

**KPN SERIES MANUAL**



Thank you very much for selecting Autonics products.  
For your safety, please read the following before using.

**Caution for your safety**

- ※Please keep these instructions and review them before using this unit.
- ※Please observe the cautions that follow;
- Warning** Serious injury may result if instructions are not followed.
- Caution** Product may be damaged, or injury may result if instructions are not followed.
- ※The following is an explanation of the symbols used in the operation manual.
- Caution**: Injury or danger may occur under special conditions.

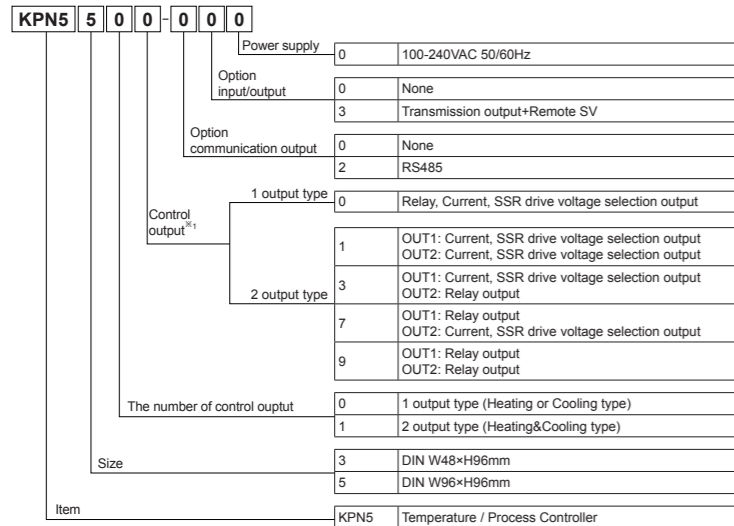
**Warning**

1. In case of using this unit with machinery (Ex: nuclear power control, medical equipment, ship, vehicle, train, airplane, combustion apparatus, safety device, crime/disaster prevention equipment, etc) which may cause damages to human life or property, it is required to install fail-safe device.
2. It may cause a fire, human injury or damage to property.
3. Do not connect, inspect or repair when power is on.
4. Do not disassemble the case. Please contact us if it is required.
5. Do not disconnect or repair when power is on.

**Caution**

1. This unit shall not be used outdoors.
2. When connecting wire, AWG 20(0.50mm<sup>2</sup>) should be used and bolt should be screwed on terminal block with 0.74N-m to 0.90N-m strength.
3. For crimped terminal, select following shaped terminal M3.
4. Please observe the rated specifications.
5. Do not use beyond of the rated switching capacity of relay contact.
6. In cleaning unit, do not use water or an oil-based detergent and use dry towels.
7. Do not use this unit in place where there are flammable or explosive gas, humidity, direct ray of the light, radiant heat, vibration and impact etc.
8. Do not inflow dust or wire dregs into the unit.
9. Please wire properly after checking the terminal polarity when connecting temperature sensor.
10. In order to install the units with reinforced insulation, use the power supply unit which basic insulation level is ensured.

**Ordering information**



※1: The 1 output type is heating or cooling output type and the 2 output type is heating&cooling output type.  
The 1 output type is able to use only one output among relay, current, SSR drive voltage outputs.  
OUT1 of the 2 output type is fixed as heating output and OUT2 of the 2 output type is fixed as cooling output.  
If you select the SSR drive voltage or current output model, you can select the appropriate control output.

※The above specifications are subject to change without notice.

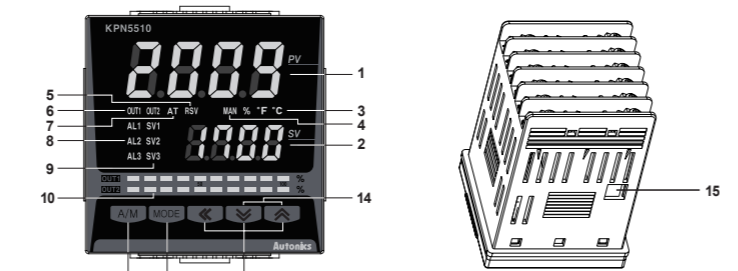
**Specifications**

Series	KPN53 □ □	KPN55 □ □
Power supply	100-240VAC 50/60Hz	
Allowable voltage range	90 to 110% of rated voltage	
Power consumption	Max. 15VA	
Display method	7 Segment(Red, Green), control output Bar graph: Red, Green	
Character size	PV(W×H)	7.0×14.6mm
	SV(W×H)	6.0×12.0mm
Input type	RTD	JPl 100Ω, DP1 100Ω, DP1 50Ω, Cu 100Ω, Cu 50Ω, Nikel 120Ω(6types)
	TC	K, J, E, T, L, N, U, R, S, B, C, G, PLI(13types)
Input type	Analog	Voltage: 0 to 100mV, 0 to 5V, 1 to 5V, 0 to 10V(4types) / Current: 0 to 20mA, 4 to 20mA(2types)
Display accuracy	RTD	At room temperature(23°C±5°C): (PV ±0.3% or ±1°C, select the bigger one) ±1Digit*1
	TC	Out of range of room temperature: (PV ±0.5% or ±2°C, select the bigger one) ±1Digit
	Analog	At room temperature(23°C±5°C): ±0.3% F.S. ±1Digit Out of range of room temperature: ±0.5% F.S. ±1Digit
Control input	CT input	±5% F.S. ± 1Digit
Control output	Relay	OUT1, OUT2: 250VAC 5A 1a
	SSR	11VDC ±2V 20mA Max.
Option output	Current	DC4-20mA or DC0-20mA (Max. Load 500Ω)
	Communication	DC4-20mA (Max. Load 500Ω, Output accuracy: ±0.3% F.S. ±1 Digit)
Option input	CT	0.0 to 50.0A(Primary heater current value measuring range) ※CT ratio = 1/1000
	Remote SV	1-5VDC or DC4-20mA (Current input: using external resistance 250Ω)
Control type	Heating, Cooling	ON/OFF, P, PI, PD, PID control mode
	Heating&Cooling	
Hysteresis	Thermocouple / RTD: 1 to 100°C/°F(0.1 to 100.0°C/°F variable, Analog: 1 to 100Digit	
Proportional band(P)	0.1 to 999.9°C(0.1 to 999.9%)	
Integral time(I)	0 to 9999 sec.	
Derivative time(D)	0 to 9999 sec.	
Control period(T)	0.1 to 120.0 sec(※Relay output and SSR drive output only)	
Manual reset value	0.0~100.0%	
Sampling period	50ms	
Dielectric strength	2000VAC 50/60Hz for 1min.(between power source terminal and input terminal)	
Vibration	0.75mm amplitude at frequency of 5 to 55Hz (for 1min.) in each X, Y, Z direction for 2 hours	
Relay life cycle	Mechanical	Over 10,000,000 times
	Electrical	Over 100,000 times (250VAC 3A resistance load)
Insulation resistance	Over 100MΩ(at 500VDC megger)	
Noise resistance	Square shaped noise by noise simulator (pulse width 1μs)±2kV R-phase, S-phase	
Memory retention	Approx. 10years(When using non-volatile semiconductor memory type)	
Environ-ment	Ambient temperature	-10 to 50°C, storage: -20 to 60°C
	Ambient humidity	35 to 85%RH, storage: 35 to 85%RH
Protection	IP65(Front part)	
Insulation type	Double insulation or reinforced insulation (Mark: <b>□</b> Dielectric strength between the measuring input part and the power part: 2kV)	
Weight	Approx. 230g (approx. 160g)	Approx. 316g (approx. 220g)

※1: ○ At room temperature(23°C±5°C)  
- TC K, J, T, N, E type, below -100°C / TC L, U, PL°C, RTD Cu50Ω, DP1 50Ω: (PV ±0.3% or ±2°C, select the bigger one)±1Digit  
- TC C, G type/TC R, S type, below 200°C: (PV ±0.3% or ±3°C, select the bigger one)±1Digit  
- TC B type, below 400°C: There is no accuracy standards.  
○ Out of range of room temperature  
- RTD Cu50Ω, DP150Ω: (PV ±0.5% or ±3°C, select the bigger one) ±1Digit  
- TC R, S, B, C, G: (PV ±0.5% or ±10°C, select the bigger one) ±1Digit  
- Others: Below -100°C: Within ±5°C

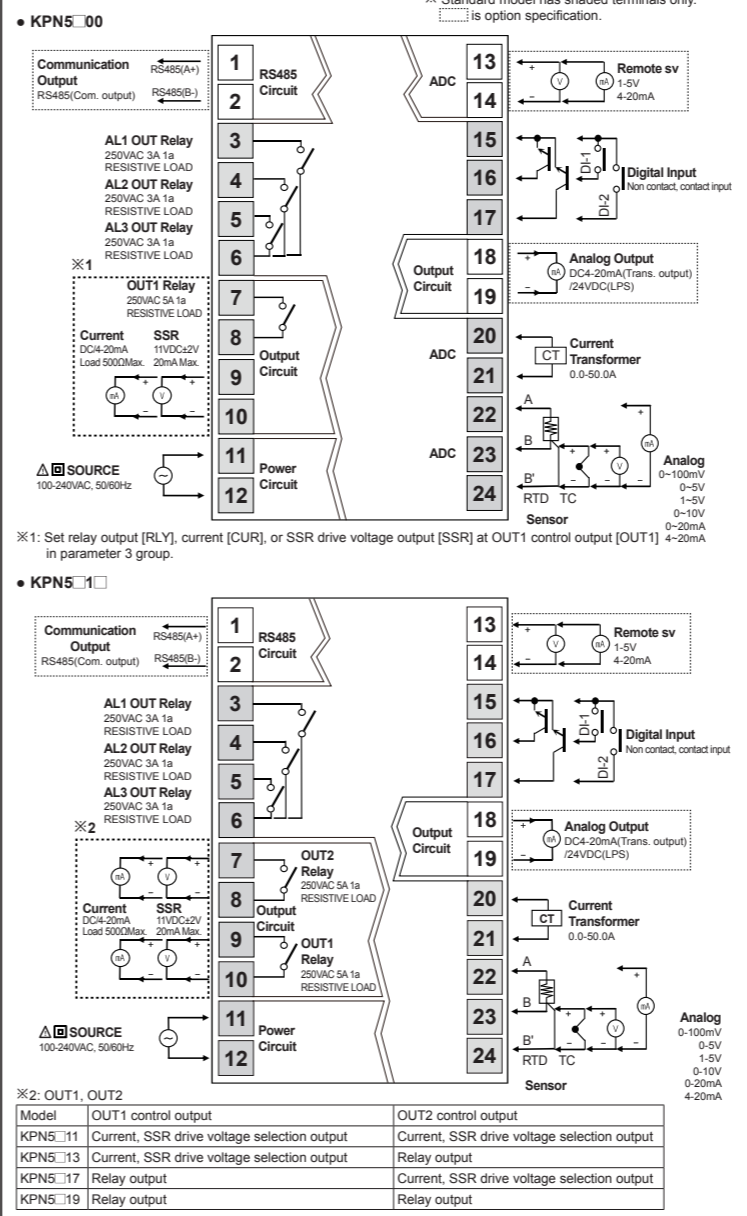
※ The weight is with packaging and the weight in parentheses is only unit weight.  
※Environment resistance is rated at no freezing or condensation.

**Parts description**



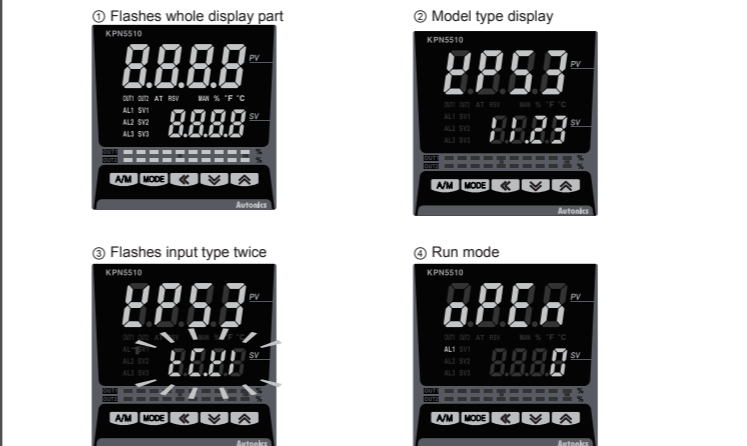
1. **Measured value (PV) display part:** RUN mode: It displays currently measured value (PV). Setting mode: It displays the parameter.
  2. **Set value (SV) display part:** RUN mode: It displays the set value (SV). Setting mode: It displays the set value of the parameter.
  3. **Unit (°C/°F%) indicator:** It displays the unit set at display unit [D.UNT] in parameter 3 group.
  4. **Manual control indicator:** It turns ON during manual controlling.
  5. **Remote SV control indicator:** It turns ON during remote SV controlling.
  6. **Control output (OUT1, OUT2) indicator:** It turns ON when the control output is ON.  
※When using current output, in case that for manual control MV is 0.0%, the control output indicator turns OFF but the other cases it turns ON always. In case that for auto control MV is over 3.0%, it turns ON and the MV is below 2.0%, it turns OFF.
  7. **Auto tuning indicator:** It flashes by 1 sec. when executing auto tuning.
  8. **Alarm output (AL1, AL2, AL3) indicator:** It turns ON when the alarm output is ON.
  9. **Multi SV indicator:** The SV 1 to 3 indicator turns ON when using multi SV function.
  10. **Bar graph for control output:** It displays control output MV as bar graph. The KPN5□00 as 1 output type has one bar graph (OUT1), and the KPN5□1□ as 2 output type has two bar graphs (OUT1, OUT2).
  11. **[AM] key:** It is used when switching auto control to manual control.
  12. **[MODE] key:** It is used when entering parameter setting group, returning to RUN mode, moving parameter, saving the set value.
  13. **[□] [□] [□] keys:** It is used when entering the set value changing mode and moving or changing up/down digit.
  14. **Digital input key:** When pressing [□] + [□] keys for 3 sec. at the same time, it operates the function (RUN/STOP, alarm clear, auto tuning) set at digital input key [DI-K] in parameter 5 group.
  15. **PC loader port:** It is the PC loader port for serial communication to set parameter and monitoring by DAQMaster installed in PC. Use this for connecting SCM-US(USB) to Serial converter, sold separately.
- ※The display part is different by options.

**Connections**

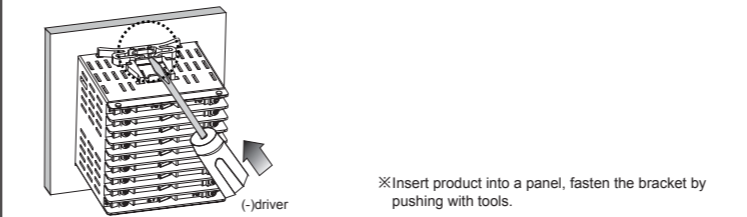


**Front Panel Display when power is ON**

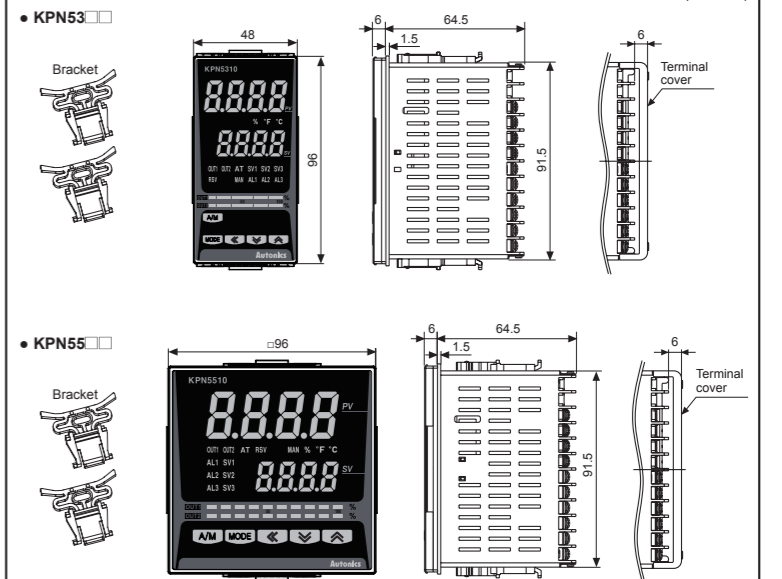
When supplying the power to the product, the display part flashes for 1 sec. It displays the model type (option output, control output) and flashes the input type twice and it operates in RUN mode.



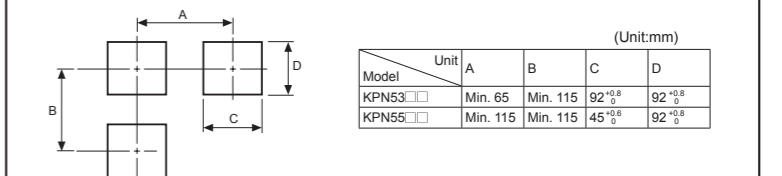
**Installation**



**Dimensions**



**Panel cut-out**

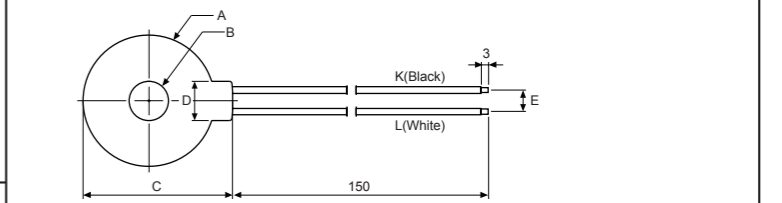
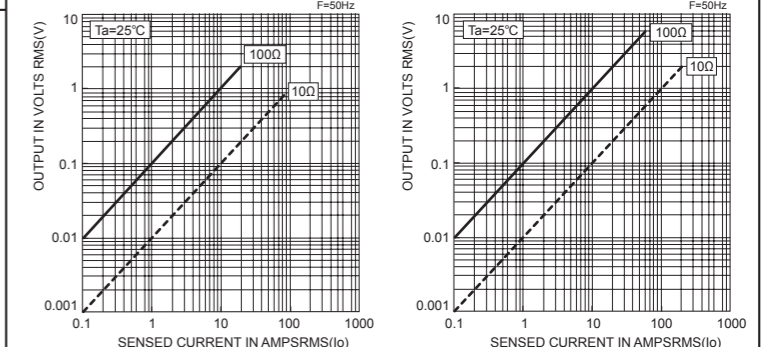


**Terminal cover(Sold separately)**



**Current transformer(CT, Sold separately)**

- CSTC-E80LN  
Max. load current: 80A(50/60Hz)  
※ Max. load current for KPN Series is 50A.  
Current ratio: 1/1000,  
Wire wound resistance: 31Ω±10%
- CSTC-E200LN  
Max. load current: 200A(50/60Hz)  
※ Max. load current for KPN Series is 50A.  
Current ratio: 1/1000,  
Wire wound resistance: 20Ω±10%

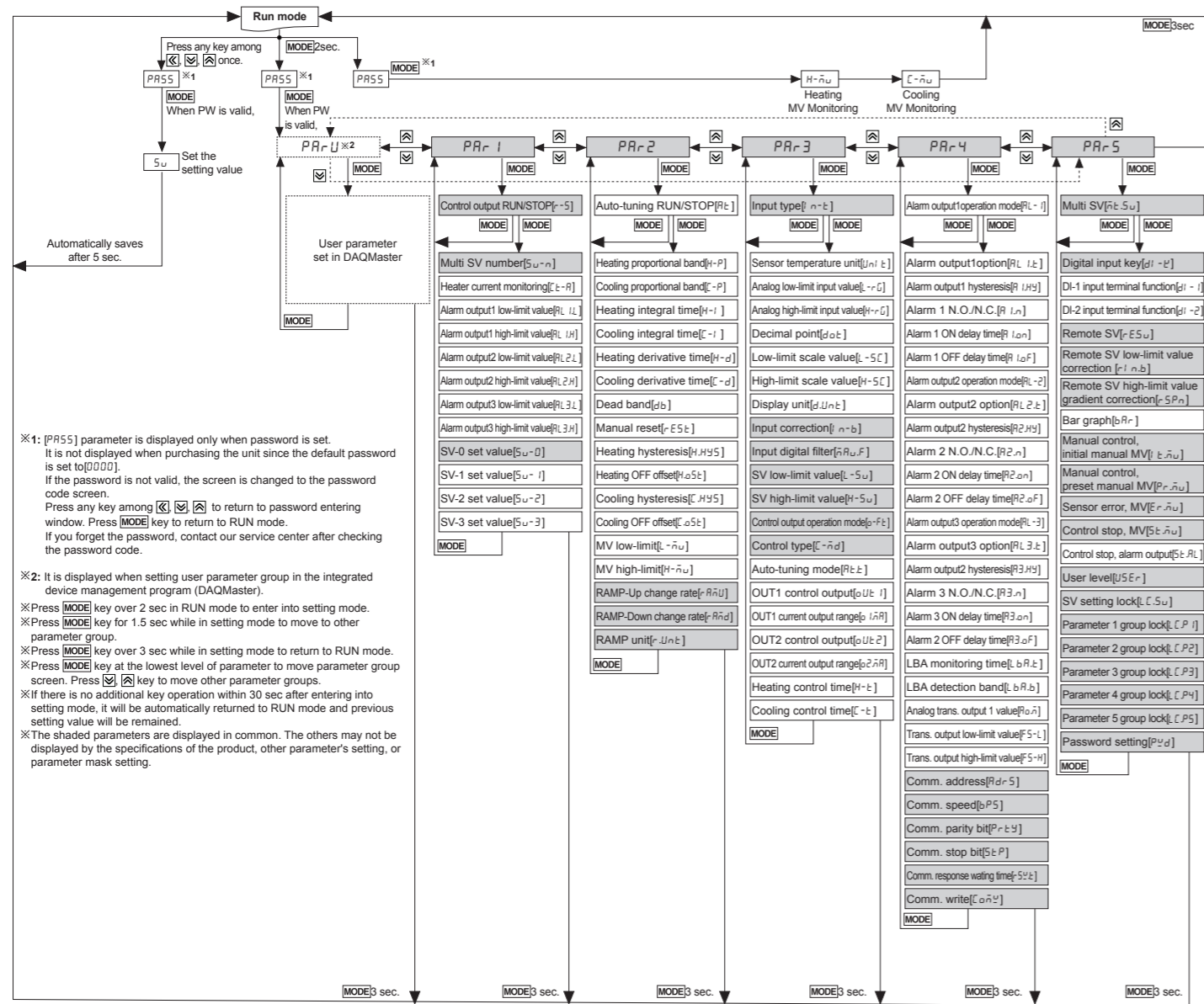


(Unit:mm)

Model	A	B	C	D	E	F
CSTC-E80LN	∅23.3	∅7	26.5	7	3.8	10.5
CSTC-E200LN	∅37.1	∅13	40.8	10	4.5	13.5

※When using CT, do not supply primary current with open CT output. High voltage occurs at CT output part.  
※The current for above two CTs is 50A same but inner hole sizes are different. Please use this for your environment.

**Flow chart for setting group**



※1: [PR55] parameter is displayed only when password is set. It is not displayed when purchasing the unit since the default password is set to 0000. If the password is not valid, the screen is changed to the password code screen. Press any key among [OK] [F1] [F2] to return to password entering window. Press [MODE] key to return to RUN mode. If you forget the password, contact our service center after checking the password code.

※2: It is displayed when setting user parameter group in the integrated device management program (DAQMaster).

※Press [MODE] key over 2 sec in RUN mode to enter into setting mode.

※Press [MODE] key for 1.5 sec while in setting mode to move to other parameter group.

※Press [MODE] key over 3 sec while in setting mode to return to RUN mode.

※Press [MODE] key at the lowest level of parameter to move parameter group screen. Press [F1] [F2] key to move other parameter groups.

※If there is no additional key operation within 30 sec after entering into setting mode, it will be automatically returned to RUN mode and previous setting value will be remained.

※The shaded parameters are displayed in common. The others may not be displayed by the specifications of the product, other parameter's setting, or parameter mask setting.

**Input type and temperature range**

Input type	Dot	Display	Input range(°C)	Input range(°F)
Thermocouple	K(CA)	1	-200 to 1350	-328 to 2463
	J(IC)	0.1	-199.9 to 999.9	-199.9 to 999.9
	E(CR)	1	-200 to 800	-328 to 1472
	T(CC)	0.1	-199.9 to 800.0	-199.9 to 999.9
	B(PR)	1	0 to 1800	32 to 3272
	R(PR)	1	0 to 1750	32 to 3182
	S(PR)	1	0 to 1750	32 to 3182
	N(NN)	1	-200 to 1300	-328 to 2372
	C(TT)※1	1	0 to 2300	32 to 4172
	G(TT)※2	1	0 to 2300	32 to 4172
	L(IC)	0.1	-200 to 900	-199.9 to 999.9
	U(CC)	1	-200 to 400	-328 to 752
RTD	Platinel II	1	0 to 1390	32 to 2534
	Cu 50Ω	0.1	-199.9 to 200.0	-199.9 to 392.0
	Cu 100Ω	0.1	-199.9 to 200.0	-199.9 to 392.0
	JPT 100Ω	1	-200 to 650	-328 to 1202
	DP1 50Ω	0.1	-199.9 to 600.0	-199.9 to 999.9
	DP1 100Ω	1	-200 to 650	-328 to 1202
	Nickel 120Ω	1	-80 to 200	-112 to 392
Analog	Voltage	0-10V	A-u1	(Display range is variable according to decimal point position.)
	0-5V	A-u2		
	1-5V	A-u3		
	0-100mV	A-u4		
Current	0-20mA	A-i1		
0-420mA	A-i2			

※1: Same as existing W5 (TT) type sensor ※2: Same as existing W(TT) type sensor

**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.

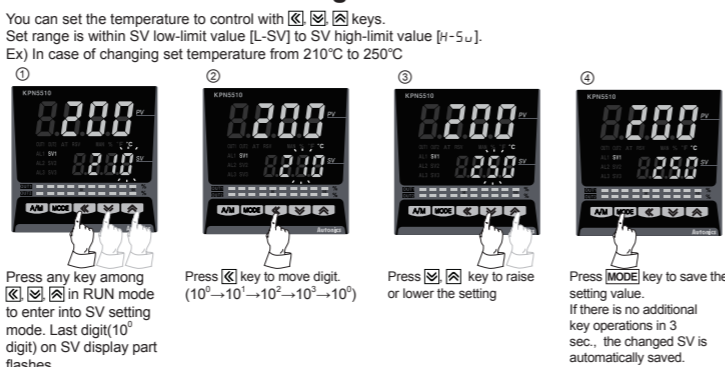
**OUT1** (Red LED)

**OUT2** (GreenLED)

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.

**Flow chart for SV setting**



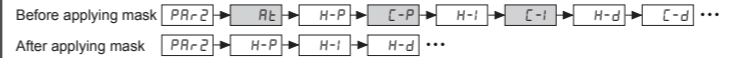
**Remote SV setting**

This function is to set SV by inputting analog (DC4-20mA, 1-5VDC) signal to 13, 14 terminals. (Set that remote SV [E5u] is ON in parameter 5 group.) Input analog signal is changed to between SV low-limit value and SV high-limit value. This changed signal sets the SV.

※When using remote SV, you cannot select SV setting by front keys and multi SV setting by digital input.

**Parameter mask**

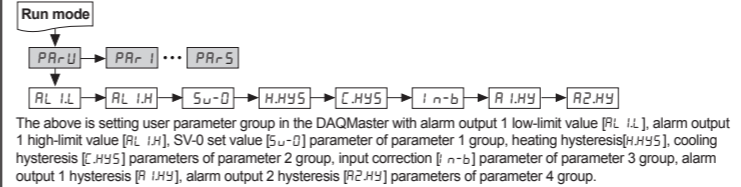
This function is able to hide unnecessary parameters to user environment or less frequently used parameters in parameter setting group. You can set this in the integrated device management program (DAQMaster). Though masked parameters are not displayed in parameter setting group, the parameter setting values are applied. For more information, refer to the DAQMaster user manual. Visit our website (www.autonics.com) to download the DAQMaster program and the user manual.



The above is masking auto tuning [P], cooling proportional band [C-P], cooling integral time [C-I], cooling derivative time [C-d] parameters in parameter 2 group.

**User parameter group [PR-U] setting**

This function is able to set the frequently used parameters to the user parameter group. You can quickly and easily set parameter settings. User parameter group can have up to 30 parameters in the integrated device management program (DAQMaster). For more information, refer to the DAQMaster user manual. Visit our website (www.autonics.com) to download the DAQMaster program and the user manual.



The above is setting user parameter group in the DAQMaster with alarm output 1 low-limit value [RL IL], alarm output 1 high-limit value [RL IH], SV-0 set value [S0-0] parameter of parameter 1 group, heating hysteresis [H45], cooling hysteresis [C45] parameters of parameter 2 group, input correction [I-nb] parameter of parameter 3 group, alarm output 1 hysteresis [R1H], alarm output 2 hysteresis [R2H] parameters of parameter 4 group.

**Auto-tuning**

Auto-tuning measures the control subject's thermal characteristics and thermal response rate, and then determines the necessary PID time constant. Application of the PID time constant realizes fast response and high precision temperature control. (When setting control type [C-nd] to [P], it appears.) Set [AT] parameter to [on] in parameter 2 group to start auto-tuning. To stop auto-tuning, change the set as [off]. (It maintains P, I, D values of before auto-tuning.) If sensor break error [PE] occurs during auto-tuning, it stops this operation. If the measured temperature is over or below the input range, it operates continuously. During auto-tuning operation, whole parameters are only available to check.

**Alarm**

Mode	Name	Alarm operation	Description
off	—	—	No alarm output
dULC	Deviation high-limit alarm	OFF → ON (High deviation: Set as 10°C)	If deviation between PV and SV as high-limit is higher than set value of deviation temperature, the alarm output will be ON.
JDdu	Deviation low-limit alarm	ON → OFF (Low deviation: Set as 10°C)	If deviation between PV and SV as low-limit is higher than set value of deviation temperature, the alarm output will be ON.
JDdC	Deviation high/low-limit alarm	ON → OFF (Low deviation: Set as 10°C, High deviation: Set as 20°C)	If deviation between PV and SV as high/low-limit is higher than set value of deviation temperature, the alarm output will be ON.
CdUJ	Deviation high/low-limit reserve alarm	OFF → ON (Low deviation: Set as 10°C, High deviation: Set as 20°C)	If deviation between PV and SV as high/low-limit is higher than set value of deviation temperature, the alarm output will be OFF.
PuCC	Absolute value high limit alarm	OFF → ON (Absolute-value: Set as 90°C)	If PV is higher than the absolute value, the output will be ON.
JDPU	Absolute value low limit alarm	ON → OFF (Absolute-value: Set as 90°C)	If PV is lower than the absolute value, the output will be ON.
LbA	Loop break alarm	—	It will be ON when it detects loop break.
SbA	Sensor break alarm	—	It will be ON when it detects sensor disconnection.
HbA	Heater break alarm	—	It will be ON when CT detects heater break.

※H: Alarm output [ ] hysteresis [R1H]

**Alarm option**

Mode	Name	Description
RL-A	Standard alarm	If it is an alarm condition, alarm output is ON. If it is a clear alarm condition, alarm output is OFF.
RL-b	Alarm latch	If it is an alarm condition, alarm output is ON and maintains ON status.
RL-C	Standby sequence 1	First alarm condition is ignored and from second alarm condition, standard alarm operates.
RL-d	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 alarm condition, alarm latch operates.
RL-E	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.
RL-F	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 setting 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.

※Condition of re-applied standby sequence for standby sequence 1, alarm latch and standby sequence 1: Power ON Condition of re-applied standby sequence for standby sequence 2, alarm latch and standby sequence 2: Power ON, changing set temperature, alarm temperature [RL 1, RL 2] or alarm operation [RL - 1, RL - 2], switching STOP mode to RUN mode.

**Parameter initialization**

It initializes all parameters to factory default values. Press front [F1] [F2] [F3] keys for 5 sec. at the same time and [ni] parameter is displayed. Select [E5] to initialize all parameters. If the password is set, you must enter the password. After initialing the parameters, the password parameter is also initialized.

**Factory default**

SV setting [S0- ]		Password input parameter	
Parameter	Default	Parameter	Default
S0-u	0	PR55	0001
<b>Parameter 1group [PR-1]</b>			
Parameter	Default	Parameter	Default
r-S	r-Un	RL IL	1550
Su-n	Su-0	RL IH	1550
Ct-A	0.0	RL 2L	1550
RL IL	1550	RL 2H	1550
<b>Parameter 2group [PR-2]</b>			
Parameter	Default	Parameter	Default
At	off	H-d	0000
H-P	0.100	C-d	0000
C-P	0.100	db	0000
H-I	0000	rESt	0500
C-I	0000	HH45	002
<b>Parameter 3group [PR-3]</b>			
Parameter	Default	Parameter	Default
I-nb	PCRH	H-5C	1000
Un1t	0	dUn1t	0.00
L-rG	0000	I-nb	0000
H-rG	1000	ARuF	000.1
dObt	00	L-Su	-200
L-5C	0000	H-5u	1350
<b>Parameter 4group [PR-4]</b>			
Parameter	Default	Parameter	Default
RL-1	dULC	R2HY	00.1
RL IH	RL-A	R2n	no
RL 1b	00.1	R2on	0000
RLn	no	R2oF	0000
RLon	0000	RL-3	LbA
RLoF	0000	RL3t	RL-A
RL-2	JDdu	R3HY	00.1
RL 2t	RL-A	R3n	no
<b>Parameter 5group [PR-5]</b>			
Parameter	Default	Parameter	Default
nt5u	1	r5Pn	1000
di-5	5t0P	oUt1	5tRL
di-1	off	bAr	ALL
di-2	off	I-tSu	RUt0
rE5u	off	PrSu	0000
r1nb	0000	ErSu	0000

※Shaded parameters are the factory default of heating&cooling model.

**Manual**

For the detail information and instructions, please refer to the user manual and the user manual for communication. Visit our homepage (www.autonics.com) to download manuals.

**Integrated device management program: DAQMaster**

DAQMaster is the integrated device management program. It is available for parameter setting, monitoring, and user group, parameter mask function setting only for KPN series. Visit our website (www.autonics.com) to download it.

Item	Recommended requirement
System	IBM PC compatible PC, Intel Pentium III above
Operating system	Microsoft Windows 98/NT/XP/Vista/Window 7
Memory	Above 256MB
Hard disk	1GB of Hard disk space or more
VGA	Resolution display above 1024x768
Other	RS-232 Serial port (9Pin), USB port

**Caution for using**

- Please use separated line from high voltage line or power line in order to avoid inductive noise.
  - Please install power switch or circuit-breaker in order to cut power supply off.
  - The switch or circuit-breaker should be installed near by users.
  - This unit is designed for temperature controlling only. Do not apply this unit as a voltage meter or a current meter.
  - In case of using RTD sensor, 3-wire type must be used. If you need to extend the line, 3-wire must be used with the same thickness as the line.
  - It might cause temperature difference if the resistance of line is different.
  - In case of making power line and input signal line close, line filter for noise protection should be installed at power line and input signal line should be shielded.
  - Keep away from the high frequency instruments. (High frequency welding machine & sewing machine, big capacitive SCR controller)
  - Installation environment
    - ① It shall be used indoor.
    - ② Altitude Max. 2000m.
    - ③ Pollution Degree 2.
    - ④ Installation Category II.
- ※It may cause malfunction if above instructions are not followed.

**Major products**

- Photoelectric sensors
- Fiber optic sensors
- Door sensors
- Door side sensors
- Area sensors
- Proximity sensors
- Pressure sensors
- Rotary encoders
- Connectors/sockets
- Switching mode power supplies
- Control switches/Lamps/Buzzers
- I/O Terminal Blocks & Cables
- Stepper motors/drivers/motion controllers
- Graphic/Logic panels
- Field network devices
- Laser marking system(Fiber, CO<sub>2</sub>, Nd:YAG)
- Laser welding/soldering system
- Temperature controllers
- Temperature/humidity transducers
- SSR/Power controllers
- Counters
- Timers
- Panel meters
- Tachometer/Pulse(Rate)meters
- Display units
- Sensor controllers
- Recorders
- Indicators
- Converters
- Temperature transmitters
- Pressure transmitters
- Temperature transmitters
- Controllers

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TEL: 82-32-610-2700 / FAX: 82-32-329-0728  
E-mail: sales@autonics.com

**The proposal of a product improvement and development: product@autonics.com**