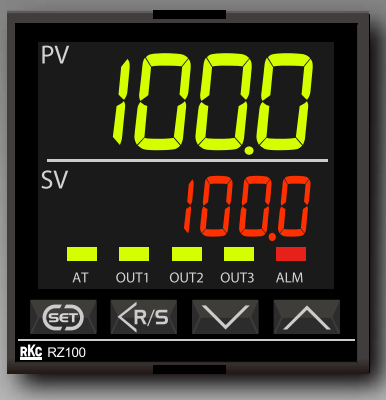
CONTROLLER

Digital Temperature Controller

RZ SERIES



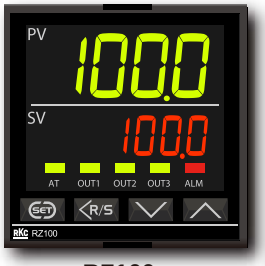
Reinforced Insulation

RKC INSTRUMENT INC.

Clear Display

Uses large high intensity LED.
Clear wide view angle provides outstanding visibility

Digital Temperature Controller
RZ Series



RZ100
(48x48mm)

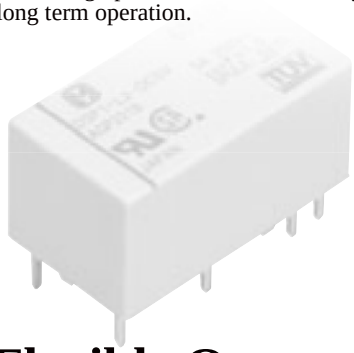
RZ400
(48x96mm)

Reinforced Insulation

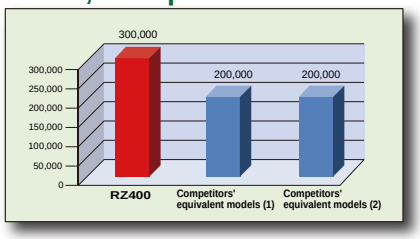
MADE IN JAPAN

Long Operation Life

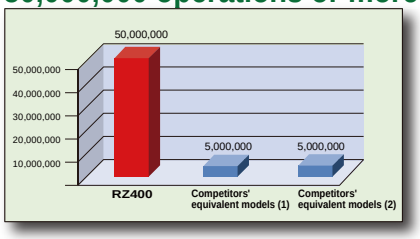
Use of high performance control relay assures long term operation.



Electrical Life (Relay contact output) : 300,000 operations or more



Mechanical life (Relay contact output) : 50,000,000 operations or more



· Data when used at a rated value. Depending on the operating conditions, there may be some exceptions that we cannot guarantee.
· Applies to the control output relays mounted on OUT1 and OUT2 of RZ400.
Depending on the operating conditions, there may be some exceptions that we cannot guarantee.

Flexible Output Configuration

This controller can incorporate up to 2 of relay contact output, voltage pulse output, or current output as OUT1 and OUT2, and 1 relay output as OUT3.
Each of these outputs can be configured to control output (heat or cool), alarm output (alarm 1 or 2), and HBA output (HBA1 or 2).
Output type is freely changeable to meet the requirements of different applications.

Please specify the output type (relay contact, voltage pulse or current) at the time of ordering.

Heat-side Control Output
Cool-side Control Output
Alarm 1 Output
Alarm 2 Output
HBA 1 Output
HBA 2 Output

→ OUT1
→ OUT2
→ OUT3

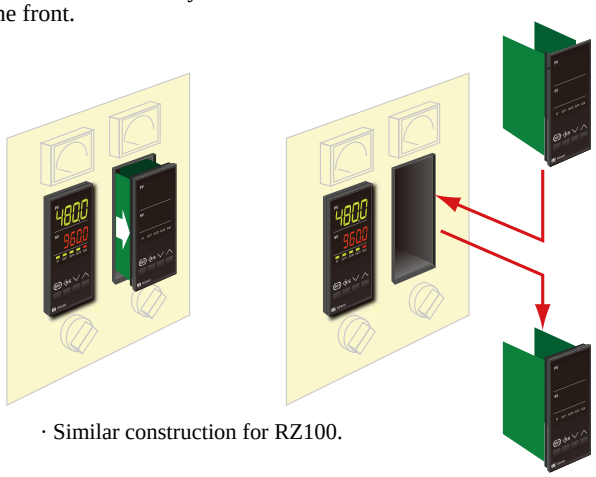
Output 1 (OUT1) : Relay contact, Voltage pulse, DC current
Output 1 (OUT1) Assignment
: Heat-side Control Output, Cool-side Control Output
Alarm 1/Alarm 2 Output, HBA1/HBA2 Output

Output 2 (OUT2) : Relay contact, Voltage pulse, DC current
Output 2 (OUT2) Assignment
: Heat-side Control Output, Cool-side Control Output
Alarm 1/Alarm 2 Output, HBA1/HBA2 Output

Output 3 (OUT3) : Relay contact
Output 3 (OUT3) Assignment
: Cool-side Control Output
Alarm 1/Alarm 2 Output, HBA1/HBA2 Output

Easy Maintenance

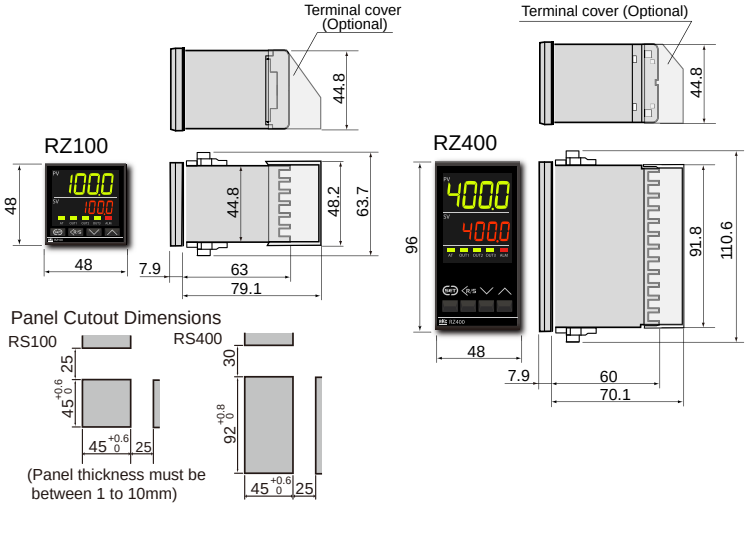
The internal assembly of the RZ Series can be removed from the front.



· Similar construction for RZ100.

External Dimensions

Unit : mm



Model and Suffix Codes

Specifications												
		48×48mm (1/16 DIN) **RZ100** / 48×96mm (1/8 DIN) **RZ400**	①	②	③	④	⑤	⑥	⑦	⑧	⑨
			–	□	□	□	*	□	□	/ □	– □	□□□
①	**Output 1 (OUT1)**	Not supplied	**N**								
		Relay contact output	**M**								
		Voltage pulse output	**V**								
		0 to 20mA DC	**7**								
		4 to 20mA DC	**8**								
②	**Output 2 (OUT2)**	Not supplied		**N**							
		Relay contact output		**M**							
		Voltage pulse output		**V**							
		0 to 20mA DC		**7**							
		4 to 20mA DC		**8**							
③	**Output 3 (OUT3)**	Not supplied			**N**						
		Relay contact output			**M**						
④	**CT input**	Not supplied				**N**					
		For CTL-6-P-N (0 to 30A) 2 points				**T**					
		For CTL-12-S56-10L-N (0 to 100A) 2 points				**U**					
⑤	**Communication**	Not supplied					**N**				
		RS-485 (ANSI/RKC standard protocol)					**5**				
		RS-485 (MODBUS protocol)					**6**				
⑥	**Waterproof/ Dustproof**	Not supplied						**N**			
		Waterproof/Dustproof protection						**1**			
⑦	**Initial Setting (Quick start code)**	No Quick Start Code 1 and 2 (Default setting) *1							**N**		
		Specify Quick Start Code 1 *2							**1**		
		Specify Quick Start Code 1 and 2							**2**		
Quick Start Code 1	⑧ **Control Method**	PID control with AT (Reverse action)								**F**	
		PID control with AT (Direct action)								**D**	
		Heat/Cool PID control with AT								**G**	
		Heat/Cool PID control with AT for extruder (Air cooling type)								**A**	
		Heat/Cool PID control with AT for extruder (Water cooling type)								**W**	
	⑨ **Input and Range**	See the Input Range Code									□□□

*1 : Default setting (No Quick Start Code 1)

Specification \ Output type	OUT1 supplied OUT2 not supplied	OUT1 supplied OUT2 supplied
Control Method	PID control with AT (Reverse action)	Heat/Cool PID control with AT for extruder (Air cooling type)
Input Range	Thermocouple K, 0 to 400℃	

• OUT3 : Deviation high alarm.

*2 : Default setting (No Quick Start Code 2)

• PID control with AT (Code:F/D) type

Output	OUT1	Supplied	Supplied	Supplied	Supplied
	OUT2	Not supplied	Supplied	Not supplied	Supplied
	OUT3	Not supplied	Not supplied	Supplied	Supplied
Output assigment	OUT1	Control output (Reverse action)	Control output (Reverse action)	Control output (Reverse action)	Control output (Reverse action)
	OUT2	Not supplied	Alarm1 output (deviation high)	Not supplied	Alarm1 output (deviation high)
	OUT3	Not supplied	Not supplied	Alarm1 output (deviation high)	Alarm2 output (deviation low)

• Heat/Cool PID control with AT (Code:G/A/W) type

Output	OUT1	Supplied	Supplied
	OUT2	Supplied	Supplied
	OUT3	Not supplied	Supplied
Output assigment	OUT1	Control output (Heat control)	Control output (Heat control)
	OUT2	Control output (Cool control)	Control output (Cool control)
	OUT3	Not supplied	Alarm1 output (deviation high)

Input Range Codes

Input		Range	Code
Thermocouple	K (JIS/IEC)	0 to 200℃	K 01
		0 to 400℃	K 02
		0 to 600℃	K 03
		0 to 800℃	K 04
		0 to 1000℃	K 05
		0 to 1200℃	K 06
		0 to 1372℃	K 07
		0.0 to 400.0℃	K 09
		0.0 to 800.0℃	K 10
		0 to 100℃	K 13
		0 to 300℃	K 14
		0 to 450℃	K 17
		0 to 500℃	K 20
		-200 to +1372℃	K 41
		-199.9 to +400.0℃	K 43
		0 to 800°F	K A1
		0 to 1600°F	K A2
		0 to 2502°F	K A3
		-100.0 to +752.0°F	K C8
	J (JIS/IEC)	0 to 200℃	J 01
		0 to 400℃	J 02
		0 to 600℃	J 03
		0 to 800℃	J 04
		0 to 1000℃	J 05
		0 to 1200℃	J 06
		-199.9 to +300.0℃	J 07
		0 to 450℃	J 10
		0 to 800°F	J A1
		0 to 1600°F	J A2
		0 to 2192°F	J A3
		0 to 300°F	J A6
		0 to 800°F	J A7
		-328 to +2192°F	J B9
		-199.9 to +550.0°F	J C8

Input		Range	Code
Thermocouple	T (JIS/IEC)	-199.9 to +400.0℃	T 01
		-199.9 to +100.0℃	T 02
		-100.0 to +200.0℃	T 03
		0.0 to 350.0℃	T 04
		-199.9 to +300.0℃	T 05
		0.0 to 400.0℃	T 06
	R (JIS/IEC)	0 to 1600℃	R 01
		0 to 1769℃	R 02
		0 to 1350℃	R 04
		0 to 3200°F	R A1
	S (JIS/IEC)	0 to 1600℃	S 01
		0 to 1769℃	S 02
	B (JIS/IEC)	400 to 1800℃	B 01
		0 to 1820℃	B 02
	E (JIS/IEC)	0 to 800℃	E 01
		0 to 1000℃	E 02
	N (JIS/IEC)	0 to 1200℃	N 01
	W5Re/ W26Re (ASTM)	0 to 2000℃	W01
		0 to 2320℃	W02
		0 to 4000°F	WA1
	PLII (NBS)	0 to 1300℃	A 01
		0 to 1390℃	A 02
		0 to 1200℃	A 03
		0 to 2400°F	A A1
		0 to 2534°F	A A2
	U (DIN)	-199.9 to +600.0℃	U 01
	L (DIN)	0 to 400℃	L 01

Input		Range	Code
RTD	Pt100 (JIS/IEC)	-199.9 to +649.0℃	D 01
		-199.9 to +200.0℃	D 02
		-100.0 to +50.0℃	D 03
		-100.0 to +100.0℃	D 04
		-100.0 to +200.0℃	D 05
		0.0 to 50.0℃	D 06
		0.0 to 100.0℃	D 07
		0.0 to 200.0℃	D 08
		0.0 to 300.0℃	D 09
		0.0 to 500.0℃	D 10
		-199.9 to +999.9°F	D A1
		-199.9 to +200.0°F	D A3
		-199.9 to +100.0°F	D A4
		-199.9 to +300.0°F	D A5
		0.0 to 100.0°F	D A6
		0.0 to 400.0°F	D A8
		0.0 to 500.0°F	D A9
		-199.9 to +900.0°F	D B2

Input		Range	Code
RTD	JPt100 (JIS)	-199.9 to +649.0℃	P 01
		-199.9 to +200.0℃	P 02
		-199.9 to +100.0℃	P 04
		-100.0 to +200.0℃	P 05
		0.0 to 50.0℃	P 06
		0.0 to 100.0℃	P 07
		0.0 to 200.0℃	P 08
		0.0 to 300.0℃	P 09
		0.0 to 500.0℃	P 10

Quick Start Codes 2

• Quick start code tells the factory to ship with each parameter preset to the values detailed as specified by the customer.
Quick start code is not necessarily specified when ordering, unless the preset is requested. These parameters are software selectable items and can be re-programmed in the field via the manual.

Specifications		(1)	(2)	(3)	(4)	(5)	(6)	(7)
		□	□ – □	– □	– □	□ – □		□
(1) Alarm1 Type	None	**N**	**N**					
	Deviation High	**A**	**A**					
	Deviation Low	**B**	**B**					
	Deviation High/Low (Common high/low setting)	**C**	**C**					
	Band (Common high/low setting)	**D**	**D**					
	Deviation High with Hold	**E**	**E**					
	Deviation Low with Hold	**F**	**F**					
	Deviation High/Low with Hold (Common high/low setting)	**G**	**G**					
	Process High	**H**	**H**					
	Process Low	**J**	**J**					
	Process High with Hold	**K**	**K**					
	Process Low with Hold	**L**	**L**					
(2) Alarm2 Type	Deviation High with Alarm Re-hold	**Q**	**Q**					
	Deviation Low with Alarm Re-hold	**R**	**R**					
	Deviation High/Low with Re-Hold (Common high/low setting)	**T**	**T**					
	Band (Individual high and low settings)	**U**	**U**					
	Set value High	**V**	**V**					
	Set value Low	**W**	**W**					
	Deviation High/Low (Individual high and low settings)	**X**	**X**					
	Deviation High/Low with Alarm Hold (Individual high and low settings)	**Y**	**Y**					
	Deviation High/Low with Alarm Re-Hold (Individual high and low settings)	**Z**	**Z**					
	Loop break alarm	Can not be specified	**2**					
	RUN status	**4**	**4**					
(3) Control Output Assignment	a) PID control type : Output 1 (OUT1) b) Heat/Cool PID control : Heat-side output : Output 1 (OUT1) Cool-side output : Output 2 (OUT2)			**1**				
	a) PID control type : Output 2 (OUT2) b) Heat/Cool PID control : Heat-side output : Output 2 (OUT2) Cool-side output : Output 1 (OUT1)			**2**				
	Heat/Cool PID control : Heat-side output : Output 1 (OUT1) Cool-side output : Output 3 (OUT3) (Can be specified only for Heat/Cool PID control)			**3**				
	Heat/Cool PID control : Heat-side output : Output 2 (OUT2) Cool-side output : Output 3 (OUT3) (Can be specified only for Heat/Cool PID control)			**4**				
(4) Alarm1 Output Assignment *1	No assignment				**N**			
	Output 1 (OUT1)				**1**			
	Output 2 (OUT2)				**2**			
	Output 3 (OUT3)				**3**			
(5) Alarm2 Output Assignment *1	No assignment					**N**		
	Output 1 (OUT1)					**1**		
	Output 2 (OUT2)					**2**		
	Output 3 (OUT3)					**3**		
(6) HBA1 Output Assignment *2	No assignment						**N**	
	Output 1 (OUT1)						**1**	
	Output 2 (OUT2)						**2**	
	Output 3 (OUT3)						**3**	
(7) HBA2 Output Assignment *2	No assignment							**N**
	Output 1 (OUT1)							**1**
	Output 2 (OUT2)							**2**
	Output 3 (OUT3)							**3**

*1 : Cannot be specified if the output terminal is already specified for control output.
*2 : Cannot be specified if the output terminal is already specified for control output.

Example of Model Codes and Quick Start Codes

Specifications

Input/Range : Thermocouple K 0 to 400℃
Control Method : Heat/Cool PID control (Water Cooling)
Heat-side Output : Output 1 (OUT1)
Cool-side Output : Output 2 (OUT2)
Alarm 1 : Deviation High (Output 3(OUT3))
Alarm 2 : Deviatio Low with Alarm Hold (Output 3(OUT3))
• OUT3 : OR logic output of Alarm 1 and Alarm 2

Factory Setting Codes

Model and Suffix Codes /N2 -WK02

Control Method: Heat/Cool PID Control (Water Cooling) — Code : W
Input/Range: Thermocouple K 0 to 400℃ — Code : K02

Quick Start Codes

AF-1-33-NN

Alarm1: Deviation High — (1) Code : A
Alarm2: Deviatio Low with Alarm Hold — (2) Code : F
OUT1: Heat-side Control Output
OUT2: Cool-side Control Output — (3) Code : 1
OUT3: Alarm 1 and Alarm 2 — (4) Code : 3
(5) Code : 3
HBA: None — (6) Code : N
(7) Code : N

Main Specifications

Input

Input type	Thermocouple K, J, T, E, S, R, B, N (JIS/IEC) PLII (NBS), W5Re/W26Re (ASTM), U, L (DIN) RTD Pt100 (JIS/IEC), JPt100 (JIS) • 3-wire system • Universal inputs.
Sampling time	0.25sec
Influence of external resistance	0.2μV/Ω (Thermocouple input)
Influence of lead resistance	0.02% of reading/Ω (RTD input) • Maximum 10Ω per wire
Current transformer (CT) input (Optional)	(1) Number of inputs : 2 points (2) Input range : CTL-6-P-N 0.0 to 30.0 A CTL-12-S56-10L-N 0.0 to 100.0 A

Performance

Measuring accuracy table

Input Type	Range	Accuracy
K, J, T, E, PLII *1 U, L	Lower than -100°C (-148°F) -100 to 500°C (-148 to 932°F) 500°C (932°F) or higher	± (2.0°C [3.6°F] + 1 digit) ± (1.0°C [1.8°F] + 1 digit) ± (0.2% of Reading + 1 digit)
N, R, S *2 W5Re/W26Re	Lower than 0°C (32°F) 0 to 1000°C (32 to 1832°F) 1000°C (1832°F) or higher	± (4.0°C [7.2°F] + 1 digit) ± (2.0°C [3.6°F] + 1 digit) ± (0.2% of Reading + 1 digit)
B	Lower than 400°C (752°F) 400 (752°F) or higher	± (70°C [126°F]) + 1 digit) ± (2°C [3.6°F] + 1 digit)
Pt100, JPt100	Lower than 200°C (392°F) 200°C (392°F) or higher	± (0.4°C [0.7°F] + 1 digit) ± (0.2% of Reading + 1 digit)

*1 : Accuracy is not guaranteed for less than -100°C .
*2 : Accuracy is not guaranteed for less than 400°C (752°F) for Input Type R, S, B and W5Re/W26Re.

Cold junction temperature compensation error	±0.5°C (-10 to +55°C (14 to 131°F))

Control

Control method	PID control (With autotuning) • P, PI, PD, ON/OFF control selectable • Direct action/Reverse action is selectable Heat/Cool type PID control (With autotuning)
Setting range	a) Proportional band : 1(0.1) to span (°C,°F) • Within 9999(999.9)°C (°F) (ON/OFF control when P = 0) b) Integral time : 1 to 3600 sec (PD control when I = 0) c) Derivative time : 1 to 3600 sec (PI control when D = 0) d) Cool side proportional band : 1 to 1000% of heat side proportional band * Invalidity when P=0. * Only cooling side ON/OFF control is not available. e) Anti-Reset Windup(ARW) : 1 to 100% of heat side proportional band (Integral action is OFF when ARW = 0) f) Proportional cycle time : 1 to 100 sec
Additional function	Fine tuning, Startup tuning, Auto tuning, RUN/STOP

Output

Number of outputs	Up to 3 points (OUT1 to OUT3)
Output function	Control output, Alarm output, HBA (Heater break alarm) output
Output type	Relay contact output (1) [OUT1,2 of RZ400 : Control output] a) Contact type : 1a contact b) Contact rated : 250V AC 3A, 30V DC 1A (Resistive load) c) Electric life : 300,000 operations or more (Rated load) d) Mechanical life : 50,000,000 operations or more Relay contact output (2) [OUT1,2 and 3 of RZ100 : Control output, OUT3 of RZ400 : Control output] a) Contact type : 1a contact b) Contact rated : 250V AC 3A, 30V DC 1A (Resistive load) c) Electric life : 100,000 operations or more (Rated load) d) Mechanical life : 20,000,000 operations or more Relay contact output (3) [RZ100 and RZ400 : Alarm output, HBA output a) Contact type : 1a contact b) Contact rated : 250V AC 1A, 30V DC 0.5A (Resistive load) c) Electric life : 150,000 operations or more (Rated load) d) Mechanical life : 20,000,000 operations or more Voltage pulse output : 0/12V DC (Load resistance : More than 500Ω) Current output: 4 to 20mA DC, 0 to 20mA DC (Load resistance : Less than 500Ω)

Event (Alarm) (Optional)

Event type	Temperature alarm, HBA(Heater break alarm), LBA (Control loop break alarm)
Temperature alarm type	Process high, Process low, Deviation high, Deviation low, Deviation high/low, Band, Set value high, Set value low, LBA (Control loop break alarm), RUN status monitor
Additional function	a) Energized/de-energized action is configurable. b) Delay timer : 0 to 600 sec c) Interlock (latch) function is configurable.

Communication (Optional) • Loader communication : Standard

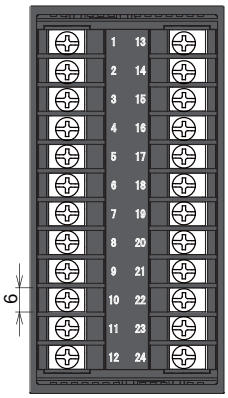
Communication method	RS-485
Protocol	a) ANSI X3.28 sub-category 2.5A4 (RKC standard) b) MODBUS-RTU
Loader communication	ANSI X3.28 sub-category 2.5A4 (RKC standard)

General Specifications

Supply voltage	85 to 264V AC (50/60Hz common) Rating : 100 to 240V AC
Power consumption	RZ100 : 5.1VA (100V), 7.6VA (240V), RZ400 : 5.9VA (100V), 8.4VA (240V)
Rush current	Less than 5.6A (100V), Less than 13.3A (240V)
Insulation resistance	More than 20MΩ (500V DC) between measured terminals and ground
Dielectric voltage	2300V AC for 1 minute
Ambient temperature	-10 to 55°C (14 to 131°F)
Ambient humidity	5 to 95%RH (Non condensing) • Absolute humidity : MAX.W.C29.3g/m3 dry air at 101.3kPa
Weight	RZ100 : 115g, RZ400 : 165g
Water/Dust proof (Optional)	IP66

Rear Terminals

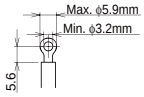
RZ400



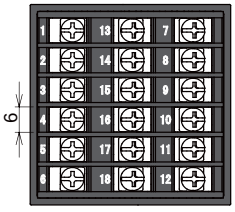
No	Contents
1	Power supply
2	100 to 240V AC
3	Output 2 (OUT2)
4	(1) Relay contact (2) Voltage pulse (3) Current
5	Output 1 (OUT1)
6	(1) Relay contact (2) Voltage pulse (3) Current
7	
8	Output 3 (OUT3)
9	Relay contact
10	Measuring input
11	
12	

No	Contents
13	Communication SG
14	T/R(A) RS-485
15	T/R(B)
16	
17	
18	
19	
20	
21	
22	CT2 CT1/2 input
23	CT1
24	COM

Dimensions of the crimp terminal



RZ100



No	Contents
1	Power supply
2	100 to 240V AC
3	Output 2 (OUT2)
4	(1) Relay contact (2) Voltage pulse (3) Current
5	Output 1 (OUT1)
6	(1) Relay contact (2) Voltage pulse (3) Current

No	Contents
13	Communication SG
14	T/R(A) RS-485
15	T/R(B)
16	CT2 CT1/2 input
17	CT1
18	COM

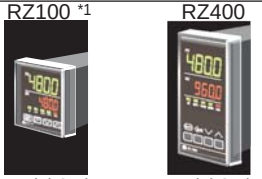
No	Contents
7	
8	Output 3 (OUT3)
9	Relay contact
10	Measuring input
11	
12	

Accessories (Sold separately)

Terminal Cover

Model Code : KCA100-517
Model Code : KFB400-58

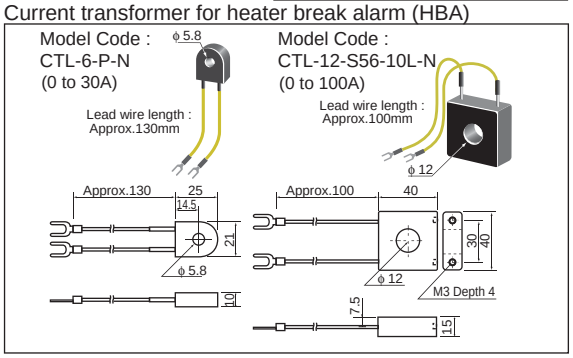
Front Cover



Model Code : KRB100-36A
Model Code : KRB400-36

*1: Soft cover (Silicone rubber) type is availabe. Only for RZ100. Model Code : KRB100-315(1)

Current transformer for heater break alarm (HBA)



Safety Warning

- Before operating this product, read the instruction manual carefully to avoid incorrect operation.
- This product is intended for use with industrial machines, test and measuring equipment. It is not designed for use with medical equipment.
- If it is possible that an accident may occur as a result of the failure of the product or some other abnormality, an appropriate independent protection device must be installed.

Caution for the export trade

All transactions must comply with laws, regulations, and treaties.

Caution for imitated products

As products imitating our product now appear on the market, be careful that you don't purchase these imitated products. We will not warrant such products nor bear the responsibility for any damage and/or accident caused by their use.

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