

# Single Loop Controller

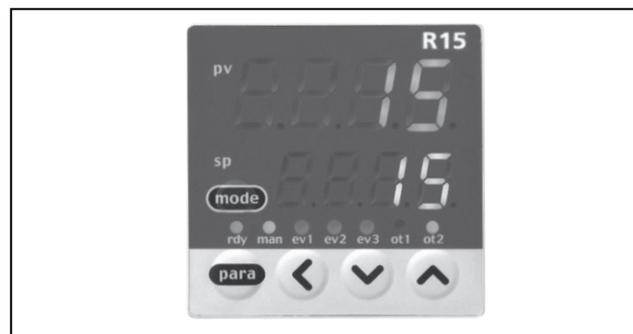
## Model R15

### General

Model R15 is a 48 x 48mm compact digital indicating controller featuring group multi-range inputs and PID control system using new algorithms "RationalLOOP PID (Ra-PID)" and "Just-FITTER".

Up to two control output points (this number of points may vary depending on the model) can be used, which are selectable from the relay contact and current.

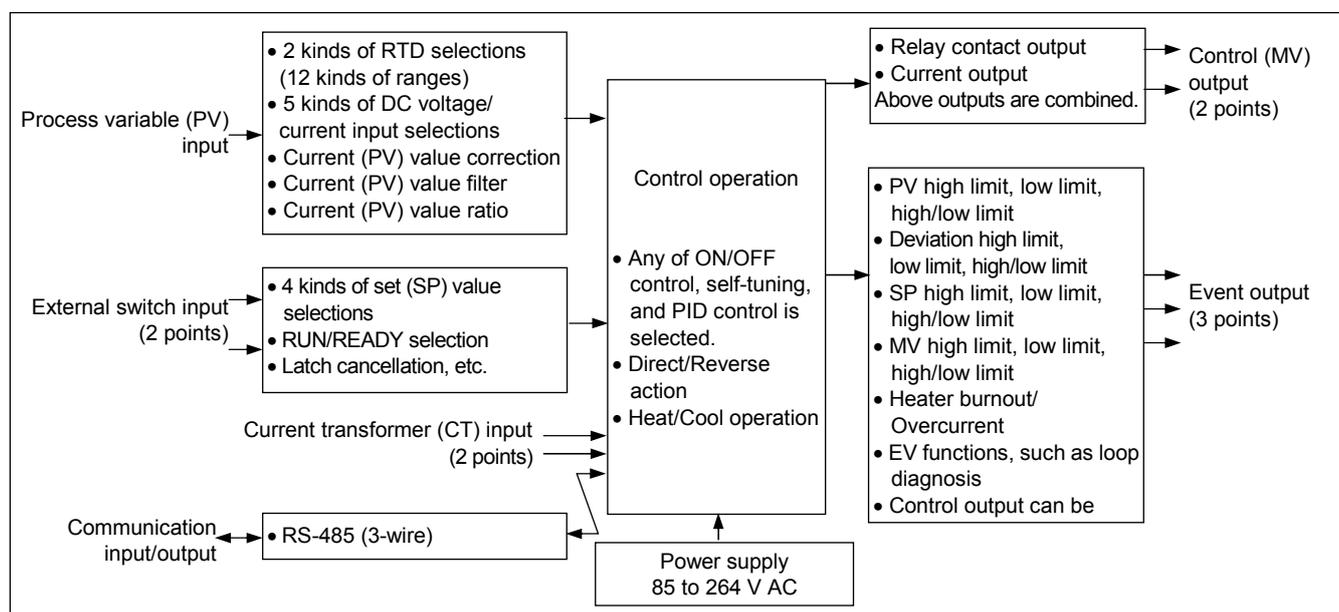
Two kinds of mounting methods are provided, panel mounting type and socket mounting type.



### Features

- Compact body with a depth of 60mm. The mask of the front panel is also only 2mm thick.
- The accuracy is  $\pm 0.5\%$  FS.
- The input type can be changed among the RTD group and linear group.
- The control method can be selected from any of the ON/OFF control, PID control using "RationalLOOP PID (Ra-PID) + Just-FITTER", and self-tuning.
- The heat and cool control can be achieved by using two control output points and event outputs.
- 18 kinds of operations, such as set (SP) value selection, RUN/READY selection, and latch cancellation, etc. can be set using two external switch input points.
- The process variable (PV) value can be corrected.
- The controller is applicable to the communication (3-wire RS-485) as optional.
- Up to eight points can be registered for the parameter keys, ensuring easy operation.
- Use of "mode" key ensures easy operation, RUN/READY, AUTO/MANUAL, and LSP selections, and latch cancellation.
- Up to three event output points are provided. In addition to temperature events, such as PV, DEV, and SP, CT heater burnout/overcurrent, status events such as loop diagnosis can also be set.

### Basic Function Block of Model R15



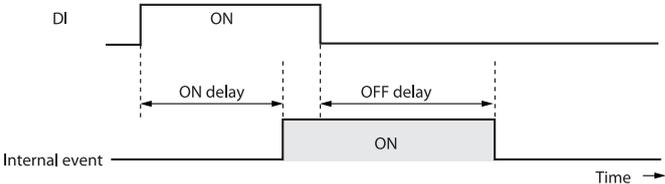
## Specifications

<b>PV input</b>	Input type	RTD, DC current, DC voltage (Selected by model. See Table 1.)		
	Sampling time	0.5 s		
	Process variable (PV) correction	-1999 to +9999 or -199.9 to +999.9		
	Input bias current	RTD input	Approx. 1mA (flowed from A-terminal)	
		DC voltage input	0 - 5 V, 1 - 5 V range: 3.5 $\mu$ A or less 0 - 10 V range: 7 $\mu$ A or less	
	Effect of wiring resistance	RTD input	$\pm 0.05$ %FS/ $\Omega$ or less	
		DC voltage input	0 - 5 V, 1 - 5 V range: 3.5 $\mu$ V/ $\Omega$ or less 0 - 10 V range: 7 $\mu$ V/ $\Omega$ or less	
	Display at burnout	RTD input	RTD burnout: Upscale + alarm display (AL01) A-wire burnout: Upscale + alarm display (AL01) B-wire burnout: Upscale + alarm display (AL01, AL03) C-wire burnout: Upscale + alarm display (AL01, AL03) 2 or 3 wires burnout: Upscale + alarm display (AL01, AL03) A- and B-wire short-circuit: Downscale + alarm display (AL02) A- and C-wire short-circuit: Downscale + alarm display (AL02)	
		DC voltage input	Downscale + alarm display (AL02) However, burnout cannot be detected for the 0-10 V range.	
		DC current input	Downscale + alarm display (AL02) However, burnout cannot be detected for the 0-20 mA range.	
<b>Indications and setting</b>	PV, SP indication method	4-digit, 7-segment LED (PV: Upper green display, SP: Lower orange display)		
	Number of setting points	Max. 4 points		
	Setting method	<, v, or ^ key operation at each digit		
	Setting range	See Table 1.		
	Indication accuracy	$\pm 0.5$ %FS $\pm 1$ digit		
	Indication range	See Table 1.		
	Indication and setting units	RTD input: 1 $^{\circ}$ C, 0.1 $^{\circ}$ C (depending on the type of input)		
		DC voltage input/DC current input (programmable range): 1, 0.1, 0.01, 0.001		
	Settling value (SP) limit	Low limit	Low limit value of range to high limit value of setting value (SP) limit	
		High limit	Low limit value of setting value (SP) limit to high limit value of range	
	Function display	Digital 4-digit, 7-segment LED indication (on the PV display, displayed in green)		
	Status indication	EV1, EV2, EV3: Red LED lamp indication OT1, OT2 (control output), RDY (READY), MAN (power): Green LED lamp indication		
	Display selection	Process variable (PV), Setting value (SP), Control output value, Heater current value, Time event remaining time, SP number		
	Key lock	Selected from the following three methods: <ul style="list-style-type: none"> <li>• Key locking for all modes.</li> <li>• Operable only for operation indications SP/EV/UF and parameter setting mode/SP/event.</li> <li>• Operable only for operation indications SP/EV/UF.</li> </ul>		
Password	The data is protected by setting the password.			
<b>Control output</b>	Output type	<b>Relay contact</b>	<b>Current</b>	
	Control method	Selected from the following three methods: <ul style="list-style-type: none"> <li>• ON/OFF control</li> <li>• Control with fixed PID value (PID control using Ra-PID and Just-FITTER)</li> <li>• Self-tuning</li> </ul>		
	Output rating	Control output (N.O. side): 250 V AC/30 V DC, 3 A (resistive load) Control output (N.C. side): 250 V AC/30 V DC, 1 A (resistive load) Service life: 50,000 cycles or more on N.O. side 100,000 cycles or more on N.C. side Min. switching specification: 5 V, 100 mA Min. OFF time / ON time: 250 ms	Output type: 0 to 20 mA DC or 4 to 20 mA DC Allowable load resistance: Max. 600 $\Omega$ Output accuracy: $\pm 0.5$ %FS ( $\pm 1$ %FS for 0 to 1 mA)	
	Cycle time (s)	5 to 120	—	
	PID control	Proportional band (%FS)	0.1 to 999.9	
		Integral time (s)	0 to 9999 (PD operation when I = 0)	
		Derivative time (s)	0 to 9999 (PI operation when D = 0)	
		Manual set (%)	-10.0 to 110.0 (only when I = 0)	
	Just-FITTER	Overshoot suppression coefficient	0 to 100	
	<b>Control output</b>	ON/OFF control	Differential gap ( $^{\circ}$ C)	0 to 9999 or 0.0 to 999.9
Control operation selection		Direct action or Reverse action		
RUN/READY selection		Selected with the RDY Key on the front panel or external contact input (In READY mode: Control output OFF)		
Heat/Cool control selection		Control output and Event output		

<b>External contact input (DI)</b>	Number of inputs	2 points				
	Function	Up to 4 kinds of setting value (SP) selections, RUN/READY selection, AUTO/MANUAL selection, Auto tuning stop/start, Self-tuning disable/enable, Control action Direct/Reverse selection, SP ramp enable/disable, PV value hold, Max. PV value hold, Min. PV value hold, Timer start/stop, All DO latch cancellation				
	Input rating	Dry contact or open collector				
	Min. detection holding time	1 s or longer				
	Allowable ON contact resistance	Max. 250 Ω				
	Allowable OFF contact resistance	Min. 100 kΩ				
	Allowable ON-state residual voltage	Max. 1.0 V				
	Open terminal voltage	5.5 V DC ±1 V				
<b>Event</b>	ON terminal voltage	Approx. 7.5 mA (at short-circuit), Approx. 5.0 mA (at contact resistance of 250 Ω)				
	Number of output points	0 to 3 points (depending on the model)				
	Number of internal event settings	Up to 5 settings				
	Event type	<ul style="list-style-type: none"> <li>• shows that the ON/OFF is changed at this value.</li> <li>○ shows that the ON/OFF is changed at a point that 1U is added to this value.</li> </ul>	<b>PV high limit</b>		<b>PV low limit</b>	
			<b>Direct action</b>	<b>Reverse action</b>	<b>Direct action</b>	<b>Reverse action</b>
	U: minimum unit		<b>PV high/low limit</b>		<b>Deviation high limit</b>	
			<b>Direct action</b>	<b>Reverse action</b>	<b>Direct action</b>	<b>Reverse action</b>
			<b>Deviation low limit</b>		<b>Deviation high/low limit</b>	
			<b>Direct action</b>	<b>Reverse action</b>	<b>Direct action</b>	<b>Reverse action</b>
			<b>SP high limit</b>		<b>SP low limit</b>	
			<b>Direct action</b>	<b>Reverse action</b>	<b>Direct action</b>	<b>Reverse action</b>
			<b>SP high/low limit</b>		<b>MV high limit</b>	
			<b>Direct action</b>	<b>Reverse action</b>	<b>Direct action</b>	<b>Reverse action</b>
			<b>MV low limit</b>		<b>MV high/low limit</b>	
			<b>Direct action</b>	<b>Reverse action</b>	<b>Direct action</b>	<b>Reverse action</b>
			<b>Heater burnout / Overcurrent</b>		<b>Heater short-circuit</b>	
			<b>Direct action</b>	<b>Reverse action</b>	<b>Direct action</b>	<b>Reverse action</b>

Event	Event type	<b>Loop diagnosis 1</b>	
		<p>The event is turned ON when PV does not change corresponding to increase/decrease in MV (Manipulated variable). This event is used to detect any fault of final control devices.</p> <ul style="list-style-type: none"> <li>Setting items                     <ul style="list-style-type: none"> <li>Main setting: MV (Manipulated variable)</li> <li>Sub-setting: PV</li> <li>ON delay time: Diagnosis time</li> </ul> </li> <li>Operation specifications                     <p>The event is turned ON when the value does not reach the PV set in the sub-setting within the diagnosis time (ON delay time) even though the MV exceeding the main setting is held.</p> </li> <li>CAUTION                     <p>When setting the ON delay, it is necessary to put in "Multi-function setup". The default setting of the ON delay before shipment is 0.0 s.</p> </li> </ul>	
		<b>Direct action</b>	<b>Reverse action</b>
		Heat control	Cool control
		<p>ON delay is started when conditions 1 and 2 are satisfied.</p>	<p>ON delay is started when conditions 1 and 2 are satisfied.</p>
		<b>Loop diagnosis 2</b>	
		<p>The event is turned ON when PV does not change corresponding to increase/decrease in MV (Manipulated variable). This event is used to detect any fault of final control devices.</p> <ul style="list-style-type: none"> <li>Setting items                     <ul style="list-style-type: none"> <li>Main setting: MV (Manipulated variable)</li> <li>Sub-setting: Change in PV from the point that the MV exceeds the main setting.</li> <li>ON delay time: Diagnosis time</li> </ul> </li> <li>Operation specifications                     <p>The event is turned ON when the MV exceeding the main setting is held (conditions 2) and the PV does not reach the value that the sub-setting is added to (subtracted from) the PV at the point where the MV exceeds the main setting within the diagnosis time (ON delay time) (conditions 1).</p> </li> <li>CAUTION                     <p>When setting the ON delay, it is necessary to put in "Multi-function setup". The default setting of the ON delay before shipment is 0.0 s.</p> </li> </ul>	
		<b>Direct action</b>	<b>Reverse action</b>
		Heat control	Cool control
		<p>ON delay is started when conditions 1 and 2 are satisfied.</p>	<p>ON delay is started when conditions 1 and 2 are satisfied.</p>

Event	Event type	<b>Loop diagnosis 3</b>	
		<p>The event is turned ON when PV does not change corresponding to increase/decrease in MV (Manipulated variable). This event is used to detect any fault of final control devices.</p> <ul style="list-style-type: none"> <li>Setting items <ul style="list-style-type: none"> <li>Main setting: Change in PV from the point that the MV reaches the high limit (100%) or low limit (0%).</li> <li>Sub-setting: Range of absolute value of deviation (PV - SP) allowing the event to turn OFF.</li> <li>ON delay time: Diagnosis time</li> <li>OFF delay time: A period of time from power ON allowing the event to turn OFF.</li> </ul> </li> <li>Operation specifications <ul style="list-style-type: none"> <li>The direct action is used for the heat control. The event is turned ON when the increase in PV becomes smaller than the main setting after the diagnosis time (ON delay time) has elapsed from the time that the MV had reached the high limit, or when the decrease in PV becomes smaller than the main setting from the time that the diagnosis time (ON delay time) has elapsed from the time that the MV had reached the low limit.</li> <li>The reverse action is used for the cool control. The event is turned ON when the decrease in PV becomes smaller than the main setting after the diagnosis time (ON delay time) has elapsed from the time that the MV had reached the high limit, or when the increase in PV becomes smaller than the main setting after the diagnosis time (ON delay time) has elapsed from the time that the MV had reached the low limit.</li> <li>The event is turned OFF regardless of other conditions when the absolute value of the deviation (PV - SP) becomes less than the sub-setting.</li> <li>The event is turned OFF regardless of other conditions when a period of time after starting of operation from the time that the power has been turned ON becomes less than the OFF delay time. However, the event is turned OFF when the absolute value of the deviation is the (sub-setting - hysteresis) value or less after the absolute value of the deviation has become the sub-setting or more.</li> </ul> </li> <li>CAUTION <p>When setting the ON delay and OFF delay, it is necessary to put in "Multi-function setup". The default settings of the ON delay and OFF delay before shipment are 0.0s.</p> </li> </ul>	
		<p style="text-align: center;"><b>Direct action</b></p> <p>Heat control</p> <p style="text-align: center;">ON delay is started when conditions 1 and 2 are satisfied.</p>	<p style="text-align: center;"><b>Reverse action</b></p> <p>Cool control</p> <p style="text-align: center;">ON delay is started when conditions 1 and 2 are satisfied.</p>
		<b>PV Alarm (status)</b>	
		<p style="text-align: center;"><b>Direct action</b></p> <p>ON when PV alarm (alarm code AL01 to 03) occurs, OFF in other cases.</p>	<p style="text-align: center;"><b>Reverse action</b></p> <p>OFF when PV alarm (alarm code AL01 to 03) occurs, ON in other cases.</p>
		<b>READY (status)</b>	
		<p style="text-align: center;"><b>Direct action</b></p> <p>ON in the READY mode. OFF in the RUN mode.</p>	<p style="text-align: center;"><b>Reverse action</b></p> <p>OFF in the READY mode. ON in the RUN mode.</p>
		<b>MANUAL (status)</b>	
		<p style="text-align: center;"><b>Direct action</b></p> <p>ON in the MANUAL mode. OFF in the AUTO mode.</p>	<p style="text-align: center;"><b>Reverse action</b></p> <p>OFF in the MANUAL mode. ON in the AUTO mode.</p>
		<b>During AT (Auto tuning)</b>	
		<p style="text-align: center;"><b>Direct action</b></p> <p>ON while AT is running. OFF while AT is being stopped.</p>	<p style="text-align: center;"><b>Reverse action</b></p> <p>OFF while AT is running. ON while AT is being stopped.</p>
		<b>During SP ramp</b>	
		<p style="text-align: center;"><b>Direct action</b></p> <p>ON during SP ramp. OFF when SP ramp is not performed or is completed.</p>	<p style="text-align: center;"><b>Reverse action</b></p> <p>OFF during SP ramp. ON when SP ramp is not performed or is completed.</p>

Event	Event type	Control operation (status)		
		Direct action	Reverse action	
		ON during direct action (cooling). OFF during reverse action (heating).	OFF during direct action (cooling). ON during reverse action (heating).	
		ST(Smart Tuning) setting standby (status)		
		Direct action	Reverse action	
		ON in the ST setting standby. OFF in the ST setting completion.	OFF in the ST setting standby. ON in the ST setting completion.	
		Timer (status)		
		<p>The direct and reverse action settings are disabled for the timer event. When using the timer event, it is necessary to set the operation type of the DI allocation to "Timer Start/Stop". Additionally, when setting the event channel designation of the DI allocation, multiple timer events are controlled from individual internal contacts (DI).</p> <ul style="list-style-type: none"> <li>Setting items <ul style="list-style-type: none"> <li>ON delay time: A period of time necessary to change the event from OFF to ON after DI has been changed from OFF to ON.</li> <li>OFF delay time: A period of time necessary to change the event from ON to OFF after DI has been changed from ON to OFF.</li> </ul> </li> <li>Operation specifications <ul style="list-style-type: none"> <li>The event is turned ON when DI ON continues for ON delay time or longer.</li> <li>The event is turned OFF when DI OFF continues for OFF delay time or longer.</li> <li>In other cases, the current status is continued.</li> </ul> </li> </ul>  <ul style="list-style-type: none"> <li><b>CAUTION</b> When setting the ON delay and OFF delay, it is necessary to put in "Multi-function setup". The default settings of the ON delay and OFF delay before shipment are 0.0s. The default setting of the event channel designation of the DI allocation before shipment is "0". In this case, the timer event start/stop can be set for all internal events from one internal contact (DI). Additionally, as one or more event channel designation is set, the timer event start/stop can be set for one internal event specified by one internal contact (DI). However, when setting the event channel of the DI allocation, it is necessary to put in "Multi-function setup".</li> </ul> <p>Direct/Reverse action, standby, and READY operations can be set when setting up each event (E1.C1 to E5.C2).</p>		
	Differential gap	0 to 9999 or 0.0 to 999.9		
	Output operation	ON/OFF operation		
	Output type	SPST relay contacts, Common for 3 points/individual contact for 2 points		
	Output rating	250 V AC/30 V DC, 2 A (resistive load)		
	Service life	100,000 cycles or more		
	Min. switching specifications	5 V, 10 mA		
Communi- cation	Communication system	Communication protocol	RS-485	
		Network	Multidrop, Connected as slave station, 1 to 31 units max.	
		Data flow	Half-duplex	
		Synchronization method	Start/stop synchronization	
	Interface	Transmission system	Balance (differential) type	
		Data line	Bit serial	
		Communication lines	3 transmit/receive lines	
		Transmission speed	4800, 9600, 19200, 38400 bps	
		Communication distance	Max. 500 m	
		Protocol	RS-485 (3-wire type)	
	Message characters	Character configuration	9 to 12 bits/character	
		Data length	7 or 8 bits	
		Stop bit length	1 or 2 bits	
Parity bit		Even parity, odd parity, or non-parity		
Current transformer input	Number of inputs	2 points		
	Detection function	Control output is ON.: Detection of heater line break or overcurrent Control output is OFF.: Detection of final control device short-circuit		
	Input object	Number of current transformer windings: 800 turns Model QN206A (φ5.8 mm hole)      Optional Model QN212A (φ12 mm hole)      Optional		

<b>Current transformer input</b>	Measurement current range	0.4 to 50 A				
	Indication range	0.0 to 70.0 A				
	Indication accuracy	$\pm 5\%FS \pm 1$ digit				
	Indication resolution	0.1 A				
	Output	Selected from control output 1 and control output 2, or event output 1, event output 2, and event output 3.				
	Min. detection time	Burnout detection: 0.3 s or more for min. control output ON time Final control device short-circuit detection: 0.3 s or more for min. control output OFF time				
<b>General specifications</b>	Memory backup	Semiconductor non-volatile memory				
	Power supply voltage	85 to 264 V AC, 50/60 Hz $\pm 2$ Hz				
	Power consumption	12 VA or less				
	Insulation resistance	Between power supply terminal and secondary terminal, 500 V DC, 10 M $\Omega$ or more				
	Dielectric strength	Between power supply terminal and secondary terminal, 1500 V AC for 1 min.				
	Power ON inrush current	20 A or less				
	Operating conditions	Ambient temperature	0 to 50 °C (0 to 40 °C for side-by-side mounting)			
		Ambient humidity	10 to 90 %RH (No condensation allowed)			
		Vibration resistance	0 to 2 m/s <sup>2</sup> (10 to 60 Hz for 2 hrs. in each of X, Y, and Z directions)			
		Shock resistance	0 to 10 m/s <sup>2</sup>			
		Mounting angle	Reference plane $\pm 10^\circ$			
	Transportation conditions	Ambient temperature	-20 to +70 °C			
		Ambient humidity	10 to 95 %RH (No condensation allowed)			
		Package drop test	Drop height: 60 cm (1 corner, 3 sides, 6 planes, free fall)			
	Mask and case material	Mask: Polyester film, Case: Modified PPE				
	Mask and case color	Mask: Dark gray (DIC*546), Case: Light gray (DIC*650) * DIC (DIC Color Guide) is the color standard provided by DIC Corporation.				
Conformed standards	EN61010-1, EN61326-1					
Overvoltage category	Category II (IEC60364-4-433, IEC60664-1)					
Mounting	Model R15S: Socket mounting (with dedicated socket)					
	Model R15T: Panel mounting (with dedicated mounting bracket)					
Weight	Model R15S: Approx. 200g (including socket)					
	Model R15T: Approx. 150g (including dedicated mounting bracket)					
<b>Standard accessories</b>	<b>Part name</b>	<b>Part No.</b>	<b>Q'ty</b>	<b>Auxiliary parts/device (optional)</b>	<b>Part/Device name</b>	<b>Part/Model No.</b>
	Mounting bracket*	81446403-001	1		Mounting bracket for Model R15T	81446403-001
	Gasket*	81409657-001	1		Gasket (20 pcs./set)	81446918-001
	Unit indication label	—	1		Current transformer	QN206A ( $\phi 5.8$ mm hole) QN212A ( $\phi 12$ mm hole)
				Socket	81446976-001	
				Hard cover	81446442-001	
				Soft cover	81446443-001	
				Terminal cover	81446898-001	

\* Supplied only with Model R15T

**Table 1 Input Types and Ranges**

Input type	C01 No.	Sensor type	Range (°C)	Range (°F)
RTD	41	Pt100	-200 to +500	-300 to +900
	42	JPt100	-200 to +500	-300 to +900
	43	Pt100	-200 to +200	-300 to +400
	44	JPt100	-200 to +200	-300 to +400
	51	Pt100	-50.0 to +200.0	-50 to +400
	52	JPt100	-50.0 to +200.0	-50 to +400
	53	Pt100	-50.0 to +100.0	-50 to +200
	54	JPt100	-50.0 to +100.0	-50 to +200
	63	Pt100	0.0 to 200.0	0 to 400
	64	JPt100	0.0 to 200.0	0 to 400
	67	Pt100	0 to 500	0 to 900
	68	JPt100	0 to 500	0 to 900

Input type	C01 No.	Sensor type	Range
Linear input	86	1 to 5 V	Scaling between -1999 to +9999. Decimal point position changeable.
	87	0 to 5 V	
	88	0 to 10 V	
	89	0 to 20 mA	
	90	4 to 20 mA	

**Handling Precautions**

- The range having the decimal point is displayed to the 1st digit after the decimal point.
- Set C01 No. according to the sensor type and range to be used.

**Conformed standards for input sensors**

RTD Pt100: JIS C 1604-1997  
JPt100: JIS C 1604-1989

\* JIS: Japanese Industrial Standards

## Model Selection Guide

I	II	III	IV	V	VI	VII
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 Example: R15TR0TA0000

I	II	III	IV	V	VI	VII	Specifications	
Basic model number	Mounting	Control output	PV input	Power supply	Option	Additional processing		
R15							Single Loop Controller	
		T					Panel mounting type	
	(Note 4)	S					Socket mounting type	
							<b>Control output 1</b>	<b>Control output 2</b>
	(Note 2)		R0				Relay output	None
			C0				Current output	None
	(Note 1)		CC				Current output	Current output
				R			RTD input (Pt100/JPt100)	
				L			DC voltage/current input (1 to 5 V DC, 0 to 5 V DC, 0 to 10 V DC, 0 to 20 mA DC, 4 to 20 mA DC)	
					A		Power: 100 to 240 V AC, 50/60 Hz	
						00	None	
						01	Event relay output: 3 points	
				(Notes 1, 3)		02	Event relay output: 3 points Current transformer input: 2 points Digital input: 2 points	
				(Notes 1, 3)		03	Event relay output: 3 points Current transformer input: 2 points RS-485 communication	
				(Notes 1, 3)		04	Event relay output: 2 points (independent contact)	
			(Notes 1, 3)		05	Event relay output: 2 points (independent contact) Current transformer input: 2 points Digital input: 2 points		
			(Notes 1, 3)		06	Event relay output: 2 points (independent contact) Current transformer input: 2 points RS-485 communication		
					00	No additional processing		
					D0	With inspection certificate document		
					Y0	Traceability certificate available		

Note 1. This model cannot be selected for R15S.

Note 2. Only 1 N.O. contact is available for R15S.

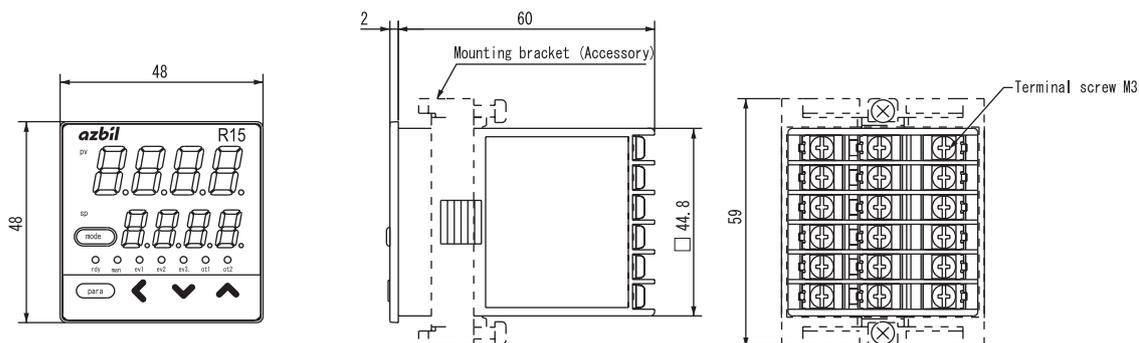
Note 3. Current transformer is optional (sold separately).

Note 4. Socket is optional (sold separately).

(Unit: mm)

**Dimensions**

**Model R15T (Panel mounting type)**

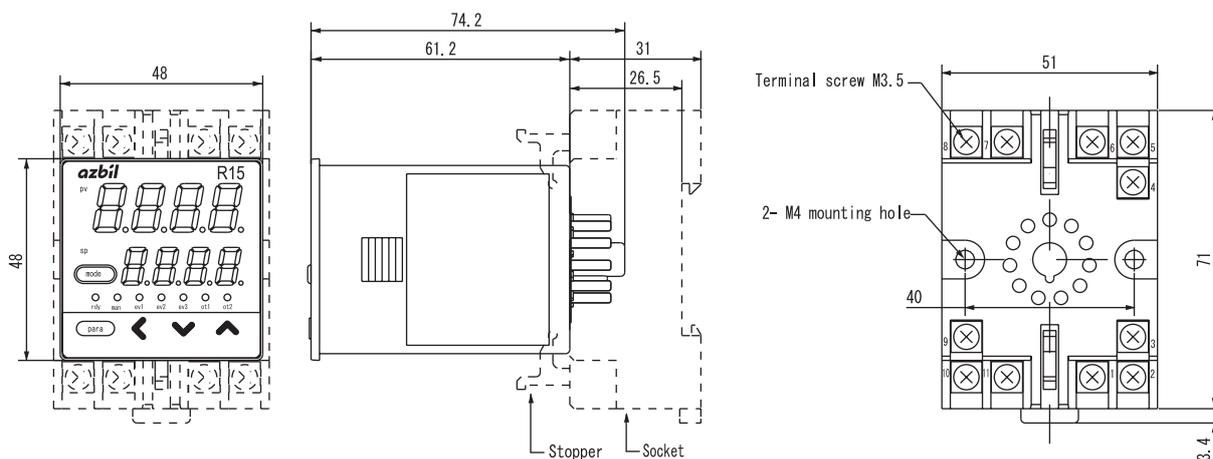


**Handling Precautions**

Tighten the screws of the attached mounting bracket. When the mounting bracket is secured firmly so that no play exists, tighten the screws further by half-turn to fix the bracket to the panel. If the screws are tightened excessively, this may cause the case to deform.

**Model R15S (Socket mounting type)**

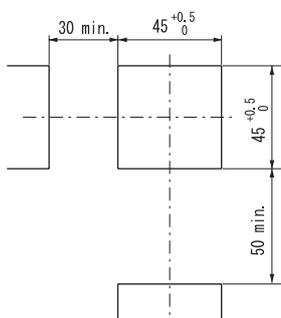
**Socket Part No. 81446976-001 (Optional)**



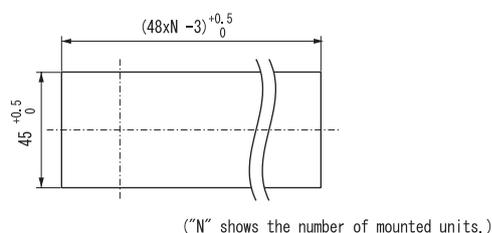
Put the socket stoppers in the upper and lower holes of the main body and secure the socket firmly.

**Panel cutout diagram**

**Individual mounting**



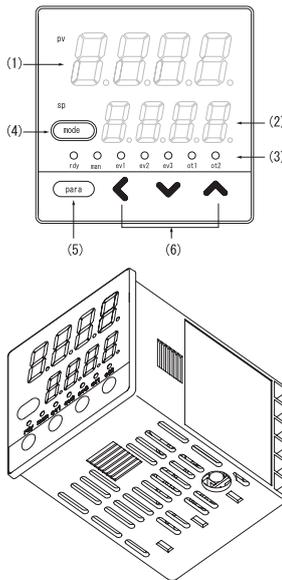
**Side-by-side mounting**



**Handling Precautions**

- When mounting three or more units of Model R15 tightly in the horizontal direction, pay special attention so that the ambient temperature does not exceed 40 °C.
- When the water-proof structure is required, always mount the unit individually after the gasket supplied with Model R15T has been mounted on the main body.
- Keep a space of 50 mm or more in the vertical direction.

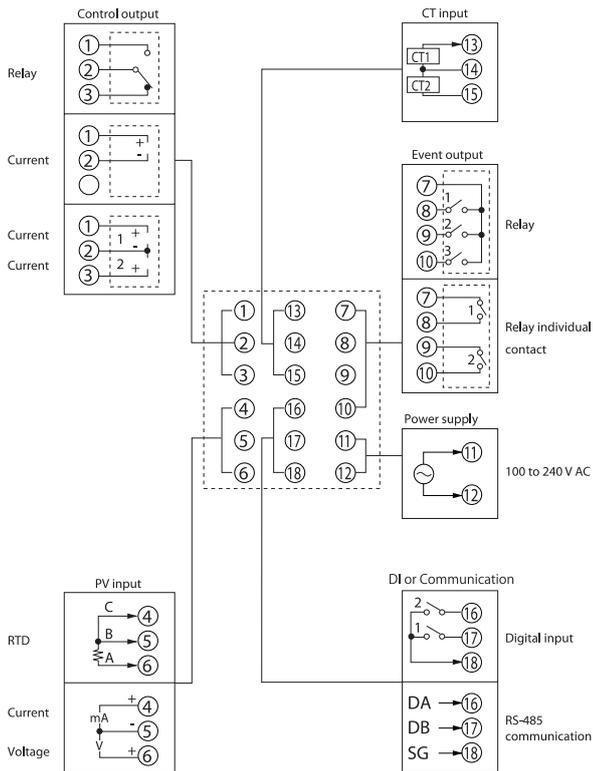
**Part Names and Functions**



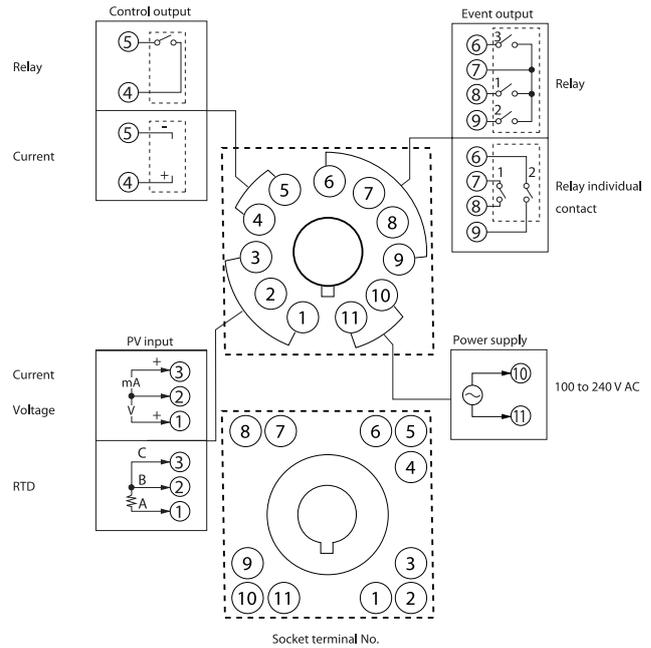
- (1) Display 1: Displays PV values (present temperature, etc.) or setting items.
- (2) Display 2: Displays SP values (set temperature, etc.) or the set value of each setting item.
- (3) Mode indicators
  - rdy: Lights in READY mode (control stop).
  - man: Lights in MANUAL mode (manual operation mode).
  - ev1 to ev3: Lights when event relay output is ON.
  - ot1 to ot2: Lights when control output is ON.
- (4) [mode] key: Performs the preset operation when being pressed for 1 s or longer.  
The default setting before shipment is the RUN/READY selection.
- (5) [para] key: Switches the display.
- (6) <, v, ^ keys: Increase/decrease numeric values, or shift digits.

**Terminal Connection Diagram**

**Wiring of Model R15T**

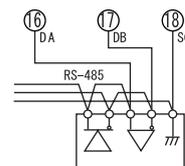


**Wiring of Model R15S**



**Connection of RS-485 communication**

RS-485 is a 3-wire connection.



Example: Connection with 5-wire instrument

**Handling Precautions**

Do not connect any external terminating resistor since a device similar to the terminating resistor is built-into this controller.

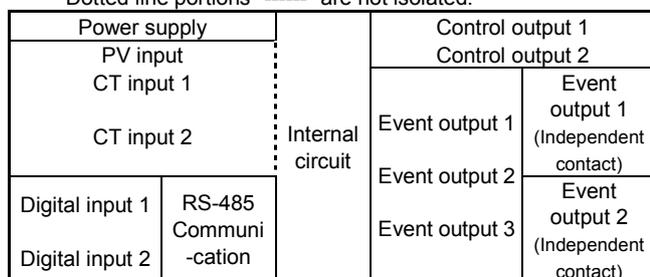
## Precautions on the Use of Self-tuning Function

The final control devices must be turned on simultaneously with or prior to this product when the self-tuning function is to be used.

## Precautions on Wiring

### 1. Internal isolation

Solid line portions "———" are isolated.  
Dotted line portions "-----" are not isolated.

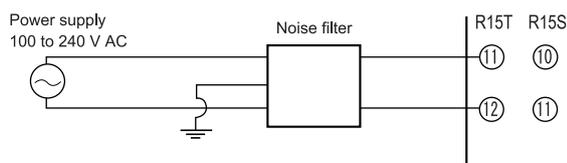


\* Availability of input and output varies depending on a model.

### 2. Preventive measures against noise for power supply

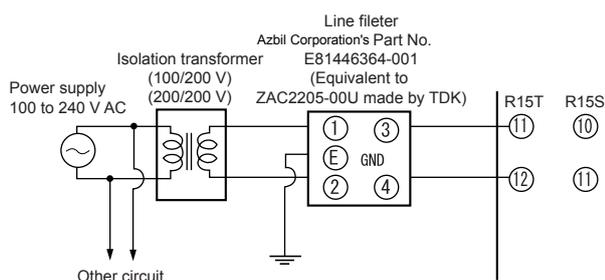
#### (1) Reduction of noise

Even if the noise is small, use the noise filter to eliminate the effect of the noise as much as possible.



#### (2) Protection from large noise

If a large amount of noise exists, use appropriate isolation transformer and line filter to eliminate the effect of the noise.



### 3. Installation environment noise sources and preventive measures

Generally, the following may be the noise sources in the installation environment:

Relay and contact, electromagnetic coil, solenoid valve, power supply line (particularly, 100 V AC or more), motor commutator, phase angle control SCR, radio communication device, welding machine, high-voltage ignitor, etc.

#### Preventive measures against fast rise noise

Use of CR filter is effective to prevent fast rise noise.

Recommended filter:

Azbil Corporation's Part No. **81446365-001**  
(Equivalent to 953M50033311 made by Matsuo Electric.)

### 4. Wiring precautions

- (1) After taking the noise preventive measures, do not bundle the primary and secondary power cables together or put both power cables in the same conduit or duct.
- (2) Keep the input/output and communication lines 50 cm or more away from the power lines and power supply lines having a voltage of 100 V AC or more. Additionally, do not put these lines together in the same conduit or duct.

### 5. Inspection after wiring

After the wiring work has been completed, always inspect and check the wiring status. Great care should be taken since incorrect wiring may cause the product to malfunction or severe personal injury.

 RESTRICTION ON USE

This product has been designed, developed and manufactured for general-purpose application in machinery and equipment. Accordingly, when used in the applications outlined below, special care should be taken to implement a fail-safe and/or redundant design concept as well as a periodic maintenance program.

- Safety devices for plant worker protection
- Start/stop control devices for transportation and material handling machines
- Aeronautical/aerospace machines
- Control devices for nuclear reactors

Never use this product in applications where human safety may be put at risk.

Install this product in the following locations.

- Common mode voltage for I/O excluding the power supply and relay contact output must satisfy the following.  
Voltage between the product and the ground: 33 V r.m.s. or less, 46.7 V peak or less
- Not high or low temperature/humidity.
- Free from sulfide gas or corrosive gas.
- Less dust or soot.
- Appropriately protected locations from direct sunlight, wind or rain.
- Less mechanical vibration and shock.
- Not close to the high voltage line, to welding machine or to electrical noise generating source.
- Minimum of 15 m away from the high voltage ignition device for a boiler.
- Less effect by magnetic.
- No flammable liquid or gas.

**azbil**

*Specifications are subject to change without notice.*

**Azbil Corporation**  
**Building Systems Company**

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