# OMRON®

## Digital Temperature Display | K3TL

### Low-cost, High-quality Digital Thermometer with Built-in Microcomputer

- ■ Compact (96 W x 48 H x 66 D) DIN-size body
- ■ Requires only 3.5 mm of mounting thickness
- ■ Highly visible 14.2-mm LED display
- ■ Multi-temperature range incorporated
- ■ Upper or lower limit selectable (models with alarm output)
- ■ Optional: water-resistant, IP51 construction

## Ordering Information

### Temperature Range

| Item | Thermocouple | | | | Platinum resistance thermometer | | |
|---|---|---|---|---|---|---|---|
| Input | K (CA) | | J/L (IC) | | Pt100/JPt100 | | |
| Temperature range | 0° to 400°C | 0° to 999°C | 0° to 300°C | 0° to 500°C | 0° to 99.9°C | 0° to 400°C | −50° to 50°C |
| | 0° to 400°F | 0° to 999°F | 0° to 400°F | 0° to 999°F | 0° to 99.9°F | 0° to 800°F | 0° to 200°F |
| Range selection | 4-range selectable | | | | 3-range selectable | | |
| Model | Display only | **K3TL-TA11** | | | | **K3TL-TB11** | |
| | With alarm output | **K3TL-TA11-C** | | | | **K3TL-TB11-C** | |

**Note:** The °C or °F display can be selected. For details, refer to *Measuring Ranges.*

### Model Number Legend

```
K3TL -  □ □ □ □ - □
        1 2 3 4   5
```

**1, 2. Input Sensor Code**
TA: Thermocouple (K, J)
TB: Platinum resistance thermometer (Pt)

**3. Series No.**
1: Current series

**4. Supply Voltage**
1: 100 to 240 VAC
8: 24 VAC (24-VAC type is available by request.)

**5. Output**
None: Without relay output
C: With relay output

### ■ ACCESSORIES (ORDER SEPARATELY)

| Description | Appearance | Part number |
|---|---|---|
| Water-resistant Soft Front Cover | | **K32-L49SC** |
| Terminal Cover | | **K32-L49TC** |

# Specifications

## ■ RATINGS

| Supply voltage | | 100 to 240 VAC (50/60 Hz) |
|---|---|---|
| Operating voltage range | | –15% to +10% of supply voltage |
| Power consumption | | 6.6 VA (at max. load) (see note) |
| Insulation resistance | | 10 MΩ min. (at 500 VDC) between external terminal and case |
| Dielectric strength | | 2,000 VAC min. for 1 min between input terminal and power supply<br>2,000 VAC min. for 1 min between external terminal and case |
| Noise immunity | | ±1,500 V on power supply terminals in normal or common mode |
| Vibration resistance | Malfunction | 10 to 55 Hz, 0.5-mm single amplitude for 10 min each in X, Y, and Z directions |
| | Destruction | 10 to 55 Hz, 0.75-mm single amplitude for 2 hrs each in X, Y, and Z directions |
| Shock resistance | Malfunction | 100 m/s² (approx. 10G) for 3 times each in 6 directions |
| | Destruction | 300 m/s² (approx. 30G) for 3 times each in 6 directions |
| Ambient temperature | Operating | –10° to 55°C; 14° to 131°F (with no icing) |
| | Storage | –20° to 65°C; –4° to 149°F (with no icing) |
| Ambient humidity | Operating | 35% to 85% (with no condensation) |
| Ambient atmosphere | | Must be free of corrosive gas |
| Approvals | UL | File No. E41515 |
| | CSA | File No. LR67027 |

**Note:** An inrush current of approximately 1.0 A will flow at the moment power is turned on and continue for approximately 5 ms.

## ■ OUTPUT RATINGS

| Item | Resistive load (cos ∅ = 1) | Inductive load (cos ∅ = 0.4, L/R = 7 ms) |
|---|---|---|
| Rated load | 5 A at 250 VAC; 5 A at 30 VDC | 1.5 A at 250 VAC; 1.5 A at 30 VDC |
| Rated carry current | 5 A max. (at COM terminal) | |
| Max. contact voltage | 380 VAC, 125 VDC | |
| Max. contact current | 5 A max. (at COM terminal) | |
| Max. switching capacity | 1,250 VA, 150W | 375 VA, 80 W |
| Min. permissible load | 10 mA at 5 VDC | |

## ■ CHARACTERISTICS

| Measuring accuracy | | ±0.5% FS ±1 digit (see note 1) |
|---|---|---|
| Input | Thermocouple | K (CA), J/L (IC) |
| | Platinum resistance thermometer | JPt100/Pt100 |
| Sampling period | | 2 times/s |
| Display refresh period | | 2 s (average of 4 sampling data) |
| Display | | 7-segment LED |
| Display scale | | °C or °F display selectable |
| Input shift | | –99° to 99°C/°F or –9.9° to 9.9°C/°F (see note 2) |
| Alarm output function | | Output configuration: Relay contact (SPDT)<br>Upper or lower range selectable with DIP switch |
| Enclosure ratings | Front panel | IEC IP51 (see note 3) |
| | Case | IEC IP20 |
| | Terminals | IEC IP00 |

**Note:**  1. The measuring accuracy is at an ambient temperature of 25°±5°C.

2. This applies only to a platinum resistance thermometer with an input range of 0° to 99.9°C/°F.

3. IP51 is maintained when the water-resistant soft cover and bracket are used. IP50 will, however, be maintained without these water-resistant accessories.

## ■ MEASURING RANGES

| Input | | Measuring ranges | | Hysteresis (see note) |
|---|---|---|---|---|
| Thermocouple | K | 0° to 400°C | 0° to 400°F | 1° C/°F |
| | | 0° to 999°C | 0° to 999°F | 1° C/°F |
| | J/L | 0° to 300°C | 0° to 400°F | 1° C/°F |
| | | 0° to 500°C | 0° to 999°F | 1° C/°F |
| Platinum resistance thermometer | | 0.0° to 99.9°C | 0.0° to 99.9°F | 0.1°C/°F |
| | | 0° to 400°C | 0° to 800°F | 1° C/°F |
| | | −50° to 50°C | 0° to 200°F | 1° C/°F |

**Note:** Hysteresis of alarm output set value (fixed value for each range)
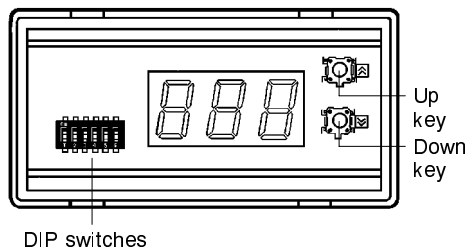
# Nomenclature



Alarm display   PV display   Unit name
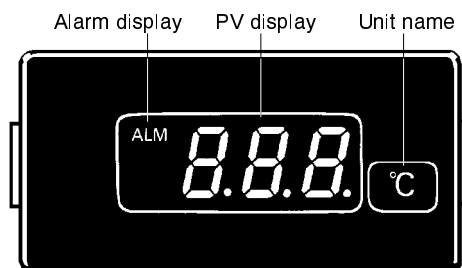
# Operation

The lower part of the front panel cover has two grooves. Hook the grooves with a flat-blade screwdriver to remove the cover before operating the K3TL.

**Without cover**



Up key
Down key

DIP switches

**Note:** After the front panel cover is removed to select the function or perform the necessary settings, do not touch components other than the dip switch or keys. Keep all metal objects off the K3TL, especially when power is turned on.

| Item | Function |
|---|---|
| DIP switches | Used to select input range, display unit, alarm mode. |
| Up/Down Key | Used to select alarm set value and input compensation value. |

## ■ DIP SWITCH SETTING

The DIP switch pins are all set to OFF before shipping. Refer to the following tables for setting the DIP switch.

**Note:** Be sure to turn off the power before changing the settings of the DIP switch other than pin 6.

### Thermocouple Models (K3TL-TA)
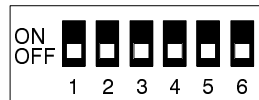


| Function | | | | Pin no. | Pin setting |
|---|---|---|---|---|---|
| Input range | K | 0° to 400°C | 0° to 400°F | 1/2 | OFF/OFF |
| | | 0° to 999°C | 0° to 999°F | | ON/OFF |
| | J/L | 0° to 300°C | 0° to 400°F | | OFF/ON |
| | | 0° to 500°C | 0° to 999°F | | ON/ON |
| Specification (see note) | K, L (DIN) | | | 3 | ON |
| | K, J (JIS) | | | | OFF |
| Scale | °F | | | 4 | ON |
| | °C | | | | OFF |
| Alarm mode | Lower-limit (relay operates for values less than the set value) | | | 5 | ON |
| | Upper-limit (relay operates for values more than the set value) | | | | OFF |
| Input compensation function | Input compensation value set mode | | | 6 | ON |
| | Usually set to OFF | | | | OFF |

**Note:** If a K-type sensor is used, you can set pin 3 to either ON or OFF.

### Platinum Resistance Thermometer Models (K3TL-TB)
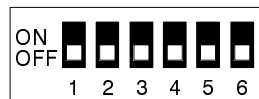


| Function | | | Pin no. | Pin setting |
|---|---|---|---|---|
| Input range | 0° to 99.9°C | 0° to 99.9°F | 1/2 | OFF/OFF |
| | 0° to 400°C | 0° to 800°F | | ON/OFF |
| | −50° to 50°C | 0° to 200°F | | OFF/ON |
| Specification | Pt100 | | 3 | ON |
| | JPt100 (JIS 1981) | | | OFF |
| Scale | °F | | 4 | ON |
| | °C | | | OFF |
| Alarm mode | Lower-limit (relay operates for values less than the set value) | | 5 | ON |
| | Upper-limit (relay operates for values more than the set value) | | | OFF |
| Input compensation function | Input compensation value set mode | | 6 | ON |
| | Usually set to OFF | | | OFF |

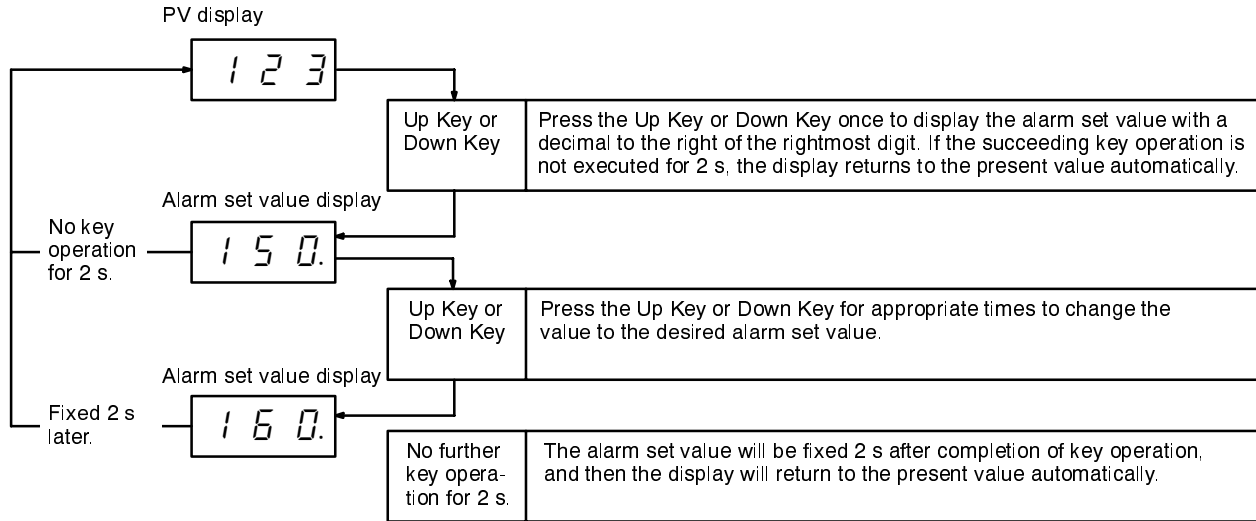## ■ OPERATION TIMING OF ALARM OUTPUT
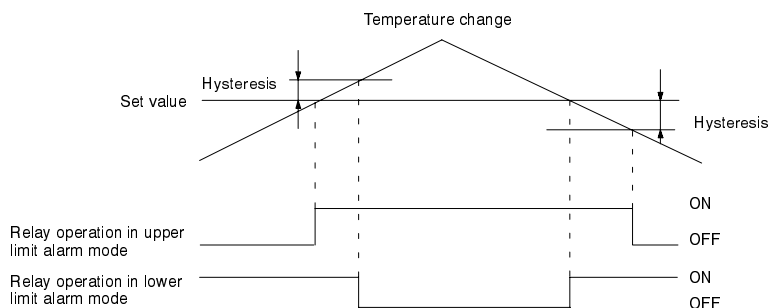
# ■ OPERATING PROCEDURES

## Setting Alarm Value

**Setting Range**

−99 to 999 or −9.9 to 99.9 (°C/°F) regardless of the temperature range that you have selected.

PV display

```
 1  2  3
```

| | | |
|---|---|---|
| | Up Key or Down Key | Press the Up Key or Down Key once to display the alarm set value with a decimal to the right of the rightmost digit. If the succeeding key operation is not executed for 2 s, the display returns to the present value automatically. |

Alarm set value display

```
 1  5  0.
```

No key operation for 2 s.

| | | |
|---|---|---|
| | Up Key or Down Key | Press the Up Key or Down Key for appropriate times to change the value to the desired alarm set value. |

Alarm set value display

```
 1  6  0.
```

Fixed 2 s later.

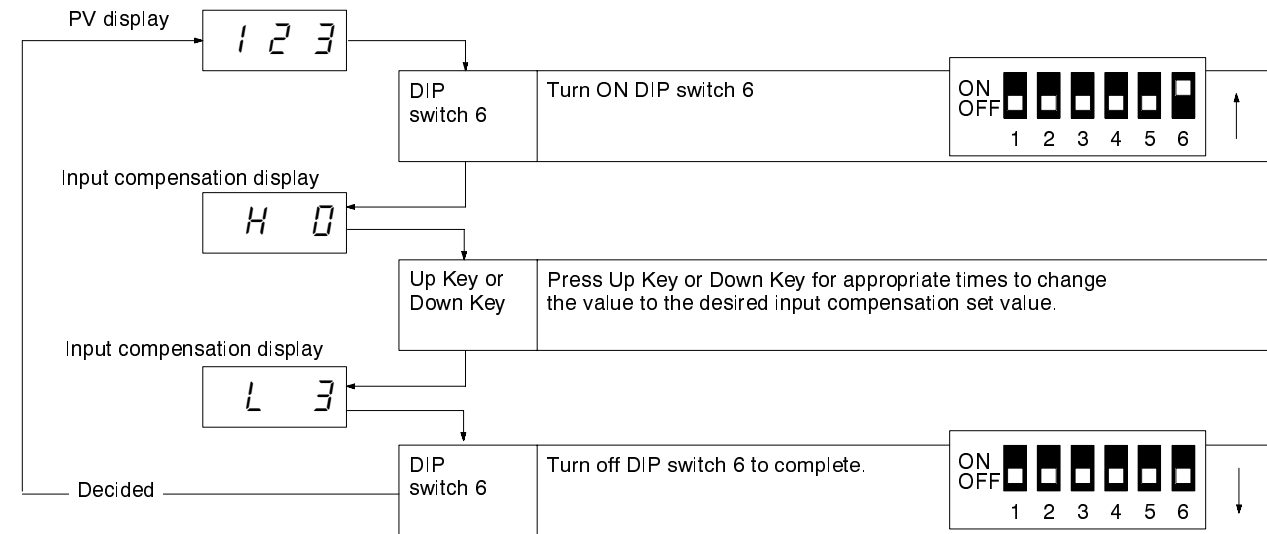| | | |
|---|---|---|
| | No further key operation for 2 s. | The alarm set value will be fixed 2 s after completion of key operation, and then the display will return to the present value automatically. |

If you change the temperature range after you set the alarm set value, the new alarm set value will remain unchanged.
If you change the display unit, the alarm set value will not be converted from the °C to °F value or vice versa.

If you remove or add the decimal point from or to the display, the display value will change as follows:

```
 9  0.  0.
```
With decimal

Range change ←——→

```
 9  0  0.
```
Without decimal
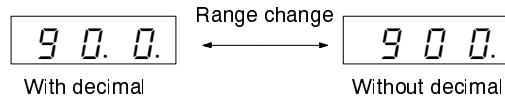
## Setting Input Compensation (Shift)

PV display

```
 1  2  3
```

| | | | |
|---|---|---|---|
| | DIP switch 6 | Turn ON DIP switch 6 | ON OFF  1 2 3 4 5 6 ↑ |

Input compensation display

```
 H  0
```

| | | |
|---|---|---|
| | Up Key or Down Key | Press Up Key or Down Key for appropriate times to change the value to the desired input compensation set value. |

Input compensation display

```
 L  3
```

| | | | |
|---|---|---|---|
| Decided | DIP switch 6 | Turn off DIP switch 6 to complete. | ON OFF  1 2 3 4 5 6 ↓ |

**Possible Compensation Range for Each Temperature Range**

| Temperature range | Platinum resistance thermometer 0.0 to 99.9 (°C/°F) | Other ranges |
|---|---|---|
| Possible compensation range | −9.9 to 9.9 (°C/°F) | −99 to 99 (°C/°F) |
| Input compensation display | L9.9  to  H9.9 | L99  to  H99 |

**Example of Compensation**

| Input compensation value display | Sensor measurement temperature | Displayed temperature |
|---|---|---|
| H 0 (With no compensation) | 100°C | 100°C |
| H 9 (9°C compensation) | 100°C | 100°C |
| L 9 (−9°C compensation) | 100°C | 91°C |

If you change the temperature range after you set the input compensation, the new input compensation will remain unchanged.

If you remove or add the decimal point from or to the display, the display value will change as follows:

Range change

H 1.9  ←——→  H 19

With decimal        Without decimal
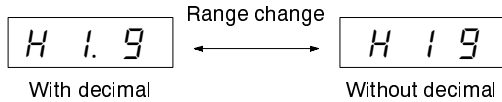
## ■ DISPLAY WITH SENSOR ERROR

### Thermocouple

| Condition | | Message | Alarm output |
|---|---|---|---|
| Disconnected | | FFF (flashes) | OFF |

**Note:** The room temperature will be displayed if the input terminals are short-circuited.

### Platinum Resistance Thermometers

| Condition | | Message | Alarm output |
|---|---|---|---|
| Disconnected | | FFF (flashes) | OFF |
| | | --- (flashes) | OFF |
| | Breaks in 2 or 3 wires. | FFF (flashes) | OFF |
| Short-circuited | | --- (flashes) | OFF |

**Note:** The Pt has a resistance of 100 Ω at a temperature of 0°C and approximately 140 Ω at a temperature of 100°C.
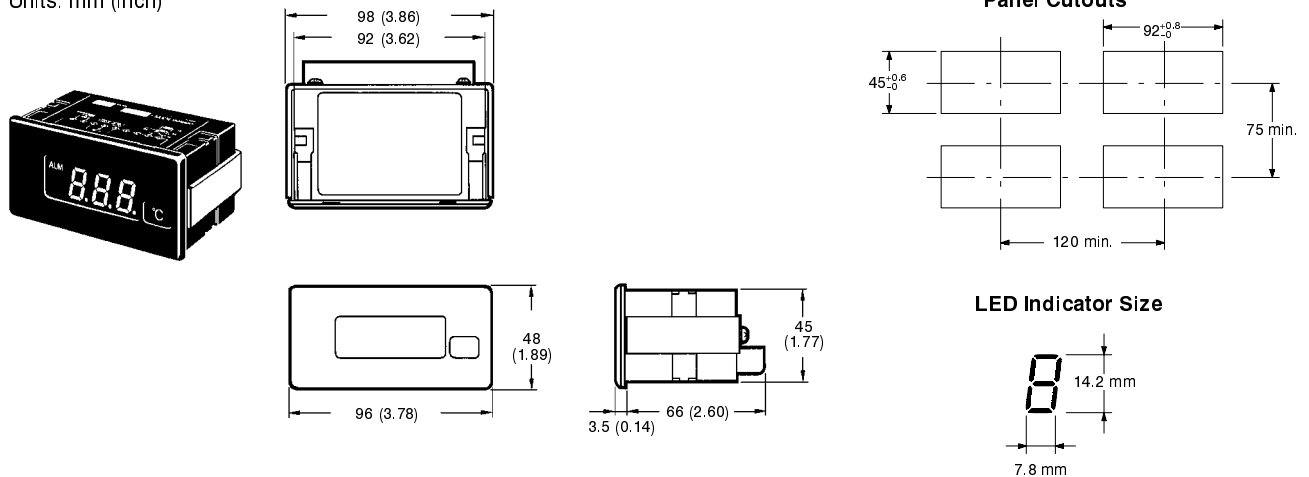
## ■ ERROR MESSAGES

The following table lists the error messages and the meaning of the error messages.

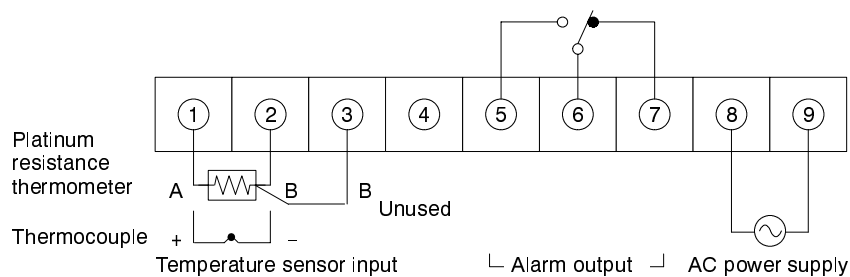| Message | Problem | Alarm output | Solution |
|---|---|---|---|
| FFF | The input temperature value is higher than the permissible measuring range. | The present setting will be put on hold. | Limit the input temperature value within the permissible range. |
| --- | The input temperature value is lower than the permissible measuring range. | The present setting will be put on hold. | Limit the input temperature value within the permissible range. |
| FFF (flashes)<br>--- (flashes) | A sensor error has occurred or the sensor temperature is far higher or lower than the permissible measuring range. | OFF | Remove the cause of the sensor error by referring to the error message. |
| E11<br>E33 | A memory error (E11) or AD converter error (E33) has occurred. | OFF | Turn power on again. If the K3TL is still not reset, consult your OMRON representative. |

# Dimensions

Units: mm (inch)

**Panel Cutouts**

92⁺⁰·⁸₋₀

45⁺⁰·⁶₋₀

75 min.

120 min.

98 (3.86)

92 (3.62)

48 (1.89)

96 (3.78)

45 (1.77)

66 (2.60)

3.5 (0.14)

**LED Indicator Size**

14.2 mm

7.8 mm

# Installation

## ■ EXTERNAL CONNECTION



Platinum resistance thermometer

Thermocouple

Temperature sensor input

Alarm output

AC power supply

**Note:** Terminals 5, 6, and 7 are not used by models with no alarm output. (These terminals are open only for models incorporating the display function.)

# Precautions

## Installation

### Location

- Never use the K3TL Digital Temperature Display in areas where corrosive gas (particularly sulfureted or ammonia gas) is generated.
- Do not use the K3TL in a location subject to severe shock or vibration, excessive dust, or excessive moisture.
- Select an installation location where the K3TL can be used at an ambient operating temperature –10° to 55°C (14° to 131°F).
- Verify that panel thickness is 1 to 3.2 mm (0.04 to 0.13 in).
- Verify that the panel area and cut-out opening will allow the K3TL to be installed as perfectly horizontal as possible.

### Installation Procedure

1. Insert the K3TL into the panel cut-out.
2. Secure the K3TL with the mounting bracket, fastening the mounting screws with a tightening torque of 5 kgf/cm (0.49 N/m). *Always* attach the mounting bracket before wiring.
3. Then, wire the terminals.

### Attach the Unit Label

Select a unit label from the sheet provided, and attach it to the K3TL. (No product is shipped with the unit label attached.)



### Removal Procedure

1. Loosen the screws and widen the bracket.
2. Always remove the wiring before removing the mounting bracket.

## Selecting Functions or Settings

- Remove the front panel cover to select a function or perform the necessary settings.
- Keep all metal objects away from the K3TL, especially when power is turned on.
- Touch only the dip switch or keys. Do not touch other components.

## Accessories (Order Separately)

### Water-resistant Soft Front Cover

The K3TL will maintain IP51 water-resistant standards only after this water-resistant soft front cover and mounting bracket are properly attached to the K3TL. Attach these before installing the K3TL.



Mounting Bracket
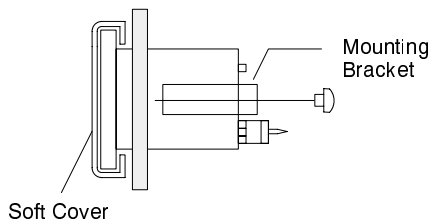
Soft Cover

**Note:** Be sure to use the Water-resistant Soft Front Cover and mounting bracket together.

### Calibration

Before you calibrate K3TL, remove the water-resistant soft front cover. (For the exact procedure, refer to the instruction sheet enclosed with the product.)
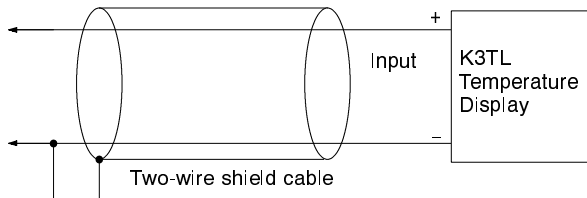
## Noise Insulation

### Power Supply

Although all possible counter-measures against noise have been taken, the K3TL Temperature Display cannot resist excess noise. If a power relay, magnetic switch, or high-frequency device is connected to the power supply line or if there is a possibility of a high-voltage spark or abnormal voltage generation due to lightning, connect a noise absorption circuit such as a line filter, noise-cut transformer, or varistor to the K3TL Temperature Display.



Line filter

K3TL Temperature Display



K3TL Temperature Display

Input

Power supply

Surge absorber
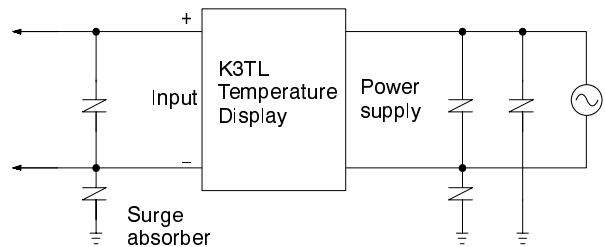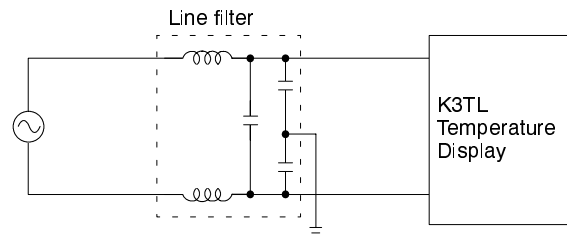
## Induced Noise

If induced noise is a problem, shield the K3TL Temperature Display with a metal cover and ground the metal cover. To reduce induced noise on the input lines, use a two-wire shielded cable and connect the shield wire to the negative terminal at a point on the signal source.



Input

K3TL Temperature Display

Two-wire shield cable