Bar Graph Temperature Controllers

KPN Series

PRODUCT MANUAL

For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.
The specifications, dimensions, etc are subject to change without notice for product improvement Some models may be discontinued without notice.

Features

- High speed sampling of 50ms and ±0.3% display accuracy
- Enable to check control output operation amount by adopting bar graph
- Simultaneous heating/cooling control and automatic/manual control for high performance control
- Selection function of current output or SSR drive output
- Parameter setting available via PC (USB and RS485 communication)
  - Free device comprehensive management program (DAQMaster)
- Communication converter sold separately:
  SCM-US (USB/Serial converter), SCM-38I (RS232C/RS485 converter) SCM-US48I (USB/RS485 converter)
- Multi-SV (Max. 4) function (select via digital input terminal)
- Heater break alarm
- CT sold separately: CSTC-E80LN, CSTC-E200LN, CSTS-E80PP
- Small size (rear length: 60 mm)
- Multi input/multi range

Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- ⚠ symbol indicates caution due to special circumstances in which hazards may occur.

⚠ Warning Failure to follow instructions may result in serious injury or death

01. Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss.(e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)
Failure to follow this instruction may result in personal injury, economic loss or fire.

02. Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact or salinity may be present.
Failure to follow this instruction may result in explosion or fire.

03. Install on a device panel to use.
Failure to follow this instruction may result in electric shock.

04. Do not connect, repair, or inspect the unit while connected to a power source.
Failure to follow this instruction may result in fire or electric shock.

05. Check 'Connections' before wiring.
Failure to follow this instruction may result in fire.

06. Do not disassemble or modify the unit.
Failure to follow this instruction may result in fire or electric shock.

⚠ Caution Failure to follow instructions may result in injury or product damage

01. When connecting the power input and relay output, use AWG 20 (0.50 mm^2) cable or over, and tighten the terminal screw with a tightening torque of 0.74 to 0.90 N·m.
When connecting the sensor input and communication cable without dedicated cable, use AWG 27 to 16 cable and tighten the terminal screw with a tightening torque of 0.74 to 0.90 N m..
Failure to follow this instruction may result in fire or malfunction due to contact failure.

02. Use the unit within the rated specifications.
Failure to follow this instruction may result in fire or product damage

03. Use a dry cloth to clean the unit, and do not use water or organic solvent.
Failure to follow this instruction may result in fire or electric shock.

04. Keep the product away from metal chip, dust, and wire residue which flow into the unit.
Failure to follow this instruction may result in fire or product damage.

Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- Check the polarity of the terminals before wiring the temperature sensor. For RTD temperature sensor, wire it as 3-wire type, using cables in same thickness and length. For thermocouple (CT) temperature sensor, use the designated compensation wire for extending wire.
- Keep away from high voltage lines or power lines to prevent inductive noise. In case installing power line and input signal line closely, use line filter or varistor at power line and shielded wire at input signal line. Do not use near the equipment which generates strong magnetic force or high frequency noise.

CE EAC

- Do not apply excessive power when connecting or disconnecting the connectors of the product.
- Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
- Do not use the unit for other purpose (e.g. voltmeter, ammeter), but temperature controller.
- When changing the input sensor, turn off the power first before changing. After changing the input sensor, modify the value of the corresponding parameter.
- Power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- Do not overlapping communication line and power line. Use twisted pair wire for communication line and connect ferrite bead at each end of line to reduce the effect of external noise.
- Make a required space around the unit for radiation of heat. For accurate temperature measurement, warm up the unit over 20 min after turning on the power.
- Make sure that power supply voltage reaches to the rated voltage within 2 sec after supplying power.
- Do not wire to terminals which are not used.
- This unit may be used in the following environments.
  - Indoors (in the environment condition rated in 'Specifications')
  - Altitude Max. 2,000 m
  - Pollution degree 2
  - Installation category II

Ordering Information

This is only for reference, the actual product does not support all combinations.
For selecting the specified model, follow the Autonics website .

K P N 5 ❶ ❷ - ❸ ❹ 0

❶ Size
2: DIN W 96 × H 48 mm
3: DIN W 48 × H 96 mm
5: DIN W 96 × H 96 mm

❷ Control output

PN	Output number	Type	
		Heating: OUT1	Cooling: OUT2
00	1 (Heating or Cooling)	Relay, selectable current or SSR drive output	
11	2 (Heating & Cooling)	Selectable current or SSR drive output	
13		Selectable current or SSR drive output	Relay
17		Relay	Selectable current or SSR drive output
19		Relay	

❸ Option Communication output
0: No
2: RS485

❹ Option in/output
0: No
3: Transmission output + Remote SV

Manual

For proper use of the product, refer to the manuals and be sure to follow the safety considerations in the manuals.
Download the manuals from the Autonics website.

Software

Download the installation file and the manuals from the Autonics website.

■ DAQMaster

DAQMaster is comprehensive device management program. It is available for parameter setting, monitoring.

Sold Separately

- Terminal protection cover: RHA / RLA Cover
- Current transformer (CT)
- Communication converter: SCM Series

Specifications

Series		KPN Series
Power supply		100 - 240 VAC~ 50/60 Hz
Power consumption		≤ 15 VA
Sampling period		50 ms
Input specification		Refer to 'Input Type and Using Range'.
Option input	CT input	• 0.0-50.0 A (primary current measurement range) • CT ratio: 1/1,000
	Remote SV	1 - 5 VDC⎓ or 4 - 20 mA (Current Input: External resistance 250 Ω)
	Digital input	• Contact - ON: ≤ 2 kΩ, OFF: ≥ 90 kΩ • Non contact - residual voltage ≤ 1.0 V, leakage current ≤ 0.1 mA
Control output	Relay	250 VAC~ 5 A 1a
	SSR	11 VDC⎓ ±2 V, ≤ 20 mA
	Current	DC 4-20 mA or DC 0-20 mA (parameter), load resistance: ≤ 500 Ω
Alarm output	Relay	250 VAC~ 3 A 1a
Option output	Transmission	DC 4 - 20 mA (load resistance: ≤ 500 Ω, output accuracy: ±0.3% F.S. ±1-digit)
	RS485 Comm.	Modbus RTU
Display type		7 segment (red, green), control output bar graph (red, green), LED type
Control type	Heating, Cooling	ON/OFF, P, PI, PD, PID Control
	Heating & Cooling	
Hysteresis		• Thermocouple, RTD: 1 to 100 (0.1 to 100.0) °C/°F • Analog: 1 to 100 digit
Proportional band (P)		0.1 to 999.9 °C/°F (0.1 to 999.9%)
Integral time (I)		0 to 9,999 sec
Derivative time (D)		0 to 9,999 sec
Control cycle (T)		• 0.1 to 120.0 sec [relay output model] • 1.0 to 120.0 sec [SSR drive output model]
Manual reset		0.0 to 100.0%
Relay life cycle	Mechanical	≥ 10,000,000 operations
	Electrical	≥ 100,000 operations (load resistance: 250 VAC~ 3 A)
Dielectric strength		Between power source terminal and input terminal: 2,000 VAC~ 50/60 Hz for 1 min
Vibration		0.75 mm amplitude at frequency of 5 to 55 Hz (for 1 min) in each X, Y, Z direction for 2 hours
Insulation resistance		≥ 100 MΩ (500 VDC⎓ megger)
Noise immunity		±2 kV square shaped noise (pulse width 1 μs) by noise simulator R-phase, S-phase
Memory retention		≈ 10 years (non-volatile semiconductor memory type)
Ambient temperature		-10 to 50 °C, storage: -20 to 60 °C (no freezing or condensation)
Ambient humidity		35 to 85%RH, storage: 35 to 85%RH (no freezing or condensation)
Protection structure		IP65 (front panel, IEC standards)
Insulation type		Double or reinforced insulation (mark: ⧈, dielectric strength between the measuring input part and the power part: 2 kV)
Accessory		Bracket
Approval		CE EAC
Unit weight (packaged)		• KPN52□-□: ≈ 160 g (≈ 230 g) • KPN53□-□: ≈ 160 g (≈ 230 g) • KPN55□-□: ≈ 220 g (≈ 316 g)

Communication Interface

■ RS485

Comm. protocol	Modbus RTU
Application standard	EIA RS485 compliance with
Maximum connection	31 units (Address: 01 to 127)
Synchronous method	Asynchronous
Comm. method	Two-wire half duplex
Comm. effective range	≤ 800 m
Comm. speed	2,400 / 4,800 / 9,600 (default) / 19,200 / 38,400 bps (parameter)
Response time	5 to 99 ms (default: 20 ms)
Start bit	1 bit (fixed)
Data bit	8 bit (fixed)
Parity bit	None (default), Odd, Even
Stop bit	1 bit, 2 bit (default)

Input Type and Using Range

The setting range of some parameters is limited when using the decimal point display.

Input type		Decimal point	Display	Using range (°C)	Using range (°F)
Thermo -couple	K (CA)	1	tC.K1	-200 to 1,350	-328 to 2,463
		0.1	tC.K2	-199.9 to 999.9	-199.9 to 999.9
	J (IC)	1	tC.J1	-200 to 800	-328 to 1,472
		0.1	tC.J2	-199.9 to 800.0	-199.9 to 999.9
	E (CR)	1	tC.E1	-200 to 800	-328 to 1,472
		0.1	tC.E2	-199.9 to 800.0	-199.9 to 999.9
	T (CC)	1	tC.t1	-200 to 400	-328 to 752
		0.1	tC.t2	-199.9 to 400.0	-199.9 to 752.0
	B (PR)	1	tC-b	0 to 1,800	32 to 3,272
	R (PR)	1	tC-r	0 to 1,750	32 to 3,182
	S (PR)	1	tC-S	0 to 1,750	32 to 3,182
	N (NN)	1	tC-n	-200 to 1,300	-328 to 2,372
	C (TT) [01]	1	tC-C	0 to 2,300	32 to 4,172
	G (TT) [02]	1	tC-G	0 to 2,300	32 to 4,172
	L (IC)	1	tC.L1	-200 to 900	-328 to 1,652
		0.1	tC.L2	-199.9 to 900.0	-199.9 to 999.9
	U (CC)	1	tC.U1	-200 to 400	-328 to 752
		0.1	tC.U2	-199.9 to 400.0	-199.9 to 752.0
	Platinel II	1	tC-P	0 to 1,390	32 to 2,534
RTD	Cu50 Ω	0.1	Cu50	-199.9 to 200.0	-199.9 to 392.0
	Cu100 Ω	0.1	Cu10	-199.9 to 200.0	-199.9 to 392.0
	JPt100 Ω	1	JPt.1	-200 to 650	-328 to 1,202
		0.1	JPt.2	-199.9 to 650.0	-199.9 to 999.9
	DPt50 Ω	0.1	dPt.5	-199.9 to 600.0	-199.9 to 999.9
	DPt100 Ω	1	dPt.1	-200 to 650	-328 to 1,202
		0.1	dPt.2	-199.9 to 650.0	-199.9 to 999.9
	Nickel120 Ω	1	ni.12	-80 to 200	-112 to 392
Analog	0 to 10 V	-	A-u1	-1,999 to 9,999 (Display range varies according to the position of the decimal point.)	
	0 to 5 V	-	A-u2		
	1 to 5 V	-	A-u3		
	0 to 100 mV	-	Ano1		
	0 to 20 mA	-	AnA1		
	4 to 20 mA	-	AnA2		

01) C (TT): Same as existing W5 (TT) type sensor

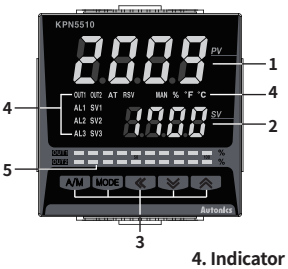
02) G (TT): Same as existing W (TT) type sensor

• Permissible line resistance per line: ≤ 5 Ω

■ Display accuracy

Input type	Using temperature	Display accuracy
Thermo -couple RTD	At room temperature (23°C ±5 °C)	(PV ±0.3% or ±1 °C higher one) ±1-digit • Thermocouple K, J, T, N, E below -100 °C and L, U, PLII, RTD Cu50 Ω, DPt50 Ω: (PV ±0.3% or ±2 °C higher one) ±1-digit • Thermocouple C, G and R, S below 200 °C: (PV ±0.3% or ±3 °C higher one) ±1-digit • Thermocouple B below 400 °C: There is no accuracy standards
	Out of room temperature range	(PV ±0.5% or ±2 °C higher one) ±1-digit • RTD Cu50 Ω, DPt50 Ω: (PV ±0.5% or ±3 °C higher one) ±1-digit • Thermocouple R, S, B, C, G: (PV ±0.5% or ±10 °C higher one) ±1-digit • Other sensors: ≤ ±5 °C (≤-100 °C)
Analog	At room temperature (23°C ±5 °C)	±0.3% F.S. ±1-digit
	Out of room temperature range	±0.5% F.S. ±1-digit

Unit Descriptions



1. PV display part (Red)

• Run mode: Displays PV (Present value).

• Setting mode: Displays parameter name.

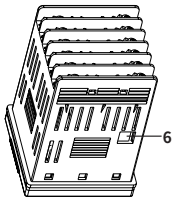
2. SV display part (Green)

• Run mode: Displays SV (Setting value).

• Setting mode: Displays parameter setting value.

3. Input key

Display	Name
[A/M]	Control Switching key
[MODE]	Mode key
[◀], [▼], [▲]	Setting value control key



4. Indicator

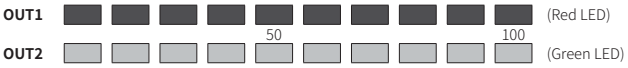
Display	Name	Description
MAN	Manual control	Turns ON during manual control
%, °F, °C	Unit	Displays selected unit (parameter)
OUT1/2	Control output	Turns ON when the control output is ON • Current output Manual control: 0% OFF, over ON Auto control: below 2% OFF, over 3% ON
AT	Auto tuning	Flashes during auto tuning every 1 sec
RSV	Remote SV	Turns ON during remote SV control
AL1/2/3	Alarm output	Turns ON when the alarm output is ON
SV1/2/3	Multi SV	The SV indicator is ON which is currently displayed. (When using multi SV function)

5. Bar graph: Refer to 'Bar Graph'.

6. PC loader port: For connecting communication converter (sold separately).

Bar Graph

MV of control output (OUT1, OUT2) is displayed as the bar graph in real-time. According to bar graph setting in parameter 5 group, it displays bar graph by control output or does not display it.



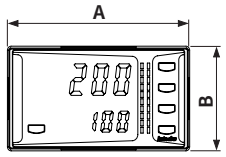
One LED is 10% (total 10 LEDs: 100%). If control output MV is 0.1 to 10%, one LED turns ON. If MV is 90.1 to 100%, 10 LEDs turn ON.

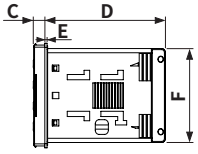
The 1 output type (heating or cooling control) model has one OUT1 bar graph (red).

The 2 output type (heating & cooling control) model has two bar graphs: OUT1 bar graph (red), OUT2 bar graph (green). OUT1 is for heating MV and OUT2 is for cooling MV.

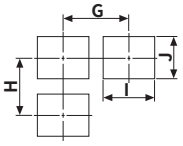
Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.
- Below is based on KPN52□-□ Series.



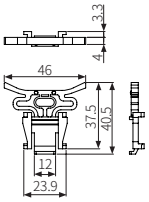


■ Panel cut-out

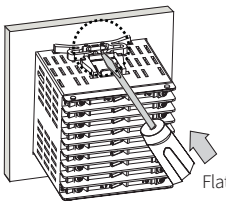


	Body						Panel cut-out			
	A	B	C	D	E	F	G	H	I	J
KPN52□-□	96	48	6	64.5	1.5	44.7	≥ 115	≥ 65	$92^{+0.8}_{0}$	$45^{+0.6}_{0}$
KPN53□-□	48	96	6	64.5	1.5	91.5	≥ 65	≥ 115	$45^{+0.6}_{0}$	$92^{+0.8}_{0}$
KPN55□-□	96	96	6	64.5	1.5	91.5	≥ 115	≥ 115	$92^{+0.8}_{0}$	$92^{+0.8}_{0}$

■ Bracket



Installation Method



Flathead screwdriver

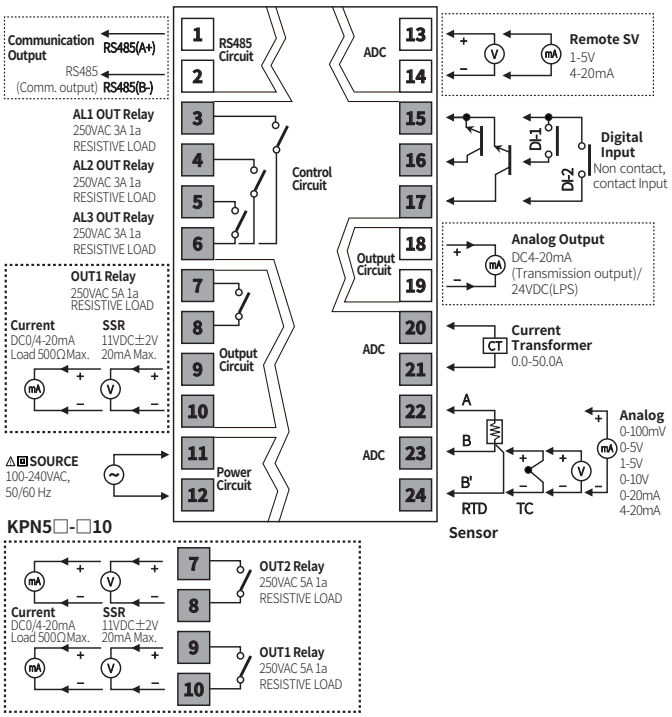
Insert the unit into a panel, fasten the bracket by pushing with tools with a flathead screwdriver.

Errors

Display	Input	Description	Output	Troubleshooting
oPEn	Temperature sensor	Flashes at 0.5 sec interval when input sensor is disconnected or sensor is not connected.	'Sensor error, MV' parameter setting value	Check input sensor status.
	Analog	Flashes at 0.5 sec interval when input is over F.S. ±10%.	'Sensor error, MV' parameter setting value	Check analog input status.
HHHH	Temperature sensor	Flashes at 0.5 sec intervals if the input value is above the input range.	Heating: 0%, Cooling: 100%	When input is within the rated input range, this display disappears.
	Analog	Flashes at 0.5 sec intervals if the input value is over 5 to 10% of high limit or low limit value.	Normal output	
LLLL	Temperature sensor	Flashes at 0.5 sec. intervals if the input value is below the input range.	Heating: 100%, Cooling: 0%	
	Analog	Flashes at 0.5 sec intervals if the input value is over 5 to 10% of low limit or high limit value.	Normal output	
Err	Temperature sensor	Flashes at 0.5 sec intervals if there is error for setting and it returns to the error-before screen.	-	Check setting method.
	Analog			

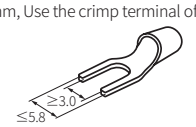
Connections

- Shaded terminals are standard model. ⋯ is option specification.

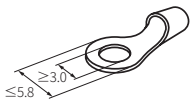


Crimp Terminal Specifications

- Unit: mm, Use the crimp terminal of follow shape.



Fork crimp terminal



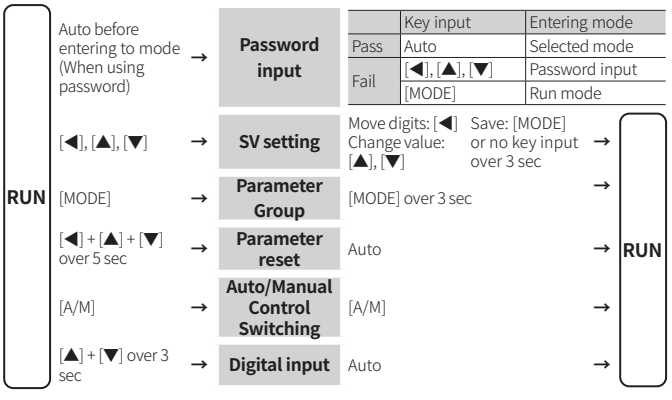
Round crimp terminal

Initial Display When Power is ON

When power is supplied, after all display will flash for 1 sec, model name is displayed sequentially. After input sensor type will flash twice, enter into RUN mode.

	1. All display	2. Model	3. Input specification	4. Run mode
PV display part	8.8.8.8	PPS3	PPS3	oPEn
SV display part	8.8.8.8	11.23	tC.P1	0

Mode Setting



Parameter Setting

- Some parameters are activated/deactivated depending on the model or setting of other parameters.
- The 'Parameter mask' feature, which hide unnecessary or inactive parameters, and the 'User parameter group' feature, which quickly and easily set up certain parameters that are frequently used, can be set up in DAQMaster.
- Refer to the user manual for the details.

■ Parameter 1 group

Parameter	Display	Default
Control output RUN/STOP	r-S	rUn
Multi SV selection	Su-n	Su-0
Heater current monitoring	Ct-A	0.0
Alarm output1 low limit	AL 1L	1550
Alarm output1 high limit	AL 1H	1550
Alarm output2 low limit	AL2.L	1550
Alarm output2 high limit	AL2.H	1550
Alarm output3 low limit	AL3.L	1550
Alarm output3 high limit	AL3.H	1550
Multi SV 0	Su-0	0000
Multi SV 1	Su-1	0000
Multi SV 2	Su-2	0000
Multi SV 3	Su-3	0000

■ Parameter 2 group

Parameter	Display	Default
Auto tuning RUN/STOP	At	oFF
Heating proportional band	H-P	0 10.0
Cooling proportional band	C-P	0 10.0
Heating integral time	H-I	0000
Cooling integral time	C-I	0000
Heating derivative time	H-d	0000
Cooling derivative time	C-d	0000
Dead overlap band	db	0000
Manual reset	rESt	050.0
Heating hysteresis	H.HYS	002
Heating OFF offset	H.oSt	000
Cooling hysteresis	C.HYS	002
Cooling OFF offset	C.oSt	000
MV low limit	L-ñu	-100.0
MV high limit	H-ñu	100.0
RAMP up change rate	rAñU	000
RAMP down change rate	rAñd	000
RAMP time unit	r.Unt	ñIn

■ Parameter 3 group

Parameter	Display	Default
Input specification	In-t	tCA.H
Temperature unit	Unit	°C
Analog low limit	L-rG	00.00
Analog high limit	H-rG	10.00
Scaling decimal point	dot	0.0
Low limit scale	L-SC	000.0
High limit scale	H-SC	100.0
Display unit	d.Unt	°ro
Input correction	In-b	0000
Input digital filter	ñAu.F	000.1
SV low limit	L-Su	-200
SV high limit	H-Su	1350
Control output mode	o-Ft	HEAt (Output number: 1) H-C (Output number: 2)
Control type	C-ñd	PId (Output number: 1) P.P (Output number: 2)
Auto tuning mode	At.t	tUn1
OUT1 control output selection	oUt1	rLY (Output number: 1) SSr (Output number: 2)
OUT1 current output range	o1.ñA	4-20
OUT2 control output selection	oUt2	SSr
OUT2 current output range	o2.ñA	4-20
Heating control cycle	H-t	020.0 (Relay) 000.0 (SSR)
Cooling control cycle	C-t	

■ Parameter 4 group

Parameter	Display	Default
Alarm output1 operation mode	AL-1	duCC
Alarm output1 option	AL 1t	AL-A
Alarm output1 Hysteresis	A1HY	001
Alarm output1 contact type	A1n	no
Alarm output1 ON delay time	A1on	0000
Alarm output1 OFF delay time	A1oF	0000
Alarm output2 operation mode	AL-2	JJdu
Alarm output2 option	AL2t	AL-A
Alarm output2 hysteresis	A2.HY	001
Alarm output2 contact type	A2.n	no
Alarm output2 ON delay time	A2.on	0000
Alarm output2 OFF delay time	A2.oF	0000
Alarm output3 operation mode	AL-3	LbA
Alarm output3 option	AL3t	AL-A
Alarm output3 hysteresis	A3.HY	001
Alarm output3 contact type	A3.n	no
Alarm output3 ON delay time	A3.on	0000
Alarm output3 OFF delay time	A3.oF	0000
LBA time	LbAt	0000
LBA band	LbAb	002
Analog transmission output	Ao.ñ	Pu
PV transmission output low limit	FS-L	-200
PV transmission output high limit	FS-H	1350
Communication address	Adr5	01
Communication speed	bPS	96
Comm. parity bit	PrtY	nonE
Comm. stop bit	StP	2
Response time	r5Yt	20
Comm. write	CoñU	EnA

■ Parameter 5 group

Parameter	Display	Default
Multi SV number	ñt.Su	1
Digital input key	dI-K	StoP
Digital input1 Terminal Function	dI-1	oFF
Digital input2 Terminal Function	dI-2	oFF
Remote SV	rE.Su	oFF
Remote SV low limit correction	r In.b	0
Remote SV high limit gradient correction	r5Pn	100
Bar graph	bAr	oUt1 (Output number: 1) ALL (Output number: 1)
Manual control, initial MV	It.ñu	AUto
Manual control, preset MV	Pr.ñu	000.0
Sensor error, MV	Er.ñu	000.0
Control stop, MV	St.ñu	000.0
Control stop, alarm output	St.AL	Cont
User level	USEr	Stnd
SV setting lock	LC.Su	oFF
Parameter 1 group lock	LC.P1	oFF
Parameter 2 group lock	LC.P2	oFF
Parameter 3 group lock	LC.P3	oFF
Parameter 4 group lock	LC.P4	oFF
Parameter 5 group lock	LC.P5	oFF
Password setting	PYd	0000

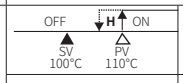
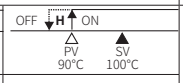
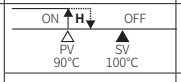
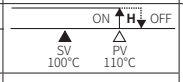
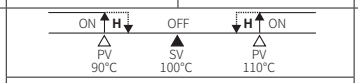
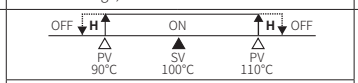
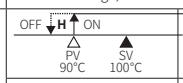
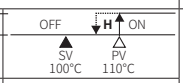
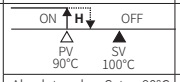
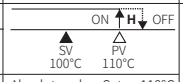
Function: Alarm

888. 8
Alarm operation / Alarm option

Set both alarm operation and alarm option by combining. Each alarm operates individually in two alarm output models. When the current temperature is out of alarm range, alarm clears automatically.

■ Operation

• **H**: Alarm output hysteresis

Name	Alarm operation		Description
-	-		No alarm output
Deviation high limit			If deviation between PV and SV as high-limit is higher than set value of deviation temperature, the alarm output will be ON.
	High deviation: Set as 10°C	High deviation: Set as -10°C	
Deviation low limit			If deviation between PV and SV as low limit is higher than set value of deviation temperature, the alarm output will be ON.
	Low deviation: Set as 10°C	Low deviation: Set as -10°C	
Deviation high, low limit			If deviation between PV and SV as high/low-limit is higher than set value of deviation temperature, the alarm output will be ON.
	High, Low deviation: Set as 10°C		
Deviation high, low limit reverse			If deviation between PV and SV as high/low-limit is lower than set value of deviation temperature, the alarm output will be OFF.
	High, Low deviation: Set as 10°C		
Absolute value high limit			If PV is higher than the absolute value, the output will be ON.
	Absolute value: Set as 90°C	Absolute value: Set as 110°C	
Absolute value low limit			If PV is lower than the absolute value, the output will be ON.
	Absolute value: Set as 90°C	Absolute value: Set as 110°C	
Sensor break	-		It will be ON when it detects sensor disconnection.
Heater break	-		It will be ON when it detects heater disconnection.
Loop break	-		It will be ON when it detects loop disconnection.

■ Option

Name	Description	Condition of re-apply
Standard alarm	If it is an alarm condition, alarm output is ON. If it is a clear alarm condition, alarm output is OFF.	-
Alarm latch	If it is an alarm condition, alarm output is ON and maintains ON status.	-
Standby sequence 1	First alarm condition is ignored and from second alarm condition, standard alarm operates. When power is supplied and it is an alarm condition, this first alarm condition is ignored and from the second alarm condition, standard alarm operates.	Power ON
Alarm latch and standby sequence 1	If it is an alarm condition, it operates both alarm latch and standby sequence. When power is supplied and it is an alarm condition, this first alarm condition is ignored and from the second 1alarm condition, alarm latch operates.	
Standby sequence 2	First alarm condition is ignored and from second alarm condition, standard alarm operates. When re-applied standby sequence and if it is alarm condition, alarm output does not turn ON. After clearing alarm condition, standard alarm operates.	Power ON, change SV, change alarm temperature / operation or change STOP to RUN mode
Alarm latch and standby sequence 2	Basic operation is same as alarm latch and standby sequence1. It operates not only by power ON/OFF, but also alarm set value, or alarm option changing. When re-applied standby sequence and if it is alarm condition, alarm output does not turn ON. After clearing alarm condition, alarm latch operates.	

Segment Table

The segments displayed on the product indicate the following meanings. It may differ depending on the product.

7 Segment			
0	0	I	I
1	1	J	J
2	2	K	K
3	3	L	L
4	4	M	M
5	5	N	N
6	6	O	O
7	7	P	P
8	8	Q	Q
9	9	R	R
A	A	S	S
b	B	T	T
C	C	U	U
d	D	V	V
E	E	W	W
F	F	X	X
G	G	Y	Y
H	H	Z	Z

11 Segment			
0	0	I	I
1	1	J	J
2	2	K	K
3	3	L	L
4	4	M	M
5	5	N	N
6	6	O	O
7	7	P	P
8	8	Q	Q
9	9	R	R
A	A	S	S
b	B	T	T
C	C	U	U
d	D	V	V
E	E	W	W
F	F	X	X
G	G	Y	Y
H	H	Z	Z

12 Segment			
0	0	I	I
1	1	J	J
2	2	K	K
3	3	L	L
4	4	M	M
5	5	N	N
6	6	O	O
7	7	P	P
8	8	Q	Q
9	9	R	R
A	A	S	S
b	B	T	T
C	C	U	U
d	D	V	V
E	E	W	W
F	F	X	X
G	G	Y	Y
H	H	Z	Z

16 Segment			
0	0	I	I
1	1	J	J
2	2	K	K
3	3	L	L
4	4	M	M
5	5	N	N
6	6	O	O
7	7	P	P
8	8	Q	Q
9	9	R	R
A	A	S	S
b	B	T	T
C	C	U	U
d	D	V	V
E	E	W	W
F	F	X	X
G	G	Y	Y
H	H	Z	Z