



## ■ SPECIFICATIONS

### INPUT SPECIFICATIONS

#### Input signal:

Thermocouple ... B, R, S, N, K, E, J, T, U, L, WRe5-WRe26, W-WRe26, PtRh40-PtRh20, PlatineI II  
Resistance thermometer ... Pt100, JPt100  
DC voltage ... 0 to 20mV, 0 to 5V, 0 to 10V  
DC current ... 4 to 20mA [By using a 250Ω shunt resistor (sold separately) and 5V range (1 to 5V)]

#### Measuring range:

Refer to the list of measuring ranges.  
Total of 20 kinds consisted of 14 kinds of thermocouple, 2 kinds of resistance thermometer, 3 kinds of dc voltage, and 1 kind of dc current

#### Accuracy ratings:

±0.1% of measuring range ± 1 digit (at reference operation conditions), exception PtRh40-PtRh20: ±0.3% ± 1 digit  
Refer to the details of accuracy ratings.

#### Reference junction compensation accuracy:

±1.0°C (23°C ± 10°C), ±2.0°C (-10 to 50°C)

#### Temperature unit: °C or °F

#### Sampling period: Approx. 0.2 second

#### Burnout: Up scale/down scale (selectable)

#### Allowable signal source resistance:

Thermocouple/mV input ... 250Ω or less  
V input ... 1kΩ or less  
Resistance thermometer input ... 10Ω or less (per wire)

#### Input resistance: Thermocouple/DC voltage ... 1MΩ or more DC current ... Approx. 250Ω

#### Measuring current: Resistance thermometer ... 1mA ± 20%

#### Measuring input shift (sensor correction):

Can be set with the resolution of 0.1 times the setting resolution of SV (-19999 to 20000)

#### Digital filter: 0.0 to 99.9 seconds

#### Scaling: Range/scale of DC voltage/current input (-19999 to 20000), optional setting

#### Scale decimal point: 0 to 4

#### Maximum allowable input range: DC voltage ... ±10VDC RTD ... ±5VDC

#### Maximum common mode voltage: 30VAC

#### Common mode rejection ratio:

130dB or more (50/60Hz) (signal source resistance 1Ω or less)

#### Series mode rejection ratio:

50dB or more (50/60Hz) (signal source resistance 1Ω or less)

### CONTROL SPECIFICATIONS

#### Control cycle time: Approx. 0.2 second

#### Control system:

On-off pulse type PID system  
Current output type PID system  
SSR drive pulse type PID system  
On-off servo type PID system  
Voltage output type PID system  
Multiple control type (on-off pulse type/current output type/SSR drive pulse type) PID system  
\* 2-position control is selectable.

#### Control setpoint: 4 sets switching, 5-digit setting

#### Setpoint limiter: Within measuring range

#### Setpoint ramp function:

Setpoint ramp unit ... °C/second, °C/minute, °C/hour (common to rising/falling)  
Setpoint rising ramp: 0 to 20000 (0 = no operation)  
Setpoint falling ramp: 0 to 20000 (0 = no operation)  
PV start function ... At SV change, power-on, MAN to AUTO, etc.

#### Control setpoint accuracy ratings:

Relative error to displayed value ... ± 1 digit

#### Auto-tuning: Standard (Manual setting of PID constants enabled)

#### PID constants:

4 sets switching (interlocking to SV)  
P ... 0.1 (0.0) to 999.9% (0 = 2-position)  
I ... 0 to 9999 seconds  
D ... 0 to 9999 seconds

#### PID deadband (gap):

0.0 to 9.9% (4 sets switching, interlocking to SV)

#### Anti-reset windup:

High limit ... 0.0 to 100.0%, Low limit ... -100.0 to 0.0%

#### Overshoot suppression function:

On/off selectable (4 sets independent switching, interlocking to SV, independent keeping of learned results)

#### Control operation:

With direct/reverse action switching

### Output specifications:

#### • On-off pulse type

Output signal ... On-off pulse conductive signal

#### Contact ratings ...

Resistive load 100VAC 5A, 240VAC 5A, 30VDC 5A  
Inductive load 100VAC 2.5A, 240VAC 2.5A, 30VDC 2.5A

Electrical relay life ... More than 100,000 times

Pulse cycle ... Approx. 1 second to 180 seconds adjustable  
Contact protection element ... Not built-in [If required, add a contact protection element (sold separately) externally.]

#### • Current output type

Output signal ... 4 to 20mADC, Load resistance ... 600Ω or less

#### • SSR drive pulse type

Output signal ... On-off pulse voltage signal

At ON 12VDC ± 20% (load current ... 20mA or less)  
At OFF 0.8VDC or less

Pulse cycle ... Approx. 1 second to 180 seconds adjustable

#### • On-off servo type

Output signal ... On-off conductive signal

Feedback resistance ... 100Ω to 2.5kΩ

#### Contact ratings ...

Resistive load 100VAC 5A, 240VAC 5A, 30VDC 5A  
Inductive load 100VAC 2.5A, 240VAC 2.5A, 30VDC 2.5A  
Minimum load 5VDC or more, 10mADC or more

Electrical relay life ... More than 100,000 times

Contact protection element ... Not built-in [If required, add a contact protection element (sold separately) externally.]  
Combination adjustment ... Manual or auto-tuning

#### • Voltage output type

Output signal ... 0 to 10VDC

Output resistance ... Approx. 10Ω

Load resistance ... 50kΩ or more

#### Output limiter: 4 sets switching (interlocking to SV)

High limit ... 0.0 to 105.0%, Low limit ... -5.0 to 100.0%

#### Output variation limiter: 4 sets switching (interlocking to SV)

Rising ... 0.1 to 100.0%, Falling ... -100.0 to -0.1%

#### Output preset: -100.0 to 100.0%

#### PV error output: -5.0 to 105.0%

#### Run/Ready: Run/ready (control stop, output: preset output value) selectable

#### Preset output: -5.0 to 105.0%

#### Control at power recovery: Continuous/ready selectable

#### Auto-output/man-output (AUTO/MANUAL): Balanceless bumpless switching

### EVENT SPECIFICATIONS

#### Event point: 2 points (Additional 2 points can be added. – option)

#### Event type:

Setting to each of Event 1/2  
Absolute value alarm ... High/low, standby enabled/disabled  
Deviation alarm ... High/low, standby enabled/disabled  
Absolute value deviation alarm ... High/low, standby enabled/disabled  
Setpoint alarm ... High/low, standby enabled/disabled  
Output value alarm ... High/low, standby enabled/disabled  
Abnormal control loop, fail, heater disconnection alarm, timer function

#### Event setpoint: Event 1/2, 4 sets individual setting

#### Event deadband: Can be set by the resolution of 0.1 times the setting resolution of SV, Setting to each Event 1/2

#### Event delay: 0 to 9999 seconds

#### Event output phase: Normal/reverse selectable

#### Event output at Ready: Off/computation selectable

#### Event output:

Output signal ... Form A relay output

#### Contact ratings ...

Resistive load 100VAC 3A, 240VAC 3A, 30VDC 3A  
Inductive load 100VAC 1.5A, 240VAC 1.5A, 30VDC 1.5A

Minimum load 5VDC or more, 10mADC or more

Electrical relay life ... More than 100,000 times

Contact protection element ... Not built-in [If required, add a contact protection element (sold separately) externally.]

### RETRANSMISSION OUTPUT SPECIFICATIONS

Output signal being proportioned to the setpoint, the measured value, control output value, etc.

#### Output signal:

1 kind to be specified from 4 to 20mADC (load resistance ... 400Ω or less), 0 to 1VDC, or 0 to 10VDC (output resistance ... approx. 10Ω, load resistance ... 50kΩ or more)

#### Output accuracy: ±0.2% of retransmission scale range

#### Output resolution: Approx. 1/30000

#### Retransmission scale: -19999 to 20000, optional setting

### REMOTE CONTACTS INPUT SPECIFICATIONS

Following functions enabled by the remote contacts input

**Input point:** 4 points (No-voltage contacts or transistor open collector)  
(Remote contacts rating ...5VDC or more, 2mA or more)

#### Function:

The following functions are allocated by parameter settings.

- (1) Setpoint external switching, (2) Auto/man external switching
- (3) Run/ready switching, (4) Timer start-up, (5) Holding of the setpoint ramp operation, (6) Resetting of the setpoint ramp operation,
- (7) Remote/local switching

### DISPLAY/SETTING SPECIFICATIONS

**Display type:** 5-digit seven-segment LED display, two lines

Status display ... 8 independent LEDs

Deviation display ... 2-segment

#### Display content:

First LED (green) display ...

At operation mode: Measured value (PV)

Decimal place of PV is optionally set in 0 to 4.

At setting mode: Parameter item

Second LED (red) display ...

At operation mode: Setpoint (SV) or control output value (OUT)

At setting mode: Parameter or data monitoring (operation mode)

Status (red/green) ...

EV1 (red): Lights when EV1 is activated.

EV2 (red): Lights when EV2 is activated.

MAN (red): Lights when the control output value is set manually.

SV1/2/3/4 (green): The number selected is lit.

OUT (green): Lights when the control output value is displayed in the second display.

Deviation display (green) ...  $\Delta$  or  $\nabla$  lights in accordance with deviation (settable).

#### Operation mode display:

No display function of the operation mode screen, 5 levels

**Automatic return:** Returns to operation mode if any key is not pressed for more than 1 minute in setting mode.

**Password:** No display function of the setting mode screen by a password, 3 levels

**Key lock:** Locking function of parameters, 5 levels

**Eng. port:** Communications enabled by connecting the exclusive cable (Model: RZ-EC1) to the Eng. port at the upper side of the case.

Parameter programming software package available (release shortly)

### GENERAL SPECIFICATIONS

**Rated power voltage:** 100 to 240VAC 50/60Hz (universal)

**Allowable power voltage:** 90 to 264VAC

**Power consumption:** Approx. 16VA (max.)

#### Operation conditions:

Operation	Reference condition	Normal condition
Ambient temperature	23°C $\pm$ 2°C	-10 to 50°C (Max. 40°C for closed-installation)
Ambient humidity	55% $\pm$ 5%RH	20 to 90%RH
Power supply	100VAC $\pm$ 1%	90V to 264VAC
Power frequency	50Hz/60Hz $\pm$ 1%	50Hz/60Hz $\pm$ 2%
Mounting angle	Forward/backward $\pm$ 3 degrees or less	Forward/backward $\pm$ 10 degrees or less
Vibration/impact	0m/s <sup>2</sup> / 0m/s <sup>2</sup>	2m/s <sup>2</sup> / 0m/s <sup>2</sup>

**Ambient temperature change ratio:** 10°C/H or less

**Warm-up time:** 30 minutes or more

**Power interruption:** Parameters are memorized by EEPROM (Writing: Approx. 100,000 times)

#### Insulation resistance:

Between primary side terminals (\*1) and secondary side terminals (\*2) 20M $\Omega$  or more at 500VDC

#### Dielectric strength:

Between primary side terminals (\*1) and secondary side terminals (\*2) 1 minute at 1500VAC

\*1 = Terminals of power supply, control output event relay output

\*2 = Terminals except above

**Front and case:** Front ... Non-flammable ABS

Case ... Non-flammable polycarbonate resin

**Color:** Gray

**Installation:** Flush panel installation

**Weight:** Approx. 350 to 500g (max.)

#### Transportation/storage condition (with packing at shipment):

Ambient temperature ... -20 to 60°C

Ambient humidity ... 5 to 95%RH (no dew condensation)

Vibration ... 0 to 4.9m/s<sup>2</sup> (10 to 60Hz)

Impact ... 400m/s<sup>2</sup> or less

### INTERNATIONAL STANDARDS

**CE:** EN61326+A1 \*, EN61010+A2

**UL:** UL3121-1 (approval pending)

**CSA (C-UL):** C22.2, No. 1010 (approval pending)

**NEMA:** NEMA250 4X (front panel: option) (equivalent to IEC529 IP66)

Note: Not available in closed-installation

\* The display of the measured value and output may vary up to  $\pm$ 10% or  $\pm$ 2mV under the EMC test ambient.

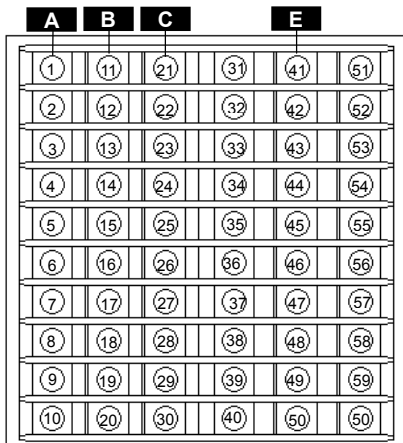
### ACCURACY RATINGS

Input	Accuracy ratings	Details	
T/C	B	$\pm$ 0.1% $\pm$ 1 digit exception: $\pm$ 0.2% $\pm$ 1 digit for -200°C to 0°C	Not specified for less than 400°C
	R		400°C to 800°C: $\pm$ 0.2% $\pm$ 1 digit
	S		0°C to 400°C: $\pm$ 0.2% $\pm$ 1 digit
	N, K, E, J, T, U, L		0°C to 400°C: $\pm$ 0.2% $\pm$ 1 digit
	WRe5-WRe26		
	W-WRe26		0°C to 400°C: $\pm$ 0.4% $\pm$ 1 digit
	Platinel II		
PIRh40-PIRh20	$\pm$ 0.3% $\pm$ 1 digit	0°C to 400°C: $\pm$ 2% $\pm$ 1 digit	
		400°C to 800°C: $\pm$ 1% $\pm$ 1 digit	
RTD	Pt100 JPt100	$\pm$ 0.1% $\pm$ 1 digit	
DC voltage	mV, V	$\pm$ 0.1% $\pm$ 1 digit	
DC current	mA	$\pm$ 0.1% $\pm$ 1 digit	By using the shunt resistor specified for current input

### OPTIONS

Option	Contents
Control output 2 (Heating/cooling)	Control calculation: Matching computation/cooling proportion computation switching Matching computation parameters • Split direct ... 0.0 to 60.0% • Split reverse ... 40.0 to 100.0% Cooling proportion computation parameters • Cooling proportional band coefficient ... 0.00 to 10.00 • Deadband ... -50.0 to 50.0% Pulse cycle: 1 second to 180 seconds (cooling side)
Communications interface (RS-232C, RS-422A or RS-485)	The setpoint and the measured value can be transmitted to a master CPU, and the parameters can be set by the master CPU. Protocol: MODBUS, RTU mode/Ascii mode switching, and private protocol Address: 01 to 99 Communications function: 1 kind to be specified from setpoint/data transmission, digital transmission, or digital remote
Remote signal input	Remote input function By the remote contacts, Remote or Local can be selected, and the setpoint can be set in Remote. This function can be used in a secondary controller for cascade control. Input signal: 1 kind to be specified from 4 to 20mADC (input resistance approx. 50 $\Omega$ ), 0 to 1VDC (input resistance approx. 500k $\Omega$ or more), or 0 to 10VDC (input resistance approx. 100k $\Omega$ or more) Input accuracy: $\pm$ 0.3% of input range $\pm$ 1 digit Input resolution: Approx. 1/40000 Remote scale: Optional setting from -19999 to 20000 Remote shift: Can be set by the resolution being 0.1 times the setting resolution of SV (-19999 to 20000) Cascade primary controller function Cascade calculation: SV2 = (a + d x SV1/100) x MV1 + b + c x SV1 SV2 ... SV (%) of secondary controller SV1 ... SV (%) of primary controller MV1 ... PID constants (%) of primary controller Cascade parameters: a = primary ratio fixed parameter ... 0.01 to 1.00 b = primary bias fixed parameter ... -100.0 to 100.0% c = Primary bias variable parameter ... 0.00 to 1.00 d = Primary ratio variable parameter ... 0.00 to 1.00
Heater disconnection detection	Function to detect the heater disconnection by CT input (CT: separate purchase required) Input signal: 5.0 to 50.0AAC (50/60Hz) Input accuracy: $\pm$ 5% of full scale $\pm$ 1 digit Resolution: Approx. 1/400 Recommended CT: Model CTL-6-S-H
Water-proof	For water-proofing of the front panel, a rubber packing is inserted between a controller and a panel board. NEMA250 4X (equivalent to IEC529, IP66) This option cannot be applied for closed-installation.

## ■ TERMINAL BOARD



Note) 1. All terminal screws are M3.5.  
2. For Y-tip or O-tip, use it with the outside dimension of 7mm or less.

### Line A Measuring input/control output 1/power supply

Measuring input	No.	Voltage (current *)	T/C	RTD
	1	+	/	/
	2	/	+	A
	3	-	-	B
4	/	/	B	

\* For current input  
Connect a shunt resistor (250Ω, sold separately) to + and - terminals.

Control output (heating)	No.	On-off pulse type multiple output 1 (On-off pulse output)	SSR drive pulse type Current output type Voltage output type	On-off servo type See <b>Line C</b>
	6	H (NC)	+	/
	7	C (COM)	-	/
	8	L (NO)	/	/

Power	No.	
	9	L (live)
10	N (Neutral)	

### Line B Communications/remote contacts input

Communications interface	No.	RS-232C	RS-422A	RS-485
	11	SD	SDA	SA
	12	/	SDB	SB
	13	RD	RDA	/
	14	/	RDB	/
15	SG	SG	SG	

Remote contacts input	No.	
	16	DI1+
	17	DI2+
	18	DI3+
	19	DI4+
20	DI-COM	

### Line C Retransmission output/control output 2/CT/event output ... differs on output type of heating control.

No.	Standard	No.	On-off servo type	No.	Multiple type
21	+	Retransmission output	21	/	Retransmission output
22	-		22	R1 (open)	
23	H (NC) +	Control output 2 (cooling)	23	RC (common)	Multiple output 2 (SSR drive pulse)
24	C (COM) -		24	R2 (close)	
25	L (NO) /		25	M3 (close)	
26	CT		26	M2 (open)	
27	CT	CT input	27	M1 (common)	Multiple output 3 (Current output)
28	EV1		28	EV1	
29	EV2	COM12	29	EV2	COM12
30	COM12		30	COM12	

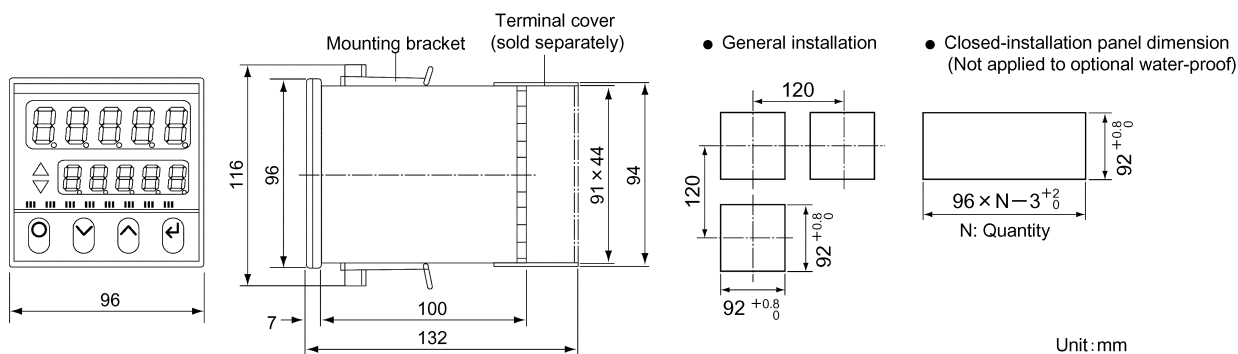
Note) The retransmission output is in **Line E** for on-off servo type and in **Line C** for other types.

### Line E Remote contacts input, etc.

No.		
21	+	Retransmission output (On-off servo type only)
22	-	
23	+	Remote input
24	-	
25	/	/
26	R/L+	Remote/Local *
27	R/L-COM	
28	EV3	Buffer relay
29	EV4	Buffer relay
30	COM34	Power

\* R/L: Analog remote/local switching (ON: Remote, OFF: Local)

## ■ DIMENSIONS AND PANEL CUTOUT (Steel plate with thickness of 1 to 10mm is recommended for installation.)



## ■ ACCESSORIES (Separate purchase is required.)

Accessory	Remarks
CT (current transformer)	Recommendation: Model CTL-6-S-H
Terminal cover	The depth is extended to 132mm by the terminal cover.
Shunt resistor for current input (250Ω)	For measurement by DC current of 4 to 20mA

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