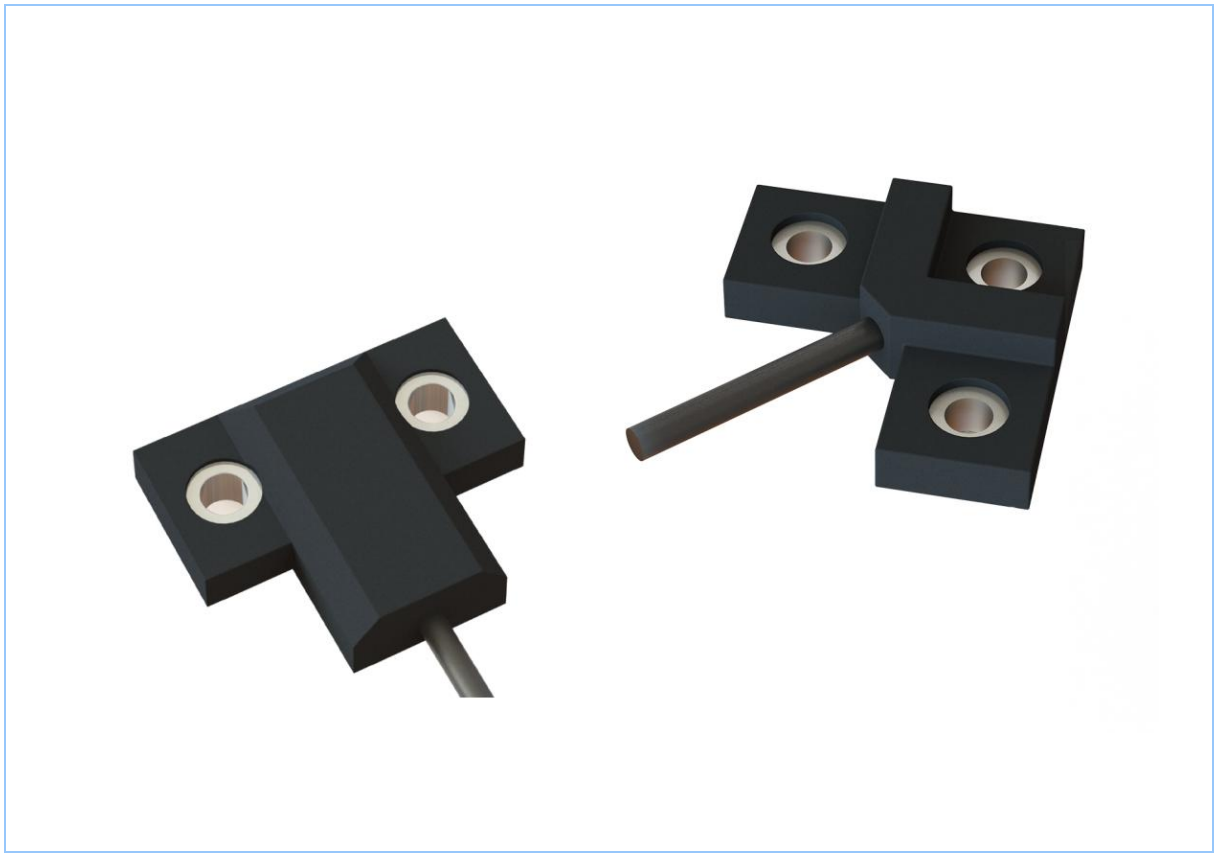
XSENSORS
TECHNOLOGY AND INNOVATION



Manual

Strain sensor X-118-1AX (single axis)

Strain sensor X-118-2AX (dual axis)

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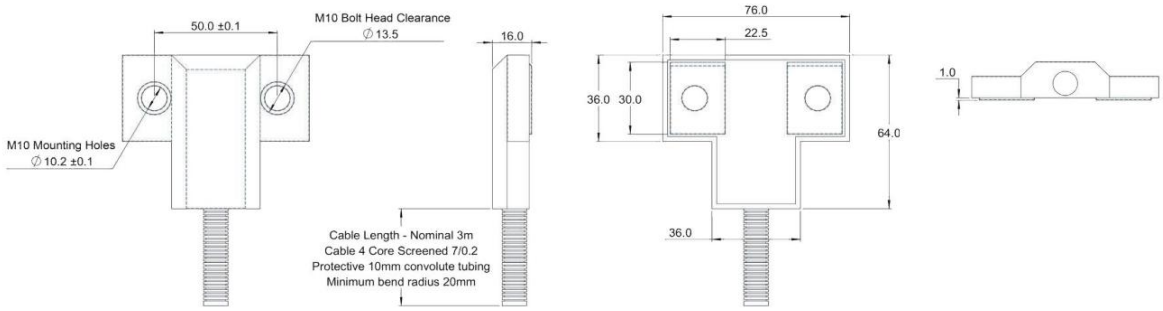
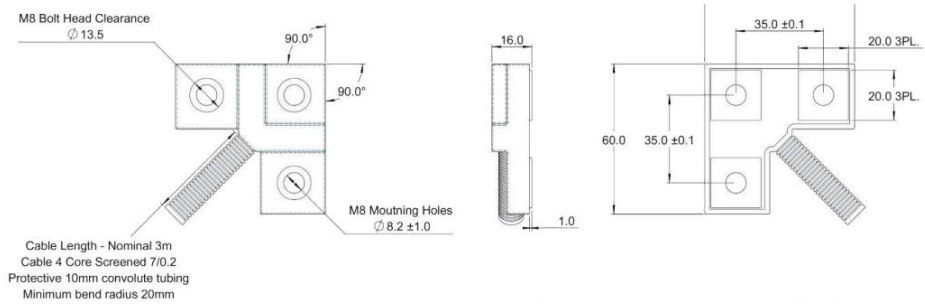
1. Dimensions

Strain Sensor 118-1AX



Strain sensor 118-2AX



2. Electrical connection

Excitation +	Red
Excitation -	Blue
Signal +	Green
Signal -	Yellow

The sensor gives an output proportional to the strain in the surface to which it is bolted.

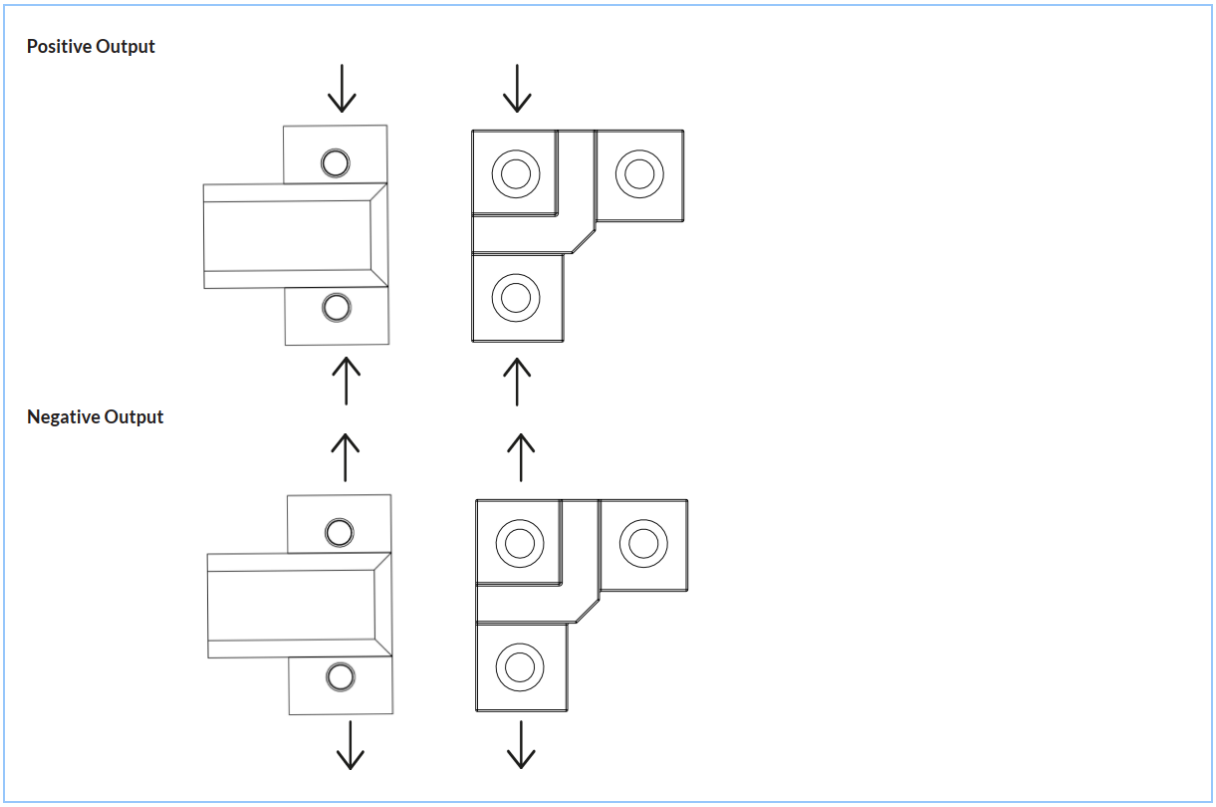
When loaded / unloaded, the structure should not present any bending strain to the strain sensor as this may affect the accuracy of readings.

The polarity of the output of the transducer is dependent on direction of strain applied.

3 Hole Sensors have 2 orthogonal active arms, the output is proportional to the difference in strain applied to the two arms.

A positive output is given for a compression in one arm and / or a tension in the other. A negative output is given when the direction of the strain is reversed. An equal strain (either both tension, or both compression) in both arms will give a zero output.

By changing the Excitation+ and the Excitation- wire, the signal direction can be changed to positive on tension.



3. Mounting

Ideally, the structure to which the strain sensor is bolted should be mechanically dominant to the sensor and have a cross-sectional area of > 500mm^2. Use with smaller cross-sectional areas is possible, but output levels may be affected and care should be taken ensure the stability of the structure and strain paths under load.

The sensor can either be mounted directly to the structure using tapped fixing holes, NOT with nut and bolt. Alternatively, mounting blocks can be welded to the structure, using method described below. In both cases the mounting surface should be flat and clean. Mechanical unevenness can cause the sensor to twist or stretch during bolting, adding an offset to the zero.

Final user calibration should always be determined empirically.

The structure to which the strain sensor is bolted becomes the dominant strain measuring element. The strain seen in the strain sensor is the same that in the structure, therefore the output from the strain sensor represent the strain in the structure.

In normal installations the strain sensor output is measured with no strain in the structure and with a known strain or load on the structure and a calibration affect from these results.

(1) Surface Preparation

The sensor-mounting surface must be flat and clean.

The sensor has three pads, which are bolted to the structure; if the bolting procedure twists or stretches the sensor elements due to the machined unevenness of the surface it will apply an offset to the sensor. The system has been designed to accept a small amount of zero offset however this should be kept to a minimum.

The sensor can be fixed to the structure using an adhesive; the adhesive greatly reduces long-term movement of the sensor relative to the structure. The better the bond is to the structure, the better the performance. The adhesives used to bond sensors, will be affected by, dirt, grease or any other contamination on the surface. We therefore recommend that: -

The surface is degreased in two phases, phase one would be using a simple degreasing agent to remove obvious debris and the second phase would be to repeat this with a clean application of the degreasing agent and the use of a clean wipe, the second wipe should be inspected, to assess the level of any residual contamination.

The degreasing agent itself can contain substances, which will reduce adhesion. Therefore, the cleaning agent itself should not be flooded on to the surface, and any remaining residue must be cleaned away thoroughly.

The lower faces of the sensor should also be inspected for contamination before application and cleaned if required.

(2) Optional: Applying welding blocks

Firstly, prior and during fitting the sensor and the structure it will be fitted to should be the same temperature.

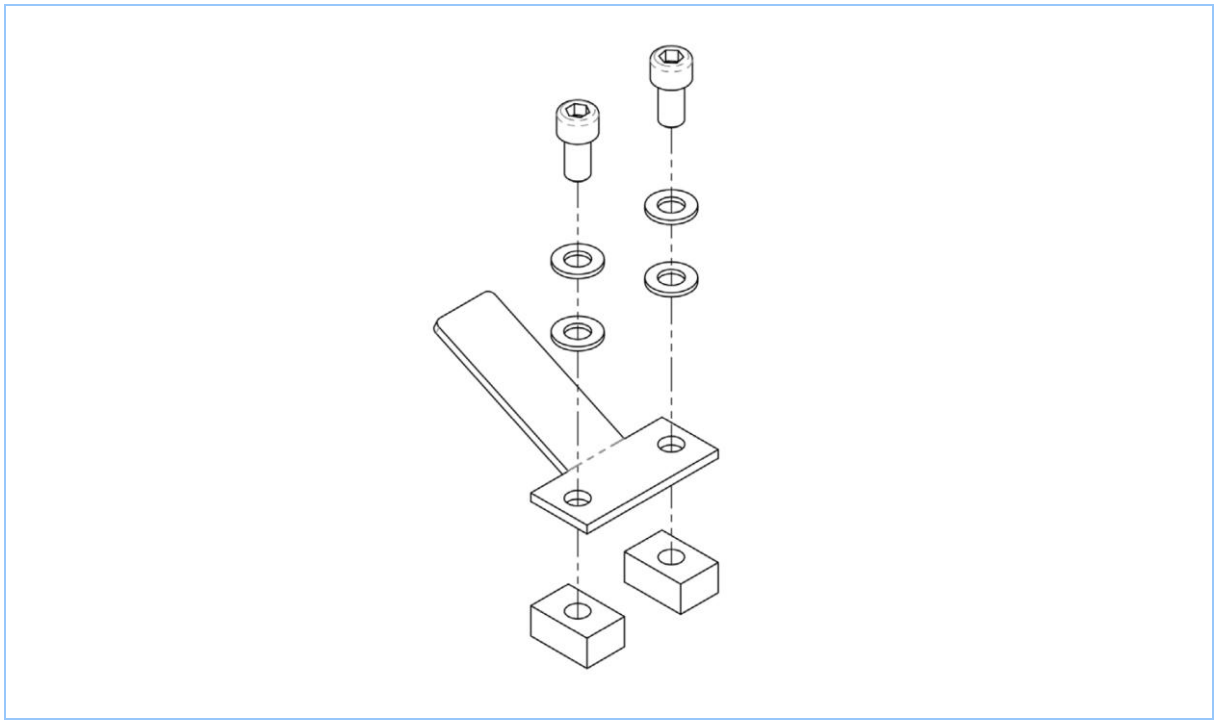
Present the sensor to the structure and confirm alignment with the fixing holes/structure. Attached the welding blocks to the fitment jig using the bolts, ensure the blocks are fitted to the jig square.

Once the blocks are securely on the jig, place the jig with the blocks onto the structure in the correct orientation and alignment with the strain path.

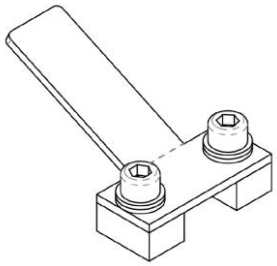
Proceed to then tack weld the blocks to the structure. Remove the bolts and therefore the Jig, and continue to fully and securely weld the blocks on.

Please follow illustration shown below:

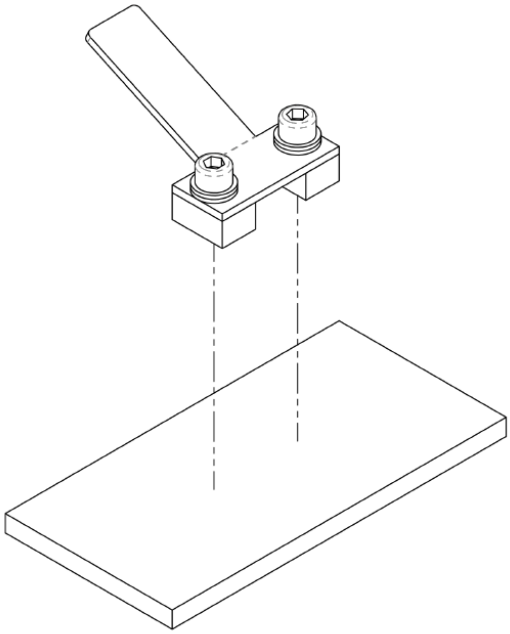
1. Fasten weldable blocks to fitment jig as shown.



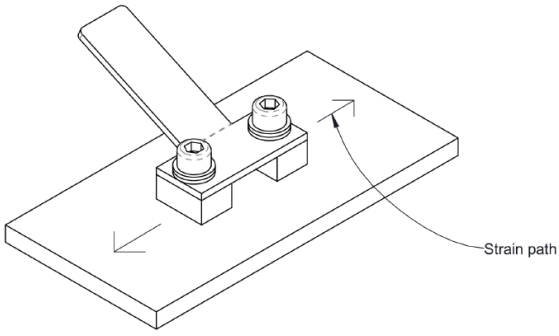
2. Ensure weldable blocks are aligned, with respect to the jig, as shown (all sides flush)



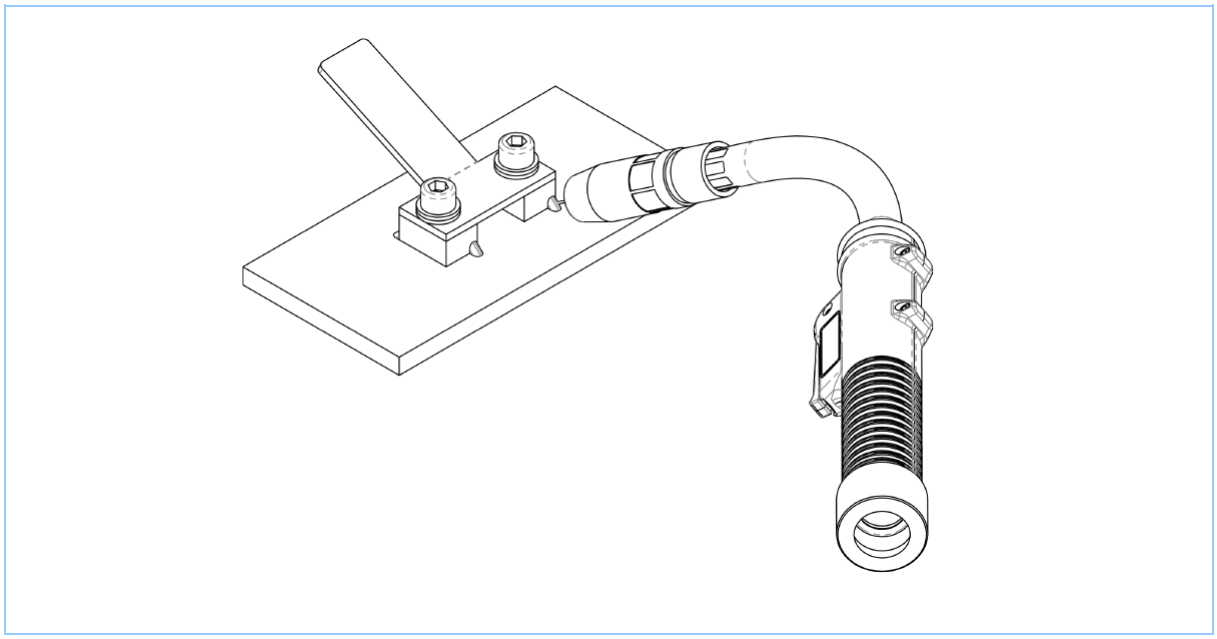
3. Offer up jig to installation point



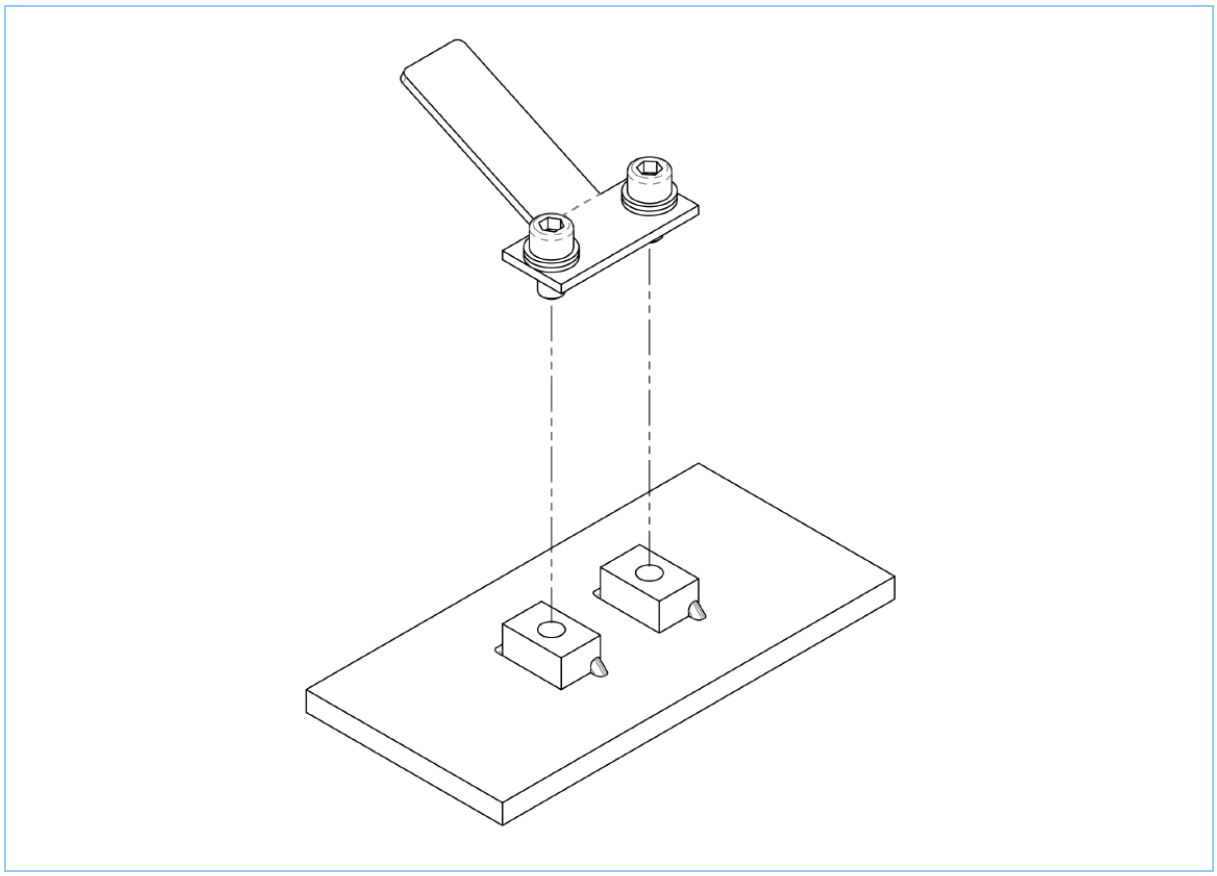
4. Ensure bolt-on is orientated along strain path as shown



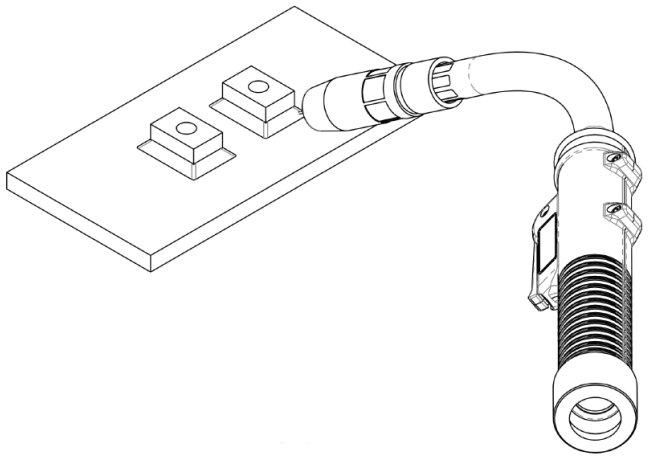
5. Tack weld blocks into place



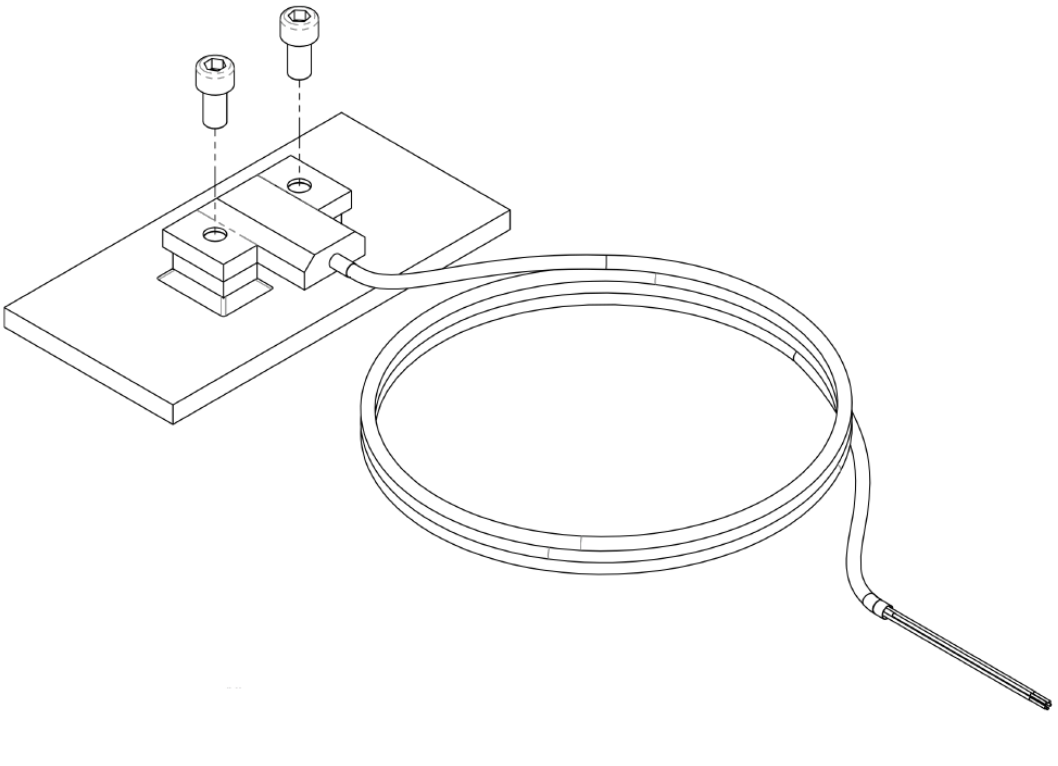
6. Remove fitment jig



7. Fillet weld blocks. Allow to return to ambient temperature.



7. Fit the bolt-on sensor to weldable blocks using bolts provided to 10 Nm. Allow 30 min for the bolt-on sensor and substrate to normalise in temperature. Finally, loosen bolts and re-tighten to 40 Nm.



(3) Application without welding blocks

Present the sensor to the structure and check alignment of the fixing holes, loose bolt the sensor to the axle/structure to check that the sensor is not pre-stressed by the bolts.

Remove the bolts.

If using adhesive: Apply adhesive to either (a) both surfaces, or (b) one surface and catalyst to the other as directed.

Present the sensor to the structure and loose bolt it. Tighten alternately to achieve a torque of 30Nm for each of the bolts. This should be carried out in three even steps 10, 20 & 30Nm.

The glue line should be thin and even but will vary according to the instructions of the specified adhesive.

4. Acceptable Adhesives & Fixings:

- Loctite Retaining Compound 638 or equivalent
- Loctite 330 with 737 activators or equivalent

Fixing Bolts must be M8 with Hex Socket Cap Screws

Please note that the sensor and the structure to which the sensor is to be fixed should both be at the same temperature for the duration of the fitting process.

5. Bolts required:

- 2-Hole sensor; M10 10.9 grade or higher, tightened to 40Nm
- 3-Hole sensor; M8 10.9 grade or higher, tightened to 30Nm