Single Loop Controller

General

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

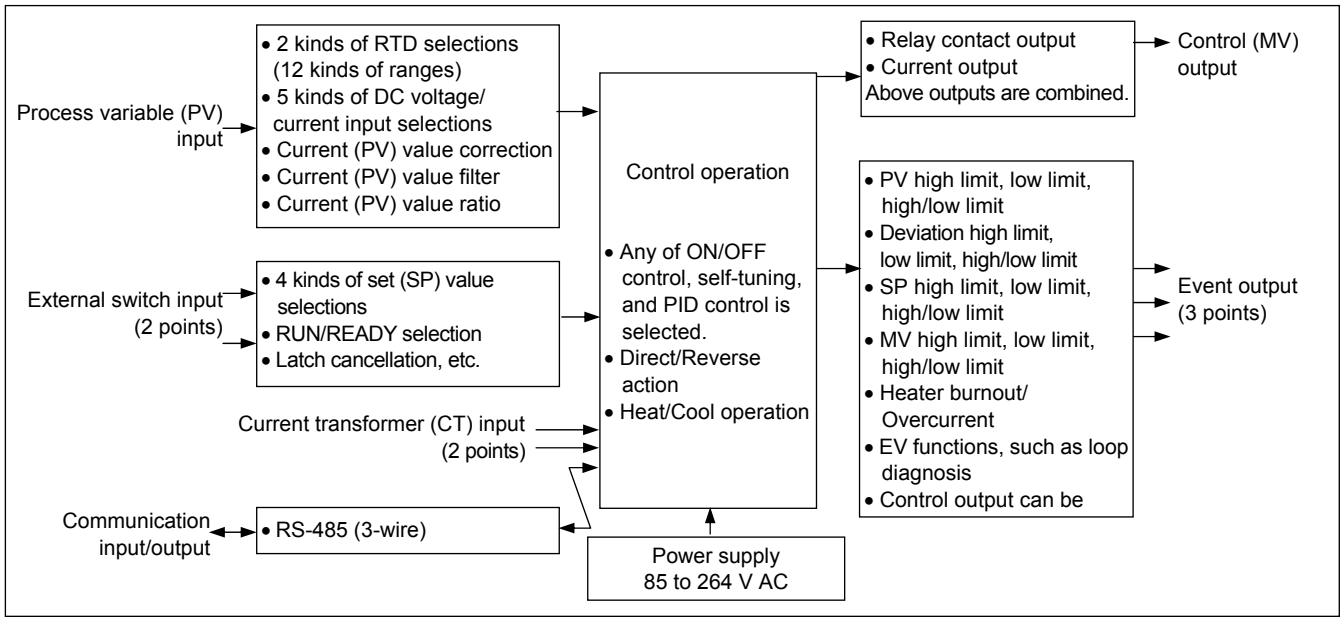
Up to two control output points (this number of points may vary depending on the model) can be used, which are selectable from the relay contact and current.

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 ±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 "RationaLOOP 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

PV input	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 μA or less	
			0 - 10 V range: 7 μA or less	
	Effect of wiring resistance	RTD input	±0.05 %FS/Ω or less	
		DC voltage input	0 - 5 V, 1 - 5 V range: 3.5 μV/Ω or less	
			0 - 10 V range: 7 μV/Ω 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.	
Indications and setting	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	<, ∨, or ∧ key operation at each digit		
	Setting range	See Table 1.		
	Indication accuracy	± 0.5 %FS ± 1 digit		
	Indication range	See Table 1.		
	Indication and setting units	RTD input: 1 °C, 0.1 °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: • Key locking for all modes. • Operable only for operation indications SP/EV/UF and parameter setting mode/SP/event. • Operable only for operation indications SP/EV/UF.		
	Password	The data is protected by setting the password.		
Control output	Output type	**Relay contact**		**Current**
	Control method	Selected from the following three methods: • ON/OFF control • Control with fixed PID value (PID control using Ra-PID and Just-FiTTER) • Self-tuning		
	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 Ω Output accuracy: ± 0.5 %FS (± 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	
Control output	ON/OFF control	Differential gap (°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		

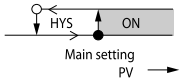
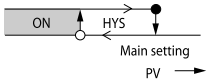
External contact input (DI)	Number of inputs	2 points
	Function	Up to 4 kinds of setting value (SP) selections, RUN/READY selection, AUTO/MANUAL selection, Auto tuning stop/start, Self-turning disable/enable, Control action Direct/Reverse selection, SP ramp enable/disable, PV value hold, Max. PV value 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
	ON terminal voltage	Approx. 7.5 mA (at short-circuit), Approx. 5.0 mA (at contact resistance of 250 Ω)
Event	Number of output points	0 to 3 points (depending on the model)
	Number of internal event settings	Up to 5 settings

Event type

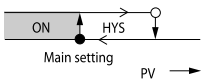
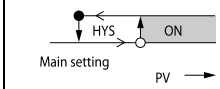
- • shows that the ON/OFF is changed at this value.
- ○ shows that the ON/OFF is changed at a point that 1U is added to this value.

U: minimum unit

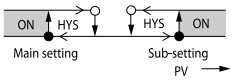
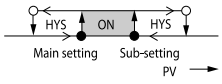
PV high limit

Direct action	Reverse action
	

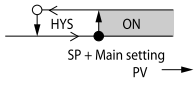
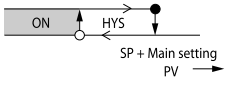
PV low limit

Direct action	Reverse action
	

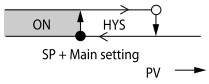
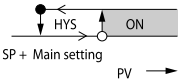
PV high/low limit

Direct action	Reverse action
	

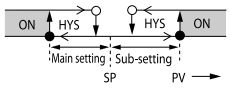
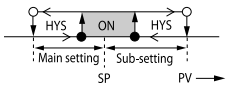
Deviation high limit

Direct action	Reverse action
	

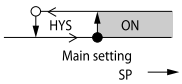
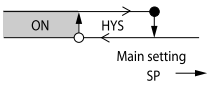
Deviation low limit

Direct action	Reverse action
	

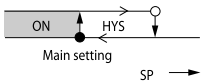
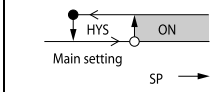
Deviation high/low limit

Direct action	Reverse action
	

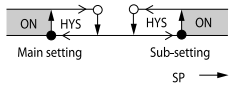
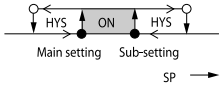
SP high limit

Direct action	Reverse action
	

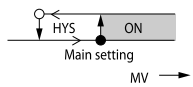
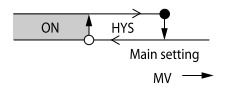
SP low limit

Direct action	Reverse action
	

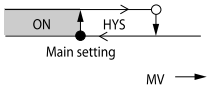
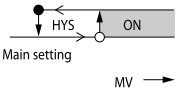
SP high/low limit

Direct action	Reverse action
	

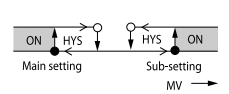
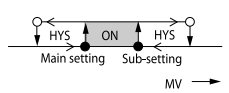
MV high limit

Direct action	Reverse action
	

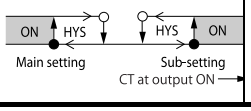
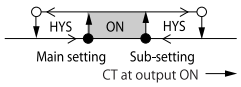
MV low limit

Direct action	Reverse action
	

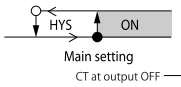
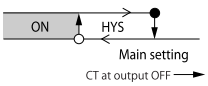
MV high/low limit

Direct action	Reverse action
	

Heater burnout / Overcurrent

Direct action	Reverse action
	

Heater short-circuit

Direct action	Reverse action
	

Event

Event type

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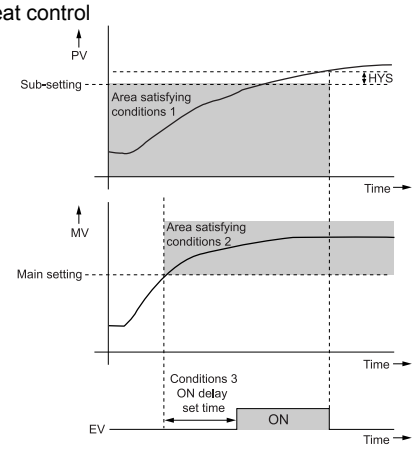
Loop diagnosis 1

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.

- Setting items
  - Main setting: MV (Manipulated variable)
  - Sub-setting: PV
  - ON delay time: Diagnosis time
- Operation specifications
  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.
- CAUTION
  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.

Direct action

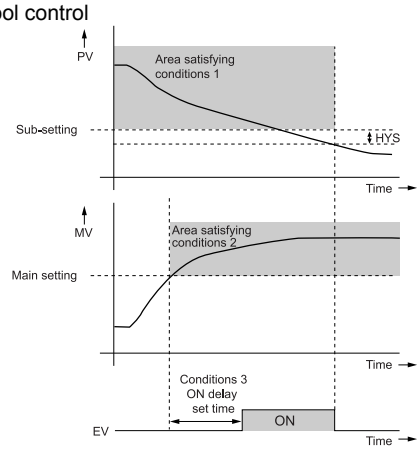
Heat control



ON delay is started when conditions 1 and 2 are satisfied.

Reverse action

Cool control



ON delay is started when conditions 1 and 2 are satisfied.

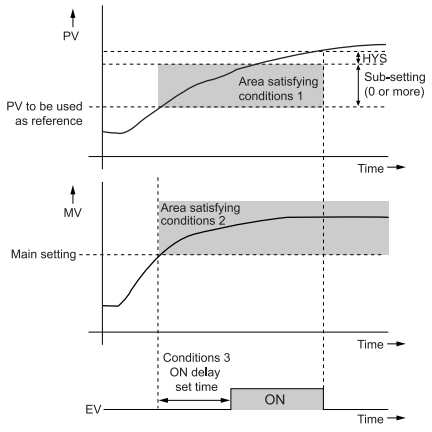
Loop diagnosis 2

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.

- Setting items
  - Main setting: MV (Manipulated variable)
  - Sub-setting: Change in PV from the point that the MV exceeds the main setting.
  - ON delay time: Diagnosis time
- Operation specifications
  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).
- CAUTION
  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.

Direct action

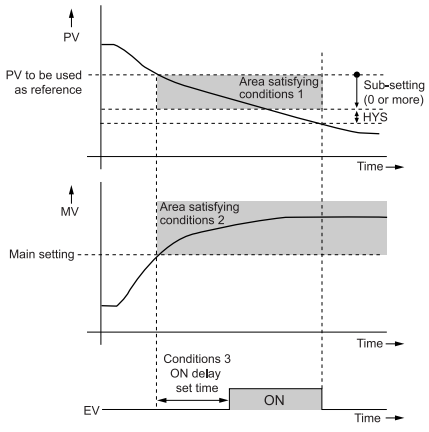
Heat control



ON delay is started when conditions 1 and 2 are satisfied.

Reverse action

Cool control



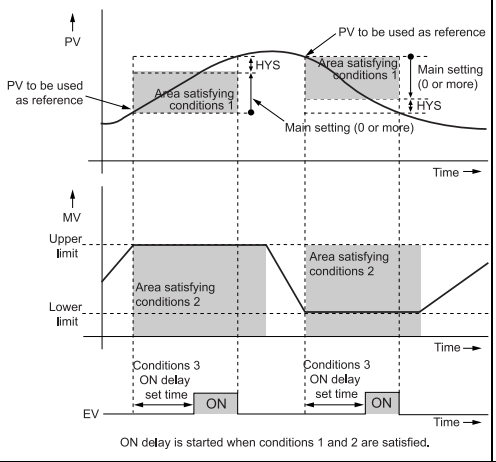
ON delay is started when conditions 1 and 2 are satisfied.

Event	Event type	Loop diagnosis 3

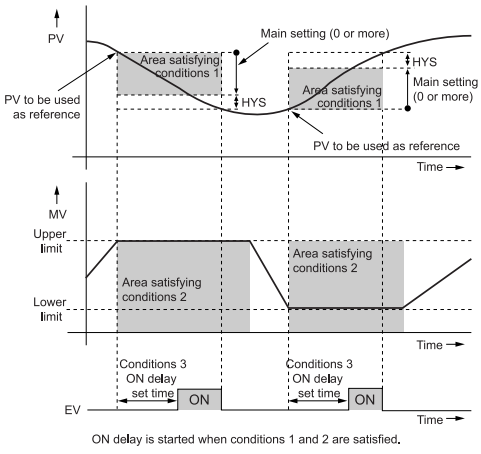
The event is turned ON when PV does not change corresponding to increase/decrease in MV (Manipulated variable).
This event is used to detect any fault of final control devices.

- Setting items
  - Main setting: Change in PV from the point that the MV reaches the high limit (100%) or low limit (0%).
  - Sub-setting: Range of absolute value of deviation (PV - SP) allowing the event to turn OFF.
  - ON delay time: Diagnosis time
  - OFF delay time: A period of time from power ON allowing the event to turn OFF.
- Operation specifications
  - 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.
  - 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.
  - The event is turned OFF regardless of other conditions when the absolute value of the deviation (PV - SP) becomes less than the sub-setting.
  - 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.
- CAUTION
  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.

Direct action	Reverse action
Heat control	Cool control

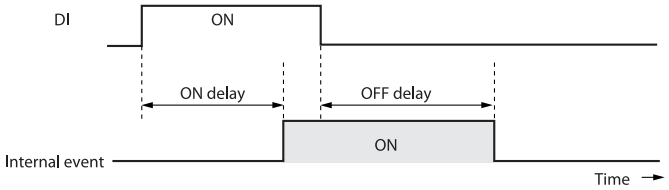


ON delay is started when conditions 1 and 2 are satisfied.



ON delay is started when conditions 1 and 2 are satisfied.

PV Alarm (status)	
Direct action	**Reverse action**
ON when PV alarm (alarm code AL01 to 03) occurs, OFF in other cases.	OFF when PV alarm (alarm code AL01 to 03) occurs, ON in other cases.
READY (status)	
Direct action	**Reverse action**
ON in the READY mode. OFF in the RUN mode.	OFF in the READY mode. ON in the RUN mode.
MANUAL (status)	
Direct action	**Reverse action**
ON in the MANUAL mode. OFF in the AUTO mode.	OFF in the MANUAL mode. ON in the AUTO mode.
During AT (Auto tuning)	
Direct action	**Reverse action**
ON while AT is running. OFF while AT is being stopped.	OFF while AT is running. ON while AT is being stopped.
During SP ramp	
Direct action	**Reverse action**
ON during SP ramp. OFF when SP ramp is not performed or is completed.	OFF during SP ramp. ON when SP ramp is not performed or is completed.

<table>
<tr><td rowspan="11">Event</td><td rowspan="11">Event type</td><td colspan="3">Control operation (status)</td></tr>
<tr><td colspan="2">Direct action</td><td>Reverse action</td></tr>
<tr><td colspan="2">ON during direct action (cooling).
OFF during reverse action (heating).</td><td>OFF during direct action (cooling).
ON during reverse action (heating).</td></tr>
<tr><td colspan="3">ST(Smart Tuning) setting standby (status)</td></tr>
<tr><td colspan="2">Direct action</td><td>Reverse action</td></tr>
<tr><td colspan="2">ON in the ST setting standby.
OFF in the ST setting completion.</td><td>OFF in the ST setting standby.
ON in the ST setting completion.</td></tr>
<tr><td colspan="3">Timer (status)</td></tr>
<tr><td colspan="3">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).
• Setting items
• 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.
• 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.
• Operation specifications
• The event is turned ON when DI ON continues for ON delay time or longer.
• The event is turned OFF when DI OFF continues for OFF delay time or longer.
• In other cases, the current status is continued.
 

• CAUTION
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".</td></tr>
<tr><td colspan="3">Direct/Reverse action, standby, and READY operations can be set when setting up each event (E1.C1 to E5.C2).</td></tr>
<tr><td>Differential gap</td><td colspan="3">0 to 9999 or 0.0 to 999.9</td></tr>
<tr><td>Output operation</td><td colspan="3">ON/OFF operation</td></tr>
<tr><td>Output type</td><td colspan="3">SPST relay contacts, Common for 3 points/individual contact for 2 points</td></tr>
<tr><td>Output rating</td><td colspan="3">250 V AC/30 V DC, 2 A (resistive load)</td></tr>
<tr><td>Service life</td><td colspan="3">100,000 cycles or more</td></tr>
<tr><td>Min. switching specifications</td><td colspan="3">5 V, 10 mA</td></tr>
<tr><td rowspan="13">Communi-cation</td><td rowspan="4">Communication system</td><td>Communication protocol</td><td colspan="2">RS-485</td></tr>
<tr><td>Network</td><td colspan="2">Multidrop, Connected as slave station, 1 to 31 units max.</td></tr>
<tr><td>Data flow</td><td colspan="2">Half-duplex</td></tr>
<tr><td>Synchronization method</td><td colspan="2">Start/stop synchronization</td></tr>
<tr><td rowspan="6">Interface</td><td>Transmission system</td><td colspan="2">Balance (differential) type</td></tr>
<tr><td>Data line</td><td colspan="2">Bit serial</td></tr>
<tr><td>Communication lines</td><td colspan="2">3 transmit/receive lines</td></tr>
<tr><td>Transmission speed</td><td colspan="2">4800, 9600, 19200, 38400 bps</td></tr>
<tr><td>Communication distance</td><td colspan="2">Max. 500 m</td></tr>
<tr><td>Protocol</td><td colspan="2">RS-485 (3-wire type)</td></tr>
<tr><td rowspan="4">Message characters</td><td>Character configuration</td><td colspan="2">9 to 12 bits/character</td></tr>
<tr><td>Data length</td><td colspan="2">7 or 8 bits</td></tr>
<tr><td>Stop bit length</td><td colspan="2">1 or 2 bits</td></tr>
<tr><td>Parity bit</td><td colspan="2">Even parity, odd parity, or non-parity</td></tr>
<tr><td rowspan="3">Current transformer input</td><td>Number of inputs</td><td colspan="3">2 points</td></tr>
<tr><td>Detection function</td><td colspan="3">Control output is ON.: Detection of heater line break or overcurrent
Control output is OFF.: Detection of final control device short-circuit</td></tr>
<tr><td>Input object</td><td colspan="3">Number of current transformer windings: 800 turns
Model QN206A (ϕ5.8 mm hole) Optional
Model QN212A (ϕ12 mm hole) Optional</td></tr>
</table>

Current transformer input	Measurement current range	0.4 to 50 A	
	Indication range	0.0 to 70.0 A	
	Indication accuracy	±5 %FS ± 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	
General specifications	Memory backup	Semiconductor non-volatile memory	
	Power supply voltage	85 to 264 V AC, 50/60 Hz ± 2 Hz	
	Power consumption	12 VA or less	
	Insulation resistance	Between power supply terminal and secondary terminal, 500 V DC, 10 MΩ 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^2 (10 to 60 Hz for 2 hrs. in each of X, Y, and Z directions)
		Shock resistance	0 to 10 m/s^2
		Mounting angle	Reference plane ± 10°
	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)	

Standard accessories	**Part name**	**Part No.**	**Q'ty**
	Mounting bracket*	**81446403-001**	1
	Gasket*	**81409657-001**	1
	Unit indication label	—	1

Auxiliary parts/device (optional)	**Part/Device name**	**Part/Model No.**
	Mounting bracket for Model R15T	**81446403-001**
	Gasket (20 pcs./set)	**81446918-001**
	Current transformer	**QN206A (ϕ5.8 mm hole)**
		QN212A (ϕ12mm 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	Example: R15TR0TA0000

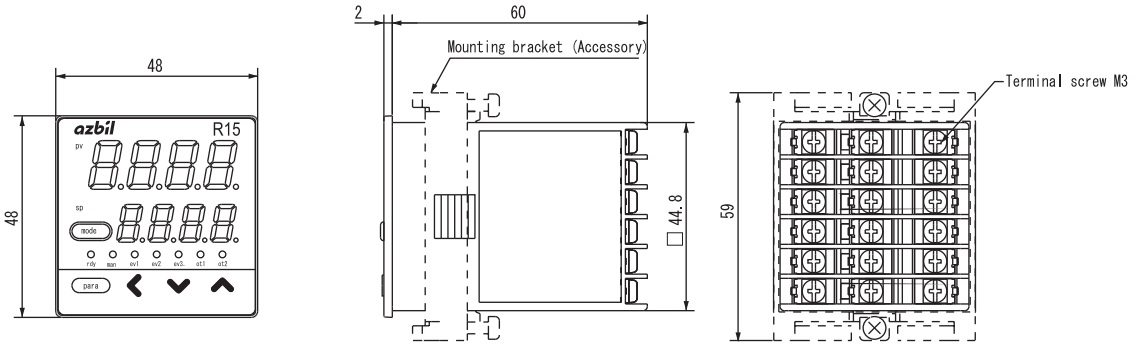
I Basic model number	II Mounting	III Control output	IV PV input	V Power supply	VI Option	VII Additional processing	Specifications
R15							Single Loop Controller
	T						Panel mounting type
(Note 4)	**S**						Socket mounting type
	(Note 2)	**R0**					Relay output
		C0					Current output
			R				RTD 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
					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).

Dimensions

(Unit: mm)

Model R15T (Panel mounting type)

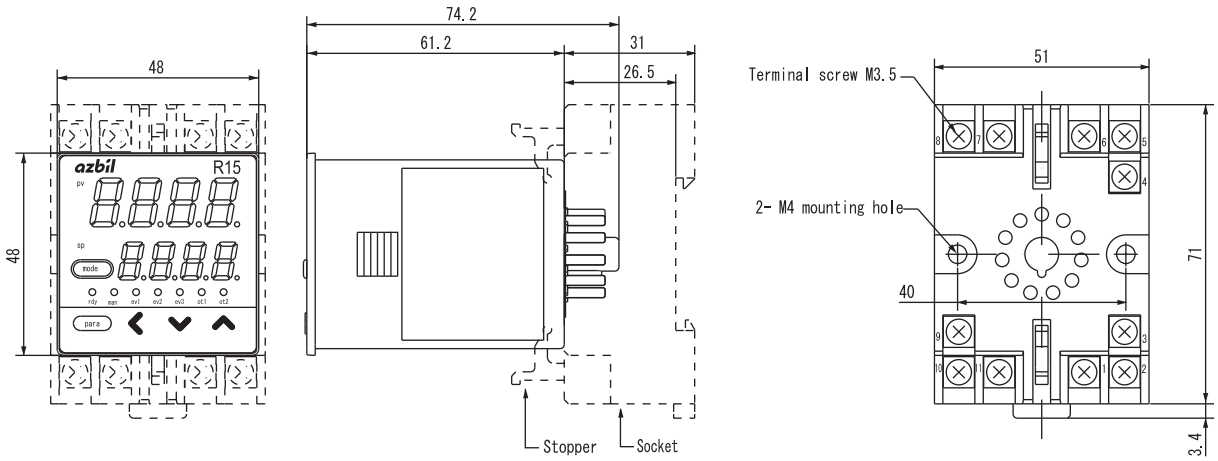


Handling Precautions

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)

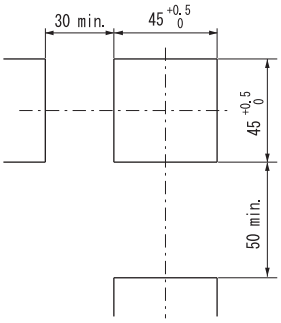
Socket Part No. 81446976-001 (Optional)



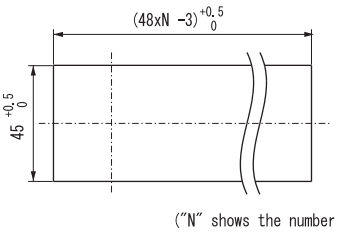
Put the socket stoppers in the upper and lower holes of the main body and secure the socket firmly.

Panel cutout diagram

Individual mounting



Side-by-side mounting

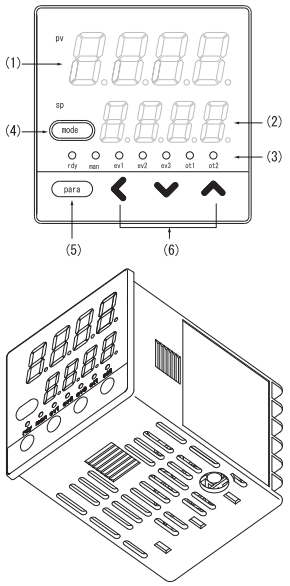


("N" shows the number of mounted units.)

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.

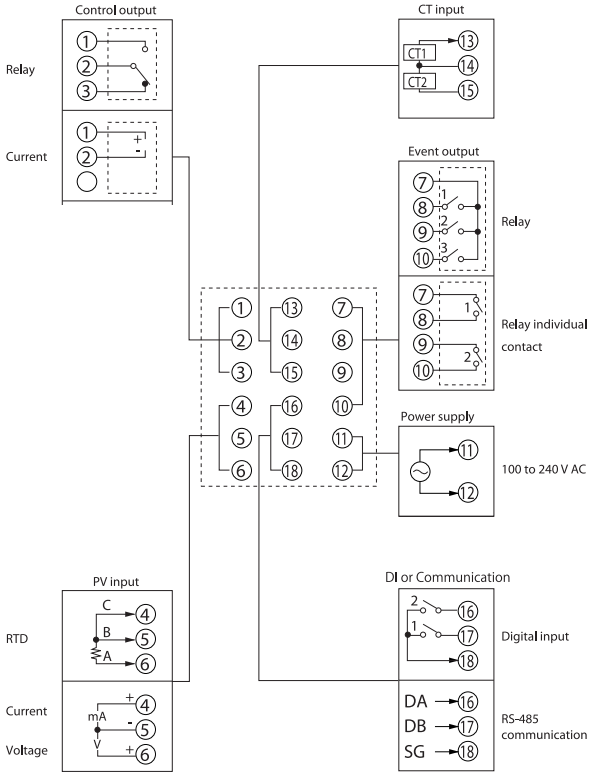
The default setting before shipment is the RUN/READY selection.

(5) [para] key: Switches the display.

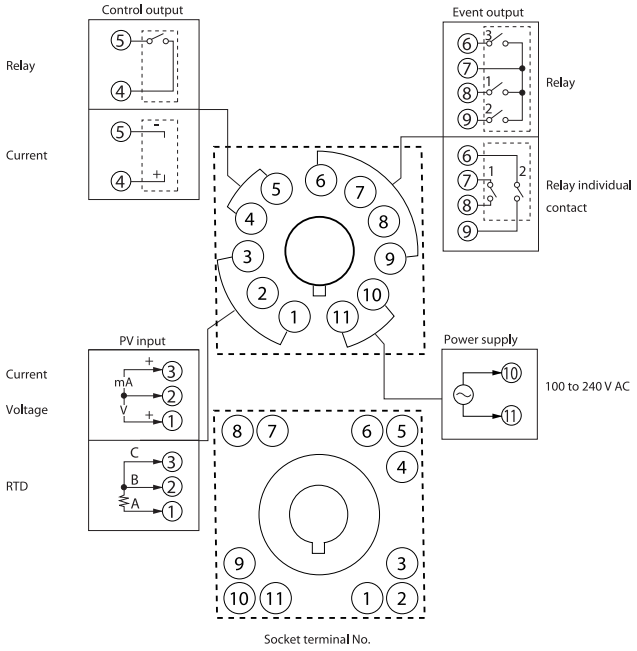
(6) <, ∨, ∧ keys: Increase/decrease numeric values, or shift digits.

Terminal Connection Diagram

Wiring of Model R15T

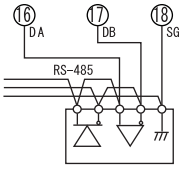


Wiring of Model R15S



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.

<table>
<tr><td colspan="2">Power supply</td><td rowspan="3">Internal circuit</td><td colspan="2">Control output</td></tr>
<tr><td colspan="2">PV input
CT input 1

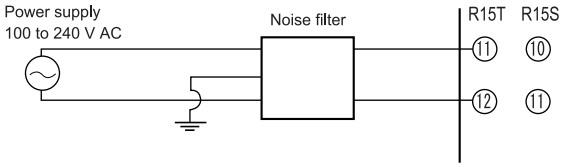
CT input 2</td><td rowspan="2">Event output 1
Event output 2</td><td>Event output 1
(Independent contact)</td></tr>
<tr><td>Digital input 1

Digital input 2</td><td>RS-485
Communi
-cation</td><td>Event output 3</td><td>Event output 2
(Independent contact)</td></tr>
</table>

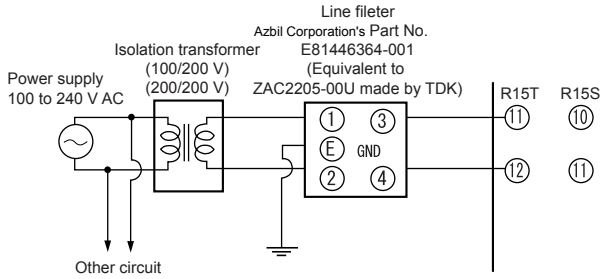
∗ Availability of input and output varies depending on a model.

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 953M500333311 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.

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⚠ 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.

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Specifications are subject to change without notice.

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