

KCH-5A STRAIN GAGES WITH PROTECTOR

INSTRUCTION MANUAL

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

1. Safety precautions

Warning!



Improper handling may cause serious injury to the operator. To avoid harm, be sure to observe the accompanying instructions.

- Incomplete welding applied to the stud bolts may cause the protector to come off and fall. After you have welded the stud bolts, be sure to check that the welding strength is proper.
- Welding of the stud bolts may not be desirable on some materials to be measured from a view point of crack occurrence and fatigue life. Prior to welding, therefore, carefully consider the suitability of welding. In case welding cannot be applied, fix the instrument using commercially available stainless steel belts and fixtures (of 2 sets).
- If the nuts, which fasten the protector, get loose, the protector may come off and fall. Be sure to tighten the nuts by applying a prescribed torque using a torque wrench.
- If high impacts or vibrations effect the cable, it may be damaged to come off and fall. To avoid harm, take a proper measure to fix it securely.

2. Handling precautions

Notes

In order to avoid the instrument's failure and malfunction, be sure to observe the accompanying instructions.

- Take care to avoid to touch the sensor (strain gage) of the instrument with your finger. Also take care to avoid scratches on it by hitting with a hard matter.
- The shield wire of the cable is not connected to the protector.
- The allowable radius of curvature is about 1500mm when it is installed in an arc and about 100mm when in the axial direction of a cylinder.
- It is advised to use EP-34B to bond the strain gage. If it cannot be used, use CC-33A in stead.
- Use a commercially available welder to weld the stud bolts.

3. Standard accessories

When unpacking the package, check to be sure that the following items are included.

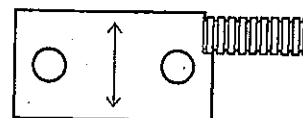
Stud bolts	2
M8 nuts	2
Spring washers	2
Washers	2
Calibration sheet	1
Instruction manual	1
Warranty	1

4. Installation

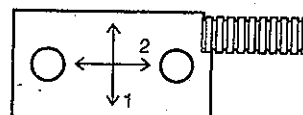
- Using belt sander (#47 or so), remove black scale and paint from the measuring area. The prepared area of about 40 x 70mm is necessary.
- Decide on the mounting position of the instrument, then the welding positions of the bolts. The pitch between the two welds should be 36 ± 0.3 mm. (Pay attention to the strain sensing direction of each model. See *1 below.)

*1 Strain sensing direction

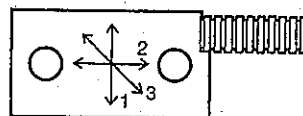
KCH-5A-1 (Uniaxial, 350Ω)



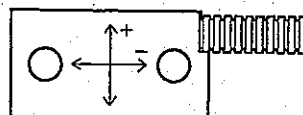
KCH-5A-2 (Biaxial, 90° cross, 350Ω)



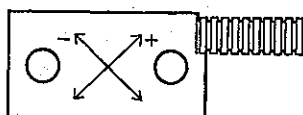
KCH-5A-3 (Triaxial, 45°/90°, 350Ω)



KCH-5A-B, BJ (Quadreaial, full bridge, for bending, 350Ω)



KCH-5A-S, SJ (Quadreaial, full bridge, for shearing, 350Ω)



- Using a stud welder, join the measuring object to the stud bolts. (See the instruction manual of the welder in use for the soldering requirements, etc.)
- Apply the two washers to the stud bolt, then tighten the M-8 nut with a torque wrench which is set to 10N·m (Reference value:

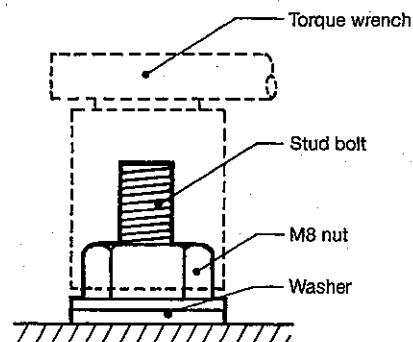


Fig.1

100kgf·cm), then check the welding strength (i.e. check that the stud bolt does not peel off). (See Fig.1)

After that, detach the nut and washers.

In the same manner, ensure the required welding strength on the other stud bolt.

- 4.5 Polish the bonding area, onto which the strain gage is to be bonded, with sandpaper (#300 or so), then clean it with a solvent such as acetone.
- 4.6 Peel off the protection film from the strain gage, and apply a proper amount of EP-34B or CC-33A to the exposed area of the strain gage. (All tying vinyl strings must be removed.) Also see the instruction manual of the adhesive for how to use.
- 4.7 Let the stud bolts go through the holes in the protector, then lightly press the protector against the measuring area.
- 4.8 Apply the washers and spring washers to the stud bolts, then tighten M8 nuts equally on the left and right, using a torque wrench which is set to 8N·m (Reference value: 80kgf·cm).
- 4.9 To mount the gage using a stainless steel belt, put the belt on the protector so that it covers a half of the inside of the hole on the protector, then tighten the belt fixtures equally on the left and right till the surface of the metal at the bottom of the protector comes into contact with the measuring object.

5. Connection

- 5.1 After the adhesive has cured (*2), measure the gage resistance (*3) and insulation resistance (with an excitation voltage of below 50VDC).

*2 With EP-34B: 24 hours at 25°C, or 2 hours at 80°C

With CC-33A: 1 hour at 25°C

*3 KCH-5A-1: No.1 gage, between red and white/black

KCH-5A-2: No.1 gage, between red and white/black (at 90°)

No.2 gage, between green and yellow/blue

KCH-5A-3: No.1 gage, between red and white

No.2 gage, between black and green (at 90°)

No.3 gage, between yellow and blue (at 45°)

KCH-5A-B, S, BJ, SJ

Input side (+)....red Input side (-)....black

Output side (-)....white Output side (+)....green

- 5.2 Connect to a measuring instrument such as UCAM.

KCH-5A-1, 2 3-wire connection system

KCH-5A-3 2-wire connection system

KCH-5A-B, S, BJ, SJ..... Full bridge connection system

NOTE: BJ and SJ require a relay cable.

6. Conversion

If the gage factor (usually 2.00) of a measuring instrument in use differs from the gage factor described in the calibration sheet, use the following formula to obtain a true strain value.

$$\epsilon = \frac{2.00}{K_s} \times \epsilon_1$$

where

ϵ : True strain value

ϵ_1 : Measured strain value

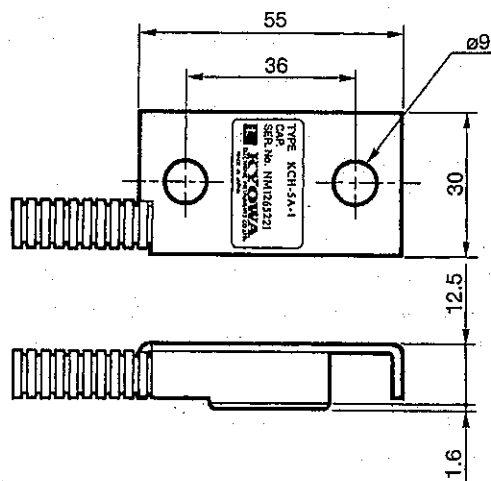
K_s : Gage factor described in the calibration sheet

7. Specifications

Model	KCH-5A-1, 2	KCH-5A-3
Gage factor	2.1, app.	←
Gage length	5mm	←
Gage resistance	350Ω	←
Gage pattern	Uniaxial, biaxial	Triaxial
Measuring range	10000 × 10 ⁻⁶ strain	←
Operating temp. range	-40 ~ 100°C	←
Gage connection	3-wire system	2-wire system
Installation method	Gage	EP-34B, CC-33A
	Protector	M8 stud bolts or stainless steel belt
Protector material	SUS304	←
Cable length	10m	←

Model	KCH-5A-B, S	KCH-5A-BJ, SJ
Gage factor	2.1, app.	←
Gage length	2mm	←
Gage resistance	350Ω	←
Gage pattern	Quadreaxial, shearing	←
Measuring range	10000 × 10 ⁻⁶ strain	←
Operating temp. range	-40 ~ 100°C	←
Gage connection	Full bridge	←
Installation method	Gage	EP-34B, CC-33A
	Protector	M8 stud bolts or stainless steel belt
Protector material	SUS304	←
Cable length	10m	2m

BJ and SJ models are for use in sensors for track weight self-weighting system. Available with a cable cover and waterproof connector. Dedicated relay cables (TN-29 ~ 33), options, are available.



For your information – A stud bolt welder, stud bolts and stainless steel belts which are to be used:

Purchase these on the market as KYOWA does not supply them. Examples are shown below.

Stud bolt welder and stud bolts:

Nihon Drive It (Ltd.) – Stud welder, CD-800 model; Welding gun, H-100 model

Stainless steel belts and fixtures:

Iwabuchi (Ltd.) – Safety belt, SFBT-10 model; Stainless steel belt fixture, SLS-1 model

KYOWA
KYOWA ELECTRONIC INSTRUMENTS CO., LTD.

Overseas Department:

Address: 1-22-14, Toranomon, Minato-ku, Tokyo 105-0001 Phone: 03-3502-3553 Fax: 03-3502-3678