

RKC

REX-P250

DIGITAL PROGRAM CONTROLLER

Most Advanced Controller with Abundant Functions.
Unique Transparent Touch-key panel Improving Operatability.



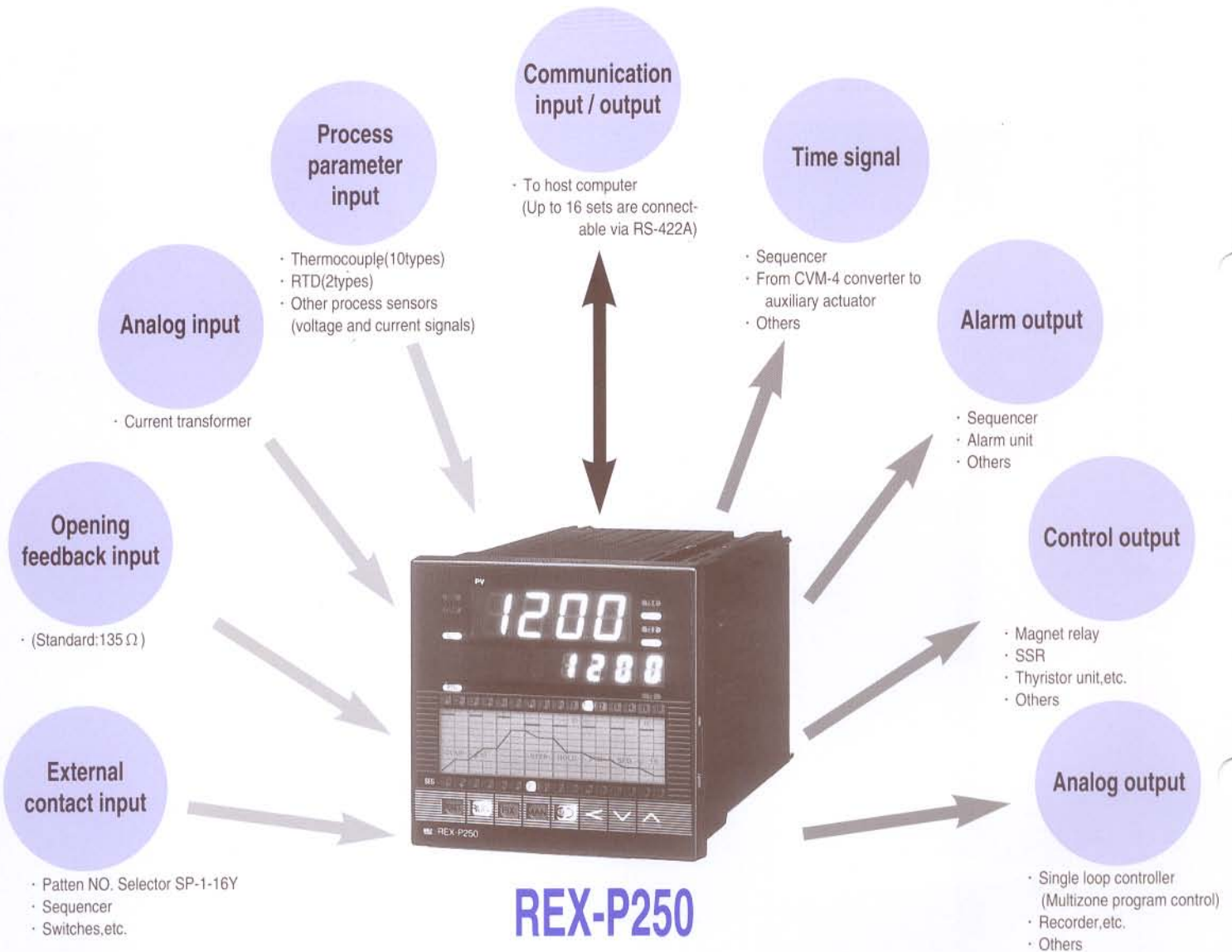
RKC

RKC INSTRUMENT INC.

Responding to all processes with abundant input and output types

Features

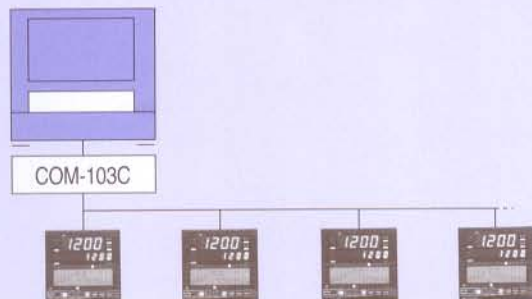
- Large-capacity program of 16 segments \times 16 patterns.
(Up to 256 segments are continuously operable by pattern link function.)
- High accuracy of $\pm(0.3\%$ of displayed value $+1$ digit)
- Time signal which can output 4 digital output points up to 16 times / pattern
- Eight PID constants and alarm set-values can be filed and also be set for each segment.
- Control in three modes, that is, program mode, FIX mode and manual mode.



Application Examples

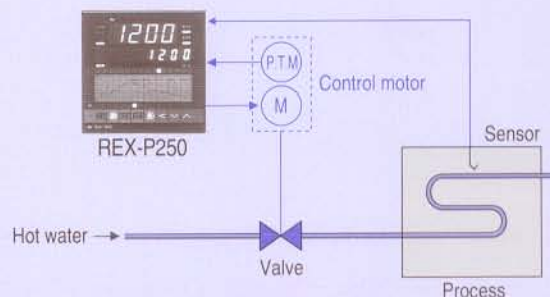
• Various testing equipment such as constant temperature bath, etc.

The program controller REX-P250 used for the control of various testing equipment is provided with an interface function to facilitate centralized control by computer.



• Temperature control by the use of control motor.

Even for valve open / close using a control motor, the controller can send control signal directly to the control motor without using an electro-to-electro positioner.

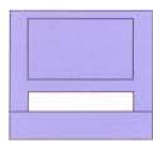


Functions

Interface Function (Option)

A built-in RS-422A or RS-232C interface enables data communication with a host computer. Use this function for preparation of factory automation such as data control, etc.

- Monitoring
- Pattern setting
- Others



RS-422A
RS-232C



Up to 16 sets

REX-P250

External Contact Input

Pattern No. Setting, reset, run, step and hold can be executed by external contact signal via rear terminals as well as front key operation. This function can be used for automation of each process, malfunction prevention, etc. using external contact signals (sequencer, switches, etc.)



REX-250



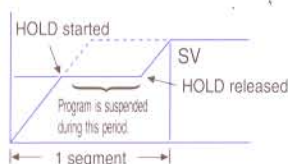
SP-1



PLC

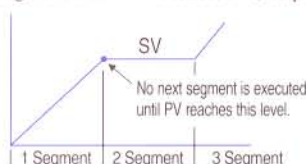
HOLD Function

Program progress can be suspended when this function is activated and the level at that time is maintained until the HOLD function is released.



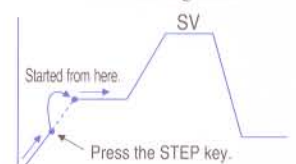
WAIT Function

In program control, PV (measured value) may not follow program progress. In such case, this function suspends program progress at each end segment (for each line segment) and then executes the next segment after PV reaches SV (set-point).



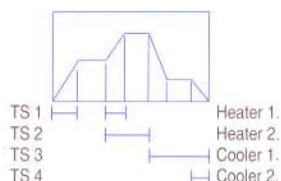
STEP Function

In program control, press this step key when the current segment needs to be skipped to execute the next segment for some reasons. The segment under execution is thus skipped and the program continues from the next segment.



Time signal

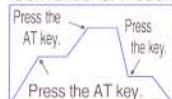
This function is used for the ON/OFF operation of auxiliary heater and cooler, and sequencer input signal in accordance with program progress by setting ON time and OFF time. Up to 16 times of setting / pattern are available and output form is 4-point open collector. (When CVM-4 is connected, relay contact output)



AT. Learning Function (AT. Test Function)

If temperature levels are different the same PID constants may not achieve optimum control. Therefore, if the conventional AT function is used, it needs to be executed every time the program enters the soak level (fixed setpoint control of program). However, the AT learning function automatically activates AT at 8 soak levels from the beginning to obtain and memorize the respective optimum PID constants.

Conventional model.



The AT key needs to be pressed every time in accordance with program progress.

AT Test



Autotuning is executed automatically at each soak level without executing program.

Analog output (option)

PV (measured value), SV (set value) and MV (manipulated variable) can be output as DC voltage and/or current analog signals. The SV level can be specified for multi-zone program control, and the PV level, for recorder input. Opening value can also be output for the position proportioning control type.

Specify any one of
PV, SV and MV.



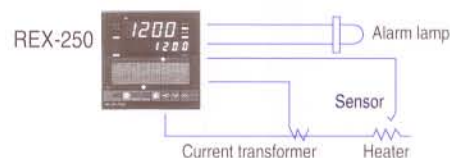
REX-250



0 to 10mV DC, 0 to 10V
DC, 4 to 20mA DC, etc.

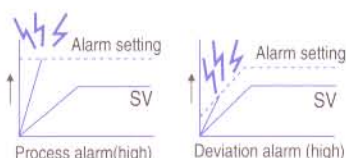
Heater Break Alarm (Option)

For relay contact or SSR drive output, heater break can be detected with the use of our current transformer (CTL-6-P-N).



Alarm output(option)

Two types of alarm can be selected from process alarm (high,low) and deviation alarm (high, low, high/low, band). However, when the heater break alarm function is built in the controller, only a single alarm type can be specified.



PV bias

This function can be used when REX-P250 has a display difference from the indication of a recorder used in conjunction. Also, the REX-P250 display needs to be matched to recorder indication or the displayed value needs to be carried in relation with other instruments because of sensor location.

$$\text{Actual PV} + \text{PV bias} = \text{Displayed value}$$

$$197^{\circ}\text{C} + 3^{\circ}\text{C} = 200^{\circ}\text{C}$$

Specifications

REX-250

INPUT	Input type		Thermocouple (T / C), RTD, DC voltage and current.				
	Input break protection		T / C, RTD	UP-scale (as standard)			
			DC voltage DC current	Uncertain (Down-scale for 1 ~ 5V DC and 4 ~ 20mA DC input.)			
	Sampling cycle		0.5 sec.				
	PV bias		- Span to + Span (However, between -1999 and 9999)				
	PV digital filter		0 to 100 sec				
ACCURACY	Accuracy	Level	Thermocouple	±(0.3% of displayed value + 1 digit) or ±2°C (±4°F), whichever is larger.			
			RTD	±(0.3% of displayed value + 1 digit) or ±0.8°C (±1.6°F), whichever is larger.			
			DC voltage DC current	±(0.2% of span + 1 digit) or better.			
		Segment time		±(0.01% of set value) or within ±50 msec.			
		Proportional band / Hysteresis width		±0.5% of span or ±0.5°C [°F]			
		Other setting items		±0.5% of setting range.			
PROGRAM SECTION	Storage program patterns		Max. 16 patterns (16 segments per pattern.)				
	Storage segments		Max. 256 segments (16 segments × 16 patterns). Linkable.				
	Program repeat		1 ~ 999 times or continuous.				
	Setting	Level	See standard scale ranges.				
		Time	00 hr 00 min 00 sec ~ 99 hrs 59 min 59 sec				
	PID constant section		Selectable from 8 patterns for each segment				
Start mode		Zero start or PV start (selectable)					
CONTROL SECTION	Control action		PID action with / without AT (type H, F)		PID action for control motor drive (type Y)		
	Control type		Pogram, fixed-set (FIX) point and manual.		Program, fixed-set point (FIX) and manual.		
	SETTING ITEM	Proportional band (P)		0.1 ~ 999.9% of span. (P = 0% → ON / OF action)		0.1 ~ 999.9% of span	
		Integral time (I)		1 ~ 3600 sec.		1 ~ 3600 sec.	
		Derivative time (D)		1 ~ 3600 sec.		1 ~ 3600 sec.	
		Differential gap		When used with ON / OF action 0 ~ 100 or 0.0 ~ 100.0°C [°F]		OPEN / CLOSE output differential gap 0.1 ~ 20.0% of prop. band	
		Deadband				0.1 ~ 20% 0.1 ~ 20.0% of prop band (Y action only)	
		Digital filter		0 ~ 100 sec.		0 ~ 100 sec.	
		Output limiter		-5.0 ~ 105.0% for both high and low limit (with RFB limiter)		-5.0 ~ 105% for both high and low limit (with RFB limiter)	
	CONTROL OUTPUT	Wait zone		0 ~ 99°C [°F] or 0.0 ~ 9.9°C [°F]		0 ~ 99°C [°F] or 0.0 ~ 9.9°C [°F]	
		Relay output		250V AC 3A (resistive load) 1c contact <cycle : 1 ~ 100 sec.>		Control motor drive output	
		SSR drive pulse voltage output		0 / 12V DC (load resistance more than 800 Ω) <cycle : 1 ~ 100 sec.>		OPEN / CLOSE independent relay output, 250V AC 3A, 1a contact	
		Current output		4 ~ 20mA DC or 0 ~ 20mA DC (load resistance more than 600 Ω)		Feedback resistance 135 Ω as standard	
		Continuous voltage output		0 ~ 5V, 0 ~ 10V, 1 ~ 5V DC (load resistance more than 1K Ω)			
	Triac trigger output		Zero-cross system for driving medium capacity triac (100A or less) <cycle : 1 ~ 100 sec.>				
OTHERS	Time signal		Setting time	00 hr 00 mn 00 sec ~ 99 hrs 59 min 59 sec.			
			Storage pattern	16 patterns (16 time on / off per pattern)			
			Output	4-point open collector output, 24V DC 50mA.			
	Pattern end output		setting range	00 hr 00 mn 00 sec ~ 99 hrs 59 min 59 sec.			
			Output	1-point open collector output, 24V DC 50mA.			
	External control function		Start pattern No. setting (4 bit binary contact), RESET, RUN, HOLD, STEP				
Self-diagnosis function		Setting input data check, RAM check, CPU power check and watch-dog timer.					
		Output : 1 point relay contacts output, 250V DC 0.1A (resistive load.) OPEN when fail is detected.					
POWER FAILURE	Data back up period		Data is backed up by lithium battery about 10 years (Dependent on ambient conditions, etc.)				
	Momentary power failure		NOT affected by power failure shorter than 50m sec.				
	Recovery after Power failure		HOT start for power failure shorter than 4 sec.				
HOT or COLD start (selectable) for power failure longer than 4 sec.							
GENERAL SPECIFICATION	Supply voltage		Rating : 100 ~ 240V AC (90 ~ 264V AC including voltage variation), 50 / 60Hz.				
	Housing color		Black				
	Ambient condition		0 ~ 50°C (32 ~ 122°F), 45 ~ 85% RH.				
	Net weight		Approx. 0.75kg				
	External Dimensions		96 × 96 × 150mm (H × W × D)				

※T / C Types R, S : Accuracy is $\pm 6^{\circ}\text{C}$ between 0 and 399 $^{\circ}\text{C}$ (0 ~ 750 $^{\circ}\text{F}$). T / C Type B is out of guaranteed accuracy between 0 and 399 $^{\circ}\text{C}$ (0 ~ 750 $^{\circ}\text{F}$).

Specifications

《OPTION》

■ Alarm action (Specify the type when ordering)

Type	Deviation alarm (high, low, high/low, band), process alarm (high, low) (Up to 2 alarms can be specified.) HOLD function can be provided.
Output	Relay contact output 250VAC 1A (Resistive load) 1a contact
Differential gap	0 to 100°C[°F] or 0.0 to 100.0 [°F] [%]

■ Analog Output (Specify signal code)

No. of outputs	1point			
Type (specify anyone of them)	Measured value (PV)		Setpoint (SV)	Manipulated variable (MV)
	Valve position (POS) [Specified only PID action for control moter drive]			
Output signal	Continuous voltage output	0 ~ 10mV	0 ~ 100mV	Load resistance more than 20k Ω
		0 ~ 1V	0 ~ 5V	Load resistance more than 1k Ω
		0 ~ 10V	1 ~ 5V	Load resistance more than 1k Ω
	Continuous current output	0 ~ 20mA	4 ~ 20mA Other	Load resistance less than 600 Ω
Output resolution	More than 12 bits			

■ Heater Break Alarm (Not available on current/continuous voltage output types and servo action type Y)

Input (Current detector)	CTL-6-P-N (0 ~ 30A) (Device Specified by RKC)
	CTL-12-S56-10L-N (0 ~ 100A) (Device specified by RKC)
Setting range	0.0 ~ 100.0A
Heater current display accuracy	$\pm 5\%$ of input value or $\pm 2A$, whichever is larger
Setting memory area	8-memory
Output	Relay contact output. 250V AC 1A (resistive load), 1a contact.

■ Communication Function

Communication method	RS-232C (EIA), Full-duplex, start / stop method. Protocol : ANSI × 3.28				
	RS-422A (EIA), half-duplex, multi-drop, start / stop method. Protocol : ANSI × 3.28				
Max. connection	RS-232C (1 point), RS-422A (16 points, address 0 ~ 15)				
Communication speed	600 BPS	1200 BPS	2400 BPS	4800 BPS	9600 BPS
Bit structure	START bit	1bit			
	DATA bit	7 or 8 bits			
	Parity bit	Even, odd, and none			
	Stop bit	1 or 2 bit.			
Commucation code	ASCII (JIS)				

■ CVM-4 OUTPUT CONVERTER (OPTION)

This unit used to covert open collector signal output from REX-P250 into relay contact output.

Input	Open collector output from REX-P250 (parallel signal)
Output	Relay contact 250V AC 2A (resistive load). 1a contact.
Cable length	2 meters (Prepare connection cable on your side)
Ambient condition	0 ~ 50°C (32 ~ 122°F), 45 ~ 85% RH.
Supply voltage	100 / 110, 120, 200 / 220, 240V AC $\pm 10\%$, (50 / 60 Hz), whichever is specified.
Power consumption	Less than 6VA.
Insulation resistance	More than 20M Ω (500V DC) between input and ground terminals.
	More than 20M Ω (500V DC) between power and ground terminals.
Dielectric strength	1000V AC for one minute between input and ground terminals.
	1500V AC for one minute between power and ground terminals.
Net weight	less than 1.5kg (3.3lb)
External dimensions	137 \times 67 \times 184mm. (H \times W \times D)

■ SP- 1 selector (OPTION)

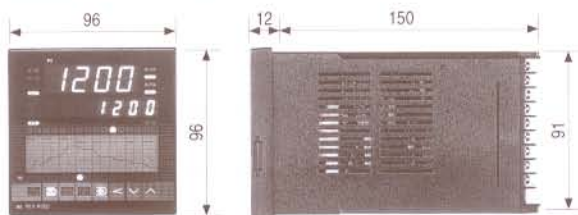
SP-1-16Y is a pattern NO. selector which can connect up to REX-250 (P200) sets.

Setting	digital switch (2-button type) Push switch (Non-lock type)
Setting range	1 to 16
Performance	Contact resistance : Less than 200m Ω
Operating condition	Ambient temperature -10 to + 50°C (No dew condensation)
Weight	Approx. 110g
External dimensions	48 (H) \times 48 (W) \times 100 (D) mm

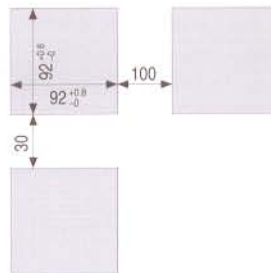
Rear Terminals And External Dimensions.

REX-P250

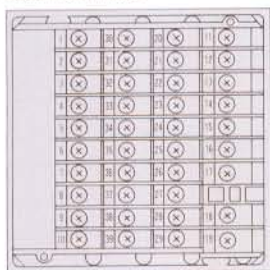
External Dimensions (unit : mm)



Panel Cutout (unit : mm)



Rear Terminals



1 Please use solderless terminal smaller than 8.1mm for terminal Nos., 17,18,19, and for other terminals, please use solderless terminals smaller than 6.2mm.



2 The above illustration shows all terminals with screws, but on actual instrument, unused terminals are covered with a plate.

Terminal Configuration

NO.	Function
1	Ground
2	100-240W Power supply
3	GOM (-)
5	TS1 Time signal output (open collector)
6	TS2
7	TS3
8	TS4
9	END: Pattern end output
10	

NO.	Function
30	Alarm output
31	FALL
32	ALM1
33	ALM2 or HBA
34	Control output (H, F types)
35	Control output (Y types)
36	Relay contact output
37	Relay contact output
38	Analog output
39	

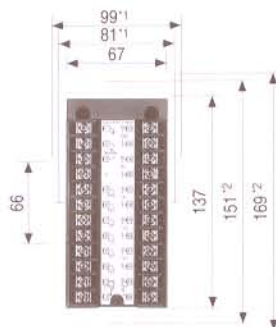
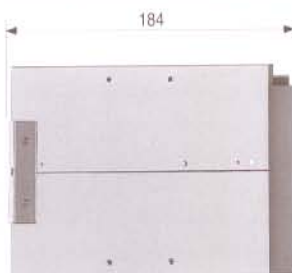
NO.	Function
20	COM (-) Contact input
21	PTN1
22	Pattern NO. Selection input (Binary contact signal)
23	2
24	4
25	8
26	P.SET
27	RESET
28	RUN
29	STEP
	HOLD

Alarm Output terminals / HBA : Heater Break Alarm
Control Output terminals /
M : Relay output
V : SSR drive output
R : Current output
E : DC voltage output
G : Triac trigger output

NO.	Function
11	SG Communication
12	RS-422A RS-232C
13	T/R (B) SD RD (1 or 2)
14	Current transformer input
15	CT
16	Feedback resistance input
17	RTD INPUT (1) T / C input (2) RTD input (3) DC voltage / current input specify one of them
18	TC
19	

CVM-4 CONVERTER(OPTION)

External Dimensions (unit : mm)



SP-1 (option)

External Dimensions(unit : mm)



(Panel thickness is 1 ~ 2.3mm)

Panel Cutout (unit : mm)



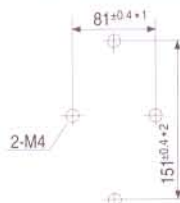
Rear Terminal Configuration

NO.	Function	NO.	Function
1	Ground	13	NO
2	AC 100 / 110 V 200 / 220 V	14	END
3		15	C
4		16	Pattern END
5	END	17	NO
6	TS1	18	TS1
7	TS2	19	NO
8	TS3	20	TS2
9	TS4	21	NO
10	COM	22	TS3
11		23	NO
12		24	TS4

Mounting

Dimensions

1 when mounting brackets are supplied on both sides.
2 when mounting brackets are supplied on top and bottom.



Note : Use solderless terminal lugs smaller than 8.1mm for M3.5.

Rear Terminal



Note 1 : Use solderless terminal lugs smaller than 6.2mm for M3 for terminal NO. s 17, 18 and 19.

Note 2 : The above illustration shows all terminals with screws, but on actual instrument, unused terminals are covered with a plate.

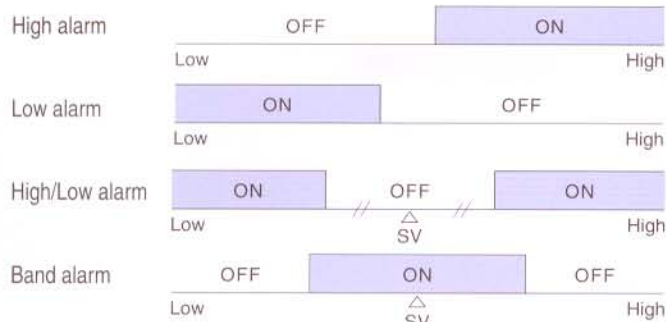
Rear Terminal Configuration

NO.	Function	NO.	Function
6	P.SET	7	
1	COM	8	
2	1	9	
3	2		
4	4		
5	8		

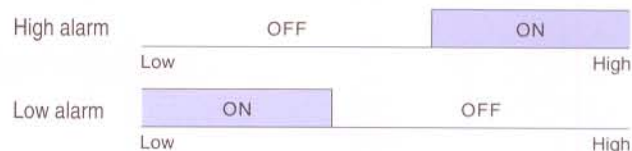
Specification Selection

Note 2 : Alarm action type (HOLD function can be provided.) when two alarm types are selected, no heater break alarm function can be provided.

• Deviation alarm



• Process alarm



1st alarm		2nd alarm	
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Note 3 : Standard Range

Input	Standard Range	Input	Standard Range
Thermocouple	Type K (JIS / ICE) 0 ~ 200°C, 0 ~ 400°C, 0 ~ 600°C, 0 ~ 800°C, 0 ~ 1000°C, 0 ~ 1200°C, 0 ~ 1372°C (1°C), -100.0 ~ 400.0°C (0.1°C) 0 ~ 800°F, 0 ~ 1600°F, 0 ~ 2502°F (1°F), -100.0 ~ 750.0°F (0.1°F)	Thermocouple	Type (ASTM) W5Re / W26Re 0 ~ 2000°C, 0 ~ 2320°C (1°C) 0 ~ 4000°F (1°F)
	Type J (JIS / ICE) 0 ~ 200°C, 0 ~ 400°C, 0 ~ 600°C, 0 ~ 800°C, 0 ~ 1000°C, 0 ~ 1200°C (1°C), -100.0 ~ 400.0°C (0.1°C) 0 ~ 800°F, 0 ~ 1600°F, 0 ~ 2192°F (1°F), -100.0 ~ 750.0°F (0.1°F)		Type PL II (NBS) 0 ~ 1300°C (1°C) 0 ~ 2300°F (1°F)
	Type R, S (JIS / ICE) 0 ~ 1600°C, 0 ~ 1769°C (1°C) 0 ~ 3200°F, 0 ~ 3216°F (1°F)	RTD	Pt 100 (JIS / ICE) -199.9 ~ 649.0°C, -199.9 ~ 200.0°C, -100.0 ~ 50.0°C, -100.0 ~ 100.0°C, -100.0 ~ 200.0°C, 0.0 ~ 50.0°C, 0.0 ~ 100.0°C, 0.0 ~ 200.0°C, 0.0 ~ 300.0°C, 0.0 ~ 500.0°C (0.1°C)
	Type B (JIS / ICE) 400 ~ 1800°C, 0 ~ 1820°C (1°C) 750 ~ 3200°F, 0 ~ 3308°F (1°F)		JPt 100 (JIS) -199.9 ~ 999.9°F, -199.9 ~ 400.0°F, -199.9 ~ 200.0°F, -100.0 ~ 100.0°F, -100.0 ~ 300.0°F, 0.0 ~ 100.0°F, 0.0 ~ 200.0°F, 0.0 ~ 400.0°F, 0.0 ~ 500.0°F (0.1°F)
	Type E (JIS / ICE) 0 ~ 800°C, 0 ~ 1000°C (1°C), -100.0 ~ 300.0°C (0.1°C) 0 ~ 1600°F, 0 ~ 1832°F (1°F), -100.0 ~ 500.0°F (0.1°F)	DC voltage/current	0 ~ 10mV, 0 ~ 100mV, 0 ~ 1V, 0 ~ 5V 0 ~ 10V, 1 ~ 5V 0 ~ 20mA 4 ~ 20mA
	Type T (JIS / ICE) 0 ~ 400°C (1°C) 0 ~ 752°F (1°F) -199.9 ~ 400.0°C, -199.9 ~ 100.0°C, -100.0 ~ 200.0°C, 0.0 ~ 350.0°C (0.1°C) -199.9 ~ 752.0°F, -100.0 ~ 200.0°F, -100.0 ~ 400.0°F, 0.0 ~ 450.0°F, 0.0 ~ 752.0°F (0.1°F)		
	Type N (ICE) 0 ~ 1200°C, 0 ~ 1300°C (1°C) 0 ~ 2300°F, 0 ~ 2372°F (1°F)		

Standard range	Input	Range
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Note 4 : Selected from the following table.

Current output	R	DC.4 ~ 20mA	DC.0 ~ 20mA	
Continuous voltage output	E	DC.0 ~ 5V	DC.0 ~ 10V	DC.1 ~ 5V

Note 5 : Heater break input (When not specified : 0 to 30A)

0 ~ 30A (Standard)	0 ~ 100A (Special)
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Note 6 : Analog output type (Specify one of them)

Input value	Set value	Manipulated value	Only for opening output (POS) position proportioning PID
Range			

Time signal during autotuning (Specify one of them when autotuning is provided)

Continuous time signal output during autotuning	Time signal output OFF during autotuning
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Specify either one of them since calculated autotuning value varies with the influence of cooler, etc. by time signal.

Deviation alarm in manual control (Specify either one of them when alarm action is provided.)

Deviation alarm for set-value in program control.	Deviation alarm for set-value in fixed setpoint control.
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Special Selection List

DIGITAL PROGRAM CONTROLLER

Item	Model Code & Functions											Remarks
	REX-P250				-	*	-		-			
Control action	PID action PID action with autotuning PID action for control motor drive	H F Y										
Alarm Note 2	No alarm		N									
	Single alarm		S									
	Dual alarm		D									
Input Note 3	T/C input			C								
	RTD input			R								
	DC voltage / current (Specify signal code) Note 1											
Control output	Relay					M						
	SSR drive pulse voltage					V						
	DC current Note 4					R						
	DC voltage Note 4					E						
	Triac trigger					G						
Case color	Black						B					
Option	Analog input	No analog input Heater break alarm Note 5						N 2				
	Analog output	No analog output Signal level selection							N			
	Digital Communication	No digital communication RS-232C RS-422A								N 1 2		

Note 1

Signal level selection	1	DC.0~10mV	2	DC.0~100mV	3	DC.0~1V	4	DC.0~5V	5	DC.0~10V	6	DC.1~5V	7	DC.0~20mA	8	DC.4~20mA	9	Others
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OUTPUT CONVERTER

Item	Model Code & Functions			Remarks
	CVM-4	-2		
Contact output	With contact output (without FAIL output)	2		
Supply voltage	100/110V AC		1	
	120V AC		2	
	200.220V AC		3	
	240V AC		4	
	Others		9	

PATTERN No. SELECTOR

SP-1-16Y (Pattern setting button provided)

SP-1-16N (Pattern setting button not provided)

Subject to change without notice due to design changes.



RKC INSTRUMENT INC.
(RIKA KOGYO CO., LTD)

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