BR-BT Stress Transducers
INSTRUCTION MANUAL

Thank you for purchasing the KYOWA product. Before using it, please read this instruction manual carefully. Also, keep the manual within easy reach so that you can refer to it whenever necessary.

When using the stress transducer, be sure to observe the following [safety precautions]. KYOWA ELECTRONIC INSTRUMENTS CO., LTD. is not responsible for damages resulting from any breach of the safety precautions.

1. Safety precautions

Caution! Improper handling may cause injury to the operator and damage to property. Be sure to read and observe the given instructions.

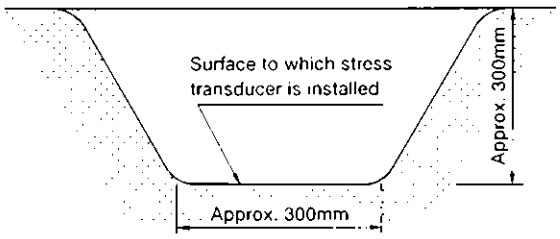
- Because this product uses specific chemicals, it should be disposed by an authorized industrial waste disposal agency, by going through the formalities prescribed by the industrial waste disposal law.

2. Installation

- Note that accurate stress measurement will be impossible unless the stress transducer is so installed that there is no opening between the stress sensing diaphragm and the surface which contacts concrete.

2.1 Preparing the surface of concrete

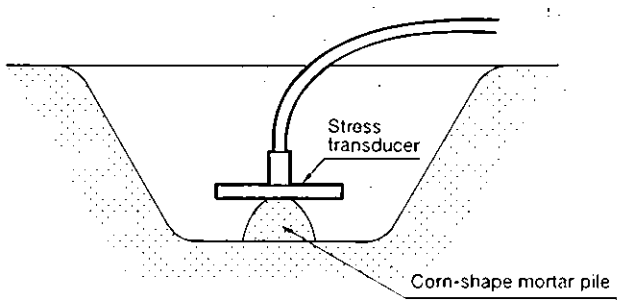
Tip the surface area of concrete to which the stress transducer is installed, using a wire brush or the like.



2.2 Installing the stress transducer

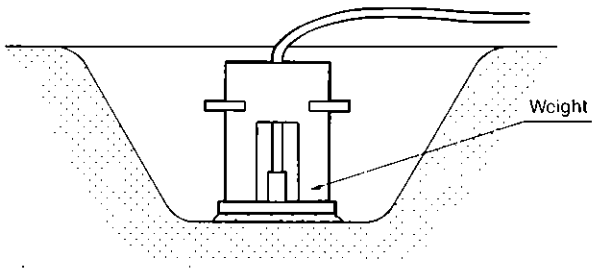
- Knead non-contractible cement and sand (smaller than 0.5mm) into paste, then put it in a corn-shape pile of mortar.
- Dampen the sensing diaphragm of the stress transducer with water, press it onto the top of the corn while slightly turning it, and thus let it adhere to the mortar firmly. Do it while watching a level so that the stress transducer is installed horizontally.
- The thickness of mortar (the distance between the concrete surface and the stress transducer's sensing diaphragm) should be about 5mm.

  Note: If installation has to be done over again because of failure of horizontal installation or other, remove the mortar and start with forming a corn-shape pile once more. If otherwise, air bubbles will enter between the sensing diaphragm and the surface of mortar, thus making correct measurement impossible.



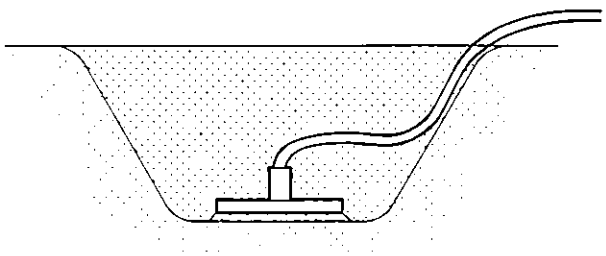
2.3 Curing the stress transducer

- Apply an approximately 5 to 10kg weight to the stress transducer, keep this situation for 8 to 10 hours or longer, then gently remove the weight.
- Connect the stress transducer to the indicator and measure the initial unbalance value. Also, connect the stress transducer to the tester and measure the insulation resistance value.
- Using the cable connection kit, connect the extension cable, which was already distributed, with the stress transducer's inpurt/output cable.



2.4 Embedding the stress transducer

- Place concrete little by little, carefully avoiding damage to the stress transducer and cable.
- While placing concrete, keep hitting the circumference of the stress transducer installation with a ram.
- After placing concrete was completed, connect the stress transducer to the indicator and measure the initial unbalance value. Also, connect the stress transducer to the tester and measure the insulation resistance value.



3. Handling precautions

3.1 Check that the stress transducer's manufacturing number agrees with the calibration sheet.

3.2 Check the transducer's insulation resistance value. (It should be 100MΩ/50VDC or higher). Be sure to use a bridge voltage below 50Vdc.

3.3 Using the tester, check the input/output resistance values. They should be as stated below.
Input resistance (between red and black wires): approx. 350Ω
Output resistance (between white and green wires): approx. 450Ω

3.4 Avoid hitting and other shocks on the transducer, or disconnection or damage may occur to the transducer. If shocks be given to the transducer, its performance stability may be adversely affected in long-term continuous operation.

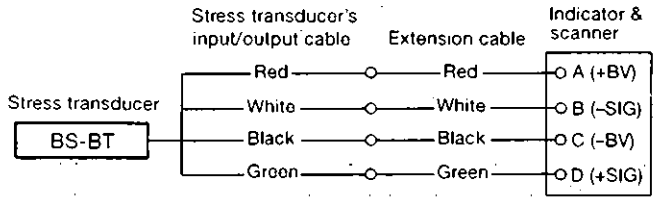
3.5 Avoid hitting the transducer's pressure sensing diaphragm.

3.6 During transit, keep the transducer in the case. Bringing it by holding the cable may damage the cable to cause disconnection and deterioration of the insulation resistance. Measurement may thus become impossible.

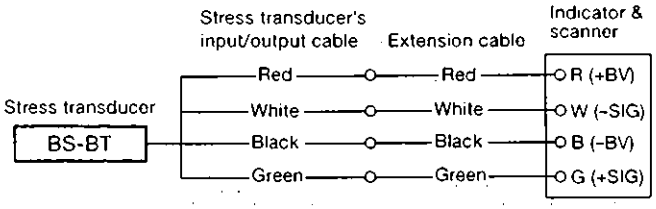
4. Connection

4.1 Connections of the stress transducer's input/output cable and extension cable with the indicator terminals as well as with the scanner terminals are illustrated below. The indicator terminals and the scanner terminals will come with either A, B, C, D description or R, W, B, G description.

① A, B, C, D description



② R, W, B, G description



4.2 Use any one of the indicators listed below.

(1) SMD-20A
(2) UCAM-70A-20 Used in combination
USB-70A-30
(3) UCAM-20PC Used in combination
USB-23A
USS-23A
(4) UCAM-5DM-99
(5) RMH-201A, 210A
(6) RDT-110A, 170A

5. Conversion

5.1 For conversion, use the calibration factor stated in the calibration sheet.

5.2 When a strain amplifier is used, its outputs read in $\varepsilon \times 10^{-6}$ equivalent strain. Stress corresponding to 1×10^{-6} equivalent strain is stated in the calibration sheet. Stress can then be found through multiplication.

$$\text{Stress} = (\text{Strain amplifier's output: } \varepsilon \times 10^{-6}) \times (\text{Calibration factor: Pa} / 1 \times 10^{-6})$$

5.3 When other type of amplifier or a recorder is used, it is necessary to accurately measure the bridge excitation voltage applied. The calibration sheet states stress corresponding to 1μV voltage output against 1V bridge excitation voltage.
Stress can then be found through multiplication.

$$\text{Stress} = \frac{\text{Bridge output voltage: } \mu V}{\text{Bridge excitation voltage: V}} \times (\text{Calibration factor: Pa/ } 1\mu V/V)$$

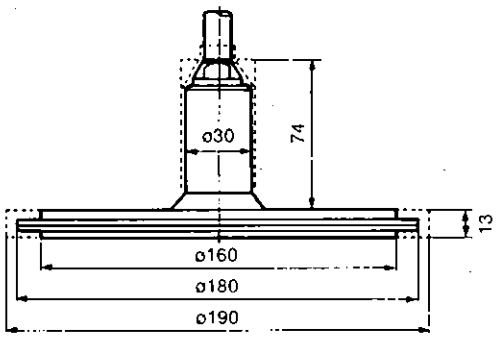
5.4 Conversion of temperatures measured with the temperature measuring function

Formula to convert temperatures measured with the temperature measuring function

Temperature $t = (S - S_0) \times \beta$

where S: Amplifier's temperature reading (X 0.01Ω)
S_0: Reading at 0°C (X 0.01Ω)
β: Temperature coefficient (°C/ 0.01Ω)

6. Dimensions



7. Specifications

Model	Rated capacity	Temp. meas. range
BR-2KBT	200kPa (2.039kgf/cm^2)	−30 to 70°C
BR-5KBT	500kPa (5.099kgf/cm^2)	
BR-10KBT	1MPa (10.20kgf/cm^2)	
BR-20KBT	2MPa (20.39kgf/cm^2)	
BR-50KBT	5MPa (50.99kgf/cm^2)	
BR-100KBT	10MPa (102.0kgf/cm^2)	

NOTE: The units and numerical values in brackets in the [CAP.] column on the nameplate and in the above capacity column depend on the conventional unit expression just for reference.

Rated output: 1mV/V (2000 x 10^{-6} strain) or higher
(2KBT: 0.9mV/V or higher)
Non-linearity: ±1%RO (2KBT:±2%RO)
Hysteresis: ±0.5%RO
Recommended bridge excitation voltage: 2 to 10V, AC or DC
Input resistance: Approx. 350Ω between red and black
Output resistance: Approx. 450Ω between white and green
Safe temperature range: −30 to 80°C
Safe overload rating: 150% (120% on 2, 5, 10 and 100KBT)
Weight: Approx. 2.9kg
Cable: 0.5mm^2, 4-conductor chloroprene 1m, ø8mm, terminated in exposed wires

■ Accessories

Calibration sheet	1
Instruction manual	1
Warranty	1
Vinyl cap	1

8. Other

If any question should arise, contact KYOWA or KYOWA representative for information.

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