

■ Input Specifications

●Universal Input

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

Input Type	Instrument Range		Accuracy	
	°C	°F		
Thermo-couple	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
	J	-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
		-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
	T	-270.0 to 400.0°C	-450.0 to 750.0°F	±0.15% of instrument range ±1 digit for 400°C or more
		0.0 to 400.0°C	-200.0 to 750.0°F	±5% of instrument range ±1 digit for less than 400°C
	B	0.0 to 1800.0°C	32 to 3300°F	±0.1% of instrument range ±1 digit for less than 0°C
	S	0.0 to 1700.0°C	32 to 3100°F	±0.1% of instrument range ±1 digit for less than 0°C
	R	0.0 to 1700.0°C	32 to 3100°F	±0.1% of instrument range ±1 digit for less than 0°C
	N	-200.0 to 1300.0°C	-300.0 to 2400.0°F	±0.1% of instrument range ±1 digit for less than 0°C
	E	-270.0 to 1000.0°C	-450.0 to 1800.0°F	±0.1% of instrument range ±1 digit for less than 0°C
	L	-200.0 to 900.0°C	-300.0 to 1600.0°F	±0.1% of instrument range ±1 digit for less than 0°C
U	-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	
RTD	W	0.0 to 2300.0°C	32 to 4200°F	±0.2% of instrument range ±1 digit (Note 2)
		Platinel 2	0.0 to 1390.0°C	32.0 to 2500.0°F
	PR20-40	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	±0.2% of instrument range ±1 digit
		JPt100	-200.0 to 500.0°C	-300.0 to 1000.0°F
	Pt100	-150.00 to 150.00°C	-200.0 to 300.0°F	±0.1% of instrument range ±1 digit
		-200.0 to 850.0°C	-300.0 to 1560.0°F	±0.1% of instrument range ±1 digit (Note 1)
	Standard signal	-200.0 to 500.0°C	-300.0 to 1000.0°F	±0.1% of instrument range ±1 digit
		-150.00 to 150.00°C	-200.0 to 300.0°F	±0.1% of instrument range ±1 digit
DC voltage/current	0.400 to 2.000 V		±0.1% of instrument range ±1 digit	
	1.000 to 5.000 V			
	4.00 to 20.00 mA			
	0.000 to 2.000 V			
	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: Select from 50, 100, and 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 is detected and set automatically. Manual selection.

- 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

●Auxiliary Analog Input

- If equipped. See Model Descriptions.
- Use: Remote setpoint setting, external compensating input, auxiliary input for computation, etc.
- Number of inputs: 1
- Input type, instrument range, and measurement accuracy: See the table below

Input Type	Instrument Range	Accuracy
Standard signal	0.400 to 2.000 V	±0.2% of instrument range ±1 digit
	1.000 to 5.000 V	±0.1% of instrument range ±1 digit
DC voltage	0.000 to 2.000 V	±0.2% of instrument range ±1 digit
	0.00 to 10.00 V	±0.1% of instrument range ±1 digit
DC voltage for high-input impedance	0.000 to 1.250 V	±0.1% of instrument range ±1 digit

- Input sampling (control) period: Same as universal input
- Input resistance: About 1 MΩ
However, 10 MΩ or more for DC voltage for high-input impedance range
- Burnout detection: Functions for standard signal input type
Burnout is determined to have occurred if it is 0.1 V or less.

■ Contact Input Specifications

- Number of inputs: 3 (PPC5-10xx), 4 (PPC5-11xx).
- Use: SP switch, operation mode switch, and event input
- Input type: Dry contact or NPN transistor input
- Input contact rating: 12 V DC, 10 mA or more
Use a contact with a minimum on-current of 1 mA or less.
- ON/OFF detection: Dry contact input:
Contact resistance of 1 kΩ or less is determined as "ON" and contact resistance of 50 kΩ or more as "OFF."
NPN Transistor 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

■ Analog Output Specifications

- Number of outputs: Control output: 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

■ Retransmission Output Specifications

- Number of outputs: Retransmission output; 1, shared with 15 V DC loop power supply
- Current output: 4 to 20 mA DC or 0 to 20 mA DC/ load resistance of 600 Ω or less
- Current output accuracy (conversion accuracy from PV display on the set scale): ±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.
This is not conversion accuracy through input and output but the performance of transmission output itself.

■ 15 V DC Loop Power Supply Specifications

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

■ Step Response Time Specifications

Within 500 ms (when the control period is 50 ms or 100 ms)
Within 1 s (when the control period is 200 ms)
(63% of analog output response time when a step change of 10 to 90% of input span is applied)

■ Relay Contact Output Specifications

- Use: ON/OFF control, alarm output, FAIL output, etc.
 - Contact type and number of outputs: Control output: contact point 1c; 1 point
Contact rating: 250 V AC, 3 A or 30 V DC, 3A (resistance load)
Alarm output: contact point 1a; 3 points (common is independent)
Contact rating: 240 V AC, 1A or 30 V DC, 1 A (resistance load)
 - Electrical life: 1 x 10⁸ cycles minimum (at full load, resistive, 20 times/min)
Mechanical life: 5 x 10⁷ cycles minimum (at 300 times/min)
 - Time resolution of control output: 10 ms or 0.1% of output, whichever is larger
- Note: The control output should always be used with a load of 10 mA or more.
The alarm output should always be used with a load of 1 mA or more.

■ Safety and EMC Standards

- Safety: Compliant with IEC/EN 61010-1 (CE), IEC/EN 61010-2-201 (CE), IEC/EN 61010-2-030 (CE), approved by CAN/CSA C22.2 No. 61010-1 (CSA), approved by UL 61010-1.
Installation category: II
Pollution degree: 2
Measurement category: I (CAT I) (UL, CSA), O (Other) (CE)
Rated measurement input voltage: Max. 10 V DC
Rated transient overvoltage: 1500 V (*)
* This is a reference safety standard value for measurement category I of CSA/UL 61010-

- 1, and for measurement category O of IEC/EN 61010-2-030. This value is not necessarily a guarantee of instrument performance.

- EMC standards: Compliant with CE marking
EN 61326-1 Class A, Table 2 (For use in industrial locations), EN 61326-2-3
* The instrument continues to operate at a measurement accuracy of within ±20% of the range during testing.
EN 55011 Class A, Group 1
EN 61000-3-2 Class A
EN 61000-3-3
EN 55011 Class A, Group 1

■ Construction, Installation, and Wiring

- Dust-proof and drip-proof: IP66 (for front panel) (Not available for side-by-side close mounting.)
- Material: Polycarbonate (Flame retardancy: UL94V-0)
- Case color: Light charcoal gray
- Weight: 0.5 kg or less
- External dimensions (mm): 96 (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): 92^{+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
Power consumption: 18 VA
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 (UL, CSA)
Between primary terminals and secondary terminals: 3000 V AC for 1 minute (CE)
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.)
- Insulation resistance: Between power supply terminals and a grounding terminal 20 MΩ or more at 500 V DC
- Isolation specifications

PV (universal) input terminals	Internal circuits	Power supply
Auxiliary analog input terminals		
Control, retransmission (analog) output terminals (not isolated between the analog output terminals)		
Control relay (contact point c) output terminals		
Alarm-1 relay (contact point a) output terminals		
Alarm-2 relay (contact point a) output terminals		
Alarm-3 relay (contact point a) output terminals		
Contact input terminals (all)		
RS-485 communication terminals (2 ports)		
Ethernet communication terminal		

The circuits divided by lines are insulated mutually.

■ Environmental Conditions

Normal Operating Conditions:

- Ambient temperature: -10 to 50°C (side-by-side mounting: -10 to 40 °C)
 - 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
- *: An LCD (liquid crystal display) is used as the display for this product. At low temperatures the display transitions may become slow. However, this does not impact controller function.

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



- 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.
- For the wiring cable, the temperature rating is 75 °C or more.
- 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.
- The insulation provided to each relay output terminal is functional insulation.
- To prevent electric shock, do not touch any terminals while power is supplied to the controller.

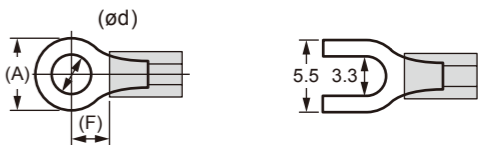


- When connecting two or more crimp-on terminal lugs to the single terminal block, bend the crimp-on terminal lugs so that they sit flush with the terminal before tightening the screw.
- Do not wire two or more crimp-on terminal lugs to the single high-voltage terminal of the power supply, control relay, or alarm relays.



- 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.
- To maximize the life of the control relay output, use an auxiliary relay to perform ON/OFF control.
- The use of inductance (L) loads such as auxiliary relays, motors and solenoid valves may cause malfunction or relay failure; it is recommended to 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

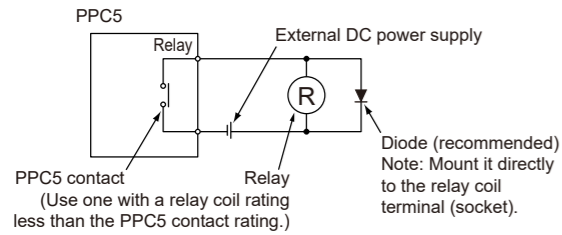
Applicable wire size: Power supply wiring 1.25 mm² or more

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

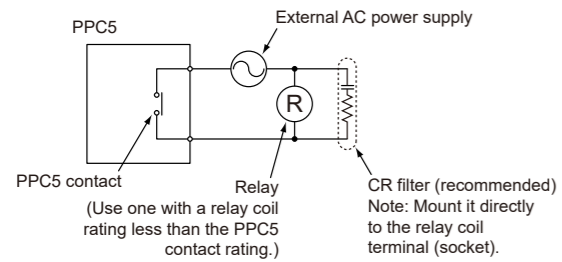
● Cable Specifications and Recommended Cables

Purpose	Type
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 For thermocouple input (PV input), shielded compensating lead wire of cross-sectional area less than or equal to 0.75 mm ² is recommended. If the cross-sectional area is wide, the reference junction compensation error may be large.
RTD	Shielded wires (three/four conductors)
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

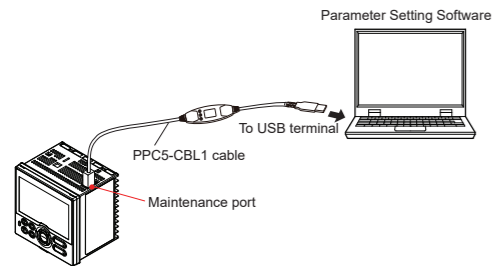
DC Relay Wiring



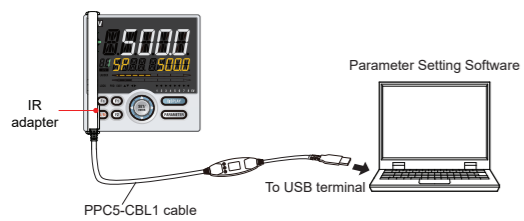
AC Relay Wiring



Programming Cable Connection



When using the maintenance port, power is provided from the USB port. Do not supply power to the controller through the terminals until disconnected from the maintenance port.



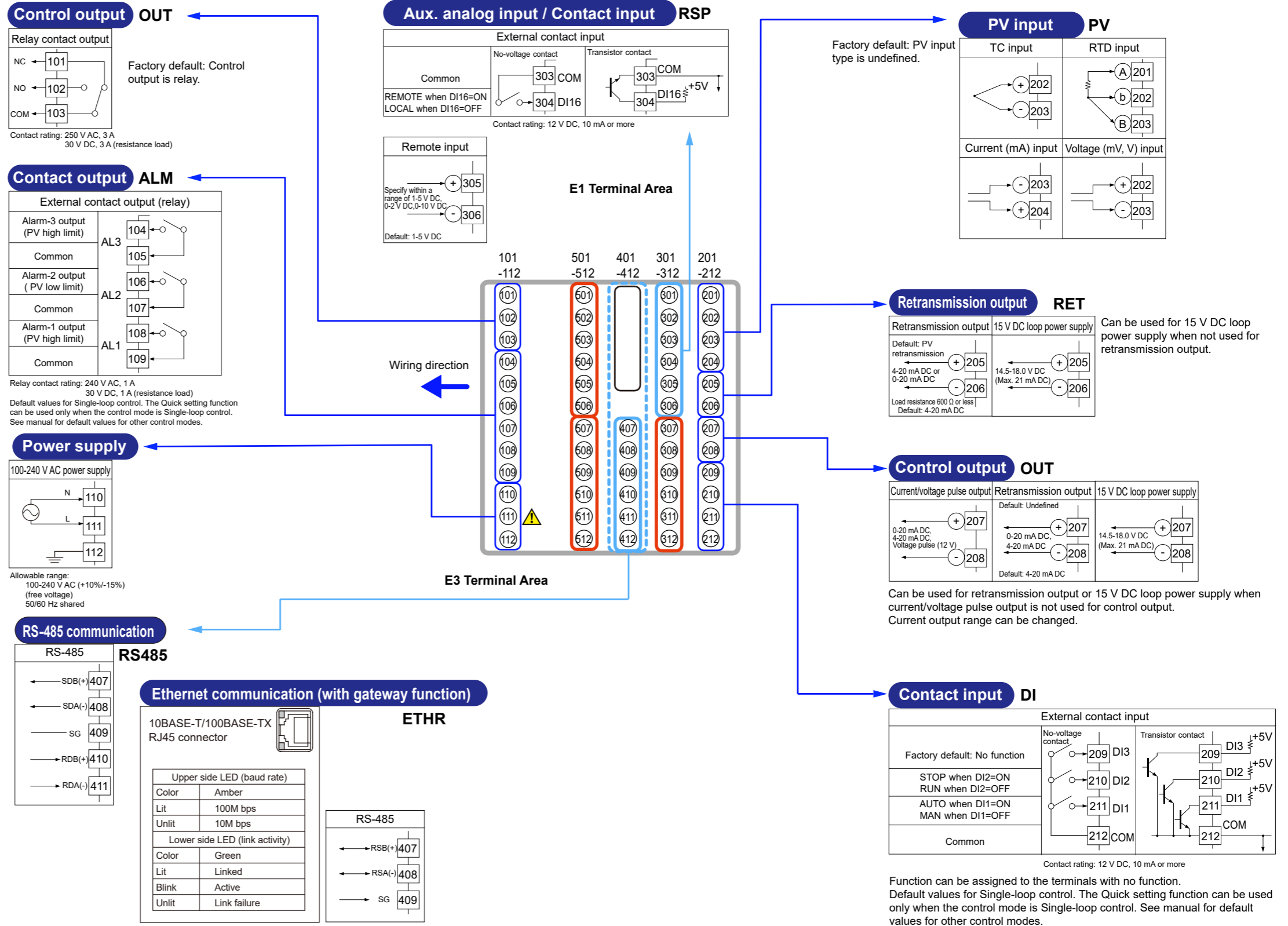
The IR adapter does not power the controller. When using the IR adapter power must be supplied to the controller.

- Notes:
1. PPC5-CBL1 configuration cable with IR adapter purchased separately
 2. Parameter Setting Software available for free download from www.automationdirect.com

6. Terminal Wiring Diagrams



- Do not make any connections to unused terminals.



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Initial Settings

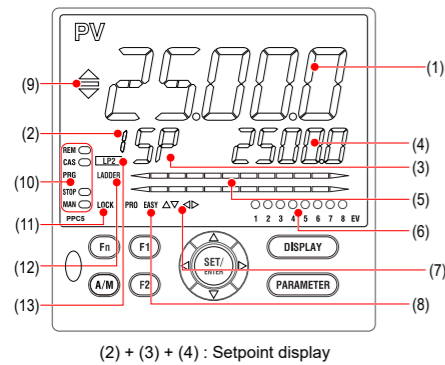
This document describes installation, wiring, and other tasks required to make the controller ready for operation. For details of each function, refer to the User's Manual.

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Contents

- Names and Functions of Display Parts
- Setup Procedure
- Quick Setting Function (Setting of Input and Output)
- Setting Alarm Type
- Setting Alarm Setpoint
- Reset Parameters to Factory Default Values

1. Names and Functions of Display Parts

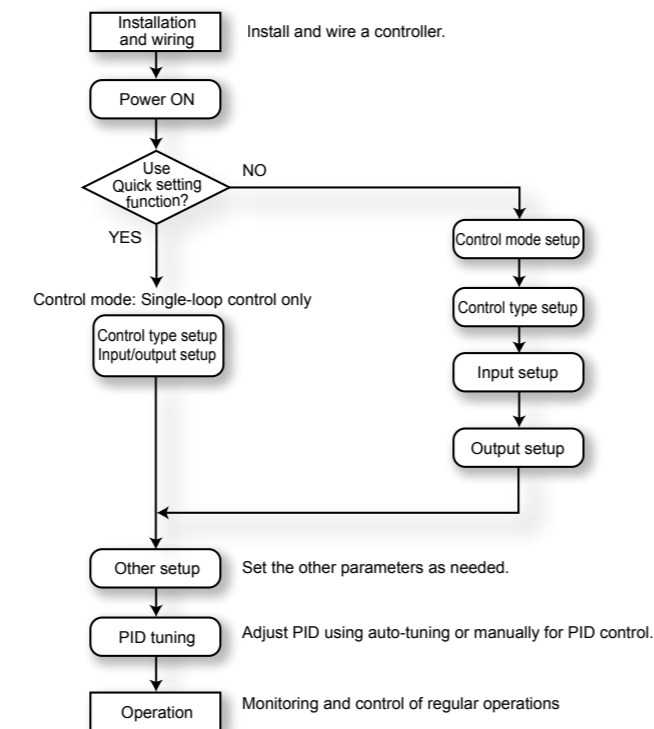


No. in figure	Name	Description												
(1)	PV display (white or red)	Displays PV. Displays an error code if an error occurs. Displays the scrolling guide in the Menu Display and Parameter Setting Display when the guide display ON/OFF is set to ON.												
(2)	Group display (green)	Displays a group number (1 to 8 or R) and terminal area (E1 to E3). 1 to 8 represent SP numbers in the Operation Display. R and E1 to E3 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 and white)	Displays control output value (OUT) and measured input value (PV). The data to be displayed can be set by the parameter. Initial value: upper bar (deviation), lower bar (control output).												
(6)	Event indicator (orange)	Lit when the alarms 1 to 8 occur. (Initial value: 1 to 4) 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)	Deviation indicator (green)	Displays the status of a deviation (PV - SP). <ul style="list-style-type: none"> ▲ : Lit if a deviation exceeds the deviation display band. ■ : Lit when a deviation is within the deviation display band ▼ : Lit if a deviation falls below the deviation display band. The deviation indicator is unlit if the Displays other than the Operation Display or SELECT Display are shown. Deviation display band can be set by the parameter.												
(10)	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>CAS</td> <td>Lit when in cascade mode (CAS).</td> </tr> <tr> <td>PRG</td> <td>Unused</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).	CAS	Lit when in cascade mode (CAS).	PRG	Unused	STOP	Lit when in stop mode (STOP).	MAN	Lit when in manual mode (MAN). Blinks during auto-tuning.
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(11)	Security indicator (red)	Lit if a password is set. The setup parameter settings are locked.												
(12)	Ladder	Not used in PPC5 Controller.												
(13)	Loop 2 indicator (LP2 lamp) (green)	Lit when the control mode is Cascade control. In the Operation Display, the LP2 lamp is lit while the Loop-2 data is displayed on Setpoint display. In the Parameter Setting Display, the LP2 lamp indicates the loop of displayed menu symbol or parameter symbol. The LP2 lamp is lit while the Loop-2 menu symbol or parameter symbol is displayed.												

No. in figure	Name	Description
(1)	DISPLAY key	Used to switch the Operation Displays. Press the key in the Operation Display to switch the provided Operation Displays. Press the key in the Menu Display or Parameter Setting Display to return to the Operation Display.
(2)	PARAMETER key	Hold down the key for 3 seconds to move to the Operation Parameter Setting Display. Hold down the key and the Left arrow key simultaneously for 3 seconds to move to the Setup Parameter Setting Display. Press the key in the Parameter Setting Display to return to the Menu Display. Press the key once to cancel the parameter setting (setpoint is blinking).
(3)	SET/ENTER key Up/Down/Left/Right arrow keys	SET/ENTER key Press the key in the Menu Display to move to the Parameter Setting Display of the Menu. Press the key in the Parameter Setting Display to transfer to the parameter setting mode (setpoint is blinking), and the parameter can be changed. Press the key during parameter setting mode to register the setpoint. Up/Down/Left/Right arrow keys Press the Left/Right arrow keys in the Menu Display to switch the Displays. Press the Up/Down/Left/Right arrow keys in the Parameter Setting Display to switch the Displays. Press the Up/Down arrow keys during parameter setting mode (setpoint is blinking) to change a setpoint. Press the Left/Right arrow keys during parameter setting mode (setpoint is blinking) to move between digits according to the parameter.
(4)	IR interface	Communication interface for the IR adapter and configuration cable (PPC5-CBL1) used when setting and storing parameters from a PC.
(5)	A/M key	Used to switch between AUTO and MAN modes. The setting is switched between AUTO and MAN each time the key is pressed.
(6)	User function keys	F1, F2, and Fn keys. The user can assign a function to each key through parameters using the parameter setting software.

2. Setup Procedure

The following flowchart shows the setup procedure for the PPC5 controller.



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.
- Control type (PID control, ON/OFF control, etc.)
 - Input function (PV input type, range, scale (at voltage input), etc.)
 - Output function (control output type and cycle time)

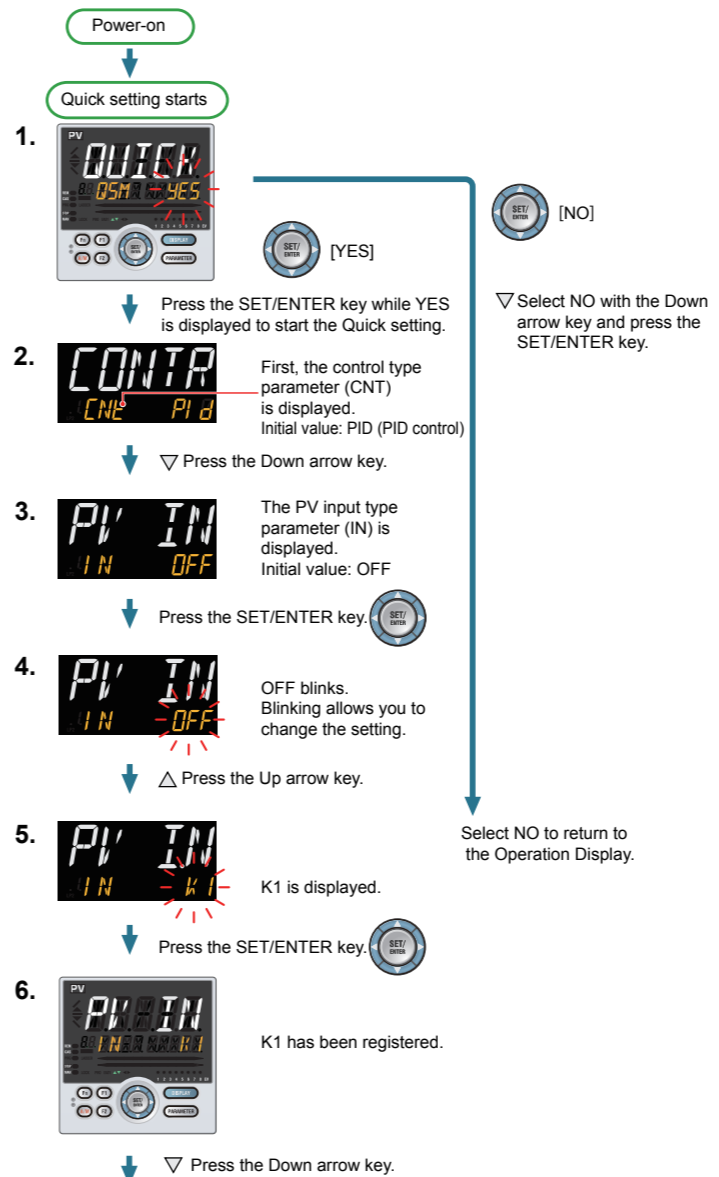
After turning on the controller, first decide whether or not to use the Quick setting function. The Quick setting function can be used only when the control mode is Single-loop control. For other control modes, set the functions without using the Quick setting function.

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.

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.



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 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 00.02 for current output.
- 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) S-PI: Sample PI control BATCH: Batch PID control FFPID: Not used

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 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: -150.00 to 150.00 °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: -150.00 to 150.00 °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.
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.)
SDP	PV input scale decimal point position	0: No decimal place 3: Three decimal places 1: One decimal place 4: Four decimal places 2: Two 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

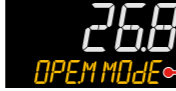
Output Function


Parameter Symbol	Name of Parameter	Setting Range
OT	Output type selection	Control output (Lower two digits) 00: OFF 01: OUT terminals (voltage pulse) 02: OUT terminals (current) 03: OUT terminals (relay)
CT	Control output cycle time	0.5 to 1000.0 s


4. Setting Alarm Type

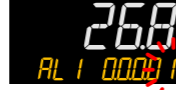
The following operating procedure shows an example of changing the alarm-1 type (factory default: PV high limit alarm) to PV low limit alarm (setpoint: 02).


- 

Show the Operation Display.
- 

Hold down the key for 3 seconds. MODE menu is displayed.
- 

Press the Right arrow key until ALRM menu appears. ALRM menu is displayed.
- 

Press the SET/ENTER key. The parameter AL1 (alarm-1 type) is displayed.
- 

Press the SET/ENTER key. The last digit of the setpoint blinks.
- 

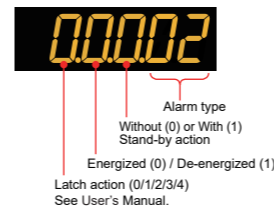
Change the setpoint using the Up/Down arrow keys to increase and decrease the value and the Left/Right arrow keys to move between digits. Press the SET/ENTER key. The alarm-1 type setpoint 02 (PV low limit) is registered. After the setup is completed, press the DISPLAY key or DISP key once to return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

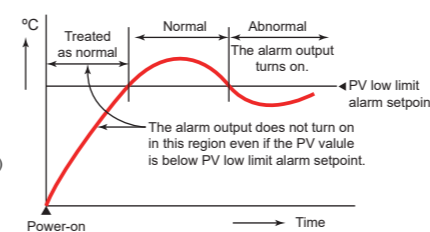
Alarm Type (Alarm Setpoint)	Alarm Action (Energized)	Alarm Action (De-energized)
No alarm (00)	-	-
PV high limit (01) Analog input PV high limit (19) Auxiliary analog input RSP high limit (21)	Hysteresis Open (unit) / Closed (lit) PV, RSP → Alarm setpoint	Hysteresis Closed (unit) / Open (lit) PV, RSP → Alarm setpoint
PV low limit (02) Analog input PV low limit (20) Auxiliary analog input RSP low limit (22)	Hysteresis Closed (lit) / Open (unit) Alarm setpoint PV, RSP	Hysteresis Open (unit) / Closed (unit) Alarm setpoint PV, RSP
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 (unit) / 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 (unit) / 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 PV SP or Target SP	Hysteresis Hysteresis Open (unit) / Closed (unit) / Open (lit) Deviation setpoint PV 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 PV SP or Target SP	Hysteresis Hysteresis Closed (unit) / Open (lit) / Closed (unit) Deviation setpoint PV SP or Target SP
Control output high limit (15)	Hysteresis Open (unit) / Closed (lit) Output Alarm setpoint	Hysteresis Closed (unit) / Open (lit) Output Alarm setpoint
Control output low limit (16)	Hysteresis Closed (lit) / Open (unit) Alarm setpoint Output	Hysteresis Open (unit) / Closed (unit) Alarm setpoint Output
PV velocity (29)	Fault diagnosis alarm (30) Burnout of PV input, RSP remote auxiliary analog input, ADC failure, RJC error. FAIL (31) 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/unit" shows status of EV (event) lamp.
Note 2: ⊕ Positive setpoint, ⊖ Negative setpoint

Setting Display of Alarm Type




Stand-by Action





5. Setting Alarm Setpoint


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

Before setting the alarm setpoint, check the alarm type. To change the alarm type, see "4. Setting Alarm Type."

- Show the Operation Display.
 - Display MODE menu with the same procedure as described in Setting Alarm Type. Press the Right arrow key.
 - 

SP menu is displayed. Press the SET/ENTER key. Press the Down arrow key until A1 appears.
 - 

The parameter A1 is displayed. A1 to A8 represent the alarm-1 to -8 setpoints. Group
- Each parameter and group can be changed in the Parameter Setting Displays of alarms using arrow keys.
 ▲▼ Up/Down arrow keys: parameters
 ◀▶ Left/Right arrow keys: groups
- Display the parameter and group that need to be changed. Press the SET/ENTER key.
- 

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.
 - 

The setpoint has been registered. After the setup is completed, press the DISPLAY key or DISP key once to return to the Operation Display.

6. Reset Parameters to Factory Default Values

Parameters that have been changed can be initialized to factory default values or user default values. Follow the steps below to reset to the factory default values:

- Hold down the Parameter and Left Arrow keys for 3 seconds.
- Using the Left Arrow key scroll left to SET.MLVL and press the SET/ENTER key.
- Press the SET/ENTER key and then use the Up Arrow key to select PRO and press the SET/ENTER key.
- Press the PARAMETER key to go back.
- Press the Left Arrow key till Set.MINit is displayed and press the SET/ENTER key.
- Press the Down Arrow until F.dEF is displayed and press the SET/ENTER key.
- Use the Arrow keys to change the value to -12345 and press the SET/ENTER key.
- The controller will reboot to the quick setting menu with the factory defaults loaded.

Changing the parameter display levels

This document does not explain all the parameters. To display all the parameters, change the parameter display level to professional setting mode. For details, see "Setting Security Functions" in the User's Manual.

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Operations

This document describes installation, wiring, and other tasks required to make the controller ready for operation. For details of each function, refer to the User's Manual.

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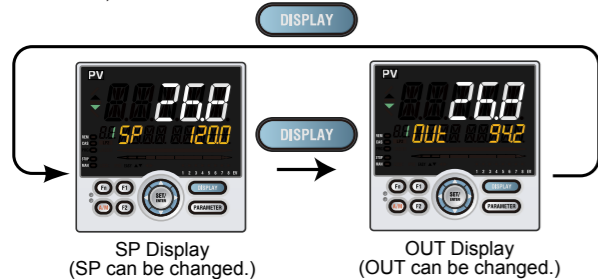
Contents

1. Operation Monitoring Displays
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. Operation Monitoring Displays

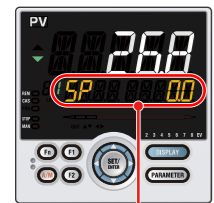
■ Operation Display Switching Diagram

- **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).



For additional Operation Monitoring Display options see the User Manual.

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. Press the SET/ENTER key. The parameter R.L (REMOTE/LOCAL switch) is displayed.
4. Press the Down arrow key until the parameter AT appears.
5. The parameter AT (auto-tuning switch) is displayed.
6. Press the SET/ENTER key. OFF blinks.
7. Press the Up/Down arrow keys to display the required setpoint. Blinks during the change.
8. Press the SET/ENTER key. The setting range is 1 to 8 (represent group numbers) or R. To perform auto-tuning for the PID of group 1, set the parameter AT to 1. To quit the auto-tuning, set the parameter to OFF.
9. Press the SET/ENTER key. The setpoint has been registered. This starts auto-tuning. The output can be limited during auto-tuning. For details, see User's Manual.
10. Press the SET/ENTER key. The setpoint has been registered. The setpoint SPNO. (SP number selection) is displayed.
11. Press the SET/ENTER key. Change the setpoint using the Up/Down arrow keys. Blinks during the change.
12. Press the SET/ENTER key. The setpoint has been registered. Press the DISPLAY key or DISP key once to return to the Operation Display.
13. Press the SET/ENTER key. SPNO. has been changed to 2.

During auto-tuning,
• The MAN lamp blinks.
• The OUT symbol appears.
• The output values at 100.0% and 0% appear alternately.

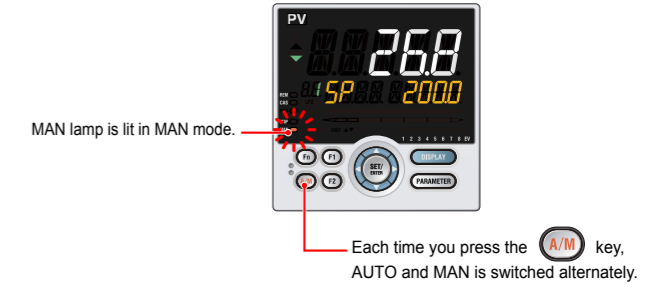
4. Selecting Target Setpoint Numbers (SPNO.)

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. Press the SET/ENTER key. The parameter R.L (REMOTE/LOCAL switch) is displayed.
4. Press the Down arrow key until the parameter SPNO. appears.
5. The parameter SPNO. (SP number selection) is displayed.
6. Press the SET/ENTER key. Change the setpoint using the Up/Down arrow keys. Blinks during the change.
7. Press the SET/ENTER key. The setpoint has been registered. Press the DISPLAY key or DISP key once to return to the Operation Display.
8. Press the SET/ENTER key. 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 = 1 to 5), the controller can be operated manually starting from the corresponding manual preset output value (MPO1 to MPO5 parameters).

6. Switching between RUN and STOP

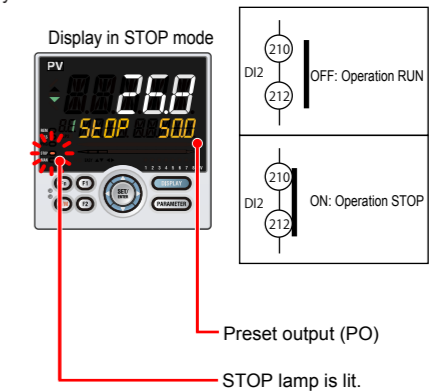
RUN and STOP switching can be performed using any of the following: (1) Contact input, (2) Parameter, (3) Communication, and (4) User function key. The following shows an example of switching using the contact input. (The switching function is assigned to DI2 contact for the factory default.) For details 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.



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 communications (if equipped) or the auxiliary analog input (if equipped) as the target setpoint. The following shows an example of switching from local to remote using the parameter.

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.  Hold down the PARAMETER key or PARA key for 3 seconds to display MODE menu.

3.  Press the SET/ENTER key.

4.  The parameter R.L (REMOTE/LOCAL switch) is displayed.

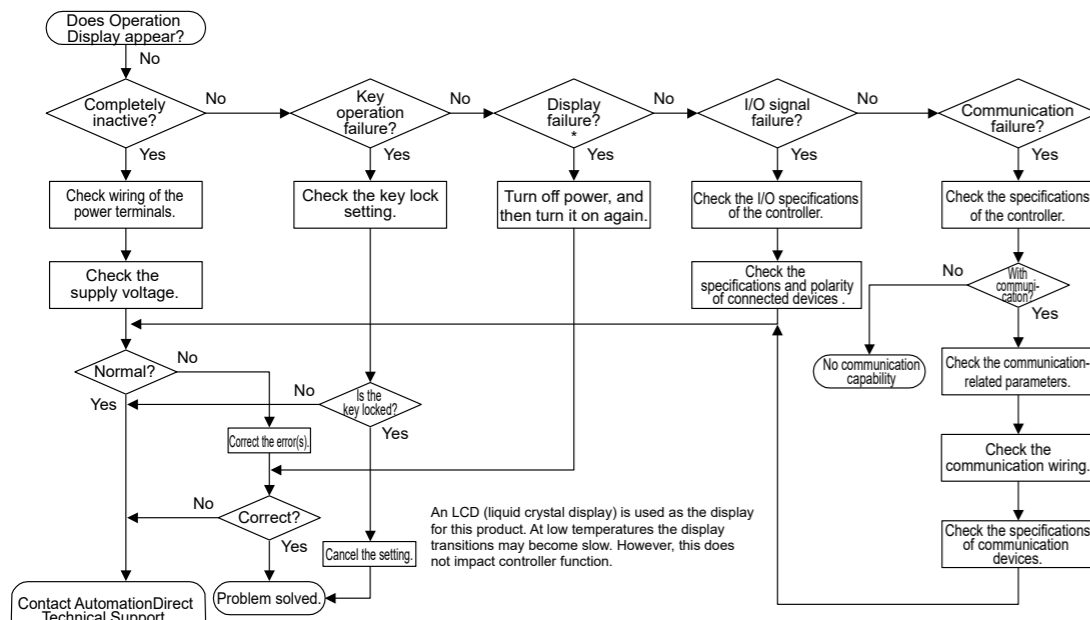
5.  Press the SET/ENTER key.
 Δ▽ Change the operation mode using the Up/Down arrow keys. Blinks during the change.

6.  Press the SET/ENTER key.
 The REM lamp is lit.

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.



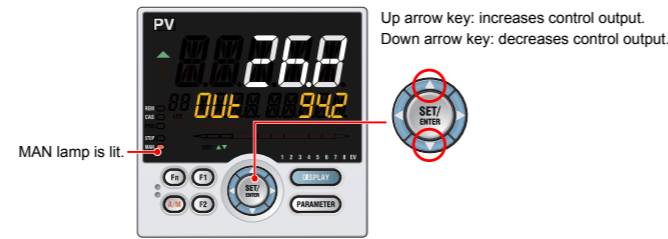
8. Manipulating Control Output in Manual Mode

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.



■ 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 AutomationDirect
ERR	SYS - - - -	—	—	System data error	System data is corrupted.	Faulty. Contact AutomationDirect
	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 AutomationDirect			
SLOT 0017 (0017: Error occurs to all hardware of E1 or E3-terminal areas.)	Nonresponding hardware of extended function (E1 or E3-terminal areas)	Inconsistency of system data and hardware of extended function. Nonresponding communication between hardware of extended function (E1 or E3-terminal areas).				
Normal indication	Normal indication	Rightmost decimal point on PV display blinks. Rightmost decimal point on Symbol display blinks.	Setup parameter (PA.ER)	Calibration value error	Initialized to calibrated default value because of corrupted factory default value.	Faulty. Contact AutomationDirect
				Faulty FRAM	Data writing (storing) to FRAM is impossible.	
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 •RSP input	Analog input terminal AD value error	Faulty. Contact AutomationDirect
RJC.E (Displays RJC. E and PV alternately.)	Normal indication (Note)	—	Setup parameter (AD1.E)	Universal input terminal RJC error •PV input •RSP input	Universal input terminal RJC error	Faulty. Contact AutomationDirect 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 •RSP input	Analog input terminal sensor burnout	Check wiring and sensor. Error indication is erased in normal operation.
			Setup parameter (PV1.E / PV2.E)	PV input burnout error (Loop 1, Loop 2)	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 / PV2.E)	PV input over-scale PV input under-scale (PV values out of -5 to 105%) (Loop 1, Loop 2)	PV input is out of -5 to 105%.	Check analog input value.
Normal indication	Normal indication	—	Setup parameter (PV1.E / PV2.E)	RSP input burnout error (Loop 1, Loop 2)	Burnout of analog input connected to RSP	Check wiring and sensor. Error indication is erased in normal operation.
Normal indication	RSP B.OUT	—	Setup parameter (PV1.E / PV2.E)	Burnout error when RSP input is used for control (Loop 1, Loop 2)	Burnout of analog input connected to RSP when RSP is used for control computation	Check wiring and sensor. Error indication is erased in normal operation.
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	—	Setup parameter (PV1.E/PV2.E)	Auto-tuning time-out (Loop 1, Loop 2)	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
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.
					Inconsistency of loop between coordinated master and slaves	Check the communication parameters. Recovery at normal receipt. Change from remote to local mode 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)	Communication from coordinated master is interrupted for 2 seconds.	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 AutomationDirect
Undefined	Undefined	—	—	Faulty MCU / DCU (ROM / RAM error, corrupted)	MCU / DCU is corrupted.	Faulty. Contact AutomationDirect

■ 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

Before contacting AutomationDirect Technical Support write down the parameter settings.

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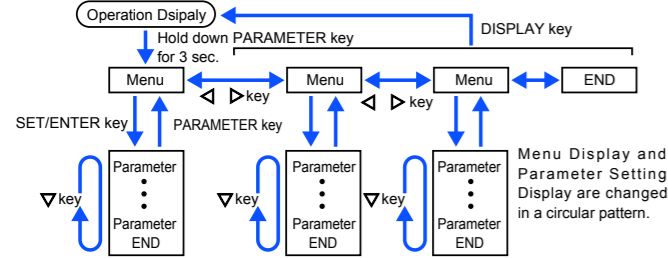
Parameters

This document describes installation, wiring, and other tasks required to make the controller ready for operation. For details of each function, refer to the User's Manual.

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Operation Parameters

Hold down the PARAMETER key for 3 seconds to move from the Operation Display to the Operation Parameter Setting Display. Press the DISPLAY key once to return to the Operation Display.



The parameter groups can be switched using left and right arrow keys. Move to the Setup Parameter Setting Display: Hold down the PARAMETER key and the Left arrow key simultaneously for 3 sec.

Operation for Setting

- To select the displayed parameter setting, 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 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.

Note that there are some parameters which are not displayed depending on the model, control mode (CTLM), control type (CNT), etc. The parameters for professional setting mode (LEVL: PRO) are not described in this manual. See User's Manual.

Operation Mode

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
SP (S,R)	STOP/RUN switch	STOP: Stop mode RUN: Run mode Preset output (PO) is generated in STOP mode. Default: Not displayed while STOP/RUN switch is assigned to contact input DI2.	RUN		EASY
RL (R,L)	REMOTE/LOCAL switch	LCL: Local mode REM: Remote mode Select a remote input method for acquiring the target setpoint from remote input or communication using the parameter RMS.	LCL		
RL (AT)	AUTO-tuning switch	OFF: Disable 1 to 8: Perform auto-tuning. Tuning result is stored in the specified numbered PID. R: Tuning result is stored in the PID for reference deviation.	OFF		
SPNO (SPNO.)	SP number selection	1 to 8 (Depends on the setup parameter SPGR. setting.)	1		
PI d (PID)	PID number	The PID group number being selected is displayed. 1 to 8. R: PID group for reference deviation	1		

SELECT Parameter

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
Registered parameter symbol	SELECT parameter 10 to 19	Setting range of a registered parameter. For details, see User's Manual	—	Table below	EASY
Parameter	n=10 n=11 n=12 n=13 n=14 n=15 n=16 n=17 n=18 n=19				
CSn					

For the registration of SELECT parameters, see User's Manual.

SP and Alarm Setpoint Setting Parameter

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
SP (SP)	Target setpoint	0.0 to 100.0% of PV input range (EU) (Setting range: SPL to SPH)	SPL		EASY
PI dN (PIDN)	PID number selection	Set a PID group number to use. 1 to 8 (Depends on the setup parameter PIDG. setting.)	1 to 8	Table below	
AL 1 to AL 8 (A1 to A8)	Alarm-1 to -8 setpoint	Set a display value of setpoint of PV alarm, SP alarm, deviation alarm, output alarm, or velocity alarm. -19999 to 30000 (Set a value within the input range.) Decimal point position depends on the input type	0		

For the parameter SP (target setpoint), 8 groups are displayed for the factory default. The number of groups can be changed by the setup parameter SPGR. (number of SP groups). For the alarm setpoint parameter, alarm-1 to -4 are displayed for the factory default. The number of alarms can be changed using the setup parameter ALNO. (number of alarms). To change the number of SP groups or alarms, see User's Manual. Use the following table to record SP and alarm setpoints.

Parameter	n=1	n=2	n=3	n=4	n=5	n=6	n=7	n=8
SP								
PIDN								
A1								
A2								
A3								
A4								
A5								
A6								
A7								
A8								

n: group number

SP-related Setting Parameter

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
RMS (RMS)	Remote input method	RSP: Via remote auxiliary analog input COM: Via communication	RSP		STD
RFL (RFL)	Remote input filter	OFF, 1 to 120 s	OFF		
RL (RT)	Remote input ratio	SP = Remote input x RT + Remote input bias 0.001 to 9.999	1.000		EASY
RbS (RBS)	Remote input bias	-100.0 to 100.0% of PV input range span (EU)	0.0 % of PV input range span		
UPR (UPR)	SP ramp-up rate	Used to prevent SP from changing suddenly. Set a ramp-up rate or ramp-down rate per hour or minute. Set a time unit using the parameter TMU.	OFF		EASY
DNR (DNR)	SP ramp-down rate	OFF, 0.0 + 1 digit to 100.0% of PV input range span (EU)	OFF		
TMU (TMU)	SP ramp-rate time unit	HOUR: Ramp-up rate or ramp-down rate per hour MIN: Ramp-up rate or ramp-down rate per minute	HOUR		STD
SPL (SPT)	SP tracking selection	Tracking is performed when the mode changes from Remote to Local. (The local setpoint keeps track of the remote setpoint.) OFF, ON	ON		
PV L (PVT)	PV tracking selection	Causes the setpoint to keep track of the PV so the setpoint automatically reverts to its original value at a preset rate of change. The UPR, DNR, and TMU are used in combination. Operating conditions: 1) MAN → AUTO, 2) STOP → AUTO, 3) Power-on, 4) SP number change, 5) SP change OFF, ON	OFF		STD

Alarm Function Setting Parameter

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
AL 1 to AL 8 (AL1 to AL8)	Alarm-1 to 8 type Example: Alarm-1 Latch action Energized/De-energize Stand-by action	Set a 5-digit value in the following order. [Latch action (0/1/2/3/4)] + [Energized (0) or De-energized (1)] + [Without (0) or With (1) Stand-by action] + [Alarm type: 2 digits (see below)] For latch action, see User's Manual. Alarm type: 2 digits 00: Disable 01: PV high limit 02: PV low limit 03: SP high limit 04: SP low limit 05: Deviation high limit 06: Deviation low limit 07: Deviation high and low limits 08: Deviation within high and low limits 09: Target SP high limit 10: Target SP low limit 11: Target SP deviation high limit 12: Target SP deviation low limit 13: Target SP deviation high and low limits 14: Target SP deviation within high and low limits 15: OUT high limit 16: OUT low limit 17: Not used 18: Not used 19: Analog input PV high limit 20: Analog input PV low limit 21: Remove aux. Analog input RSP high limit 22: Remote aux. Analog input RSP low limit 23: Not used 24: Not used 25: Not used 26: Not used 27: Not used 28: Not used 29: PV velocity 30: Fault diagnosis 31: FAIL 32: Deviation(%) high limit 33: Deviation(%) low limit 34: Deviation(%) high and low limits 35: Deviation(%) within high and low limits 36: Target SP deviation(%) high limit 37: Target SP deviation(%) low limit 38: Target SP deviation(%) high and low limits 39: Target SP deviation(%) within high and low limits	AL1, AL3, AL5, AL7: Latch action (0) PV high limit (01) Without Stand-by action (0) Energized (0) AL2, AL4, AL6, AL8: Latch action (0) Energized (0) Without Stand-by action (0) PV low limit (02)	Table below	EASY
VEL 1 to VEL 8 (VT1 to VT8)	PV velocity alarm time setpoint 1 to 8	0.01 to 99.59 (minute.second)	1.00		STD
HY 1 to HY 8 (HY1 to HY8)	Alarm-1 to -8 hysteresis	Set a display value of setpoint of hysteresis. -19999 to 30000 (Set a value within the input range.) Decimal point position depends on the input type. When the decimal point position for the input type is set to "1", the initial value of the hysteresis is "1.0".	10		
DYN 1 to DYN 8 (DYN1 to DYN8)	Alarm-1 to -8 On-delay timer	An alarm output is ON when the delay timer expires after the alarm setpoint is reached. 0.00 to 99.59 (minute.second)	0.00		
AMD (AMD)	Alarm mode	0: Always active 1: Not active in STOP mode 2: Not active in STOP or MAN mode	0		

For the alarm function setting parameter, 4 alarms are displayed for the factory default. The number of alarms can be changed by the setup parameter ALNO. (number of alarms). To change the number of alarms, see User's Manual.

Parameter	n=1	n=2	n=3	n=4	n=5	n=6	n=7	n=8
ALn								
VTn								
HYn								
DYNn								

n: alarm number

PV-related Setting Parameter

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
BS (BS)	PV input bias	-100.0 to 100.0% of PV input range span (EU)	0.0 % of PV input range span		EASY
FL (FL)	PV input filter	OFF, 1 to 120 s	OFF		

PID Setting Parameter

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
P (P)	Proportional band	0.0 to 999.9% When 0.0% is set, it operates as 0.1%.	5.0%		EASY
I (I)	Integral time	OFF: Disable 1 to 6000 s	240 s		
d (D)	Derivative time	OFF: Disable 1 to 6000 s	60 s		
OH (OH)	Control output high limit	-4.9 to 105.0%, (OL<OH)	100.0%		
OL (OL)	Control output low limit	-5.0 to 104.9%, (OL<OH), SD: Tight shut	0.0%		
MR (MR)	Manual reset	Enabled when integral time is OFF. The manual reset value equals the output value when PV = SP. -5.0 to 105.0%	50.0%		
HYS (HYS)	Hysteresis (in ON/OFF control)	0.0 to 100.0% of PV input range span (EU)	0.5 % of PV input range span		
HYUP (HYUP)	Upper-side hysteresis (in ON/OFF control)	0.0 to 100.0% of PV input range span (EU)	0.5 % of PV input range span		
HYLO (HYLO)	Lower-side hysteresis (in ON/OFF control)		0.5 % of PV input range span		
DR (DR)	Direct/reverse action switch	RVS: Reverse action DIR: Direct action	RVS	STD	
PO (PO)	Preset output	In STOP mode, fixed control output can be generated. -5.0 to 105.0%	0.0%		

For the PID setting parameter, 8 groups are displayed for the factory default. The number of groups can be changed by the setup parameter PIDG. (number of PID groups). To change the number of PID groups, see User's Manual.

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	n=5	n=6	n=7	n=8	R
P								
I								
D								
OH								
OL								
MR								
HYS								
HY.UP								
HY.LO								
DR								
PO								

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. Do not use the function for control processes with response such as flow or pressure control.	OFF		EASY
AT.TY (AT.TY)	Auto-tuning type	0: Normal 1: Stability	0		STD
STM (STM)	Sample PI sampled time	0 to 9999 s	60 s		EASY
SWD (SWD)	Sample PI control time span	0 to 9999 s	30 s		
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
MPO1 to MPO5 (MPO1 to MPO5)	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 RP7 (RP1 to RP7)	Reference point 1 to 7	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 ≤ RP4 ≤ RP5 ≤ RP6 ≤ RP7)	100.0% of PV input range	Table below	STD
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 (EU)	0.5% of PV input range span		
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 (EU)	OFF		STD

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	n=4	n=5	n=6	n=7
RPn							

P Parameter (See User Manual)

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 Configuration 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										

10-segment Linearizer-1, -2 Setting Parameter

Menu symbol: **PYS1** (PYS1) **PYS2** (PYS2)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
PYS (PYS)	10-segment linearizer selection	OFF: Disable PV: PV analog input RSP: RSP remote auxiliary analog input AIN2: Not used AIN4: Not used PVIN: PV input OUT: OUT analog output OUT2: Not used RET: RET analog output	PV (CTLM: SGL)		
A1 (A1)	10-segment linearizer input 1	-66.7 to 105.0% of input range (EU) Output linearizer: -5.0 to 105.0%	0.0%		STD
b1 (B1)	10-segment linearizer output 1	10-segment linearizer bias: -66.7 to 105.0% of input range span (EU) 10-segment linearizer approximation: -66.7 to 105.0% of input range (EU) Output linearizer: -5.0 to 105.0%	0.0%		
A2 to A11, b2 to b11 (A2 to A11, B2 to B11)	10-segment linearizer input 2 to 11 10-segment linearizer output 2 to 11	Same as A1 and B1	Same as A1 and B1		
PMD (PMD)	10-segment linearizer mode	0: 10-segment linearizer bias 1: 10-segment linearizer approximation	0		

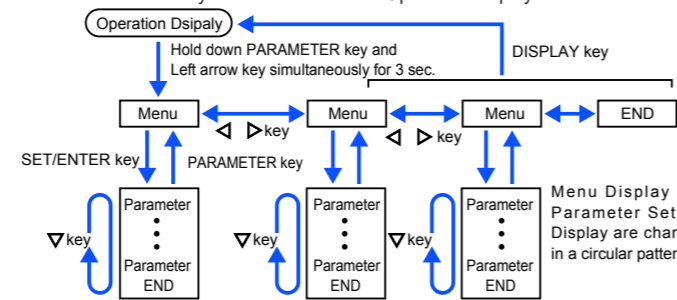
Use the following table to record the 10-segment linearizer input and output setting values.

Parameter	n=2	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10	n=11
An										
Bn										

Setup Parameters

Hold down the PARAMETER 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 once to return to the Operation Display.



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

Operation for Setting

- To select the displayed parameter setting 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 control mode (CTLM), control type (CNT), etc. The parameters for professional setting mode (LEVL: PRO) are not described in this manual. See User's Manual.

Control Function Setting Parameter

Menu symbol: **CTL** (CTL)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
CTLM (CTLM)	Control mode	When using the controls other than Single-loop control, see User's Manual SGL: Single-loop control CAS1: Cascade primary-loop control CAS2: Cascade secondary-loop control CAS: Cascade control BUM: Loop control for backup PVSU: Loop control with PV switching PVSEL: Loop control with PV auto-selector PVHD: Loop control with PV-hold function	SGL		STD
CNT (CNT)	Control type	PID: PID control ONOF: ON/OFF control (1 point of hysteresis) ONOF2: ON/OFF control (2 points of hysteresis) S-PI: Sample PI control BATCH: Batch PID control FFPID: Not used.	PID		EASY
SPGR (SPGR.)	Number of SP groups	Set a number of SP groups to use. 1 to 8	8		
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 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
PIDG. (PIDG.)	Number of PID groups	Set a number of PID groups to use. 1 to 8	8		
SMP (SMP)	Input sampling period (control period)	50: 50 ms, 100: 100 ms, 200: 200 ms	100		

PV Input Setting Parameter

Menu symbol: **PV** (PV)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
IN (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	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		EASY
SL (SL)	Minimum value of PV input scale		Depends on the input type		

bSL (BSL)	PV input burnout action	OFF: Disable UP: Upscale DOWN: Downscale	Depends on the input type		
AbS (A.BS)	PV analog input bias	-100.0 to 100.0% of PV input range span (EU)	0.0 % of PV input range span		STD
RfL (A.FL)	PV analog input filter	OFF, 1 to 120 s	OFF		

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

RSP Input Setting Parameter (E1 terminal Area)

Menu symbol: **RSP** (RSP)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
IN (IN)	RSP remote auxiliary analog input type	0.4-2V: 0.400 to 2.000 V 1-5V: 1.000 to 5.000 V 0-2V: 0.000 to 2.000 V 0-10V: 0.00 to 10.00 V 0-125: 0.000 to 1.250 V	1-5V		
UNIT (UNIT)	RSP remote auxiliary analog input unit	-: No unit, C: Degree Celsius -: No unit, -: No unit, - -: No unit, F: Degree Fahrenheit	C		
RH (RH)	Maximum value of RSP remote auxiliary analog input range	Depends on RSP remote auxiliary analog input type (IN)	5		EASY
RL (RL)	Minimum value of RSP remote auxiliary analog input range		1		
SDP (SDP)	RSP remote auxiliary analog 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	1		
SH (SH)	Maximum value of RSP remote auxiliary analog input scale	-19999 to 30000, (SL<SH), SH - SL ≤ 30000	1370.0		EASY
SL (SL)	Minimum value of RSP remote auxiliary analog input scale		-270.0		
bSL (BSL)	RSP remote auxiliary analog input burnout action	OFF: Disable UP: Upscale DOWN: Downscale	OFF		STD

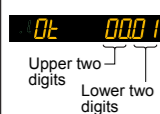
Input Range, SP Limiter Setting Parameter

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 F: Degree Fahrenheit	Same as PV input unit		
PDP (PDP)	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	Depends on the input type		
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				
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 % of PV input range		

■ Output Setting Parameter

Menu symbol: **OUT** (OUT)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
OT (OT)	Output type selection 	Control output (Lower two digits) 00: OFF 01: OUT terminals (voltage pulse) 02: OUT terminals (current) 03: OUT terminals (relay)	Standard type: 00.03		EASY
CT (CT)	Control output cycle time	0.5 to 1000.0 s	30.0 s		EASY
RTS (RTS)	Retransmission output type of RET	OFF: Disable PV1: PV SP1: SP OUT1: OUT LPS: 15 V DC loop power supply PV2: Loop-2 PV SP2: Loop-2 SP OUT2: Loop-2 OUT TSP1: Target SP HOUT1: Not used COUT1: Not used MV1: Not used TSP2: Loop-2 target SP HOUT2: Not used COUT2: Not used MV2: Not used PV: PV terminals analog input RSP: RSP terminals remote auxiliary analog input AIN2: Not used AIN4: Not used * Loop-2 setting values are unavailable in Single-loop control.	PV1		EASY
RTH (RTH)	Maximum value of retransmission output scale of RET	When RTS = PV1, SP1, PV2, SP2, TSP1, TSP2, PV or RSP: RTL + 1 digit to 30000 -19999 to RTH - 1 digit Decimal point position: When RTS=PV1, SP1, or TSP1, decimal point position is same as that of PV input. When RTS=PV2, SP2, or TSP2, decimal point position is same as that of RSP input.	100 % of PV input range		STD
RTL (RTL)	Minimum value of retransmission output scale of RET	When RTS=PV, decimal point position is same as that of PV input scale. When RTS=RSP, decimal point position is same as that of RSP input scale.	0 % of PV input range		STD
O1RS (O1RS)	Retransmission output type of OUT current output	Same as RTS	OFF		
O1RH (O1RH)	Maximum value of retransmission output scale of OUT current output	When O1RS = PV1, SP1, PV2, SP2, TSP1, TSP2, PV or RSP: O1RL + 1 digit to 30000 -19999 to O1RH - 1 digit Decimal point position: When O1RS=PV1, SP1, or TSP1, decimal point position is same as that of PV input. When O1RS=PV2, SP2, or TSP2, decimal point position is same as that of RSP input.	-		STD
O1RL (O1RL)	Minimum value of retransmission output scale of OUT current output	When O1RS = PV, decimal point position is same as that of PV input scale. When O1RS = RSP, decimal point position is same as that of RSP input scale.	-		STD
OUA (OUA)	OUT current output range	4-20: 4 to 20 mA 0-20: 0 to 20 mA 20-4: 20 to 4 mA 20-0: 20 to 0 mA	4-20		
RETA (RETA)	RET current output range	20-4: 20 to 4 mA 20-0: 20 to 0 mA	4-20		

■ RS-485 Communication Setting Parameter (E3 terminal Area)

Note: See User's Manual for available Modbus addresses

Menu symbol: **R485** (R485)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
PSL (PSL)	Protocol selection	PCL: Not used PCLSM: Not used LADR: Not used CO-M: Coordinated master station CO-S: Coordinated slave station MBASC: Modbus (ASCII) MBRTU: Modbus (RTU) CO-S1: Coordinated slave station (Loop-1 mode) CO-S2: Coordinated slave station (Loop-2 mode) P-P: Not used	MBRTU		EASY
BPS (BPS)	Baud rate	600: 600 bps 1200: 1200 bps 2400: 2400 bps 4800: 4800 bps 9600: 9600 bps 19200: 19.2k bps 38400: 38.4k bps	19200		EASY
PRI (PRI)	Parity	NONE: None EVEN: Even ODD: Odd	EVEN		
STP (STP)	Stop bit	1: 1 bit, 2: 2 bits	1		
DLN (DLN)	Data length	7: 7 bits, 8: 8 bits	8		
ADR (ADR)	Address	1 to 99	1		

■ Ethernet Communication Setting Parameter (E3 terminal Area)

Note: See User's Manual for available Modbus addresses

Menu symbol: **ETHR** (ETHR)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
HSR (HSR)	High-speed response mode	OFF, 1 to 8	1		
BPS (BPS)	Baud rate	9600: 9600 bps 19200: 19.2k bps 38400: 38.4k bps	38400		
PRI (PRI)	Parity	NONE: None EVEN: Even ODD: Odd	EVEN		
IP1 to IP4 (IP1 to IP4)	IP address 1 to 4	0 to 255 Initial value: (IP1),(IP2),(IP3),(IP4) =(192),(168),(1),(1))	See left	Table below	
SM1 to SM4 (SM1 to SM4)	Subnet mask 1 to 4	0 to 255 Initial value: (SM1),(SM2),(SM3),(SM4) =(255),(255),(255),(0))	See left	Table below	
DG1 to DG4 (DG1 to DG4)	Default gateway 1 to 4	0 to 255 Initial value: (DG1),(DG2),(DG3),(DG4) =(0),(0),(0),(0))	See left	Table below	EASY
PR1 (PR1)	Port number	502, 1024 to 65535	502		
IPAR (IPAR)	IP access restriction	OFF: Disable, ON: Enable	OFF		
IP1 to IP4, 2IP1 to 2IP4 (IP1 to IP4, 2IP1 to 2IP4)	Permitted IP address 1-1 to 1-4 Permitted IP address 2-1 to 2-4	0 to 255 Initial value: (1.IP1),(1.IP2),(1.IP3),(1.IP4) =(255),(255),(255),(255) (2.IP1),(2.IP2),(2.IP3),(2.IP4) =(255),(255),(255),(255)	See left	Table below	
ESW (ESW)	Ethernet setting switch	Setting this parameter to "ON" enables the Ethernet communication parameter settings. OFF, ON The parameter ESW automatically returns to "OFF" after "ON" is set.	OFF		

Use the following table to record Ethernet communication setting value.

Parameter	n=1	n=2	n=3	n=4
IPn				
SMn				
DGn				
1.IPn				
2.IPn				

■ Key Action Setting Parameter

Menu symbol: **KEY** (KEY)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
F1 (F1)	User function key-1 action setting	OFF: Disable A/M: AUTO/MAN switch C/A/M: CAS/AUTO/MAN switch R/L1: REM/LCL switch R/L2: Loop-2 REM/LCL switch S/R: STOP/RUN switch CAS: Switch to CAS AUTO: Switch to AUTO MAN: Switch to MAN REM1: Switch to REM LCL1: Switch to LCL REM2: Switch to Loop-2 REM LCL2: Switch to Loop-2 LCL STOP: Switch to STOP RUN: Switch to RUN AT: Auto-tuning LTUP: LCD brightness UP LTDN: LCD brightness DOWN BRI: Adjust LCD brightness LCD: LCD backlight ON/OFF switch LAT: Latch release PID: PID tuning switch * Loop-2 setting values are unavailable in Single-loop control.	OFF		
F2 (F2)	User function key-2 action setting		OFF		EASY
Fn (Fn)	User function key-n action setting		PID		

■ Display Function Setting Parameter

Menu symbol: **DISP** (DISP)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
DVB (DVB)	Deviation display band	Permits a change in the span of deviation shown on the front-panel deviation monitor. 0.0 to 100.0% of PV input range span (EU).	1.0 % of PV input range span		STD
PCMD (PCMD)	Active color PV display switch	0: Fixed in white 1: Fixed in red 2: Link to alarm 1 (Alarm OFF: white, Alarm ON: red) 3: Link to alarm 1 (Alarm OFF: red, Alarm ON: white) 4: Link to alarm 1 or 2 (Alarm OFF: white, Alarm ON: red) 5: Link to alarm 1 or 2 (Alarm OFF: red, Alarm ON: white) 6: PV limit (Within range: white, Out of range: red) 7: PV limit (Within range: red, Out of range: white) 8: SP deviation (Within deviation: white, Out of deviation: red) 9: SP deviation (Within deviation: red, Out of deviation: white) 10: Link to DI (ON: red, OFF: white)	0		EASY
PCH (PCH)	PV color change high limit	Set a display value when in PV limit or SP deviation. -19999 to 30000 (Set a value within the input range.)	0		
PCL (PCL)	PV color change low limit	Decimal point position depends on the input type.	0		
BAR1 (BAR1)	Upper bar-graph display registration	0: Disable 1: OUT 2: Not used 3: PV 4: SP 5: Deviation 6: Loop-2 OUT 7: Not used 8: Loop-2 PV 9: Loop-2 SP 10: Loop-2 deviation 11 to 16: Disable bar graph 17: Not used 18: PV terminals analog input 19: RSP terminals remote auxiliary analog input 20: Not used 21: Not used 27: TSP 28: TSP deviation 29: Loop-2 TSP 30: Loop-2 TSP deviation	5		STD
BAR2 (BAR2)	Lower bar-graph display registration		1		
BDV (BDV)	Bar-graph deviation display band	0.0 to 100.0% of PV input range span (EU)	1.0 % of PV input range span		
GUID (GUID)	Guide display ON/OFF	OFF: Nondisplay, ON: Display	ON		STD
ECO (ECO)	Economy mode	OFF: Disable 1: Economy mode ON (All indications except PV display OFF) 2: Economy mode ON (All indications OFF) 3: Brightness 10 % (whole indication)	OFF		
BRI (BRI)	Brightness	(Dark) 1 to 5 (Bright)	3		EASY
MLSD (MLSD)	Least significant digital mask of PV display	OFF: With least significant digit ON: Without least significant digit	OFF		STD
MKTP (MKTP)	Method for least significant digital mask of PV display	0: Rounding, 1: Rounding-off	0		STD

■ SELECT Display Setting Parameter

Menu symbol: **CSEL** (CSEL)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
CS1 to CS5 (CS1 to CS5)	SELECT Display-1 to -5 registration	Register the operation parameter (except the Operation Mode) that is frequently modified to display it in the Operation Display. OFF, 2301 to 5000, 6701 to 6710 For the setting range, see User's Manual.	OFF	Table below	STD

Use the following table to record SELECT Display setting value.

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

■ Key Lock Setting Parameter

Menu symbol: **KLOC** (KLOC)

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

■ DI Function Registration Parameter

Menu symbol: **DISL** (DISL)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
A/M (A/M)	AUTO/MAN switch		5025		
R/L (R/L)	REMOTE/LOCAL switch		5046		
S/R (S/R)	STOP/RUN switch		5026		
CAS (CAS)	Switch to CAS		OFF		
AUTO (AUTO)	Switch to AUTO	The values below will assign the digital input to the function. Set "OFF" to disable the function.	OFF		
MAN (MAN)	Switch to MAN	Standard terminals DI1: 5025, DI2: 5026, DI3: 5027	OFF		STD
REM (REM)	Switch to REMOTE	E1-terminal area (Models with RSP remote auxiliary analog input), DI16: 5046	OFF		
LCL (LCL)	Switch to LOCAL		OFF		
AT (AT)	Auto-tuning START/STOP switch		OFF		
LAT (LAT)	Latch release		OFF		
LCD (LCD)	LCD backlight ON/OFF switch		OFF		
PVRW (PVRW)	PV red/white 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	See next paragraph.	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>SPb3</i> (SP.B3)	Bit-3 of SP number		OFF		
<i>PNb0</i> (PN.B0)	Bit-0 of PID number	The values below will assign the digital input to the bit number. Set "OFF" to disable the function. Standard terminals DI1: 5025, DI2: 5026, DI3: 5027 E1-terminal area DI16, 5046	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>PNb3</i> (PN.B3)	Bit-3 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			
<i>SPbC</i> (SP.BC)	Bit changing method of SP number	0: Status switch 1 1: Status switch 2	0		STD

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	The values below will assign the alarm to the alarm output. 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 Alarm 5: 4358	4354		
<i>AL3S</i> (AL3.S)	AL3 function selection	Alarm 6: 4359 Alarm 7: 4361 Alarm 8: 4362	4355		
<i>ORS</i> (OR.S)	OUT relay function selection	AUTO (OFF) / MAN (ON) status: 4193 REM (ON) / LCL (OFF) status: 4194 STOP (ON) / RUN (OFF) status: 4195 Output tracking (ON) switching signal: 4201 FAIL (Normally ON) output: 4256	OFF		

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>RLM</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		
<i>FREQ</i> (FREQ)	Power frequency	AUTO, 60: 60 Hz, 50: 50 Hz	AUTO		EASY
<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	ENG		
<i>PASS</i> (PASS)	Password setting	0 (No password) to 65535	0		

Error and Version Confirmation Parameter (for display only)

Menu symbol: *VER* (VER)

Parameter symbol	Name of Parameter	Status record	Display level
<i>PAER</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)	Loop-1 PV input error status		
<i>PV2E</i> (PV2.E)	Loop-2 PV input error status		
<i>LAER</i> (LA.ER)	Not used		
<i>MCU</i> (MCU)	MCU version		
<i>DCU</i> (DCU)	DCU version		
<i>ECU1</i> (ECU1)	ECU-1 version (E1-terminal area)		
<i>ECU2</i> (ECU2)	ECU-2 version (E2-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		EASY
<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)		

* The parameters for Loop-2 are unavailable in Single-loop control.

Parameter Display Level Parameter

Menu symbol: *LVL* (LVL)

Parameter symbol	Name of Parameter	Setting Range	Initial value	User setting	Display level
<i>LVL</i> (LVL)	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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