

Series 4G/8G/16G Temperature/Process Controllers

■ Warning

- ⚠ • **DANGER! Caution! Electric Shock!** When the power is on, DO NOT touch the AC terminals in case an electric shock may occur. Make sure the power is disconnected when you check the input power supply.
- Prevent dust or metallic debris from falling into the controller and causing malfunctions. DO NOT modify or uninstall the controller.
- Series 4G/8G/16G is an open-type device. Make sure it is installed in an enclosure free of dust and humidity to limit the potential for electric shock.
- Wait for one minute after the power is switched off to allow the capacitor to discharge. DO NOT touch the internal wiring within this period of time.

■ Display, LED & Keys

- ⏏ : Key lock LED
- ALM1~ALM3: Alarm output LED
- OUT1/OUT2: Output LED
- AT: Auto-tuning LED
- MAN: Manual mode LED



Upper display: Process Value (PV)
Lower display: Set point value (SV)
°C/°F: Celsius or Fahrenheit

--- : Output % meter

- F1 F2 : User-defined function keys
- ↵ ↶ : "ENTER" and "INDEX" keys
- ⬇ ⬆ : Up/Down SV adjustment keys

■ Ordering Information

1 G - 2 3 - 4 5 - 6

1 Series / Panel size (W×H)	16: 1/16 DIN W48 × H48mm 8: 1/8 DIN W48 × H96mm 4: 1/4 DIN W96 × H96mm
2 Output 1 options	2: Voltage pulse, 12V ±10% 3: Relay, 250 VAC, 5A 5: DC current, 4 to 20m A 6: L: Linear voltage, 0 to 10 VDC
3 Output 2 options	2: Voltage pulse, 12V ±10% 3: Relay, 250 VAC, 5A 5: DC current, 4 to 20m A 6: L: Linear voltage, 0 to 10 VDC
4 Optional Function 1	0: None 1: Event input 2 3: Retransmission output 4: CT input 2
5 Optional Function 2	0: None 1: Event input 1 2: Remote setpoint input 4: CT input 1
6 Options	"Blank": AC 100 to 240V LV: DC 24 V±10%

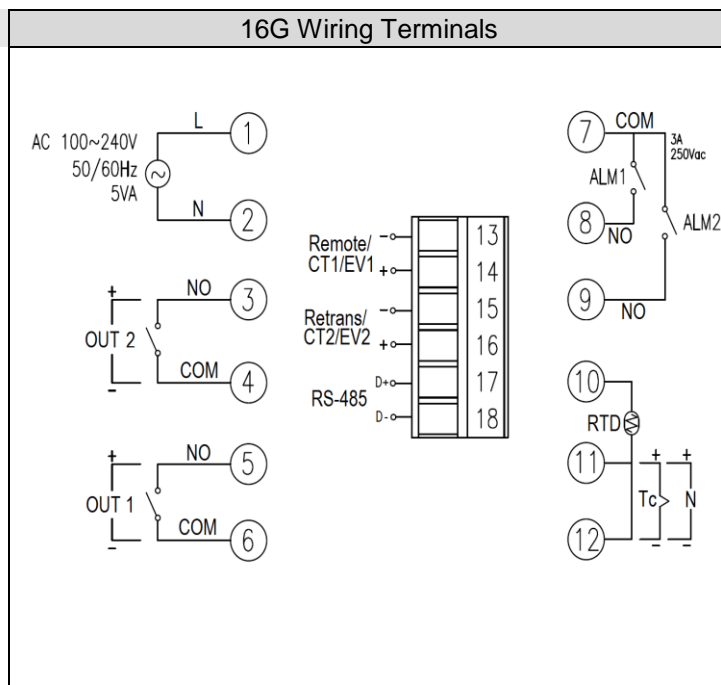
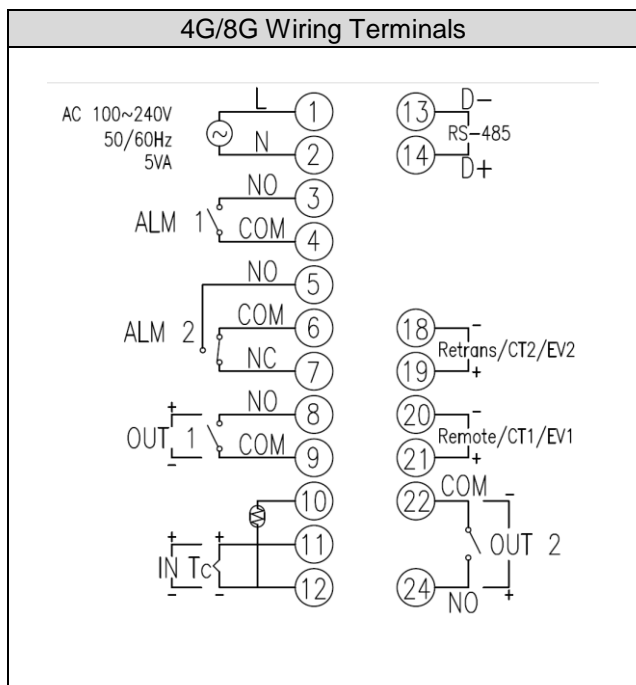
■ Specifications

Supply Voltage	AC 100 to 240 V -20/+8%, 50/60Hz; Optional DC 24 V ±10%
Power Consumption	5 VA
Display	Process Value: 4-digit, orange LCD Setpoint Value: 4-digit, green LCD
Input sensors	Thermocouple: K, J, T, E, N, R, S, B, L, U, TXK
	RTD: Pt100, JPt100, Cu50, Ni120
	Analog input: 0 to 5 V, 0 to 10 V, 0 to 20 mA, 4 to 20 mA, 0 to 50 mV
Control modes	PID, PID program (ramp/soak), Fuzzy, Manual, ON/OFF, 2PID
Tuning method	Auto-tuning, Self-tuning
Display Resolution	0 or 1 digit to the right of the decimal point
Sampling rate	Analog input: 0.1s, Thermocouple or platinum RTD: 0.1s
Ambient temperature	0 to +50°C
Ambient humidity	35 to 80% RH (non-condensing)

■ Panel Cutout

Model	Panel cutout (W × H)
16G	45mm × 45mm
8G	44.5mm × 91.5mm
4G	91mm × 91mm

■ Wiring



Parameters Operation



Regulation Mode	Operation Mode	Initial Setting Mode
AL Auto-tuning (Set in PID control and RUN mode) Press ENT ▾	T234 Use ▼ ▲ to set up target temperature Press ENT ▾	INP Set up input type Press ENT ▾
SE Self-tuning switch (set when in PID control and the TUNE parameter = ST)	R-S Control loop RUN or STOP	TEMP Set up temperature unit (not displayed when in analog input)
PLd Select the n th (n = 0 ~ 5) PID. When n = AUTO, PID is auto-selected.	PLRN Set up start pattern (when in PID programmable control and PSEL)	EP-H Set up upper temperature limit
Paob Set up PID control offset	SEEP Set up start step (when in programmable control)	EP-L Set up lower temperature limit
FZ-R Set up Fuzzy gain value	SP Set up the position of decimal point	CTRL Select control modes
FZdb Set up Fuzzy Deadband	LoL Lock the keys	CRS Select SV control modes
a1-S Adjust Output 1 hysteresis (when in ON/OFF control)	AL-H Set up upper limit of Alarm 1	W-SV Set up waiting temperature (when in programmable control)
a2-S Adjust Output 2 hysteresis (when in ON/OFF control)	AL-L Set up lower limit of Alarm 1	W-TM Set up waiting time (when in programmable control)
a1-H a1-L Control cycle for Output 1 (except in ON/OFF control)	AL-2H Set up upper limit of Alarm 2	SLoS Set up start slope (when in programmable control)
a2-H a2-L Control cycle for Output 2 (except in ON/OFF control)	AL-2L Set up lower limit of Alarm 2	PREN Select pattern to be edited
CoEP Ratio of Output 1 against Output 2 when in dual output control (set when in PID and dual output control)	AL-3H Set up upper limit of Alarm 3	TUNE Select AT or ST
dEPd Set up deadband (when in dual output)	AL-3L Set up lower limit of Alarm 3	S-TC Select heating, cooling or dual output heating and cooling
PV-F Set up input filter factor	ALHP Record highest temperature of Alarm 1	ALR1 ALR2 ALR3 Set up Alarm 1 mode
PV-R Set up input filter range	ALLP Record lowest temperature of Alarm 1	ALJ1 ALJ2 ALJ3 Set up Alarm 1 options
PVof Adjust input compensation	AL2HP Record highest temperature of Alarm 2	ALJ1 ALJ2 ALJ3 Set up Alarm 1 delay
PVbR Adjust input gain	AL2LP Record lowest temperature of Alarm 2	PVC PV color change
SPSL Set up rising slope (when CRTS = SLOP)	AL3HP Record highest temperature of Alarm 3	PdS 2PID Switch temperature
ALMR Adjust upper limit compensation for analog Output 1*	AL3LP Record lowest temperature of Alarm 3	PdL 2PID Return temperature
ALML Adjust lower limit compensation for analog Output 1*	oU1 Display and adjust Output 1 volume	RMER Set up Remote type
AL2MR Adjust upper limit compensation for analog Output 2*	oU2 Display and adjust Output 2 volume	EXEF Select auxiliary function
AL2ML Adjust lower limit compensation for analog Output 2*	oPMR Set up percentage of upper limit for Output 1	EXE2 Select auxiliary function 2
ALMR* Adjust upper limit compensation for Retransmission*	oPL Set up percentage of lower limit for Output 1	CoSH Enable/disable communication write-in
ALML* Adjust lower limit compensation for Retransmission*	o2PMR Set up percentage of upper limit for Output 2	C-SL Select ASCII or RTU format
RM-S Adjust Remote gain	o2PL Set up percentage of lower limit for Output 2	C-Ad Set up communication address
RM-F Adjust Remote compensation	CT1 Display current measured at CT1	bPS Set up baudrate
EXE1 Set up EVENT1 function	CT2 Display current measured at CT2	LEN Set up data length
EXE2 Set up EVENT2 function	Press ENT to return to set up target temperature	StoP Set up stop bit
EXE3 Set up EVENT3 function Press ENT to return to auto-tuning		PRBY Set up parity bit Press ENT to return to set up input type

*1 scale = 2μA; 1scale = 1mV

PID mode: Any of the 6 PID groups can be selected. When n = AUTO, the program will automatically select the PID group that is the closest to the target temperature.

PLd Select the n th PID (n = 0 ~ 5) Press ENT ▸ 0 ~ 5 th PID	SP0 Set up the 0 th PID temperature value Press ENT ▾	SP5 Set up the 5 th PID temperature value Press ENT ▾
	PB0 Set up the 0 th proportional band value	PB5 Set up the 5 th proportional band value
	TI0 Set up the 0 th Ti value	TI5 Set up the 5 th Ti value
	TD0 Set up the 0 th Td value	TD5 Set up the 5 th Td value
	CoEP0 Set up the 0 th PID integral deviation Press ENT to return to PID deviation	CoEP5 Set up the 5 th PID integral deviation Press ENT to return to PID deviation

Patterns and steps: Edit **PR05** in **TEMP** parameter. Take editing pattern 0 for example:

SPxx & TMxx parameters save must be after Press **SAVE** in **PR05** parameter.

PR05 Select the pattern number to be edited Select number > Press ↵ to select OFF	SP00 Edit temperature for Step 0 Press ↵ ▾	PS00 Select actual number of steps when the program is executing Press ↵ ▾
Exit pattern and step editing and switch to 5-HC to continue the setup process.	TM00 Edit time for Step 0 (time unit: hr, min)	CY00 Set up additional cycles (0 ~ 99) for the pattern execution
	Set up Step 0 ~ 15 in order	LN00 Set up link pattern. OFF refers to the program end.
	SP15 Edit temperature for Step 15	Press ↵ to return to select the pattern number to be edited
	TM15 Edit time for Step 15 Press ↵ to set up actual step numbers	

■ RS-485 Communication

Series 4G/8G/16G Controllers support baudrate 2,400 to 38,400 bps, Modbus ASCII/RTU protocol, function code 03H and reads maximum 8 words from the register.

Address	Content	Definition
1000H	Present value (PV)	Measuring unit: 0.1 scale. The following values read mean error occurs. 8002H: Temperature not yet acquired 8003H: Not connected to sensor 8004H: Incorrect sensor
1001H	Set value (SV)	Measuring unit: 0.1 scale.
1002H	Upper limit of temp. range	Cannot exceed the default value
1003H	Lower limit of temp. range	Cannot fall below the default value
1005H	Control mode	0: PID, 1: ON/OFF, 2: Manual, 3: FUZZY
1006H	Heating/cooling control	0: Heating/ Heating, 1: Cooling/ Heating, 2: Heating/cooling, 3: Cooling/ Cooling
1007H	1 st heating/cooling control cycle	0.1 ~ 99.0 sec.
1008H	2 nd heating/cooling control cycle	0.1 ~ 99.0 sec.
1009H	Proportional band (PB)	0.1 ~ 999.9
100AH	Ti value	0 ~ 9,999
100BH	Td value	0 ~ 9,999
1012H	Read/write Output 1 volume	Unit: 0.1%, only valid in manual control mode
1013H	Read/write Output 2 volume	Unit: 0.1%, only valid in manual control mode
1016H	Regulated temp. value	-99.9 ~ +99.9, Unit: 0.1
102AH	Read/write LED status	b0: ALM3, b1: ALM2, b2: °F, b3: °C, b4: ALM1, b5: OUT2, b6: OUT1, b7: AT
102BH	Read/write key status	b0: Set, b1: Select, b2: Up, b3: Down, 0: Press it
102CH	Panel lockup status	0: Normal, 1: Fully locked, 2: SV adjustable
102DH	CT value	Unit: 0.1A
103BH	AT setting	0 : OFF(default), 1 : ON
103CH	Control RUN/STOP setting	0 : STOP, 1 : RUN (default), 2 : END (program), 3 : HOLD (program)

■ Alarm Outputs

Series 4G/8G/16G controllers offer 3 alarm outputs, and each alarm output has 20 alarm modes to choose from in the initial setting mode.

SV	Alarm mode	Alarm output operation
0	No alarm	
1	Alarm output will be enabled when the temperature reaches upper or lower limit: The alarm will be enable when the PV exceeds $SV + AL-H$ or falls below $SV - AL-L$.	
2	Alarm output will be enabled when the temperature reaches the upper limit: The alarm will be enabled when the PV exceeds $SV + AL-H$.	
3	Alarm output will be enabled when the temperature reaches the lower limit: The alarm will be enabled when the PV falls below $SV - AL-L$.	
4	Alarm output will be enabled when the temperature reaches the absolute value of the upper or lower limit: The alarm will be enabled when the PV exceeds $AL-H$ or falls below $AL-L$.	
5	Alarm output will be enabled when the temperature reaches the absolute value of the upper limit: The alarm will be enabled when the PV exceeds $AL-H$.	
6	Alarm output will be enabled when the temperature reaches the absolute value of the lower limit: The alarm will be enabled when the PV falls below $AL-L$.	
7	Upper limit hysteresis alarm: The alarm will be enabled when the PV exceeds $SV + AL-H$. The alarm will be disabled when the PV falls below $SV + AL-L$.	
8	Lower limit hysteresis alarm: The alarm will be enabled when the PV falls below $SV - AL-H$. The alarm will be disabled when the PV exceeds $SV - AL-L$.	
9	Offline alarm: The alarm will be enabled when the input sensor is not correct or offline.	
10	Timing alarm	
11	CT1 alarm: The alarm will be enabled when the CT1 value falls below $AL-L$ or exceeds $AL-H$.	
12	CT2 alarm: The alarm will be enabled when the CT2 value falls below $AL-L$ or exceeds $AL-H$.	
13	When SOAK status (temperature hold) happens to PID program control, alarm output is ON.	
14	When RAMP UP status happens to PID program control, alarm output is ON.	
15	When RAMP DOWN status happens to PID program control, alarm output is ON.	
16	When RUN status happens to PID program control, alarm output is ON.	
17	When HOLD status happens to PID program control, alarm output is ON.	
18	When STOP status happens to PID program control, alarm output is ON.	
19	When END status happens to PID program control, alarm output is ON.	

