



RoHS Directive compatibility information  
<http://www.mew.co.jp/ac/e/environment/>

## FEATURES

### 1. Better visibility

1) The KT4H uses our time-proven display system (negative type LCD + LED backlight) that is used in our timers and counters.

2) 11-segment LCD improves ability to distinguish alphanumeric.  
 3) Largest letter height of PV value in its class for easy readability even from a distance.

### 2. Space savings (Depth: 56mm)

Control panel installation length has been shortened to the utmost.

### 3. Ability to use any sensor (input) is inherited from KT Series

The KT4H comes standard with ability to use any sensor (input): thermocouple (10 types), RTD (2 types), DC current (2 types), and DC voltage (4 types)

### 4. Simple operation enables highly accurate temperature control

The operation mode uses "PID control" which allows a stable temperature to be maintained. Capable of high accuracy with an input span of  $\pm 0.2\%$  and a high-speed sampling period of 250 ms.

### 5. Improved communication functions

1) MEWTOCOL communications protocol is built in. Up to 31 temperature controllers can be connected and data can be collected using a DLU (Web

Datalogger Unit) or similar.

2) Using the external tool port, all settings can be loaded and settings can be made.

### 6. Easier operation

1) The switch layout has been changed and mode changes easier using the front keys.

2) Improved switch construction provides a much more positive clicking action.

### 7. Protective construction

Despite its compact size, protective structure conforms to IP66 (front panel only, when using rubber packing).

### 8. Improved control functions (option)

1) Capable of 4-point temperature selection by external input.

2) Control output can be turned ON and OFF externally.

3) 3-phase heater burn-out detection function

4) Non-contact voltage output in heating/cooling control output available.

### 9. Complies with international standards.

UL and C-UL compliance. CE marking conformity.

## PRODUCT TYPES

### KT4H Series

Base model	Power supply	Sensor input	Control output	Alarm output	Heating/cooling control	Heater burnout alarm	Communications function	Description
AKT4H	1							100 to 240V AC
	2							24V AC/DC
		1						Multi-input (Thermocouple, RTD, DC Voltage and DC Current)
			1					Relay contact
			2					Non-contact voltage (for SSR drive)
			3			0		DC current <b>Heater burn-out alarm not possible.</b>
				1				1 point (1a)
				2	0			2 points (1a + 1a) <b>Heating/cooling control output not possible.</b>
					0			Not available
					1	0		Relay contact <b>Heater burn-out alarm not possible.</b>
					2	0		Non-contact voltage (for SSR drive) <b>Heater burn-out alarm not possible.</b>
						0		Not available
			1 or 2		0	3		Single phase 20A (Heater burn-out alarm not supported when control output is DC output type/not supported when heating and cooling control is selected)
			1 or 2		0	4		Single phase 50A (Heater burn-out alarm not supported when control output is DC output type/not supported when heating and cooling control is selected)
			1 or 2		0	5		Three phase 20A (Heater burn-out alarm not supported when control output is DC output type/not supported when heating and cooling control is selected)
			1 or 2		0	6		Three phase 50A (Heater burn-out alarm not supported when control output is DC output type/not supported when heating and cooling control is selected)
							Blank	Not available
							1	Serial communication RS-485
							2	Contact input

Notes: 1. CT1 or CT2 for current transformer is provided as an accessory when heater burn-out alarm function is added.

2. Under some conditions, option functions (shaded items) may not be available; please check the "Descriptions" of the above table for non-functioning circumstances.

### ● Part No.

Example: Part No. when the optional functions (Heating/Cooling control + communication function) are added on to the basic model are as follows;

Part No.: AKT4H1111101

**KT4H Temperature Controller**  
 ARCT1B291E '07.10

**New**

# KT4H Temperature Controller

## ● Options

Product name	Part No.
Shunt resistor (for Current input)	AKT4810
Terminal cover	AKT4H801
Tool cable	AKT4H820

## ● Setting software

Product name	Description	Remark
KT Monitor	Editing of all types of data, File saving Monitoring of readings, Saving of log files	Available for download at no charge from company website. <a href="http://www.mew.co.jp/ac/e">http://www.mew.co.jp/ac/e</a>

Note: Please download user manual from the company website.

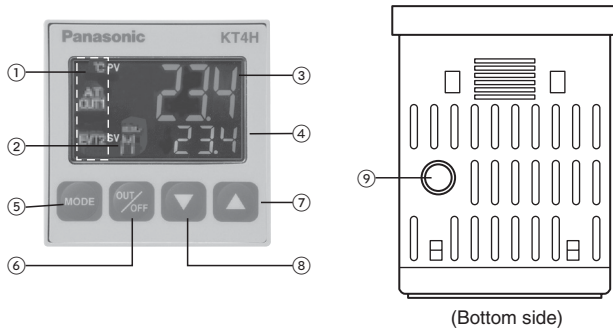
## RATING & SPECIFICATIONS

Item		Specifications		
Size (W × H × D)		48 × 48 × 62mm		
Rating	Supply voltage (Must be specified)	100 to 240V AC 24V AC/DC		
	Frequency	50/60Hz		
	Power consumption	Approx. 8VA		
	Rated graduation	Input type	Input range	
			Thermocouple	
		K	–200 to 1370°C (–320 to 2500°F)	
			–200.0 to 400.0°C (–320.0 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	–200.0 to 400.0°C (–320.0 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 (–320 to 1500°F) –200.0 to 850.0°C (–320.0 to 1500.0°F)		
	JPt100	–200 to 500°C (–320 to 900°F) –200.0 to 500.0°C (–320.0 to 900.0°F)		
DC	Current	4 to 20mA DC		
		0 to 20mA DC		
	Voltage	0 to 1V DC		
		0 to 10V DC		
1 to 5V DC	–2000 to 10000			
	0 to 5V DC	<ul style="list-style-type: none"> <li>• Scaling and change to the decimal point position are possible for DC current and DC voltage input.</li> <li>• DC current input is supported with an externally mounted 50Ω shunt resistor (sold separately).</li> </ul>		
Multi-input	Thermocouple	K, J, R, S, B, E, T, N, PL-II, C (W/Re5-26) External resistor: Max. 100Ω (max. 40Ω external resistor for B input)		
	RTD	Pt100, JPt100Ω 3-conductor system (Allowable input conductor resistance for each conductor: max. 10Ω)		
	DC current	0 to 20mA DC	Input impedance: 50Ω (Connect 50Ω shunt resistor between input terminals.)	
		4 to 20mA DC	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. 100kΩ		
Control output	Relay contact (Contact material: Ag alloy)	(Must be specified)		
	Non-contact voltage		1a: 3A 250V AC (Resistive load), 1A 250V AC (Inductive load cosφ=0.4), Electric life: 100,000 times	
	DC current		12V DC±15%, Max. load current: 40mA (Short-circuit protected) 4 to 20mA DC Load resistance: Max. 550Ω	
Alarm output 1 (EVT1) Relay contact (Contact material: Ag alloy)		Relay contact 1a: 3A 250VAC (Resistive load) Electric life: 100,000 times		
Alarm output 2 (EVT2)		Same as Alarm output 1		
Control mode		Actions mentioned below can be selected by key operation. [Default PID] PID (with auto-tuning function), PI, PD (with manual reset function), P (with manual reset function), ON/OFF action		
Target temperature setting		Primary setting/secondary setting/third setting/fourth setting (switched by external terminal)		
Accuracy	Thermocouple	Within ±0.2% of each input span ±1 digit 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 (32 to 400°F) B input 0 to 300°C (32 to 600°F): Accuracy is not guaranteed. K, J, T, E, and N input less than 0°C (32°F): Within ±0.4% of input span ±1 digit		
	RTD	Within ±0.1% of each input span ±1 digit or ±1°C (2°F) whichever is greater		
	DC current and DC voltage	Within ±0.2% of each input span ±1 digit		
Sampling period		250ms		
Hysteresis (ON/OFF)		Thermocouple & RTD: 0.1 to 100.0°C (32.18 to 212°F) DC current and DC voltage: 1 to 1000 (The decimal point place follows the selection)		
Proportional band		0 to 1000°C (32 to 1832°F) The decimal point input: 0.0 to 1000°C (32 to 1832°F) DC current and DC voltage: 0.0 to 100.0%		
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 10MΩ or greater		
Breakdown voltage		1.5kV AC for 1 min between input terminal and power terminal, & between output terminal and power terminal		
Malfunction vibration		10 to 55 Hz (1 cycle/min.) single amplitude 0.35 mm (10 minutes on 3 axes)		
Breakdown vibration		10 to 55 Hz (1 cycle/min.) single amplitude 0.75 mm (1 hour on 3 axes)		
Malfunction shock		X, Y & Z each direction for 5 times 98m/s <sup>2</sup>		
Breakdown shock		Same as above, but 294m/s <sup>2</sup>		
Ambient temperature		0 to 50°C		
Ambient humidity		35 to 85%RH (No condensation)		
Mass		Approx. 120g		
Waterproof		IP66 (applicable only to the front panel subject to rubber gasket employed)		
Display character height		PV: 12mm SV: 6mm		
Options	Heating/ Cooling control	Relay contact (Contact material: Ag alloy)		
	Output (Must be specified)		Control capacity 1a: 3A 250V AC (Resistive load), Electric life: 100,000 times	
Heater burn-out alarm output (Relay contact material: Ag alloy)		12V DC±15% Max. 40mA (Short-circuit protected) Specify either single-phase 20 A, single-phase 50 A, 3-phase 20 A, or 3-phase 50 A for rated heater current. Setting accuracy: within ±5% of rated heater current Relay contact 1a: 3A 250V AC (Resistive load), Electric life: 100,000 times		
Tool port		Communication interface C-MOS level Cannot be used at the same time as serial communication (option). *This port can only be used with the tool cable (AKT4H820).		
Accessories	Mounting frame	Comes with KT4H.		
	Rubber gasket			

## COMMUNICATION FUNCTION OVERVIEW

Item	Specifications
Communication type	Half-duplex
Communication speed	Select 2400, 4800, 9600, or 19200 bps using key operation.
Synchronization type	Asynchronous
Protocol	Modbus RTU, Modbus ASCII, MEWTOCOL (Slave)
Coding	Binary/ASCII
Interface	EIA RS485 compliant
No. of nodes	31
Maximum cable length	1,000 m (cable resistance must be within 50Ω)

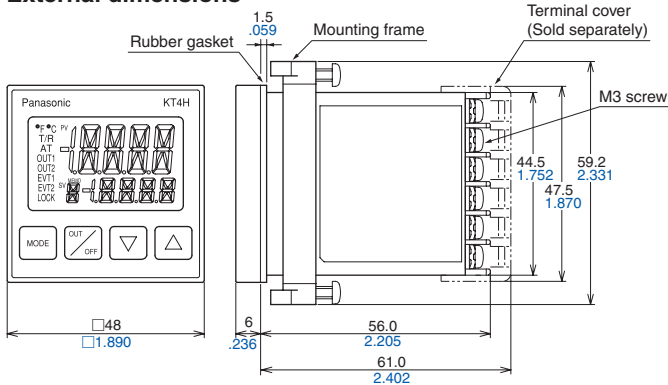
## PARTS AND FUNCTIONS



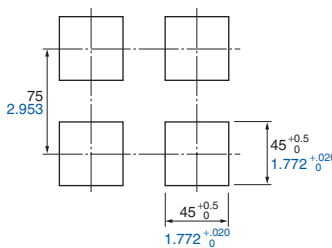
- ① Action indicators (backlight: orange)
  - °F °C ..... Lights respectively when temperature unit °F/°C is selected.
  - T/R ..... Lights during Serial communication (option) TX output.
  - AT ..... Flashes during auto-tuning or auto-reset
  - OUT1 ..... Lights when control output is ON or Heating output (option) is ON.  
For DC current output type, it flashes corresponding to the manipulated variable in 0.25 second cycles.
  - OUT2 ..... Lights when Cooling output (option) is ON.
  - EVT1 ..... Lights when Alarm 1 output is ON.
  - EVT2 ..... Lights when Alarm 2 output (option) is ON or Heater burnout alarm (option) is ON.
  - LOCK ..... Lights when Lock 1, Lock 2 or Lock 3 is selected.
- ② MEMO display ..... Indicates the set value memory number (backlight: green).
- ③ PV display ..... Indicates the PV (process variable) (backlight: red/orange/green).
- ④ SV display ..... Indicates the SV (set value) (backlight: green).
- ⑤ Mode key ..... Selects the setting mode, and registers the set value.
- ⑥ OUT/OFF key ..... The control output ON/OFF or Auto/Manual control can be switched.
- ⑦ Increase key ..... Increases the numeric value.
- ⑧ Decrease key ..... Decreases the numeric value.
- ⑨ Tool connector ..... By connecting the tool cable, the following operations can be conducted from the external computer using the exclusive tool software.
  - Reading and setting of SV, PID and various set values from external computer
  - Reading of PV and action status
  - Function change

## DIMENSIONS (Unit: mm *inch*) General tolerance: $\pm 1 \pm .039$

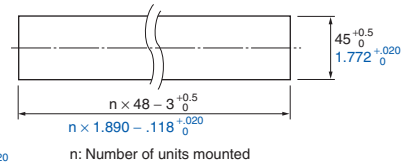
### External dimensions



### Panel cutout



### Lateral close mounting



Notes: If lateral close mounting is used for the controller, IP66 specification (Dust-proof/Drip-proof) may be compromised, and all warranties will be invalidated.

# KT4H Temperature Controller

## BASIC OPERATING PROCEDURES

### 1. Setup Procedures

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

1. Specification setting: Settings for input type, alarm actions, etc., are set using the specification setting mode.  
(If the users' specification is the same as the default value, specification setting is not necessary for the controller.)
2. Main setting mode: Set Step SV during main setting mode.
3. Sub setting mode: Set PID values, A1 setting, etc.  
(If the users' PID values are the same as the default value, it is not necessary to set them.)
4. Auxiliary function setting mode: Set the Lock function, Communication conditions (Option: serial communication), etc.  
(If the users' specification is the same as the default value, it is not necessary to set them.)

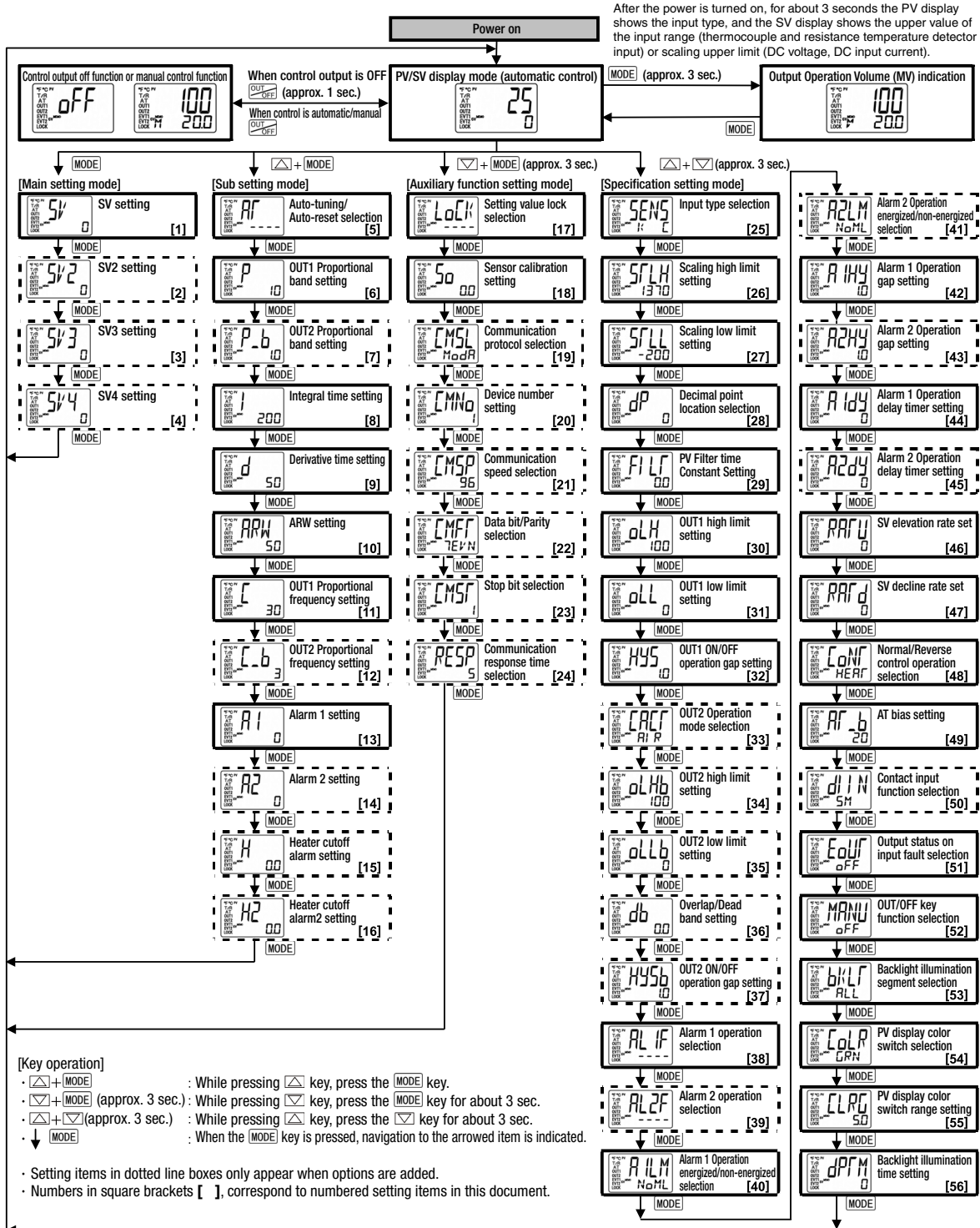
### 2. Specification setting

Before using the unit, it is necessary to adjust settings, such as input type, alarm actions, control actions, and other items, to match the conditions of use. This is known as specification setting. Factory settings at time of shipment are, input: K -200° to 1,370°C; and Alarm 1: no operation, comes into operation reverse (heating). If the factory settings are acceptable, the specification settings will be appropriate when the device is installed into the equipment and the specification setting procedure will not be required

### 3. Basic setting operations

For setting-mode navigation, refer to the particular setting mode. After navigation using the  $\Delta$  and  $\nabla$  keys, setting (selection) of each setting (selection) item is done by registration using the  $\square$  (MODE) key.

Power on  
Running



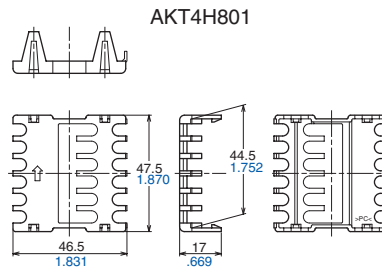
Note: Please refer to the user manual for detailed operating procedures.

## OPTIONS

### 1. Shunt resistor

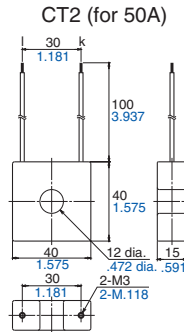
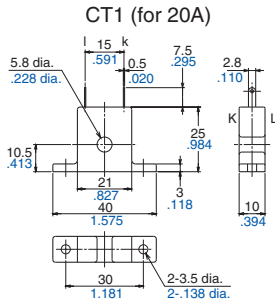


### 2. Terminal cover

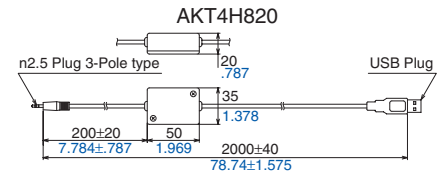


General tolerance:  $\pm 1 \pm 0.039$

### 3. Current transformer (CT)

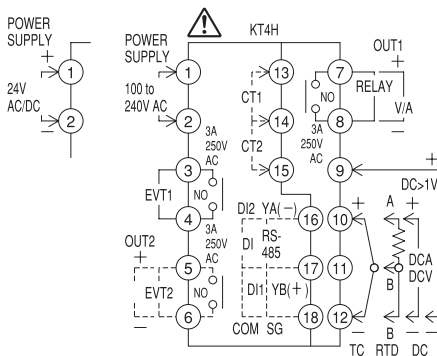


### 4. Tool cable



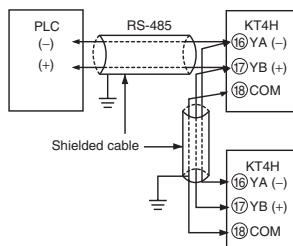
\*CT1 or CT2 for current transformer is provided as an accessory when heater burn-out alarm function is added.

## EXTERNAL CONNECTION DIAGRAM



- POWER SUPPLY ..... Power supply
- EVT1 ..... Alarm 1 output
- EVT2 ..... Alarm 2 output (option) or heater burn-out  
Alarm output (option)
- OUT1 ..... Control output or heating output (option)
- OUT2 ..... Cooling output (option)
- TC ..... Thermocouple input
- RTD ..... Resistance temperature detection input
- DC ..... Direct current input (DCA) or DC voltage input (DCV)  
(For DC voltage input, + side terminal number differs depending on the voltage.  
Also, DC current input, connect s shunt resistor between No. 10 and 12 terminal.)
- CT1 ..... Current transformer input 1 (option: Single, three phase)
- CT2 ..... Current transformer input 2 (option: Three-phase)
- DI ..... Contact input (option)
- RS-485 ..... Serial communication RS-485 (option)

## COMMUNICATION FUNCTION CONNECTION DIAGRAM (PLC Connection Diagram)



### Notes:

1. To prevent current flow along shield sections, ground one end of the shield line. (If both ends of the shield section are grounded, a closed circuit with the earth will form and electricity flowing through the shield line will cause increased susceptibility to noise.)
2. Terminating Resistors (Terminators)  
The KT4H series has a built-in pull-up resistor or pull-down resistor. For this reason, do not connect the terminating resistor on the communication line.



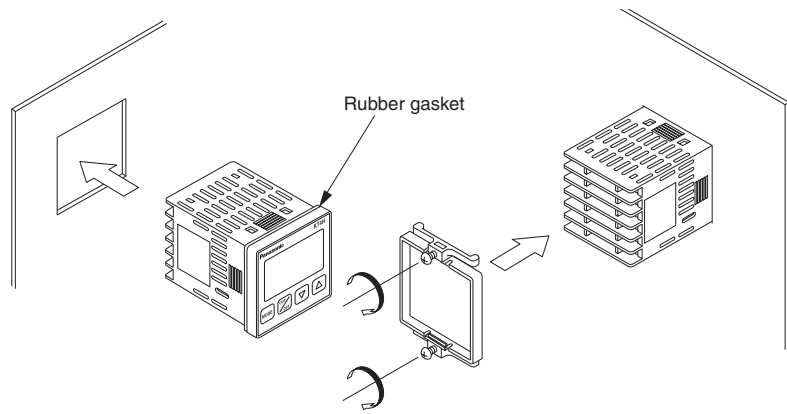
# KT4H Temperature Controller

## 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 5 mm.

- 1) Insert the unit from the front of the control panel.
- 2) Push the installation frame fully into contact with the panel and tighten the screws (screw torque from 0.05 N·m to 0.06N·m).



## NOTICE ON OPERATION

### 1. Notice on site selection

This instrument is intended to be used in the following environment (IEC61010-1)

Over voltage category II, Pollution degree 2

Mount the controller in a place with:

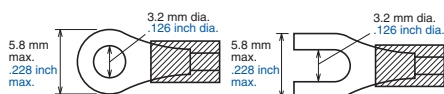
- 1) A minimum of dust, and an absence of corrosive gases
- 2) No flammable, explosive gases
- 3) Few mechanical vibrations or shocks
- 4) No exposure to direct sunlight, an ambient temperature of 0 to 50°C (32 to 122°F) that does not change rapidly (When installing inside a panel, make particular allowance for heat dissipation. Avoid installation in situations such as above equipment that generates heat.)
- 5) Locations in which temperature rapidly changes may cause condensation.
- 6) Locations or atmospheres in which gasoline, thinners, alcohol, or other organic solvents are present, or in which ammonia, sodium hydroxide, or other strong alkaline substances may adhere.
- 7) Locations susceptible to direct impact or the transmission of vibrations, or where splashing with water is possible.
- 8) In the proximity of equipment in which large switching surges occur or near high-voltage cables, high-voltage equipment, power lines, power equipment, ham radio transmitters, or equipment containing these or similar devices.
- 9) An ambient non-condensing humidity of 35 to 85%RH
- 10) No large capacity electromagnetic switches or cables through which large current is flowing
- 11) 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 KT4H series is designed to be wired from the left side

The lead wire must be inserted from the left side of the terminal, and fastened by the terminal screw. Use a solder-less terminal with insulation sleeve that fits to the M3 screw.

Wire-pressed terminal	Company name	Part number	Fastening torque
Fork type	NICHIFU Co., Ltd.	1.25Y-3	0.6 N·m, Max. 1.0 N·m.
	J.S.T. Mfg. Co., Ltd.	VD1.25-B3A	
Round type	NICHIFU Co., Ltd.	1.25-3	
	J.S.T. Mfg. Co., Ltd.	V1.25-3	



- 2) Recommended terminal fastening torque is approximately: 0.6N·m to 1.0N·m.

- 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.

### 3. NOTICE ON THE MOUNTING

Do not use excessive force while screwing in the mounting frame of KT4H series. Recommended torque is approximately 0.05 to 0.06 N·m.

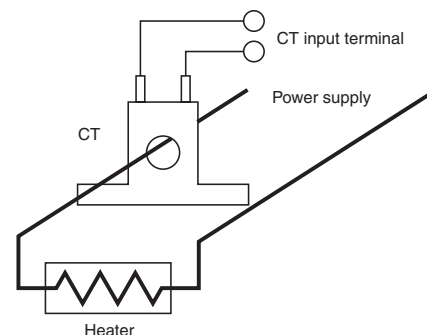
### 4. OPTIONAL HEATER BURN-OUT ALARM OUTPUT

- 1) This alarm is not available for detecting current under phase control.

- 2) Use the current transformer (CT) provided, and pass one lead wire of the heater circuit into the hole of CT.

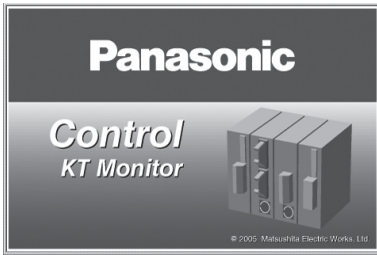
- 3) When wiring, keep CT wire away from AC source and load wire to avoid external interference.

- 4) In three phase installations, ensure that R, S, and T are each connected to a 2-line CT that connects with CT1 ((13)-(14)) and CT2 ((14)-(15)) terminals.



## KT Monitor

Available for download free of charge. Use it to acquire data from the KT4H temperature controller.



Download from <http://www.mew.co.jp/ac/e>

## FEATURES

1. Parameters can be set from a computer.
2. Measurement data can be monitored from a computer.
3. Measurement data can be logged to a computer.

## Recommended Temperature Controllers

### KT Series Temperature Controllers

Economically priced models that provide high accuracy with easy operation. The newly added KT2 series enables pattern control with a small form factor temperature controller.



KT2 Series  
(48×24×98.5mm)



KT4 Series  
(48×48×95mm)



KT7 Series  
(22.5×75×100mm)



KT8 Series  
(48×96×98.5mm)



KT9 Series  
(96×96×98.5mm)

## FEATURES

### 1. Multi-input

Versatile thermocouple, RTD, DC voltage and DC current input for temperature detecting sensors

### 2. Meets market demands for costeffectiveness

### 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  $\pm 0.2\%$ .

### 4. DIN Rail mounting types are aligned taking global market demand into consideration (KT7 series)

### 5. With three additional types of option function (heater burnout alarm output, heating/cooling control, and spare alarm output) for each series, a selection of 232 types is possible

### 6. Communication specification uses RS485 (Modbus protocol)

It is possible to connect up to 31 temperature controllers, which can facilitate central control (temperature data acquisition and setting value adjustment).

\*Modbus is a communication protocol developed for PLCs by Modicon Inc.

### 7. Nine step pattern control possible. (KT2 series)

## Specifications

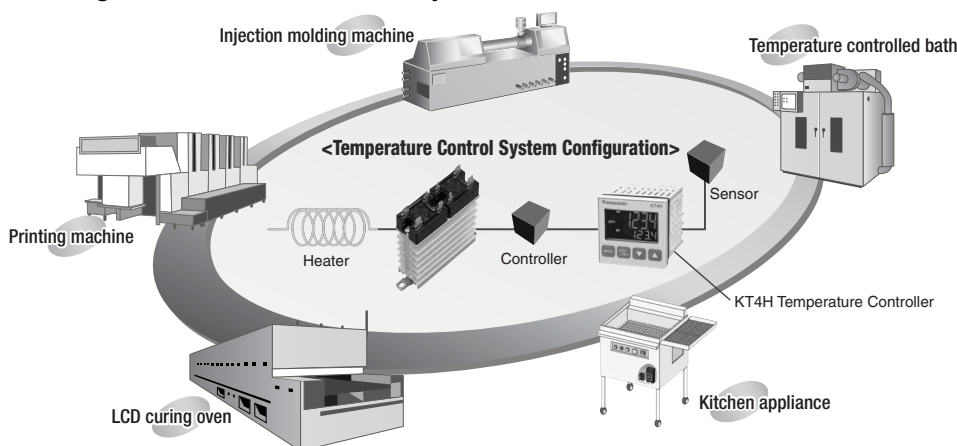
Type	KT2 Series	KT7 Series	KT4 Series	KT8 Series	KT9 Series
Supply voltage	100 to 240 V AC, 24 V AC/DC (Must be specified)				
Power consumption	Approx. 5 VA	Approx. 6 VA	Approx. 8 VA		
Multi-input	Thermocouple: K, J, R, S, B, E, T, N, PL-11, C (W/Re5-26) RTD: PL100, JPt100 3-conductor system DC current: 0 to 20mA DC, 4 to 20mA DC DC voltage: 0 to 1 V DC, 0 to 5 V DC, 1 to 5 V DC, 0 to 10 V DC				
Control output	Relay contact	1a	1a	1a1b	
	Non-contact DC voltage	12% V DC			
	DC current	4 to 20 mA DC			
		3 A 250 V AC (Resistive load), 1 A 250 V AC (Inductive load $\cos \phi = 0.4$ ), 100, 000 times			

## Product numbers

Types	Supply voltage	Control output	Part No.
KT2 Series	100 to 240 V AC	Relay contact output	AKT2111200
KT7 Series			AKT7111100
KT4 Series			AKT4111100
KT8 Series			AKT8111100
KT9 Series			AKT9111100

## Applications

Contributing to space savings of various heater control systems



# KT4H Temperature Controller

## Recommended SSR

### Heater Control SSR Lineup

Wide range of selections for different applications

Type	SSR Stand Alone					Slim Heat Sink Combined Type						
Series	AQ-J*1			AQ-N*1		AQ-J						
Dimensions mm inch												
Output arrangement	1a			1a		1a		1a x 2				
Load current	10A	15A	25A	10A	15A	20A	25A	40A	10A	20A	10A	15A
Load voltage	75 to 264V AC			75 to 250V AC		75 to 264V AC		75 to 264V AC				
Input voltage	4 to 6V DC 10 to 18V DC 18 to 28V DC			4 to 32V DC		4 to 6V DC 10 to 18V DC 18 to 28V DC		4 to 6V DC 10 to 18V DC 18 to 28V DC				
Operational method	Zero-cross (Turn ON and Turn OFF)*2			Zero-cross (Turn ON and Turn OFF)*2		Zero-cross (Turn ON and Turn OFF)*2						
Mounting	Screw		○		○		○		○			
	DIN rail		—		—		○		○			
Varistor	○			○		○		○				
LED indication	—			○		—		—				
Terminal cover	—			○		—		—				

Notes: \*1. A slim heat sink is available as an optional component.  
\*2. Random types are available upon request.

### AQ-J SSR Slim Heat Sink Combined Type

## FEATURES

#### 1. 28mm-wide Slim Profile

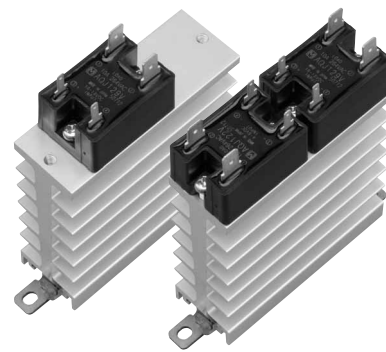
Two ultra-small SSR units are built into a slim heat sink!  
Uses 36% less space than the previous model

#### 2. Simple Installation

Both screw mount and DIN rail mount are possible.  
Easy connection of input/output with tab terminals

#### 3. Built-in Varistor

Excellent external surge absorption



### Part number

Output configuration	Type	Load current	Load voltage	Input voltage	Part No.
1a	Zero-cross	10 A	75 V to 264 V	4 to 6 V DC	AQJ112VY
				10 to 18 V DC	AQJ119VY
				18 to 28 V DC	AQJ116VY
1ax2				4 to 6 V DC	AQJ112VW
				10 to 18 V DC	AQJ119VW
				18 to 28 V DC	AQJ116VW

Check our website for more detailed product information about solid state relays.

<http://www.mew.co.jp/ac/e/control/relay/solid-state/>

These materials are printed on ECF pulp.  
These materials are printed with earth-friendly vegetable-based (soybean oil) ink.



## Matsushita Electric Works, Ltd. Automation Controls Business Unit

■ Head Office: 1048, Kadoma, Kadoma-shi, Osaka 571-8686, Japan

■ Telephone: +81-6-6908-1050 ■ Facsimile: +81-6-6908-5781

<http://www.mew.co.jp/ac/e/>

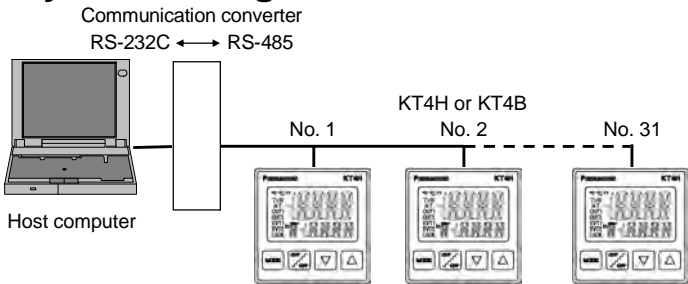
COPYRIGHT © 2007 All Rights Reserved  
Specifications are subject to change without notice.  
ARCT1B291E 200710-1YT



These instructions are for communication functions. For detailed operating instructions, please refer to User's Manual for the KT4H/B.

Serial communication and Tool port communication cannot be used together. When performing Serial communication, remove the tool cable (AKT4H820) from the USB port of the PC and tool connector of the KT4H/B. When performing Tool port communication, it is not required to remove the Serial communication cables. However, do not send a command from the master side.

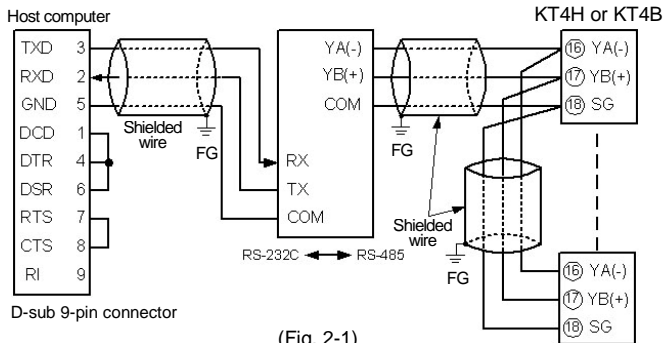
## 5. System configuration



(Fig. 1-1)

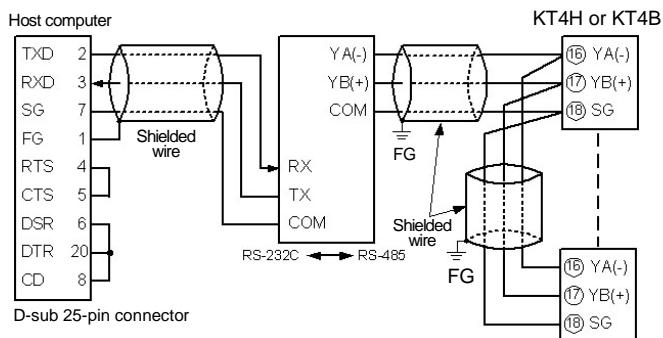
## 2. Wiring

Wiring example using a communication converter  
 Using a D-sub 9-pin Connector



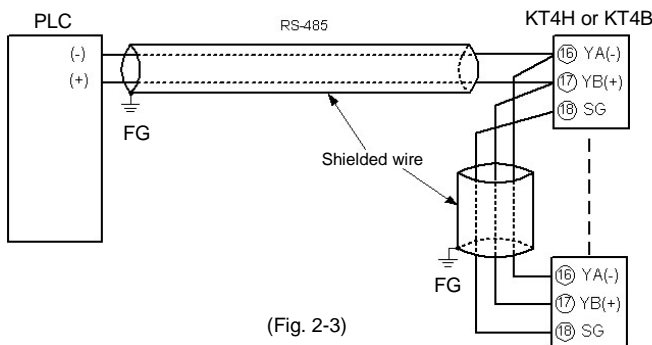
(Fig. 2-1)

Using a D-sub 25-pin Connector



(Fig. 2-2)

When connecting to a PLC (RS-485)



(Fig. 2-3)

### Shielded wire

Connect only one side of the shielded wire to the FG terminal so that current cannot flow to the shielded wire. If both sides of the shielded wire are connected to the FG terminal, the circuit will be closed between the shielded wire and the ground. As a result, current will run through the shielded wire and this may cause noise. Be sure to ground the FG terminal.

### Terminator (Terminal resistor)

Do not connect terminator with the communication line because each KT4H/B has built-in pull-up and pull-down resistors instead of a terminator. If there is a large distance between the PLC and the KT4H/B, connect the terminator on the PLC side. (Connect a terminator of 120Ω or more resistance.)

## 3. Communication parameter setting

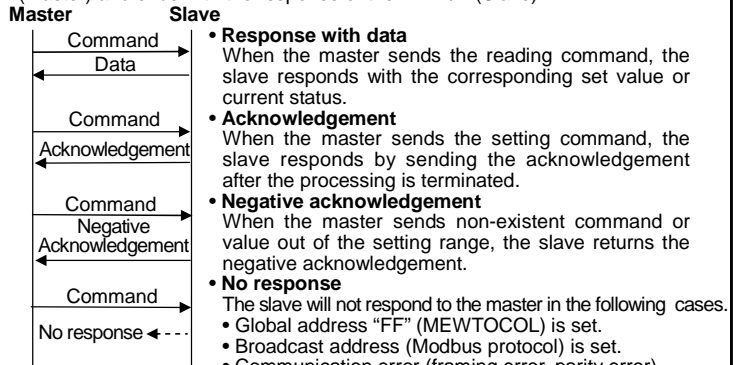
Set each communication parameter following the procedures below.

- (1) + MODE → Proceed to Auxiliary function setting mode. Press MODE key while pressing key in the PV/SV display mode. The unit proceeds to Auxiliary function setting mode.
- (2) [17] → Auxiliary function setting mode. Press MODE key twice. The unit proceeds to Communication protocol selection.
- (3) [19] → Communication protocol selection. Select the communication protocol. ModR : Modbus ASCII mode (Default), ModR : Modbus RTU mode, MEWT : MEWTOCOL (Slave).
- (4) [20] → Instrument number setting. Set the instrument number of the controller individually when communicating by connecting plural instruments. 1 to 99 (Default: 1).
- (5) [21] → Communication speed selection. Set the communication speed equal to that of the host computer. 24 : 2400bps, 48 : 4800bps, 96 : 9600bps (Default), 192 : 19200bps.
- (6) [22] → Data bit/Parity selection. Select the data bit and parity. B8N0N : 8 bits/No parity, B7N0N : 7 bits/No parity, B8EVEN : 8 bits/Even, B7EVEN : 7 bits/Even (Default), B8ODD : 8 bits/Odd, B7ODD : 7 bits/Odd.
- (7) [23] → Stop bit selection. Select the stop bit. 1 : 1 (Default), 2 : 2.
- (8) [24] → Communication response time setting. Set the minimum response time. 5 to 99 (Default: 5ms).

Numbers such as [17], [19], etc. are setting item numbers. Refer to the User's Manual for the KT4H/B.

## 4. Communication procedures

Communication starts with command transmission from the host computer (Master) and ends with the response of the KT4H/B (Slave).



(Fig. 4-1)

### RS-485 communication timing

#### Master side (Notice on programming)

Set the program so that the master can disconnect the transmitter from the communication line within a 1 character transmission period after sending the command in preparation for reception of the response from the slave. To avoid the collision of transmissions between the master and the slave, send the next command after carefully checking that the master received the response.

#### Slave side

When the slave starts transmission through the communication line, the slave is arranged so as to provide an idle status (mark status) transmission period of 5ms or more (communication response time from 5 to 99ms settable) before sending the response to ensure the synchronization on the receiving side. The slave is arranged so as to disconnect the transmitter from the communication line within a 1 character transmission period after sending the response.

## 5. Specifications

- Communication system : Half duplex
- Cable length : 1,000m (Max.), cable resistance 50Ω or less (Terminator: None or 120Ω or more on PLC side)
- Communication line : EIA RS-485
- Communication speed : 9600bps (2400, 4800, 9600, 19200bps) Selectable by key
- Synchronous system : Start-stop synchronous
- Code : ASCII (Modbus ASCII, MEWTOCOL), Binary (Modbus RTU)
- Error correction : Command request repeat system

### About User's Manual

- Please download User's Manual at <http://panasonic-denko.co.jp/ac/e/>
- For the detailed usage and User's Manual, please contact us at the address below.



# Panasonic<sup>®</sup> KT4H/B Temperature Controller

Installation Instructions No. KT4HE5 2009.07  
To ensure safe and correct use, thoroughly read and understand these instructions before using this instrument. For detailed usage and options, please refer to User's Manual for the KT4H/B.

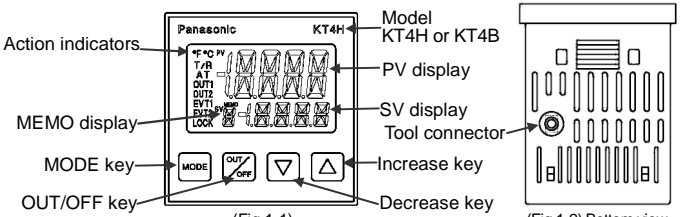
## SAFETY PRECAUTIONS

- (Be sure to follow the precautions described below to prevent injury or accidents.)**  
The safety precautions are classified into categories: "Warning" and "Caution".
- Warning:** Procedures which may lead to dangerous conditions and cause death or serious injury, if not carried out properly.
  - Caution:** Procedures which may lead to dangerous conditions and cause superficial to medium injury or physical damage or may degrade or damage the product, if not carried out properly.
- Warning**
- When using this controller on occasions which serious injury would be expected to occur or when damage is likely to expand or proliferate, make sure to take safety measures such as installing double safety structures.
  - Do not use this controller in an environment with flammable gases, or it may cause explosion.
- Caution**
- Fasten the electric wire with the terminal screws securely. Imperfect connection may cause abnormal heating or fumes.
  - Use this controller according to the rating and environmental conditions. Otherwise abnormal heating or fumes may occur.
  - Do not touch the terminals while the power is supplied to the controller, as this may cause electric shock.
  - Do not disassemble or modify the controller, as this may cause electric shock or fumes.

## Caution

- This instrument should be used in accordance with the specifications described in these instructions. If it is not used according to the specifications, it may malfunction or cause fire.
- Be sure to follow the warnings, cautions and notices. Not doing so could cause serious injury or accidents.
- The contents of this booklet are subject to change without notice.
- This instrument is designed to be installed in a control panel. If not, measures must be taken to ensure that the operator cannot touch power terminals or other high voltage sections.
- Be sure to turn the power supply to the instrument OFF before cleaning this instrument.
- Use a soft, dry cloth when cleaning the instrument.  
(Alcohol based substances may tarnish or deface the unit.)
- As the display section is vulnerable, do not strike or scratch it with a hard object.
- Any unauthorized transfer or copying of this document, in part or in whole, is prohibited.
- Matsushita Electric Works, Ltd. is not liable for any damages or secondary damages incurred as a result of using this product, including any indirect damages.

## 1. Name and functions of the sections

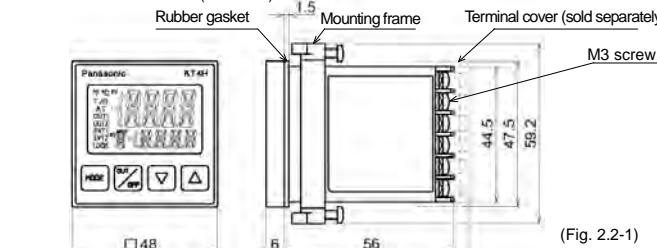


- MODE key:** Selects the setting mode, or registers the set value.  
**OUT/OFF key:** Switches control output ON/OFF or Auto/Manual control.  
**Increase key:** Increases the numeric value.  
**Decrease key:** Decreases the numeric value.  
**PV display:** Indicates the PV (process variable).  
**SV display:** Indicates the SV (main set value).  
**MEMO display:** Indicates the set value memory number.
- Action indicators**
- °C:** Temperature unit °F or °C lights when selected.
  - TR:** Lights when Serial communication (option) is performing (TX output).
  - AT:** Flashes while AT (auto-tuning) or auto-reset is performing.
  - LOCK:** Lights when Lock 1, Lock 2 or Lock 3 is selected.
  - OUT1:** Lights when control output is ON or when Heating output (option) is ON.
  - OUT2:** Lights when cooling output (option) is ON.
  - EVT1:** Lights when Alarm 1 output is ON.
  - EVT2:** Lights when Alarm 2 output (option) is ON or Heater burnout alarm (option) is ON.
- Tool connector:** The following operations can be conducted from external computer by connecting the tool cable (sold separately). (1) Reading and setting of SV, PID and various set values, (2) Reading of PV and action status, (3) Function change

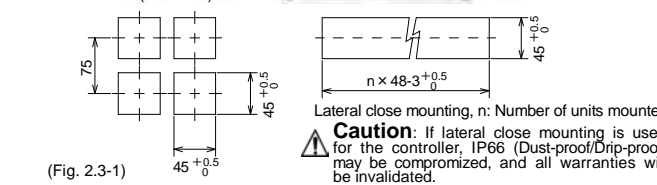
## 2. Mounting to the control panel

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

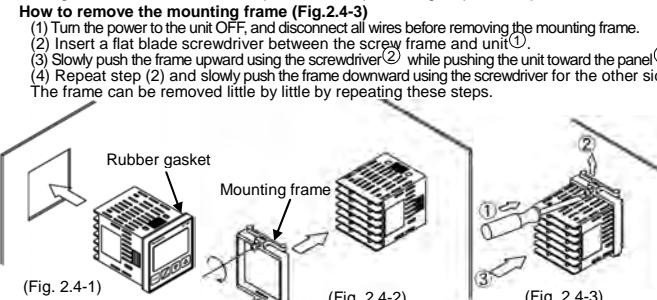
## 2.2 External dimensions (Unit: mm) Common to KT4H/B



## 2.3 Panel cutout (Unit: mm)



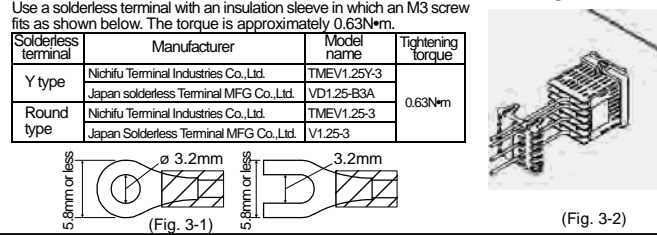
- 2.4 Mounting and removal to/from the control panel**  
**How to mount the KT4H/B (Fig.2.4-1, Fig.2.4-2)**  
Mount the controller vertically to ensure it adheres to the Dust-proof/Drip-proof specification (IP66). Mountable panel thickness: Within 1 to 5mm  
(1) Insert the controller from the front side of the panel.  
(2) Insert the mounting frame until the frame tips come into contact with the panel, and fasten with screws.  
Tighten screws with one rotation upon the screw tips touching the panel. Torque: 0.05 to 0.06N·m.
- How to remove the mounting frame (Fig.2.4-3)**  
(1) Turn the power to the unit OFF, and disconnect all wires before removing the mounting frame.  
(2) Insert a flat blade screwdriver between the screw frame and unit.  
(3) Slowly push the frame upward using the screwdriver while pushing the unit toward the panel.  
(4) Repeat step (2) and slowly push the frame downward using the screwdriver for the other side. The frame can be removed little by little by repeating these steps.



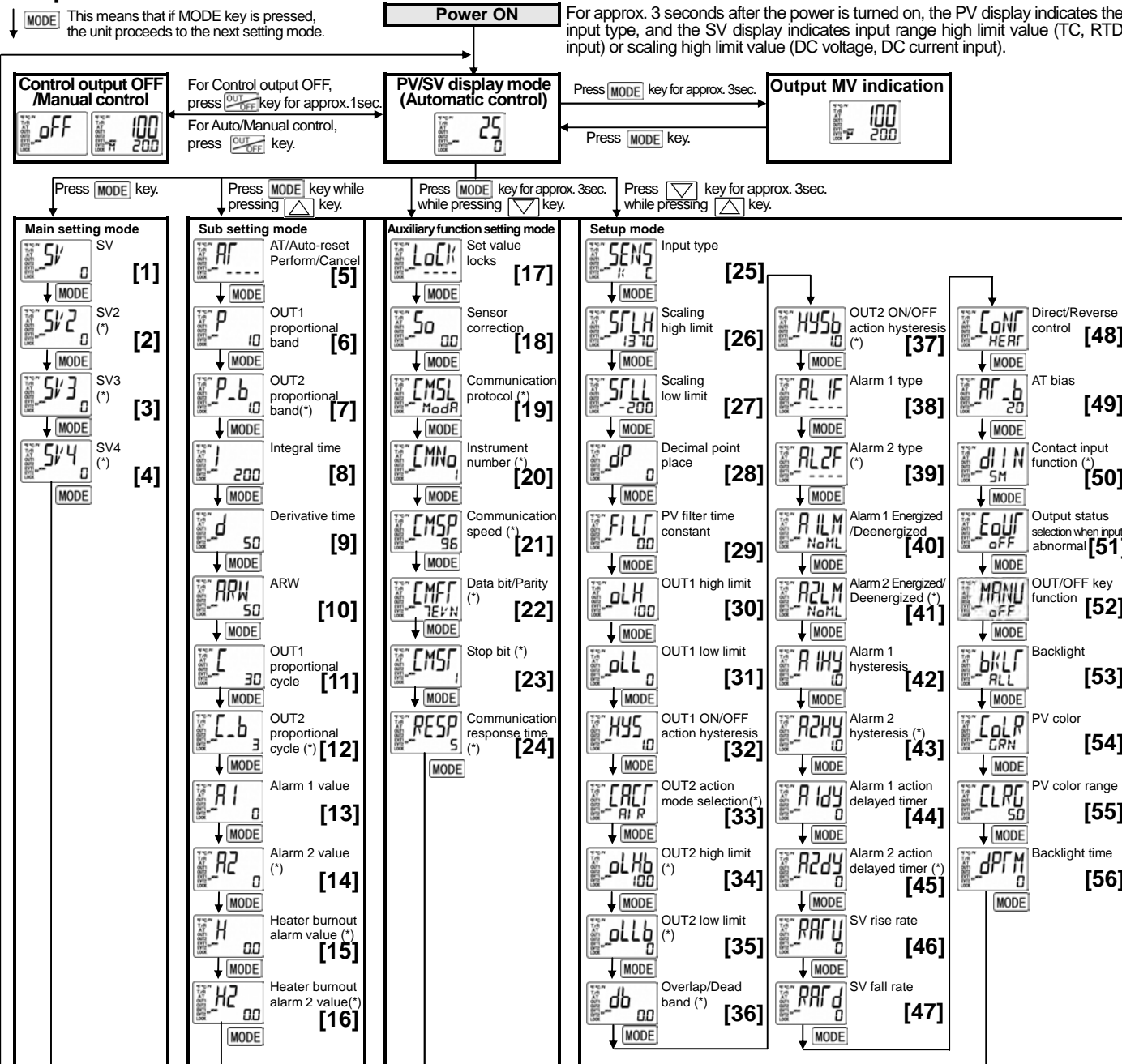
## 3. Wiring

- Warning**  
Turn the power supply to the instrument off before wiring or checking it. Working or touching the terminal with the power switched on may result in severe injury or death due to Electric Shock.
- Caution**
- The terminal block of this instrument is designed to be wired from the left side. The lead wire must be inserted from the left side of the terminal, and fastened by the terminal screw. The torque is approximately 0.63N·m.
  - When using a terminal cover (AKT4H801), pass terminal wires numbered 7 to 12 into the holes of the terminal cover. See (Fig. 3-2).
  - To extend a thermocouple's lead wire, be sure to use a compensating lead wire in accordance with the sensor input specification. (If any other compensating lead wire is used, a temperature indication error may be caused.)
  - Use the 3-wire RTD which corresponds to the input specification of this controller.
  - This controller does not have a 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)
  - For a 24V AC/DC power source, do not confuse polarity when using direct current (DC).
  - When using a relay contact output type, externally use a relay according to the capacity of the load to protect the built-in relay contact.
  - When wiring, keep input wires (thermocouple, RTD, etc.) away from AC sources or load wires to avoid external interference.
  - If Alarm 2 and Heater burnout alarm are added together, they (EVT2) utilize common output terminals.

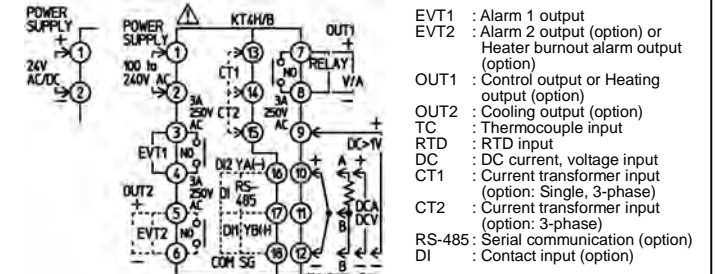
- Lead wire solderless terminal**  
Use a solderless terminal with an insulation sleeve in which an M3 screw fits as shown below. The torque is approximately 0.63N·m.
- | Solderless terminal | Manufacturer                            | Model name  | Tightening torque |
|---------------------|---|-------------|-------------------|
| Y type              | Nichifu Terminal Industries Co., Ltd.   | TMEV1.25Y-3 | 0.63N·m           |
|                     | Japan solderless Terminal MFG Co., Ltd. | VD1.25-3BA  |                   |
| Round type          | Nichifu Terminal Industries Co., Ltd.   | TMEV1.25-3  | 0.63N·m           |
|                     | Japan Solderless Terminal MFG Co., Ltd. | V1.25-3     |                   |



## 5. Operation flowchart



(\*) : Setting items with (\*) are optional, and they appear only when the options are added. Numbers such as [1], [2], etc. are setting item numbers in the User's Manual.



- Wiring of Heater burnout alarm (single, 3-phase)**  
This alarm is not usable for detecting heater current under phase control. Use the current transformer (CT) provided, and pass one lead wire of the heater circuit into the hole of the CT. (Fig.3-4) When wiring, keep the CT wire away from AC sources or load wires to avoid the external interference. In the case of 3-phase, pass any 2 lead wires of R, S, T into the CT, and connect them with CT1 (13, 14) and CT2 (14, 15) terminals.

## 4. Operation

- After the unit is mounted to the control panel and wiring is completed, operate the unit following the procedures below.  
**(1) Turn the power supply to the KT4H/B ON.**  
**(2) Initial settings**  
Refer to "5. Operation flowchart", "6. Basic operation" and "7. AT Perform/Cancel". Select an input type, alarm type, Direct/Reverse action, etc. during Setup mode. If initial settings are not required, skip this step, and proceed to step (3).  
**Input type selection (Default: K, -200 to 1370°C)**

Input type	Temperature range	Input type	Temperature range
K	-200 to 1370 °C	F	-320 to 2500 °F
J	-200.0 to 400.0 °C	F	-320.0 to 750.0 °F
R	-200 to 1000 °C	F	-320 to 1800 °F
S	0 to 1760 °C	F	0 to 3200 °F
B	0 to 1760 °C	F	0 to 3200 °F
E	0 to 1820 °C	F	0 to 3300 °F
T	-200 to 800 °C	F	-320 to 1500 °F
N	-200.0 to 400.0 °C	F	-320.0 to 750.0 °F
PL-II	-200 to 1300 °C	F	-320 to 2300 °F
PL-III	0 to 1390 °C	F	0 to 2500 °F
C(W/Re5-26)	0 to 2315 °C	F	0 to 4200 °F
Pt100	-200.0 to 850.0 °C	F	-320.0 to 1500.0 °F
JPT100	-200.0 to 500.0 °C	F	-320.0 to 900.0 °F
Pt100	-200 to 850 °C	F	-320 to 1500 °F
JPT100	-200 to 500 °C	F	-320 to 900 °F
420A	4 to 20mA		
200A	0 to 20mA		
0	0 to 1V		
0	0 to 5V		
0	1 to 5V		
0	0 to 10V		

- Alarm type selection (Default: No alarm action "----")**
- | Alarm action | High limit alarm | Low limit alarm | High/Low limits alarm |
|--------------|------------------|-----------------|-----------------------|
| ON           | A1 hysteresis    | A1 hysteresis   | A1 hysteresis         |
| OFF          | A1 hysteresis    | A1 hysteresis   | A1 hysteresis         |
- Alarm Energized/Deenergized selection**  
[Default: EVT1 contact output ON (Energized) NoML]  
NoML: EVT1 contact output ON (Energized) REVF: EVT1 contact output OFF (Deenergized)
- Direct/Reverse action selection (Default: Reverse (Heating) HEARF)**  
HEARF: Reverse action (Heating), COOL: Direct action (Cooling)
- OUT/OFF key function selection (Default: OUT/OFF function OFF)**  
OFF: OUT/OFF function, MANU: Auto/Manual control function
- Set value lock selection (Default: Unlock "----")**  
LoC1: Lock 1 (All set values are locked)  
LoC2: Lock 2 (All set values except SV are locked)  
LoC3: Lock 3 (Set values can be changed temporarily, however, after the power is turned off and on, they return to their previous values.)
- Turn the load circuit power ON.**  
Control action starts so as to keep the control target at the SV (desired value).

- 6. Basic operation** (Main setting mode, When setting SV to 100°C)  
(1) Press **MODE** key in the PV/SV display mode. The unit proceeds to the Main setting mode.  
(2) Set SV. Set SV with **▲** or **▼** key.  
(3) Register the SV. Register the SV by pressing **MODE** key. The unit reverts to the PV/SV display mode.  
(4) Control starts. Control starts so as to keep the measuring temperature at 100°C.

- 7. AT Perform/Cancel (PID action)**  
In order to set each value of P, I, D and ARW automatically, the auto-tuning process should be made to fluctuate to obtain an optimal value. Sometimes the auto-tuning process will not fluctuate if auto-tuning is performed at or near room temperature. Therefore auto-tuning might not finish normally.  
(1) Press **MODE** key while pressing **▲** key in the PV/SV display mode. The unit proceeds to the Sub setting mode.  
(2) Select AT Perform/Cancel. Select AT Perform with **▲** key, or select AT Cancel with **▼** key.  
(3) Confirm AT Perform/Cancel. Press **MODE** key. The unit reverts to the PV/SV display mode.  
(4) AT Perform/Cancel. While AT is performing, the AT indicator flashes, and it goes off when AT is cancelled.

- 8. Specifications**  
**Power supply:** 100 to 240V AC 50/60Hz, or 24V AC/DC 50/60Hz  
Allowable fluctuation range: 100 to 240V AC: 85 to 264V AC, 24V AC/DC: 20 to 28V AC/DC
- Indication accuracy**  
Thermocouple: Within ±0.2% of each input span ±1digit, or within ±2°C (4°F), whichever is greater  
However, for R, S inputs, 0 to 200°C (0 to 400°F): Within ±6°C (12°F)  
B input, 0 to 300°C (0 to 600°F): Accuracy is not guaranteed.  
K, J, E, T, N inputs, less than 0°C (32°F): Within ±0.4% of input span ±1digit  
RTD: Within ±0.1% of each input span ±1digit, or within ±1°C (2°F), whichever is greater  
DC current, voltage input: Within ±0.2% of each input span ±1digit
- Control output**  
Relay contact: 1a, Control capacity, 3A 250V AC (resistive load) 1A 250V AC (inductive load cosφ=0.4)  
Electric life: 100,000 cycles  
Non-contact voltage (For SSR drive): 12V DC ±15%, Max. 40mA (short circuit protected)  
DC current: 4 to 20mA DC, Load resistance, Max. 550Ω
- Alarm 1 output, Alarm 2 output, Heater burnout alarm output**  
Relay contact 1a, Control capacity, 3A 250V AC (resistive load), Electric life, 100,000 cycles  
Control output 2  
Relay contact 1a, Control capacity, 3A 250V AC (resistive load), Electric life, 100,000 cycles  
Non-contact voltage (For SSR drive): 12V DC ±15%, Max. 40mA DC (short circuit protected)
- Contact input**  
Circuit current when closed: Approx. 6mA  
**Power consumption:** Approx. 8VA  
**Ambient temperature, humidity:** 0 to 50°C (32 to 122°F), 35 to 85%RH (no condensation)  
**Weight:** Approx. 120g
- Accessories included:** Mounting frame 1 piece, Rubber gasket (Mounted to the unit) 1 piece, Installation instructions 1 copy  
Heater burnout alarm Single phase 20A: CT1 (AKT4815), 50A: CT2 (AKT4816) 1 piece each  
Heater burnout alarm 3-phase 20A: CT1 (AKT4815), 50A: CT2 (AKT4816) 2 pieces each  
**Accessories sold separately:** Terminal cover (AKT4H801), Shunt resistor (AKT4810 (50Ω))  
Tool cable (AKT4H820)

**About User's Manual**  
Please download User's Manual at <http://www.nais-e.com/download/index.html>  
For the detailed usage and User's Manual, please contact us at the address below.

Panasonic Electric Works Co., Ltd. Automation Controls Business Unit | Pursuant to the directive 2004/108/EC, article 9(2)  
Head Office: 1048 Kadoma, Kadoma-shi, Osaka 571-8686, Japan | Panasonic Electric Works Europe AG  
Telephone: Japan (81) Osaka (06) 6908-1050 | Rudolf-Diesel-Ring 2 83607 Holzkirchen, Germany  
Facsimile: Japan (81) Osaka (06) 6908-5781 | This product has been developed/produced for industrial use only.