Panasonic

Overview

TEMPERATURE CONTROLLERS

Ecological • Reliable • Highest quality • Cost-saving

Overview

Dimensions W x H x D (mm)	Display character height (mm)					
	PV: 8.7 / SV: 8.7	12 / 6	12.4 / 8.8	7.4 / 7.4	14 / 14	14 / 14
96 x 96 x 58.5						**KT9R** Big display
48 x 96 x 58.8					**KT8R** Easy readable display	
22.5 x 75 x 100			**KT7** DIN rail			
48 x 48 x 58.8		**KT4R** High performance				
48 x 48 x 56	**KT4H/KT4B** 11 segment LCD display					
48 x 24 x 98.5	**KT2** Nine step pattern control					

Common features

› Multi-input: Versatile thermocouple, RTD, DC current, DC voltage
› Control modes: PID, on/off control, Anti-Reset-Windup (ARW)
› Control output: Relay, non-contact voltage output (for SSR drive, DC output)
› Accuracy: ± 0.2% span

› Simple operation
› Heater burnout alarm available
› Alarm output with 9 different operation modes
› RS485 ASCII/Modbus communication available
› Supply voltage: 24V AC/DC or 100 to 240V AC
› Compliant with UL, CSA standards and CE marking

Applications

Constant temperature bath

Scrubber

Shrink wrapping machine

Oven

Warm and cold storage units

Printing machine

Contributing to space saving, cost saving, and effort saving of various heater control systems.

Injection molding machine

Temperature control system configuration

Sensor

Temperature controlled bath

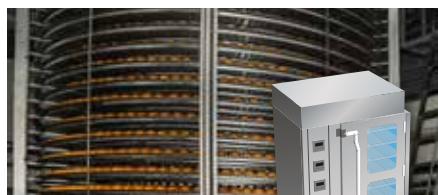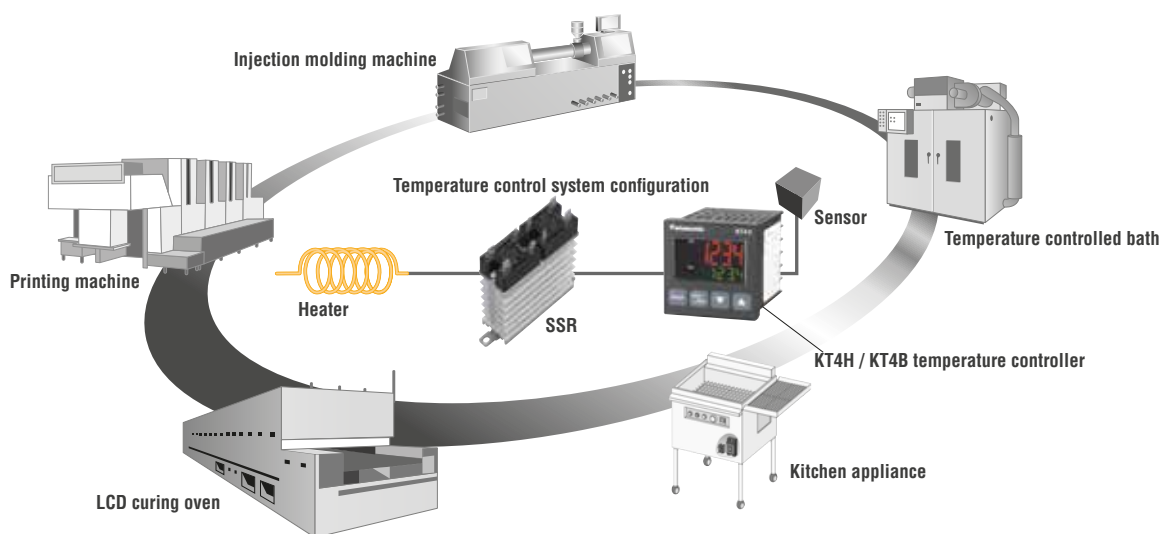Printing machine

Heater

SSR

KT4H / KT4B temperature controller

Kitchen appliance

LCD curing oven

Selection of products

Model	KT2	KT4R	KT4H / KT4B	KT7	KT8R	KT9R
Dimensions (W x H x D)	48 x 24 x 98.5mm	48 x 48 x 58.8mm	48 x 48 x 56mm	22.5 x 75 x 100mm	48 x 96 x 58.8mm	96 x 96 x 58.8mm
Degree of protection	IP66 (applicable only to the front panel subject to rubber gasket employed) except for **KT7**					
Output type	Output range					
Control output — Relay contact	1a	1a	1a1b	1a	1a1b	1a1b
	3A 250V AC (resistive load), 1A 250V AC (inductive load cos Ø = 0.4), electric life: 100 000 times					
Control output — DC voltage	12 to 14V DC; max. load current: 40mA (short-circuit protected)					
Control output — DC current	4 to 20mA DC, load resistance: max. 550Ω					
Input type	Input range					
Thermocouple — K	−200 to 1370°C					
	−199.9 to 400°C					
Thermocouple — J	−200 to 1000°C					
Thermocouple — R	0 to 1760°C					
Thermocouple — S	0 to 1760°C					
Thermocouple — B	0 to 1820°C					
Thermocouple — E	−200 to 800°C					
Thermocouple — T	−199.9 to 400°C		−200 to 400°C	−199.9 to 400°C		
Thermocouple — N	−200 to 1300°C					
Thermocouple — PL-II	−200 to 1390°C					
Thermocouple — C (W/Re5-26)	0 to 2315°C					
RTD — Pt100	−200 to 850°C					
	−199.9 to 850°C		−200 to 850°C	−199.9 to 850°C		
RTD — JPt100	−200 to 500°C					
RTD — 3-conductor system	−199.9 to 500°C		−200 to 500°C	−199.9 to 500°C		
DC current — 4 to 20mA DC / 0 to 20mA DC; **DC voltage** — 0 to 1V DC / 0 to 10V DC / 1 to 5V DC / 0 to 5V DC	-1999.0 to 9999.0; −199.9 to 999.9; −19.99 to 99.99; −1999.9 to 9.999 • Scaling and change to the decimal point position is possible for DC current and DC voltage input. • DC current input is supported with an externally mounted 50Ω shunt resistor (sold separately).		−2000 to 10,000		-1999.0 to 9999.0; −199.9 to 999.9; −19.99 to 99.99; −1999.9 to 9.999 • Scaling and change to the decimal point position is possible for DC current and DC voltage input. • DC current input is supported with an externally mounted 50Ω shunt resistor (sold separately).	
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					
Supply voltage (must be specified)	100 to 240V AC 24V AC/DC	100 to 240V AC	100 to 240V AC 24V AC/DC	100 to 240V AC 24V AC/DC	100 to 240V AC	100 to 240V AC
Communication function	RS485/Modbus Communication speed: 2400/4800/9600/19200bit/s					
Standards — EMC directives	EN61000-6-4/EN61000-6-2					
Standards — Low-voltage directives	EN61010-1/IEC61010-1					

Further specifications see page 14.

KT4R/KT8R/KT9R

Easy to configure and to program

› Fast & easy configuration
› Built-in easy programming function

› Fine control of heat capacity
› Built-in rearing auto tuning function

KT4R series

Base model	Power supply	Sensor input	Control output	Alarm output	Heating/cooling control	Heater burnout alarm	Communication function	Model No.
AKT4R	1 100 to 240V AC	1 multi-input	1 relay contact	1	0	0	—	AKT4R111100
							1 (serial communication RS485)	AKT4R1111001
				2			—	AKT4R111200
							1 (serial communication RS485)	AKT4R1112001
			2 non-contact voltage outputs	1			—	AKT4R112100
							1 (serial communication RS485)	AKT4R1121001
				2			—	AKT4R112200
							1 (serial communication RS485)	AKT4R1122001

KT8R series

Base model	Power supply	Sensor input	Control output	Alarm output	Heating/cooling control	Heater burnout alarm	Model No.
AKT8R	1 100 to 240V AC	1 multi-input	1 relay contact	1	0	0	AKT8R111100
				2 (see note)			AKT8R111200
			2 non-contact voltage outputs	1			AKT8R112100
				2			AKT8R112200

Note: EV2 can be activated for heating and cooling control.

KT9R series

Base model	Power supply	Sensor input	Control output	Alarm output	Heating/cooling control	Heater burnout alarm	Model No.
AKT9R	1 100 to 240V AC	1 multi-input	1 relay contact	1	0	0	AKT9R111100
			3 non-contact voltage outputs	1			AKT9R113100

■ Options

Product	Applicable for	Model No.
Terminal cover	KT4R	AKT4H801
	KT8R	AKT8R801
	KT9R	AKT9R801
Installation frame	KT4R	AKW4822
	KT8R	AKW8822
	KT9R	—

Note: Since a shunt resistor is built in, a separately sold shunt resistor is not required when DC current input is specified.
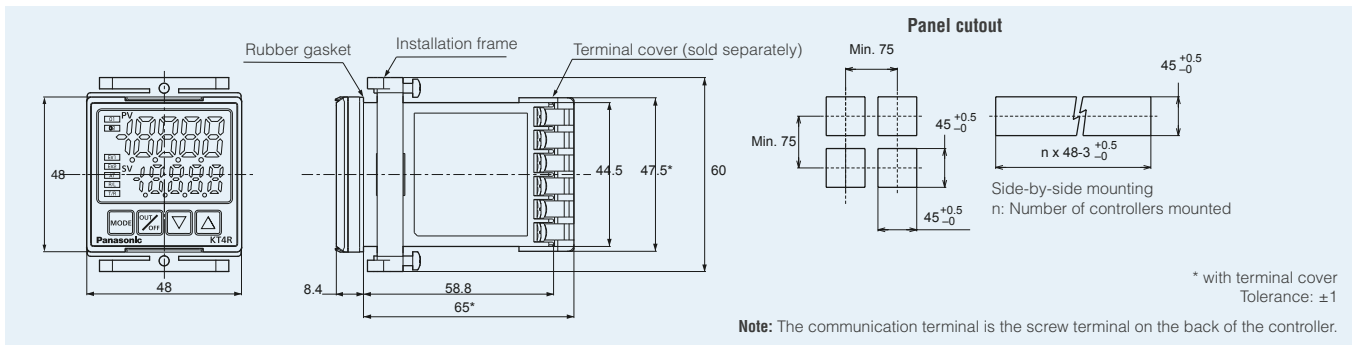
1	PV display	Indicates the process value (PV).
2	SV display	Indicates the set value (SV).
3	Increase key	Increases the numeric value.
4	Decrease key	Decreases the numeric value.
5	Mode key	Selects the setting mode or registers the set value.
6	OUT / OFF key	The control output ON / OFF, auto / manual control function or program control can be switched (not available for **KT7**).
7	MEMO / STEP display	Indicates the set value memory number during fixed value control (**KT8R** and **KT9R** only) or the step number during program control.
8	Action indicators (not available for **KT7**)	
	O1	Lights up when control output 1 is ON or when heating control output (option) is ON. For the DC current output type, it flashes corresponding to the manipulated variable in a 125ms cycle.
	O2	Lights up when cooling control output (option) is ON.
	EV1	Lights up when Alarm 1 output is ON.
	EV2	Lights up when Alarm 2 output (option) is ON.
	AT	Flashes during auto-tuning or auto-reset.
	T/R	Lights up during serial communication (option) TX output (**KT4R** only).

Note: The colors are the same for all models.

■ Dimensions KT4R (unit: mm)

Rubber gasket Installation frame Terminal cover (sold separately)

Panel cutout

Min. 75

45 $^{+0.5}_{-0}$

Min. 75

45 $^{+0.5}_{-0}$

45 $^{+0.5}_{-0}$

n x 48-3 $^{+0.5}_{-0}$

Side-by-side mounting
n: Number of controllers mounted

44.5 47.5* 60

48

48

8.4 58.8 65*

* with terminal cover
Tolerance: ±1

Note: The communication terminal is the screw terminal on the back of the controller.

■ Dimensions KT8R (unit: mm)

Rubber gasket Screw type mounting bracket Terminal cover (sold separately)

Panel cutout

Min. 75

92 $^{+0.5}_{-0}$

Min. 130

92 $^{+0.5}_{-0}$

45 $^{+0.5}_{-0}$

n x 48-3 $^{+0.5}_{-0}$

Side-by-side mounting
n: Number of controllers mounted

96

91 94* (106)

48

8.4 58,8 67*

* with terminal cover
Tolerance: ±1

■ Dimensions KT9R (unit: mm)

Rubber gasket Screw type mounting bracket Terminal cover (sold separately)

Panel cutout

Min. 130

92 $^{+0.8}_{-0}$

Min. 130

n x 96-3 $^{+0.5}_{-0}$

Side-by-side mounting
n: Number of controllers mounted

92 $^{+0.5}_{-0}$

96

91 94* (106)

96

8,4 58.8 67*

* with terminal cover
Tolerance: ±1

KT2

Tiny size – pattern control

› 1/32 DIN size temperature controller
› Size 48 x 24 x 95.5mm (WxHxD)
› 9-step pattern control (ramp function)
› Panel-mounted type
› IP66 waterproof (front side if panel mounted)

› 2 set values possible (externally selectable)
› 2nd optional alarm output
› Heating and cooling control with 2nd optional control output (relay)
› Analog value converter function

■ **Product types**

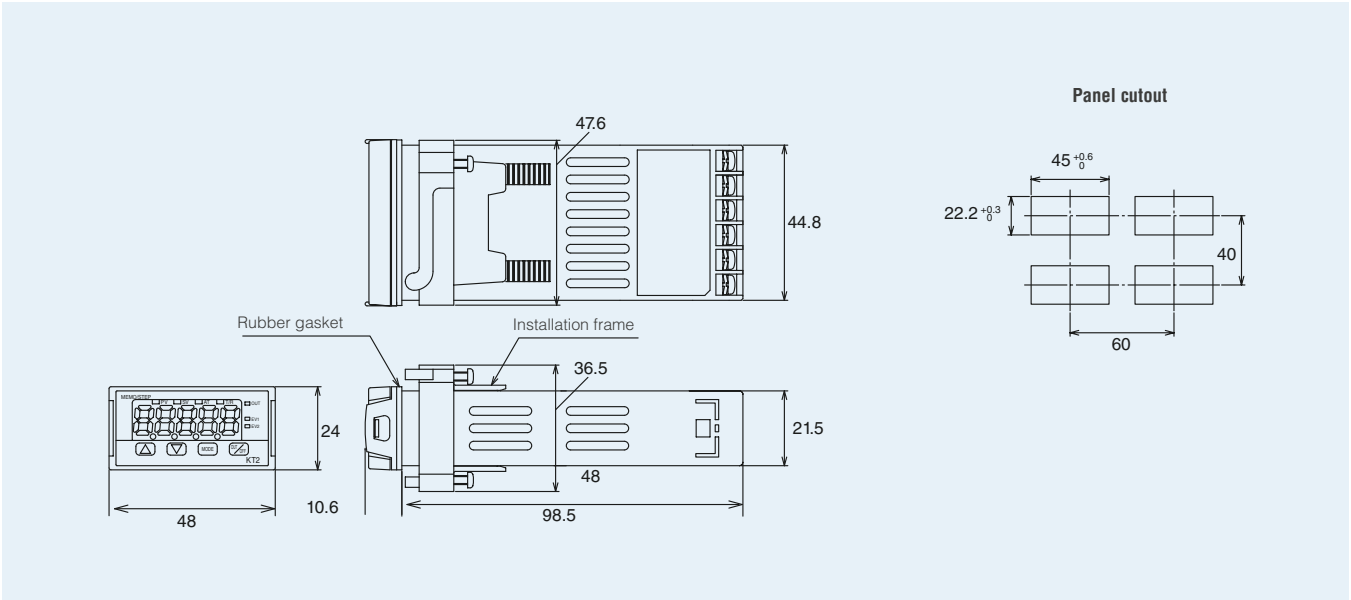| Base model	Power supply	Sensor input	Control output	Alarm output	Heating/ cooling control	Heater burnout alarm	Communication function	Description	
AKT2								48 x 24 x 98.5mm	
	1							100 to 240V AC	Must be specified
	2							24V AC/DC	
		1						Multi-input (thermocouple, RTD, DC current and DC voltage)	
			1					Relay contact output 1a 3A 250V AC	Must be specified
			2					Non-contact voltage output (for SSR drive)	
			3					Current output	
				2	0	0	Blank	When neither the heating/cooling nor the communication function is added: Relay contact output (alarm 1): Can be used Open collector output (alarm 2): Can be used	
				1	1	0	Blank	When only the 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 the 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 the heating/cooling and the communication functions are added: Relay contact output (alarm 1): Cannot be used Open collector output (alarm 2): Cannot be used	

Note:

When heating/cooling is selected, alarm output 1 cannot be used. When the communication function is selected, alarm output 2 cannot be used.
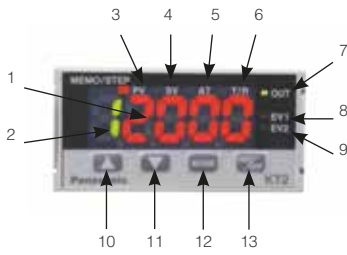
1	**PV/SV display (red)**	Indicates the process value and set value. During setting mode, characters and set value of the setting item are indicated in turn.
2	**MEMO/STEP display (green)**	Indicates the set value memory number during fixed value control or the step number during program control.
3	**PV indicator (red)**	Lights up when the process value (PV) is indicated.
4	**SV indicator (green)**	Lights up when the main set 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 the 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 set value. (By pressing the Mode key, the set value or selected value can be registered.)
13	**OUT/OFF key**	The control output OUT/OFF or program control RUN/STOP can be switched.

■ **Dimensions KT2 (unit: mm)**

KT4H / 4B

Small-sized standard type

› 1/16 DIN size temperature controller
› Size 48 x 48 x 62 (WxHxD)
› Panel-mounted type
› IP66 waterproof (frontside if panel mounted)

› 2nd optional alarm output
› Heating and cooling control with optional control output (non-contact voltage output)

■ Product types

Base model	Power supply	Sensor input	Control output	Alarm output	Heating/cooling control	Heater burn-out alarm	Communica-tion function	Description	
AKT4H/-B								48 x 48 x 62mm	
	1							100 to 240V AC	
	2							24V AC/DC	
		1						Multi-input (thermocouple, RTD, DC current and DC voltage)	
			1					Relay contact output 1a 3A 250V AC	
			2					Non-contact voltage (for SSR drive)	
			3			0		DC current	**Heater burnout alarm not possible**
				1				1 point (1a)	
				2	0			2 points (1a + 1a)	**Heating/cooling control output not possible**
					0			Not available	
					1	0		Relay contact	**Heater burnout alarm not possible**
					2	0		Non-contact voltage (for SSR drive)	**Heater burnout alarm not possible**
						0		Not available	
			1 or 2		0	3		Single phase 20A (heater burnout 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 burnout 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 burnout 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 burnout 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 RS485	
							2	Contact input	

Notes:
*1 Current transformer **CT1** or **CT2** is included with **KT7** and **KT4H** when heater burnout alarm function is added.
*2 Under some conditions, option functions (shaded items) may not be available; please check the description in the table above for details.
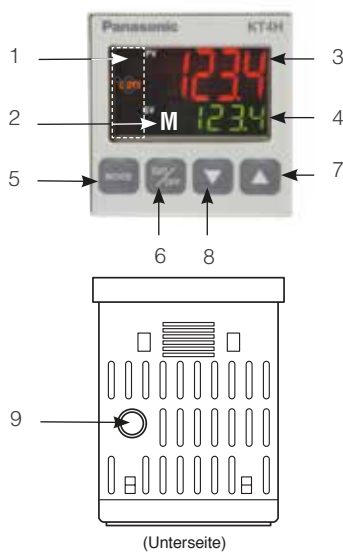
■ Options

Product name	Model No.
Shunt resistor (for DC current input)	AKT4810
Terminal cover	AKT4H801
Tool cable	AKT4H820
Installation frame for **KT4**, **KT4H/-B**	AKW4822

■ Setting software

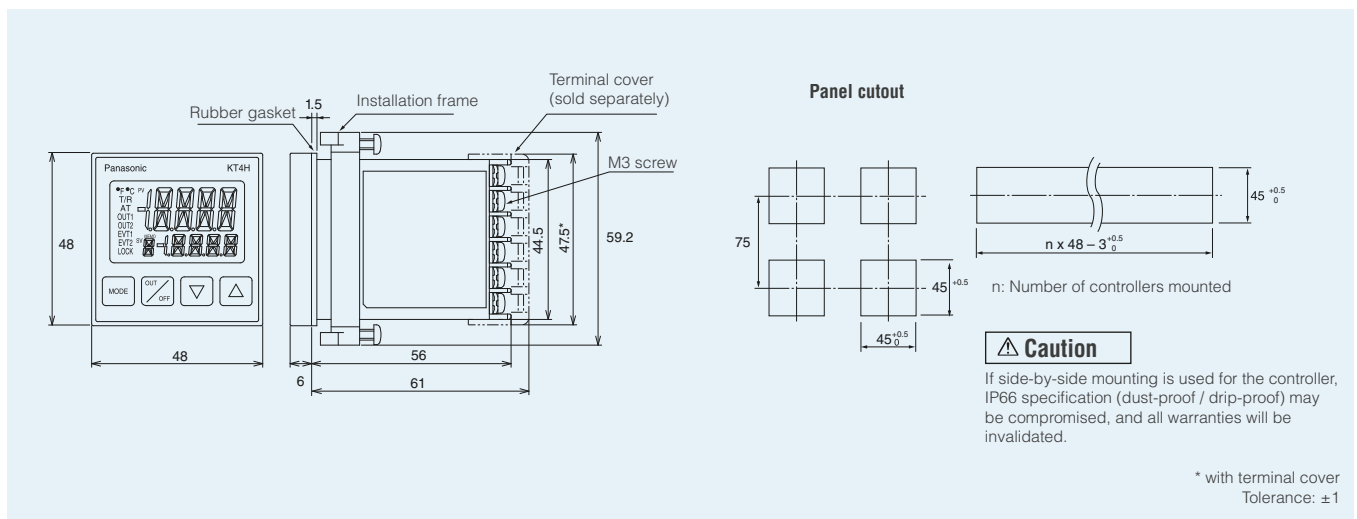| Product name	Description
KT Monitor	Editing of all types of data, file saving, monitoring of readings, saving of log files

Note: Please download the user manual from our website.

(Unterseite)

	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 up when control output or Heating output is ON: For the DC current output type, it flashes corresponding to the manipulated variable in a 0.25 second cycle.
		OUT2	Lights up when cooling output (option) is ON.
		EVT1	Lights up when alarm 1 output is ON.
		EVT2	Lights up when alarm 2 output (option) is ON or heater burnout alarm (option) is ON.
		LOCK	Lights up 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 value) (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 KT4H / KT4B (unit: mm)

Rubber gasket   1.5

Installation frame

Terminal cover (sold separately)

M3 screw

Panel cutout

n: Number of controllers mounted

n x 48 − 3 $^{+0.5}_{0}$

$45^{+0.5}_{0}$

$45^{+0.5}_{0}$

$45^{+0.5}_{0}$

75

48   48   6   56   61   44.5   47.5*   59.2

⚠ **Caution**

If side-by-side mounting is used for the controller, IP66 specification (dust-proof / drip-proof) may be compromised, and all warranties will be invalidated.

* with terminal cover
Tolerance: ±1

KT7

Slim rail-mounting type

› Size 22.5 x 75 x 100mm (WxHxD)
› Front screw terminals
› DIN rail mounting type

› Alarm output
› Analog value converter function

■ Product Types

Base model	Power supply	Sensor input	Control output	Alarm output	Heating/cooling control	Heater burnout alarm	Communication function	Description
AKT7								22.5 x 75 x 100mm
	1							100 to 240V AC
	2							24V AC/DC
		1						Multi-input (thermocouple, RTD, DC current and DC voltage)
			1					Relay contact output 1a 3A 250V AC
			2					Non-contact voltage output (for SSR drive)
			3					Current output
				1				Open collector output (alarm output 1)
					0			Not available (without heating/cooling function)
						0		Not available
						1		5A (not available for current output type) open collector output
						2		10A (not available for current output type) open collector output
						3		20A (not available for current output type) open collector output
						4		50A (not available for current output type) open collector output
								Not available
							1	Available

Note:
Current transformer **CT1** or **CT2** is included with **KT7** and **KT4H** when heater burnout alarm function is added.

1	**PV display**	Indicates the process value (PV).
2	**SV display**	Indicates the set value (SV).
3	**Increase key**	Increases the numeric value.
4	**Decrease key**	Decreases the numeric value.
5	**Mode key**	Selects the setting mode or registers the set value.

■ Dimensions KT7 series (unit: mm)
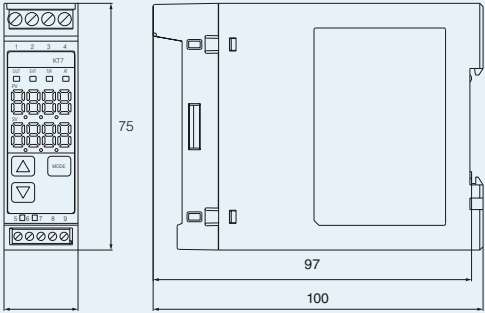
Note: The communication terminal is the modular jack on the bottom of the controller.

■ Performance outline

Item				KT2	KT4R	KT8R	KT9R	KT7	KT4H / KT4B
						Specifications			
Size				48 × 24mm	48 × 48mm	48 × 96mm	96 × 96mm	22.5 × 75mm	48 × 48mm
Rating		Rating power supply (Must be specified)		100 to 240V AC					
				24V AC / DC	–	–	–	24V AC / DC	24V AC / DC
		Rating frequency		50 / 60Hz					
		Rating power consumption		5 VA approx.	8 VA approx.			6 VA approx.	8 VA approx.
	Rating scale	Input type		Input range					
		Thermocouple	K	−200 to 1370°C	−200 to 1370°C			−200 to 1370°C	
				−199.9 to 400°C	−200 to 400°C			−199.9 to 400°C	−200 to 400°C
			J	−200 to 1000°C	−200 to 1000°C			−200 to 1000°C	
			R	0 to 1760°C	0 to 1760°C			0 to 1760°C	
			S	0 to 1760°C	0 to 1760°C			0 to 1760°C	
			B	0 to 1820°C	0 to 1820°C			0 to 1820°C	
			E	−200 to 800°C	−200 to 800°C			−200 to 800°C	
			T	−199.9 to 400°C	−200 to 400°C			−199.9 to 400°C	−200 to 400°C
			N	−200 to 1300°C	−200 to 1300°C			−200 to 1300°C	
			PL–II	0 to 1390°C	0 to 1390°C			0 to 1390°C	
			C (W / Re5–26)	0 to 2315°C	0 to 2315°C			0 to 2315°C	
		RTD	Pt100	−200 to 850°C	−200 to 850°C			−200 to 850°C	−200 to 850°C
				−199.9 to 850°C	−200 to 850°C			−199.9 to 850°C	−200 to 850°C
			JPt100	−200 to 500°C	−200 to 500°C			−200 to 500°C	
				−199.9 to 500°C	−200 to 500°C			−199.9 to 500°C	−200 to 500°C
		DC	Current 4 to 20mA DC	−1999 to 9,999 −199.9 to 999.9 −19.99 to 99.99 −1.999 to 9.999	−2000 to 10,000			−1999 to 9,999 −199.9 to 999.9 −19.99 to 99.99 −1.999 to 9.999	−2000 to 10,000
			Current 0 to 20mA DC						
			Voltage 0 to 1V DC						
			Voltage 0 to 10V DC						
			Voltage 1 to 5V DC						
			Voltage 0 to 5V DC						
				• Scaling and change to the decimal point position is possible for DC current input and DC voltage input. • DC current input of **KT2 / KT7 / KT4H / KT4B** 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) External resistor: max. 100Ω (max. 40Ω external resistor for B input)					
	RTD			Pt100, JPt100, 3-conductor system (allowable input conductor resistance for each conductor: max. 10Ω)					
	DC current	0 to 20mA DC		Input impedance: 50Ω (for **KT2 / KT7 / KT4H / KT4B**; 50Ω shunt resistor between input terminals is required.) Allowable input current: max. 50mA (for **KT2 / KT7 / KT4H / KT4B** when 50Ω shunt resistor is used)					
		4 to 20mA DC							
	DC voltage	0 to 1V DC		Input impedance: min. 1MΩ, allowable input voltage: max 5V, allowable signal source resistance: max. 2kΩ					
		0 to 5V DC		Input impedance: min. 100kΩ, allowable input voltage: max 15V, allowable signal source resistance: max. 100Ω					
		1 to 5V DC							
		0 to 10V DC							
Control output	Relay contact			1a 3A 250V AC (at resistive load), 1A 250V AC (at inductive load cos ø = 0.4), electrical life: 100 000 times					
	Non-contact voltage (voltage output for SSR drive)	(Must be specified)		12 to 20V DC, max. load current: 40mA (with short-circuit protection circuit)					12V DC ±15% Max. load current: 40mA (with short-circuit protection circuit)
	DC current			4 to 20mA DC, load resistance: max. 550Ω					
Alarm output 1 (EV1)				Relay contact 1a 3A 250V AC (resistive load) 1a 1A 250V AC (cos ø = 0.4) Electrical life: 100 000 times				Open collector control capacity: 24V DC 0.1A (max.)	Relay contact 1a: Control capacity: 3A 250V AC (resistive load), electrical life: 100 000 times
Alarm output 2 (EV2)				Open collector: 0.1A 24V DC	Same as Alarm output 1		Not available	Not available	Same as Alarm output 1
Control method				PID action (with auto-tuning function), PI action, PD action (with manual reset function), P action (with manual reset function), ON / OFF action					
Target temperature setting				Primary setting / secondary setting (switched by external terminal)	–				Primary setting / secondary setting / third setting / fourth setting (switched by external terminal)
Program control function				1 pattern, 9-step setting is possible Note: The function for the OUT/OFF key needs to be set to "Program control".					–
Indication accuracy	Thermocouple			Within ± (0.2% + 1 digit) of each input span or within ±2°C whichever is greater R or S input: within ±6°C in the range of 0 to 200°C B input, range of 0 to 300°C: accuracy is not guaranteed. K, J, E, T, and N input, less than 0°C: within ± (0.4% ±1 digit) of input span					
	RTD			Within ± (0.1% + 1 digit) of each input span or ±1°C whichever is greater					
	DC current and DC voltage			Within ± (0.2% + 1 digit) of each input span					
Sampling period				250ms	125ms			250ms	

Item			Specifications					
			KT2	KT4R	KT8R	KT9R	KT7	KT4H / KT4B
Hysteresis (ON / OFF)			Thermocouple and RTD: 0.1 to 100°C DC current and DC voltage: 1 to 1000 (The decimal point place follows the selection)	Thermocouple and RTD: 0.1 to 1000°C DC current and DC voltage: 1 to 10,000 (The decimal point place follows the selection)			Thermocouple and RTD: 0.1 to 100°C DC current and DC voltage: 1 to 1000 (The decimal point place follows the selection)	
Proportional band			For sensor input range, DC current and DC voltage: 0 to 110%	Input without decimal point: 0 to Input span Input with decimal point: 0 to Input span DC current and DC voltage: 0 to 1000%			For sensor input range, DC current and DC voltage: 0 to 110%	0 to 1000°C Input with decimal point: 0 to 1000°C DC current and DC voltage: 0 to 100%
Integral time			0 to 1000 seconds	0 to 3600 seconds			0 to 1000 seconds	
Derivative time			0 to 300 seconds	0 to 1800 seconds			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. 10 MΩ					
Breakdown voltage			Between input terminal and power terminal Between output terminal and power terminal 1.5kV AC for 1 min.					
Malfunction vibration			10 to 55 Hz (1 cycle/min.), single amplitude: 0.35mm (10 min. on 3 axes)					
Breakdown vibration			10 to 55 Hz (1 cycle/min.), single amplitude: 0.75mm (1 hour on 3 axes)					
Malfunction shock			X, Y and Z each direction for 5 times 98 m/s²					
Breakdown shock			X, Y and Z each direction for 5 times 294 m/s²					
Ambient temperature			0 to 50°C	−10 to 55°C			0 to 50°C	
Ambient humidity			35 to 85% RH (No condensation)					
Mass			120g approx.	110g approx.	160g approx.	220g approx.	150g approx.	120g approx.
Degree of protection			IP66 (applicable only to the front panel subject to rubber gasket employed)				None	IP66 (applicable only to the front panel subject to rubber gasket employed)
Display character height			PV: 8.7mm SV: 8.7mm (PV / SV switching display)	PV: 12.4mm SV: 8.8mm	PV: 14mm SV: 14mm	PV: 14mm SV: 14mm	PV: 7.4mm SV: 7.4mm	PV: 12mm SV: 6mm
Options	Heating / Cooling control	Relay contact	Relay contact: 1a 3A 250V DC (at resistive load)	Heating and cooling control with 2nd optional control output (relay, non-contact voltage, or current) when the function has been allocated to EV2.		None	None	1a Control capacity: 3A 250V AC (at resistive load), electrical life: 100 000 times
		Non-contact voltage	–					12V DC ±15%, max. 40mA (with short-circuit protection circuit)
	Heater burnout alarm		–			Open collector control capacity: 24V DC 0.1A (Max.)		For KT4H only: Specify either single phase 20A, single phase 50A, 3 phases 20A, or 3 phases 50A for rated heater current. Setting accuracy: within ±5% of rated heater current Relay contact 1a 3A 250V AC (at resistive load), electrical life: 100 000 times
Accessories	Communication function		Please refer to "Communication specifications" below (not available for KT8R / KT9R)					
	Installation frame		Included with controller				–	Included with controller
	Terminal cover		Sold separately				–	Sold separately
	Rubber gasket		Included with controller				–	Included with controller

*Tool port: KT4H and KT4B only; cannot be used at the same time as serial communication (option). This port can only be used with the tool cable (AKT4H820).
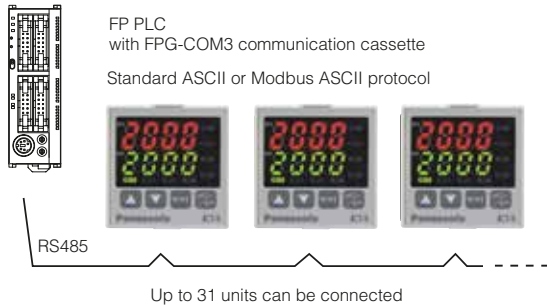
■ Communication specifications

Model	KT2 / KT7	KT4H / KT4B	KT4R
Communication method	Half-duplex		
Communication speed	Select 2400, 4800, 9600 or 19200bit/s using the keys		Select 9600, 19200 or 38400bit/s using the keys
Synchronous method	Asynchronous		
Protocols	Modbus (RTU, ASCII)	Modbus (RTU, ASCII), MEWTOCOL (Slave)	
Coding	Binary / ASCII		
Error correction	Command resending		
Error detection	Parity check and check sum		
Data structure	Start bit: 1 Data length: 7 Parity: Even Stop bit: 1 bit		Start bit: 1 Data length: 7, 8 bits (for Modbus RTU: 8 bits only) Parity: Even / Odd / None Stop bits: 1 bit / 2 bits
Interface	EIA RS485 compliant		
Number of nodes	31		
Maximum communication distance	1000m (cable resistance must be within 50Ω)		

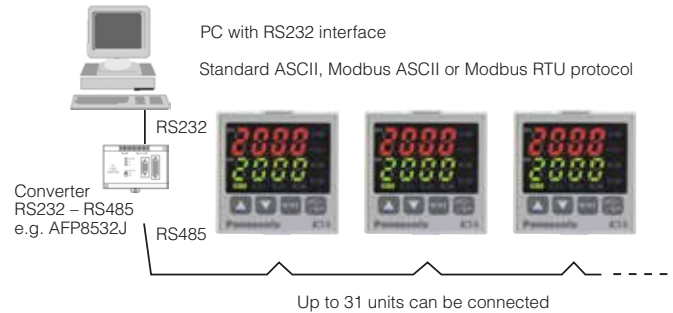## ■ Communication via RS485 and Modbus (ASCII) or Modbus RTU protocol

Example 1

Multidrop communication with a programmable logical controller (PLC)

FP PLC
with FPG-COM3 communication cassette

Standard ASCII or Modbus ASCII protocol

RS485

Up to 31 units can be connected

Example 2

Multidrop communication with a personal computer

PC with RS232 interface

Standard ASCII, Modbus ASCII or Modbus RTU protocol

RS232

Converter
RS232 – RS485
e.g. AFP8532J

RS485

Up to 31 units can be connected

With the optional communication function all settings can be entered or changed. Process value (PV) and other parameters can be read easily. All communication commands are described in the **KT** instruction manual.

■ Communication via MEWTOCOL (slave) with any FP series PLC

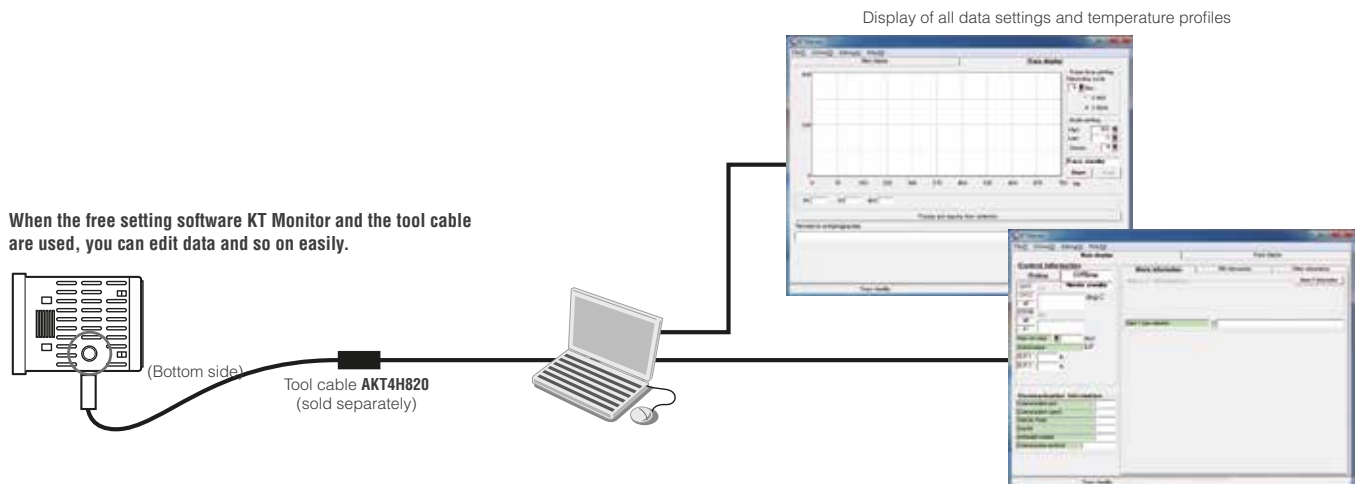| Item	Specification
Communication method	Half-duplex
Communication speed	Select 2400, 4800, 9600 or 19200bit/s using the keys
Synchronization method	Asynchronous
Protocols	Standard protocol (ASCII), Modbus (ASCII) or Modbus RTU (8-bit binary coding), **KT4H** also MEWTOCOL (Slave)
Coding	Binary / ASCII
Error correction	Command resending
Error detection	Parity check, CRC-16 (RTU), LRC (ASCII)
Data structure	Start bit: 1 Data length: 7 bits (ASCII), 8 bits (Modbus RTU) Parity: Even / Odd / None, **KT2**: Even (ASCII), None (Modbus RTU) Stop bits: 1 bit / 2 bits
Interface	RS485 compliant
Number of nodes	31
Maximum communication distance	1000m (cable resistance must be within 50Ω)

Configuration and visualization software for KT4H / KT4B

Available for download free of charge from our website. Use it to collect data from the **KT4H** / **KT4B** temperature controller.


Features

› Parameters can be set from a PC.
› Measurement data can be monitored from a PC.
› Measurement data can be logged to a PC.

Display of all data settings and temperature profiles

When the free setting software KT Monitor and the tool cable are used, you can edit data and so on easily.

(Bottom side)   Tool cable **AKT4H820**
(sold separately)

Please download the setting software **(KT Monitor)** from our website.

■ Terminal cover

AKT2801 (for **KT2**)
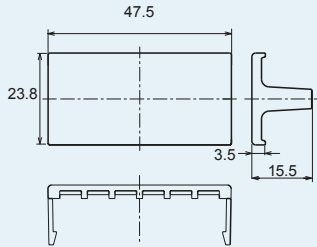
AKT8R801 (for **KT8R**)
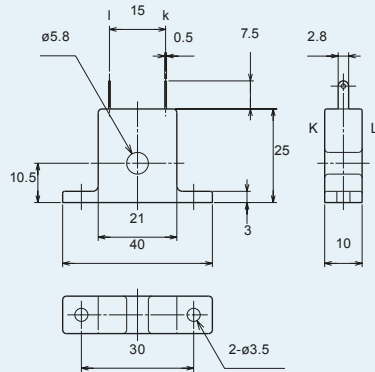AKT9R801 (for **KT9R**)
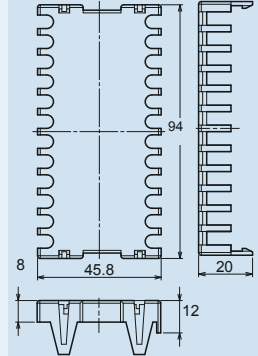
2 pieces of terminal cover **AKT8R801** can be used as an **AKT9R801**.

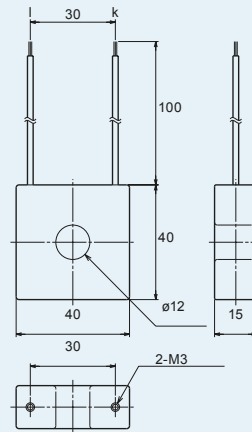**AKT4H801** (for **KT4H** / **KT4B** / **KT4R**)
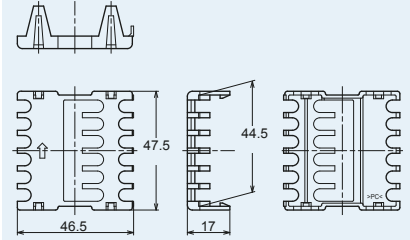
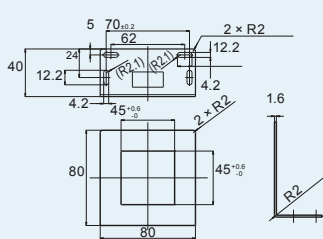### ■ Current transformer (CT)

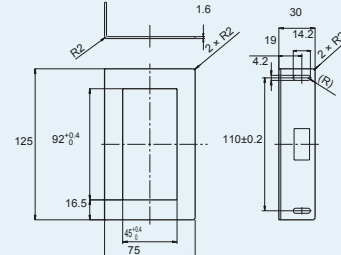**CT1** (for 5, 10 and 20A)

CT2 (for 50A)

Note: Current transformer **CT1** or **CT2** is included with **KT7** and **KT4H** when heater burnout alarm function is added.

■ Installation frame

AKW4822 (for **KT4R** / **KT4H** / **KT4B**)
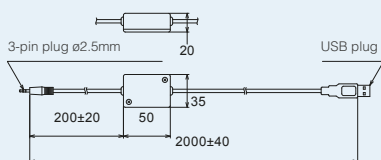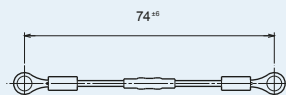

AKW8822 (for **KT8R**)

■ Tool cable (for KT4H / KT4B)

AKT4H820

3-pin plug ø2.5mm
USB plug

■ Shunt resistor

AKT4810
(**for KT2** / **KT4H** / **KT4B**)

AKT4811 (**for KT7**)
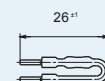
Product name		Model No.	Product name		Model No.
Terminal cover	For **KT2**	**AKT2801**	Current transformer (CT)	**CT1** (for 5, 10 and 20A)	Current transformer **CT1** or **CT2** is included with **KT7** and **KT4H** when heater burnout alarm is added.
	For **KT4R**	**AKT4H801**		**CT2** (for 50A)	
	For **KT8R**	**AKT8R801**	Tool cable (for KT4H / KT4B)		**AKT4H820**
	For **KT9R**	**AKT9R801**	Installation frame	For **KT4R / KT4H / KT4B**	**AKW4822**
	For **KT4H / KT4B**	**AKT4H801**		For **KT8R**	**AKW8822**
Shunt resistor for DC current input (sold separately)	For **KT2 / KT4H / KT4B**	**AKT4810**	DIN rail	For **KT7**	**ATA48011**
	For **KT7**	**AKT4811**	Fastening plate	For **KT7**	**ATA4806**

◼ Foreign standards

Model name	EMC Directive	Low Voltage Directive
KT2 / KT4R / KT4H / KT4B / KT7 / KT8R / KT9R	EN 61000-6-4 / EN 61000-6-2	EN 61010-1 / IEC 61010-1

◼ EN / IEC standard

Model name	UL (Recognized)		UL (Listed)		CSA (Certified)	
	File No.	Standard No.	File No.	Standard No.	File No.	Standard No.
KT2 / KT4R / KT4H / KT4B / KT7 / KT8R / KT9R	E197456	UL873	-	-	E197456 (C-UL)	C22, 2 No. 24-93

◼ Accessories solid state relays

Series	AQ-G		AQ-J			AQ-N				
Dimensions (W x H x D)	24.5 x 4.5 x 13.5mm		38 x 28 x 17mm			58 x 45 x 22mm				
Contact type	1 form A		1 form A			1 form A				
Load current	1A	2A	10A	15A	25A	10A	15A	20A	25A	40A
Load voltage	75 to 250V AC		75 to 250V AC			75 to 250V AC				
Input voltage	5/12/24V DC		5/12/24V DC			4 to 32V DC				
Function	Non zero cross / zero cross switch		Zero cross switch			Non zero cross / zero cross switch				
Connection type	PCB		Plug-in			Screw connection				
Order number non zero cross switch	AQG22212		–			AQN611				
Order number zero cross switch	AQG22112		AQJ416V			AQN611				

Heat sink	
Series	AQ-P
Dimensions (W x H x D)	78 x 28 x 78mm (AQ-J) 78 x 45 x 78mm (AQ-N)
Mounting	DIN rail
Order number	AQP-HS-SJ10A AQP-HS-SJ20A

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