

Microprocessor based single loop DDC controllers

96 × 96 mm square DIN size

- REX-C1000H Heating PID action standard type
- REX-C1000H Heating PID action external setting type
- REX-C1000H6 Heating/cooling PID action
- REX-C1000H Heating PID action temperature difference control type

One-board type controller

- REX-C1100F Heating PID action

REX-C1000 SERIES

ELECTRONIC
TEMPERATURE
CONTROLLERS

*Instruments that made automatic PID
constant tuning normal*



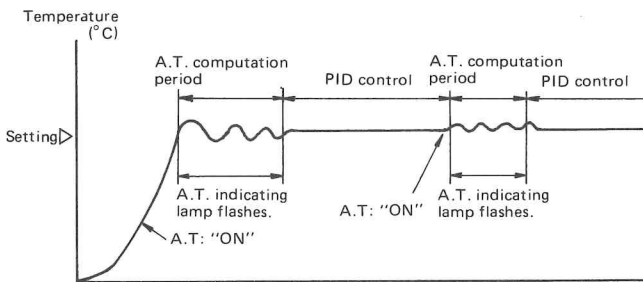
RKC RKC INSTRUMENT INC.

Versatile applications offered by wide range of products

Extended range of temperature control

Auto-tuning function (A.T.)

Even in a highly accurate controller, it is necessary to set the optimum PID constants when carrying out PID control. However, the REX-C1000 removes this problem by the use of the auto-tuning function and is thus a very high-grade controller that permits one-touch automatic PID constant setting by automatic measurement and computation.



The autotuning function can be started when the power is turned on, when the temperature rises, at control stabilization, or from any other state.

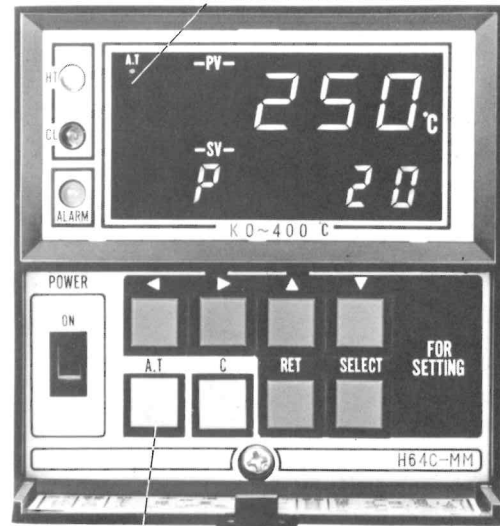
* Contact us regarding the use of the A.T. function when changes in temperature is either very large or very small due to load characteristics.

Manual setting of PID constants

The operator can set PID constants, such as proportional band (P), integral time (I), derivative time (D), ARW, etc., manually without depending on the auto-tuning function. Even in this case, control can be performed with a very high accuracy.

A.T. indicating lamp

This lamp flashes when auto-tuning calculation is being made and goes OFF when the new PID constants have been calculated.

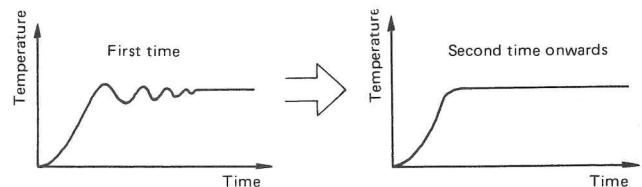


PID constants will be automatically calculated and set when the A.T. key is pressed.

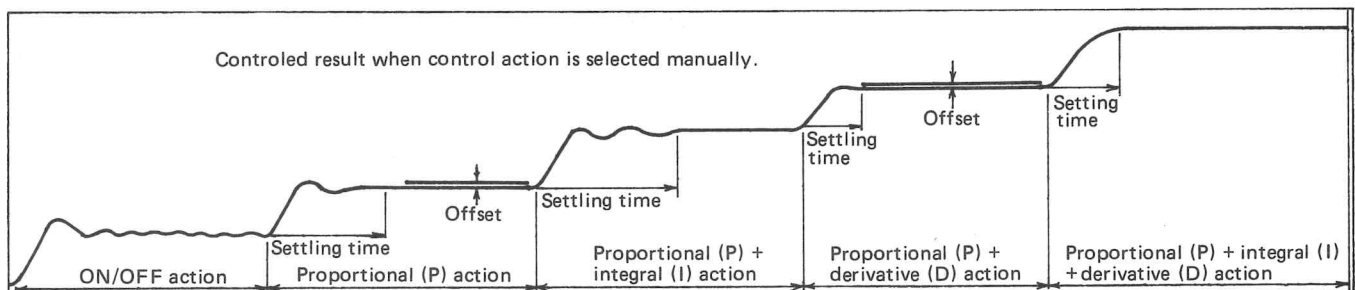
Non-volatile memory

All the set values will be stored in a non-volatile memory so that they will not be lost when the power is turned OFF. These values will be restored when the power is turned ON again.

PID constants need only be computed by using the auto-tuning function for the first time. The operation will start with the optimum constants when the power is turned ON from the second time onwards.



One 5-stage REX-C1000 allows selection of control action to match any application.



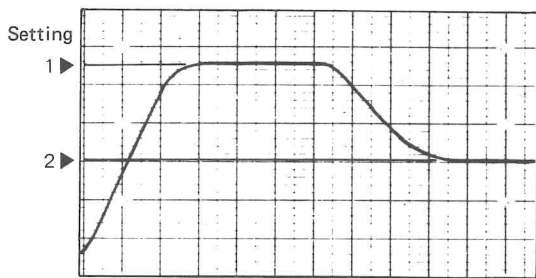
The REX-C1000 is provided with a variety of functions and is therefore a very versatile controller that can match a large number of purposes and applications.

Because of the built-in microprocessor, the wide range of functions, the ease of operation, the high accuracy of control possible, etc., have been achieved at very low cost.

This controller lets the user carry out sophisticated control accurately through simple key operation. In addition, the setting and the display are all of digital types which makes it very easy to read the data. You can select the controller most suited to your needs from the various types available - external setting, heating and cooling, temperature difference control, and one-board types.

Superior control without overshoot or undershoot

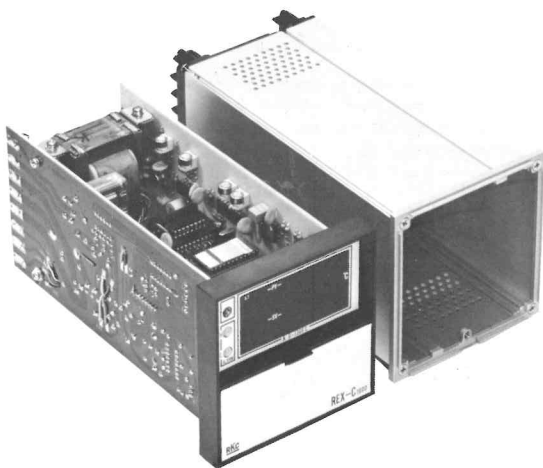
After the optimum constants are set either by autotuning or manually, the unique ARW (antireset windup) circuit prevents overshooting of the measured variable, even when the power is turned on again or the setting is changed. This provides an excellent control effect without any overshoot or undershoot.



Setting 1: Control without any overshoot
 Setting 2: Control without any undershoot after setting 1 is set to 2.

Complete plug-in system

The use of a complete plug-in construction makes maintenance, inspection and replacement much easier.

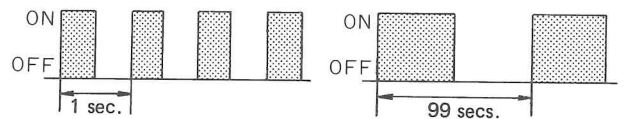


Input section and output section are isolated.

The measurement input and the operation output are electrically isolated by a photo-coupler.

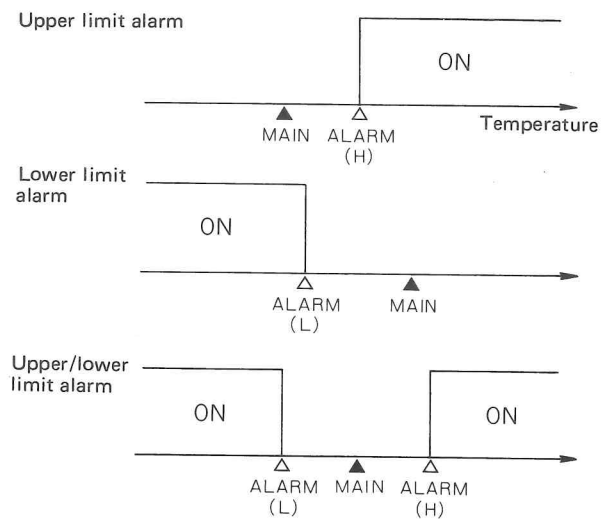
1-99 seconds variable cycle time

On relay contact and SSR drive output models, the cycle time can be adjusted from 1 to 99 seconds. The ability to adjust the cycle time makes improved control accuracy easier to attain.



Alarm operation function

It is possible to specify the upper and lower limit alarms either individually or together. These can also be used as auxiliary contacts for various operations apart from giving alarms when abnormal conditions occur. Upper and lower limit alarm outputs are independent each other. It is also possible to cancel the alarm operation only once (hold action) while the temperature is increasing or decreasing.



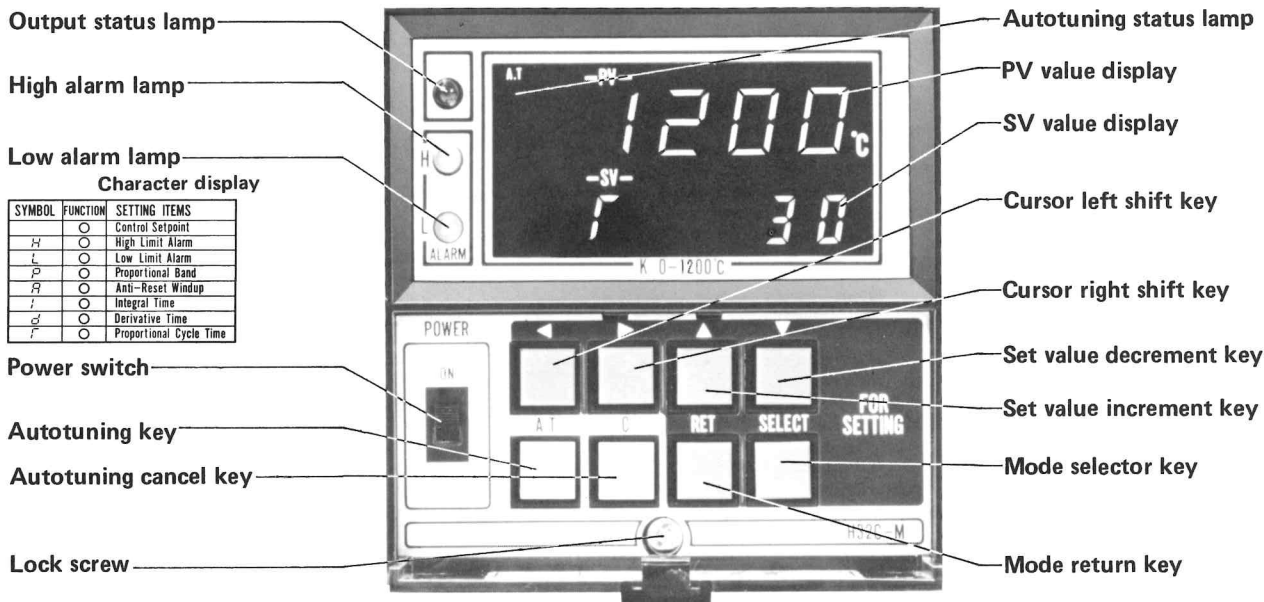
Simple operation by only pressing keys

1. REX-C1000 Standard type

We are a pioneer in the field of temperature controllers and have accumulated a vast amount of experience in this field. In addition, we have also listened very carefully to the opinions of our customers over the years to expand the measurement ranges and the types of inputs and outputs and have also added a variety of sophisticated functions and made our products highly reliable.

Furthermore, all operations are done by merely pressing appropriate keys even when carrying out the most sophisticated form of control, i.e. PID control. There is no doubt that this series of instruments is best on the market.

NAME OF PARTS



SYMBOL	FUNCTION	SETTING ITEMS
	<input type="checkbox"/>	Control Setpoint
H	<input type="checkbox"/>	High Limit Alarm
L	<input type="checkbox"/>	Low Limit Alarm
P	<input type="checkbox"/>	Proportional Band
R	<input type="checkbox"/>	Anti-Reset Windup
I	<input type="checkbox"/>	Integral Time
D	<input type="checkbox"/>	Derivative Time
F	<input type="checkbox"/>	Proportional Cycle Time

MODEL AND SUFFIX CODE

MODEL	SUFFIX CODE	DESCRIPTION
REX-C1000	H □ □ - □	Single loop DDC controller
*1 Main control action	H	PID action with autotuning (A.T) Prop. band (P) : Within main setting range (When P = 0, ON/OFF action) Integral time (I) : 1 to 3600 sec. (1 sec.) (When I = 0, integral action is OFF) Derivative time (D) : 1 to 3600 sec. (1 sec.) (When D = 0, derivative action is OFF) Anti-Reset Windup (ARW): Within main setting range. Cycle time : 1 to 99 sec. for relay contact and SSR drive output. 0 sec. for current output.
Alarm action *1 (ON/OFF action) Relay contact output 250V AC 2A, (resistive load)	1 2 3 7 8 32 78	Main control action only (No alarm) Deviation HIGH alarm (Direct action) Deviation LOW alarm (Reverse action) Deviation LOW alarm (Direct action) Deviation HIGH alarm (Reverse action) Deviation LOW alarm (Reverse action) and deviation HIGH alarm (Direct action), independent setting and independent output. Deviation LOW alarm (Direct action) and deviation HIGH alarm (Reverse action), independent setting and independent output.
Input	C R V I	Thermocouple input : K, J, T, R, S, B, E, PL-II, W/Re 5-26, N (Nicrosil/Nisil) RTD input : Pt100 3-wire system (DIN or JIS) DC potentiometric input : 0~10mV, 0~100mV DC (input impedance more than 5M ohms) 0~1V, 0~5V, 0~10V, 1~5V DC (input impedance 1M ohms) DC current input : 4~20mA DC (input impedance 250 ohms)
Output	M V R	Relay contact : 250V AC 3A (resistive load), 250V AC 1.5A cosφ = 0.4 (inductive load). Cycle time 1 to 99 sec. variable. SSR drive output : 0/12V DC pulse voltage, load resistance more than 800 ohms, cycle time 1 to 99 sec. variable. Current output : 4~20mA DC, load resistance 600 ohms

*1 Optional high/low alarm hold circuit is available. In this case add H to the end of the Model number and code.
(Example: REX-C1000H32C-MH)

See pages 14 and 17 for details of the terminals on the rear panel and examples of their connections and for some application examples.

SPECIFICATIONS

<p>INPUT</p> <p>Thermocouples ANSI/JIS types K, J, T, R, S, B, E NBS N, PL-II Hoskins type W/Re 5-26 RTD DIN or JIS Pt100 three-wire Voltages DC 0 to 1V, 0 to 5V, 0 to 10V, 1 to 5V (1Ω input impedance) DC 0 to 10mV, 0 to 100mV (5Ω input impedance) Currents DC 4 to 20mA (250Ω input impedance)</p> <p>INPUT DISPLAY</p> <p>Display method : PV . . . 4-digit LED numeric display SV . . . 4-digit LED numeric display SV Character . . . 1-digit LED display</p> <p>Display contents : PV . . . Measured value display SV . . . Character set-value display SV Character Main setting blank, upper limit alarm setting; <i>H</i>, lower limit alarm setting; <i>L</i>, proportional band setting; <i>P</i>, ARW; <i>I</i>, integral time; <i>I</i>, Derivative time; <i>C</i>, Cycle; <i>f</i> Burn-out (built-in as standard) Up-scale: (For thermocouple and RTD inputs, DC 0 to 10mV, and DC 0 to 100mV inputs only.) ↳ displayed in the most significant digit on the PV display. Down-scale: (DC 0 to 1V, 0 to 5V, 0 to 10V, 1 to 5V, DC 4 to 20mA inputs.)</p> <p>Display resolution : PV . . . 1°C (°F or %), 0.1°C (°F or %) SV . . . 1°C (°F or %), 0.1°C (°F or %) or 1 sec.</p> <p>PV display accuracy : Thermocouple inputs; ±(0.3% of displayed value +1 digit) or ±2°C, (±4°F) whichever is greater. * Input R, S, W/Re 5-26 In the range of 0 to 199°C . . . ±4°C (0 to 399°F . . . ±8°F) Above 200°C (400°F); ±(0.3% of displayed value +1 digit) or ±2°C (±4°F), whichever is greater. * Input B In the range of 400 to 1800°C (800 to 3200°F) ±(0.3% of displayed value +1 digit) or ±2°C, (±4°F) whichever is greater. However, accuracy is not guaranteed below 400°C (800°F). RTD input ±(0.3% of displayed value +1 digit) or ±0.3°C, (±0.6°F) whichever is greater. Voltage and current inputs; ±0.2% of full span.</p>	<p>SETTING</p> <p>Setting method : Settings done using keys on the front panel and confirmed on the 4-digit display. SV character is confirmed on 1 digit display.</p> <p>Setting display : SV character Main settings; blank, upper limit alarm setting; <i>H</i>, lower limit alarm setting; <i>L</i>, proportional band; <i>P</i>, ARW; <i>I</i>, integral time; <i>I</i>, derivative time; <i>C</i>, cycle; <i>f</i>.</p> <p>Setting resolution : SV . . . 1°C (°F) (0.1°C (°F) for RTD input Pt100 and 0.1% for voltage and current input.) or 1 second. Alarms . . . 1°C (°F)(0.1°C (°F) for thermocouple input T and RTD input Pt100) Voltage and current inputs . . . 1%</p> <p>Setting accuracy : Thermocouple inputs; ±(0.3% of set value +1 digit) or ±2°C (±4°F), whichever is greater. * Input R, S, W/Re 5-26 In the range of 0 to 199°C . . . ±4°C (0 to 399°F . . . ±8°F) Above 200°C (400°F); ±(0.3% of set value +1 digit) or ±2°C (±4°F), whichever is greater. * Input B In the range of 400 to 1800°C (800 to 3200°F) ±(0.3% of set value +1 digit) or ±2°C (±4°F), whichever is greater. However, this accuracy can not be guaranteed below 400°C (800°F). RTD input ±(0.3% of set value +1 digit) or ±0.3°C (±0.6°F), whichever is greater. Voltage and current inputs; ±0.2% of full span. Proportional band and ARW settings ±(0.3% of set value +1 digit); ±0.2% for voltage and current inputs. Integral time, derivative time, and cycle settings; ±0.3% of set-value. Alarm settings; ±(0.3% of set value +1 digit) . . . ±0.2% in the case of voltage and current inputs.</p> <p>Set-value protection : Set-values are stored in a non-volatile memory during power OFF and restored after power ON automatically.</p> <p>Adjustment operation: See Model & code list (p. 4).</p> <p>Output : See Model & code list (p. 4).</p> <p>Signal source resistance: 100Ω or less for thermocouple inputs. Input lead resistance: RTD input; 10Ω or less per wire. Power supply voltage: 100/110V AC and 200/220V AC or 120V AC and 240V AC (50/60 Hz)</p> <p>Permissible voltage variation: Within ±10% of rated voltage. Permissible ambient temperature: 0 to 50°C (32 to 122°F) Ambient relative humidity: 45 to 85% RH Power consumption : 8VA max. Weight : Approx. 1.4kg External dimensions: See dimensional diagram (p. 18).</p>
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INPUT AND SCALE RANGE

INPUT		SCALE RANGE (minimum resolution)
DC current	4~20mA	0.0~100.0% (0.1), 0.0~20.0% (0.1), 0.0~500.0% (0.1)
DC voltage	0~10mV, 0~100mV	0.0~100.0% (0.1), 0.0~20.0% (0.1)
	0~1V, 0~5V	0.0~500.0% (0.1)
	0~10V, 1~5V	
Thermocouple	Type K (ANSI/JIS)	0~400°C (1), 0~800°C (1), 0~1200°C (1) 0~800°F (1), 0~2500°F (1)
	Type J (ANSI/JIS)	0~400°C (1), 0~800°C (1), 0~1000°C (1)
	Type E	0~800°F (1), 0~1600°F (1)
	Type T (ANSI/JIS)	-200.0/+350.0°C (0.1), -100.0/+200.0°C (0.1) -100.0/+200.0°F (0.1), -200.0/+100.0°F (0.1), 0.0/+450.0°F (0.1)
	Type R (ANSI/JIS)	0~1600°C (1)
	Type S	0~3200°F (1)
	Type B (ANSI/JIS)	400~1800°C (1) 800~3200°F (1)
	W/Re 5-25	0~1500°C (1), 0~2000°C (1) 0~3200°F (1)
RTD Pt100	DIN or JIS	-200.0/+200.0°C (0.1), -100.0/+50.0°C (0.1), -100.0/+100.0°C (0.1), -100.0/+200.0°C (0.1), 0.0~50.0°C (0.1), 0.0~100.0°C (0.1), 0.0~200.0°C (0.1), 0.0~300.0°C (0.1), 0.0~500.0°C (0.1), -100.0/+500.0°C (0.1)
		0.0~200.0°F (0.1) -100.0/+100.0°F (0.1), 0.0~800.0°F (0.1)

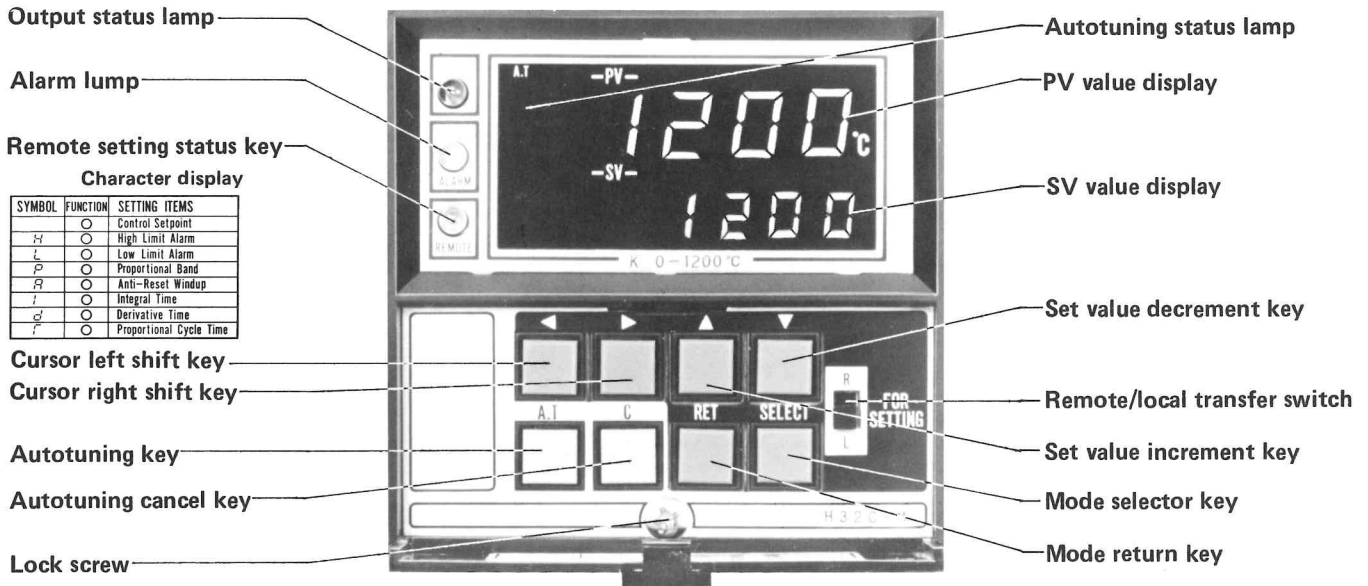
External setting feature makes settings easy

2. REX-C1000 External setting type

Main setting can be done via a standardized signal input from an external device through slide switch selection. This feature makes the REX-C1000 (remote setting type)

connectable to a host or large computer and is very useful for centralized control of several REX-C1000's (external setting type).

NAME OF PARTS



SYMBOL	FUNCTION	SETTING ITEMS
	○	Control Setpoint
H	○	High Limit Alarm
L	○	Low Limit Alarm
P	○	Proportional Band
R	○	Anti-Reset Windup
I	○	Integral Time
D	○	Derivative Time
F	○	Proportional Cycle Time

MODEL AND SUFFIX CODE

MODEL	SUFFIX CODE	DESCRIPTION
REX-C1000	H □ □ - □ 01 □	Remote setting type single loop DDC controller
Main control action	H	PID action with autotuning (A.T) Prop. band (P) : Within main setting range (When P = 0, ON/OFF action) Integral time (I) : 1 to 3600 sec. (1 sec.) (When I = 0, integral action is OFF) Derivative time (D) : 1 to 3600 sec. (1 sec.) (When D = 0, derivative action is OFF) Anti-Reset Windup (ARW) : Within main setting range. Cycle time : 1 to 99 sec. for relay contact and SSR drive output. 0 sec. for current output.
Alarm action *1 (ON/OFF action) Relay contact output 250V AC 2A (resistive load)	1 2 3 7 8 32 78	Main control action only (No alarm) Deviation HIGH alarm (Direct action) Deviation LOW alarm (Reverse action) Deviation LOW alarm (Direct action) Deviation HIGH alarm (Reverse action) Deviation LOW alarm (Reverse action) and deviation HIGH alarm (Direct action), independent setting and independent output. Deviation LOW alarm (Direct action) and deviation HIGH alarm (Reverse action), independent setting and independent output.
Input	C R V I	Thermocouple input : K, J, T, R, S, B (ANSI/JIS), Nicrosil/Nisil RTD input : Pt100 3-wire system (DIN/JIS) DC potentiometric input : 0~10mV, 0~100mV (input impedance more than 5M ohms) 0~1V, 0~5V, 0~10V, 1~5V (input impedance 1M ohms) DC current input : 4~20mA DC (input impedance 250 ohms)
Output	M V R	Relay contact output : 250V AC 3A (resistive load), 250V AC 1.5A cosφ = 0.4 (inductive load). Cycle time 1 to 99 sec. variable. SSR drive output : 0/12V DC pulse voltage, load impedance more than 800 ohms, cycle time 1 to 99 sec. variable. Current output : 4~20mA DC, load resistance 600 ohms
Remote/Local switching	01	Remote/Local selection by front selector switch.
Remote setting input	I E	Current input: 4~20mA DC (input impedance 250 ohms) Voltage input: 0~1V, 0~5V, 0~10V, 1~5V DC (input impedance 1M ohms)

*1 Optional high/low alarm hold circuit is available. In this case add H to the end of the Model number and code.
(Example: REX-C1000H32C-M011H)

For details of the rear terminals and examples of their connections, and for some application examples, see pages 14 and 17.

SPECIFICATIONS

Input : Thermocouple inputs;
ANSI/JIS Types K, J, T, R, S, B, E
NBS N, PL-II
Hoskins type W/Re5-26
RTD input; JIS or DIN Pt100 three-wire
Voltage inputs; DC 0 to 1V, 0 to 5V, 0 to 10V,
1 to 5V (1M Ω input impedance) DC 0 to 10mV,
0 to 100mV (5M Ω input impedance)
Current input;
DC 4 to 20mA (25 Ω input impedance)
Action during burn-out; Up-scale or down-scale
(depending on input type).

INPUT DISPLAY

Display method : PV ... 4-digit LED numeric display
SV ... 4-digit LED numeric display
SV ... 1-digit LED display
Display contents : SV character
Main setting; Minus or blank, upper limit alarm
setting; H , lower limit alarm setting; L ,
proportional band; P , ARW; I ,
integral time; d , derivative time; c ,
cycle; f

Display resolution : PV ... 1 $^{\circ}$ C ($^{\circ}$ F or %), 0.1 $^{\circ}$ C ($^{\circ}$ F or %)
SV ... 1 $^{\circ}$ C ($^{\circ}$ F or %), 0.1 $^{\circ}$ C ($^{\circ}$ F or %) or 1 sec.
PV display accuracy : Thermocouple inputs
 $\pm(0.3\%$ of displayed value +1 digit) or $\pm 2^{\circ}$ C,
($\pm 4^{\circ}$ F) whichever is greater.
* Input R, S, W/Re5-26
In the range of 0 to 199 $^{\circ}$ C ...
 $\pm 4^{\circ}$ C (0 to 399 $^{\circ}$ F ... $\pm 8^{\circ}$ F)
Above 200 $^{\circ}$ C (400 $^{\circ}$ F) ...
 $\pm(0.3\%$ of displayed value +1 digit) or $\pm 2^{\circ}$ C,
($\pm 4^{\circ}$ F) whichever is greater.
* Input B
In the range of 400 to 1800 $^{\circ}$ C (800 to 3200 $^{\circ}$ F)
 $\pm(0.3\%$ of displayed value +1 digit) or $\pm 2^{\circ}$ C,
($\pm 4^{\circ}$ F) whichever is greater. However, accuracy is
not guaranteed below 400 $^{\circ}$ C (800 $^{\circ}$ F).
RTD input
 $\pm(0.3\%$ of displayed value +1 digit) or $\pm 0.3^{\circ}$ C,
($\pm 0.6^{\circ}$ F) whichever is greater.
Voltage and current inputs;
Within $\pm 0.2\%$ of full span.

SETTING

Internal setting (LOCAL)

Setting display : SV character
Main setting; Minus or blank, upper limit alarm
setting; H , lower limit alarm setting; L ,
proportional band; P , ARW; I , integral time; d ,
derivative time; c , cycle; f

Setting resolution : SV ... 1 $^{\circ}$ C ($^{\circ}$ F) (0.1 $^{\circ}$ C ($^{\circ}$ F) for RTD input
Pt100 and 0.1% for voltage and current inputs.)
or 1 sec.
Alarms ... 1 $^{\circ}$ C ($^{\circ}$ F) (0.1 $^{\circ}$ C ($^{\circ}$ F) for thermocouple
input T, and RTD input Pt100)
However, these are determined depending on the
position of the decimal point for voltage and
current inputs.

Setting accuracy : Thermocouple inputs;
 $\pm 2^{\circ}$ C, whichever is larger.
* Input R, S, W/Re5-26
In the range of 0 to 199 $^{\circ}$ C ... $\pm 4^{\circ}$ C
(0 to 399 $^{\circ}$ F ... $\pm 8^{\circ}$ F)
Above 200 $^{\circ}$ C (400 $^{\circ}$ F) ... $\pm(0.3\%$ of set-value
+1 digit) or $\pm 2^{\circ}$ C, ($\pm 4^{\circ}$ F) whichever is larger.
* Input B
In the range of 400 to 1800 $^{\circ}$ C
(800 to 3200 $^{\circ}$ F)
 $\pm(0.3\%$ of set-value +1 digit) or $\pm 2^{\circ}$ C, ($\pm 4^{\circ}$ F)
whichever is larger. However, this accuracy is
not guaranteed below 400 $^{\circ}$ C (800 $^{\circ}$ F).
RTD input
 $\pm(0.3\%$ of set-value +1 digit) or $\pm 0.3^{\circ}$ C, ($\pm 0.6^{\circ}$ C)
whichever is larger.
Voltage and current inputs;
Within $\pm 0.2\%$ of full span.
Proportional band and ARW setting;
 $\pm(0.3\%$ of set-value +1 digit)
Integral time, derivative time, and cycle setting;
 $\pm 0.3\%$ of set value
Alarm settings; $\pm(0.3\%$ of set-value +1 digit) ...
 $\pm 0.2\%$ in the case of voltage and current inputs.

EXTERNAL SETTING (REMOTE)

Setting input signal : Voltage inputs DC 0 to 1V, 0 to 5V, 0 to 10V,
1 to 5V (Corresponding to the range of main
setting).
a) Input impedance = 1M Ω
b) Input line open; Down-scale (Minimum value
is set in the setting range of main setting)
Current inputs; DC 4 to 20mA
(Corresponding to the main setting range.)
a) Input impedance = 250 Ω
b) Input line open; Down-scale
Setting accuracy : Display accuracy +1 digit
Remote-Local setting selection : Selected by a slide switch on the front panel.
a) Remote/local selection by using only the
front panel switch.
Remote setting \rightarrow LED (green) display.
b) When the selection is changed from remote to
local, the local setting values will be changed to
remotely set values before this change is made.
c) The auto-tuning function will not be available
for remote settings.
d) PID constants can be changed even in the
remote setting mode.

Setting protection : Setting values are stored in a nonvolatile memory
when the power to the controller is turned OFF.
These values will be restored when the power to
the controller is turned ON again.

Adjustment operation : See Model & code list (p. 6).

Outputs : See Model & code list (p. 6)

Power supply voltage : 100/110V AC or 120V AC or 200/220V AC
or 240V AC (50/60Hz)

Permissible voltage variation : Within $\pm 10\%$ of rated voltage.

Permissible ambient temperature : 0 to 50 $^{\circ}$ C (32 to 122 $^{\circ}$ F)

Ambient relative humidity : 45 to 85% RH.

Power consumption : 8VA max.

Weight : Approx. 1.4kg.

External dimensions : See dimensional diagram (p. 18).

INPUT AND SCALE RANGE

	INPUT	SCALE RANGE (minimum resolution)
DC current	4~20mA	0.0~100.0% (0.1) Please contact RKC for other ranges.
DC voltage	0~10mV, 0~100mV, 0~1V, 0~5V, 0~10V, 1~5V	0.0~100.0% (0.1) Please contact RKC for other ranges.
Thermocouple	Type K (ANSI/JIS)	0~400 $^{\circ}$ C (1), 0~800 $^{\circ}$ C (1), 0~1200 $^{\circ}$ C (1), 0~800 $^{\circ}$ F (1), 0~2500 $^{\circ}$ F (1)
	Type J (ANSI/JIS)	0~400 $^{\circ}$ C (1), 0~800 $^{\circ}$ C (1), 0~1000 $^{\circ}$ C (1), 0~800 $^{\circ}$ F (1), 0~1600 $^{\circ}$ F (1)
	Type E (ANSI/JIS)	0~400 $^{\circ}$ C (1), 0~800 $^{\circ}$ C (1), 0~1000 $^{\circ}$ C (1), 0~800 $^{\circ}$ F (1), 0~1600 $^{\circ}$ F (1)
	Type T (ANSI/JIS)	-200.0/+100.0 $^{\circ}$ C (0.1), -100.0/+250.0 $^{\circ}$ C (0.1), 0.0~400.0 $^{\circ}$ C (0.1), -300.0~0.0 $^{\circ}$ F (0.1), -200.0~100.0 $^{\circ}$ C (0.1) -100.0~200.0 $^{\circ}$ F (0.1), 0.0~450.0 $^{\circ}$ F (0.1)
	Type R (ANSI/JIS)	0~1600 $^{\circ}$ C (1)
	Type S (ANSI/JIS)	0~3200 $^{\circ}$ F (1)
	Type B (ANSI/JIS)	400~1800 $^{\circ}$ C (1) 800~3200 $^{\circ}$ F (1)
	W/Re5-26	0~2000 $^{\circ}$ C (1) 0~3200 $^{\circ}$ F (1)
	Nicrosil/Nisil	0~1200 $^{\circ}$ C (1) 0~2000 $^{\circ}$ F (1)
PL-II	0~1300 $^{\circ}$ C (1) 0~2400 $^{\circ}$ F (1)	
RTD Pt100	DIN or JIS	-200.0/+200.0 $^{\circ}$ C (0.1), -100.0/+50.0 $^{\circ}$ C (0.1), -100.0/+100.0 $^{\circ}$ C (0.1), -100.0/+200.0 $^{\circ}$ C (0.1), 0.0~50.0 $^{\circ}$ C (0.1), 0.0~100.0 $^{\circ}$ C (0.1), 0.0~200.0 $^{\circ}$ C (0.1), 0.0~500.0 $^{\circ}$ C (0.1) -300.0~200.0 $^{\circ}$ F (0.1), -200.0~300.0 $^{\circ}$ F (0.1), -100.0~400.0 $^{\circ}$ F (0.1), 0.0~500.0 $^{\circ}$ F (0.1)

PID heating and cooling control performed easily

3. REX-C1000 Heating and cooling type

In the temperature control of extrusion machines, the control of the cooling side will become necessary when the temperature increases above the set-value due to the friction of the screw. In such situations, it is possible to use the REX-C1000H6 series controller which is capable of controlling both heating and cooling. The proportional bands of

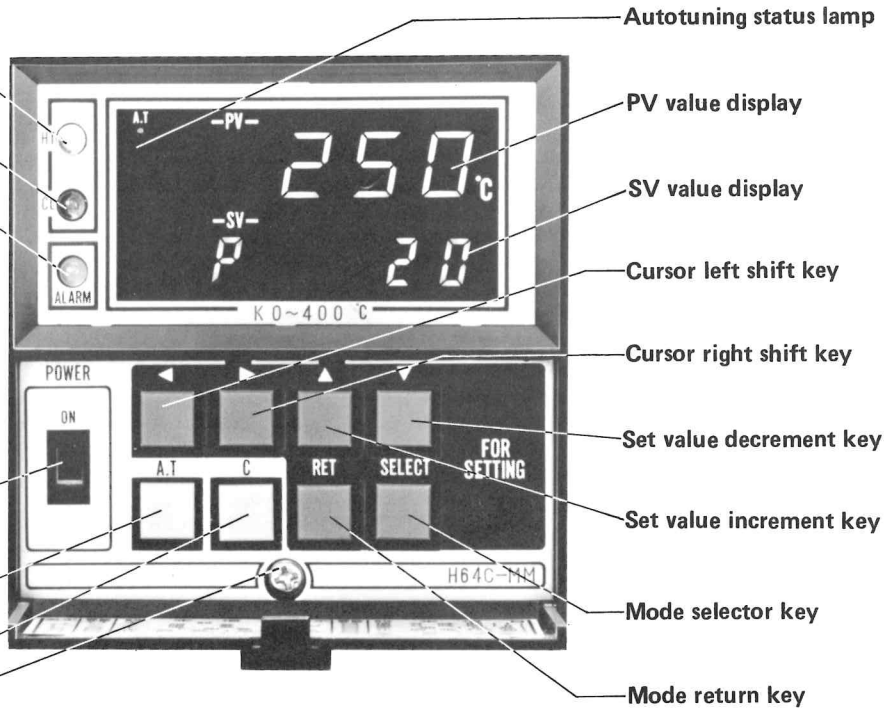
heating and cooling sections are independent in this PID controller. This allows accurate controls with energy savings. This type of controller can be used for constant temperature chambers, various types of test equipment or scientific research equipment as well as in production equipment.

NAME OF PARTS

- Heating side output status lamp
- Cooling side output status lamp
- Alarm lamp

Character display

SYMBOL	FUNCTION	SETTING ITEMS	SYMBOL	FUNCTION	SETTING ITEMS
	<input type="radio"/>	Control Setpoint	/	<input type="radio"/>	Integral Time
H	<input checked="" type="checkbox"/>	High Limit Alarm	d	<input type="radio"/>	Derivative Time
L	<input checked="" type="checkbox"/>	Low Limit Alarm	f	<input type="radio"/>	Cycle Time (Heating)
b	<input type="checkbox"/>	High and Low Limit Alarm	c	<input type="radio"/>	Proportional Band (Cooling)
P	<input type="checkbox"/>	Proportional Band (Heating)	o	<input type="radio"/>	Deadband - Overlap
R	<input type="checkbox"/>	Anti-Reset Windup	e	<input type="radio"/>	Cycle Time (Cooling)



MODEL AND SUFFIX CODE

Caution: When ordering, specify air or water cooling type (Z-022).

MODEL	SUFFIX CODE	DESCRIPTION
REX-C1000	H6 □ □ - □ □	Heating/Cooling type, single loop DDC controller
Main control action	H6	PID action with autotuning (A.T) Heating prop. band (PH) : 1 to 100°C (°F) (1°C or °F) (When, PH = 0, ON/OFF action) Anti-Reset Windup (ARW) : 1 to 100°C (°F) (1°C or °F) Integral time (I) : 1 to 3600 sec. (1 sec.) (When I = 0, integral action is OFF) Derivative time (D) : 1 to 3600 sec. (1 sec.) (When D = 0, derivative action is OFF) Cooling prop. band (Pc) : 1 to 1000% (Pc is a percentage to PH) Heating cycle time (TH) : 1 to 99 sec. (1 sec.) TH = 0 sec. for current output (R). Cooling cycle time (Tc) : 1 to 99 sec. (1 sec.) Deadband/Overlap (D.B/O.L) : -10 to +10°C (-10.0 to +10.0°C for RTD input) from the main set point.
Alarm action *1 (ON/OFF action) Relay contact output, 250V AC 2A, (resistive load)	(blank) 2 3 4	Main control action only (No alarm) Deviation HIGH alarm (Direct action) Deviation LOW alarm (Reverse action) Deviation HIGH and LOW alarm } Any of these actions is not added to thermocouple type T.
Input	C R	Thermocouple input : K, J, T RTD input : Pt100 3-wire system (DIN/JIS)
Heating output	M V R	Relay contact output : 250V AC 3A (resistive load), 250V AC 1.5A cosφ = 0.4 (inductive load). Cycle time 1 to 99 sec. variable. SSR drive output : 0/12V DC pulse voltage, load resistance more than 800 ohms, cycle time 1 to 99 sec. variable. Current output : 4~20mA DC, load resistance less than 600 ohms.
Cooling output	M V	Relay contact output : 250V AC 3A (resistive load), 250V AC 1.5A cosφ = 0.4 (inductive load). Cycle time 1 to 99 sec. variable. SSR drive output : 0/12V DC pulse voltage, load impedance more than 800 ohms, cycle time 1 to 99 sec. variable.

*1 No code is affixed when alarm is not provided.
 Optional hold function can be provided with "4" action. In this case add H to the end of the Model number and code.
 (Example: REX-C1000H64C-MMH)

For details of the rear terminals and examples of their connections and for some applications, see pages 15 and 16.

● SPECIFICATIONS

Inputs : Thermocouples ANSI/JIS Types K, J, T
 RTD DIN or JIS Pt100 three-wire
 Action in the event of burn-out
 Up-scale (' ω ' displayed in the most significant digit on the PV display)
 Outputs on both heating and cooling sides will turn OFF.

INPUT DISPLAY

Display method : PV . . . 4-digit LED numeric display
 SV . . . 4-digit LED numeric display
 SV character . . . 1 digit LED display

Display contents : PV . . . Measured value display
 SV . . . Set-value displayed for each set item indicated by the SV character.

SV character
 Main setting; blank, upper limit alarm setting; H , lower limit alarm setting; L , upper and lower limit alarm setting; b , heating section proportional band setting; P , ARW; R , integral time; I , derivative time d , heating section cycle; f , cooling section proportional band; c , dead band overlap; D , cooling section cycle; e .

* Characters for the alarm will be one of the types as selected by the user.

Display resolution : PV . . . 1 or 0.1°C (or %)
 SV . . . 1, 0.1°C (or %) 1 second.

PV display accuracy : Thermocouple inputs
 $\pm(0.3\%$ of displayed value +1 digit) or $\pm 2^\circ\text{C}$, ($\pm 4^\circ\text{F}$) whichever is greater.

RTD input
 $\pm(0.3\%$ of displayed value +1 digit) or $\pm 0.8^\circ\text{C}$, ($\pm 1.6^\circ\text{F}$) whichever is greater.

SETTING

Setting method : Settings are done using the front panel keys and are confirmed on 4-digit LED numeric display.
 SV character is displayed on 1 digit display.

Setting item display : SV character
 Same as the description given for the SV character in the display contents.
Setting resolution : SV . . . 1°C (°F) (0.1°C (°F) for thermocouple input T, and RTD input Pt100) or 1 sec.
 Alarms . . . 1°C (°F) (0.1°F (°F) for thermocouple input T and RTD input Pt100)

Setting accuracy : Thermocouple inputs
 $\pm(0.3\%$ of set value +1 digit) or $\pm 2^\circ\text{C}$, ($\pm 4^\circ\text{F}$) whichever is greater.
 RTD input
 $\pm(0.3\%$ of set value +1 digit) or $\pm 0.8^\circ\text{C}$, ($\pm 1.6^\circ\text{F}$) whichever is greater.

Proportional band, ARW, O.L/D.B

Settings . . . $\pm(0.3\%$ of set-value +1 digit)

Integral time, derivative time, and

Cycle settings . . . $\pm 0.3\%$ of set-value

Alarm settings . . . $\pm(0.3\%$ of set-value +1 digit)

Setting protection : Setting values are stored in a non-volatile memory when the power to the unit is turned OFF.
 These values are restored when the power is ON again.

Control action : See Model & code list (p. 8).

Outputs : See Model & code list (p. 8).

Signal source resistance : Thermocouple inputs; 100 Ω or less.

Power supply voltage : 100/110V AC and 200/220V AC or 120V and 240V AC, 50 or 60 Hz.

Allowable voltage variation: Within $\pm 10\%$ of rated voltage.

Permissible ambient temperature: 0 to 50°C (32 to 122 °F)

Ambient relative humidity : 45 to 85% RH

Power consumption : 8VA max.

Weight : Approx. 1.4kg

External dimensions : See dimensional diagram (p. 18).

● INPUT AND SCALE RANGE

INPUT		SCALE RANGE (minimum resolution)
Thermocouple	Type K (ANSI/JIS)	0~400°C (1), 0~800°C (1), 0~1200°C (1) 0~800°F (1), 0~2500°F (1)
	Type J (ANSI/JIS)	0~400°C (1), 0~800°C (1), 0~1000°C (1) 0~800°F (1), 0~2000°F (1)
	Type T (ANSI/JIS)	-200.0/+350.0°C (0.1), 0.0~350.0°C (0.1)
RTD Pt100	DIN or JIS	0.0~500.0°C (0.1) 0.0~900.0°F (0.1)

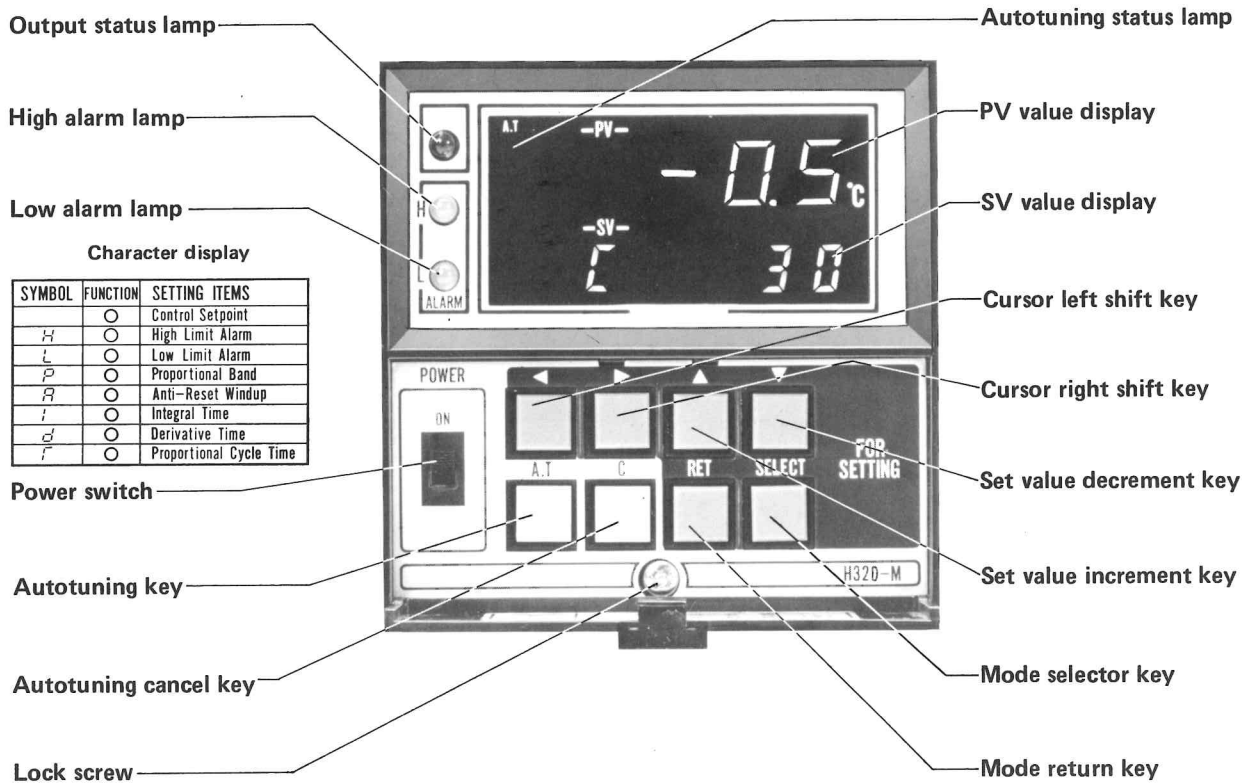
Universality can meet all applications

4. REX-C1000 Temperature difference control type

Various types of industrial furnaces now in use such as diffusion furnaces, sintering furnaces, etc., require the temperature to be uniform. In some other cases, a fixed temperature difference may have to be maintained within the same furnace. In such cases, two thermocouples are used, one of which is taken as the reference input and the

temperature of the other thermocouple is controlled to the set temperature difference using this type of controller. Therefore, there will be no need to change the setting in this controller even when the temperature setting of the reference temperature is changed (the master controller).

NAME OF PARTS



SYMBOL	FUNCTION	SETTING ITEMS
	<input type="radio"/>	Control Setpoint
H	<input type="radio"/>	High Limit Alarm
L	<input type="radio"/>	Low Limit Alarm
P	<input type="radio"/>	Proportional Band
R	<input type="radio"/>	Anti-Reset Windup
I	<input type="radio"/>	Integral Time
d	<input type="radio"/>	Derivative Time
F	<input type="radio"/>	Proportional Cycle Time

MODEL AND SUFFIX CODE

MODEL	SUFFIX CODE	DESCRIPTION
REX-C1000	H □ D - □	Differential temperature control type single-loop DDC controller
Main control action	H	PID action with autotuning (A.T) Prop. band (P) : 0.1 to 100.0% of full-span. (When P = 0, ON/OFF action) Integral time (I) : 1 to 3600 sec. (1 sec.) (When I = 0, integral action is OFF) Derivative time (D) : 1 to 3600 sec. (1 sec.) (When D = 0, derivative action is OFF) Anti-Reset Windup (ARW) : 0.1 to 100.0% of full-span. Cycle time : 1 to 99 sec. for relay contact and SSR drive output. 0 sec. for current output.
Alarm action (ON/OFF action) Relay contact output 250V AC 2A (resistive load)	1 2 3 32	Main action only (No alarm) Deviation HIGH alarm (Direct action) Deviation LOW alarm (Reverse action) Deviation LOW alarm (Reverse action) and deviation HIGH alarm (Direct action), independent setting and independent output.
Differential temp. input	D	Differential temperature input from two thermocouples. Type K or R.
Output	M V R	Relay contact output : 250V AC 3A (resistive load), 250V AC 1.5A cosφ = 0.4 (inductive load). Cycle time 1 to 99 sec. variable. SSR drive output : 0/12V DC pulse voltage, load resistance more than 800 ohms, cycle time 1 to 99 sec. variable. Current output : 4~20mA DC, load resistance 600 ohms

For details of the rear terminals and examples of their connections and for some applications, see pages 15 and 16.

● SPECIFICATIONS

Inputs : Thermocouples ANSI/JIS K (reference point 750°C), or R (reference point 1050°C) - TC₁, TC₂ (reference) should both be of the same type.
Also, at least one of the two must not be grounded (floating).

Action during burn-out : Up-scale 'L' display

DISPLAY

Measured value display : Digital display

Display method : PV . . . 7-segment LED 4-digit numeric display
SV . . . 7-segment LED 4-digit numeric display
SV character . . . 1-digit LED display

Display contents : SV character
Main setting; minus or blank, upper limit alarm setting; *H* , lower limit alarm setting; *L* , proportional band; *P* , anti-reset wind-up; *R* , integral time; *I* , derivative time; *d* , cycle; *f*

Display range : -200.0 to +200.0°C

Display accuracy : Within ±0.8°C when the temperature difference is 0°C.
When the temperature difference is not 0°C, accuracy depends on the actual condition of use (the controlling temperature of the master controller and the value of the temperature difference) because the voltage generated in the thermocouple has non-linear characteristic vs. temperature.

Display resolution : 0.1°C

SETTING

Setting display : Digital display

Setting method : Using front panel keys

Main setting range : -200.0 to +200.0°C

Setting accuracy : Same as the display accuracy.
Proportional band, ARW setting;
Same as the display accuracy.
Integral time, derivative time, and cycle settings;
±0.3% of set-value.
Alarm setting; Same as display accuracy.

Setting resolution : 0.1°C (both main setting and alarms)

Setting protection : Set-values are saved in a non-volatile memory when the power to the unit is turned OFF. These values are restored when the power to the unit is turned ON again.

Adjustment operation : See Model & code list (p. 10).

Outputs : See Model & code list (p. 10).

Power supply voltage : 100/110V AC or 120V AC or 200/220V AC or 240V AC (50/60Hz)

Allowable voltage Variations : Within ±10% of rated voltage

Allowable ambient temperature : 0 to 50°C (32 to 122°F)

Ambient humidity : 45 to 85% RH

Power consumption : 8VA max.

Weight : Approx. 1.4kg.

External dimensions : See dimensional diagram (p. 18).

● INPUT AND SCALE RANGE

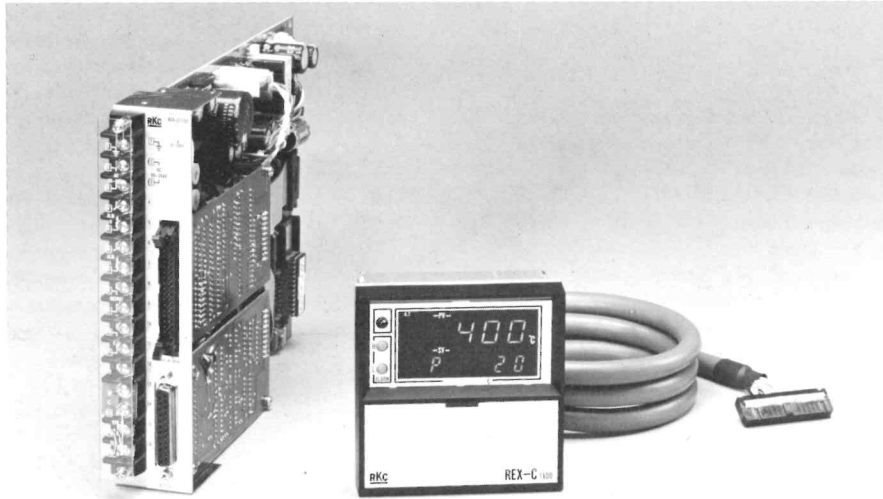
INPUT		SCALE RANGE (minimum resolution)
Thermocouple	Type K, R (ANSI/JIS)	-200.0~200.0°C (0.1)

System expansion via interface

5. REX-C1100 One board type controller

As the name itself suggests, this controller occupies very little space because of a thin board and can be used where the actual controller needs to be placed beyond operator's easy access or where centralized control is performed. Therefore, the setting and the monitoring of measured values in this type of controller can only be made via the

RS-232C communication functions. An entry unit for displaying the measured and set-values can also be connected to this unit by which it is possible to remotely operate this unit. Therefore, this type of controller is ideal for FA and LA systems.



● MODEL AND SUFFIX CODE

① CONTROLLER

MODEL	SUFFIX CODE	DESCRIPTION
REX-C11 <input type="checkbox"/> <input type="checkbox"/>	F 32 <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/>	One-board single loop DDC controller
Entry unit connector <input type="checkbox"/> 2 <input type="checkbox"/> 3		With connecting function to entry unit. Without connecting function to entry unit.
Communication function <input type="checkbox"/> 0 <input type="checkbox"/> 1		No communication function. (Entry unit must be used.) With RS-232C (EIA) communication function.
Control action	F	PID action with autotuning (A.T) Proportional band (P) : 1 to 200°C °F (1°C or °F) Integral time (I) : 1 to 3600 sec. (1 sec.) Derivative time (D) : 1 to 3600 sec. (1 sec.) Anti-Reset Windup (ARW) : 1 to 100% of proportional band. Cycle time : Relay contact output, SSR drive output . . . 1 to 100 sec. Current output, voltage output . . . 0 sec.
Alarm action	32	Deviation HIGH and LOW alarm, independent setting and output.
Input	C R	Thermocouple input : K, J, R RTD input : Pt100 3-wire system
Output	M V R E	Relay contact output : 250V AC 3A (resistive load), 250V AC 1.5A cosφ = 0.4 (inductive load, cycle time 1 to 99 sec. variable). SSR drive output : 0/12V DC pulse voltage, load resistance more than 800 ohms, cycle time 1 to 99 sec. variable. Current output : 4~20mA DC, load resistance less than 600 ohms. Continuous voltage output: 1~5V DC, load resistance more than 800 ohms.
High/Low alarm hold circuit	H	With High/Low alarm hold circuit. Without High/Low alarm hold circuit.

② ENTRY UNIT

MODEL	DESCRIPTION
REX-C1110	Entry unit with cable 1.5m (standard)

● INPUT AND SCALE RANGE

INPUT	SCALE RANGE (minimum resolution)
Thermocouple	Type K (ANSI/JIS) 0~1300°C (1) 0~2500°F (1)
	Type J (ANSI/JIS) 0~1000°C (1) 0~2000°F (1)
	Type R (ANSI/JIS) 0~1600°C (1) 0~3200°F (1)
RTD Pt100	-200.0/+300.0°C (0.1), -100.0/+100.0°C (0.1), 0.0~200.0°C (0.1), 0.0~500.0°C (0.1)
	-200.0~200.0°F (0.1), -200.0~300.0°F (0.1), -100.0~400.0°F (0.1), 0.0~500.0°F (0.1)

● SPECIFICATIONS

A. Control Unit

Input : Thermocouples ANSI/JIS Types K, J, R
RTD DIN or JIS Pt100 three-wire
Burn-out action built-in as standard (up-scale).

SETTING

Setting method : a) Computer mode (COMP);
Setting via the communication channel
b) Local mode (LOCAL);
Setting by the entry unit (optional)

Setting resolution : SV ... 1°C (°F) (0.1°C (°F) for RTD input)
Alarm ... 1°C (°F) (0.1°C (°F) for RTD input)

Setting accuracy : Thermocouple inputs
±(0.3% of displayed value +1 digit) or ±2°C,
(±4°F) whichever is greater.
* Input R
In the range of 0 to 1600°C (0 to 3200°F)
0 to 199°C ... ±4°C (0 to 399°F ... ±8°F)
Above 200°C (400°F) ...
±(0.3% of displayed value +1 digit) or ±2°C,
(±4°F) whichever is greater.
RTD input
±(0.3% of displayed value +1 digit) or ±0.8°C,
(±1.6°F) whichever is greater.
Proportional band and ARW settings ...
±(0.3% of set-value +1 digit)
Integral time, derivative time, and cycle settings ...
±0.3% of set-value.
Alarm settings ... ±(0.3% of set-value +1 digit)

Control action : PID action with auto-tuning

Output : See Model & code list (p. 12).

Display (Entry unit communication)

Display resolution : 1°C (°F) or 0.1°C (°F)

Display accuracy : Same as setting accuracy

Communication : Serial communication EIA RS-232C standard functions

Communication method : Full duplex, start-stop synchronization

Communication speed : 1200, 2400, 4800, or 9600 BPS

Data length : 7 bits

Start bit : One bit

Parity bit : One bit; odd parity

Stop bits : Two bits

C/L Selection : Computer mode/local mode selection input

Computer mode : Shorted between pins 10 and 11.

Local mode : Open between pins 10 and 11.

B. Entry Unit (Optional)

DISPLAY

Display method : a) 7-Segment LED display
PV ... 4-digit LED numeric display
SV ... 4-digit LED numeric display
SV Character ... 1-digit LED display
SV Character
Main setting; blank, Upper limit setting; *H*,
Lower limit alarm setting; *L*, Proportional
band; *P*, ARW; *R*, Integral time; *I*,
Derivative time; *C*, Cycle; *F*.
Up-scale; *u* displayed in the most significant
digit on the PV display.

b) LED display
Main output action display; 1 lamp
Alarm action display
Upper limit; 1 lamp, Lower limit; 1 lamp.
Auto-tuning display
The A.T lamp flashes while the auto-tuning
calculations are being made and goes OFF after
the PID constants have been evaluated.

Input display resolution : 1°C (°F) or 0.1°C (°F)

Input display accuracy : Thermocouple input
±(0.3% of displayed value +1 digit) or ±2°C,
(±4°F) whichever is greater.
* In the range of 0 to 1600°C (0 to 3200°F)
0 to 199°C ... ±4°C (0 to 399°F ... ±8°F)
200 to 1600°C (400 to 3200°F) ...
±(0.3% of displayed value +1 digit) or ±2°C,
(±4°F) whichever is greater.
RTD input
±(0.3% of displayed value +1 digit) or ±0.8°C,
(±1.6°F) whichever is greater.
Proportional band and ARW
settings ... ±(0.3% of set value +1 digit)
Internal time, derivative time, and cycle settings ...
±0.3% of set-value
Alarm settings ... ±(0.3% of set value +1 digit)

C. Common Specifications

Power supply voltage : 90 to 264V AC (including the power supply
voltage variations); 50/60 Hz

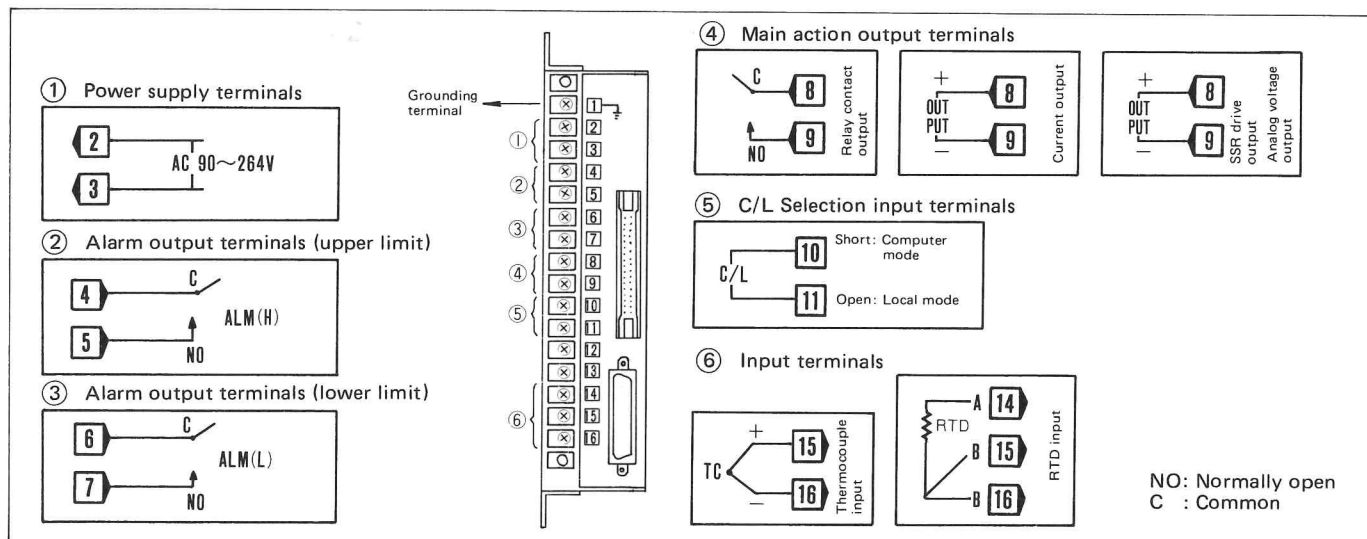
Allowable ambient temperature: 0 to 50°C (32 to 122°F)

Ambient humidity : 45 to 85% RH

Power consumption : 11VA max. (including the entry unit)

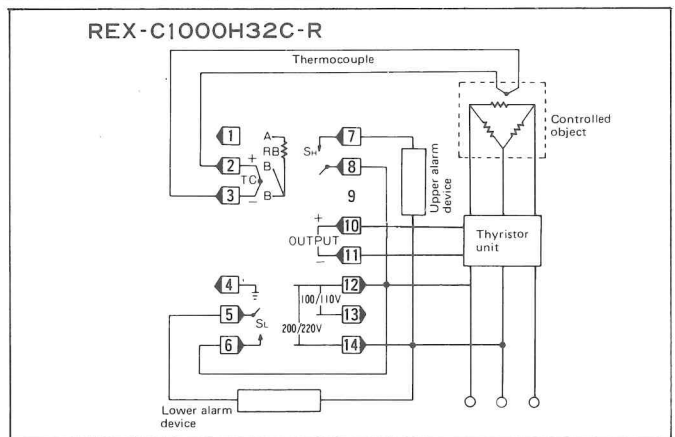
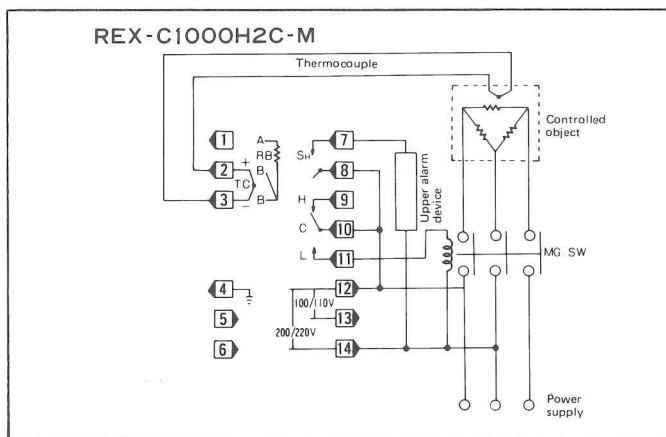
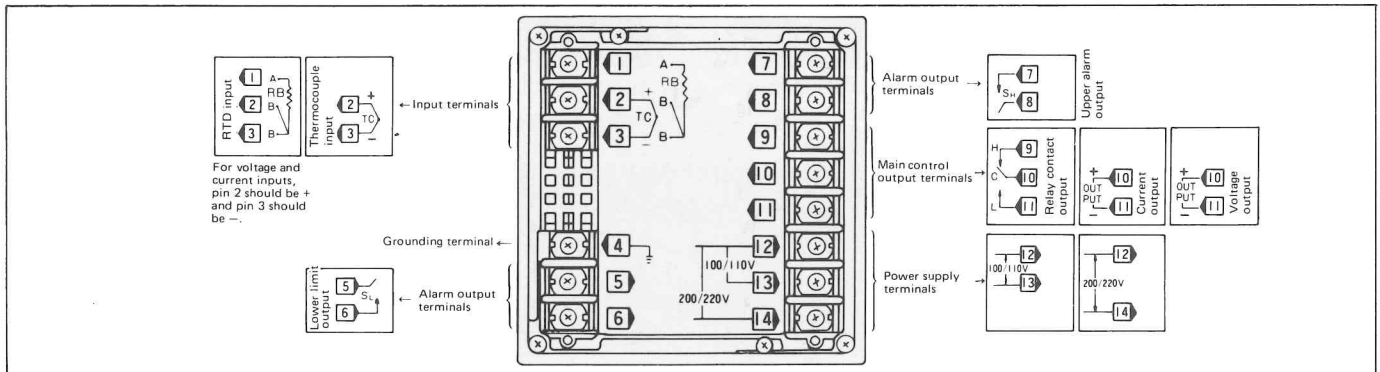
Weight : Control unit; Approx. 1.0kg

● REAR PANEL TERMINALS

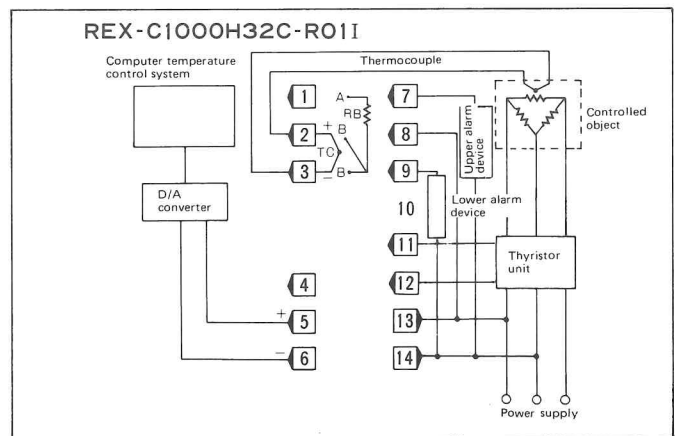
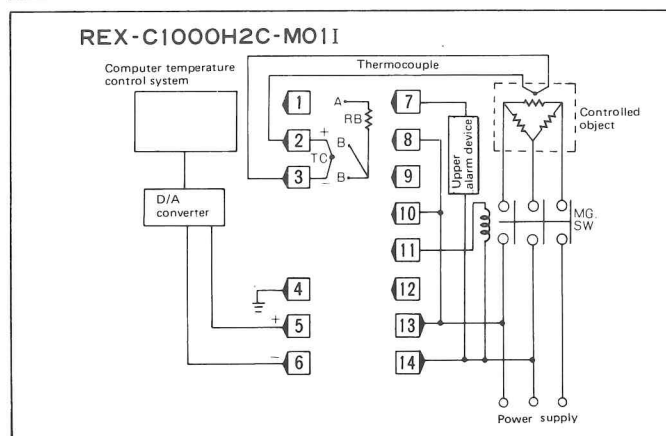
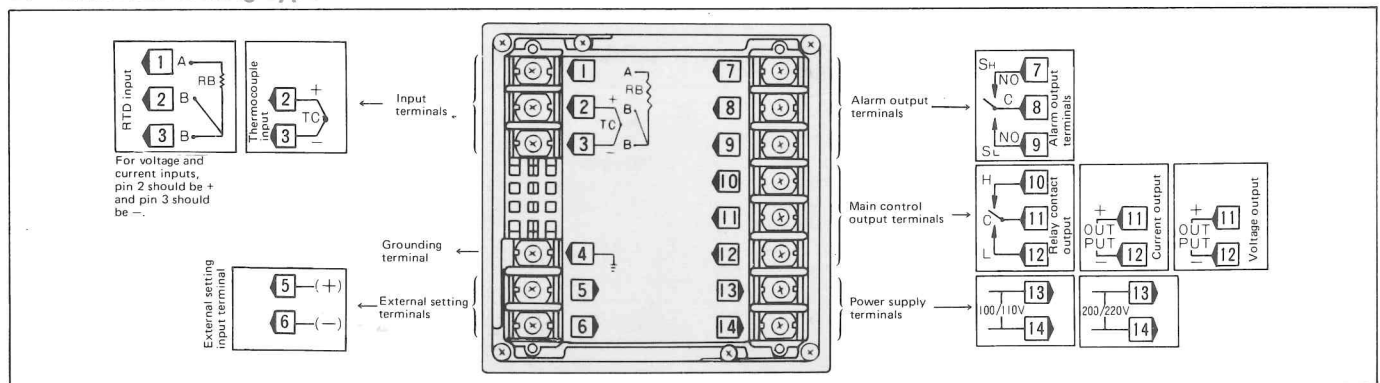


REAR TERMINALS AND CONNECTION EXAMPLES

1. Standard type



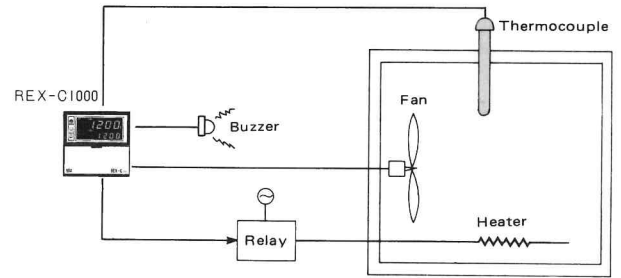
2. External setting type



● APPLICATIONS

REX-C1000 Standard Type

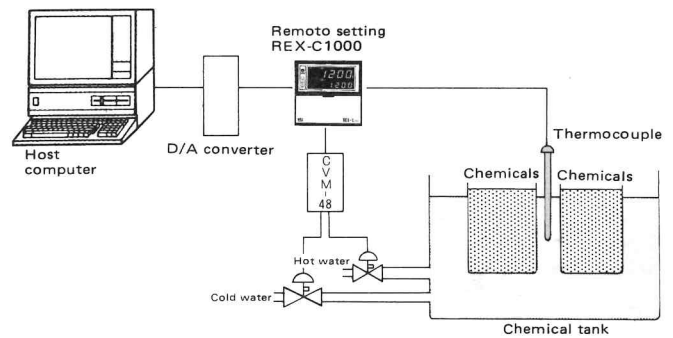
The REX-C1000 can be used for temperature control in various industries. Control is carried out by comparing the temperature measured with a thermocouple to the temperature set by the REX-C1000 and turning off the heater if the measured temperature is higher than the set value and turning on the heater if it is lower. This type is also provided with an alarm system that turns on the fan if the temperature becomes too high and sounds a buzzer if it is too low.



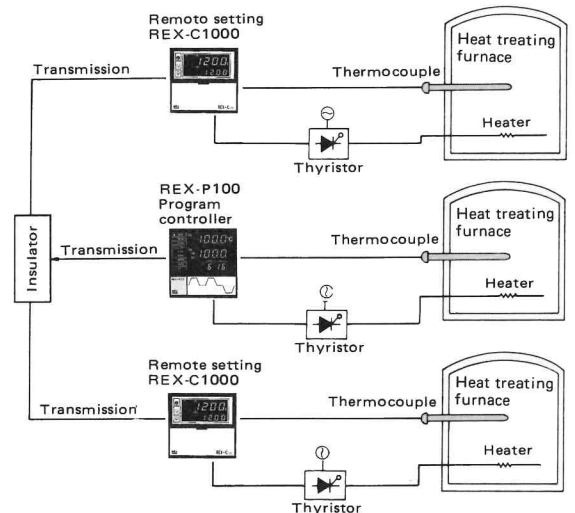
REX-C1000 Remote Setting Type

The REX-C1000 Remote Setter enables the changing of the main setting from the host computer.

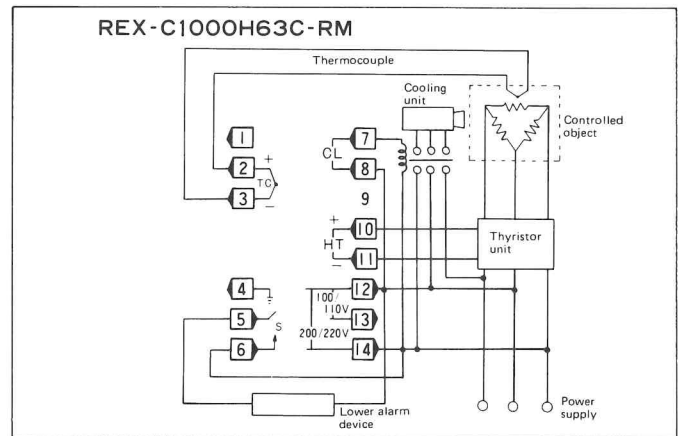
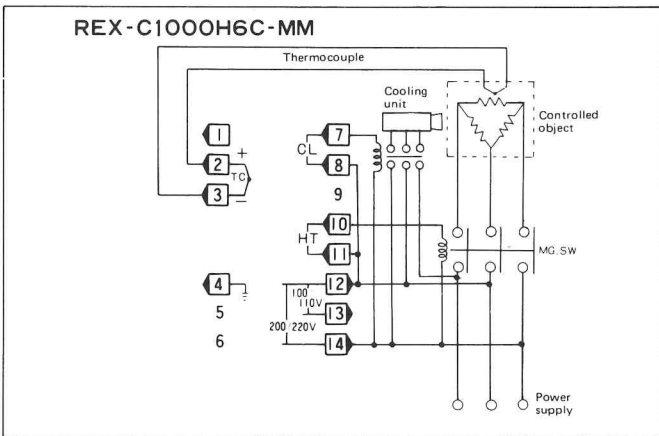
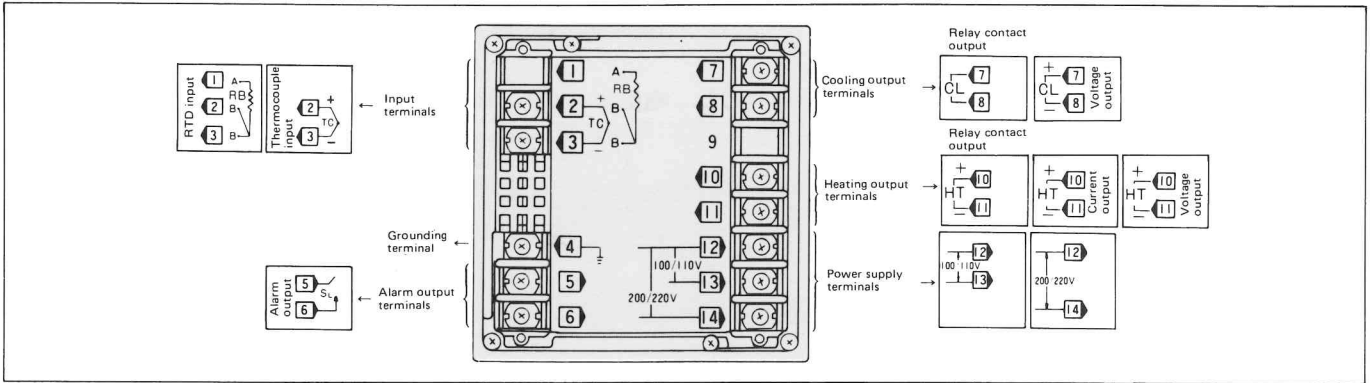
The REX-C1000 is set by analog signals which have been converted by a D/A converter from digital signals received from the host computer. Converter CVM-48 is capable of dividing the 4 to 20mA DC output of the REX-C1000 to heating and cooling signals. In temperature control of chemicals holding tanks, the CVM-48 supplies the appropriate heating signals to the hot water valve and cooling signals to the water valve with the proper timing to provide highly accurate control.



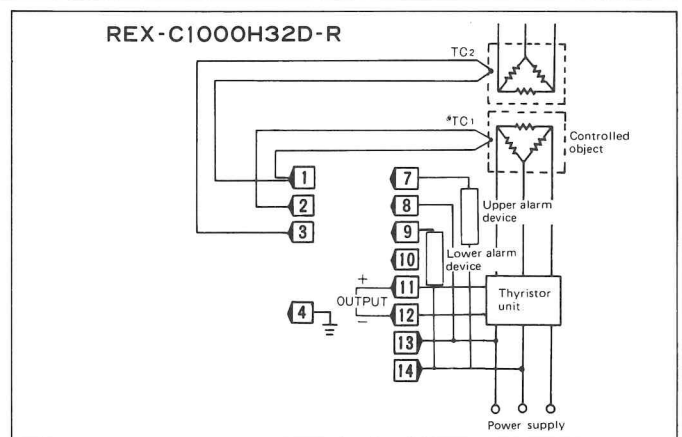
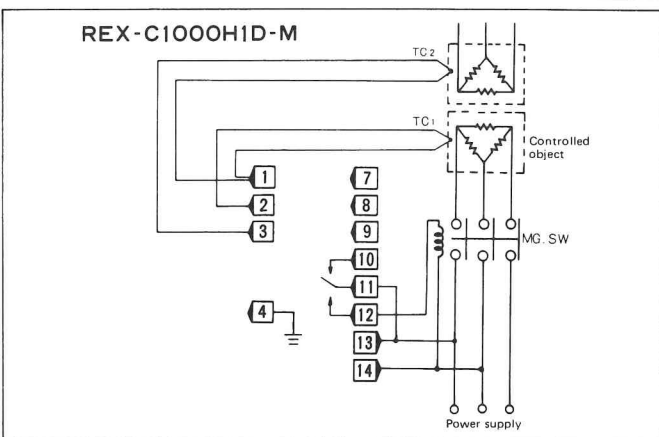
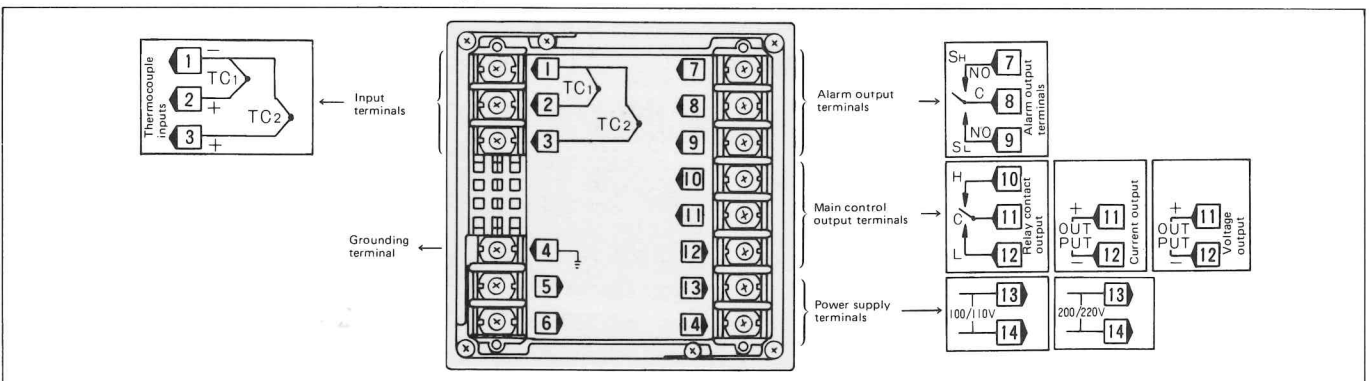
The REX-P100 (Program controller) transmission output (SV output) is used as REX-C1000 remote setting input. This enables easy and highly accurate program control at low instrumentation costs.



3. Heating and cooling type



4. Difference temperature control type

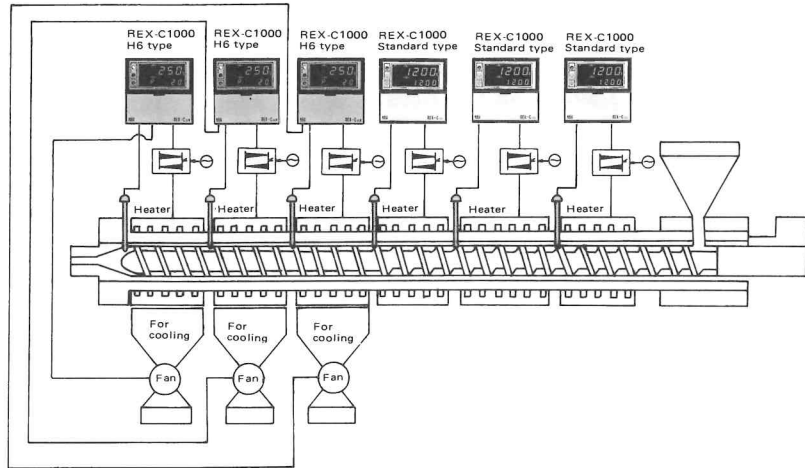


APPLICATIONS

REX-C1000H6 Heating/Cooling Type

Depending on the molding machine, the values may be higher than those set for REX-C1000 because friction, caused by the screw turning in the resin, generates additional heat to that in the resin.

In case of this nature, use REX-C1000H6 (heating/cooling type) and adjust temperature by means of heating and cooling control, especially in cylinders where friction heat occurs in the adiabatic extrusion state.

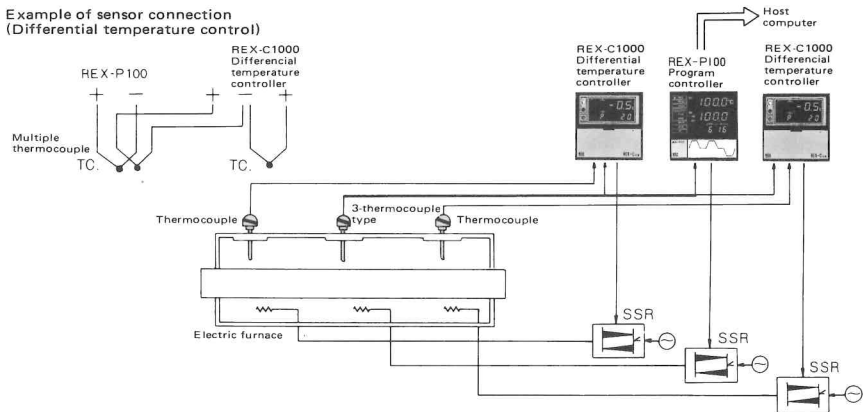


REX-C1000 Differential Temperature Control Type

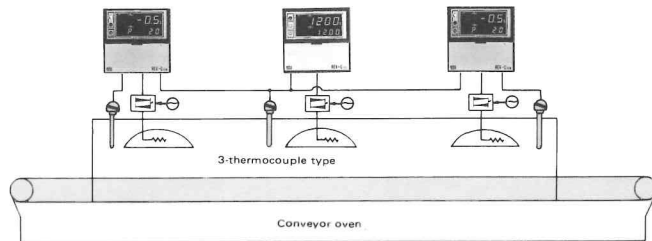
Applications like a sintering furnace have multiple heaters and each of them must be controlled at a uniform temperature so that the product quality can be stabilized.

The program controller used as a master controller changes the set point temperature as the program goes, and the set point of the differential temperature controller is changed similarly according to the program so as to keep the constant temperature difference. The differential temperature controller compares the input from the sensor with the input from the master controller and performs the control action to maintain the same temperature difference.

Example of sensor connection (Differential temperature control)

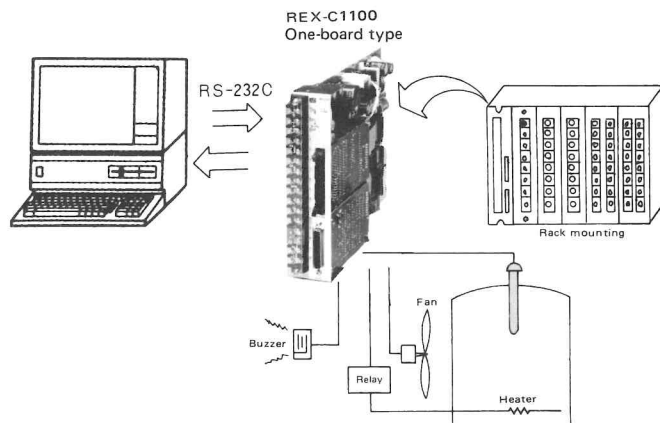


In conveyor furnace temperature control, a slight difference occurs between the temperature near the inlet and outlet and that near the center. This controller is used when it is necessary to set the temperature near the inlet and outlet slightly higher than that near the center to maintain a uniform temperature throughout the oven.



REX-C1100 One-Board Type

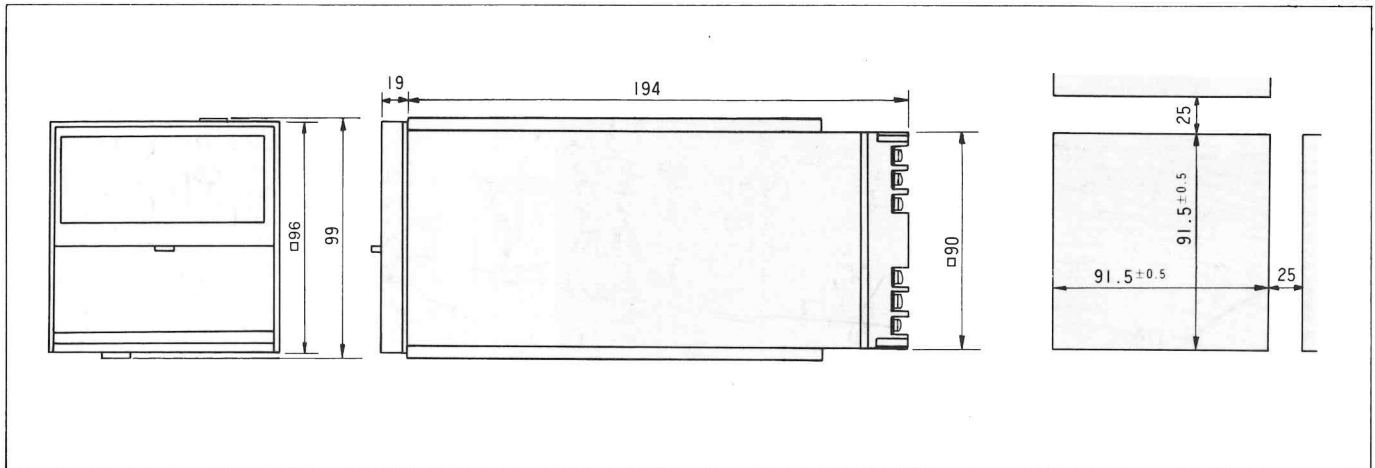
The REX-C1100 with communication functions (RS-232C) is capable of interchanging data with the host computer. This enables the setting of constants transmission requesting characters from the host computer enabling the data processing and high accuracy temperature measurement and control for centralized control such as FA.



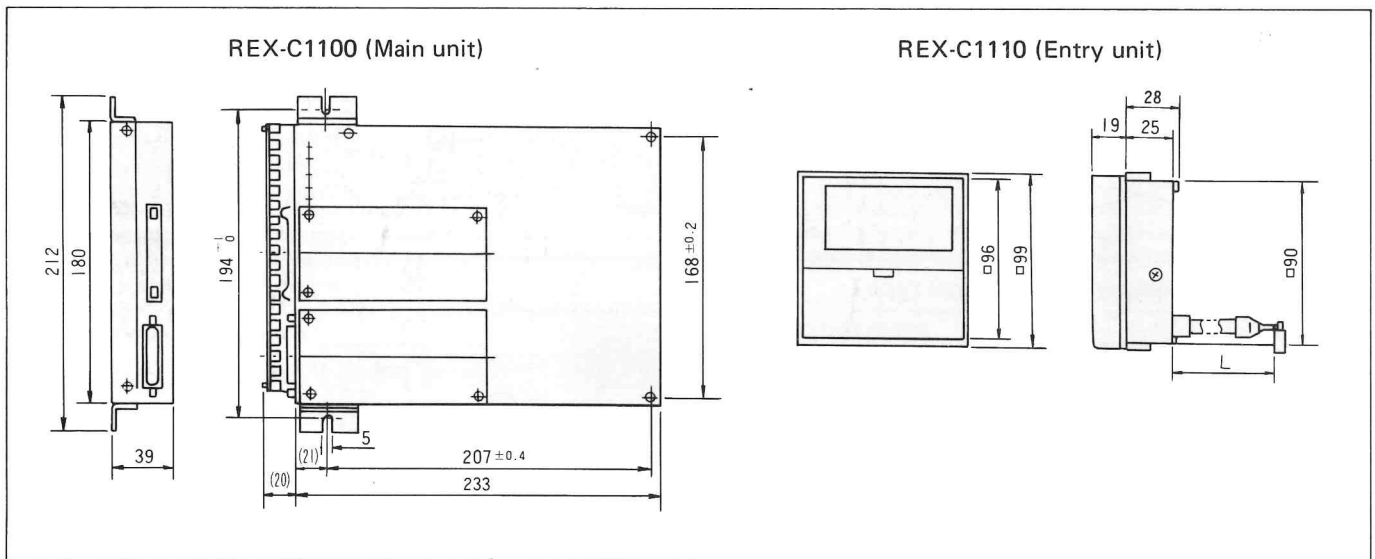
● EXTERNAL DIMENSIONS AND PANEL CUTOUT DIMENSIONS

External dimensions and panel output dimensions

Unit: mm



One-board type



Subject to change without notice due to design changes.

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