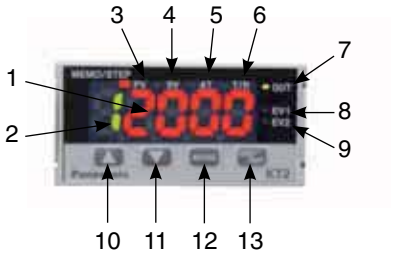
# Specifications

| Model | | KT2 | KT4 | KT4H / KT4B | KT8 | KT9 | KT7 |
|---|---|---|---|---|---|---|---|
| Power consumption | | Approx. 5VA | Approx. 8VA | | | | Approx. 6VA |
| Frequency | | 50/60Hz | | | | | |
| Alarm output 1 (EVT1)<br>Relay contact<br>Contact material: Ag alloy) | | Relay contact<br>1a 3A 250VAC<br>(resistive load)<br>1a 1A 250VAC<br>(inductive load)<br>cosØ=0.4) | Relay contact 1a 3A 250VAC (resistive load)<br>Electric life: 100,000 times | | | | Open collector,<br>control capacity:<br>24VDC 0.1A (max.) |
| Alarm output 2 (EVT2) | | Open collector<br>0.1A 24VDC | The same as the one of Alarm output 1 | | | | None |
| Accuracy | Thermocouple | Within ±0.2% ±1 digit of each input span or within ±2°C whichever is greater.<br>However, R and S input; within ±6°C in the range of 0 to 200°C<br>B input 0 to 300°C: Accuracy is not guaranteed.<br>K, J, T, E and N input less than 0°C: Within ±0.4% ±1 digit of input span | | | | | |
| | RTD | Within ±0.1% of each input span ±1 digit or ±1°C whichever is greater | | | | | |
| | DC current/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<br>DC current and DC voltage: 1 to 1000 (the decimal point place follows the selection) | | | | | |
| Proportional band | | For sensor input range and DC current, DC voltage 0.0 to 110.0% | Thermocouple: 0 to 1000°C<br>RTD: 0.0 to 999.9°C / Decimal point input KT4H/KT4B: 0.0 to 1000°C<br>DC current and DC voltage: 0.0 to 100.0% | | | | For sensor input range and DC current, DC voltage 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 240VAC; 85 to 264VAC, when 24VAC/DC; 20 to 28VAC/DC | | | | | |
| Insulated resistance | | 500VDC 10MΩ or greater | | | | | |
| Breakdown voltage | | 1.5kVAC for 1min between input terminal and power terminal, output terminal and power terminal | 1.5kVAC for 1min between input terminal and ground terminal, input terminal and power terminal, power terminal and ground terminal, output terminal and ground terminal, output terminal and power terminal | | | | 1.5kVAC for 1min between input terminal and power terminal, output terminal and power terminal |
| Malfunction vibration | | 10 to 55Hz (0.35mm) in each direction (120ms sweep) for 10min. | | 10 to 55Hz<br>(1 cycle/min.), single amplitude 0.35mm<br>(10 min. on 3 axes) | 10 to 55Hz (0.35mm) in each direction<br>(120ms sweep) for 10min. | | |
| Breakdown vibration | | 10 to 55Hz (0.75mm) in each direction (120ms sweep) for 10min. | | 10 to 55Hz<br>(1 cycle/min.), single amplitude 0.75mm<br>(1 hour on 3 axes) | 10 to 55Hz (0.75mm) in each direction<br>(120ms sweep) for 10min. | | |
| Malfunction shock | | X, Y & Z each direction for 5 times 98m/s$^2$ (10G) | | | | | |
| Breakdown shock | | Same as above, but 294m/s$^2$ (30G) | | | | | |
| Ambient temperature | | 0 to 50°C | | | | | |
| Ambient humidity | | 35 to 85% RH (no condensation) | | | | | |
| Mass | | Approx. 120g | Approx. 130g | Approx. 120g | Approx. 240g | Approx. 370g | Approx. 150g |
| Display character height | | PV: 8.7mm<br>SV: 8.7mm* | PV: 10.2mm<br>SV: 8.8mm | PV: 12mm<br>SV: 6mm | PV: 11.2mm<br>SV: 11.2mm | PV: 18mm<br>SV: 13.2mm | PV: 7.4mm<br>SV: 7.4mm |
| Options | Alarm output 2 | 0.1A 24VDC | The same as the one of alarm output 1 | | | | None |
| | Heating/Cooling control | Relay contact:<br>1a 3A 250VDC<br>(resistive load) | Non-contact relay<br>0.3A 250VAC<br>(resistive load) | • Relay contact 1a: 3A 250VAC (resistive load) Electric life: 100,000 time<br>• Non contact voltage: 12VDC ±15% max. 40mA (short circuit protected) | • Relay contact: 1a 250VAC 3A (resistive load),<br>• DC current: 4 to 20mA DC Load resistance: Max. 550 (short-circuit protected)<br>• Non-contact voltage: 12 – 14VDC max. 40mA Electric life: 100,000 times 250VAC 1A (inductive load cosø=0.4), | | None |
| | Heater burn-out alarm | Setting accuracy: Within 5% of heater rated current | | | | | |
| | Output | None | Relay contact 1a 250VAC 3A (resistive load), Electric life: 100,000 times | | | | Open collector,<br>Control capacity:<br>24VDC 0.1A (Max.) |
| | Tool port | None | | 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). | None | | |

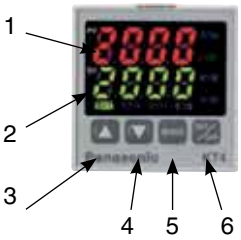
*PV/SV switching display

### KT2 Series

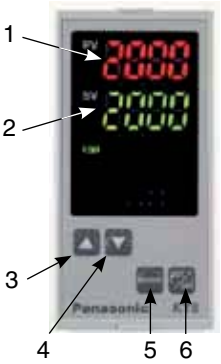



| | | |
|---|---|---|
| 1 | PV/SV display (red): | Indicates the input value and setting value. During setting mode, characters and setting value of the setting item are indicated in turn. |
| 2 | MEMO/STEP display (green): | Indicates memory number during fixed value control. Indicates step number during program control. |
| 3 | PV indicator (red): | Lights up when the input value (PV) is indicated. |
| 4 | SV indicator (green): | Lights up when the 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 (PV/SV): | The control output OUT/OFF or program control RUN/STOP can be switched. |

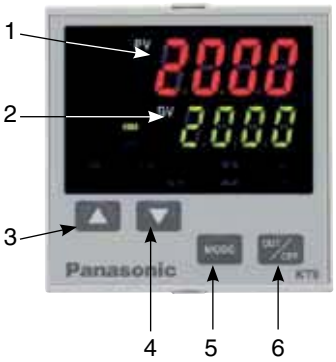
### KT4 Series



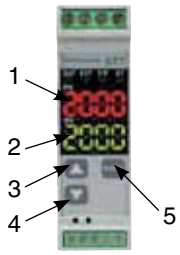

### KT8 Series




### KT9 Series



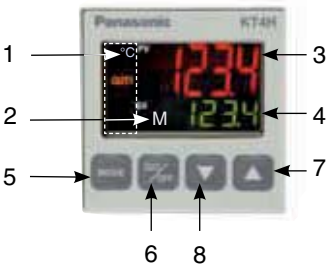

### KT7 Series

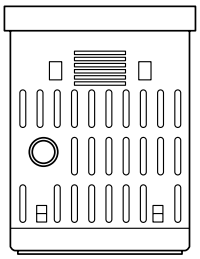



| | | |
|---|---|---|
| 1 | PV display: | Indicates PV (process variable) |
| 2 | SV display: | Indicates SV (setting value) |
| 3 | Increase key: | Increases numerical value |
| 4 | Decrease key: | Decreases numerical value |
| 5 | Mode key: | Switches the setting mode |
| 6 | OUT/OFF key: | Control output is turned on or off when control output is ON. |

Note: Color selection is the same for each size.

### KT4H/4B Series



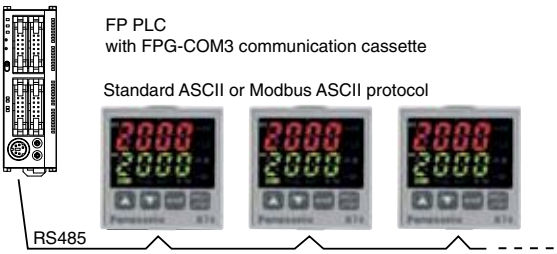
(Bottom side)

| | | |
|---|---|---|
| 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 ouptut 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 burn-out 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.<br>• Reading and setting of SV, PID and various set values from external computer<br>• Reading of PV and action status<br>• Function change |

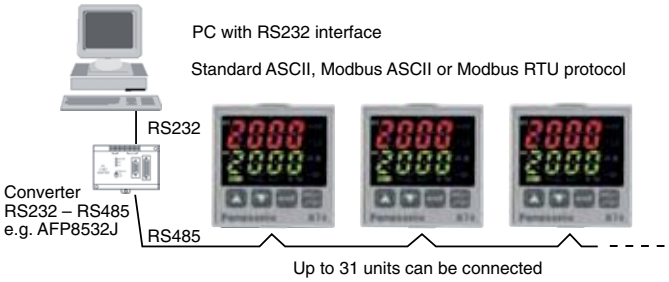
# Communication KT series

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

**Example 1**
Multidrop communication with a programmable logical controller (PLC)




**Example 2**
Multidrop communication with a personal computer




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

## Communication via MEWTOCOL (slave) with any FP series PLC*

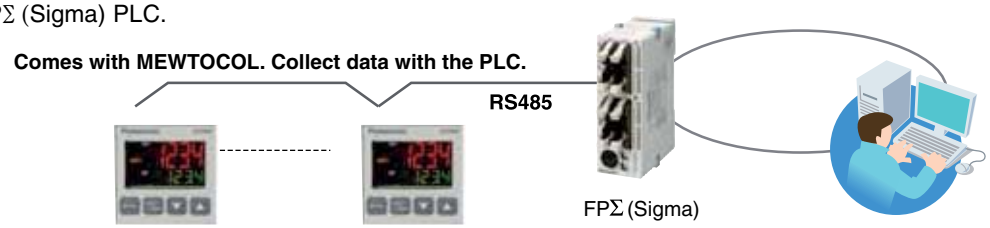
| Item | Specification |
|---|---|
| Communication type | Half-duplex |
| Communication speed | Select 2400, 4800, 9600 or 19200 bps using key operation |
| Synchronization type | Asynchronous |
| Protocols | Standard protocol (ASCII), Modbus (ASCII) or Modbus RTU mode (8-bit binary coding), KT4H also MEWTOCOL (Slave) |
| Coding | ASCII/binary |
| Error correction | Command re-send |
| Error detection | Parity check, CRC-16 (RTU), LRC (ASCII) |
| Data structure | Start bits: 1<br>Data bit: 7 (ACII), 8 (RTU)<br>Parity: Even, No, Odd (Selectable), KT2: Even (ASCII), None (RTU)<br>Stop bit: 1/2 |
| Interface | RS485 compliant |
| No. of nodes | 31 |
| Maximum cable length | 1,000m (cable resistance must be within 50Ω) |

Note: Main setting no.2 is not possible on the KT8 and KT9 when the communication functions are added.

# Communication and software KT4H / KT4B

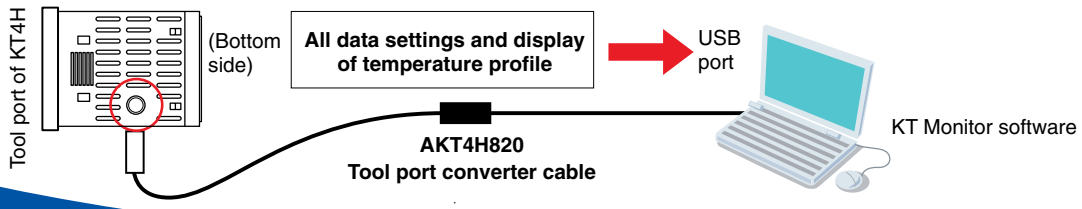
## Connect several KT4H to FP series PLCs

MEWTOCOL communications protocol is built in. Up to 31 units can be connected and data can be collected using a FPΣ (Sigma) PLC.

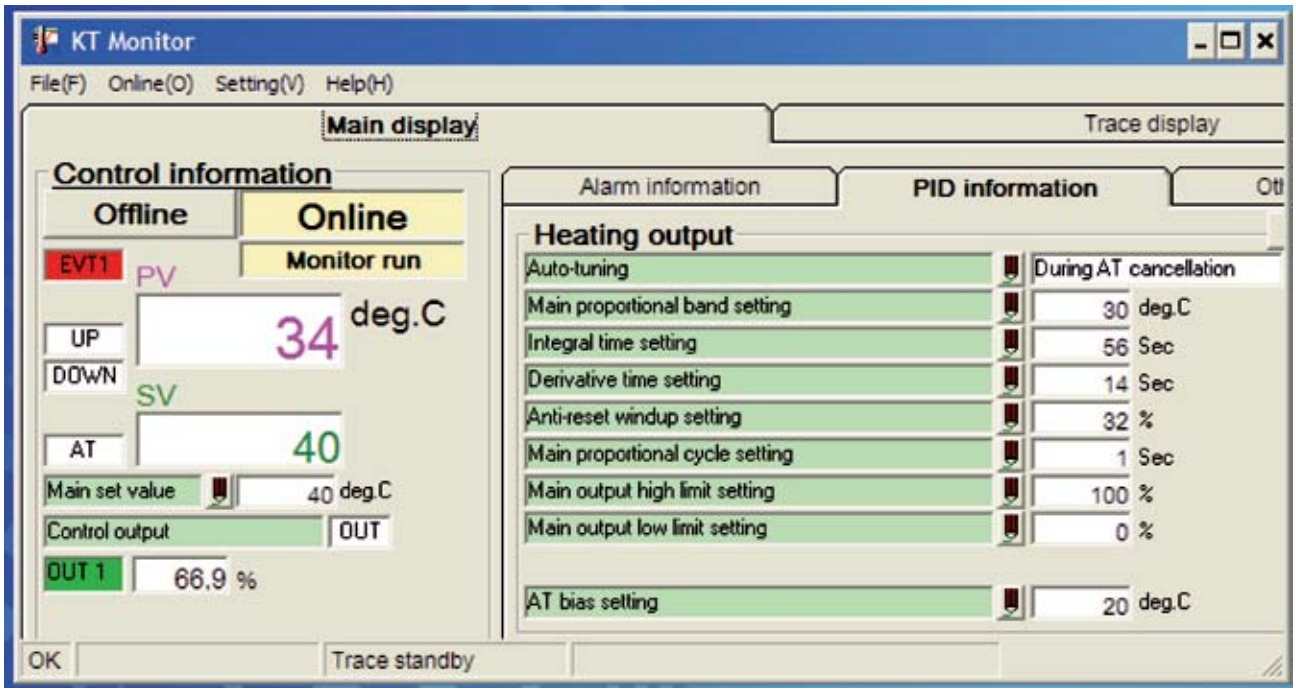



## Standard external tool port

With the external tool port, all settings can be loaded and made.

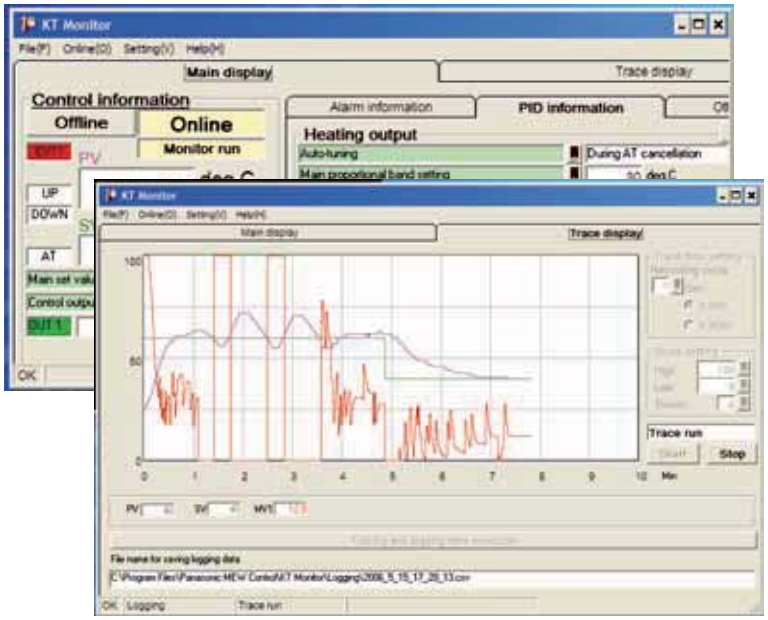


KT Monitor is a convenient software tool for editing the parameters of KT4H, saving parameters in a file, monitoring of temperature data, and monitoring and saving log files of designated values. Parameters can easily be understood and are accessible in a clear, convenient form.




With the Trace display you can display and analyze the temperature PV, the set value SV and the control the output MV. MV2 will be indicated only when heating/cooling control option is added. All values can also be recorded in a CSV-file for further processing with e.g. Excel®.

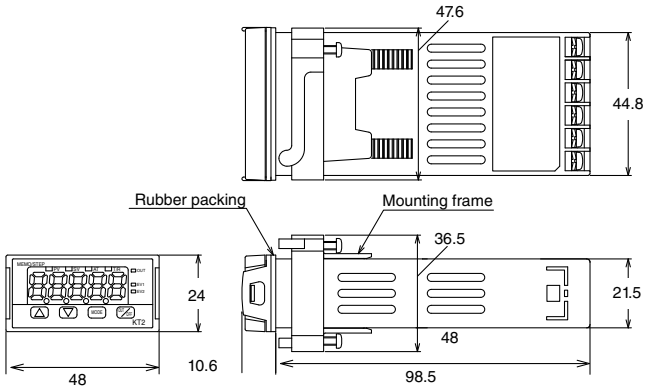
The colors of the traces are user-definable, the same goes for the interval for recording data (min. 1 second). The total number of records can be set in a range from 600 (10 min.) to 9,000 (15 min.). To scale the values displayed, you can enter upper and lower limits.



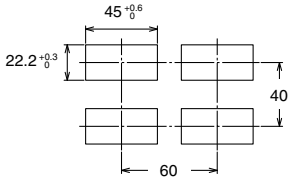
Ordering information: KT Monitor set CD with software, manuals, tool port cable AKT4H820

Requirements: PC with Windows 98/ME/2000 or XP, USB port, tool cable AKT4H820, USB driver installed (included with KT Monitor)

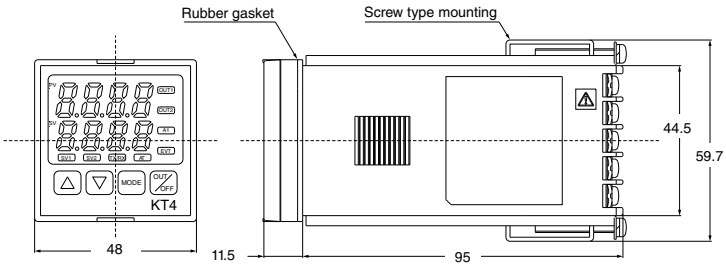
**KT2 series** (unit: mm)



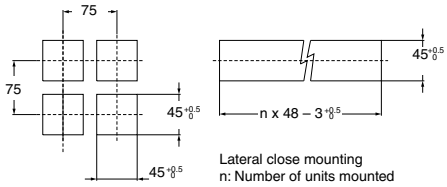

Panel cutout




**KT4 series** (unit: mm)

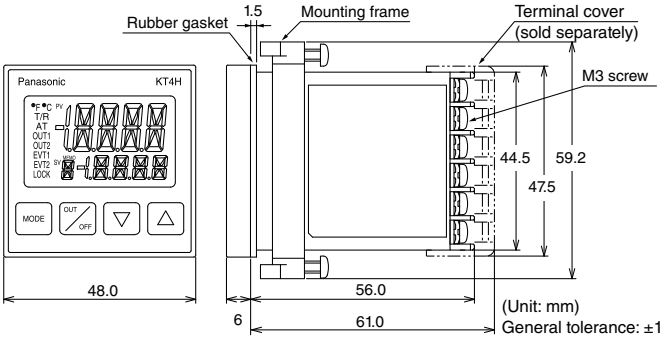



Panel cutout

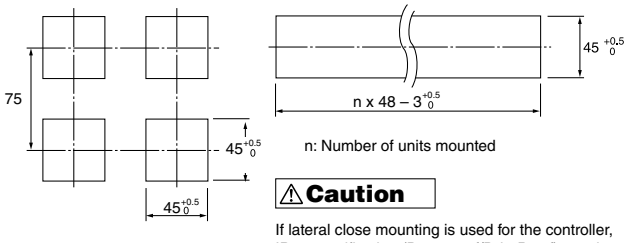



Note: The communications terminal is the screw terminal on the back of the unit.

**KT4H / KT4B series** (unit: mm)




Panel cutout

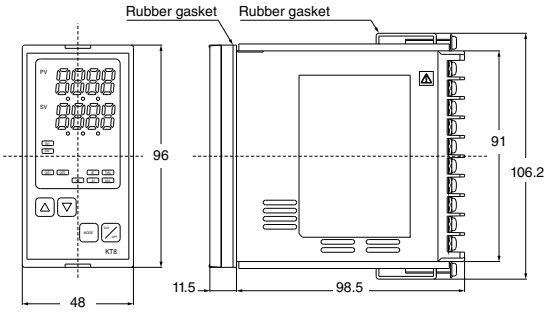



n: Number of units mounted

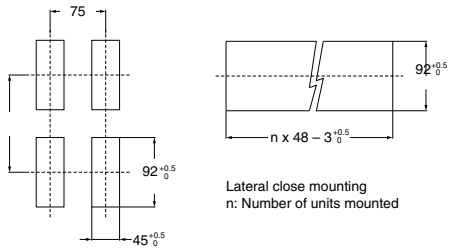
**⚠ Caution**

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

**KT8 series** (unit: mm)

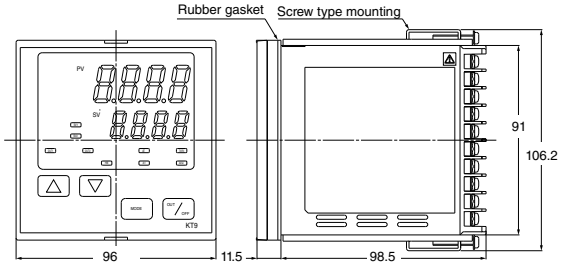



Panel cutout

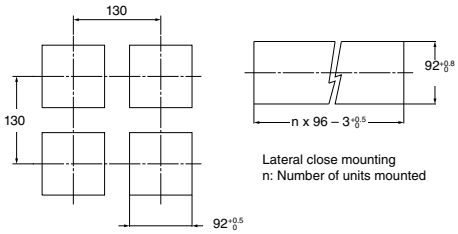



Note: The communications terminal is the screw terminal on the back of the unit.

**KT9 series** (unit: mm)

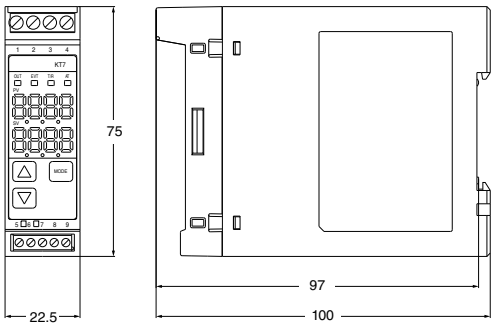



Panel cutout




Note: The communications terminal is the screw terminal on the back of the unit.

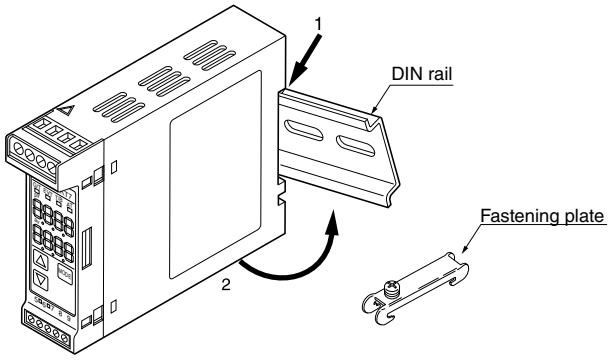
**KT7 series** (unit: mm)




Note: The communications terminal is the modular jack on the bottom of the unit.

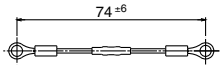
**DIN rail mounting**

Recommended DIN rail: Part No. AT8DLA1
Recommended fastening plate: Part No. ATA4806

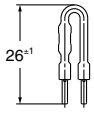



Note: The communications terminal is the modular jack on the bottom of the unit.

**Shunt resistor** for current input (mA)
**AKT4810** for KT2, KT4, KT4H, KT8, KT9

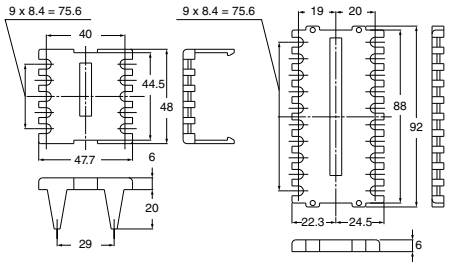



**AKT4811** for KT7

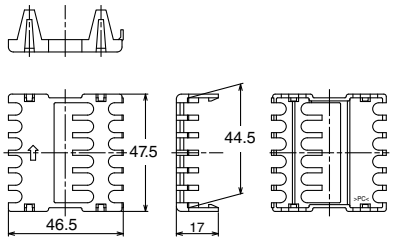



All units on this page are in mm

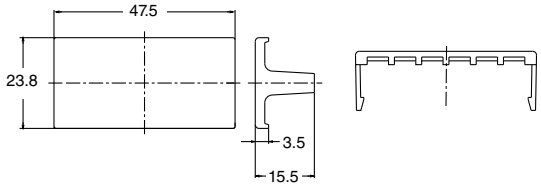
**Terminal cover** to protect rear side screw terminals from contact
**AKT4801** for KT4
**AKT8801** for KT8
**AKT9801** for KT9




**AKT4H801** for KT4H

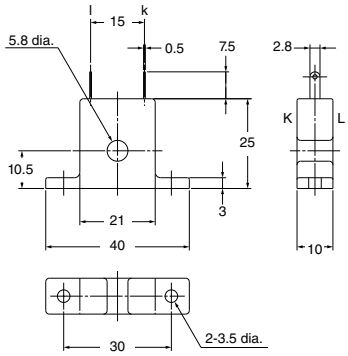



**AKT2801** for KT2

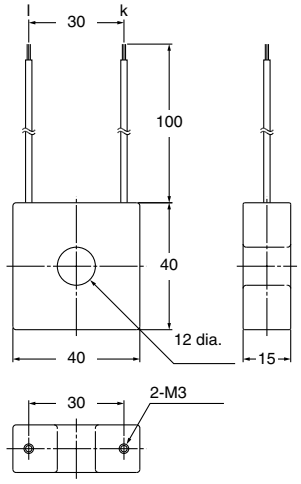



**Current transformer**
CT1 or CT2 for current detection is provided as an accessory for all types with the heate burnout alarm function. They are enclosed for these types and need not be ordered separately.

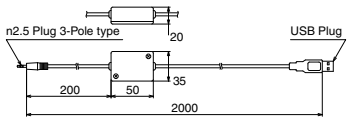
**CT1** (for 20A)




**CT2** (for 50A)




**Tool cable** to connect the KT4H's tool port to a PC's USB port.
**AKT4H820**



| Item | AQG | | AQJ | | | AQN | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| |  | |  | | |  | | | | |
| 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 250VAC | | 75 to 250VAC | | | 75 to 250VAC | | | | |
| Input voltage | 5/12/24VDC | | 5/12/24VDC | | | 4 to 32VDC | | | | |
| Function type | Non zero cross | | Zero cross | | | Non zero cross | | | | |
| Connection type | PCB | | Plug-in | | | Screw connection | | | | |
| Order no.<br>Non zero cross | AQG22212 | | – | | | AQN611 | | | | |
| Order no.<br>Zero cross | AQG22112 | | AQJ416V | | | AQN611 | | | | |

| Heat sink | | |
|---|---|---|
| Item | AQP | |
| |  |  |
| Dimensions ( W x H x D) | 78 x 28 x 78mm (AQJ) | 78 x 45 x 78mm (AQN) |
| Mounting | DIN rail | |
| Order No. | AQP-HS-SJ10A | AQP-HS-SJ20A |