



Bolt Strain Gauges BTM series

Bolt axial strain measurement

BTM series

These gauges are used for measurement of tensile strain of bolt. They are simply inserted into pre-drilled hole in the bolt with exclusive adhesives. This method is recommendable when an ordinary strain gauges can not be mounted on the bolt surface. Accurate tensile force measurement is possible by calibrating the bolt after installing the bolt gauges.

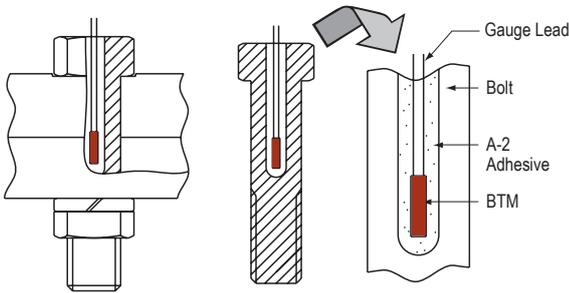
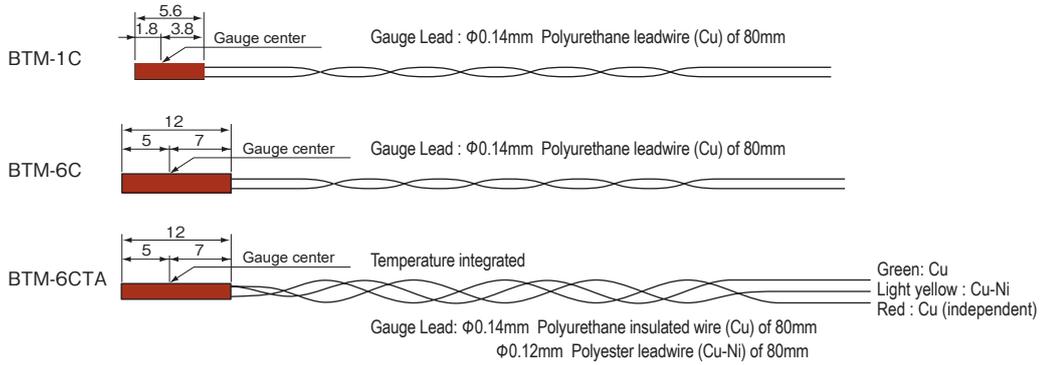
The BTM bolt gauges use heat-curing A-2 adhesive for installation, which provides better long-term stability.

Operating temperature range
-10~+80°C

Applicable adhesives
A-2 -10~+80°C

Gauge pattern	Type	Gauge size(mm)		Backing size(mm)		Resistance Ω
		Length	Width	Length	Width	

●Single axis



BTM-1C (Hole drilled : $\Phi 1.6\text{mm}$)	1	0.7	5.6	1.4	120
BTM-6C (Hole drilled : $\Phi 2.0\text{mm}$)	6	1	12	1.7	120
BTM-6CTA (Hole drilled : $\Phi 2.0\text{mm}$)	6	1	12	1.7	120

Temperature integrated applicable in -10~+80°C

NB : Polyurethane insulation of the gauge leads is easily removed by heat of soldering iron, while Polyester sheath is removed by chemical solvent.

Minimum order quantity is 10 strain gauges.
These strain gauges are available with integral leadwires attached. (made to order)

Optional syringe and needle

Exclusive syringe for injecting A-2 adhesive into the pre-drilled hole before BTM gauge is embedded.

Applicable to	Needle diameter	Needle length
BTM-1C	1.5mm-dia.	60mm
BTM-6C	1.8mm-dia.	100mm





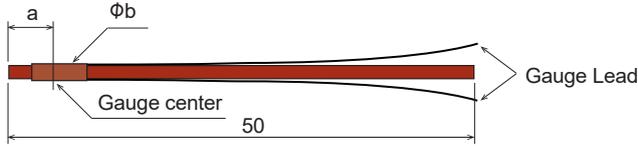
Bolt Strain Gauges BTMC series CE

These gauges are used for measurement of tensile strain of bolt. They are simply inserted into pre-drilled hole in the bolt with exclusive adhesives. This method is recommendable when an ordinary strain gauges can not be mounted on the bolt surface. Accurate tensile force measurement is possible by calibrating the bolt after installing the bolt gauges.

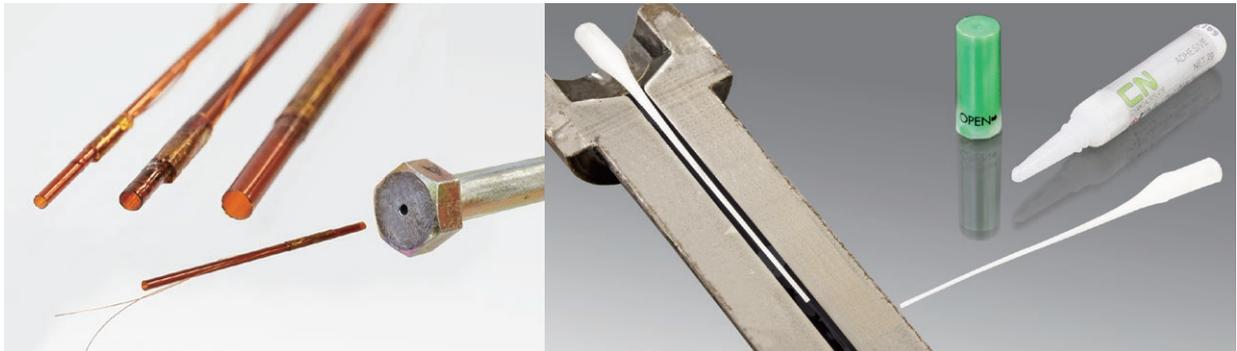
The BTMC gauges have a tube shape sensing element, and they are installed with fast-curing CN adhesive. The installation is easily made at room temperature.

Operating temperature range
-10~+80°C

Applicable adhesives
CN -10~+80°C

Gauge pattern	Type	Gauge Length (mm)	Gauge Center a(mm)	Backing diameter Φb (mm)	Resistance Ω
<p>●Single axis</p> 	BTMC-05-D10-003LE (Hole drilled : $\Phi 1.0\text{mm}$)	0.5	5	$\Phi 0.9$	120
	BTMC-1-D16-003LE (Hole drilled : $\Phi 1.6\text{mm}$)	1	5	$\Phi 1.5$	120
	BTMC-3-D20-006LE (Hole drilled : $\Phi 2.0\text{mm}$)	3	10	$\Phi 1.9$	120

Gauge Lead: $\Phi 0.1\text{mm}$ Polyimide insulated of 30mm for BTMC-05 and BTMC-1, 60mm for BTMC-3





Bolt strain gauge installation/calibration service

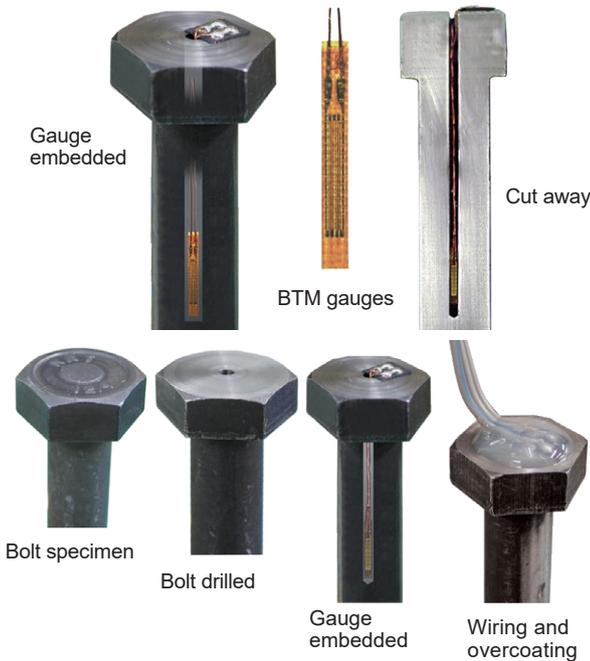
Currently, bolts are used in various fields for connecting structural members. Confirmation and management of the fixing condition are possible by measuring axial force applied to the bolt in machine structures, cars, airplanes, expressways, bridges, fixing of segments and so on. Also the axial force measurement is useful for knowing the strength of bolt and designing the bolt connection.

Processing method

There are two methods in strain gauge installation service. One is embedding, and the other is bonding.

Embedding BTM/BTMC series

A hole of 1.0mm, 1.6mm or 2mm in diameter is drilled in the center of the bolt. The strain gauge is inserted into the hole and embedded with an exclusive adhesive. This method has the advantage of avoiding the gauge being damaged by a washer, etc. while fastening the bolt.



TML offers strain gauging service for measurement of axial force acting on bolts. The service includes drilling a hole, fixing the gauge, connecting the cable, and applying load calibration to the bolt supplied by the customer. Strain gauge installation service for high temperature is also available.

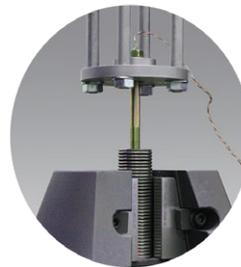
Bonding F, QF, ZF, CF series

Two strain gauges are bonded on both sides of the bolt shaft in axially symmetric positions to cancel the influence of bending. It is required to slightly scrape off the surface of the bolt shaft where the strain gauges are bonded, for the purpose of avoiding strain gauges being damaged while fastening the bolt or by contact of a washer. Choose strain gauges according to the usage conditions including temperature.



Important point

Embedment or installation service of strain gauges on bolts for high temperature use is available including the calibration work. Please contact us for the details.



Calibration service

In order to achieve accurate measurement, we offer calibration service in which the bolt is calibrated with specified load. Instruments and calibration machines used for the calibration service are periodically calibrated and inspected by public institutions traceable to the national standards.

Example)

Tensile test of bolt (bolt size : M10×1.25 L=65)

Load (KN)	0.0	4.6	9.2	13.8	18.4	23.0	Non-linearity (%RO)	Calibration coefficient (kN/1×10 ⁻⁶)
Strain output (×10 ⁻⁶)	0	378	747	1129	1518	1916	1.1	0.0120