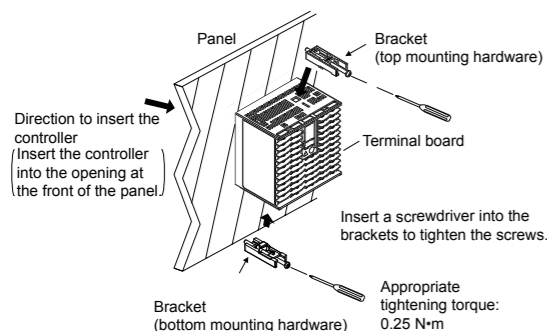


Mounting the Instrument Main Unit

Provide an instrumented panel steel sheet of 1 to 10 mm thickness. After opening the mounting hole on the panel, follow the procedures below to install the controller:

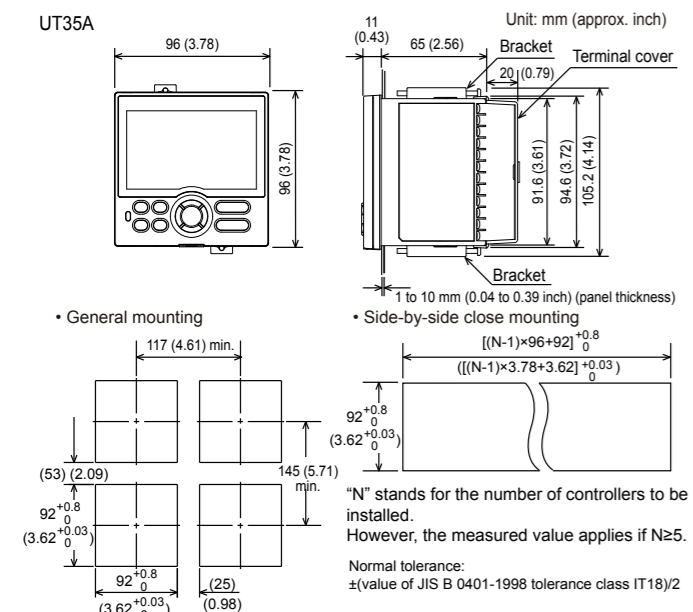
- 1) Insert the controller into the opening from the front of the panel so that the terminal board on the rear is at the far side.
- 2) Set the brackets in place on the top and bottom of the controller as shown in the figure below, then tighten the screws of the brackets. Take care not to overtighten them.



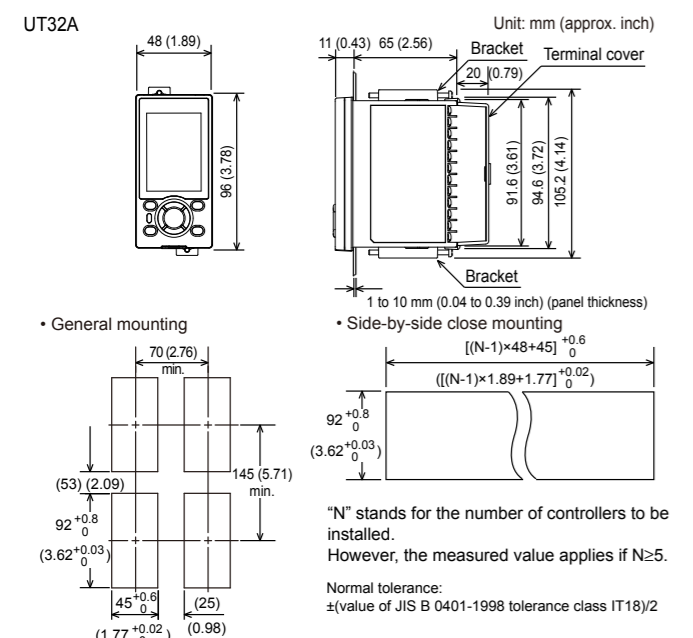
- Tighten the screws with appropriate tightening torque within 0.25 N·m. Otherwise it may cause the case deformation or the bracket damage.
- Make sure that foreign materials do not enter the inside of the instrument through the case's slit holes.

External Dimensions and Panel Cutout Dimensions

UT35A



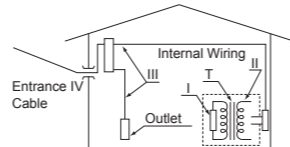
UT32A



4. Hardware Specifications



This instrument is for Measurement Category I (CAT.I). Do not use it for measurements in locations falling under Measurement Categories II, III, and IV.



Category	Measurement category	Description	Remarks
I	CAT.I	For measurements performed on circuits not directly connected to MAINS.	-
II	CAT.II	For measurements performed on circuits directly connected to the low-voltage installation.	Appliances, portable equipments, etc.
III	CAT.III	For measurements performed in the building installation.	Distribution board, circuit breaker, etc.
IV	CAT.IV	For measurements performed at the source of the low-voltage installation.	Overhead wire, cable systems, etc.

Input Specifications

• Universal Input (Equipped as standard)

- Number of inputs: 1
- Input type, instrument range, and measurement accuracy: See the table below,

Input Type	Instrument Range		Accuracy	
	°C	°F		
Thermocouple	K	-270.0 to 1370.0°C	-450.0 to 2500.0°F	±0.1% of instrument range ±1 digit for 0°C or more
		-270.0 to 1000.0°C	-450.0 to 2300.0°F	±0.2% of instrument range ±1 digit for less than 0°C
		-200.0 to 500.0°C	-200.0 to 1000.0°F	±2% of instrument range ±1 digit for less than -200.0°C of thermocouple K
	J	-200.0 to 1200.0°C	-300.0 to 2300.0°F	±1% of instrument range ±1 digit for less than -200.0°C of thermocouple T
		-200.0 to 400.0°C	-450.0 to 750.0°F	±0.1% of instrument range ±1 digit for less than 0°C
	B	0.0 to 1800.0°C	32 to 3300°F	±0.15% of instrument range ±1 digit for 400°C or more
				±5% of instrument range ±1 digit for less than 400°C
		0.0 to 1700.0°C	32 to 3100°F	±0.15% of instrument range ±1 digit
	S	0.0 to 1700.0°C	32 to 3100°F	±0.15% of instrument range ±1 digit
R	0.0 to 1700.0°C	32 to 3100°F	±0.15% of instrument range ±1 digit	
RTD	N	-200.0 to 1300.0°C	-300.0 to 2400.0°F	±0.1% of instrument range ±1 digit ±0.25% of instrument range ±1 digit for less than 0°C
		-270.0 to 1000.0°C	-450.0 to 1800.0°F	±0.1% of instrument range ±1 digit for 0°C or more
		-200.0 to 900.0°C	-300.0 to 1600.0°F	±0.2% of instrument range ±1 digit for less than 0°C
	E	-200.0 to 400.0°C	-300.0 to 750.0°F	±1.5% of instrument range ±1 digit for less than -200.0°C of thermocouple E.
		0.0 to 400.0°C	-200.0 to 1000.0°F	±0.2% of instrument range ±1 digit (Note 2)
	Platinel 2	0.0 to 1390.0°C	32.0 to 2500.0°F	±0.1% of instrument range ±1 digit
		0.0 to 1900.0°C	32 to 3400°F	±0.5% of instrument range ±1 digit for 800°C or more
		Accuracy is not guaranteed for less than 800°C.		
		W97Re3-W75Re25	0.0 to 2000.0°C	32 to 3600°F
RTD	JPT100	-200.0 to 500.0°C	-300.0 to 1000.0°F	±0.1% of instrument range ±1 digit (Note 1)
		-150.00 to 150.00°C	-200.0 to 300.0°F	±0.1% of instrument range ±1 digit
	Pt100	-200.0 to 850.0°C	-300.0 to 1560.0°F	±0.1% of instrument range ±1 digit (Note 1)
		-200.0 to 500.0°C	-300.0 to 1000.0°F	±0.1% of instrument range ±1 digit
Standard signal	0.400 to 2.000 V			
	1.000 to 5.000 V			
	4.00 to 20.00 mA			
	0.000 to 2.000 V			
DC voltage/current	0.00 to 10.00 V			
	0.00 to 20.00 mA			
	-10.00 to 20.00 mV			
	0.0 to 100.0 mV			

The accuracy is that in the standard operating conditions: 23 ± 2°C, 55 ± 10%RH, and power frequency at 50/60 Hz.

Note 1: ±0.3°C ±1 digit in the range between 0 and 100°C, ±0.5°C ±1 digit in the range between -100 and 200°C.

Note 2: W: W-5% Re/W-26% Re (Hoskins Mfg. Co.), ASTM E988

- Input sampling (control) period: 200 ms
- Burnout detection:
 - Functions at TC, RTD, and standard signal. Upscale, downscale, and off can be specified. For standard signal, burnout is determined to have occurred if it is 0.1 V or 0.4 mA or less.
 - Input bias current: 0.05 µA (for TC or RTD)
 - Measured current (RTD): About 0.16 mA
 - Input resistance:
 - TC or mV input: 1 MΩ or more
 - V input: About 1 MΩ
 - mA input: About 250 Ω

- Allowable signal source resistance:
 - TC or mV input: 250 Ω or less
 - Effects of signal source resistance: 0.1 µV/Ω or less
 - DC voltage input: 2 kΩ or less
 - Effects of signal source resistance: About 0.01%/100 Ω
- Allowable wiring resistance:
 - RTD input: Max. 150 Ω/wire (The conductor resistance between the three wires shall be equal.)
 - Wiring resistance effect: ±0.1°C/10 Ω
- Allowable input voltage/current:
 - TC, mV, mA and RTD input: ±10 V DC
 - V input: ±20 V DC
 - mA input: ±40 mA
- Noise rejection ratio:
 - Normal mode: 40 dB or more (at 50/60 Hz)
 - Common mode: 120 dB or more (at 50/60 Hz)
 - For 100-240 V AC, the power frequency can be set manually. Automatic detection is also available.
 - For 24 V AC/DC, the power frequency can be set manually.
- Reference junction compensation error:
 - ±1.0°C (15 to 35°C)
 - ±1.5°C (-10 to 15°C and 35 to 50°C)
- Applicable standards: JIS/IEC/DIN (ITS-90) for TC and RTD

Analog Output Specifications

- Number of outputs:
 - Control output: 1
 - Cooling-side control output of Heating/cooling type (Retransmission output terminal): 1
- Output type: Current output or voltage pulse output
- Current output: 4 to 20 mA DC or 0 to 20 mA DC/load resistance of 600 Ω or less
- Current output accuracy: ±0.1% of span (±5% of span for 1 mA or less)
 - The accuracy is that in the standard operating conditions: 23 ± 2°C, 55 ± 10%RH, and power frequency at 50/60 Hz.
- Voltage pulse output:
 - Use: Time proportional output
 - On-voltage: 12 V or more/load resistance of 600 Ω or more
 - Off-voltage: 0.1 V DC or less
 - Time resolution: 10 ms or 0.1% of output, whichever is larger

Step Response Time Specifications

Within 1 s (63% of analog output response time when a step change of 10 to 90% of input span is applied)

Relay Contact Output Specifications

- Contact type and number of outputs:
 - Control output: contact point 1c; 1 point
 - Heating/cooling type: contact point 1a; 2 points for both heating and cooling sides
 - Alarm output: contact point 1a; 3 points (common is independent)
- Contact rating:
 - Contact point 1c (control output): 250 V AC, 3 A or 30 V DC, 3 A (resistance load)
 - Contact point 1a (control output): 240 V AC, 3 A or 30 V DC, 3 A (resistance load)
 - Contact point 1a (alarm output): 240 V AC, 1 A or 30 V DC, 1 A (resistance load)
- Use: Time proportional output, alarm output, FAIL output, etc.
- Time resolution of control output: 10 ms or 0.1% of output, whichever is larger
- Note: This cannot be used for a small load of 10 mA or less.

Position Proportional Output Specifications

- Position signal input:
 - Slide resistance: 100 Ω to 2.5 kΩ of total resistance
 - 100% side and slide line: with disconnection detection
 - 0% side: without disconnection detection
 - Current input: 4 to 20 mA (with disconnection detection)
- Sampling period: 50 ms
- Measurement resolution: 0.1% of input span
- Position proportional relay output:
 - UT35A: contact point 1a; 2 points, 250 V AC, 3 A or 30 V DC, 3 A (resistance load)
 - UT32A: contact point 1a; 2 points, 240 V AC, 3 A or 30 V DC, 3 A (resistance load)
- Note: This cannot be used for a small load of 10 mA or less.

Retransmission Output Specifications

- Number of outputs: Retransmission output; 1, shared with 15 V DC loop power supply or Cooling-side control output.
- Current output: 4 to 20 mA DC or 0 to 20 mA DC/ load resistance of 600 Ω or less
- Current output accuracy: ±0.1% of span (±5% of span for 1 mA or less)
 - The accuracy is that in the standard operating conditions: 23 ± 2°C, 55 ± 10%RH, and power frequency at 50/60 Hz.

15 V DC Loop Power Supply Specifications

(Shared with retransmission output or Cooling-side control output.)

- Power supply: 14.5 to 18.0 V DC
- Maximum supply current: About 21 mA (with short-circuit current limiting circuit)

Contact Input Specifications

- Number of inputs: See the table of Model and Suffix Codes.
- Input type: No-voltage contact input or transistor contact input
- Input contact rating: 12 V DC, 10 mA or more
 - Use a contact with a minimum on-current of 1 mA or more.
- ON/OFF detection:
 - No-voltage contact input:
 - Contact resistance of 1 kΩ or less is determined as "ON" and contact resistance of 50 kΩ or more as "OFF."
 - Transistor contact 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: Control period +50 ms
- Use: SP switch, operation mode switch, and event input

Transistor Contact Output Specifications

- Number of outputs: See the table of Model and Suffix Codes.
- Output type: Open collector (SINK current)
- Output contact rating: Max. 24 V DC, 50 mA
- Output time resolution: 200 ms

Heater Break Alarm Specifications

- Number of inputs: 2
- Number of outputs: 2 (transistor contact output)
- Use: Measures the heater current using an external current transformer (CT) and generates a heater break alarm when the measured value is less than the break detection value.
- Current transformer input resistance: About 9.4 Ω
- Current transformer input range: 0.0 to 0.1 Arms (0.12 Arms or more cannot be applied.)
- Heater current setting range: OFF, 0.1 to 300.0 Arms
 - Note: The CT ratio can be set. CT ratio setting range: 1 to 3300
- Recommended CT: CT from U.R.D., Ltd.
 - CTL-6-S-H: CT ratio 800, measurable current range: 0.1 to 80.0 Arms
 - CTL-12L-30: CT ratio 3000, measurable current range: 0.1 to 180.0 Arms
- Heater current measurement period: 200 ms
- Heater current measurement accuracy: ±5% of current transformer input range span ± 1digit (CT error is not included.)
- Heater current detection resolution: Within 1/250 of current transformer input range span
- Break detection On-time: Min. 0.2 second (for time proportional output)

24 V DC Loop Power Supply Specifications

- Use: Power is supplied to a 2-wire transmitter.
- Power supply: 21.6 to 28.0 V DC
- Rated current: 4 to 20 mA DC
- Maximum supply current: About 30 mA (with short-circuit current limiting circuit.)

■ Safety and EMC Standards

- Safety: Compliant with IEC/EN61010-1 (CE), approved by CAN/CSA C22.2 No.61010-1 (CSA), approved by UL61010-1.
Installation category: CAT. II Pollution degree: 2
Measurement category: I (CAT. I)
Rated measurement input voltage: Max. 10 V DC
Rated transient overvoltage: 1500 V (Note)
- Note: This is a reference safety standard value for Measurement Category I of IEC/EN/CSA/UL61010-1. This value is not necessarily a guarantee of instrument performance.

- EMC Conformity standards:
CE marking
EN61326-1 Class A, Table 2 (For use in industrial locations)
EN61326-2-3
EN 55011 Class A, Group 1
EN 61000-3-2 Class A
EN 61000-3-3
- C-tick mark
EN 55011 Class A, Group 1
- The instrument continues to operate at a measurement accuracy of within ±20% of the range during testing.

■ Construction, Installation, and Wiring

- Dust-proof and drip-proof: IP56 (for front panel) (Not available for side-by-side close mounting.)
- Material: Polycarbonate (Flame retardancy: UL94V-0)
- Case color: White (Light gray) or Black (Charcoal gray light)
- Weight: 0.5 kg or less
- External dimensions (mm):
UT35A: 96 (W) × 96 (H) × 65 (depth from the panel face)
UT32A: 48 (W) × 96 (H) × 65 (depth from the panel face)
(Depth except the projection on the rear panel)
- Installation: Direct panel mounting; mounting bracket, one each for upper and lower mounting
- Panel cutout dimensions (mm):
UT35A: 92^{+0.80} (W) × 92^{+0.80} (H)
UT32A: 45^{+0.80} (W) × 92^{+0.80} (H)
- Mounting attitude: Up to 30 degrees above the horizontal. No downward tilting allowed.
- Wiring: M3 screw terminal with square washer (for signal wiring and power wiring)

■ Power Supply Specifications and Isolation

- Power supply:
Rated voltage: 100-240 V AC (+10%/-15%), 50/60 Hz
24 V AC/DC (+10%/-15%) (for /DC option)
- Power consumption: UT35A: 18 VA (DC:9 VA, AC: 14 VA if /DC option is specified)
UT32A: 15 VA (DC:7 VA, AC: 11 VA if /DC option is specified)
- Data backup: Nonvolatile memory
- Power holdup time: 20 ms (for 100 V AC drive)
- Withstanding voltage
Between primary terminals and secondary terminals: 2300 V AC for 1 minute
Between primary terminals: 1500 V AC for 1 minute
Between secondary terminals: 500 V AC for 1 minute
(Primary terminals: Power* and relay output terminals; Secondary terminals: Analog I/O signal terminals, contact input terminals, communication terminals and functional grounding terminals.)
- *: Power terminals for 24V AC/DC models are the secondary terminals.
- Insulation resistance: Between power supply terminals and a grounding terminal 20 MΩ or more at 500 V DC
- Isolation specifications

Terminal Group	Terminal Description	Internal Circuits	Power Supply
Internal Circuits	PV (universal) input terminals	Control, retransmission (analog) output terminals (not isolated between the analog output terminals)	Power supply
	Control relay (contact point c/contact point a x 2) output terminals	Valve position (feedback) input terminals	
	Alarm-1 relay (contact point a) output terminals	Control relay (contact point c/contact point a x 2) output terminals	
	Alarm-2 relay (contact point a) output terminals	Alarm-1 relay (contact point a) output terminals	
	Alarm-3 relay (contact point a) output terminals	Alarm-2 relay (contact point a) output terminals	
	Position proportional relay output terminals	Alarm-3 relay (contact point a) output terminals	
	Contact input terminals (all)	Position proportional relay output terminals	
	RS-485 communication terminals (2 ports)	Contact input terminals (all)	
	24 V DC loop power supply terminals	RS-485 communication terminals (2 ports)	
	Contact output (transistor) terminals	24 V DC loop power supply terminals	
Ethernet communication terminal	Contact output (transistor) terminals		
PROFIBUS-DP/CC-Link communication terminals	Ethernet communication terminal		
Current transformer input terminals	PROFIBUS-DP/CC-Link communication terminals		

The circuits divided by lines are insulated mutually.

■ Environmental Conditions

Normal Operating Conditions:

- Ambient temperature: -10 to 50°C (-10 to 40°C for side-by-side close mounting)
For the CC-Link option, 0 to 50 °C (0 to 40 °C for side-by-side close mounting)
- Ambient humidity: 20 to 90% RH (no condensation allowed)
- Magnetic field: 400 A/m or less
- Continuous vibration at 5 to 9 Hz: Half amplitude of 1.5 mm or less, 1oct/min for 90 minutes each in the three axis directions
Continuous vibration at 9 to 150 Hz: 4.9 m/s² or less, 1oct/min for 90 minutes each in the three axis directions
- Short-period vibration: 14.7 m/s², 15 seconds or less
- Shock: 98 m/s² or less, 11 ms
- Altitude: 2000 m or less above sea level
- Warm-up time: 30 minutes or more after the power is turned on
- Startup time: Within 10 seconds
- *: The LCD (a liquid crystal display) is used for a display portion of this product. The LCD has a characteristic that the display action becomes late at the low temperature. However, the control function is not affected.

Transportation and Storage Conditions:

- Temperature: -25 to 70°C
- Temperature change rate: 20°C/h or less
- Humidity: 5 to 95% RH (no condensation allowed)

Effects of Operating Conditions

- Effect of ambient temperature:
Voltage or TC input: ±1 μV/°C or ±0.01% of F.S./°C, whichever is larger
Current input: ±0.01% of F.S./°C
RTD input: ±0.05°C/°C (ambient temperature) or less
Analog output: ±0.02% of F.S./°C or less
- Effect of power supply voltage fluctuation
Analog input: ±0.05% of F.S. or less
Analog output: ±0.05% of F.S. or less
(Each within rated voltage range)

5. How to Connect Wires



WARNING

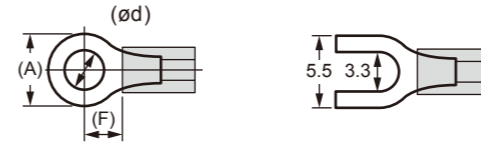
- Wiring work must be carried out by a person with basic electrical knowledge and practical experience.
- Be sure to turn OFF the power supply to the controller before wiring to avoid an electric shock. Use a tester or similar device to ensure that no power is being supplied to a cable to be connected.
- As a safety measure, always install a circuit breaker (an IEC 60947-compatible product, 5 A, 100 V or 220 V AC) in an easily accessible location near the instrument. Moreover, provide indication that the switch is a device for turning off the power to the instrument.
- Install the power cable keeping a distance of more than 1 cm from other signal wires.
- The power cable is required to meet the IEC standards concerned or the requirements of the area in which the instrument is being installed.
- Wiring should be installed to conform to NEC (National Electrical Code: ANSI/NFPA-70) or the wiring construction standards in countries or regions where wiring will be installed.
- For control relay output, alarm relay output, and power terminal connections, use heat-resistant cables.



CAUTION

- Provide electricity from a single-phase power supply. If the power is noisy, install an isolation transformer on the primary side, and use a line filter on the secondary side. When measures against noise are taken, do not install the primary and secondary power cables close to each other.
- If there is a risk of external lightning surges, use a lightning arrester etc.
- For TC 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.
- Since the control output relay has a life span (resistance load of 100,000 times), use the auxiliary relay to perform ON/OFF control.
- 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.
- After completing the wiring, the terminal cover is recommended to use for the instrument.

● Recommended Crimp-on Terminal Lugs



Recommended tightening torque: 0.6 N·m
Applicable wire size: Power supply wiring 1.25 mm² or more

Applicable terminal lug	Applicable wire size mm ² (AWG#)	(φ d)	(A)	(F)
M3	0.25 to 1.65 (22 to 16)	3.3	5.5	4.2

● Cable Specifications and Recommended Cables

Purpose	Name and Manufacturer
Power supply, relay contact outputs	600 V Grade heat-resistant PVC insulated wires, JIS C 3317(HIV), 0.9 to 2.0 mm ²
Thermocouple	Shielded compensating lead wires, JIS C 1610
RTD	Shielded wires (three/four conductors), UL2482 (Hitachi Cable)
Other signals (other than contact input/output)	Shielded wires
Other signals (contact input/output)	Unshielded wires
RS-485 communication	Shielded wires
Ethernet communication	100 BASE-TX (CAT-5)/10 BASE-T
PROFIBUS-DP communication	Dedicated cable for PROFIBUS-DP (Shielded two-wires)
CC-Link communication	Dedicated cable for CC-Link (Shielded two-wires)

PROFIBUS-DP/CC-Link Connector (wiring side) (Part number: A1987JT)
Recommended tightening torque: 0.5 to 0.6 N·m

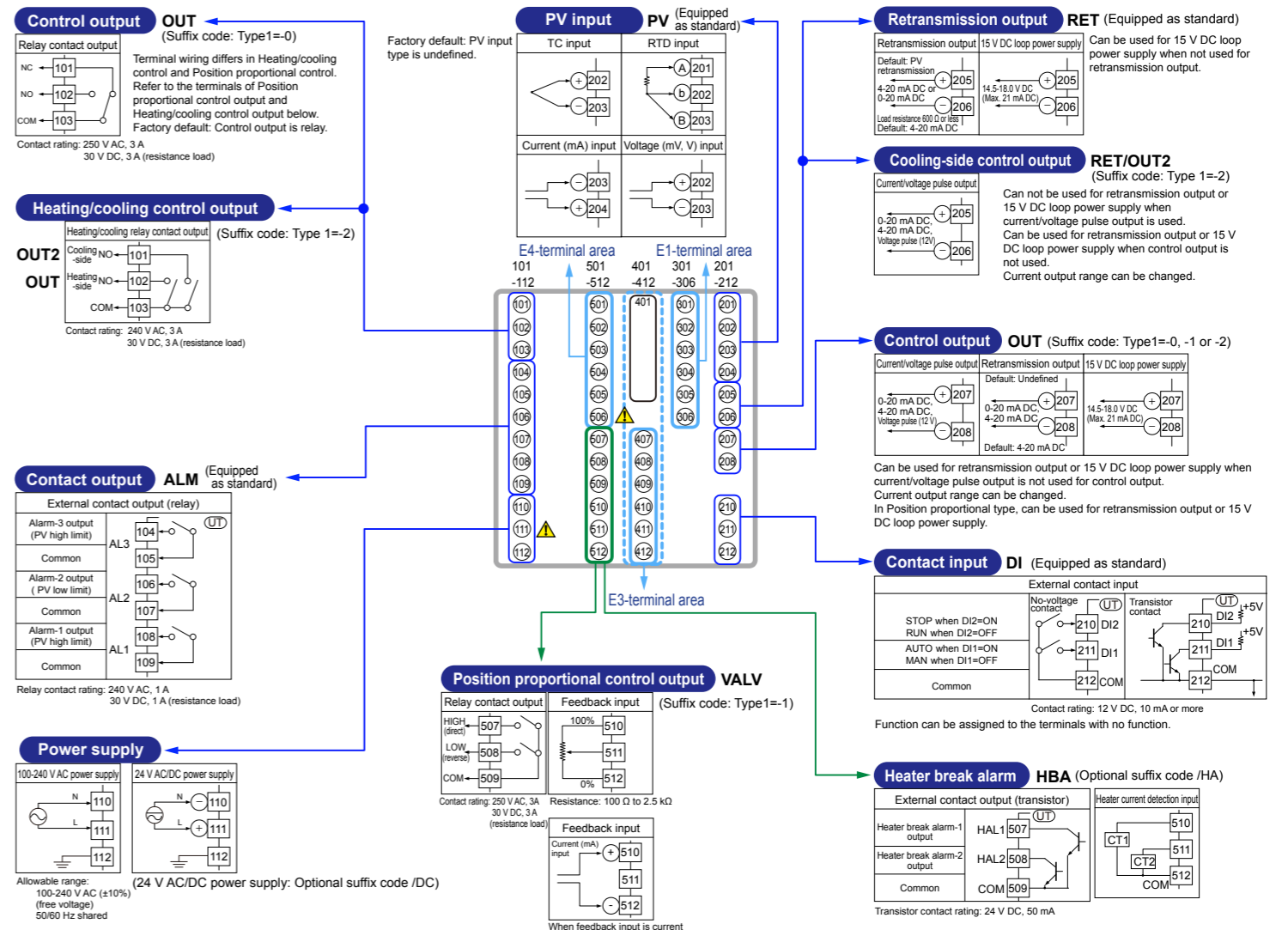
6. Terminal Wiring Diagrams



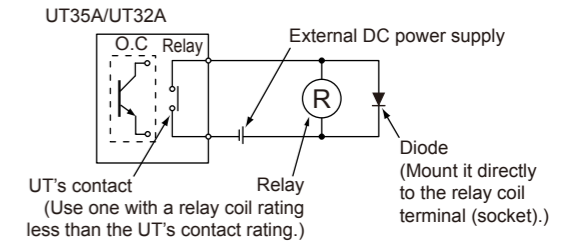
CAUTION

- Do not use an unassigned terminal as the relay terminal.
- Do not use a 100-240 V AC power supply for the 24 V AC/DC model; otherwise, the instrument will malfunction.

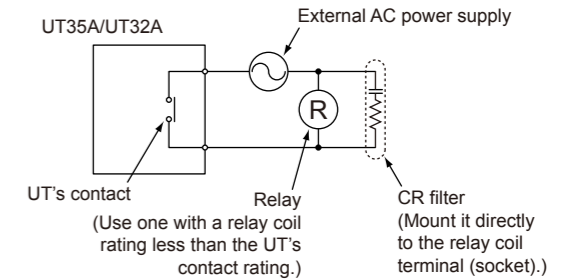
■ UT35A



DC Relay Wiring

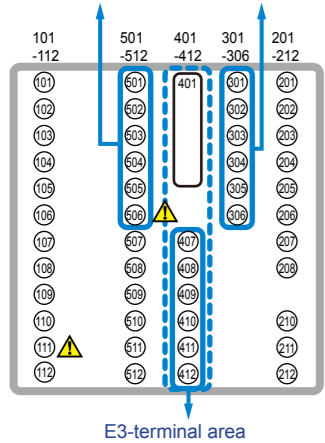


AC Relay Wiring

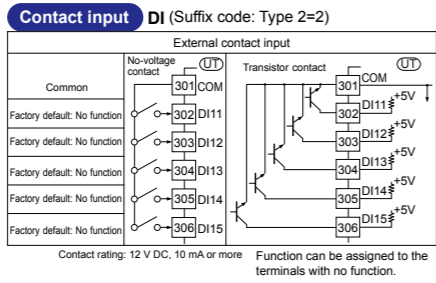


■ UT35A (Continued from page 3)

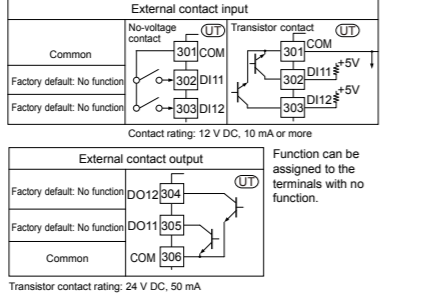
E4-terminal area E1-terminal area



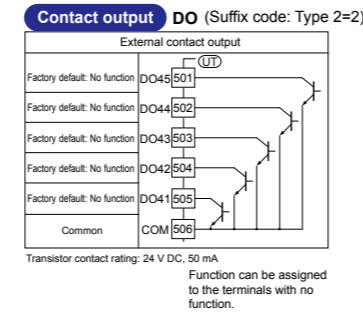
301-306 E1-Terminal Area



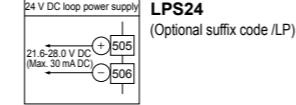
Contact input / Contact output DI/DO (Suffix code: Type 2=1)



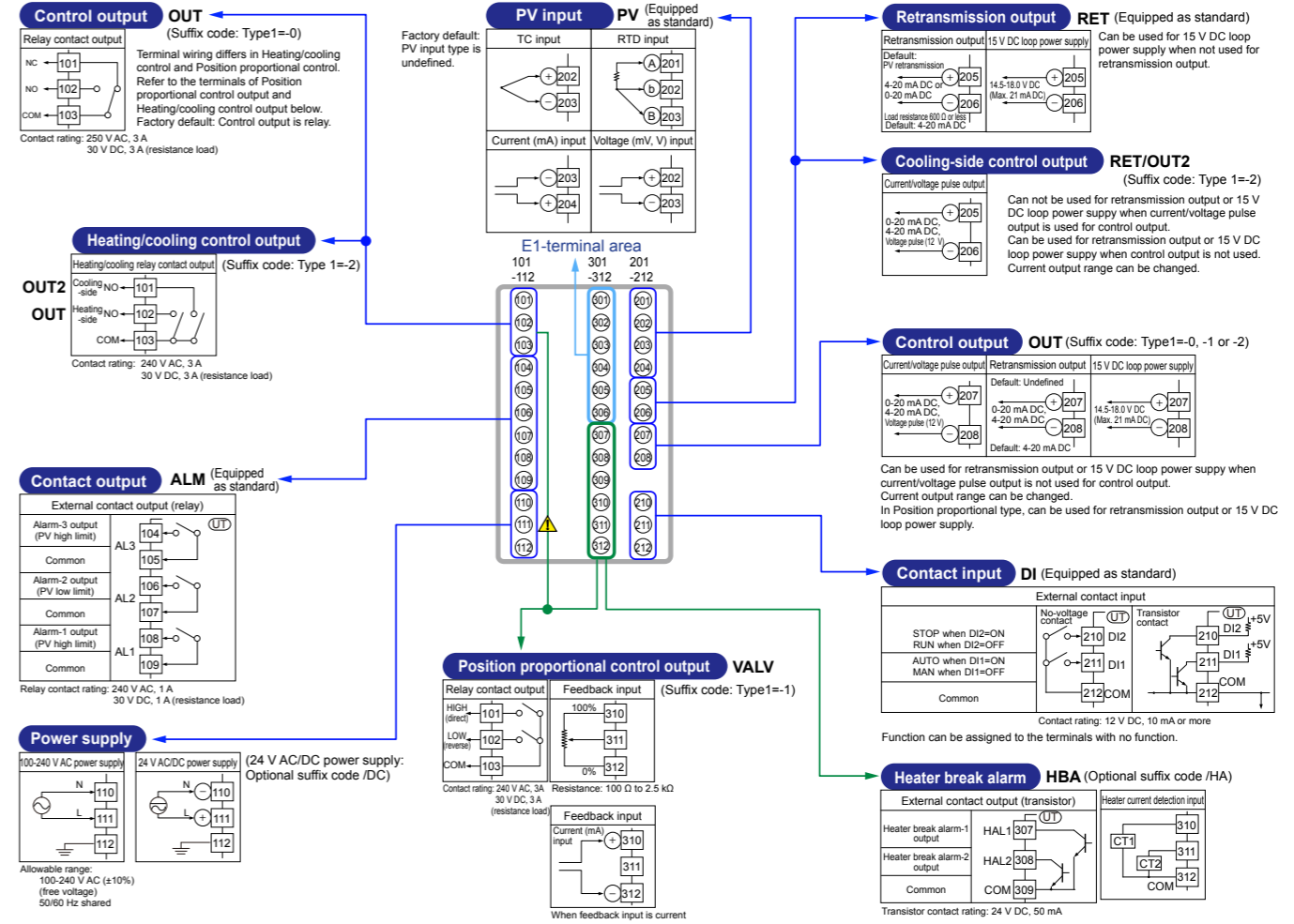
501-506 E4-Terminal Area



24 V DC loop power supply LPS24 (Optional suffix code /LP)

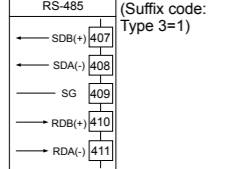


■ UT32A

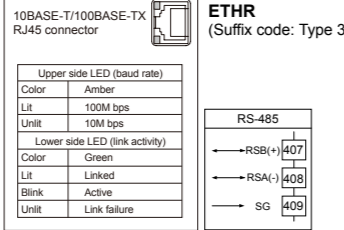


401-412 E3-Terminal Area

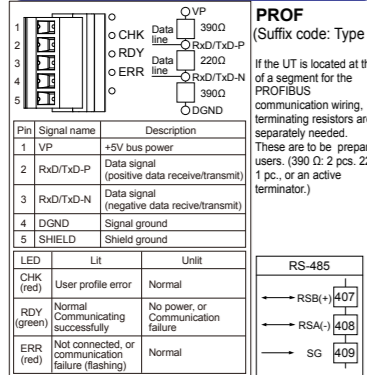
RS-485 communication RS485 (Suffix code: Type 3=1)



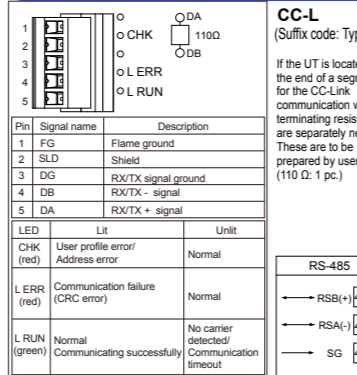
Ethernet communication (with gateway function) ETHR (Suffix code: Type 3=2)



PROFIBUS-DP communication (with Modbus master) PROF (Suffix code: Type 3=4)

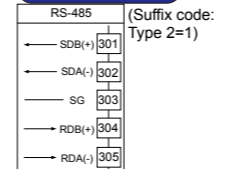


CC-Link communication (with Modbus master) CC-L (Suffix code: Type 3=3)

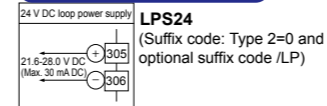


301-306 E1-Terminal Area

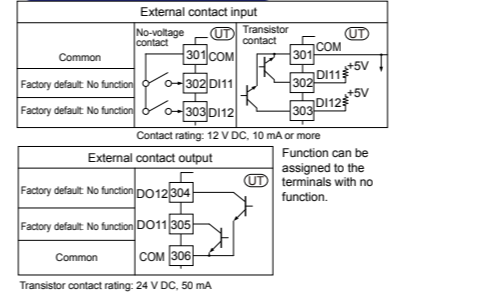
RS-485 communication RS485 (Suffix code: Type 2=1)



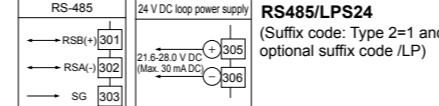
24 V DC loop power supply LPS24 (Suffix code: Type 2=0 and optional suffix code /LP)



Contact input / Contact output DI/DO (Suffix code: Type 2=2)



RS-485 communication/24 V DC loop power supply RS485/LPS24 (Suffix code: Type 2=1 and optional suffix code /LP)



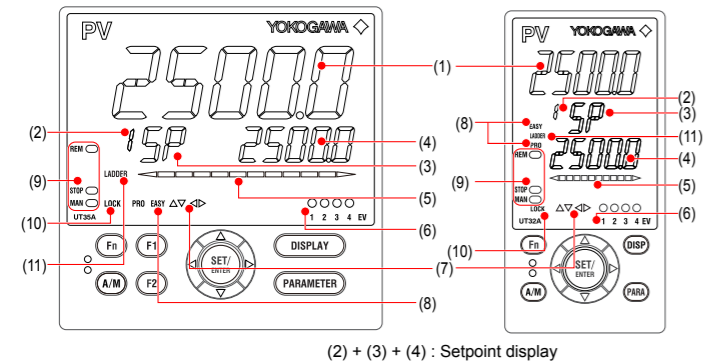
Initial Settings

This operation guide describes basic settings and operations of the UT35A/UT32A. For details of each function, see the electronic manual. The scrolling guide is displayed on PV display in the Parameter Setting Display. This guide can be turned on/off with the Fn key.

Contents

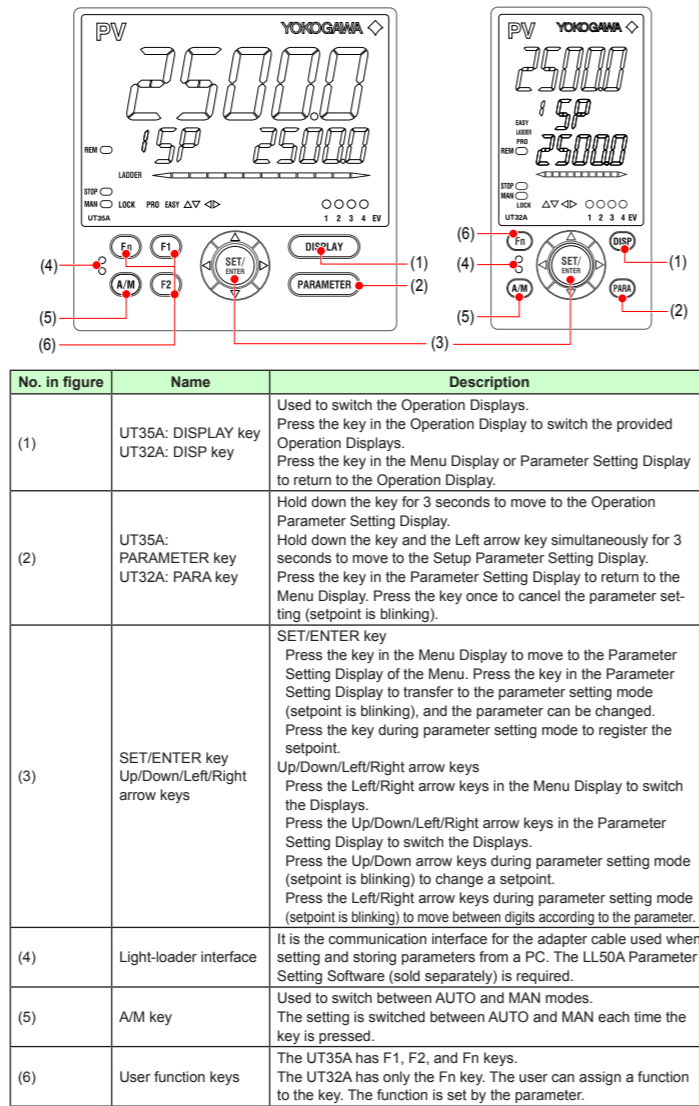
- Names and Functions of Display Parts
- Setup Procedure
- Quick Setting Function (Setting of Input and Output)
- Adjusting Valve Position Automatically (for a Position Proportional Type Controller Only)
- Setting Alarm Type
- Setting Alarm Setpoint

1. Names and Functions of Display Parts



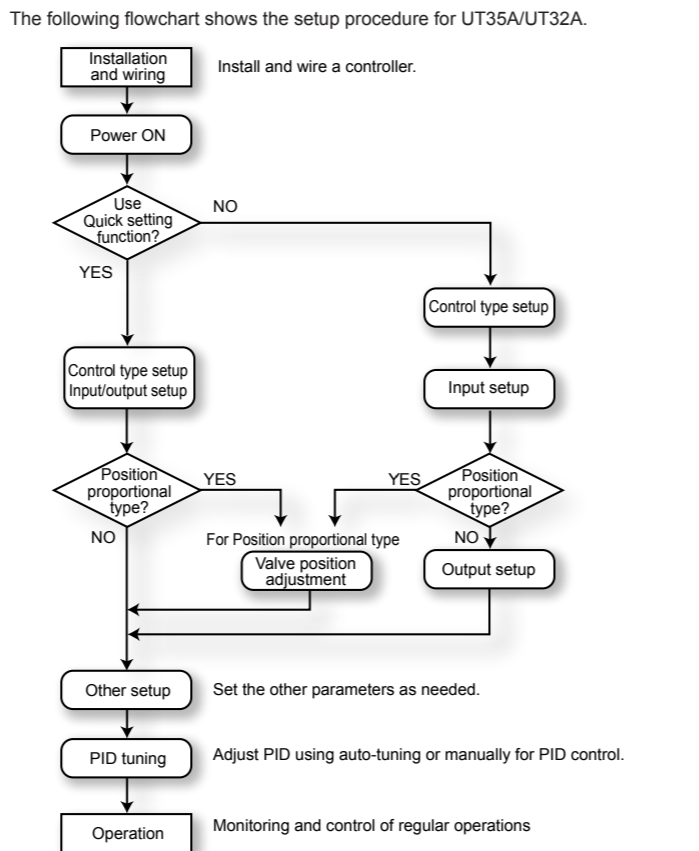
No. in figure	Name	Description												
(1)	PV display (white or red)	Displays PV. Displays an error code if an error occurs. Displays the scrolling guide in the Menu Display and Parameter Setting Display when the guide display ON/OFF is set to ON.												
(2)	Group display (green)	Displays a group number (1 to 4 or R) and terminal area (E1 to E4). 1 to 4 represent SP numbers in the Operation Display. R and E1 to E4 are displayed in the Parameter Setting Display.												
(3)	Symbol display (orange)	Displays a parameter symbol.												
(4)	Data display (orange)	Displays a parameter setpoint and menu symbol.												
(5)	Bar-graph display (orange)	Displays control output value (OUT) and measured input value (PV). The data to be displayed can be set by the parameter. Initial value: Deviation, Heating-side control output (in Heating/cooling control)												
(6)	Event indicator (orange)	Lit when the alarms 1 to 4 occur. Event displays other than alarms can be set by the parameter.												
(7)	Key navigation indicator (green)	Lit or blinks when the Up/Down or Left/Right arrow key operation is possible.												
(8)	Parameter display level indicator (green)	Displays the setting conditions of the parameter display level function. <table border="1"> <thead> <tr> <th>Parameter display level</th> <th>EASY</th> <th>PRO</th> </tr> </thead> <tbody> <tr> <td>Easy setting mode</td> <td>Lit</td> <td>Unlit</td> </tr> <tr> <td>Standard setting mode</td> <td>Unlit</td> <td>Unlit</td> </tr> <tr> <td>Professional setting mode</td> <td>Unlit</td> <td>Lit</td> </tr> </tbody> </table>	Parameter display level	EASY	PRO	Easy setting mode	Lit	Unlit	Standard setting mode	Unlit	Unlit	Professional setting mode	Unlit	Lit
Parameter display level	EASY	PRO												
Easy setting mode	Lit	Unlit												
Standard setting mode	Unlit	Unlit												
Professional setting mode	Unlit	Lit												
(9)	Status indicator (green and red)	Displays the operating conditions and control status. <table border="1"> <thead> <tr> <th>Indicator</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>REM</td> <td>Lit when in remote mode (REM).</td> </tr> <tr> <td>STOP</td> <td>Lit when in stop mode (STOP).</td> </tr> <tr> <td>MAN</td> <td>Lit when in manual mode (MAN). Blinks during auto-tuning.</td> </tr> </tbody> </table>	Indicator	Description	REM	Lit when in remote mode (REM).	STOP	Lit when in stop mode (STOP).	MAN	Lit when in manual mode (MAN). Blinks during auto-tuning.				
Indicator	Description													
REM	Lit when in remote mode (REM).													
STOP	Lit when in stop mode (STOP).													
MAN	Lit when in manual mode (MAN). Blinks during auto-tuning.													
(10)	Security indicator (red)	Lit if a password is set. The setup parameter settings are locked.												
(11)	Ladder operation indicator (green)	Lit while the ladder operation is executed.												

(2) + (3) + (4) : Setpoint display



Note: The communication connector (maintenance port) for LL50A Parameter Setting Software is on the top of the unit.

2. Setup Procedure



3. Quick Setting Function (Setting of Input and Output)

The Quick setting function is a function to easily set the basic function of the controller. Turn on the controller to start the Quick setting function. This function allows you to easily set the control type, input, and output, and quickly start the control action. The items (parameters) to be set by Quick setting function are as follows.
 (1) Control type (PID control, Heating/cooling control, etc.)
 (2) Input function (PV input type, range, scale (at voltage input), etc.)
 (3) Output function (control output type and cycle time)

After turning on the controller, first decide whether or not to use the Quick setting function.

Operation in Initial Display

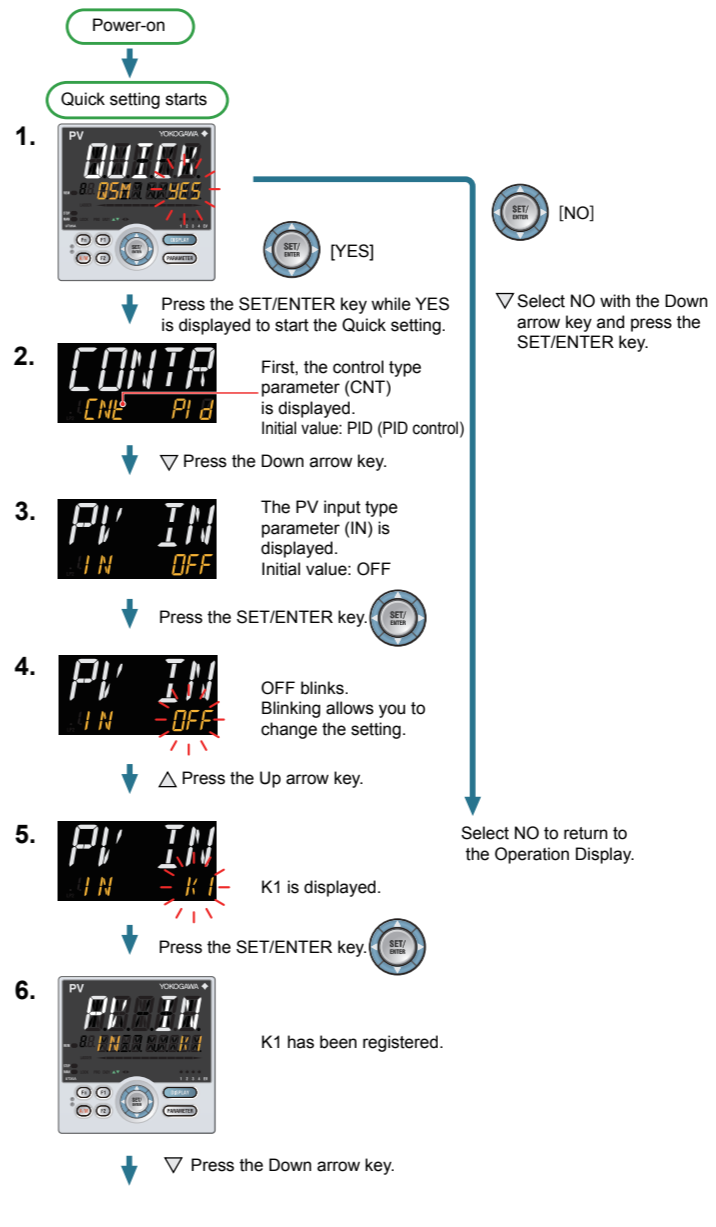
- Press the SET/ENTER key while YES is displayed to start the Quick setting function.
- If you change YES to NO and press the SET/ENTER key, Operation Display will appear without starting the Quick setting function.

Operation for Setting

- To select the parameter setting displayed as the initial value, press the Down arrow key to move to the next parameter.

Flow of Quick Setting Function

In Quick setting mode, the parameter guide appears on PV display. This guide can be turned on/off with the Fn key.



To change and set the parameter setting, press the SET/ENTER key to start the setpoint blinking. The blinking state allows you to make changes (setting mode). Use the Up/Down/Left/Right arrow keys to change the setpoint. Press the SET/ENTER key to register the setting.

Making Settings Using Quick Setting Function

Example: Setting to PID control, thermocouple type K (range of 0.0 to 500.0°C), and current control output

For the detailed procedure and switching of displays, see "Flow of Quick Setting Function" below. For the parameters to set, see the next page.

- Press the SET/ENTER key while YES for QSM (Quick setting mode) is displayed.
- Set the control type parameter (CNT) to PID (PID control).
- Set the PV input type parameter (IN) to K1 (-270.0 to 1370.0 °C).
- Set the PV input unit parameter (UNIT) to C (Degree Celsius).
- Set the maximum value of PV input range parameter (RH) to 500.0.
- Set the minimum value of PV input range parameter (RL) to 0.0.
- Set the output type selection parameter (OT) to OUT terminals (current=00.02).
- Finally, EXIT is displayed. Change NO to YES and press the SET/ENTER key to complete the setup. Operation Display appears.

Parameters to be set

Control Type

Parameter Symbol	Name of Parameter	Setting Range
CNT	Control type	PID: PID control ONOF: ON/OFF control (1 point of hysteresis) ONOF2: ON/OFF control (2 points of hysteresis) 2P2L: Two-position two-level control H/C: Heating/cooling control

Note: Some setpoints may not be displayed depending on the model and suffix codes.

Input Function

Parameter Symbol	Name of Parameter	Setting Range
IN	PV input type	OFF: Disable K1: -270.0 to 1370.0 °C / -450.0 to 2500.0 °F K2: -270.0 to 1000.0 °C / -450.0 to 2300.0 °F K3: -200.0 to 500.0 °C / -200.0 to 1000.0 °F J: -200.0 to 1200.0 °C / -300.0 to 2300.0 °F T1: -270.0 to 400.0 °C / -450.0 to 750.0 °F T2: 0.0 to 400.0 °C / -200.0 to 750.0 °F B: 0.0 to 1800.0 °C / 32 to 3300 °F S: 0.0 to 1700.0 °C / 32 to 3100 °F R: 0.0 to 1700.0 °C / 32 to 3100 °F N: -200.0 to 1300.0 °C / -300.0 to 2400.0 °F E: -270.0 to 1000.0 °C / -450.0 to 1800.0 °F L: -200.0 to 900.0 °C / -300.0 to 1600.0 °F U1: -200.0 to 400.0 °C / -300.0 to 750.0 °F U2: 0.0 to 400.0 °C / -200.0 to 1000.0 °F W: 0.0 to 2300.0 °C / 32 to 4200 °F PL2: 0.0 to 1390.0 °C / 32.0 to 2500.0 °F P2040: 0.0 to 1900.0 °C / 32 to 3400 °F WRE: 0.0 to 2000.0 °C / 32 to 3600 °F JPT1: -200.0 to 500.0 °C / -300.0 to 1000.0 °F JPT2: -150.0 to 150.0 °C / -200.0 to 300.0 °F PT1: -200.0 to 850.0 °C / -300.0 to 1560.0 °F PT2: -200.0 to 500.0 °C / -300.0 to 1000.0 °F PT3: -150.0 to 150.0 °C / -200.0 to 300.0 °F 0.4-2V: 0.400 to 2.000 V 1-5V: 1.000 to 5.000 V 4-20: 4.00 to 20.00 mA 0-2V: 0.000 to 2.000 V 0-10V: 0.00 to 10.00 V 0-20: 0.00 to 20.00 mA -1020: -10.00 to 20.00 mV 0-100: 0.0 to 100.0 mV
UNIT	PV input unit	-: No unit, C: Degree Celsius -: No unit, -: No unit, -: -: No unit, F: Degree Fahrenheit
RH	Maximum value of PV input range	Depends on the input type. - For temperature input - Set the temperature range that is actually controlled. (RL<RH) - For voltage / current input - Set the range of a voltage / current signal that is applied. The scale across which the voltage / current signal is actually controlled should be set using the maximum value of input scale (SH) and minimum value of input scale (SL). (Input is always 0% when RL = RH.)
RL	Minimum value of PV input range	Depends on the input type. - For temperature input - Set the temperature range that is actually controlled. (RL<RH) - For voltage / current input - Set the range of a voltage / current signal that is applied. The scale across which the voltage / current signal is actually controlled should be set using the maximum value of input scale (SH) and minimum value of input scale (SL). (Input is always 0% when RL = RH.)
SDP	PV input scale decimal point position	0: No decimal place 1: One decimal place 2: Two decimal places 3: Three decimal places 4: Four decimal places
SH	Maximum value of PV input scale	-19999 to 30000, (SL<SH), SH - SL ≤ 30000
SL	Minimum value of PV input scale	-19999 to 30000, (SL<SH), SH - SL ≤ 30000

Note 1: SDP, SH, and SL are displayed only for voltage/current input.

Note 2: W: W-5%Re/W-26%Re (Hoskins Mfg.Co.), ASTM E988

Output Function

Parameter Symbol	Name of Parameter	Setting Range
OT	Output type selection	Control output or Heating-side control output (Lower two digits) 00: OFF 01: OUT terminals (voltage pulse) 02: OUT terminals (current) 03: OUT terminals (relay) 06: OUT2 terminals (relay) 07: RET/OUT2 terminals (voltage pulse) 08: RET/OUT2 terminals (current) Cooling-side control output (Upper two digits) 00: OFF 01: OUT terminals (voltage pulse) 02: OUT terminals (current) 03: OUT terminals (relay) 06: OUT2 terminals (relay) 07: RET/OUT2 terminals (voltage pulse) 08: RET/OUT2 terminals (current)
CT	Control output cycle time	0.5 to 1000.0 s
CTc	Cooling-side control output cycle time (in Heating/cooling control)	0.5 to 1000.0 s

4. Adjusting Valve Position Automatically (for a Position Proportional Type Controller Only)

The following operating procedure describes how to input feedback signals from the control valve and adjust the fully-open and fully-closed positions of the valve can be adjusted automatically. The fully-open and fully-closed positions of the valve can be adjusted automatically by inputting feedback signals from the valve. To adjust the valve position, you need to carry out the connection and bring the controller into manual mode. For the connection, see "6. Terminal Wiring Diagrams" in "Installation and Wiring", and for the manual mode, see "5. Switching between AUTO and MAN" in "Operations."

1. Show the Operation Display.
MAN is lit
2. Hold down the keys for 3 seconds.
* When a password is set, PASS is displayed. If the correct password is not entered, setup parameters cannot be changed.
CTL menu is displayed.
3. Press the Right arrow key until OUT menu appears.
OUT menu is displayed.
4. Press the SET/ENTER key.
The parameter V.AT (automatic valve position adjustment) is displayed.
5. Press the SET/ENTER key.
OFF blinks.
6. Press the Up arrow key.
ON is displayed. Blinks during the change.
7. Press the SET/ENTER key.
ON has been registered and the automatic adjustment of the valve position starts. V.AT blinks during the automatic adjustment. After the adjustment is completed, press the DISPLAY key or DISP key once to return to the Operation Display.

- When the adjustment is completed normally, the indication automatically returns to OFF.
- When V.A.T.E appears on PV display, it indicates an error. Check the wiring for feedback input and perform the automatic adjustment again. To perform a valve adjustment manually, see User's Manual.

5. Setting Alarm Type

The following operating procedure shows an example of changing the alarm-1 type (factory default: PV high limit alarm) to PV low limit alarm.

1. Show the Operation Display.
2. Hold down the key for 3 seconds.
MODE menu is displayed.
3. Press the Right arrow key until ALRM menu appears.
ALRM menu is displayed.
4. Press the SET/ENTER key.
The parameter AL1 (alarm-1 type) is displayed.

5. The last digit of the setpoint blinks.
Change the setpoint using the Up/Down arrow keys to increase and decrease the value and the Left/Right arrow keys to move between digits.
Press the SET/ENTER key.
6. The alarm-1 type setpoint 02 (PV low limit) is registered.
After the setup is completed, press the DISPLAY key or DISP key once to return to the Operation Display.

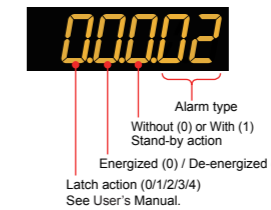
- To change the alarm type, change the last 2 digits of the 5-digit value.
- Stand-by action and excitation are turned on or off by selecting 1 or 0. (See "Setting Display of Alarm Type.")
- For the latch action, see User's Manual.

Alarm Type (Alarm Setpoint)	Alarm Action (Energized)	Alarm Action (De-energized)
No alarm (00)	-	-
PV high limit (01) Analog input PV high limit (19)	Hysteresis Open (unit) / Closed (lit) pv Alarm setpoint	Hysteresis Closed (unit) / Open (lit) pv Alarm setpoint
PV low limit (02) Analog input PV low limit (20)	Hysteresis Closed (lit) / Open (unit) Alarm setpoint pv	Hysteresis Open (lit) / Closed (unit) Alarm setpoint pv
SP high limit (03) Target SP high limit (09)	Hysteresis Open (unit) / Closed (lit) SP or Target SP Alarm setpoint	Hysteresis Closed (unit) / Open (lit) SP or Target SP Alarm setpoint
SP low limit (04) Target SP low limit (10)	Hysteresis Closed (lit) / Open (unit) Alarm setpoint SP or Target SP	Hysteresis Open (lit) / Closed (unit) Alarm setpoint SP or Target SP
Deviation high limit (05) Target SP deviation high limit (11)	Hysteresis Open (unit) / Closed (lit) PV Deviation setpoint SP or Target SP ⊕	Hysteresis Closed (unit) / Open (lit) PV Deviation setpoint SP or Target SP ⊕
Deviation low limit (06) Target SP deviation low limit (12)	Hysteresis Closed (lit) / Open (unit) Deviation setpoint: PV ⊖ SP or Target SP	Hysteresis Open (lit) / Closed (unit) Deviation setpoint: PV ⊖ SP or Target SP
Deviation high and low limits (07) Target SP deviation high and low limits (13)	Hysteresis Hysteresis Closed (lit) / Open (unit) / Closed (lit) Deviation setpoint SP or Target SP	Hysteresis Hysteresis Open (lit) / Closed (unit) / Open (lit) Deviation setpoint SP or Target SP
Deviation within high and low limits (08) Target SP deviation within high and low limits (14)	Hysteresis Hysteresis Open (unit) / Closed (lit) / Open (unit) Deviation setpoint SP or Target SP	Hysteresis Hysteresis Closed (unit) / Open (lit) / Closed (unit) Deviation setpoint SP or Target SP
Control output high limit (15) Cooling-side control output high limit (17)	Hysteresis Open (unit) / Closed (lit) Output Alarm setpoint	Hysteresis Closed (unit) / Open (lit) Output Alarm setpoint
Control output low limit (16) Cooling-side control output low limit (18)	Hysteresis Closed (lit) / Open (unit) Alarm setpoint Output	Hysteresis Open (lit) / Closed (unit) Alarm setpoint Output
Feedback input high limit (27)	Fault diagnosis alarm (30) Burnout of PV input, ADC failure, RJC error.	
Feedback input low limit (28)	FAIL (31)	
PV velocity (29)	For the factory default, the contact output is turned ON in normal operation, OFF at the time of FAIL. Control output: OFF or 0%, Alarm output: OFF	

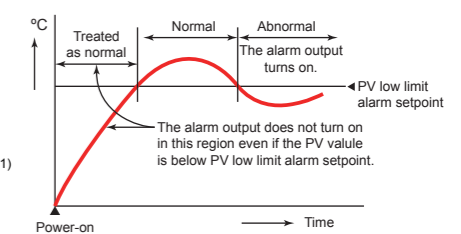
Note 1: "Open/closed" shows status of relay contact, and "lit/unlit" shows status of EV (event) lamp.

Note 2: ⊕ Positive setpoint. ⊖ Negative setpoint

Setting Display of Alarm Type



Stand-by Action



6. Setting Alarm Setpoint

The following operating procedure shows an example of setting the alarm-1 setpoint of group 1 to 180.0.

Before setting the alarm setpoint, check the alarm type. To change the alarm type, see "5. Setting Alarm Type."

1. Show the Operation Display.
2. Display MODE menu with the same procedure as described in Setting Alarm Type.
Press the Right arrow key.
3. SP menu is displayed.
Press the SET/ENTER key.
4. Press the Down arrow key until A1 appears.
The parameter A1 is displayed. A1 to A4 represent the alarm-1 to -4 setpoints.
Group
5. Blinks during the change.
Change the setpoint using the Up/Down arrow keys to increase and decrease the value and the Left/Right arrow keys to move between digits.
Press the SET/ENTER key.
6. The setpoint has been registered. After the setup is completed, press the DISPLAY key or DISP key once to return to the Operation Display.

Operations

This operation guide describes key entries for operating the UT35A/UT32A. Although the display of UT35A is used in this guide, UT32A can be operated similarly. For operations using external contact inputs, see "DI" of "6. Terminal Wiring Diagrams" in "Installation and Wiring."
If you cannot remember how to carry out an operation during setting, press the DISPLAY key or DISP key once. This brings you to the display (Operation Display) that appears at power-on.
The scrolling guide is displayed on PV display in the Parameter Setting Display. This guide can be turned on/off with the Fn key.

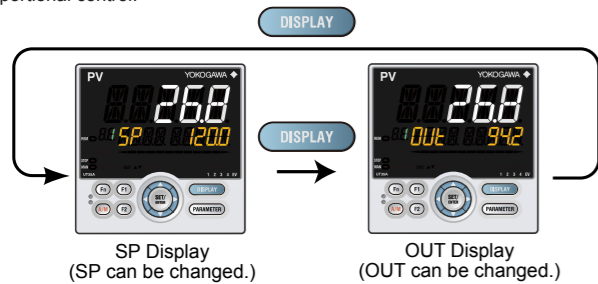
Contents

1. Monitoring-purpose Operation Displays Available during Operation
2. Setting Target Setpoint (SP)
3. Performing/Canceling Auto-tuning
4. Selecting Target Setpoint Numbers (SPNO.)
5. Switching between AUTO and MAN
6. Switching between RUN and STOP
7. Switching between REM (Remote) and LCL (Local)
8. Manipulating Control Output in Manual Mode
9. Troubleshooting

1. Monitoring-purpose Operation Displays Available during Operation

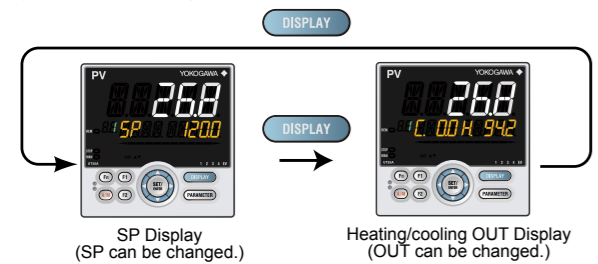
■ Operation Display Switching Diagram for Standard and Position Proportional Types

- **SP Display**
Displays the measured input value on PV display. Displays the target setpoint (SP) on Setpoint display (SP can be changed).
- **OUT Display**
Displays the measured input value on PV display. Displays the control output value (OUT) on Setpoint display (OUT can be changed in manual mode). Displays the valve's feedback input value (at 0 to 100% valve opening) in Position proportional control.



■ Operation Display Switching Diagram for Heating/Cooling Type

- **SP Display**
Displays the measured input value on PV display. Displays the target setpoint (SP) on Setpoint display (SP can be changed).
- **OUT Display**
Displays the measured input value on PV display. Displays the control output values (C.H.) of heating and cooling sides on Setpoint display (C.H. can be changed in manual mode).



After showing the OUT Display, press the DISPLAY key or DISP key to show the following displays conditionally. For details, see User's Manual.

Standard, Position Proportional, and Heating/Cooling Types

- SELECT Displays 1 to 5 (which appear when registered)
- Analog Input Display (display only) (factory default: non-display)
- Position Proportional Computation Output Display (display only) (factory default: non-display)
- PID Number Display (display only) (factory default: non-display)
- Heater Break Alarm-1 Current Display (display only) (for heater break alarm option only)
- Heater Break Alarm-2 Current Display (display only) (for heater break alarm option only)

2. Setting Target Setpoint (SP)



1. Show the SP Display (Operation Display). (This is an example of setting the target setpoint to 150.0).
2. Press the SET/ENTER key to start the last digit of the setpoint blinking. Blinking allows you to change the value.
3. To set the setpoint, use the Left/Right arrow keys to move between digits and the Up/Down arrow keys to increase and decrease the value.
4. When the required value is displayed, press the SET/ENTER key to register the setpoint.

3. Performing/Canceling Auto-tuning

Auto-tuning should be performed after setting a target setpoint. Make sure that the controller is in automatic mode (AUTO) and in run mode (RUN) before auto-tuning. For setting to AUTO, see "5. Switching between AUTO and MAN," and for setting to RUN, see "6. Switching between RUN and STOP." If the setpoint is known in advance or auto-tuning does not find any appropriate PID constants, set the PID manually. For setting the PID manually, see User's Manual.



Do not perform auto-tuning for the following processes. Tune PID manually.

- Processes with fast response such as flow rate control and pressure control.
- Processes which do not allow the output to be turned on and off even temporarily.
- Processes which prohibit severe output changes at control valves (or other actuators).
- Processes in which product quality can be adversely affected if PV values fluctuate beyond their allowable ranges.

1. Show the Operation Display.
2. Hold down the PARAMETER key or PARA key for 3 seconds to display MODE menu.
3. In cases where the communication is specified, the parameter R.L (REMOTE/LOCAL switch) is displayed.
4. Press the Down arrow key until the parameter AT appears.

5. OFF blinks.
6. Blinks during the change.
7. The setpoint has been registered. This starts auto-tuning. The limiter can be set to the output during auto-tuning. For details, see User's Manual.
8. The MAN lamp goes off, which means that the auto-tuning completed normally.

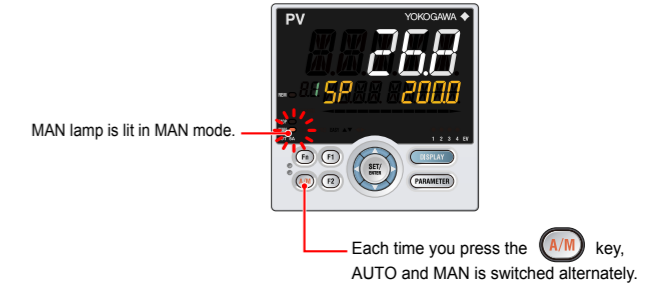
4. Selecting Target Setpoint Numbers (SPNO.)

The following operating procedure shows an example of changing the target setpoint number (SPNO.) from 1 to 2. Each SP has its PID group. The PID group set for the parameter PIDN (PID number selection) is used.

1. Show the Operation Display.
2. Hold down the PARAMETER key or PARA key for 3 seconds to display MODE menu.
3. In cases where the communication is specified, the parameter R.L (REMOTE/LOCAL switch) is displayed.
4. The parameter SPNO. (SP number selection) is displayed.
5. Change the setpoint using the Up/Down arrow keys. Blinks during the change.
6. The setpoint has been registered. Press the DISPLAY key or DISP key once to return to the Operation Display.
7. SPNO. has been changed to 2.

5. Switching between AUTO and MAN

AUTO and MAN switching can be performed using any of the following: (1) A/M key, (2) Contact input, (3) Communication, and (4) User function key. The figure below shows a direct operation using the A/M key. When AUTO and MAN switching function is assigned to the contact input, and the contact input is ON, the switching by key operation cannot be performed. For details, see User's Manual.



When AUTO is switched into MAN, the control output value in AUTO mode is held. The controller can be operated manually from the hold value. If the manual preset output is set (MPON parameter ≠ OFF), the controller can be operated manually from the arbitrary output value (MPO1 to MPO5 parameters).

6. Switching between RUN and STOP

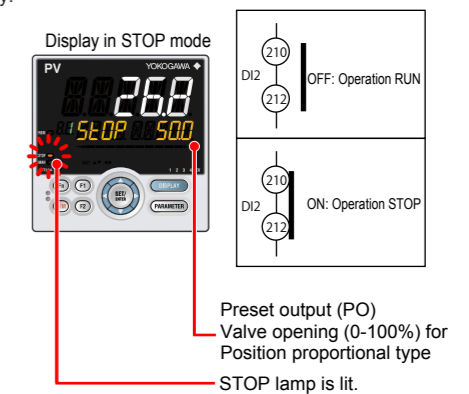
RUN and STOP switching can be performed using any of the following: (1) Contact input, (2) Parameter, (3) Communication, and (4) User function key. The following shows an example of switching using the contact input. (The switching function is assigned to DI2 contact for the factory default.) For details of other switching methods and the display appearing when the operation is started, see User's Manual.

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

PV input	Displays the PV value.
Control output	Displays the preset output value. The preset output value is set for each PID group.
Alarm output	Turns the output on in case of an alarm.

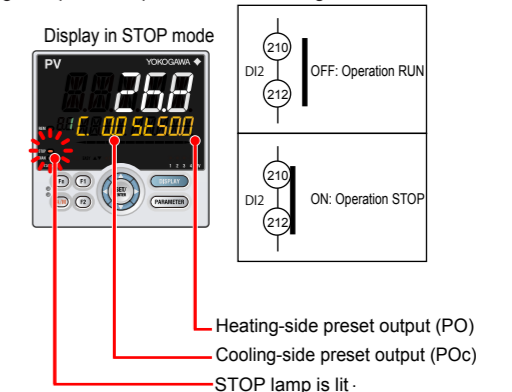
Display in STOP mode

"STOP" is displayed on Symbol display and "preset output value" is displayed on Data display.



Display in STOP mode in Heating/cooling control

"Cooling-side preset output value" is displayed on the left side of the "ST" symbol, and "Heating-side preset output value" is on the right side.



7. Switching between REM (Remote) and LCL (Local)

Remote and local switching can be performed using any of the following:
 (1) Contact input, (2) Parameter, (3) Communication, and (4) User function key.

LCL (Local)

Control is performed using the target setpoint set on the controller.

REM (Remote)

Control is performed using a setpoint via communication for the target setpoint. The following shows an example of switching from local to remote using the parameter.
 (Only in cases where the communication is specified.)

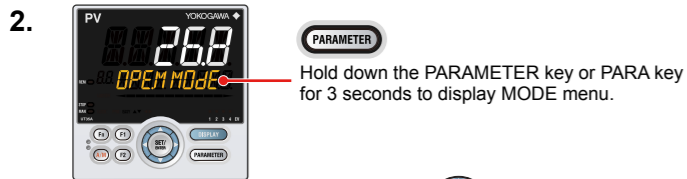
For details of other switching methods, see User's Manual.

- The PID group for the local SP number is used as PID in remote mode.

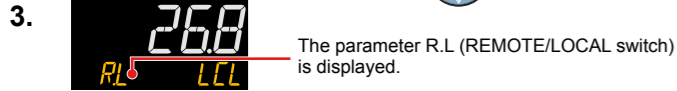
NOTE

When the contact input is ON, operation cannot be performed using the parameter, communication, or key. When the contact input is OFF and the setting is switched using the parameter, communication, or key, the last switching operation is performed.

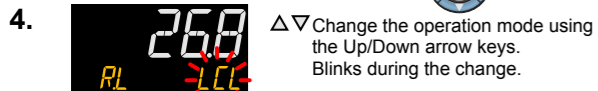
1. Show the Operation Display.



2. Press the SET/ENTER key.



3. Press the SET/ENTER key.



4. Press the SET/ENTER key.



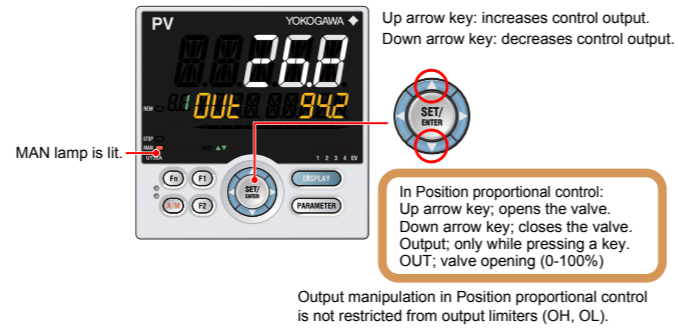
8. Manipulating Control Output in Manual Mode

NOTE

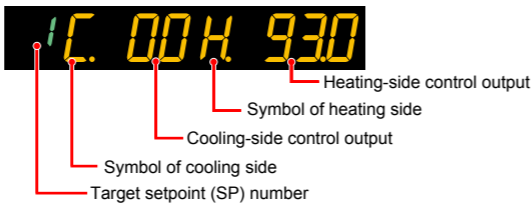
In manual mode, control output is manipulated by operating the keys (the value is changed using the Up/Down arrow keys, then outputted as it is).

Even if the SET/ENTER key is not pressed, the control output value changes according to the displayed value.

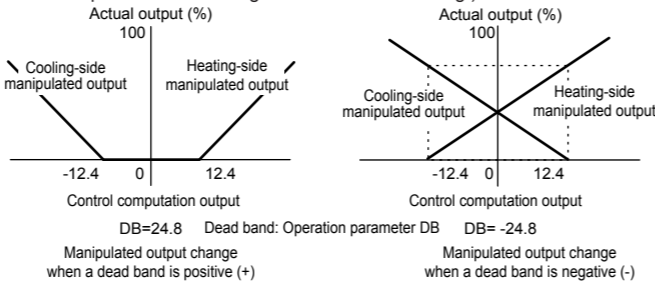
In stop mode (when the STOP lamp is lit), control output cannot be manipulated.



Manual operation in Heating/cooling control



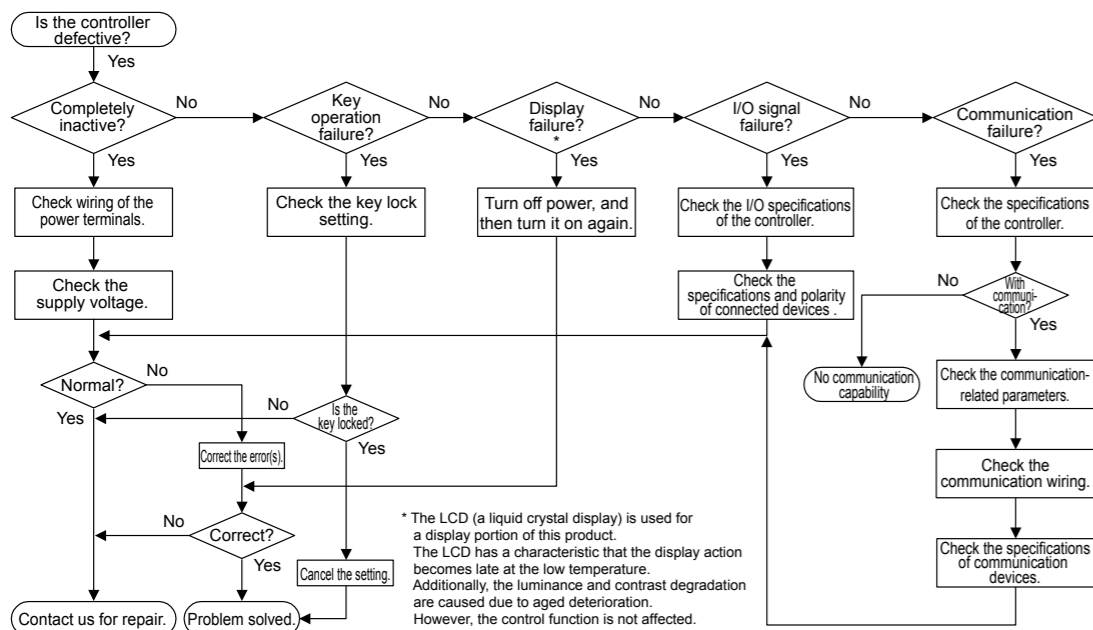
Up arrow key: concurrently decreases cooling-side control output and increases heating-side control output.
 Down arrow key: concurrently increases cooling-side control output and decreases heating-side control output.
 (Either none of the heating-side and cooling-side outputs are presented, or both of them are presented according to the dead band setting.)



9. Troubleshooting

■ Troubleshooting Flow

If the Operation Display does not appear after turning on the controller's power, check the procedures in the following flowchart.
 If a problem appears to be complicated, contact our sales representatives.



* The LCD (a liquid crystal display) is used for a display portion of this product. The LCD has a characteristic that the display action becomes late at the low temperature. Additionally, the luminance and contrast degradation are caused due to aged deterioration. However, the control function is not affected.

■ Remedies if Power Failure Occurs during Operations

- Instantaneous power failure within 20 ms. A power failure is not detected. Normal operation continues.
- Power failure for less than about 5 seconds, or for about 5 seconds or more. Affects the "settings" and "operation status." For details, see User's Manual.

NOTE

Write down the settings of parameters for a repair request.

■ Errors at Power On

The errors shown below may occur in the fault diagnosis when the power is turned on. (For details of Setpoint display and input/output action when each error occurs, see User's Manual.)

PV display (Operation Display)	Setpoint display (Operation Display)	Status indicator (Operation Display)	Parameter that displays error details	Error description	Cause and diagnosis	Remedy
Indication off	Indication off	—	—	Faulty MCU RAM / MCU ROM	MCU RAM / MCU ROM are failed.	Faulty. Contact us for repair.
ERR	SYS - - - -	—	—	System data error	System data is corrupted.	Faulty. Contact us for repair.
	PAR 0004 (for user default value error only)			User (parameter) default value error	User parameter is corrupted. Initialized to factory default value.	Check and reconfigure the initialized setting parameters. Error indication is erased when the power is turned on again.
	PAR 0010 (for setup parameter error only)			Setup parameter error	Setup parameter data is corrupted. Initialized to user default value.	
PAR 0020 (for operation parameter error only)	Operation parameter error	Operation parameter data is corrupted. Initialized to user default value.	Faulty. Contact us for repair.			
SLOT 0015 (0015: Error occurs to all hardware of E1 to E4-terminal areas.)	Nonresponding hardware of extended function (E1 to E4-terminal areas)	Inconsistence of system data and hardware of extended function. Nonresponding communication between hardware of extended function (E1 to E4-terminal areas)				
Normal indication	Normal indication	Rightmost decimal point on PV display blinks.	Setup parameter (PA.ER)	Calibration value error	Initialized to calibrated default value because of corrupted factory default value.	Faulty. Contact us for repair.
Normal indication	Normal indication	Rightmost decimal point on Symbol display blinks.	Setup parameter (PA.ER)	Faulty FRAM	Data writing (storing) to FRAM is impossible.	Faulty. Contact us for repair.
Normal indication	Normal indication	LADDER lamp blinks	Setup parameter (LA.ER)	Corrupted ladder program	Ladder program is corrupted. Operates without ladder program.	Download the ladder program again.
Normal indication	0.000 00000 (Decimal point on the left of the Symbol display blinks)	—	Setup parameter (OP.ER)	User profile error	User profile is corrupted.	Download the user profile again.

■ Errors during Operation

The errors shown below may occur during operation. (For input/output action when each error occurs, see User's Manual.)

PV display (Operation Display)	Setpoint display (Operation Display)	Status indicator (Operation Display)	Parameter that displays error details	Error description	Cause and diagnosis	Remedy
AD.ERR	Normal indication (Note)	—	Setup parameter (AD1.E)	Analog input terminal ADC error +PV input	Analog input terminal AD value error	Faulty. Contact us for repair.
RJC.E (Displays RJC. E and PV alternately.)	Normal indication (Note)	—	Setup parameter (AD1.E)	Universal input terminal RJC error +PV input	Universal input terminal RJC error	Faulty. Contact us for repair. Set the parameter RJC to OFF to erase error indication.
B.OUT	Normal indication (Note)	—	Setup parameter (AD1.E)	Analog input terminal burnout error +PV input	Analog input terminal sensor burnout	Check wiring and sensor. Error indication is erased in normal operation.
			Setup parameter (PV1.E)	PV input burnout error	Burnout of analog input connected to PV	Check wiring and sensor of connected analog input terminals. Error indication is erased in normal operation.
OVER-OVER	Normal indication	—	Setup parameter (PV1.E)	PV input over-scale PV input under-scale (PV values out of -5 to 105%)	PV input is out of -5 to 105%. Also occurs when the data out of range which is the ladder calculation result is input.	Check analog input value or ladder program.
Normal indication	OUT - - - -	—	Setup parameter (AD2.E)	Feedback input resistor/current burnout	Feedback input burnout	Check wiring of feedback input resistor/current. Error indication is erased in normal operation.
Normal indication	Normal indication	LADDER lamp blinks	Setup parameter (LA.ER)	Ladder calculation overflow	Floating point computation for ladder calculation is infinite.	Check the ladder program.
				Load factor over 100%	Computation does not end within the control period (load factor is 100% or more).	Change the control period or reduce the number of steps for the ladder program.
				Load factor over 200% (Forced end)	Computation does not end within the control period (load factor is 200% or more).	Change the control period or reduce the number of steps for the ladder program.
				Ladder program error	Ladder program is corrupted.	Download the ladder program again. If the error indication is still not erased, there is a fault. Contact us for repair.
Normal indication	0.000 00000 (Decimal point on the left of the Symbol display blinks)	—	Setup parameter (OP.ER)	Peer-to-peer communication error	Peer-to-peer communication error	Check that the target devices are connected correctly. Recovery at normal receipt.
AT.E	Normal indication	—	Setup parameter (PV1.E)	Auto-tuning time-out	Auto-tuning does not end even when 24 hours have elapsed after the start of tuning.	Check the process. Hold down any key to erase the error indication
VAT.E	Normal indication	—	Setup parameter (AD2.E)	Valve position automatic adjustment error	Fully-closed valve position is equal to or larger than the fully-open valve position after automatic valve position adjustment is performed.	Check wiring and valve. Hold down any key to erase the error indication.
Normal indication	0.000 00000 (Decimal point on the left of the Symbol display blinks)	—	Setup parameter (OP.ER)	Communication error (RS-485 communication)	Framing parity error Buffer overflow Inter-character time-out Checksum error (PC link communication with checksum) CRC check error (Modbus/RTU) LRC check error (Modbus/ASCII)	Check the communication parameters. Recovery at normal receipt. Hold down any key to stop blinking.
Normal indication	0.000 00000 (Decimal point on the left of the Symbol display blinks)	—	Setup parameter (OP.ER)	Communication error (coordinated operation)	Inconsistence of loop between coordinated master and slaves Communication from coordinated master is interrupted for 2 seconds.	Check the communication parameters. Recovery at normal receipt. Change from remote to local mode to stop blinking. When the mode is changed from remote to local, SP tracking does not work even if it is set to ON.
Normal indication	0.000 00000 (Decimal point on the left of the Symbol display blinks)	—	Setup parameter (OP.ER)	User profile error	User profile is corrupted.	Download the user profile again.
Normal indication	Normal indication	Rightmost decimal point on Symbol display blinks.	Setup parameter (PA.ER)	Faulty FRAM	Writing (storing) data to FRAM is impossible.	Faulty. Contact us for repair.
Undefined	Undefined	—	—	Faulty MCU / DCU (ROM / RAM error, corrupted)	MCU / DCU is corrupted.	Faulty. Contact us for repair.

Note: When an error occurs in input shown in Analog input display (Operation display), Setpoint display shows the same symbol as the PV display.

If you are using two or more groups of PID parameters, use the following table to record their setting values.

Parameter	n=2	n=3	n=4	R
P				
I				
D				
OH				
OL				
MR				
HYS				
SU.HY				
HY.UP				
HY.LO				
DR				
SU.DR				
Pc				
Ic				
Dc				
OHc				
OLc				
HYS _c				
DB				
PO				
SU.PO				
POc				

n: group number

■ Tuning Parameter

Menu symbol: **LUNE** (TUNE)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
SC (SC)	Super function	OFF: Disable 1: Overshoot suppressing function (normal mode) 2: Hunting suppressing function (stable mode) 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 SP. 4: Overshoot suppressing function (strong suppressing mode) Note: Setpoints 2 and 3 must be used in PID control or PI control. Disabled in the following controls: 1) ON/OFF control, 2) PD control, 3) P control, 4) Heating/cooling control. Do not use the function for the control processes with response such as flow or pressure control.	0	OFF	EASY
AT.TY (AT.TY)	Auto-tuning type	0: Normal 1: Stability	0		
AR (AR)	Anti-reset windup (excess integration prevention)	AUTO, 50.0 to 200.0%		AUTO	
OPR (OPR)	Output velocity limiter	OFF: Disable 0.1 to 100.0%/s		OFF	
MPON (MPON)	Manual preset output number selection	Select the output used in MAN mode when switched from AUTO to MAN mode. OFF: Hold the control output in AUTO mode (bumpless) 1: Use manual preset output 1 (output bump) 2: Use manual preset output 2 (output bump) 3: Use manual preset output 3 (output bump) 4: Use manual preset output 4 (output bump) 5: Use manual preset output 5 (output bump)		OFF	STD
MP01 to MP05 (MP01 to MP05)	Manual preset output 1 to 5	-5.0 to 105.0% However, output is limited to the output high limit and low limit.		0.0%	Table below

Use the following table to record the manual preset output setting value.

Parameter	n=1	n=2	n=3	n=4	n=5
MPOn					

■ Zone Control Parameter

Menu symbol: **ZONE** (ZONE)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
RP1 to RP3 (RP1 to RP3)	Reference point 1 to 3	Set reference points at which switching is carried out between groups of PID constants according to the given temperature zone. 0.0 to 100.0% of PV input range (EU) (RP1 ≤ RP2 ≤ RP3)	100.0% of PV input range	Table below	
RHY (RHY)	Zone PID switching hysteresis	Hysteresis can be set for switching at a reference point. 0.0 to 10.0% of PV input range span (EUS)	0.5% of PV input range span		STD
RdV (RDV)	Reference deviation	Set a deviation from SP. The PID for reference deviation is used if there is a larger deviation than the preset reference deviation. OFF: Disable 0.0 + 1 digit to 100.0% of PV input range span (EUS)	OFF		

For Zone control, set the setup parameter ZON (zone PID selection) to Zone PID selection.

Use the following table to record the reference point setting value.

Parameter	n=1	n=2	n=3
RPn			

■ P Parameter (for Ladder Program)

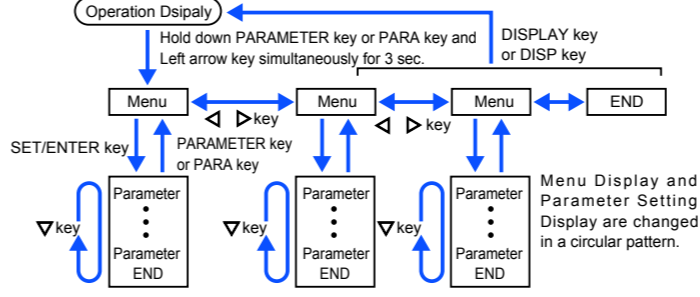
Menu symbol: **PPAR** (PPAR)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level					
P01 to P10 (P01 to P10)	P01 to P10 parameter	-19999 to 30000 (Set a decimal point position using LL50A Parameter Setting Software.)	0	Table below	STD					
Parameter	n=01	n=02	n=03	n=04	n=05	n=06	n=07	n=08	n=09	n=10
Pn										

Setup Parameters

Hold down the PARAMETER key or PARA key and Left arrow key simultaneously for 3 seconds to move from the Operation Display or Operation Parameter Setting Display to the Setup Parameter Setting Display.

Press the DISPLAY key or DISP key once to return to the Operation Display.



Move to the Operation Parameter Setting Display:
Hold down the PARAMETER key or PARA key for 3 sec.

Operation for Setting

- To select the parameter setting displayed as the initial value, press the Down arrow key to move to the next parameter.
- To change and set the parameter setting, press the SET/ENTER key to start the set-point blinking. The blinking state allows you to make changes (setting mode). Use the Up/Down/Left/Right arrow keys to change the setpoint. Press the SET/ENTER key to register the setting.

Note that there are some parameters which are not displayed depending on the Model and Suffix codes, control type (CNT), etc.

■ Control Function Setting Parameter

Menu symbol: **CTL** (CTL)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
CNT (CNT)	Control type	PID: PID control ONOF: ON/OFF control (1 point of hysteresis) ONOF2: ON/OFF control (2 points of hysteresis) 2P2L: Two-position two-level control H/C: Heating/cooling control	PID		EASY
SPGR. (SPGR.)	Number of SP groups	Set a number of SP groups to use. 1 to 4	4		
ZON (ZON)	Zone PID selection	If set to "SP group number selection," allows PID constants to be selected for each SP group. If set to "Zone PID selection," automatically selects PID constants according to the range set in the Reference point. 0: SP group number selection 1: Zone PID selection (selection by PV) 2: Zone PID selection (selection by target SP) 3: SP group number selection 2 4: Zone PID selection (selection by SP)	0		STD
PI dG. (PIDG.)	Number of PID groups	Set a number of PID groups to use. 1 to 4	4		

■ PV Input Setting Parameter

Menu symbol: **PV** (PV)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
I/N (I/N)	PV input type	OFF: Disable K1: -270.0 to 1370.0 °C / -450.0 to 2500.0 °F K2: -270.0 to 1000.0 °C / -450.0 to 2300.0 °F K3: -200.0 to 500.0 °C / -200.0 to 1000.0 °F J: -200.0 to 1200.0 °C / -300.0 to 2300.0 °F T1: -270.0 to 400.0 °C / -450.0 to 750.0 °F T2: 0.0 to 400.0 °C / -200.0 to 750.0 °F B: 0.0 to 1800.0 °C / 32 to 3300 °F S: 0.0 to 1700.0 °C / 32 to 3100 °F R: 0.0 to 1700.0 °C / 32 to 3100 °F N: -200.0 to 1300.0 °C / -300.0 to 2400.0 °F E: -270.0 to 1000.0 °C / -450.0 to 1800.0 °F L: -200.0 to 900.0 °C / -300.0 to 1600.0 °F U1: -200.0 to 400.0 °C / -300.0 to 750.0 °F U2: 0.0 to 400.0 °C / -200.0 to 1000.0 °F W: 0.0 to 2300.0 °C / 32 to 4200 °F PL: 0.0 to 1390.0 °C / 32.0 to 2500.0 °F P2040: 0.0 to 1900.0 °C / 32 to 3400 °F WRE: 0.0 to 2000.0 °C / 32 to 3600 °F JPT1: -200.0 to 500.0 °C / -300.0 to 1000.0 °F JPT2: -150.0 to 150.0 °C / -200.0 to 300.0 °F PT1: -200.0 to 850.0 °C / -300.0 to 1500.0 °F PT2: -200.0 to 500.0 °C / -300.0 to 1000.0 °F PT3: -150.0 to 150.0 °C / -200.0 to 300.0 °F 0.4-2V: 0.400 to 2.000 V 1-5V: 1.000 to 5.000 V 4-20: 4.00 to 20.00 mA 0-2V: 0.000 to 2.000 V 0-10V: 0.00 to 10.00 V 0-20: 0.00 to 20.00 mA -1020: -10.00 to 20.00 mV 0-100: 0.0 to 100.0 mV	OFF		EASY
UNIT (UNIT)	PV input unit	-: No unit, C: Degree Celsius -: No unit, -: No unit, -: No unit, F: Degree Fahrenheit	C		
RH (RH)	Maximum value of PV input range	Depends on the input type. - For temperature input - Set the temperature range that is actually controlled. (RL<RH) - For voltage / current input - Set the range of a voltage / current signal that is applied.		Depends on the input type	
RL (RL)	Minimum value of PV input range	The scale across which the voltage / current signal is actually controlled should be set using the maximum value of input scale (SH) and minimum value of input scale (SL). (Input is always 0% when RL = RH.)		Depends on the input type	
SDP (SDP)	PV input scale decimal point position	0: No decimal place 1: One decimal place 2: Two decimal places 3: Three decimal places 4: Four decimal places		Depends on the input type	
SH (SH)	Maximum value of PV input scale	-19999 to 30000. (SL<SH), SH - SL ≤ 30000		Depends on the input type	
SL (SL)	Minimum value of PV input scale	-19999 to 30000. (SL<SH), SH - SL ≤ 30000		Depends on the input type	
BSL (BSL)	PV input burnout action	OFF: Disable UP: Upscale DOWN: Downscale		Depends on the input type	STD

W: W-5% Re/W-26% Re(Hoskins Mfg.Co.). ASTM E988, WRE: W97Re3-W75Re25

■ Input Range, SP Limiter Setting Parameter

Menu symbol: **MPV** (MPV)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
PUNI (PUNI)	Control PV input unit	-: No unit C: Degree Celsius -: No unit -: No unit -: No unit F: Degree Fahrenheit	Same as PV input unit		
PdP (P.DP)	Control PV input decimal point position	0: No decimal place 1: One decimal place 2: Two decimal places 3: Three decimal places 4: Four decimal places	1		
PRH (P.RH)	Maximum value of control PV input range	-19999 to 30000. (P.RL<P.RH), P.RH - P.RL ≤ 30000		Depends on the input type	STD
PRL (P.RL)	Minimum value of control PV input range	-19999 to 30000. (P.RL<P.RH), P.RH - P.RL ≤ 30000		Depends on the input type	
SPH (SPH)	SP high limit	0.0 to 100.0% of PV input range (EU), (SPL<SPH)	100.0% of PV input range		
SPL (SPL)	SP low limit	0.0 to 100.0% of PV input range (EU), (SPL<SPH)	0.0% of PV input range		

■ Key Lock Setting Parameter

Menu symbol: *KLOC* (KLOC)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
<i>COMW</i> (COM.W)	Communication write enable/disable	OFF: Enable, ON: Disable	OFF		STD
<i>DATA</i> (DATA)	Front panel parameter data (▼,▲) key lock	OFF: Unlock, ON: Lock	OFF		
<i>A/M</i> (A/M)	Front panel A/M key lock		OFF		

■ DI Function Registration Parameter

Menu symbol: *DI.SL* (DI.SL)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
<i>A/M</i> (A/M)	AUTO/MAN switch	Set an I relay number of contact input. Set "OFF" to disable the function. Standard terminals D11: 5025, D12: 5026 E1-terminal area D11: 5041, D12: 5042, D113: 5043, D14: 5044, D15: 5045	5025		STD
<i>R/L</i> (R/L)	REMOTE/LOCAL switch		OFF		
<i>S/R</i> (S/R)	STOP/RUN switch		5026		
<i>AUTO</i> (AUTO)	Switch to AUTO		OFF		
<i>MAN</i> (MAN)	Switch to MAN		OFF		
<i>REM</i> (REM)	Switch to REMOTE		OFF		
<i>LCL</i> (LCL)	Switch to LOCAL		OFF		
<i>AT</i> (AT)	Auto-tuning START/STOP switch		OFF		
<i>LAT</i> (LAT)	Latch release		OFF		
<i>LCD</i> (LCD)	LCD backlight ON/OFF switch		OFF		

■ DI Function Numbering Parameter

Menu symbol: *DI.NU* (DI.NU)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
<i>SPb0</i> (SP.B0)	Bit-0 of SP number	Set an I relay number of contact input. Set "OFF" to disable the function. Standard terminals D11: 5025, D12: 5026 E1-terminal area D11: 5041, D12: 5042, D113: 5043, D14: 5044, D15: 5045	OFF		EASY
<i>SPb1</i> (SP.B1)	Bit-1 of SP number		OFF		
<i>SPb2</i> (SP.B2)	Bit-2 of SP number		OFF		
<i>PNb0</i> (PN.B0)	Bit-0 of PID number		OFF		STD
<i>PNb1</i> (PN.B1)	Bit-1 of PID number		OFF		
<i>PNb2</i> (PN.B2)	Bit-2 of PID number		OFF		
<i>MPb0</i> (MP.B0)	Bit-0 of manual preset output number		OFF		
<i>MPb1</i> (MP.B1)	Bit-1 of manual preset output number		OFF		
<i>MPb2</i> (MP.B2)	Bit-2 of manual preset output number		OFF		

■ AL1-AL3 Function Registration Parameter

Menu symbol: *ALM* (ALM)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
<i>AL1S</i> (AL1.S)	AL1 function selection	Set an I relay number. For the items other than below, see User's Manual. Ex.) Set the number 4353 for AL1.S to use the alarm 1. Set "OFF" to disable the function.	4353		STD
<i>AL2S</i> (AL2.S)	AL2 function selection	No function: OFF Alarm 1: 4353 Alarm 2: 4354 Alarm 3: 4355 Alarm 4: 4357	4354		
<i>AL3S</i> (AL3.S)	AL3 function selection		4355		
<i>ORS</i> (OR.S)	OUT relay function selection	AUTO (ON) / MAN (OFF) status: 4193 REM (ON) / LCL (OFF) status: 4194 STOP (ON) / RUN (OFF) status: 4195 FAIL (Normally ON) output: 4256	OFF		
<i>OR2S</i> (OR2.S)	OUT2 relay function selection		OFF		

■ DO Setting Parameter (E1/E4-terminal Area)

Menu symbol: *DO* (DO)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
<i>DO1S</i> (DO1.S)	DO11/DO41 function selection	Same as AL1.S Set "OFF" to disable the function	OFF	Table below	STD
<i>DO2S</i> (DO2.S)	DO12/DO42 function selection		OFF		
<i>DO3S</i> (DO3.S)	DO43 function selection		OFF		
<i>DO4S</i> (DO4.S)	DO44 function selection		OFF		
<i>DO5S</i> (DO5.S)	DO45 function selection		OFF		

Use the following table to record DO setting value.

Parameter	E1-terminal Area	E4-terminal Area
DO1.S		
DO2.S		
DO3.S		
DO4.S		
DO5.S		

■ System Setting Parameter

Menu symbol: *SYS* (SYS)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
<i>RMD</i> (R.MD)	Restart mode	Set how the controller should recover from a power failure of 5 seconds or more. CONT: Continue action set before power failure. MAN: Start from MAN. AUTO: Start from AUTO.	CONT		STD
<i>RTM</i> (R.TM)	Restart timer	Set time between power on and the instant where controller starts computation. 0 to 10 s	0		
<i>EPO</i> (EPO)	Input error preset output	Set preset output value when the input burnout or ADC error occurs. Manual output is prioritized when the input burnout occurs in MAN. 0: Preset output 1: 0% output 2: 100% output	0		EASY
<i>FREQ</i> (FREQ)	Power frequency	AUTO, 60: 60 Hz, 50: 50 Hz	AUTO		
<i>QSM</i> (QSM)	Quick setting mode	OFF: Disable ON: Enable	ON		
<i>LANG</i> (LANG)	Guide display language	ENG: English FRA: French GER: German SPA: Spanish	Depends on the model and suffix codes		
<i>PASS</i> (PASS)	Password setting	0 (No password) to 65535 Setting "0" means "without password protection."	0		

■ Error and Version Confirmation Parameter (for display only)

Menu symbol: *VER* (VER)

Parameter symbol	Name of Parameter	Status record	Display level
<i>PRER</i> (PA.ER)	Parameter error status		EASY
<i>OPER</i> (OP.ER)	Option error status		
<i>AD1E</i> (AD1.E)	A/D converter error status 1		
<i>AD2E</i> (AD2.E)	A/D converter error status 2		
<i>PV1E</i> (PV1.E)	PV input error status		
<i>LAER</i> (LA.ER)	Ladder error status		
<i>MCU</i> (MCU)	MCU version		
<i>DCU</i> (DCU)	DCU version		
<i>ECU1</i> (ECU1)	ECU-1 version (E1-terminal area)		
<i>ECU3</i> (ECU3)	ECU-3 version (E3-terminal area)		
<i>ECU4</i> (ECU4)	ECU-4 version (E4-terminal area)		
<i>PARA</i> (PARA)	Parameter version		
<i>HVER</i> (H.VER)	Product version		
<i>SER1</i> (SER1)	Serial number 1		
<i>SER2</i> (SER2)	Serial number 2		
<i>MAC1</i> (MAC1)	MAC address 1 (E3-terminal area)		
<i>MAC2</i> (MAC2)	MAC address 2 (E3-terminal area)		
<i>MAC3</i> (MAC3)	MAC address 3 (E3-terminal area)		

■ Parameter Display Level Parameter

Menu symbol: *LVL* (LVL)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
<i>LEVL</i> (LEVL)	Parameter display level	EASY: Easy setting mode STD: Standard setting mode PRO: Professional setting mode	STD		EASY

* For Professional setting mode, see User's Manual.

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