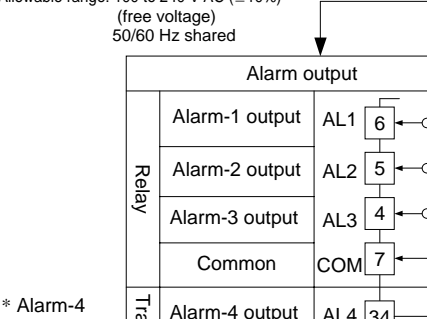
*Wiring can only be carried out for controllers with 24 V DC loop power supply.



Note: Select this option from the OT parameter.
*Time proportional PID relay contact output is configured at factory before shipment.



Allowable range: 100 to 240 V AC (±10%) (free voltage)
50/60 Hz shared

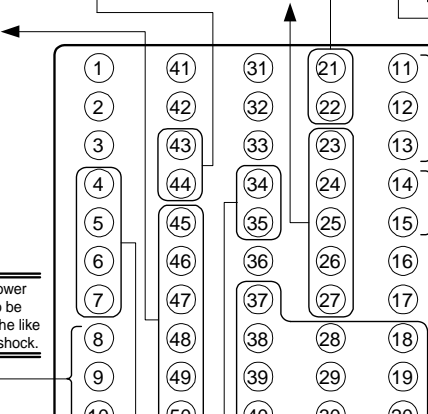
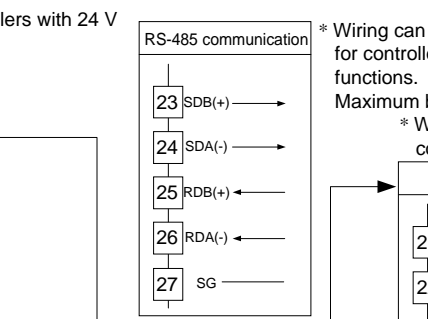


* Alarm-4 output is optional function

* OT is a setup parameter. You can change the settings of the parameter OT to change the control output type. See **Initial Settings User's Manual** for more information.

Correspondence between parameter DIS and external contact input functions			
When DIS=0	When DIS=1 (Factory-shipped setting)	When DIS=2	When DIS=3
No function	AUTO when DI1=ON MAN when DI1=OFF	AUTO when DI1=ON STOP when DI1=OFF	STOP when DI1=ON RUN when DI1=OFF
No function	STOP when DI2=ON RUN when DI2=OFF	2.SP when DI2=ON 1.SP when DI2=OFF	2.SP when DI2=ON 1.SP when DI2=OFF
No function	No function	No function	No function
No function	No function	No function	No function
No function	Common	Common	Common
Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF
Common	Common	Common	Common

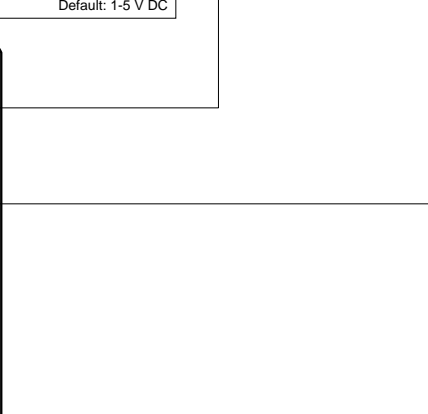
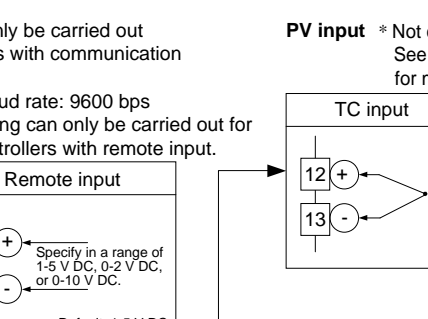
NOTE: External Contact Input
If the power is turned on when the external contact input is OFF, the mode (SPN, R/L, or A/M) existing before the power is turned off will be continued. (except for RUN/STOP)



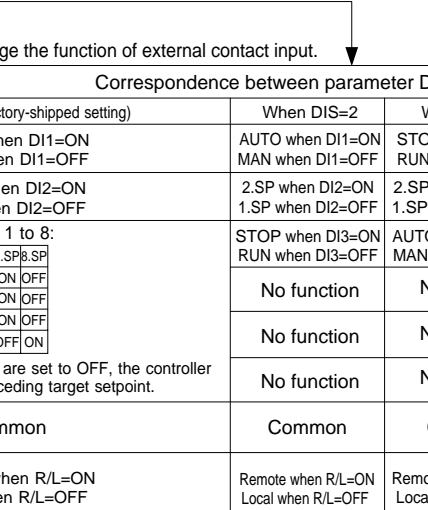
* DIS is a setup parameter. Changing DIS setpoint allows you to change the function of external contact input.

Correspondence between parameter DIS and external contact input functions					
When DIS=0	When DIS=1 (Factory-shipped setting)	When DIS=2	When DIS=3	When DIS=4	When switching target SP 1 to 8:
No function	AUTO when DI1=ON MAN when DI1=OFF	AUTO when DI1=ON STOP when DI1=OFF	STOP when DI1=ON RUN when DI1=OFF	STOP when DI3=ON MAN when DI3=OFF	STOP when DI3=ON RUN when DI3=OFF
No function	STOP when DI2=ON RUN when DI2=OFF	2.SP when DI2=ON 1.SP when DI2=OFF	2.SP when DI2=ON 1.SP when DI2=OFF	AUTO when DI4=ON MAN when DI4=OFF	AUTO when DI4=ON MAN when DI4=OFF
No function	No function	No function	No function	No function	No function
No function	No function	No function	No function	No function	No function
No function	Common	Common	Common	Common	Common
Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF
Common	Common	Common	Common	Common	Common

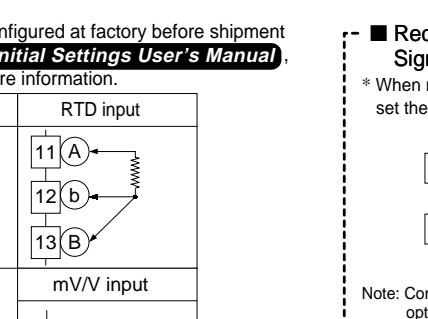
NOTE: External Contact Input
If the power is turned on when the external contact input is OFF, the mode (SPN, R/L, or A/M) existing before the power is turned off will be continued. (except for RUN/STOP)



* PV retransmission is configured at factory before shipment.



Load resistance: 600 Ω or less
* If 15 V DC loop power supply is used, retransmission output cannot be used.



Note: Connecting a 250 Ω resistor to the terminals is optional.
Model: X010-250-2 (resistor with M3.5 crimp-on terminal lugs)

* Not configured at factory before shipment. See **Initial Settings User's Manual** for more information.

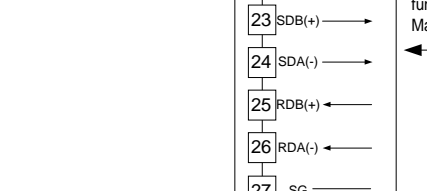
* Wiring can only be carried out for controllers with communication functions. Maximum baud rate: 9600 bps.

* Wiring can only be carried out for controllers with remote input.

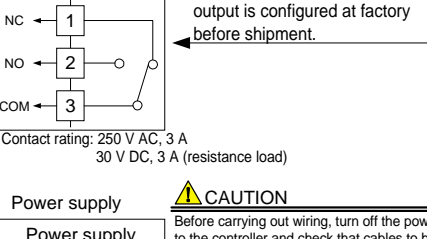
Specify in a range of 1.5 V DC, 0.2 V DC, or 0-10 V DC.
Default: 1.5 V DC

UT420 Standard Type (Model UT420-0□)

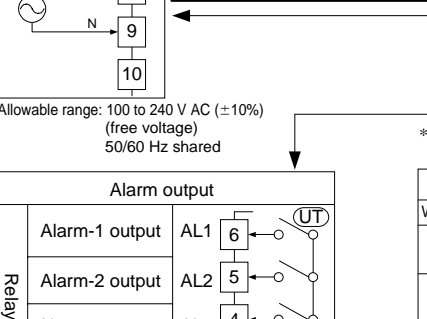
Note: Select this option from the OT parameter.



Note: Select this option from the OT parameter.
*Time proportional PID relay contact output is configured at factory before shipment.



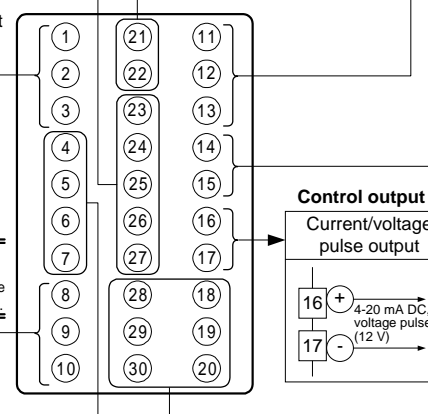
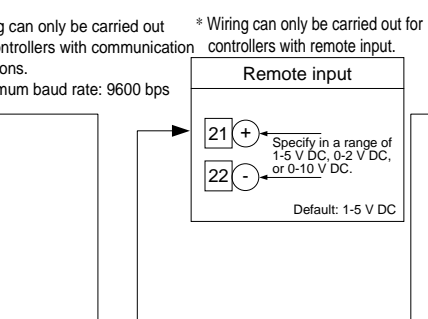
Allowable range: 100 to 240 V AC (±10%) (free voltage)
50/60 Hz shared



* Alarm-4 output is optional function

* OT is a setup parameter. You can change the settings of the parameter OT to change the control output type. See **Initial Settings User's Manual** for more information.

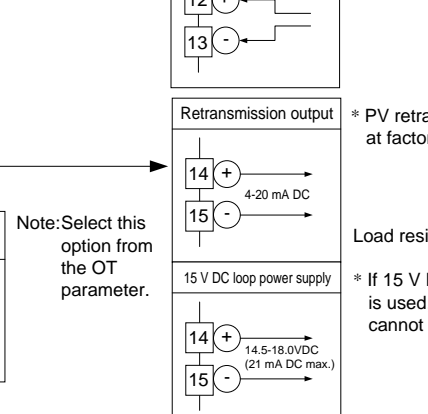
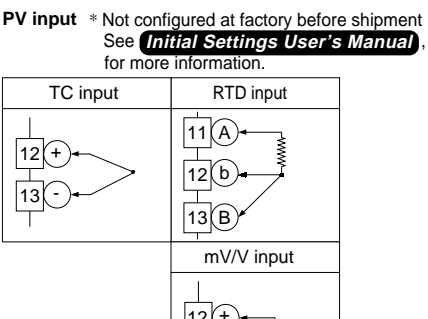
Correspondence between parameter OT and control output types			
OT=0 (factory-set default)	OT=1	OT=2	OT=3
Time proportional control Relay output (terminals ①, ② and ③)	Time proportional control Voltage pulse output (terminals ④ and ⑦)	Current output (terminals ④ and ⑦)	On-off control Relay output (terminals ①, ② and ③)



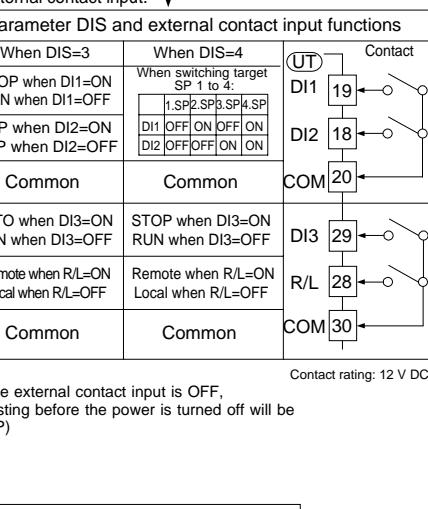
* DIS is a setup parameter. Changing DIS setpoint allows you to change the function of external contact input.

Correspondence between parameter DIS and external contact input functions					
When DIS=0	When DIS=1 (Factory-shipped setting)	When DIS=2	When DIS=3	When DIS=4	When switching target SP 1 to 8:
No function	AUTO when DI1=ON MAN when DI1=OFF	AUTO when DI1=ON STOP when DI1=OFF	STOP when DI1=ON RUN when DI1=OFF	STOP when DI3=ON MAN when DI3=OFF	STOP when DI3=ON RUN when DI3=OFF
No function	STOP when DI2=ON RUN when DI2=OFF	2.SP when DI2=ON 1.SP when DI2=OFF	2.SP when DI2=ON 1.SP when DI2=OFF	AUTO when DI4=ON MAN when DI4=OFF	AUTO when DI4=ON MAN when DI4=OFF
No function	No function	No function	No function	No function	No function
No function	No function	No function	No function	No function	No function
No function	Common	Common	Common	Common	Common
Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF
Common	Common	Common	Common	Common	Common

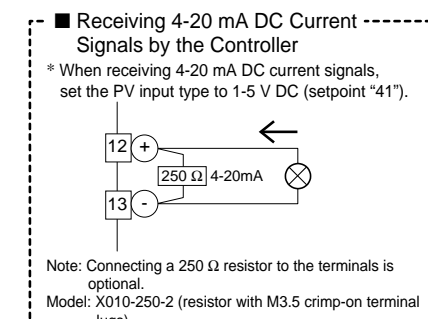
NOTE: External Contact Input
If the power is turned on when the external contact input is OFF, the mode (SPN, R/L, or A/M) existing before the power is turned off will be continued. (except for RUN/STOP)



* PV retransmission is configured at factory before shipment.



Load resistance: 600 Ω or less
* If 15 V DC loop power supply is used, retransmission output cannot be used.



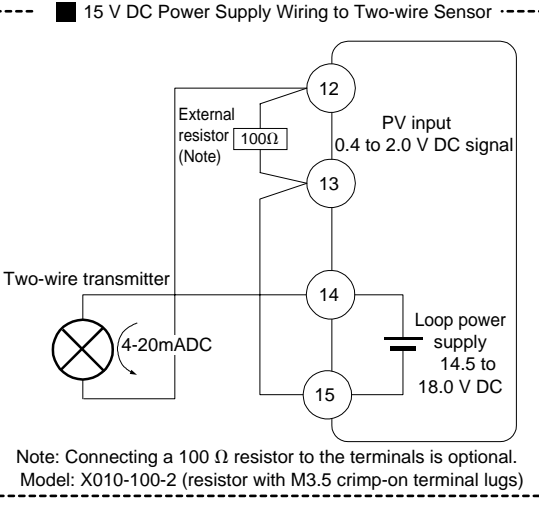
Note: Connecting a 250 Ω resistor to the terminals is optional.
Model: X010-250-2 (resistor with M3.5 crimp-on terminal lugs)

* Not configured at factory before shipment. See **Initial Settings User's Manual** for more information.

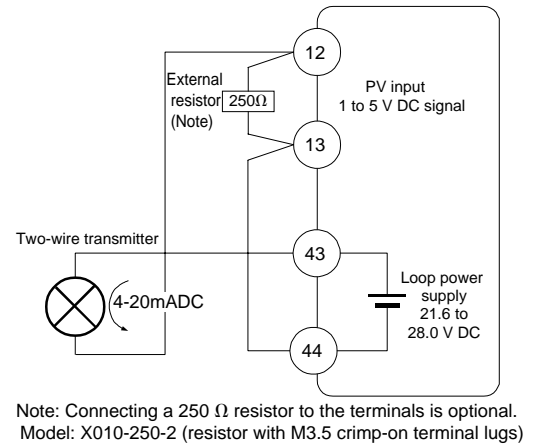
* Wiring can only be carried out for controllers with 24 V DC loop power supply.

* Wiring can only be carried out for controllers with remote input.

Specify in a range of 1.5 V DC, 0.2 V DC, or 0-10 V DC.
Default: 1.5 V DC



Note: Connecting a 100 Ω resistor to the terminals is optional.
Model: X010-100-2 (resistor with M3.5 crimp-on terminal lugs)



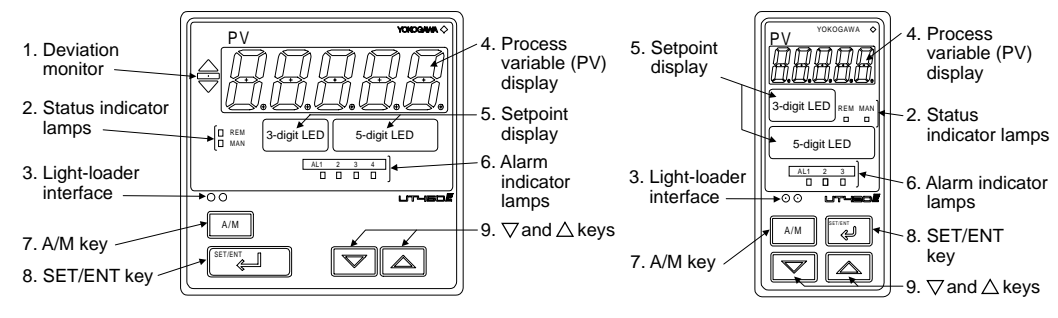
Note: Connecting a 250 Ω resistor to the terminals is optional.
Model: X010-250-2 (resistor with M3.5 crimp-on terminal lugs)

This manual describes examples of setting PV input types, control output types, and alarm types. Carrying out settings described herein allows you to perform basic control. Refer to examples of various settings to understand how to set parameters required. Refer to "1. Parameter Map" in **Parameters User's Manual** for an easy to understand explanation of setting various parameters. If you cannot remember how to carry out an operation during setting, press the key for more than 3 seconds. This brings you to the display (operating display) that appears at power-on.

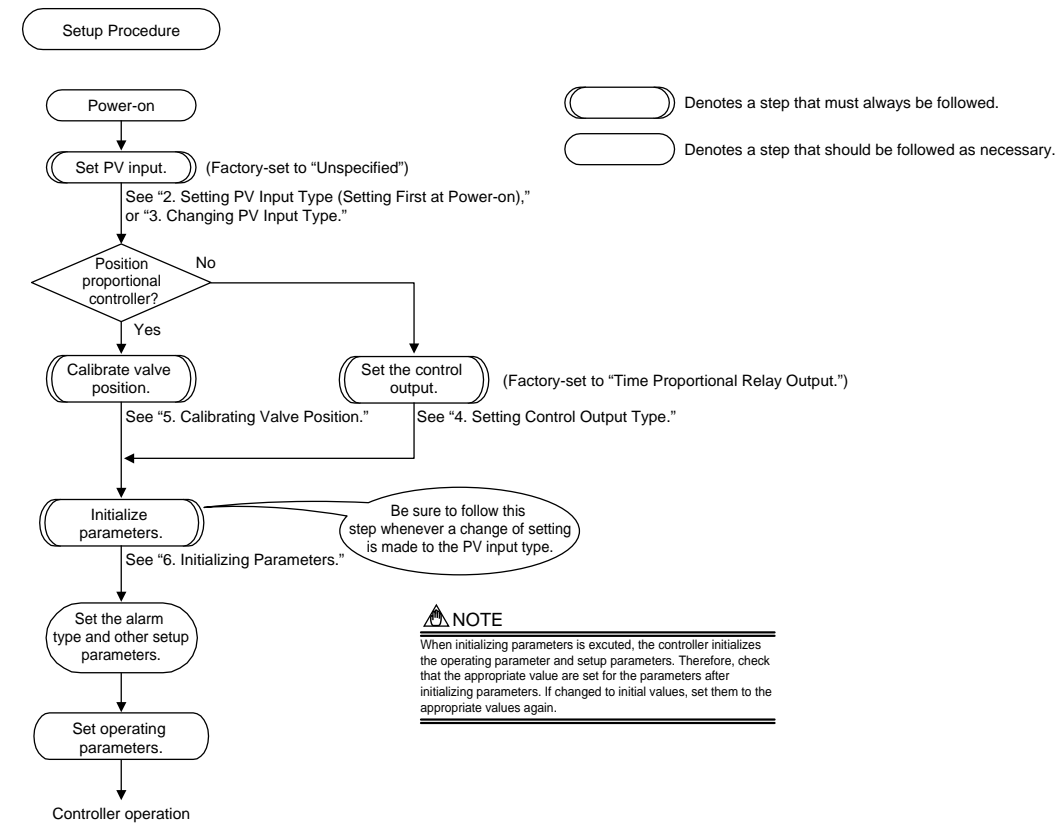
Contents

- Names and Functions of Front Panel Parts
- Setting PV Input Type (Setting First at Power-on)
- Changing PV Input Type
- Setting Control Output Type (Except for a Position Proportional Controller)
- Calibrating Valve Position (for a Position Proportional Controller Only)
- Initializing Parameters
- Changing Alarm Type
- Description of Multiple Setpoints and PID

1. Names and Functions of Front Panel Parts



Name of Part	Function
1. Deviation monitor (for UT450 only)	When lit, indicates the status of a deviation (PV - SP). : Is lit (in orange) if a deviation exceeds the deviation display range. (The deviation display range can be changed using the setup parameter "DV".) : Is lit (in green) when a deviation is within the deviation display range. : Is lit (in orange) if a deviation falls below the deviation display range. The deviation monitor goes off if any display other than the operating display or SELECT display is shown.
2. Status indicator lamps	Is lit (in green) to indicate the status of operation or control. REM: Is lit when in remote mode. MAN: Is lit when in manual mode. The lamp blinks when the controller is being auto-tuned.
3. Light-loader interface	Interface for an adapter cable used when setting and storing parameters from a PC. This requires an optional parameter setting tool.
4. Process variable (PV) display	Displays PV. Displays a menu symbol when you set a parameter. Displays an error code (in red) if an error occurs.
5. Setpoint display	Displays a parameter symbol in 3-digit LED. Displays the setpoint of a parameter in 5-digit LED.
6. Alarm indicator lamps	UT450: If any of alarms 1 to 4 occurs, the respective alarm indicator lamp (AL1 to AL4) is lit (in orange). UT420: If any of alarms 1 to 3 occurs, the respective alarm indicator lamp (AL1 to AL3) is lit (in orange).
7. A/M key	Used to switch between the AUTO and MAN modes. Each time you press the key, it switches to the AUTO or MAN mode alternately.
8. SET/ENT key	Used to switch or register a parameter. Pressing the key for more than 3 seconds allows you to switch between the operating display and the main menu for operating parameter setting display alternately.
9. ∇ and Δ keys	Used to change numerical values. On setting displays for various parameters, you can change target setpoints, parameters, and output values (in manual operation). Pressing the ∇ key decreases a numerical value, while pressing the Δ key causes it to increase. You can hold down a key to gradually increase the speed of change. To change from the parameter setting (operating or setup) display to the menu or from the setup parameter setting display menu to operating parameter setting display menu, press the ∇ and Δ keys simultaneously.



The following explanation of operation for the UT450's panel, shown in the figure, is the same as that of the UT420's panel.

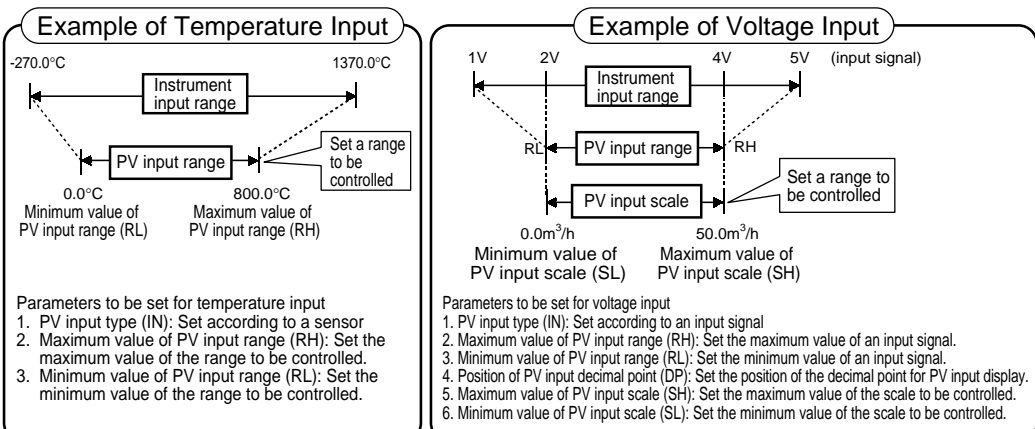
2. Setting of Main Parameters at the Factory before Shipment

Item	Factory-shipped values for standard type controllers	Factory-shipped values for heating/cooling type controllers	Factory-shipped values for position proportional type controllers
Remote input signal (only for controllers with remote inputs)	1 to 5 V DC (variable)		
Control output	Time proportional PID relay output (variable)	Heating side: Time proportional PID relay output (variable) Cooling side: Time proportional PID relay output (variable)	Relay output (fixed)
Control action	Reverse action (variable)	Not specified	
PID parameter	P = 5.0%, I = 240 seconds, D = 60 seconds.		
Alarm output	Alarm-1: PV high limit, Alarm-2: PV low limit, Alarm-3: PV high limit, Alarm-4: PV low limit		

2. Setting PV Input Type (Setting First at Power-on)

NOTE

- The controller displays the operating display when the power is turned on. However, if PV input type has not been set, "IN" appears. In this case, first use the key to display the input range code to use, then press the key to register it. Then, set the maximum value (RH) and minimum value (RL) of the PV input range (for voltage input, set the maximum value (SH) and minimum value (SL) of the PV input scale).
- The controller is configured to the initial value of each parameter at the factory before shipment. First check the initial values shown in 2. Lists of Parameters, in **Parameters User's Manual** and change parameter values as necessary.



The following operating procedure describes an example of setting a K-type thermocouple (-200.0 to 500.0°C) and a measurement range of 0.0 to 200.0°C.

- Display screen at power-on. The parameter "IN" for setting the PV input type appears.
- Press the or key to display the required setpoint.
- Press the key once to register the required setpoint.
- Press the key once to display the parameter "UN" (PV input unit).
- Press the key once to display the parameter "RH" (maximum value of PV input range).
- Press the or key to display the required setpoint. The figure below shows an example of setting the maximum value of PV input range to 200.0°C.
- Press the key once to register the setpoint.
- Press the key once to display the parameter "RL" (minimum value of PV input range).
- Press the or key to display the required setpoint. The figure below shows an example of setting the minimum value of PV input range to 0.0°C.
- Press the or key to display the required setpoint.
- To set the control output type, see step 6. onwards in "4. Setting Control Output Type." To finish settings, press the key for more than 3 seconds. This returns you to the display shown at power-on (figure below).
- Press the or key to display the required setpoint. The figure below shows an error code for input burnout (boU) if PV input wiring is not yet complete. The error code disappears when you wire the PV input terminals correctly.

Instrument Input Range Codes

Input	Type	Instrument Input Range Code	Instrument Input Range	Measurement Accuracy
Unspecified		OFF	Set the data item PV Input Type "IN" to the OFF option to leave the PV input type undefined.	
K		1	-270.0 to 1370.0°C -450.0 to 2500.0°F	±0.1% of instrument range ±1 digit at 0°C or more ±0.2% ±1 digit for temperatures below 0°C, where the accuracy is: ±2% of instrument range ±1 digit for temperatures below -200.0°C for a type-K thermocouple, or ±1% of instrument range ±1 digit for temperatures below -200.0°C for a type-T thermocouple.
		2	-270.0 to 1000.0°C -450.0 to 2300.0°F	
		3	-200.0 to 500.0°C -200.0 to 1000.0°F	
		4	-200.0 to 1200.0°C -300.0 to 2300.0°F	
		5	-270.0 to 400.0°C -450.0 to 750.0°F	
		6	0.0 to 400.0°C -200.0 to 750.0°F	
B		7	0.0 to 1800.0°C 32 to 3300.0°F	±0.15% of instrument range ±1 digit at 400°C or more ±5% of instrument range ±1 digit at less than 400°C
		8	0.0 to 1700.0°C 32 to 3100.0°F	
S		9	0.0 to 1700.0°C 32 to 3100.0°F	±0.15% of instrument range ±1 digit
		10	-200.0 to 1300.0°C -300.0 to 2400.0°F	
E		11	-270.0 to 1000.0°C -450.0 to 1800.0°F	±0.1% of instrument range ±1 digit ±0.25% of instrument range ±1 digit for temperatures below 0°C
		12	-200.0 to 900.0°C -300.0 to 1600.0°F	
L(DIN)		13	-200.0 to 400.0°C -300.0 to 750.0°F	±0.1% of instrument range ±1 digit at 0°C or more ±0.2% ±1 digit for temperatures below 0°C, where the accuracy is: ±1.5% of instrument range ±1 digit for temperatures below -200.0°C for a type-E thermocouple.
		14	0.0 to 400.0°C 32 to 2500.0°F	
U(DIN)		15	0.0 to 2300.0°C 32 to 4200.0°F	±0.2% of instrument range ±1 digit
		16	0.0 to 1390.0°C 32.0 to 2500.0°F	
Platelin 2		17	0.0 to 1900.0°C 32 to 3400.0°F	±0.5% of instrument range ±1 digit at 800°C or more No accuracy is guaranteed at less than 800°C
		18	0.0 to 2000.0°C 32 to 3600.0°F	
W		19	-200.0 to 500.0°C -300.0 to 1000.0°F	±0.1% of instrument range ±1 digit (Note1) (Note2)
		20	-200.0 to 500.0°C -300.0 to 1000.0°F	
RTD		21	-150.00 to 150.00°C -200.0 to 300.0°F	±0.2% of instrument range ±1 digit (Note1)
		22	-200.0 to 850.0°C -300.0 to 1560.0°F	
JPt100		23	-200.0 to 500.0°C -300.0 to 1000.0°F	±0.1% of instrument range ±1 digit (Note1) (Note2)
		24	-200.0 to 500.0°C -300.0 to 1000.0°F	
Pt100		25	-200.0 to 500.0°C -300.0 to 1000.0°F	±0.1% of instrument range ±1 digit (Note1) (Note2)
		26	-200.0 to 500.0°C -300.0 to 1000.0°F	
Standard signal		27	0.4 to 2 V 1 to 5 V	±0.1% of instrument range ±1 digit Display range is scalable in a range of -19999 to 30000. Display span is 30000 or less.
		28	0 to 2 V 0 to 10 V	
DC voltage		29	-10 to 20 mV 0 to 100 mV	±0.2% of instrument range ±1 digit (Note1)
		30	0.000 to 2.000 V 1.000 to 5.000 V	

* Performance in the standard operating condition (at 23±2°C, 55±10% RH, and 50/60 Hz power frequency)
 Note1: The accuracy is ±0.3°C of instrument range ±1 digit for a temperature range from 0°C to 100°C.
 Note2: The accuracy is ±0.5°C of instrument range ±1 digit for a temperature range from -100°C to 200°C.
 * To receive a 4-20 mA DC signal, select a standard signal of 1 to 5 V DC and connect it to a 250Ω resistor. This resistor is optional. Model: X010-250-2 (resistor with M3.5 crimp-on terminal lugs)

NOTE

The controller may automatically initialize the registered operating parameter setpoints if any change is made to the data item PV Input Type (IN), Maximum Value of PV Input Range (RH), Minimum Value of PV Input Range (RL), PV Input Decimal Point Position (DP), Maximum Value of PV Input Scale (SH) or Minimum Value of PV Input Scale (SL). After a change has been made to any of these data items, be sure to verify the registered operating parameter setpoints to ensure that they are correct. If any data item has been changed to its default, set it to a required value.

Ranges Selectable for PV Input

Thermocouple	1 to 18
RTD	30, 31, 35 to 37
DC voltage(mV,V)	40, 41, 50, 51, 55, 56

Ranges Selectable for Remote Input

DC voltage(V)	40, 41, 50, 51
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How to return to a menu
 Simultaneously press both the and keys once during parameter setting. This lets you return to the parameter menu.

3. Changing PV Input Type

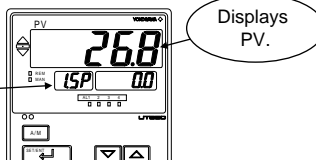

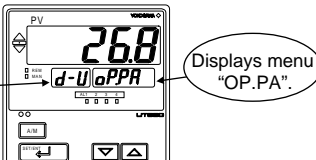

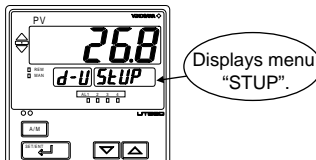

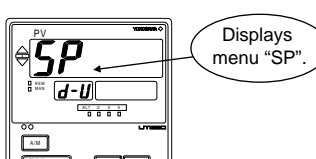

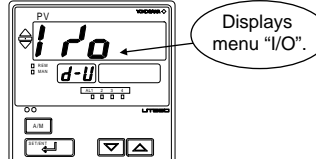

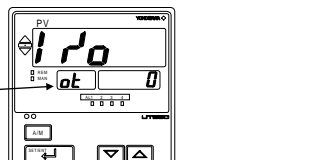


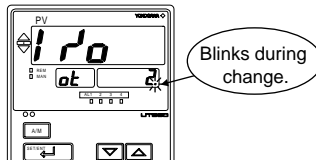

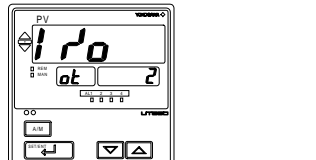

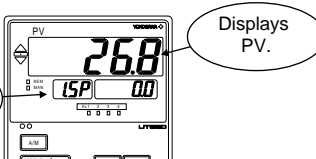
The following operating procedure describes an example of changing the setting of K-type thermocouple (-200.0 to 500.0°C) to RTD Pt100 (-200.0 to 500.0°C) and a measurement range of 0.0 to 200.0°C.

- Bring the operating display into view (display appears at power on).
- Press the key for more than 3 seconds to call up the menu "OP.PA".
- Press the key once to display the menu "STUP".
- Press the key once to display the menu "SP".
- Press the key six times to display the menu "I/O".
- Press the key once to display the parameter "IN" (PV input type).
- Press the or key to display the required setpoint. The figure below shows an example of changing to RTD Pt100 (-200.0 to 500.0°C).
- Press the key once to register the setpoint.
- Press the key once to display the parameter "RH" (maximum value of PV input range).
- Press the or key to display the required setpoint. The figure below shows an example of setting the maximum value of PV input range to 200.0°C.
- Press the key once to register the setpoint.
- Press the key once to display the parameter "RL" (minimum value of PV input range).
- Press the or key to display the required setpoint. The figure below shows an example of setting the minimum value of PV input range to 0.0°C.
- Press the key once to register the setpoint.
- Press the key for more than 3 seconds. This returns you to the display shown at power-on (figure below).

4. Setting Control Output Type (Except for a Position Proportional Controller)

The following operating procedure describes an example of changing time proportional PID relay output (0: factory-shipped value) to current output (2).

Control output terminal Values in parentheses are setpoints
 Time proportional PID relay (0)/on-off(3) output..... ①-②-③
 Current (2)/time proportional PID voltage pulse (1) output..... ④-⑦
 For details on the output terminals for heating/cooling control, see "6. Terminal Wiring Diagrams" in the **Installation User's Manual**.

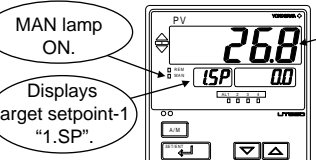

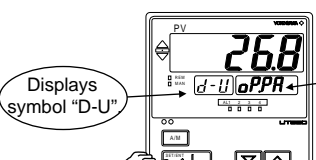

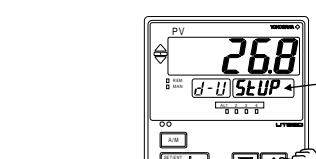

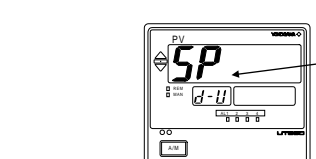

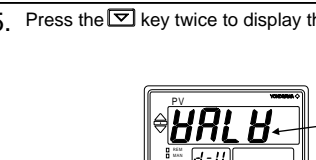

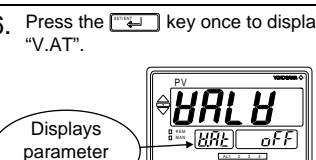

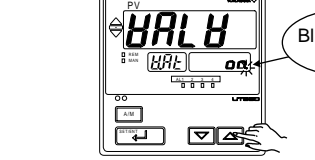

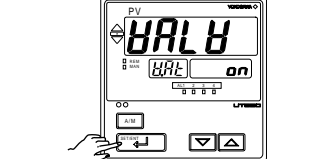
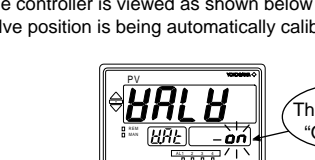
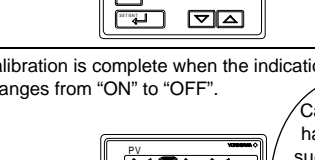

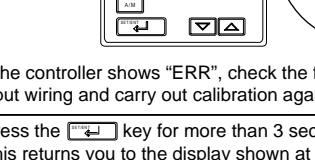
- Bring the operating display into view (display appears at power on).

- Press the  key for more than 3 seconds to call up the menu "OP.PA".

- Press the  key once to display the menu "STUP".

- Press the  key once to display the menu "SP".

- Press the  key six times to display the menu "I/O".

- Press the  key several times to display the parameter "OT" (control output type).

- Press the  or  key to display the required setpoint. The figure below shows an example of setting to current output (4 to 20 mA DC).

- Press the  key once to register the setpoint.

- Press the  key for more than 3 seconds. This returns you to the display shown at power-on (figure below).


List of Control Output Types.

Parameter Symbol	Name of Parameter	Setting Range	Control Output Types	
ot (OT)	Control output types	0	Time proportional PID relay contact output (terminals ①-②-③)	
		1	Time proportional PID voltage pulse output (terminals ④-⑦)	
		2	Current output (terminals ④-⑦)	
		3	On/off control relay contact output (terminals ①-②-③)	
		The following 4 to 12 are displayed only for heating/cooling type controllers.		
		4	Heating-side relay output (terminals ①-②-③), cooling-side relay output (terminals ④-⑤)	
		5	Heating-side pulse output (terminals ④-⑦), cooling-side relay output (terminals ④-⑤)	
		6	Heating-side current output (terminals ④-⑦), cooling-side relay output (terminals ④-⑤)	
		7	Heating-side relay output (terminals ①-②-③), cooling-side pulse output (terminals ④-⑦)	
		8	Heating-side pulse output (terminals ④-⑦), cooling-side pulse output (terminals ④-⑦)	
		9	Heating-side current output (terminals ④-⑦), cooling-side pulse output (terminals ④-⑦)	
		10	Heating-side relay output (terminals ①-②-③), cooling-side current output (terminals ④-⑦)	
11	Heating-side pulse output (terminals ④-⑦), cooling-side current output (terminals ④-⑦)			
12	Heating-side current output (terminals ④-⑦), cooling-side current output (terminals ④-⑦)			

5. Calibrating Valve Position (for a Position Proportional Controller Only)

The following operation describes a procedure of inputting a feedback signal from a control valve to calibrate the full closed and full open positions of the valve automatically. To calibrate the valve position, you need to carry out wire connections and bring the controller into manual mode. For connections, see "6. Terminal Wiring Diagrams" in the **Installation User's Manual** and for entering the manual mode, see "8. Switching between AUTO and MAN" in the **Operations User's Manual**.

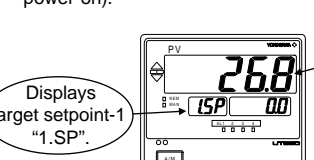

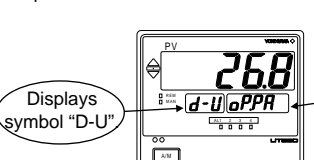

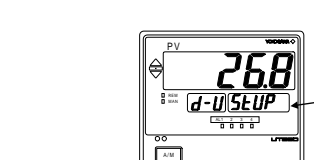

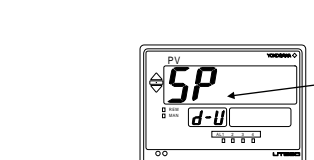

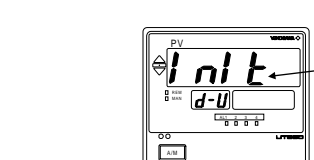

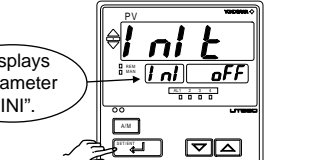

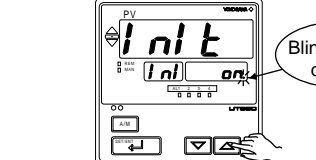

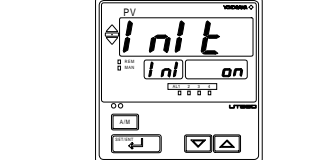

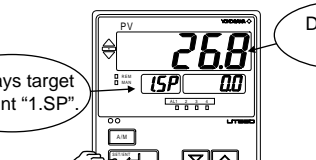
- Bring the operating display into view (display appears at power on).

- Press the  key for more than 3 seconds to call up the menu "OP.PA".

- Press the  key once to display the menu "STUP".

- Press the  key once to display the menu "SP".

- Press the  key twice to display the menu "VALV".

- Press the  key once to display the parameter "V.AT".

- Press the  key once to display "ON".

- Press the  key once. The controller automatically calibrates the valve position (fully open or closed).

- The controller is viewed as shown below when the valve position is being automatically calibrated.

- Calibration is complete when the indication changes from "ON" to "OFF".

- Press the  key for more than 3 seconds. This returns you to the display shown at power on (figure below).


6. Initializing Parameters

Be sure to follow the steps below after a change of setting has been made to the data item PV Input Type, PV Input Range or PV Input Scale.

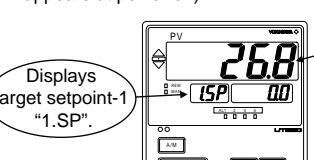

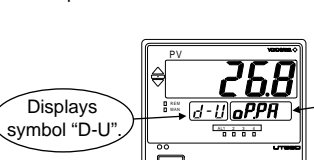

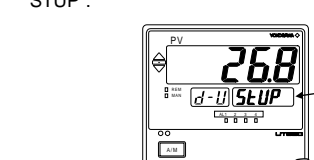

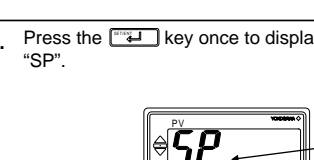

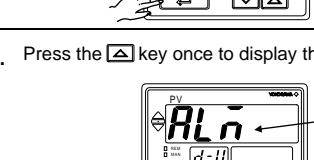

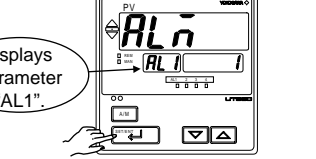


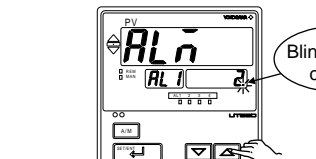

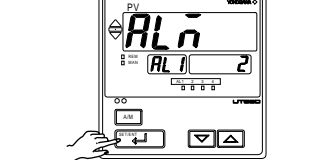

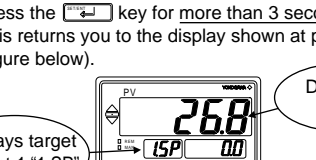
CAUTION

Initializing the above parameter setpoints may initialize the registered operating/setup parameter setpoints. Check that they are correct. If any of them has been changed to its initial value, set it to a required value.

- Bring the operating display into view (display appears at power-on).

- Press the  key for more than 3 seconds to call up the menu "OP.PA".

- Press the  key once to display the menu "STUP".

- Press the  key once to display the menu "SP".

- Press the  key once to display the menu "INIT".

- Press the  key once to display the parameter "INI".

- Press the  key to display "ON".

- Press the  key once. The display momentarily becomes blank (which is normal), indicating the parameters have been initialized.

- Press the  key for more than 3 seconds. This returns you to the display shown at power-on (figure below).


7. Changing Alarm Type

The following operating procedure describes an example of changing alarm-1 (factory-shipped setting: PV high limit alarm) to PV low limit alarm. When you have changed alarm type, the alarm setpoint will be initialized; set the alarm setpoint again.

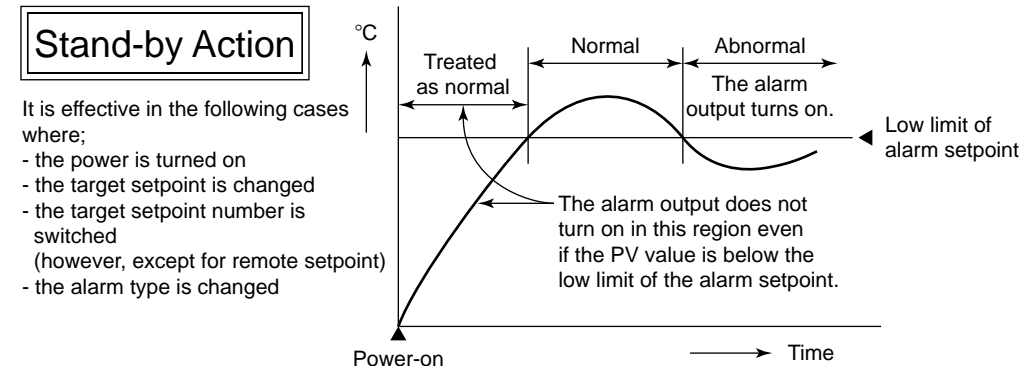
- Bring the operating display into view (display appears at power on).

- Press the  key for more than 3 seconds to call up the menu "OP.PA".

- Press the  key once to display the menu "STUP".

- Press the  key once to display the menu "SP".

- Press the  key once to display the menu "ALM".

- Press the  key once to display the parameter "AL1".

- Press the  or  key to display the required setpoint. The figure below shows an example of setting PV low limit alarm.

- Press the  key once to register the setpoint.

- Press the  key for more than 3 seconds. This returns you to the display shown at power-on (figure below).

- See "5. Setting Alarm Setpoints" in the **Operations User's Manual** when setting an alarm setpoint.

List of Alarm Types

The table below shows the alarm types and alarm actions. In the table, codes 1 to 10 are not provided with stand-by actions, while codes 11 to 20 are provided with stand-by actions.

Alarm type	Alarm action	Contact closes if alarm occurs	Contact opens if alarm occurs	Alarm type	Alarm action	Contact closes if alarm occurs	Contact opens if alarm occurs
No alarm		OFF					
PV high limit	Hysteresis Open (unit) / Closed (lit) PV Alarm setpoint	1		De-energized on deviation low limit alarm	Hysteresis Open (lit) / Closed (unit) Deviation setpoint Target SP		6
PV low limit	Hysteresis Closed (lit) / Open (unit) Alarm setpoint PV	2		Deviation high and low limits	Hysteresis Closed (unit) / Open (lit) Deviation setpoint Target SP		7
Deviation high limit	Hysteresis Open (unit) / Closed (lit) PV Target SP	3		Deviation within high and low limits	Hysteresis Open (unit) / Closed (lit) Deviation setpoint Target SP		8
Deviation low limit	Hysteresis Closed (lit) / Open (unit) Deviation setpoint PV	4		De-energized on PV high limit	Hysteresis Open (lit) / Closed (unit) Alarm setpoint		9
De-energized on deviation high limit alarm	Hysteresis Closed (unit) / Open (lit) PV Target SP	5		De-energized on PV low limit	Hysteresis Open (lit) / Closed (unit) Alarm setpoint PV		10
Timer function (control stability report event) (for Alarm-1 only)	Upward (hour/minute)	21		Sensor grounding alarm	Sensor grounding alarm		25
	Downward (hour/minute)	22		Fault diagnosis output (Note 1)	Fault diagnosis output (Note 1)		26
	Upward (minute/second)	23		FAIL output (Note 2)	The controller stops when in a FAIL state (Note 2). The control output is set to "OFF" or "0%" and the alarm output is set to "OFF".		27
SP high limit	Hysteresis Open (unit) / Closed (lit) SP Alarm setpoint	28		Output high limit	Hysteresis Open (unit) / Closed (lit) Output value Alarm setpoint		30
	Hysteresis Closed (lit) / Open (unit) Alarm setpoint SP	29		Output low limit	Hysteresis Closed (lit) / Open (unit) Alarm setpoint Output value		31

Note 1: The fault diagnosis output turns on if there is an input burnout, A/D converter failure, or reference junction compensation (RJC) failure. For input burnout or A/D converter failure, the control output is set to the setpoint of the Preset Output Value (operating parameter PO).
 Note 2: The FAIL output is on under normal operation and turns off if there is a failure.



8. Description of Multiple Setpoints and PID

The UT450/UT420 has a maximum of eight target setpoints, and has PID for each of these setpoints. The following shows the correspondence between the target setpoint numbers (SPN), target setpoints (SP), and PID parameters. Note: In factory-shipped settings, up to four target setpoints are available. To use five or more target setpoints, use setup parameter "GRP" (PID group number) to set the number of setpoints to use. For example, if you have set "2" to the target setpoint number (SPN), the control parameters available are target setpoint (2.SP), proportional band (heating-side proportional band) (2.P), integral time (heating-side integral time) (2.I), derivative time (heating-side derivative time) (2.D), cooling-side proportional band (2.Pc), cooling-side integral time (2.Ic), and cooling-side derivative time (2.Dc).

To use multiple target setpoints, see the table below to check the corresponding parameters.

Target setpoint number (SPN)	Target setpoint (SP)	PID parameter					
		Proportional band (heating-side proportional band)	Integral time (heating-side integral time)	Derivative time (heating-side derivative time)	Cooling-side proportional band	Cooling-side integral time	Cooling-side derivative time
SPN=1	1.SP	1.P	1.I	1.D	1.Pc	1.Ic	1.Dc
SPN=2	2.SP	2.P	2.I	2.D	2.Pc	2.Ic	2.Dc
SPN=3	3.SP	3.P	3.I	3.D	3.Pc	3.Ic	3.Dc
SPN=4	4.SP	4.P	4.I	4.D	4.Pc	4.Ic	4.Dc
SPN=5	5.SP	5.P	5.I	5.D	5.Pc	5.Ic	5.Dc
SPN=6	6.SP	6.P	6.I	6.D	6.Pc	6.Ic	6.Dc
SPN=7	7.SP	7.P	7.I	7.D	7.Pc	7.Ic	7.Dc
SPN=8	8.SP	8.P	8.I	8.D	8.Pc	8.Ic	8.Dc

This manual describes key entries for operating the controller. For operations using external contact inputs, see "6. Terminal Wiring Diagrams" in **Installation User's Manual**. If you cannot remember how to carry out an operation during setting, press the key for more than 3 seconds. This brings you to the display (operating display) that appears at power-on.

Contents

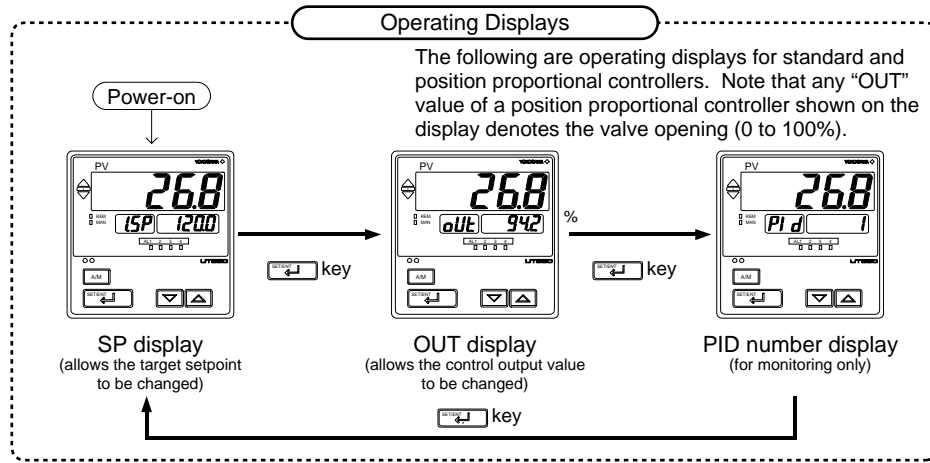
- Monitoring-purpose Operating Displays Available during Operation
- Setting Target Setpoint (SP)
- Performing/Canceling Auto-tuning
- Setting PID Manually
- Setting Alarm Setpoints
- Selecting Target Setpoint Numbers (SPN)
- Switching between Run and Stop
- Switching between AUTO and MAN
- Manipulating Control Output during Manual Operation
- Switching between Remote (REM) and Local (LCL)
- Troubleshooting

1. Monitoring-purpose Operating Displays Available during Operation

The monitoring-purpose operating displays available during operation are roughly classified into two groups depending on the types of controller and control output. One group is operating displays for standard and position proportional controllers and the other group is operating displays for a heating/cooling controller.

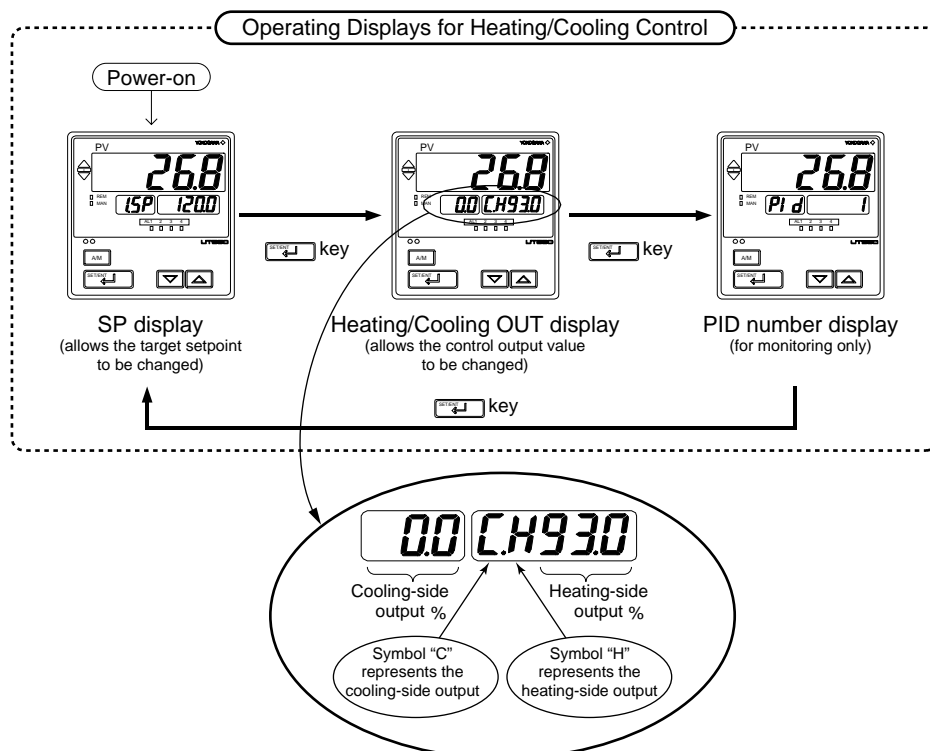
Operating displays for standard and position proportional controllers

- SP Display**
The PV input value appears on the PV display. The target setpoint (1.SP) appears on the Setpoint display. (can be changed)
- OUT Display**
The PV input value appears on the PV display. The control output value (OUT) appears on the Setpoint display. (can be changed in MAN mode) When in position proportional control, the Setpoint display shows the valve opening (0% to 100%).
- PID Number Display**
The PV input value appears on the PV display. The PID number (PID) being used appears on the Setpoint display.



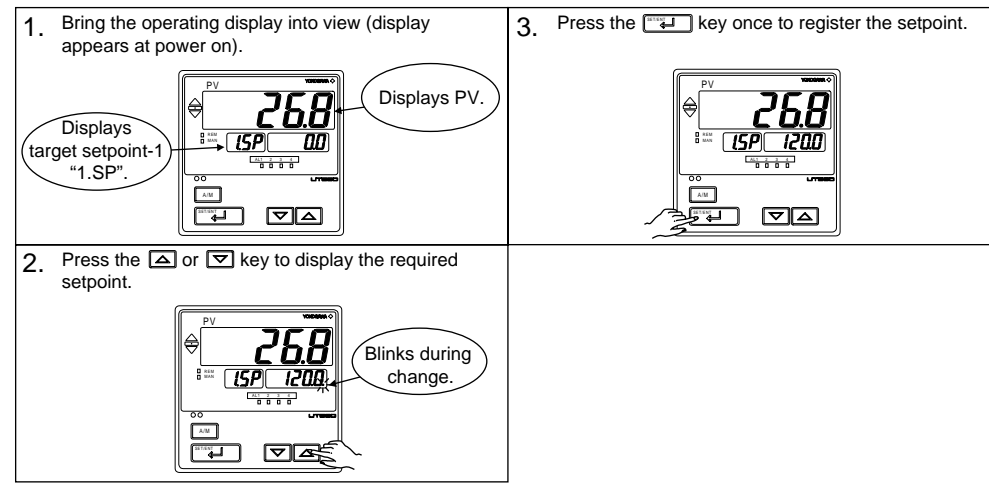
Operating displays for a heating/cooling controller

- SP Display**
The PV input value appears on the PV display. The target setpoint (1.SP) appears on the Setpoint display. (can be changed)
- Heating/Cooling OUT Display**
The PV input value appears on the PV display. The heating and cooling sides control output value (C.H) appears on the Setpoint display. (can be changed in MAN mode)
- PID Number Display**
The PV input value appears on the PV display. The PID number (PID) being used appears on the Setpoint display.



2. Setting Target Setpoint (SP)

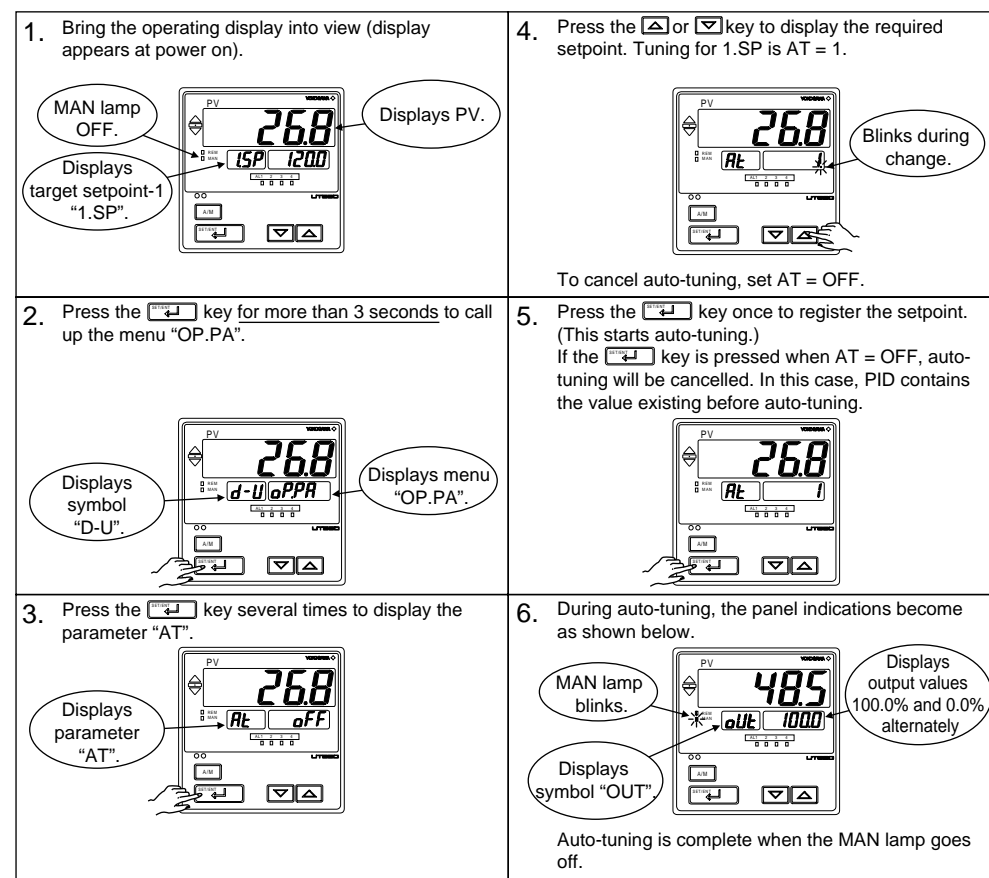
The following operating procedure describes an example of setting 120.0 to a target setpoint. In automatic operation, the controller starts control using set target setpoints.



3. Performing/Canceling Auto-tuning

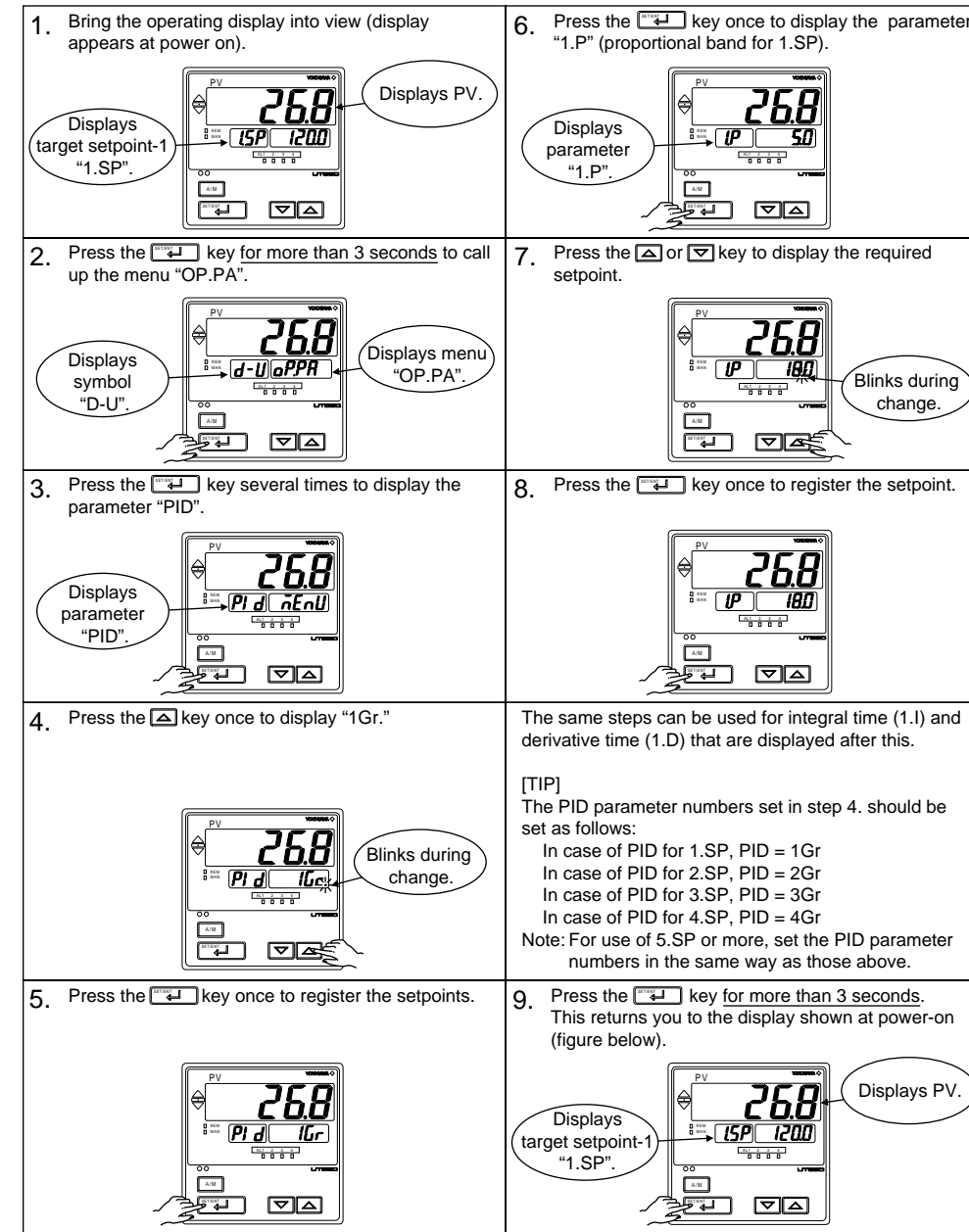
Auto-tuning should be carried out after setting a target setpoint (SP). Make sure the controller is in automatic operation mode (AUTO) and in running state (RUN) before carrying out auto-tuning. See "8. Switching between AUTO and MAN," to change to AUTO and "7. Switching between Run and Stop," to change to Run.

NOTE
 When on-off control is being used, auto-tuning cannot be carried out. Moreover, do not perform auto-tuning when controlling any of the following processes.
 • Control processes with quick response such as flow control or pressure control
 • Processes where even temporary output on/off results in inconvenience
 • Processes where a large output change at control element results in inconvenience
 • Processes where variations in PV may exceed an allowable range, adversely affecting product quality



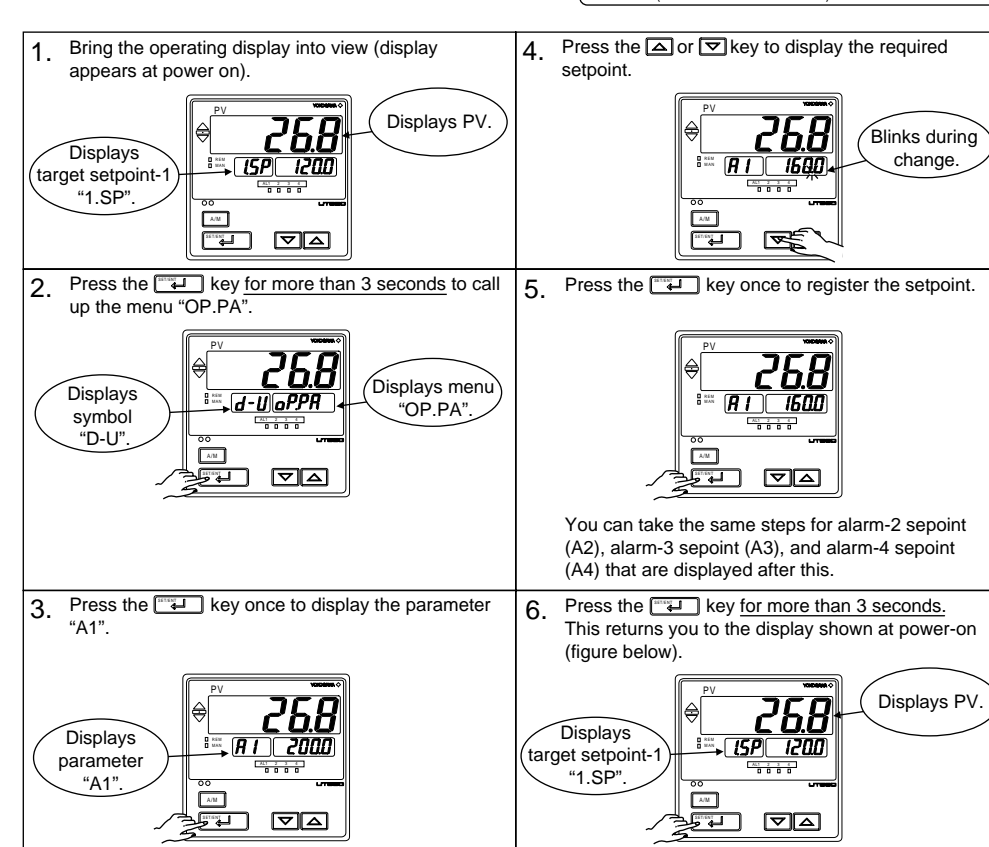
4. Setting PID Manually

If you know the values to be set or if suitable PID constants cannot be obtained by auto-tuning, follow the procedure below to set values.



5. Setting Alarm Setpoints

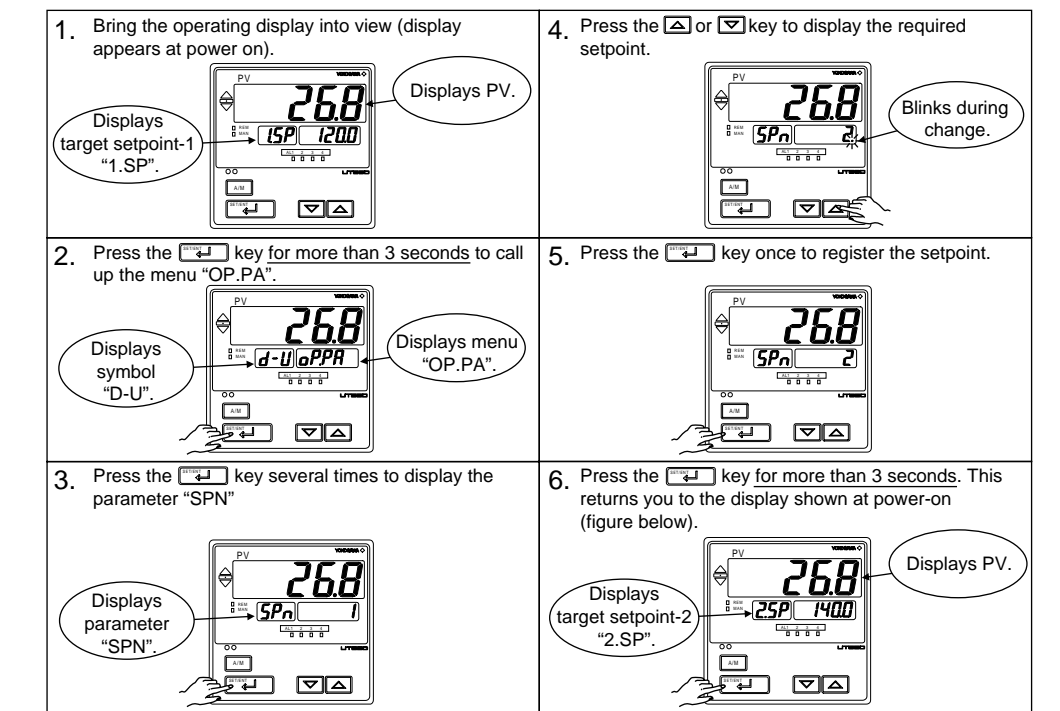
The following operating procedure describes an example of setting 160.0 to alarm-1 setpoint. Check alarm type before setting the alarm setpoint. To change alarm type, see "7. Changing Alarm Type" in **Initial Setting User's Manual**.



6. Selecting Target Setpoint Numbers (SPN)

The following operating procedure describes an example of changing a target setpoint number (SPN) from 1 to 2.

NOTE
 • If a target setpoint number has been switched using contact input, when the contact input is on, that number cannot be selected by keystroke.
 • No target setpoint number can be selected by key operation if the setup parameter DIS (DI function selection) is set to "2" or "3".



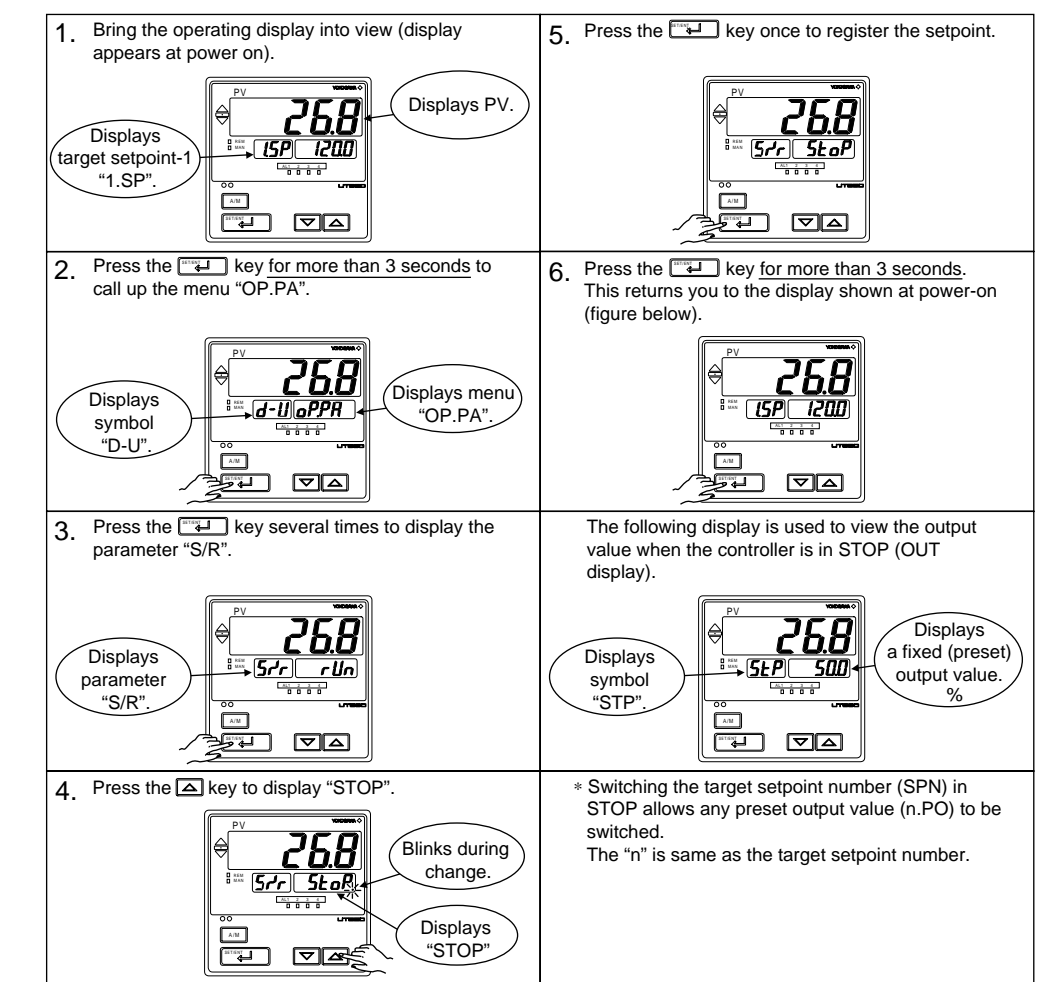
7. Switching between Run and Stop

The following operation describes the procedure of switching from the run state (RUN) to stop state (STOP).

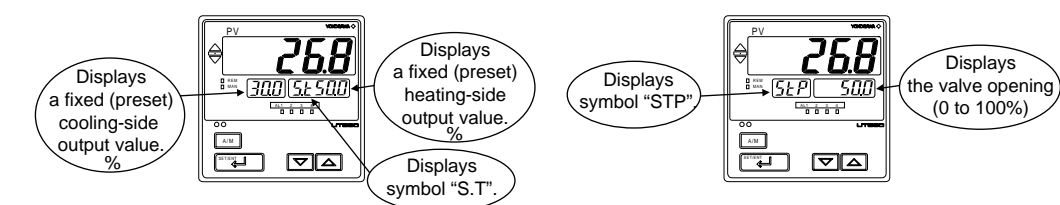
NOTE
 Factory-shipped setting does not allow switching between RUN and STOP by keystroke. To perform switching by keystroke, configure setup parameter "DIS = 0."

When the controller is stopped, input and outputs are as follows:

PV input	Displays PV.
Control output	Preset output value (factory-shipped setting: 0%)
Alarm output	ON in the event of an alarm



- In heating / cooling control, output display in STOP.
- In Position proportional control, output display in STOP.

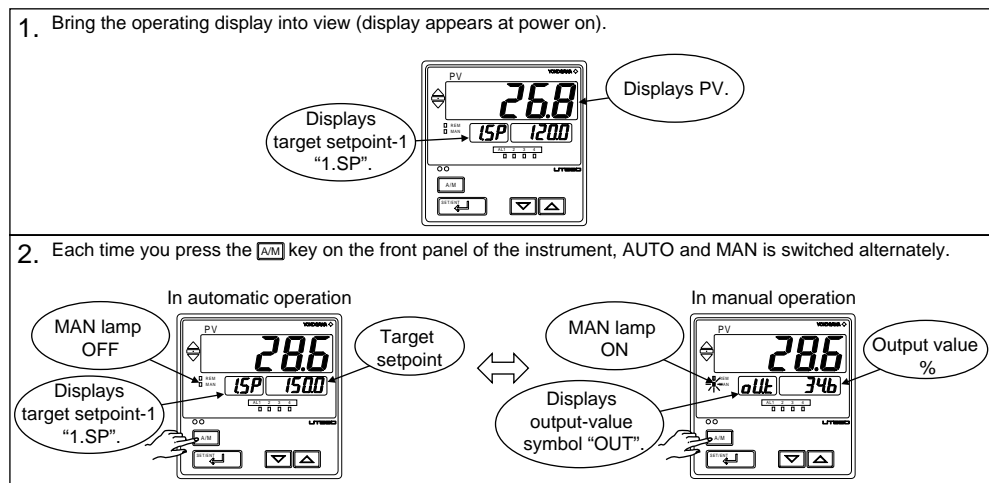


8. Switching between AUTO and MAN



NOTE

If AUTO and MAN have been switched using contact input, when the contact input is ON, switching between AUTO and MAN cannot be achieved by keystroke.



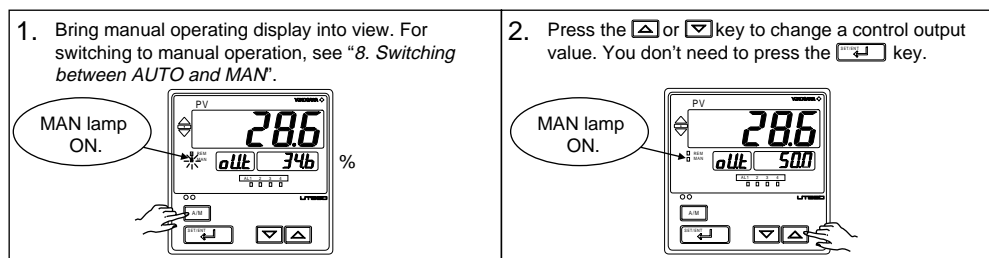
9. Manipulating Control Output during Manual Operation



NOTE

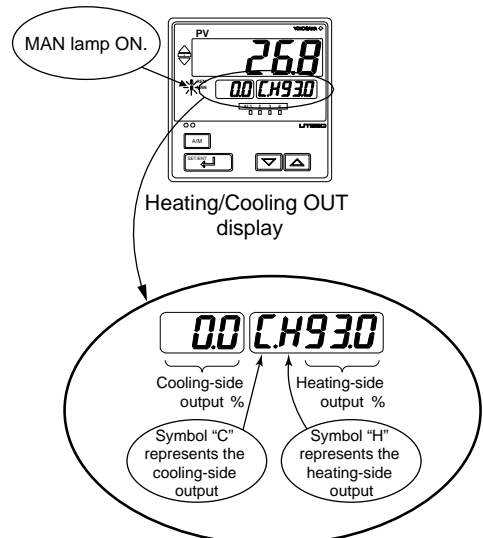
Control output cannot be changed if the controller is stopped. In this case, the preset output value (operating parameter PO) will be output. In heatin/cooling control, the heating-side preset output value (operating parameter PO) and cooling-side preset output value (operating parameter Oc) will be output.

A control output value is linked with a display value changed using the key or key. Note that the control output changes as displayed without requiring the key.



Manipulating the Control Output during Heating/Cooling Control

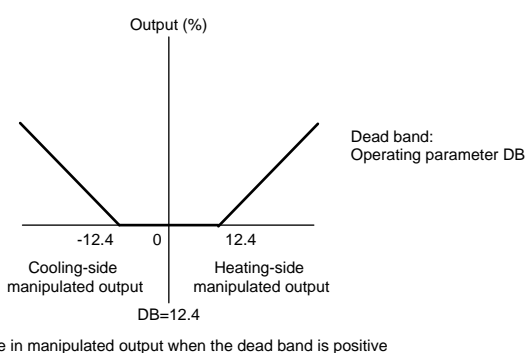
Showing the Heating/Cooling OUT display.



Controller behavior and control output manipulation when the dead band is positive

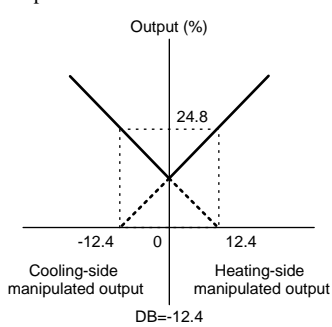
The following is an example when the DB parameter is set at 12.4%.
 If you hold down the key with the heating-side output under manipulation (i.e., cooling-side output C = 0.0%), the heating-side output (H =) decreases. Consequently, both the heating-side and cooling-side outputs change to 0.0%. If you keep the key held down longer, you enter the state of manipulating the cooling-side output, and its value begins to increase.

Inversely, if you hold down the key with the cooling-side output under manipulation (i.e., heating-side output H = 0.0%), the cooling-side output (C =) decreases. Consequently, both the heating-side and cooling-side outputs go to 0.0%. If you keep the key held down longer, you enter the state of manipulating the heating-side output, and its value begins to increase.



Controller behavior and control output manipulation when the dead band is negative

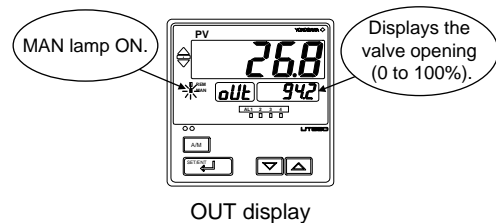
The following is an example when the DB parameter is set at -12.4%.
 If you hold down the key with the heating-side output under manipulation (i.e., cooling-side output C = 0.0%), the heating-side output (H =) decreases. If the output H falls below 24.8%, the cooling-side output C begins to increase from 0.0%. If you keep the key held down longer and the output C rises above 24.8%, the output H goes to 0.0% and you enter the state of manipulating the cooling-side output.



Manipulating the Control Output during Position Proportional Control

The controller continues to provide control output as long as the key or key is being pressed.

- key: Closes the valve.
- key: Opens the valve.



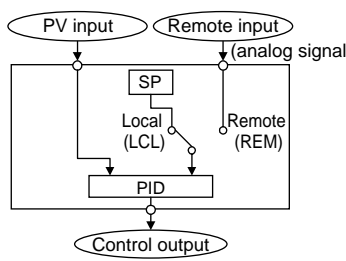
Note: Manual output is not limited to output high limit(OH) and output low limit(OL).

10. Switching between Remote (REM) and Local (LCL) Control

The following operating procedure describes an example of switching from Local (LCL) to Remote (REM). Switching between REM and LCL is possible for only controllers with remote input.

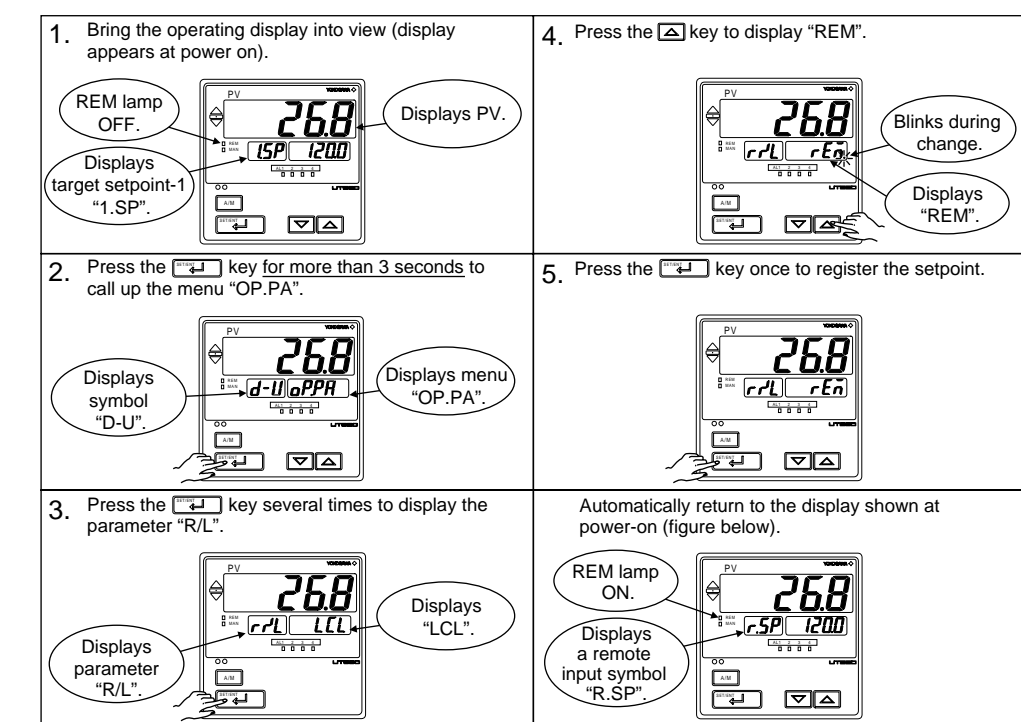
- Local: Performs control using target setpoints set in the controller.
- Remote: Performs control using external analog signals as target setpoints.

Note: The PID group number when the controller is in REMOTE operation is the same as the number set in the Target Setpoint Number (SPN) parameter.



NOTE

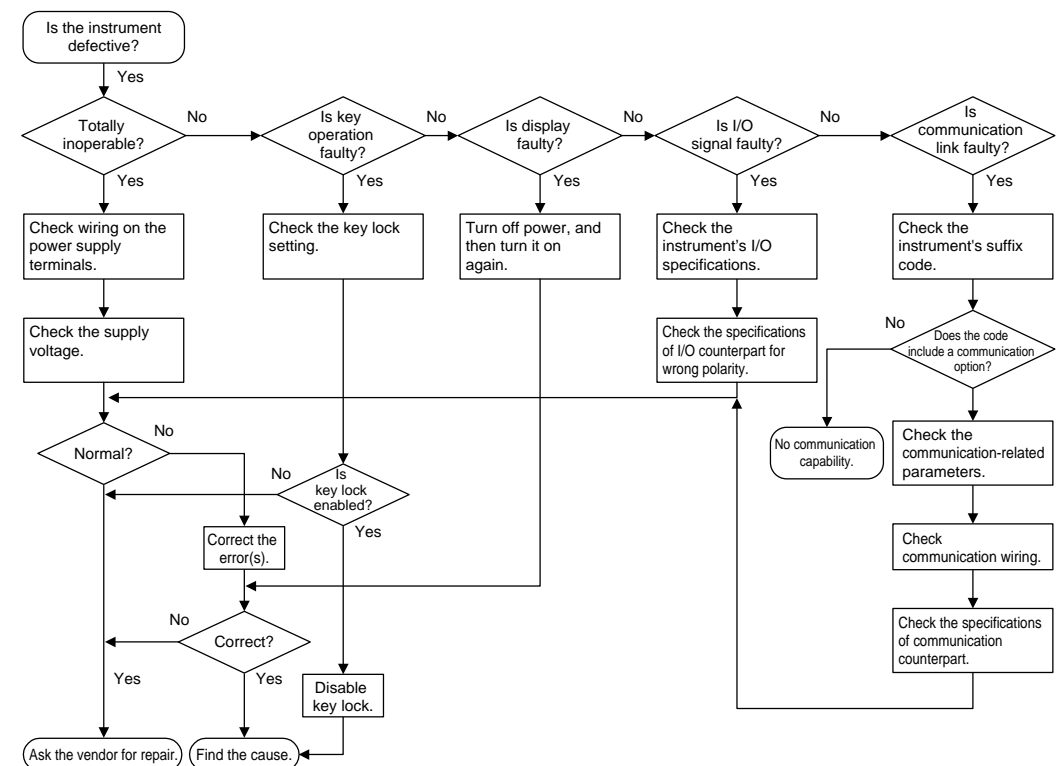
If Remote state is achieved by external contact input (contact input is ON), switching between REM and LCL cannot be achieved by keystroke.



11. Troubleshooting

Troubleshooting Flow

If the operating display does not appear after turning on the controller's power, follow the measures in the procedure below. If a problem appears complicated, contact our sales representative.



IMPORTANT

Take note of the parameter settings when asking the vendor for repair.

Errors at Power On

The following table shows errors that may be detected by the fault diagnosis function when the power is turned on.

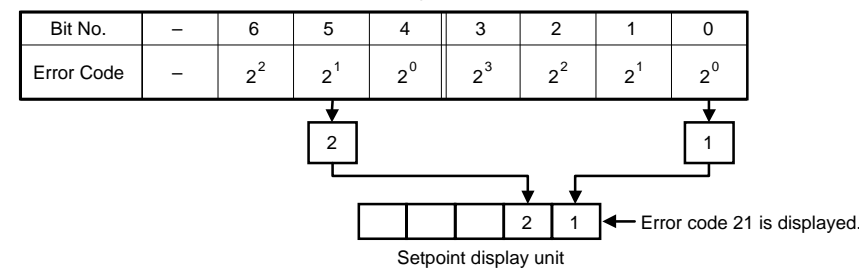
Error indication (on PV display unit)	Description of error	PV	Control output	Alarm output	Retransmission output	Communication	Remedy
E000 (E000)	Faulty RAM	None	0% or less or OFF	OFF	0% or less	Stopped	Faulty Contact us for repair.
E001 (E001)	Faulty ROM	None	0% or less or OFF	OFF	0% or less	Stopped	
E002 (E002)	System data error	Undefined	Undefined	Undefined	Undefined	Stopped	
PV decimal point blinks	Faulty calibration value	Normal action (out of accuracy)	Normal action (out of accuracy)	Normal action (out of accuracy)	Normal action (out of accuracy)	Normal action	Normal action
Error code (Note) (See description below.)	Parameter error	Normal action	0% or less or OFF	Normal action	Normal action	Normal action	Check and set the initialized parameters.

Note: An error code is displayed on the setpoint display unit.

An error code is displayed in the event of an error, according to its type. An error code is a two-digit figure in which a combination of 6 bits of on and off is converted into a decimal number. The following shows the relationship between each bit and parameter to be checked for abnormality.

Bit No.	6	5	4	3	2	1	0
Parameter to be checked	Operation mode/output	Operating parameters	Setup parameters	Range data	-	-	Calibration data

For example, if an error occurs with the operating parameter and calibration data, the error code will be as follows:



Possible Errors during Operation

The following shows possible errors occurring during operations.

Error indication (on PV display unit)	Description of error	PV	Control output	Alarm output	Retransmission output	Communication	Remedy
Displays "RJC" and PV alternately	RJC error	Measured with RJC=OFF	Normal action				Faulty Contact us for repair.
Decimal point of item part in SP display unit blinks.	EEPROM error	Normal action					
E300 (E300)	ADC error	105%	In AUTO: Preset value output In MAN: Normal action				Check wires and sensor.
baUt (B.OUT)	PV burnout error	Dependent on the BSL parameter Up-scale: 105% Down-scale: -5%					
oUEr (OVER) or -oUEr (-OVER)	Excessive PV Out of -5 to 105%	-5% or 105%	Normal action	Normal action			Check process.
E200 (E200)	Auto-tuning failure (Time-out)		Action with PID existing before auto-tuning				Check process. Press any key to erase error indication.
Setpoint display unit - - - -	Feedback resistor breakdown	Normal action	Stopped		Stopped		Check the feedback resistor.
Left end of SP display unit blinks.	Faulty communication line		Normal action		Normal action		Check wires and communication parameters, and make resetting. Recovery at normal receipt
Decimal point at right end lights.	Runaway (due to defective power or noise)	Undefined	0% or less or OFF	OFF	0% or less	Stopped	Faulty if power off/on does not reset start the unit. Contact us for repair.
All indications off	Power off	None					Check for abnormal power.

Remedies if Power Failure Occurs during Operations

The operation status and remedies after a power failure differ with the length of power failure time:

- Instantaneous power failure of 20 ms or less: A power failure is not detected. Normal operation continues.
- Power failure of about 2 seconds or less: The following show effects caused in "settings" and "operation status."

Alarm action	Continues. Alarm with standby function will enter standby status.
Setting parameter	Set contents of each parameter are retained.
Auto-tuning	Cancelled.
Control action	Action before power failure continues.

- Power failure of more than about 2 seconds: The following show effects caused in "settings" and "operation status."

Alarm action	Continues. Alarm with standby function will enter standby status.
Setting parameter	Set contents of each parameter are retained.
Auto-tuning	Cancelled.
Control action	Differs with setting of setup parameter "R.MD"(restart mode). R.MD setting: Control action after recovery from power failure CONT: Continues action before power failure. (Factory-set default) For position-proportional type, when V.MD = Valve position estimating type, starts action from 0%. MAN: Outputs preset output value (PO) as control output and continues action set before power failure in MAN mode. For position-proportional type, when V.MD = Valve position feedback type, starts action from feedback input condition at recovery from power failure. When V.MD = Valve position estimating type, starts action from 0%. For heating/cooling control, starts action from heating-side output value and cooling-side output value of 50% of control computation output. AUTO: Outputs preset output value (PO) as control output and continues action set before power failure in AUTO mode. For position-proportional type, when V.MD = Valve position feedback type, starts action from feedback input condition at recovery from power failure. When V.MD = Valve position estimating type, starts action from 0%. For heating/cooling control, starts action from heating-side output value and cooling-side output value of 50% of control computation output.

Troubleshooting When the Controller Fails to Operate Correctly

If your control tasks are not successful, check the preset parameters and controller wiring before concluding the controller to be defective. The following show some examples of troubleshooting you should refer to in order to avoid the possibility of other problems.

The controller does not show the correct measured input (PV).

- The UT450/UT420 controllers have a universal input. The type of PV input can be set/changed using the parameter "IN". At this point, the controller must be wired correctly according to the selected type of PV input. Check the wiring first if the controller fails to show the correct PV value. To do this, refer to "Initial Settings User's Manual". With the parameters "RH", "RL", "DP", "SH" and "SL", it is possible to scale the input signal and change its number of decimal places. Also check that these parameters are configured correctly.

The controller does not provide any control output or the control output does not change at all.

- The UT450/UT420 controllers have a universal output. The type of control output can be set/changed using the parameter "OT". At this point, the controller must be wired correctly according to the selected type of control output. Check the wiring first if the controller provides no control output. To do this, refer to "6. Terminal Wiring Diagrams," in "Installation User's Manual". With the parameters "OH" and "OL", it is possible to set/change the high and low limits of control output. The control output may not change at all, however, because of restrictions on these parameters. Also check the restrictions on these parameters.
- The control output can only be changed when the controller is in the MAN mode. If the MAN lamp is off (i.e., the controller is in the AUTO mode), you cannot change the control output using key operation.

The control output does not change soon after the target setpoint (SP) has been changed.

- If this happens, check the setpoint of the parameter "MOD". In cases where fixed-point control is selected as the PID control mode (MOD = 1), tracking based on the I-term works to prevent the control output from changing suddenly even if the target setpoint SP is varied. The control output therefore may appear to be working incorrectly at first; however it gradually adapts itself to the new target setpoint.

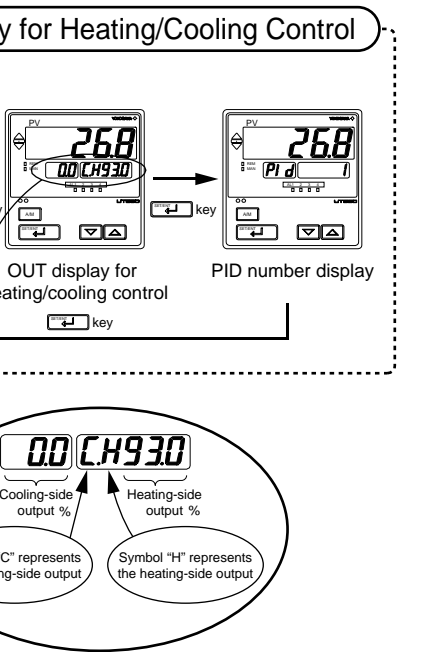
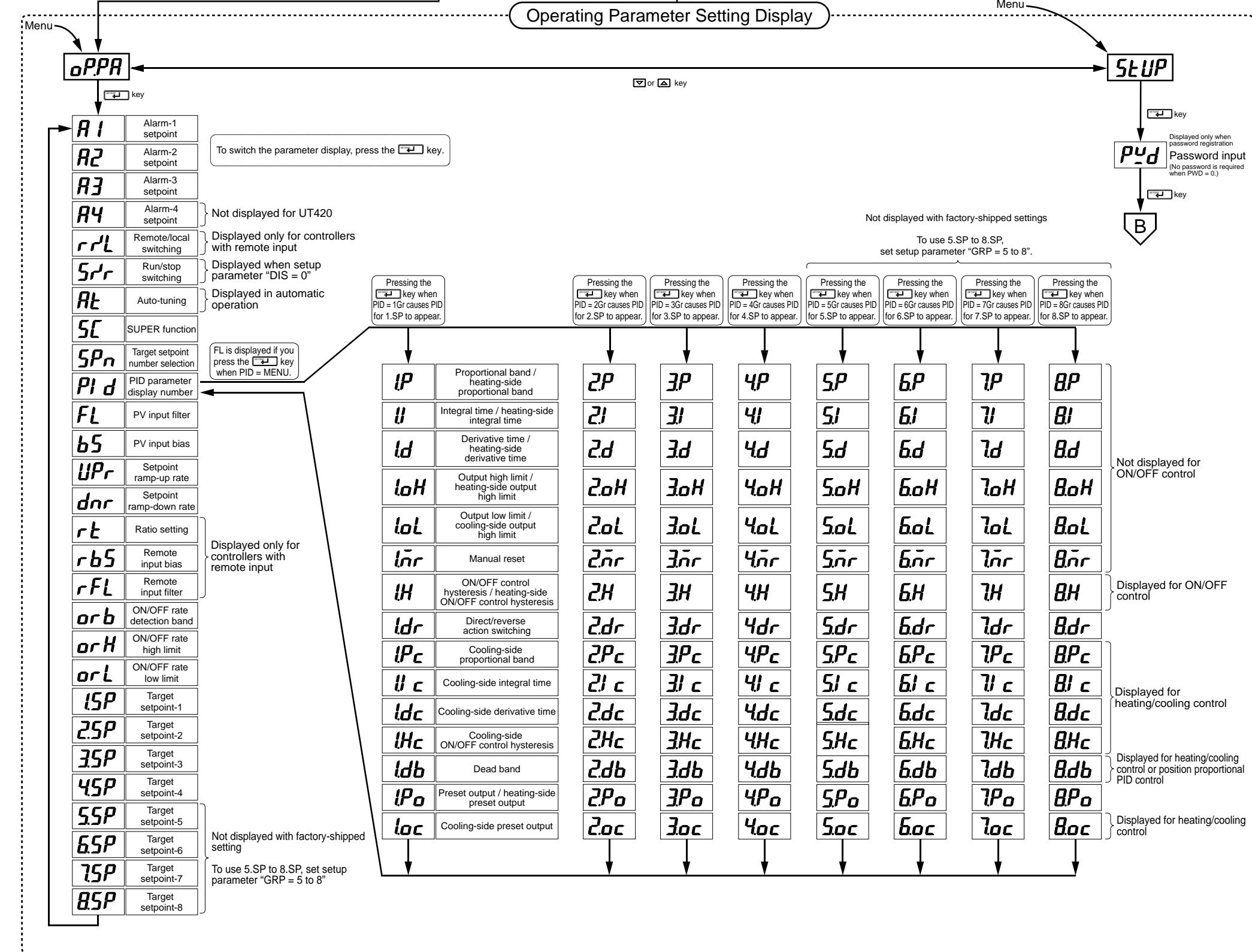
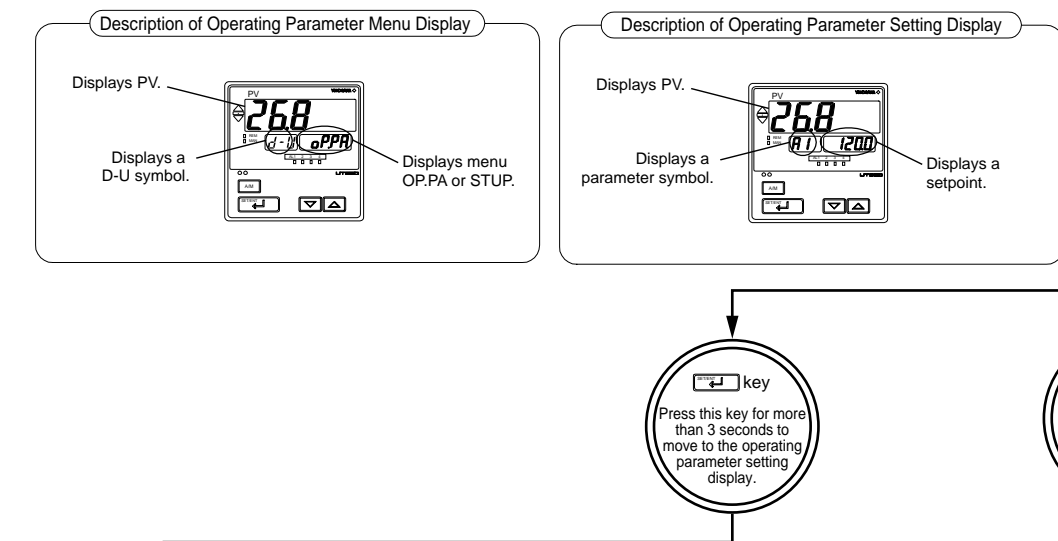
This manual contains a parameter map as a guideline for setting parameters, and lists of parameters for recording User Settings.

Contents

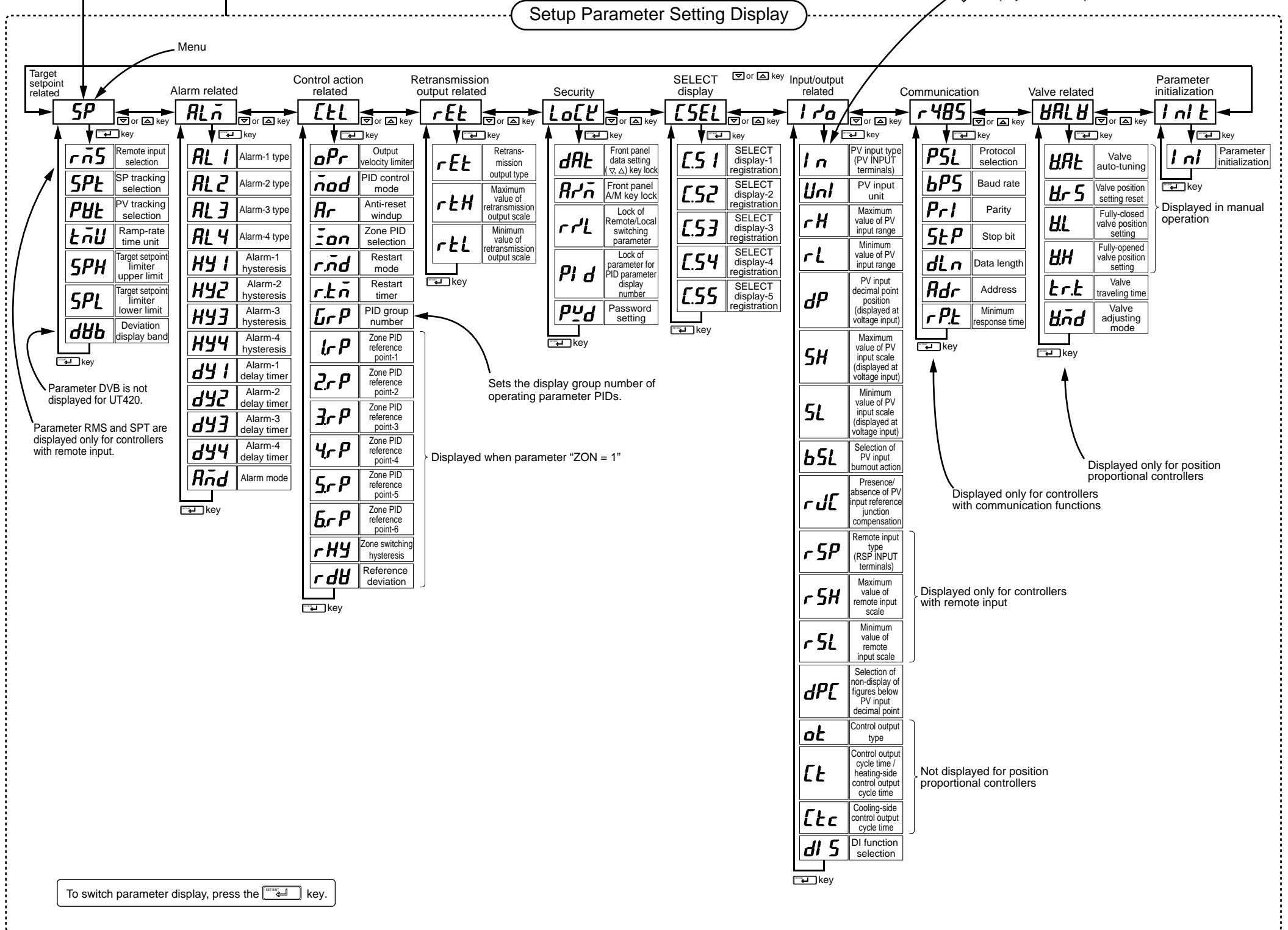
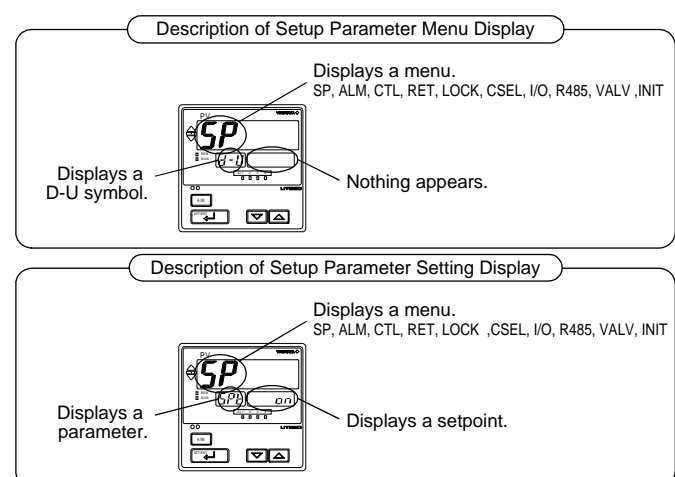
1. Basic Key Operation Sequence and Parameter Map
2. Lists of Parameters

1. Basic Key Operation Sequence and Parameter Map

If you are unsure of the key operation sequence, press the **key** (for more than 3 seconds). This displays a screen at power on (i.e. operating display).



- Basic Key Operation Sequence**
- Setting display can be switched (moved) using the **key**.
 - A numerical value is changed by:
 - (1) Using the **key** or **key** to change a displayed value (decimal point blinking) and
 - (2) Pressing the **key** to register it.
 - Pressing the **key** on an operating display (for more than 3 seconds) brings you to the operating parameter setting display.
 - Pressing the **key** on the operating parameter setting display (for more than 3 seconds) returns you to the operating display. To change from the operating parameter setting display to the operating parameter menu display, press the **key** and **key** simultaneously.
 - Pressing the **key** on the setup parameter setting display (for more than 3 seconds) returns you to the operating display. To change from the setup parameter setting display to the setup parameter menu display, press the **key** and **key** simultaneously.



Useful Operating Displays (SELECT Display)

Registering frequently changed parameters in the SELECT display after ordinary operating displays will allow you to change settings easily. A maximum of five displays can be registered.

Setting method:
 Set the parameter numbers (D register numbers) you wish to register for setup parameters C.51 to C.55.

Alarm parameter for target setpoint-1	Registration number
Alarm-1 setpoint parameter	231
Alarm-2 setpoint parameter	232
Alarm-3 setpoint parameter	233
Alarm-4 setpoint parameter	234

For any registration number other than those above, see User's Manual (Reference) (CD-ROM version).

NOTE

Changing the registered value of a setup parameter may cause the registered value of an operating parameter to be initialized automatically. Thus, when you have changed a setup parameter, always check that the registered value of the operating parameter is appropriate. If it is initialized to default, reset it to the required value.

2. Lists of Parameters

* Parameters relating to PV or setpoints should all be set in real numbers. For example, use temperature values to define target setpoints and alarm setpoints for temperature input.

Operating Parameters

Parameter Symbol	Name of Parameter	Setting Range and Description	Initial Value	User Setting	Target Item in CD-ROM
A1 (A1)	Alarm 1-setpoint	PV alarm / SP alarm: -100.0 to 100.0% of PV input range Deviation alarm: -100.0 to 100.0% of PV input range span Output alarm: -5.0 to 105.0% Timer alarm (for alarm 1 only): 0.0 to 99.59 (hour, min) or (min, sec)	PV high limit/SP high limit alarm: 100.0% of PV input range Deviation alarm: 0.0% of PV input range span Other PV/SP low limit alarm: 0.0% of PV input range Output high limit alarm: 100.0% Output low limit alarm: 0.0%		Ref.4.1(1)
A2 (A2)	Alarm 2-setpoint				same as above
A3 (A3)	Alarm 3-setpoint				same as above
A4 (A4)	Alarm 4-setpoint				same as above
rRL (R.L)	Remote/local switching	REM: remote operation LCL: local operation	LCL		
SrR (S.R)	Run/stop switching	Stop: operation stopped Run: operation started	RUN		
At (AT)	Auto-tuning	OFF: No auto-tuning 1: Auto-tuning for 1.SP 2: Auto-tuning for 2.SP 3: Auto-tuning for 3.SP 4: Auto-tuning for 4.SP 5 to 8: Perform auto-tuning on a group basis in the same way as 1 to 4 9: Performs auto-tuning to all groups 1 to 8.	OFF		

SC (SC)	"Super" function	OFF: Disable 1: Overshoot suppressing function Suppresses overshoots generated by abrupt changes in the target setpoint or by disturbances. 2: Hunting suppressing function (Stable mode) Suitable to stabilize the state of control when the load varies greatly, or the target setpoint is changed. Enables to answer the wider characteristic changes compared with Response mode. 3: Hunting suppressing function (Response mode) Enables quick follow-up and short converging time of PV for the changed target setpoint. Note: Use "SUPER" function (SC) 2 or 3 in PID control or PI control. "SUPER" function 2 or 3 is not available in the following control: 1) ON/OFF control 2) P control (control for proportional band only) 3) PD control (control for proportional band and derivative term only) 4) Heating/cooling control Do not use hunting suppressing function when control processes with response such as flow or pressure control.		OFF	Ref.2.1(5) Ref.2.1(6)
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SPn (SPn)	Target setpoint number selection	1: Selects target setpoint 1 (1.SP), 2: Selects target setpoint 2 (2.SP), 3: Selects target setpoint 3 (3.SP), 4: Selects target setpoint 4 (4.SP). Likewise, numbers 5 to 8 can be specified to select target setpoints 5.SP to 8.SP.			1
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PI d (PID)	PID parameter display number	MENU Move to FL parameter display 1Gr to 8Gr: Display of each PID parameter (factory-set to 1Gr to 4Gr)			MENU
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FL (FL)	PV input filter	OFF, 1 to 120 second Used when the PV input fluctuates.		OFF	Ref.1.1(1)
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bS (BS)	PV input bias	-100.0% to 100.0% of PV input range span Used to correct the PV input range.		0.0% of PV input range span	same as above
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UPr (UPR)	Setpoint ramp-up-rate	OFF 0.0% + 1 digit of PV input range span to 100.0% of PV input range span		OFF	Ref.4.1(4)
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dnr (DNR)	Setpoint ramp-down-rate	OFF Set ramp-up-rate or ramp-down-rate per hour or minute. Sets unit in ramp-rate-time unit (TMU).		OFF	same as above
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rt (RT)	Ratio setting	0.001 to 9.999 Target setpoint = Remote input × Ratio setpoint + Remote bias		1.000	Ref.1.2(3)
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rbS (RBS)	Remote input bias	-100.0 to 100.0% of PV input range span		0.0% of PV input range span	same as above
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rFL (RFL)	Remote input filter	OFF, 1 to 120 second.		OFF	same as above
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orb (ORB)	ON/OFF rate detection band	0.0 to 100.0% of PV input range span		1.0% of PV input range span	Ref.3.3(4)
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orH (ORH)	ON/OFF rate high limit	ORL + 1 digit to 105.0%		100.0%	same as above
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orL (ORL)	ON/OFF rate low limit	-5.0% to ORH - 1 digit		0.0%	same as above
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1SP (1.SP)	Target setpoint-1	0.0 to 100.0% of PV input range However, between target setpoint limiter lower limit (SPL) and upper limit (SPH).		0.0% of PV input range	Ref.4.1(1)
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2SP (2.SP)	Target setpoint-2				same as above
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3SP (3.SP)	Target setpoint-3				same as above
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4SP (4.SP)	Target setpoint-4				same as above
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5SP (5.SP)	Target setpoint-5	0.0 to 100.0% of PV input range However, between target setpoint limiter lower limit (SPL) and upper limit (SPH).		0.0% of PV input range	same as above
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6SP (6.SP)	Target setpoint-6				same as above
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7SP (7.SP)	Target setpoint-7				same as above
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8SP (8.SP)	Target setpoint-8				same as above
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PID-related Parameters

The following parameters are displayed when "1Gr" is set to PID parameter display number (PID). In this case, the corresponding target setpoint is 1.SP (target setpoint-1). To set PID corresponding to target setpoint 2 to 4, set "2Gr", "3Gr", or "4Gr" to PID. The relevant parameters will then be displayed.

Parameter Symbol	Name of Parameter	Setting Range and Description	Initial Value	User Setting	Target Item in CD-ROM
IP (I.P)	Proportional band/Heating-side proportional band (in heating/cooling control)	0.1 to 999.9% In heating/cooling control: 0.0 to 999.9% (in heating/cooling control when 0.0)	5.0%		Ref.4.1(1)
II (I.I)	Integral time/Heating-side integral time (in heating/cooling control)	OFF, 1 to 6000 second.	240 second.		same as above
Id (I.D)	Derivative time/Heating-side derivative time (in heating/cooling control)	OFF, 1 to 6000 second.	60 second.		same as above
IoH (I.OH)	Output high limit/Heating-side output high limit (in heating/cooling control)	-5.0 to 105.0% Heating-side limiter in heating/cooling control: 0.0 to 105.0% (1.OH < 1.OH)	100% Heating/cooling control: 100.0%		Ref.2.1(3)
IoL (I.OL)	Output low limit/Heating-side output low limit (in heating/cooling control)	-5.0 to 105.0% Cooling-side limiter in heating/cooling control: 0.0 to 105.0% (1.OL < 1.OH) SD (shutdown): Set in manual operation in 4-20 mA control output. The control output is set at 0 mA.	0.0% Heating/cooling control: 100.0%		Ref.4.1(1)
Inr (I.MR)	Manual reset	-5.0 to 105.0% (enabled when integral time "I.I" is OFF) The manual reset value equals the output value when PV = SP is true. For example, if the manual reset value is 50%, the output value is 50% when PV = SP becomes true.	50.0%		Ref.4.1(1)
IH (I.H)	ON/OFF control hysteresis/Heating-side ON/OFF control hysteresis (in heating/cooling control)	In ON/OFF control: 0.0 to 100.0% of PV input range span Position proportional PID control or heating/cooling control: 0.0 to 100.0%	0.5% of PV input range span Position proportional PID control and heating/cooling control: 0.5%		same as above

* The "User Setting" column in the table below is provided for the customer to record setpoints.

* The column "Target Item in CD-ROM" in the table below provides references from User's Manual (Reference) (CD-ROM Version) which describes items in more detail and items that are not contained in this manual.

Parameter Symbol	Name of Parameter	Setting Range and Description	Initial Value	User Setting	Target Item in CD-ROM
ldr (I.DR)	Direct/reverse action switching	RVS: reverse action, DIR: direct action			Ref.2.1(1)
IPc (I.Pc)	Cooling-side proportional band	0.0 to 999.9% (Cooling-side ON/OFF control applies when 0.0)	5.0%		Ref.4.1(1)
IIc (I.Ic)	Cooling-side integral time	OFF, 1 to 6000 second	240 second.		same as above
Idc (I.Dc)	Cooling-side derivative time	OFF, 1 to 6000 second	60 second.		same as above
IHC (I.Hc)	Cooling-side ON/OFF control hysteresis	0.0 to 100.0%	0.5%		same as above
ldb (I.DB)	Dead band	In heating/cooling control: -100.0 to 50.0% In position proportional PID control: 1.0 to 10.0%	3.0%		same as above
IPo (I.PO)	Preset output/Heating-side preset output (in heating/cooling control)	-5.0 to 105.0% In heating/cooling control: Heating side 0.0 to 105.0% In Stop mode, fixed control output can be generated.	0.0%		Ref.2.1(8)
loc (I.Oc)	Cooling-side preset output	0.0 to 105.0% In Stop mode, cooling-side fixed control output can be generated.	0.0%		Ref.4.1(1)

Refer to the table below for recording setpoints when two sets or more of PID parameters are used.

Parameter	n=2	n=3	n=4	n=5	n=6	n=7	n=8
n.P							
n.I							
n.D							
n.OH							
n.OL							
n.MR							
n.H							
n.DR							
n.Pc							
n.Ic							
n.Dc							
n.Hc							
n.DB							
n.PO							
n.Oc							

Setup Parameters

Target Setpoint-related Parameters

Parameter Symbol	Name of Parameter	Setting Range and Description	Initial Value	User Setting	Target Item in CD-ROM
rRS (RMS)	Remote input selection	RSP: Remote setpoints are used via remote input terminals. COM: Remote setpoints are used via communication.	RSP		Ref.1.2(1)
SPT (SPT)	SP tracking selection	OFF: ON Tracking is performed when the mode changes from Remote to Local (the local setpoint keeps track of the remote setpoint).	ON		Ref.1.2(4)
PHT (PV.T)	PV tracking selection	OFF: ON Uses a combination of the setpoint ramp-up rate (UPR) and setpoint ramp-down rate (DNR) parameters. Operating conditions: (1) Manual operation → Automatic operation (2) Stop of operation → Start of automatic operation (3) Power-on (4) Changing of SP number (5) Doesn't work when target setpoint is changed.	OFF		Ref.1.1(7)
tmU (TMU)	Ramp-rate time unit setting	HOUR, MIN Time unit of setpoint ramp-up rate (UPR) and setpoint ramp-down rate (DNR)	HOUR		Ref.4.1(4)
SPH (SPH)	Target setpoint limiter upper limit	0.0 to 100.0% of PV input range where, SPL < SPH Places a limit on the range within which the target setpoint is changed.	100.0% of PV input range		
SPL (SPL)	Target setpoint limiter lower limit	0.0% of PV input range			
dBb (DVB)	Deviation display band (UT450 only)	0.0 to 100.0% of PV input range span	1.0% of PV input range span		Ref.6.1(3)

Alarm-related Parameters

Parameter Symbol	Name of Parameter	Setting Range and Description	Initial Value	User Setting	Target Item in CD-ROM
AL1 (AL1)	Alarm-1 type	OFF, 1 to 31 (same as below)	1		Ref.3.3(3) Ref.3.3(4)
AL2 (AL2)	Alarm-2 type	OFF, 1 to 20, 25 to 31 1: PV high limit (energized, no stand-by action) 2: PV low limit (energized, no stand-by action)	2		Ref.3.3(4)
AL3 (AL3)	Alarm-3 type	3: Deviation high limit (energized, no stand-by action) 4: Deviation low limit (energized, no stand-by action) 5: Deviation high limit (de-energized, no stand-by action) 6: Deviation low limit (de-energized, no stand-by action) For other alarm types, see Initial Settings User's Manual .	1		same as above
AL4 (AL4)	Alarm-4 type	These Alarm 1 type parameters are common to the parameters 1.SP to 8.SP.	2		same as above
HY1 (HY1)	Alarm-1 hysteresis	0.0 to 100.0% of PV input range span Output alarm: 0.0 to 100.0%	0.5% of PV input range span Output alarm: 0.5%		Ref.3.3(2)
HY2 (HY2)	Alarm-2 hysteresis				same as above
HY3 (HY3)	Alarm-3 hysteresis				same as above
HY4 (HY4)	Alarm-4 hysteresis				same as above
dy1 (DY1)	Alarm-1 delay timer	An alarm is output when the delay timer expires after the alarm setpoint is reached. 0.00 to 99.59 (min, sec.) (enabled when alarm-1 type "AL1" is 1 to 20 or 28 to 31)	0.00		
dy2 (DY2)	Alarm-2 delay timer	0.00 to 99.59 (min, sec.) (enabled when alarm-2 type "AL2" is 1 to 20 or 28 to 31)			
dy3 (DY3)	Alarm-3 delay timer	0.00 to 99.59 (min, sec.) (enabled when alarm-3 type "AL3" is 1 to 20 or 28 to 31)			
dy4 (DY4)	Alarm-4 delay timer	0.00 to 99.59 (min, sec.) (enabled when alarm-4 type "AL4" is 1 to 20 or 28 to 31)			
Rnd (AMD)	Alarm mode	Allows the alarm function to be enabled or disabled according to the operating condition. 0: Always active 1: Not active when in Stop mode 2: Not active when in Stop mode or manual operation	0		Ref.3.3(1)

Control Action-related Parameters

Parameter Symbol	Name of Parameter	Setting Range and Description	Initial Value	User Setting	Target Item in CD-ROM
OPr (OPR)	Output velocity limiter	OFF (0) 0.1 to 100.0%/second can limit control output velocity	OFF		
nod (MOD)	PID control mode	0: Standard PID control (with output bump at SP change) 1: Fixed point control (without output bump at SP change) Choose "Fixed Point Control" when controlling pressure or flow rate.	0		Ref.2.1(2)
Ar (AR)	Anti-reset windup (Excess integration prevention)	AUTO (0), 50.0 to 200.0%. Used when the control output travels up to 100% or down to 0% and remains there. The larger SP, the sooner PID computation (integral computation) stops.	AUTO		Ref.2.1(4)
Zon (ZON)	Zone PID selection	0: SP selection 1: Zone PID	0		Ref.4.1(2)
rnd (R.MD)	Restart mode	CONT: Continues action set before power failure. MAN: Starts from manual operation status AUTO: Continues action set before power failure in automatic operation.	CONT		
rtm (R.TM)	Restart timer	0 to 10 second. Sets time between power on and the instant where controller starts computation.	0 second.		
GrP (GRP)	PID group number	1 to 8 Determines operating parameter PID display group number.	4		Ref.4.1(1)
1rP (1.RP)	Zone PID reference point-1	0.0 to 100.0% of PV input range. Note that 1.RP < 2.RP < 3.RP < 4.RP < 5.RP < 6.RP. Set Zone PID selection (ZON) parameter to "1".	100% value of PV input range		Ref.4.1(2)
2rP (2.RP)	Zone PID reference point-2				same as above
3rP (3.RP)	Zone PID reference point-3				same as above
4rP (4.RP)	Zone PID reference point-4				same as above
5rP (5.RP)	Zone PID reference point-5				same as above
6rP (6.RP)	Zone PID reference point-6				same as above
rHY (RHY)	Zone switching hysteresis	0.0 to 0.0% of PV input range span Allows a hysteresis to be set for switching at a reference point.	0.5% of PV input range span		same as above
rdv (RDV)	Reference deviation	OFF, 0.0 to 100.0% of PV input range span Used to select PID constants according to a deviation from the setpoint. The maximum group of PID constants is used when the controller fails to keep track of the deviation.	OFF		same as above

Retransmission Output Parameters

Parameter Symbol	Name of Parameter	Setting Range and Description	Initial Value	User Setting	Target Item in CD-ROM
rREt (RET)	Retransmission output type	OFF: Disable 1: PV, 2: SP, 3: OUT 4: Loop power supply for sensor (15 V) In position proportional control, a valve opening signal (0 to 100%) is transmitted if setpoint "3" is selected. In heating/cooling control, an output value before allocation to heating and cooling control (0 to 100%) is transmitted if setpoint "3" is selected (0 to 50% Cooling-side output; 50 to 100%: Heating-side output).	1		Ref.2.2(1) Ref.2.2(3)
rRH (RTH)	Max. value of retransmission output scale	RE=1, 2: RL = 1 digit to 100.0% of PV input range	100.0% of PV input range		Ref.2.2(1)
rRL (RTL)	Min. value of retransmission output scale	RE=1, 2: 0.0% of PV input range to RL - 1 digit	0.0% of PV input range		same as above

Security-related Parameters

Parameter Symbol	Name of Parameter	Setting Range and Description	Initial Value	User Setting	Target Item in CD-ROM
dAt (DAT)	Front panel data setting (Δ, ∇) key lock	OFF, ON	OFF		Ref.7.1(2)
Arn (A.M)	Front panel A/M key lock	OFF, ON	OFF		same as above
rRL (R.L)	Lock of Remote/Local switching parameter	OFF, ON	OFF		same as above
PI d (PID)	Lock of parameter for PID parameter display number	OFF, ON	OFF		same as above
PwD (PWD)	Password setting	0: Password not set 1 to 30000	0		Ref. 7.1(1)

SELECT Display Parameters

Parameter Symbol	Name of Parameter	Setting Range and Description	Initial Value	User Setting	Target Item in CD-ROM
C.S1 (C.S1)	SELECT display-1 registration	OFF, 201 to 1023 Select the desired parameter from among the operating and setup parameters, then register the number (D register No.) accompanying that parameter.	OFF		Ref.6.1(1)
C.S2 (C.S2)	SELECT display-2 registration				same as above
C.S3 (C.S3)	SELECT display-3 registration	For example, registering "231" for C.S1 allows you to change alarm-1 setpoint in operating display. Numbers for registering alarm SP parameter for operating display: Alarm-1 setpoint: 231 Alarm-2 setpoint: 232 Alarm-3 setpoint: 233 Alarm-4 setpoint: 234 Above numbers are alarm setpoint parameters for target setpoint-1 (1.SP). See User's Manual (Reference) (CD-ROM).			same as above
C.S4 (C.S4)	SELECT display-4 registration				same as above
C.S5 (C.S5)	SELECT display-5 registration				same as above

Input-/Output-related Parameters