

# Measuring Method of Strain and Temperature

Temperature measurement is necessary for strain measurement involving temperature change. In addition to the thermocouples and platinum RTDs which are generally used for measuring temperature, our product line includes temperature gauges which may be used in a same way as strain gauges, and temperature integrated strain gauges which are capable of measuring strain and temperature simultaneously. We will provide you with the introduction of their features and applications.

## Temperature measurement applications to our strain measuring instruments

Temperature measurement means	Application to static strain measuring instruments	Application to dynamic strain measuring instruments	Temperature measurement range (°C)	Features
Thermocouple (T, K, etc.)	Applicable	Applicable	-269 ~ +1760	Wide temperature range
Platinum RTD Pt100	Applicable	Not applicable	-40 ~ +400	High accuracy. Can be used only with data loggers
Temperature integrated strain gauges	Applicable	Not applicable	-20 ~ +200	Applicable to most of the foil strain gauges
Temperature gauges TF Series	Applicable	Applicable	-20 ~ +200	A dedicated adapter necessary
Temperature gauge KT-110A	Applicable	Applicable	-30 ~ +80	Robust structure, mainly for civil engineering

## THERMOCOUPLE

Wide range of temperature can be measured by selecting the types of thermocouple wire and sheath material. In this catalog, the following sheath material for thermocouples are introduced (the temperatures indicated are upper temperature limits):

Vinyl: 80 °C

Fluorinated resin: 200 °C

Glass fiber : 350 °C

See page 76 for the details of thermocouples.

By using static strain measuring instruments such as data logger TDS series and TC-32K, temperature measurement using various thermocouples can be carried out. As for DC dynamic strain measuring instrument DC-96A/DC-97A, DC-204R, DC-004P, DH-14A, TMR-300 and DS-50A, temperature measurement can be carried out by thermocouples K and T through Dedicated unit or thermocouple adapter TA-01KT.

## PLATINUM RTD

Temperature measurement can be carried out by bonding the platinum RTD to the surface of an object to be measured, just like when using strain gauges. The measurement accuracy is high, and the measurement can be done by connecting to lead wires for strain gauges. Platinum RTD

is connected to static strain measuring instruments such as data logger TDS series or TC-32K when measuring. Platinum RTD is not applicable to dynamic strain measuring instruments.

## TEMPERATURE-INTEGRATED STRAIN GAUGES

Temperature measurement function can be mounted to almost any foil strain gauge. (See the chart in pages 39 and 40 for combination of strain gauges and dedicated lead wires.) The temperature measurement point is the tab of a strain gauge, so the temperature shown is as same as the temperature of the strain gauge. The temperature can be measured using our data logger.

The applicable lead wires with temperature measuring function are as follows:

- Single core 3-wire twisted fluorinated resin (FEP) lead wire 6FB\_TLT  
Applicable temperature: -269 °C ~ +200 °C
- 3-wire paralleled vinyl lead wire -TLJBT/-TLJBT-F  
Applicable temperature: -20 °C ~ +80 °C
- 4-wire paralleled vinyl lead wire TLQ  
Applicable temperature: -20 °C ~ +80 °C

(See page 34 for details of lead wires.)

If you wish to mount the temperature measuring function on the strain gauge of your choice, insert a "T" after the number indicating the length of the gauge, and then designate the length and type of the lead wire. For example, if you want to add temperature measuring function and a 3 meters vinyl lead wire to FLA-2-11, the type name should be written as:

FLA-2 T -11 -3 TLJBT

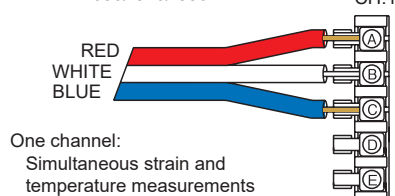
└─ 3-wire paralleled vinyl lead wire TLJBT  
└─ Desired length of the lead wire: 3m

└─ With temperature measuring function

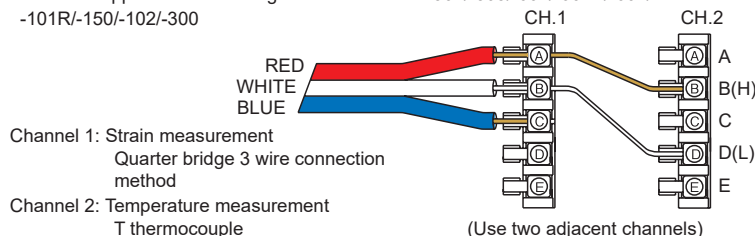
Temperature integrated strain gauges are not applicable to measurements by dynamic strain measuring instruments.

## Wire connection methods

1. For TDS-630/-540/-530



2. For other applicable measuring instruments: TDS-302/-303/-601/-601A/-602/-101R/-150/-102/-300



## TEMPERATURE GAUGES TF SERIES

Temperature gauge TF series is used for measuring surface temperature by bonding it to the surface of structural object just like strain gauges. By using adapter TGA for temperature gauge and strain measuring instrument

in combination, the measurement will be performed and represented in the unit of  $100 \times 10^{-6} / ^\circ\text{C}$ . See page 76 for details of TF series and adapter TGA.

## TEMPERATURE GAUGES KT-110A

KT-110A is a temperature sensor using full bridge method. It is used in civil engineering and construction sites for its robustness. KT-110A can carry out measurement as temperature sensor using full bridge method

(also used by transducers) by using strain measuring instruments. Consult us for details of KT-110A.