8. Maintenance and checking

- The external factors for the improper action of controller are shown as follows.

Phenomenon	Instrument status		Estimated trouble
	Digital display	Indicator	
Temperature does not rise.	Displays far above the setting value.	CONT unlit	Breaking of wire on thermocouple, compensating lead wire or RTD. Improper connection of input terminal.
	Displays the room temperature.	CONT lit	Heater breakage or improper connection Troubles of control device such as electromagnetic switch or trigger.
Temperature rises too high.	Displays (−) or around 0.	CONT lit	Short circuit of thermocouple or RTD. (including the circuit) Wrong installation (insertion) of thermocouple or RTD. Reverse polarity of thermocouple or compensating lead wire. Wrong specification or deterioration of RTD. (resistance changes)
Action unstable	Unstable display	Lit or Unlit Unstable	Influence of inductive fault or noise. AC leaks into thermometer detector. Wrong connection of terminals. (Looseness of terminal screw, etc.)

* If happened unclear phenomenon other than above mentioned, make inquiries at our agent about the matters.

9. Specifications

9.1 Standard specifications

Mounting : Flush

Setting : Input system using membrane sheet key

Display : Process variable display — Red LED, 4 digits, Size 8(H)×3.8(W) mm
Setting value display — Green LED, 4 digits, Size 8(H)×3.8(W)mm
Setting mode display — Yellow LED, 1 digit, Size 8(H)×3.8(W)mm
Setting value memory number display — Red LED, 1 digit, Size 8(H)×3.8(W)mm

Accuracy : Within ±0.3% of scaling range full scale ±1 digit, or ±2℃ (whichever is greater) for Thermocouple and RTD input
In case of R, S input, ±4℃ for 0 to 200℃
B, C input, unwarrantable for 0 to 300℃

Input : Thermocouple K, J, R, S, B, T, PL-Ⅱ, C (100Ω or less)
RTD Pt100 3-wire system, resistance per wire 4Ω max.

Output : Relay contact 1c AC 220V 3A (resistive load)
AC 220V 1A (inductive load $\cos\phi$=0.4)
Non-contact voltage (for SSR drive)
DC 15V±3V (at load resistance 1.5kΩ)
20 mA (short-circuit protected)
Current DC 4 to 20mA (load resistance max. 600Ω isolation type)
Temperature alarm (-232, -233, -234, -236, -238) Relay contact 1a
AC 220V 0.5A (resistive load)
AC 220V 0.2A (inductive load $\cos\phi$=0.4)

Control system : PID action (with auto-tuning function)
Proportional band 0.0 to 200.0% (acts ON-OFF when set to 0)
Integral time 0 to 3600 seconds (off when set to 0)
Derivative time 0 to 1800 seconds (off when set to 0)
Anti-reset windup 0 to 100%
Proportional cycle 1 to 120 seconds (not applied for -A/□)
ON-OFF action, differential 0.0 to 100.0℃

Temperature alarm : (-232, -233, -234, -236, -238)
ON/OFF action Dead band 1℃

Supply voltage : AC 110/220V, 50/60Hz, Allowable voltage fluctuation within ±10%
Instantaneous power failure within 30ms
When option [C5] or [ECC] is designated, the voltage 110 or 220 should be specified.

Ambient temperature : 0 to 50℃ (32 to 122℉)

Ambient humidity : 35 to 85%RH (non-condensing)

Power consumption : Approx. 3W

Weight : Approx. 310g

Material : Polycarbonate resin, Color; Light-gray

Insulation resistance: 10MΩ or more at DC 500V (However, voltage must not be applied to the terminal between input and output.)

Dielectric strength : Between Input terminal - Ground terminal: AC 500V for 1 minute
Between Power terminal - Ground terminal: AC 1.5kV for 1 minute
Between Output terminal - Ground terminal: AC 1.5kV for 1 minute
(However, voltage must not be applied to the terminal for the type -S/□ or -A/□)

Attached functions : Scaling function (scaling high limit and low limit setting),
Sensor correcting function, Setting value lock function,
Control mode direct/reverse changing function,
Power failure countermeasures
(data back-up by non-volatile IC memory),
Self-diagnostic function
(watchdog timer, instrument source abnormal watch, RAM check),
Automatic cold junction temperature compensation (-□/E)
Burnout function (up scale)
Output limit function
(range 0 to 100%, current output type -10 to 110%)

Accessory : Mounting brackets 1 set
Instruction manual 1 copy
Current transformer, Model CTL-6-S 1 set [when the option W is applied]

9.2 Optional specifications

Temperature alarm output with standby function : **[Code: H]**
Temperature alarm (applied for only High limit, Low limit and High/Low limit alarm) with standby function.

Aux. Temperature alarm function (A2) output : **[Code: AL□]**
The additional temperature alarm besides the standard temperature alarm. Designation of action characteristic is the same as the number of standard specification and indicated following to AL.
e.g. AL2: It shows that Aux. temperature alarm (A2) acts as High limit alarm action.

Aux. Temperature alarm function (A2) output with standby function : **[Code: AL□H]**
Standby function is applied to Aux. Temperature alarm (for only High limit, Low limit and High/Low limit alarm)
e.g. AL2H: It shows that Aux. temperature alarm (A2) acts as High limit alarm action with standby function.

Heater burnout alarm output : **[Code: W]**
0 to 100% (current 5A, 10A or 20A, specified)

Heating/cooling control output : **[Code: D□]**
Proportional band, 0.1 to 10 times of main control(C1) proportional band
Proportional cycle, 1 to 120 seconds (when the code is DR or DS)
Integral time and derivative time are applied correspondingly to the main control.
Overlap and dead band setting range, -10.0 to 10.0% of full scale

[Code: DR] Output, Relay contact, 1c
AC 220V 3A (resistive load)
AC 220V 1A (inductive load $\cos\phi$=0.4)

[Code: DS] Output, Non-contact voltage,
DC 15V±3V (at load resistance 1.5kΩ)
20mA (short circuit protected)

Setting value memory function : **[Code: SM]**
Memorizes 7 kinds of data (Main setting value, PID each value, ARW value, Temperature alarm setting value and Dead band setting value) as 1 file. [max. 8 files]

Serial communication : **[Code: C5]**

Communication method,	Half-duplex communication start-stop synchronous	
Data transfer rate,	4800bps (600, 1200, 2400bps) specified	
Data format,	Start bit	: 1
	Data bit	: 7
	Parity	: Even parity
	Stop bit	: 1
Error detection,	Parity and Checksum	

External setting : **[Code: ECC]**
It receives the setting value in digital signal from the outside.

Color Black : **[Code: BK]**
Face plate: Dark gray, Base and Case: Black

Screw type mounting bracket : **[Code: BL]**
Mounting Panel thickness 1 to 8 mm

10. Character table

Character	Description	Option applied
AC-	Initial setting (Warmup status)	
5	Main setting mode	
A	Temperature alarm setting mode	
A.	Auxiliary temperature alarm setting mode	Option [A□]
P	Proportional band setting mode for Main control(C1)	
I	Integral time setting mode	
d	Derivative time setting mode	
n	ARW setting mode	
c'	Dead band setting mode	Option [D□]
b	Heater burnout alarm setting	Option [W]
Lock	Setting value lock designating mode	
Loc 1 *	Setting value lock designating mode 1	
Loc2 *	Setting value lock designating mode 2	
Loc3 *	Memory avoiding mode [Exclusive use for ECC]	
-- *	Setting value lock is not designated	
cYc	Main control(C1) proportional cycle setting mode	
cYcc	Sub-control(C2) proportional cycle setting mode	Option [D□]
P-b	Sub-control(C2) proportional band setting mode	Option [D□]
dF A	Main control(C1) differential setting mode	
dF b	Sub-control(C2) differential setting mode	Option [D□]
SrLH	Scaling high limit setting mode	
SrLL	Scaling low limit setting mode	
orLH	Output high limit setting mode	
orLL	Output low limit setting mode	
So	Sensor correction setting mode	
dno	Instrument number designating mode	Option [C5, ECC]
cnf	Control mode designating mode	
HEAT *	Heating (reverse) action	
cool *	Cooling (direct) action	

Notes: • Characters marked by * are displayed on the SV display (Green LED), and others are on the PV display (Red LED).

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Character	Description
SV	
AT	
AT.	
P	
I	
d	
rn	
c	
b	
Lock	
Loc 1	
Loc2	
Loc3	
--	
cYc	
cYcc	
P-b	
dF A	
dF b	
SrLH	
SrLL	
orLH	
orLL	
So	
dno	
cnF	
HEAF	
cooL	

MEMO

MEMO

• • • Inquiry • • •

For any inquiry of this controller, after checking the following as to the controller, please contact your shop where purchased, or our agent.

	[Example]
• Model	MCR-234-R/E
• Temperature specification	0 to 999℃
• Type of input	K

In addition to the above, let us know the details of malfunction, if any, and the operating conditions specifically on job site.

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