NAiS

Compact temperature controller (DIN 48 × 24) that can support pattern control

KT2 Temperature Controller

■ FEATURES

1. Nine step pattern control possible.
Despite DIN 48 x 24 size, selection is possible of control with fixed set point and nine step pattern control.

2. Multi-input
Versatile thermocouple, RTD, DC voltage and DC current input for temperature detecting sensors.

3. Simple operation enables highly accurate temperature control
All required operations can be enabled by the front keys and highly accurate PID control mode ensures an input span of ±0.2%.

4. Adding in optional functions (heating/cooling and communication functions), 24 product types are available.

5. KT series complies with UL, CSA standards and CE marking.

6. Adopt RS485 and Modbus protocol for communication specification

(Sample System Configuration)
FPΣ Programmable Controller
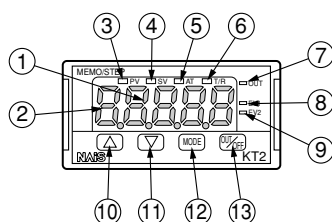(Matsushita Electric Works)

RS-485
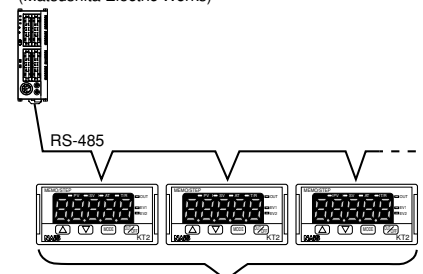
Up to 31 units can be connected

* In the configuration above, FPΣ requires a communication cassette (FPG-COM3).
* Modbus is a communication protocol developed for PLCs by Modicon Inc.

■ Name and functions of the sections

① PV/SV display (red):	Indicates the input value and setting value. During setting mode, characters and setting value of the setting item are indicated in turn.
② MEMO/STEP display (green):	Indicates memory number during fixed value control. Indicates step number during program control.
③ PV indicator (red):	Lights up when the input value (PV) is indicated.
④ SV indicator (green):	Lights up when main setting value (SV) is indicated.
⑤ AT indicator (yellow):	Flashes during AT (auto-tuning).
⑥ T/R indicator (yellow):	Flashes during serial communication (Lit while sending data, Unlit while receiving data)
⑦ OUT indicator (green):	Lights up when control output or OUT1 (Heating side, option Heating/Cooling control) is ON. (For DC current output type, it flashes corresponding to the manipulated variable in a 0.25 second cycle)
⑧ EV1 indicator (red):	Lights up when Event output 1 or OUT2 (Cooling side, option Heating/Cooling control) is ON.
⑨ EV2 indicator (red):	Lights up when Event output 2 is ON.
⑩ Increase key (△):	Increases the numeric value.
⑪ Decrease key (▽):	Decreases the numeric value.
⑫ Mode key (MODE):	Selects the setting mode or registers the setting value. (By pressing the Mode key, the setting value or selected value can be registered)
⑬ OUT/OFF key:	The control output OUT/OFF or program control RUN/STOP can be switched.

KT(AKT2)

■ PRODUCT TYPES

1. KT2 Series

Base model	Power supply	Sensor input	Control output	Alarm output	Heating/cooling control	Heater burnout alarm	Communication function	Description
AKT2								48 × 24 × 98.5mm
	1							100 to 240V AC
	2							24V AC/DC
		1						Multi-input
			1					Relay contact output
			2					Non-contact voltage output
			3					Current output
				2	0	0	Blank	When both heating/cooling and communication functions are not added: Relay contact output (alarm 1): Can be used Open collector output (alarm 2): Can be used
				1	1	0	Blank	When only heating/cooling function is added: Relay contact output (alarm 1): Cannot be used Open collector output (alarm 2): Can be used
				1	0	0	1	When only communication function is added: Relay contact output (alarm 1): Can be used Open collector output (alarm 2): Cannot be used
				0	1	0	1	When both heating/cooling and communication functions are added: Relay contact output (alarm 1): Cannot be used Open collector output (alarm 2): Cannot be used

* When heating/cooling is selected, alarm output 1 cannot be used.
   When the communication function is selected, alarm output 2 cannot be used.

• **Part No.**

(Ex) Part No. when the optional functions (of Heating/Cooling control: relay contact output + Communications function) is added on to the basic model are as follows; Part No.: AKT21110101

• **Options**

Product name	Part No.
Shunt resistor (for Current input)	AKT4810
Terminal cover	AKT2801

Note: When Current input is specified, a shunt resistor (sold separately) is required.

■ Communication Function Overview

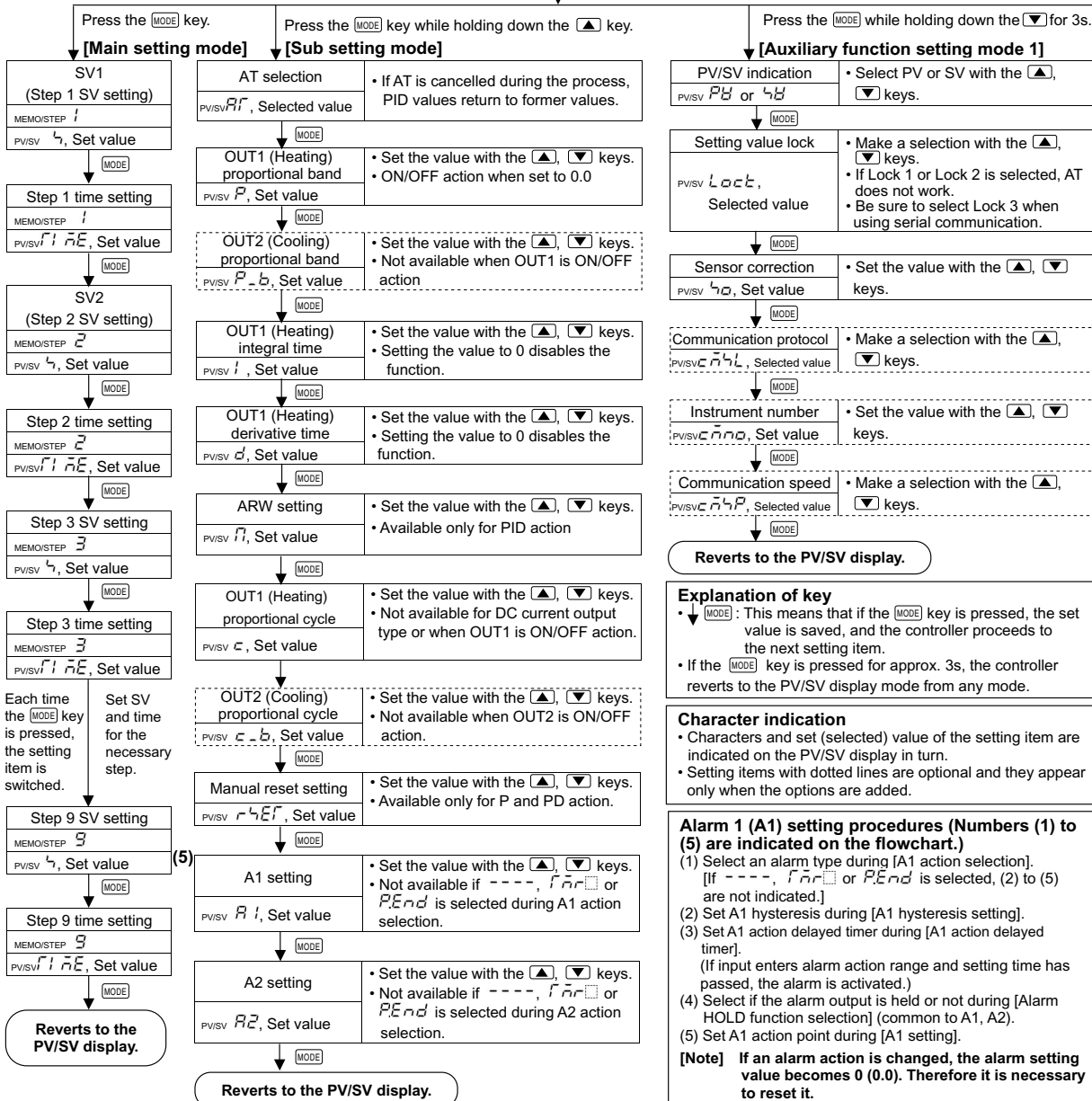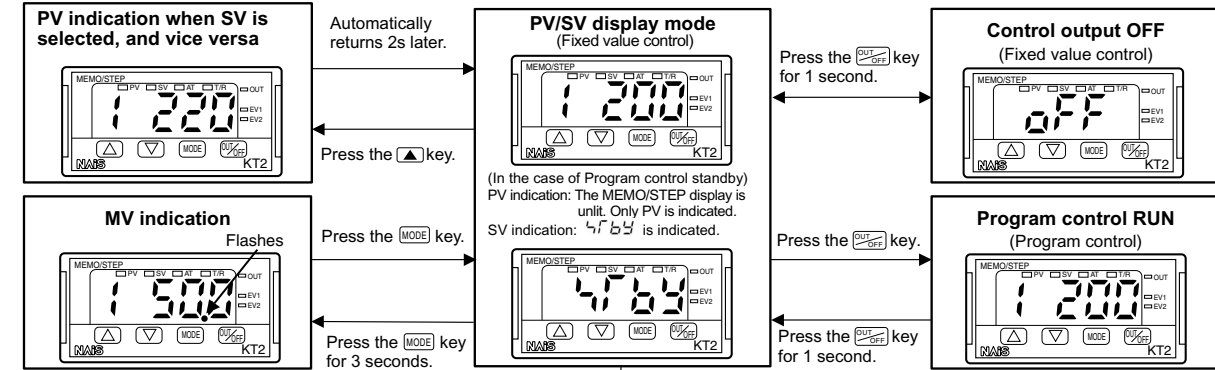| Item	Specification
Communication type	Half-duplex
Communication speed	Select 2400, 4800, 9600, or 19200 bps using key operation.
Synchronization type	Asynchronous
Protocol	Modbus
Coding	ASCII
Error correcting	Command re-send
Error detection	Parity check, check sum
Data structure	Start bit: 1 Data bit: 7 Parity: Even parity Stop bit: 1
Interface	RS485 compliant
No. of nodes	31
Maximum cable length	1,000 m (cable resistance must be within 50Ω)

■ RATING & SPECIFICATIONS

Item			Specifications
Size			48 × 24mm
Supply voltage (Must be specified)			100 to 240V AC, 24V AC/DC
Frequency			50/60Hz
Power consumption			Approx. 5VA
Input type			Input range
Thermocouple	K		−200 to 1370°C (−320 to 2500°F)
			−199.9 to 400.0°C (−199.9 to 750.0°F)
	J		−200 to 1000°C (−320 to 1800°F)
	R		0 to 1760°C (0 to 3200°F)
	S		0 to 1760°C (0 to 3200°F)
	B		0 to 1820°C (0 to 3300°F)
	E		−200 to 800°C (−320 to 1500°F)
	T		−199.9 to 400.0°C (−199.9 to 750.0°F)
	N		−200 to 1300°C (−320 to 2300°F)
	PL-II		0 to 1390°C (0 to 2500°F)
	C (W/Re5-26)		0 to 2315°C (0 to 4200°F)
RTD	Pt100		−200 to 850°C (−300 to 1500°F)
			−199.9 to 850.0°C (−199.9 to 999.9°F)
	JPt100		−200 to 500°C (−300 to 900°F)
			−199.9 to 500.0°C (−199.9 to 900.0°F)
DC Current	0 to 20mA DC		−1999 to 9999, −199.9 to 999.9 −19.99 to 99.99, −1.999 to 9.999
	4 to 20mA DC		
DC Voltage	0 to 1V DC		
	0 to 5V DC		
	1 to 5V DC		
	0 to 10V DC		
DC			• DC current input is supported with an externally mounted 50Ω shunt resistor (sold separately).
Multi-input	Thermocouple		K, J, R, S, B, E, T, N, PL-II, C (W/Re5-26)
	RTD		External resistor: Max. 100Ω (max. 40Ω external resistor for B input) Pt100, JPt100 3-conductor system (Allowable input conductor resistance for each conductor: max. 10Ω)
	DC current	0 to 20mA DC 4 to 20mA DC	Input impedance: 50Ω (Connect 50Ω shunt resistor between input terminals.) Allowable input current: max. 50 mA (when 50Ω shunt resistor is used)
	DC voltage	0 to 1V DC	Input impedance: min. 1 MΩ, Allowable input voltage: max 5 V, Allowable signal source resistance: max. 2 kΩ
		0 to 5V DC 1 to 5V DC 0 to 10V DC	Input impedance: min. 100 kΩ, Allowable input voltage: max 15 V, Allowable signal source resistance: max. 100Ω
Control output	Relay contact	(Must be specified)	1a: 3A 250V AC (Resistive load), 1a 1A 250V AC (Inductive load cosφ=0.4), Electric life: 10^5 times
	Non-contact DC voltage		12^{+3}_{-0}V DC, Max. 40mA DC (Short-circuit protected)
	DC current		4 to 20mA DC Load resistance: Max. 550Ω
Alarm output 1 (Relay contact)			1a 3A 250V AC (Resistive load), 1a 1A 250V AC (Inductive load cosφ=0.4)
Alarm output 2 (Open collector)			0.1A 24V DC
Control mode			PID (with auto-tuning function), PI, PD, P, ON/OFF action
Target temperature setting			Primary setting/secondary setting (switched by external terminal)
Program control function			1 pattern, 9 step setting is possible (However, make function selection setting of either control with fixed set point or program control.)
Accuracy	Thermocouple		Within ±0.2% ±1 digit of each input span or within ±2°C (4°F) whichever is greater However, R and S input; Within ±6°C (12°F) in the range of 0 to 200°C (0 to 400°F) B input 0 to 300°C (0 to 600°F): Accuracy is not guaranteed. K, J, E, and N input less than 0°C (32°F): Within ±0.4% ±1 digit of input span
	RTD		Within ±0.1% ±1 digit of each input span or ±1°C (2°F) whichever is greater
	DC current and DC voltage		Within ±0.2% ±1 digit of each input span
Sampling period			250ms
Hysteresis			Thermocouple & RTD: 0.1 to 100.0°C (°F) DC current and DC voltage: 1 to 1000 (The decimal point place follows the selection)
Proportional band			0.0 to 110.0%
Integral time			0 to 1000 seconds
Derivative time			0 to 300 seconds
Proportional cycle			1 to 120 seconds
Allowable voltage fluctuation			When 100 to 240V AC; 85 to 264V AC When 24V AC/DC; 20 to 28V AC/DC
Insulated resistance			500V DC Min. 10MΩ
Breakdown voltage			1.5kV AC for 1min between input terminal and power terminal & between output terminal and power terminal
Malfunction vibration			10 to 55Hz (0.35mm) to each direction (120ms sweep) for 10min.
Breakdown vibration			10 to 55Hz (0.75mm) to each direction (120ms sweep) for 10min.
Malfunction shock			X, Y & Z each direction for 5 times 10G
Breakdown shock			Same as above, but 30G
Ambient temperature			0 to 50°C
Ambient humidity			35 to 85%RH (No condensation)
Mass			Approx. 120g
Waterproof			IP66
Display character height			PV: 8.7mm, SV: 8.7mm (PV/SV switching display)
Options	Heating/Cooling control		Relay contact: 1a 3A 250V DC (Resistive load)
	Communication function		RS-485/Modbus Protocol (Modbus is a communication protocol developed for PLCs by Modicon Inc.) Communication speed: 2400/4800/9600/19200bps
Accessories	Mounting frame		Included with unit
	Terminal cover		Sold separately

KT(AKT2)

■ Setup procedures

The setup procedures of this controller is shown below. Refer to each item for details.

(1) Initial setting   : Set the Input type, Alarm action, etc. during Auxiliary function setting mode 2.
   ↓   (If the users' specification is the same as the default value of the KT2, initial setting is not necessary for the controller.)
(2) Main setting mode   : Set Step SV and Step time for Program control during Main setting mode.
   ↓
(3) Sub setting mode   : Set PID values, A1 setting, etc during Sub setting mode.
   ↓   (If the users' PID values are the same as the default value of the KT2, it is not necessary to set them.)
(4) Auxiliary function setting mode 1 : Set the Lock function, Communication conditions, etc. during Auxiliary function setting mode 1.
   ↓   (If the users' specification is the same as the default value of the KT2, it is not necessary to set them.)
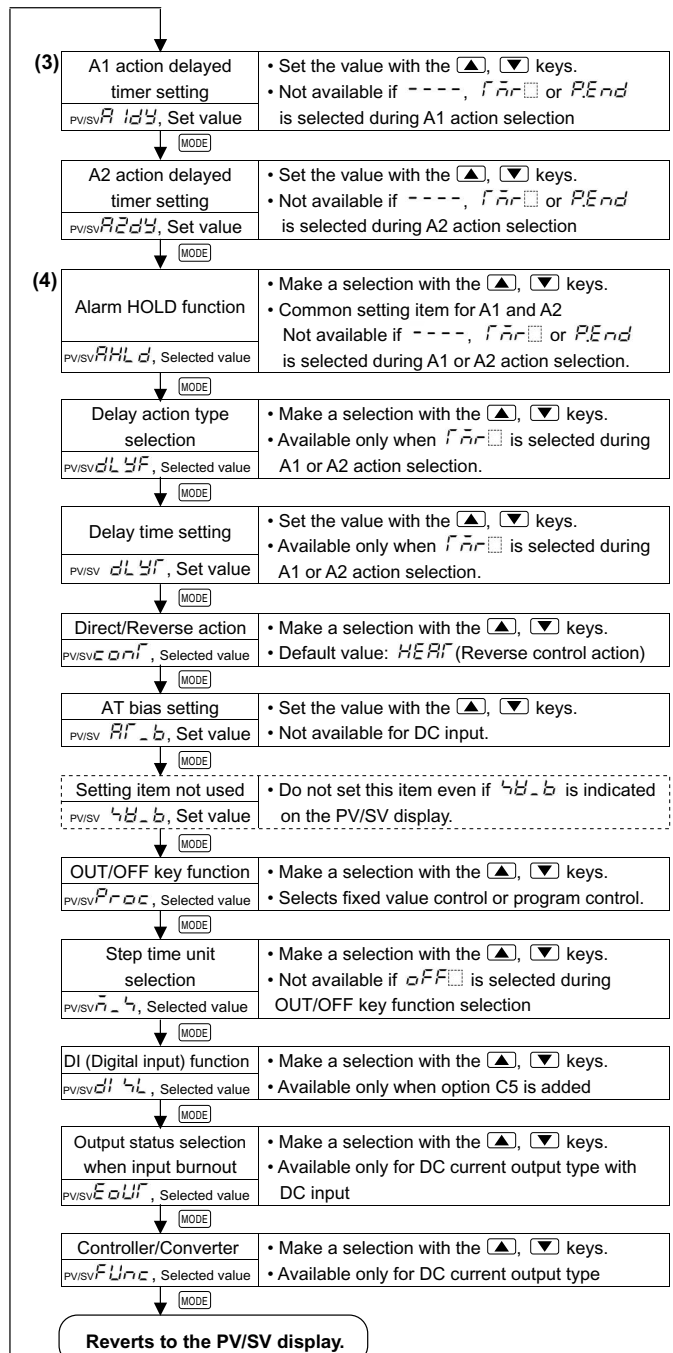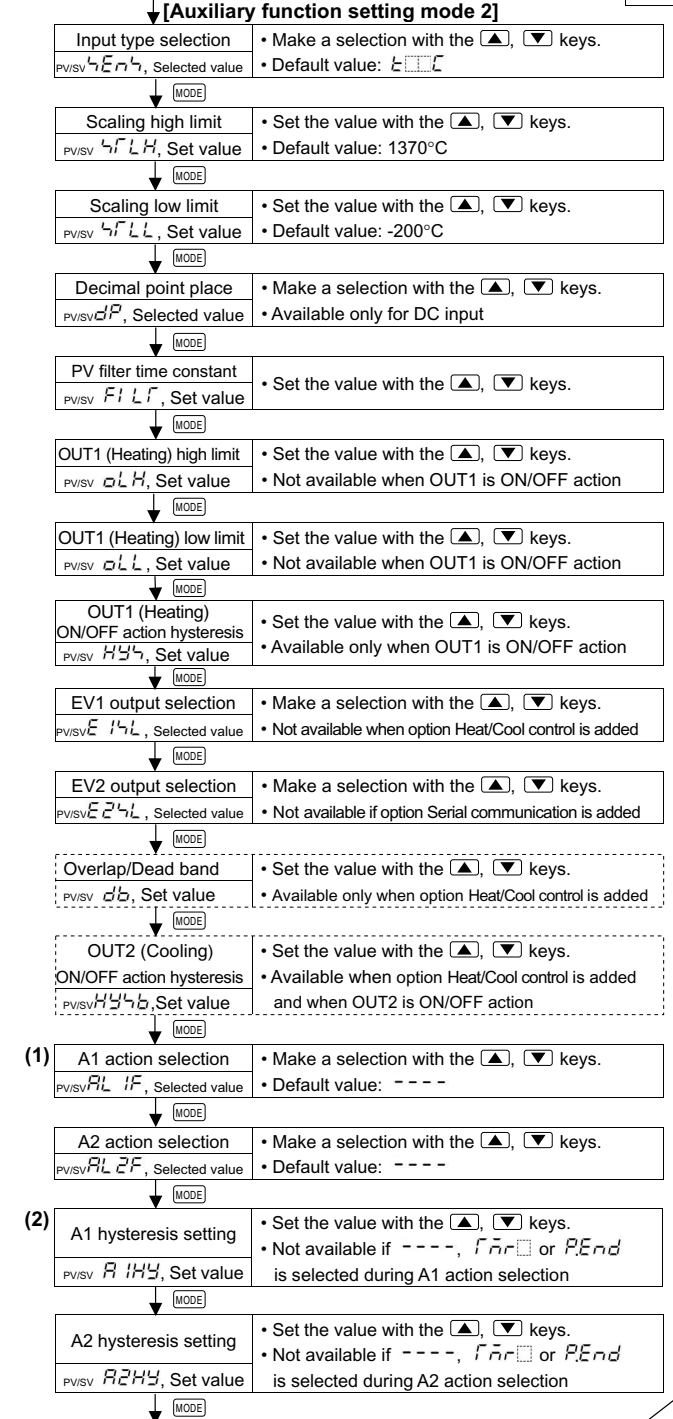   Running

PV indication when SV is selected, and vice versa		PV/SV display mode (Fixed value control)		Control output OFF (Fixed value control)

Automatically returns 2s later. →

Press the ▲ key.

(In the case of Program control standby)
PV indication: The MEMO/STEP display is unlit. Only PV is indicated.
SV indication: `ᏒᏒᏂ⅄` is indicated.

Press the OUT/OFF key for 1 second.

MV indication   Flashes

Press the MODE key. →

Press the OUT/OFF key.

Press the MODE key for 3 seconds.

Press the OUT/OFF key for 1 second.

Program control RUN (Program control)

Press the MODE key.

[Main setting mode]

Press the MODE key while holding down the ▲ key.

[Sub setting mode]

Press the MODE while holding down the ▼ for 3s.

[Auxiliary function setting mode 1]

[Main setting mode]

SV1 (Step 1 SV setting)
MEMO/STEP `1`
PV/SV `Ꮞ`, Set value
[MODE]

Step 1 time setting
MEMO/STEP `1`
PV/SV `Ꮯ1 ᎷᎬ`, Set value
[MODE]

SV2 (Step 2 SV setting)
MEMO/STEP `2`
PV/SV `Ꮞ`, Set value
[MODE]

Step 2 time setting
MEMO/STEP `2`
PV/SV `Ꮯ1 ᎷᎬ`, Set value
[MODE]

Step 3 SV setting
MEMO/STEP `3`
PV/SV `Ꮞ`, Set value
[MODE]

Step 3 time setting
MEMO/STEP `3`
PV/SV `Ꮯ1 ᎷᎬ`, Set value

Each time the MODE key is pressed, the setting item is switched.

Set SV and time for the necessary step.

Step 9 SV setting
MEMO/STEP `9`
PV/SV `Ꮞ`, Set value
[MODE]

Step 9 time setting
MEMO/STEP `9`
PV/SV `Ꮯ1 ᎷᎬ`, Set value
[MODE]

(Reverts to the PV/SV display.)

[Sub setting mode]

AT selection
PV/SV `ᏁᏒ`, Selected value
• If AT is cancelled during the process, PID values return to former values.
[MODE]

OUT1 (Heating) proportional band
PV/SV `Ᏸ`, Set value
• Set the value with the ▲, ▼ keys.
• ON/OFF action when set to 0.0
[MODE]

OUT2 (Cooling) proportional band
PV/SV `Ᏸ_Ᏸ`, Set value
• Set the value with the ▲, ▼ keys.
• Not available when OUT1 is ON/OFF action
[MODE]

OUT1 (Heating) integral time
PV/SV `1`, Set value
• Set the value with the ▲, ▼ keys.
• Setting the value to 0 disables the function.
[MODE]

OUT1 (Heating) derivative time
PV/SV `Ꮷ`, Set value
• Set the value with the ▲, ▼ keys.
• Setting the value to 0 disables the function.
[MODE]

ARW setting
PV/SV `Ꮑ`, Set value
• Set the value with the ▲, ▼ keys.
• Available only for PID action
[MODE]

OUT1 (Heating) proportional cycle
PV/SV `Ꮯ`, Set value
• Set the value with the ▲, ▼ keys.
• Not available for DC current output type or when OUT1 is ON/OFF action.
[MODE]

OUT2 (Cooling) proportional cycle
PV/SV `Ꮯ_Ᏸ`, Set value
• Set the value with the ▲, ▼ keys.
• Not available when OUT2 is ON/OFF action.
[MODE]

Manual reset setting
PV/SV `ᏒᏎᏒ`, Set value
• Set the value with the ▲, ▼ keys.
• Available only for P and PD action.
[MODE]

(5) **A1 setting**
PV/SV `Ꭺ1`, Set value
• Set the value with the ▲, ▼ keys.
• Not available if `----`, `ᏒᎷᏒ□` or `ᏢᎬᏁᏎ` is selected during A1 action selection.
[MODE]

A2 setting
PV/SV `Ꭺ2`, Set value
• Set the value with the ▲, ▼ keys.
• Not available if `----`, `ᏒᎷᏒ□` or `ᏢᎬᏁᏎ` is selected during A2 action selection.
[MODE]

(Reverts to the PV/SV display.)

[Auxiliary function setting mode 1]

PV/SV indication
PV/SV `ᏢᏎ` or `ᏎᏎ`
• Select PV or SV with the ▲, ▼ keys.
[MODE]

Setting value lock
PV/SV `Ꮮ�8ᏒᏒ`, Selected value
• Make a selection with the ▲, ▼ keys.
• If Lock 1 or Lock 2 is selected, AT does not work.
• Be sure to select Lock 3 when using serial communication.
[MODE]

Sensor correction
PV/SV `ᏂᎧ`, Set value
• Set the value with the ▲, ▼ keys.
[MODE]

Communication protocol
PV/SV `ᏒᎷᏂᏎ`, Selected value
• Make a selection with the ▲, ▼ keys.
[MODE]

Instrument number
PV/SV `ᏒᎷᎧ`, Set value
• Set the value with the ▲, ▼ keys.
[MODE]

Communication speed
PV/SV `ᏒᎷᏎᏢ`, Selected value
• Make a selection with the ▲, ▼ keys.
[MODE]

(Reverts to the PV/SV display.)

Explanation of key
• ↓[MODE] : This means that if the MODE key is pressed, the set value is saved, and the controller proceeds to the next setting item.
• If the MODE key is pressed for approx. 3s, the controller reverts to the PV/SV display mode from any mode.

Character indication
• Characters and set (selected) value of the setting item are indicated on the PV/SV display in turn.
• Setting items with dotted lines are optional and they appear only when the options are added.

Alarm 1 (A1) setting procedures (Numbers (1) to (5) are indicated on the flowchart.)
(1) Select an alarm type during [A1 action selection].
[If `----`, `ᏒᎷᏒ□` or `ᏢᎬᏁᏎ` is selected, (2) to (5) are not indicated.]
(2) Set A1 hysteresis during [A1 hysteresis setting].
(3) Set A1 action delayed timer during [A1 action delayed timer].
(If input enters alarm action range and setting time has passed, the alarm is activated.)
(4) Select if the alarm output is held or not during [Alarm HOLD function selection] (common to A1, A2).
(5) Set A1 action point during [A1 setting].
[Note] If an alarm action is changed, the alarm setting value becomes 0 (0.0). Therefore it is necessary to reset it.

Note: Please refer to the user manual for detailed operating procedures.

Input type (Character indication) and range

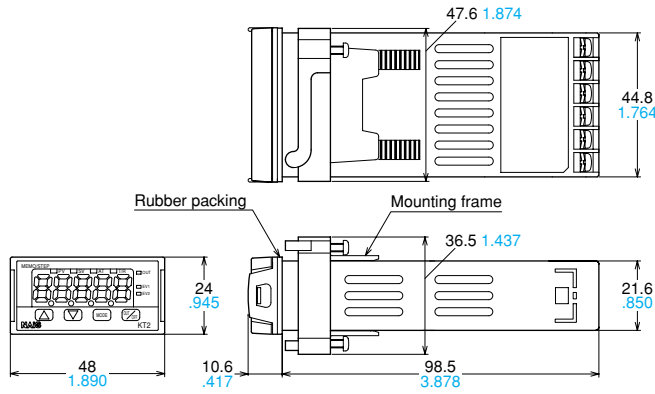|			
$tⓒⓒC$: K	-200 to 1370°C	$tⓒⓒF$: K	-320 to 2500°F
$tⓒⓒC$:	-199.9 to 400.0°C	$tⓒⓒF$:	-199.9 to 750.0°F
$JⓒⓒC$: J	-200 to 1000°C	$JⓒⓒF$: J	-320 to 1800°F
$rⓒⓒC$: R	0 to 1760°C	$rⓒⓒF$: R	0 to 3200°F
$SⓒⓒC$: S	0 to 1760°C	$SⓒⓒF$: S	0 to 3200°F
$bⓒⓒC$: B	0 to 1820°C	$bⓒⓒF$: B	0 to 3300°F
$EⓒⓒC$: E	-200 to 800°C	$EⓒⓒF$: E	-320 to 1500°F
$rⓒⓒC$: T	-199.9 to 400.0°C	$rⓒⓒF$: T	-199.9 to 750.0°F
$nⓒⓒC$: N	-200 to 1300°C	$nⓒⓒF$: N	-320 to 2300°F
$PL2C$: PL-II	0 to 1390°C	$PL2F$: PL-II	0 to 2500°F
$cⓒⓒC$: C(W/Re5-26) 0 to 2315°C		$cⓒⓒF$: C(W/Re5-26) 0 to 4200°F	
$PrⓒC$: Pt100	-199.9 to 850.0°C	$PrⓒF$: Pt100	-199.9 to 999.9°F
$JPrⓒC$: JPt100	-199.9 to 500.0°C	$JPrⓒF$: JPt100	-199.9 to 900.0°F
$PrⓒC$: Pt100	-200 to 850°C	$PrⓒF$: Pt100	-300 to 1500°F
$JPrⓒC$: JPt100	-200 to 500°C	$JPrⓒF$: JPt100	-300 to 900°F
$420A$: 4 to 20mA DC -1999 to 9999		0_1V: 0 to 1V DC -1999 to 9999	
$020A$: 0 to 20mA DC -1999 to 9999		0_5V: 0 to 5V DC -1999 to 9999	
		1_5V: 1 to 5V DC -1999 to 9999	
		0_10V: 0 to 10V DC -1999 to 9999	

Alarm action types

$Hⓒⓒ$ (High limit alarm): The alarm action is a ±deviation setting from the SV. The alarm is activated if the input value reaches the high limit setting value.

$Lⓒⓒ$ (Low limit alarm): The alarm action is a ±deviation setting from the SV. The alarm is activated if the input value goes under the low limit setting value.

$HLⓒ$ (High/Low limits alarm): Combines High limit and Low limit alarm actions. When input value reaches high limit setting value or goes under the low limit setting value, the alarm is activated.

$ di dⓒ$ (High/Low limit range alarm): When input value is between the high limit setting value and low limit setting value, the alarm is activated.

$A4ⓒ$ (Process high alarm), $rA4ⓒ$ (Process low alarm): Within the scale range of the controller, alarm action points can be set at random and if the input reaches the randomly set action point, the alarm is activated.

$Hⓒⓒ$ (High limit alarm with standby), $Lⓒⓒ$ (Low limit alarm with standby)
$HLⓒⓒ$ (High/Low limits alarm with standby)
When the power to the controller is turned on, even if the input enters the alarm action range, the alarm is not activated. (If the controller is allowed to keep running, once the input exceeds the alarm action point, the standby function will be released.)

$rⓐrⓒ$ (Timer function): If external signal enters, timer counting starts, and the action selected during Delay action type selection is outputted after the set delay time has passed.

$P.End$ (Pattern end output): When the program ends normally, pattern end output is turned on. The output is maintained until it is released with the [OUT/OFF] key.

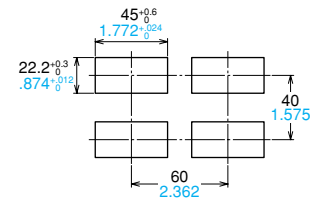Press [▼] key for 3s while holding down the [▲] key.

[Auxiliary function setting mode 2]

Input type selection PV/SV $5En5$, Selected value	• Make a selection with the [▲], [▼] keys. • Default value: $tⓒⓒC$	
Scaling high limit PV/SV $5rLH$, Set value	• Set the value with the [▲], [▼] keys. • Default value: 1370°C	
Scaling low limit PV/SV $5rLL$, Set value	• Set the value with the [▲], [▼] keys. • Default value: -200°C	
Decimal point place PV/SV dP, Selected value	• Make a selection with the [▲], [▼] keys. • Available only for DC input	
PV filter time constant PV/SV $FiLr$, Set value	• Set the value with the [▲], [▼] keys.	
OUT1 (Heating) high limit PV/SV oLH, Set value	• Set the value with the [▲], [▼] keys. • Not available when OUT1 is ON/OFF action	
OUT1 (Heating) low limit PV/SV oLL, Set value	• Set the value with the [▲], [▼] keys. • Not available when OUT1 is ON/OFF action	
OUT1 (Heating) ON/OFF action hysteresis PV/SV $HY5$, Set value	• Set the value with the [▲], [▼] keys. • Available only when OUT1 is ON/OFF action	
EV1 output selection PV/SV $E 15L$, Selected value	• Make a selection with the [▲], [▼] keys. • Not available when option Heat/Cool control is added	
EV2 output selection PV/SV $E 25L$, Selected value	• Make a selection with the [▲], [▼] keys. • Not available if option Serial communication is added	
Overlap/Dead band PV/SV db, Set value	• Set the value with the [▲], [▼] keys. • Available only when option Heat/Cool control is added	
OUT2 (Cooling) ON/OFF action hysteresis PV/SV $HY5b$, Set value	• Set the value with the [▲], [▼] keys. • Available when option Heat/Cool control is added and when OUT2 is ON/OFF action	
(1) A1 action selection PV/SV $AL 1F$, Selected value	• Make a selection with the [▲], [▼] keys. • Default value: $----$	
A2 action selection PV/SV $AL 2F$, Selected value	• Make a selection with the [▲], [▼] keys. • Default value: $----$	
(2) A1 hysteresis setting PV/SV $A 1HY$, Set value	• Set the value with the [▲], [▼] keys. • Not available if $----$, $rⓐrⓒ$ or $P.End$ is selected during A1 action selection	
A2 hysteresis setting PV/SV $A2HY$, Set value	• Set the value with the [▲], [▼] keys. • Not available if $----$, $rⓐrⓒ$ or $P.End$ is selected during A2 action selection	

(3) A1 action delayed timer setting PV/SV $A 1dY$, Set value	• Set the value with the [▲], [▼] keys. • Not available if $----$, $rⓐrⓒ$ or $P.End$ is selected during A1 action selection	
A2 action delayed timer setting PV/SV $A2dY$, Set value	• Set the value with the [▲], [▼] keys. • Not available if $----$, $rⓐrⓒ$ or $P.End$ is selected during A2 action selection	
(4) Alarm HOLD function PV/SV $AHL d$, Selected value	• Make a selection with the [▲], [▼] keys. • Common setting item for A1 and A2 Not available if $----$, $rⓐrⓒ$ or $P.End$ is selected during A1 or A2 action selection.	
Delay action type selection PV/SV $dLYF$, Selected value	• Make a selection with the [▲], [▼] keys. • Available only when $rⓐrⓒ$ is selected during A1 or A2 action selection.	
Delay time setting PV/SV $dLYr$, Set value	• Set the value with the [▲], [▼] keys. • Available only when $rⓐrⓒ$ is selected during A1 or A2 action selection.	
Direct/Reverse action PV/SV $conr$, Selected value	• Make a selection with the [▲], [▼] keys. • Default value: $HEAr$ (Reverse control action)	
AT bias setting PV/SV Ar_b, Set value	• Set the value with the [▲], [▼] keys. • Not available for DC input.	
Setting item not used PV/SV $5b_b$, Set value	• Do not set this item even if $5b_b$ is indicated on the PV/SV display.	
OUT/OFF key function PV/SV $Proc$, Selected value	• Make a selection with the [▲], [▼] keys. • Selects fixed value control or program control.	
Step time unit selection PV/SV m_5, Selected value	• Make a selection with the [▲], [▼] keys. • Not available if $oFFⓒ$ is selected during OUT/OFF key function selection	
DI (Digital input) function PV/SV $di 5L$, Selected value	• Make a selection with the [▲], [▼] keys. • Available only when option C5 is added	
Output status selection when input burnout PV/SV $EoUr$, Selected value	• Make a selection with the [▲], [▼] keys. • Available only for DC current output type with DC input	
Controller/Converter PV/SV $FUnc$, Selected value	• Make a selection with the [▲], [▼] keys. • Available only for DC current output type	

Reverts to the PV/SV display.

KT(AKT2)

■ DIMENSIONS (unit: mm inch)

47.6 1.874
44.8 1.764

Rubber packing   Mounting frame

36.5 1.437
24 .945
21.6 .850

48 1.890   10.6 .417   98.5 3.878

• Panel cutout

45 $^{+0.6}_{0}$ 1.772 $^{+.024}_{0}$
22.2 $^{+0.3}_{0}$ .874 $^{+.012}_{0}$
40 1.575
60 2.362

■ INSTALLATION

Please install vertically in order to satisfy the IP66 specification for dust and splash proofing.
The possible control panel plate thickness for installation is between 1 to 10 mm.
(1) Insert the unit from the front of the control panel.
(2) Insert the mounting frame until that the edges (2) make contact with the panel.
(3) Tighten the clamp screw and then turn it 3/4 of a turn after the edge of the screw reaches the panel.
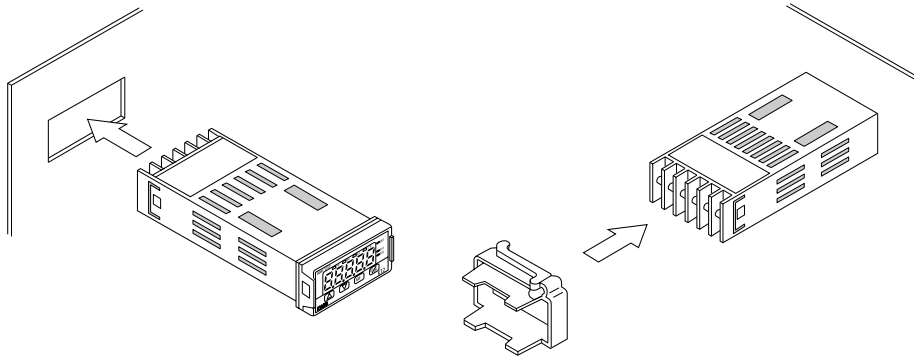
■ OPTION

1. Shunt resistor

AKT4810 (KT2, 4, 8, 9)

74 $^{\pm6}$
2.913 $^{\pm.236}$

2. Terminal cover

AKT2801

47.5 1.870
23.8 .937
3.5 .138
15.5 .610
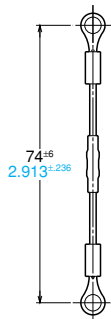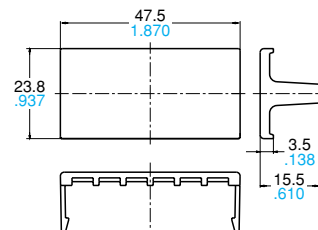
■ EXTERNAL CONNECTION DIAGRAM
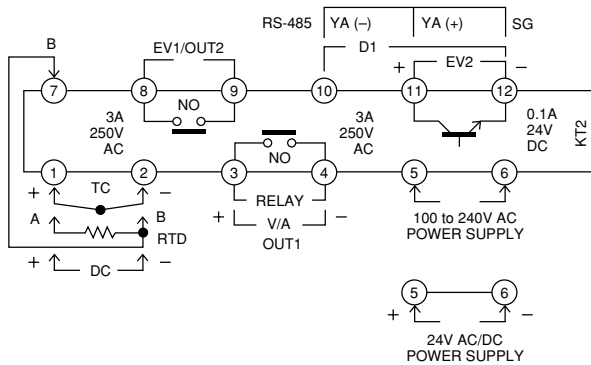
- TC: Input terminal for thermo couple.
- RTD: Input terminal for the resistance temperature sensor.
- DC: Input terminal for DC current or DC voltage.
  For DC current input, connect a separately sold receipt resistor (50Ω) between the input terminals.
- OUT1: Output terminal for the control output or heating output [option: heating/cooling control].
- POWER SUPPLY: Power supply terminal.
- EV1/OUT2: Output terminal for event output 1 or cooling output [option: heating/cooling control].
- EV2: Output terminal for event output 2.
- DI: Input terminal for DI input. (There are three types of D1 input, the SV1/SV2 external switching function, the OUT/OFF (RUN/STOP) output switching function, and timer function.)
- RS-485: Communication terminal for serial communication. (EV1, 2 is alarm output)

■ Communication Function Connection Diagram (PLC Connection Diagram)
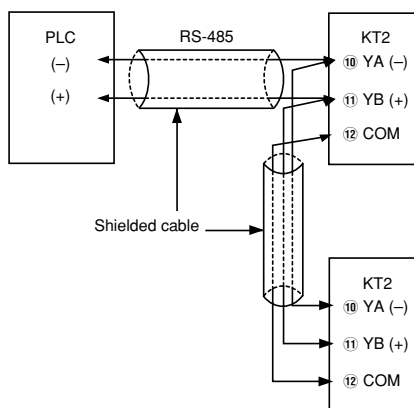
■ NOTICE ON OPERATION

1. NOTICE ON SITE SELECTION

This instrument is intended to be used in the following environment (IEC61010-1)
Overvoltage category II, Pollution degree 2
Mount the controller in a place with:
1) A minimum of dust, and an absence of corrosive gases
2) No flammable, explosive gases
3) Few mechanical vibrations or shocks
4) No exposure to direct sunlight, an ambient temperature of 0 to 50°C (32 to 122°F) that does not change rapidly
5) An ambient non-condensing humidity of 35 to 85%RH
6) No large capacity electromagnetic switches or cables through which large current is flowing
7) No water, oil or chemicals or where the vapors of these substances can come into direct contact with the controller

2. NOTICE ON THE WIRING

1) The terminal block of KT2 series are designed to be wired from the upper and lower direction. Fasten the leads with terminal screws. Use a solderless terminal with insulation sleeve that fits to the M3 screw.
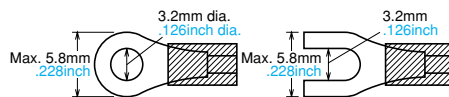
2) Tighten the terminal screws with a torque between 0.6 N·m to 1.0 N·m so that there is no looseness.
3) Use a thermocouple and compensating lead wire according to the input specification of the controller.
4) Use a 3-wire system of RTD according to the input specification of the controller.
5) This controller has no built-in power switch, circuit breaker or fuse. Therefore, it is necessary to install them in the circuit near the external controller.
(Recommended fuse: Time-lag fuse, rated voltage 250V AC, rated current 2A)
6) In the case of 24V AC/DC power supply, do not confuse the polarity when it is DC.

7) With the relay contact output type, use an auxiliary electromagnetic switch externally according to the capacity of the load to protect the built-in relay contact.
8) When wiring, keep input wire (thermocouple, RTD, etc.) away from AC source and load wire to avoid external interference.
9) Turn the power supply to the instrument off before wiring or checking. Working or touching the terminal with the power switched on may result in Electric Shock which could cause severe injury or death.
10) Do not drop wire chips into the holes of vent when wiring, because they could cause fire, malfunction or trouble with the device.
11) To prevent the unit from harmful effects of unexpected high level noise, it is recommended that a surge absorber be installed between the electromagnetic switch coils.

Please contact ....

Matsushita Electric Works, Ltd.

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