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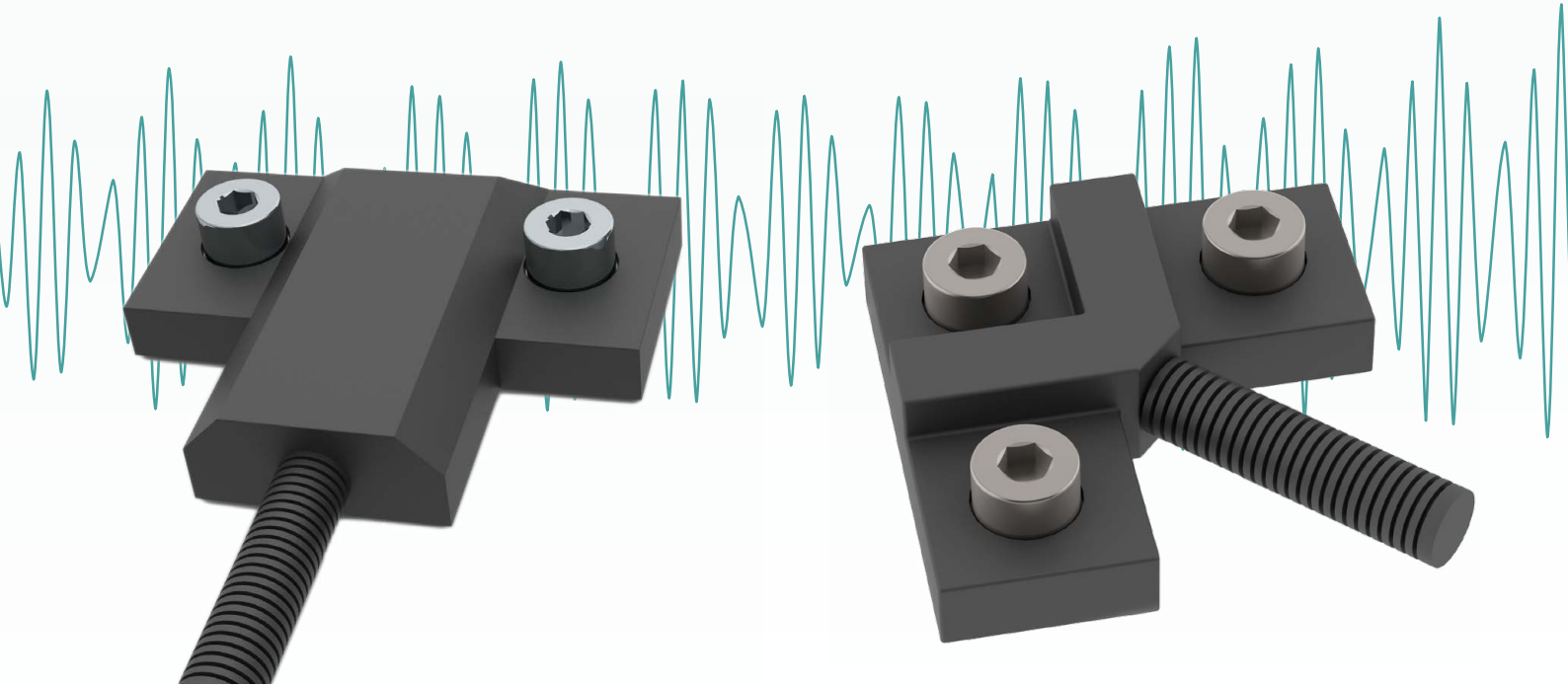
## DATUM ELECTRONICS

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SERIES 460

BOLT-ON STRAIN GAUGE SENSORS

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## THE DATUM BOLT-ON STRAIN GAUGE

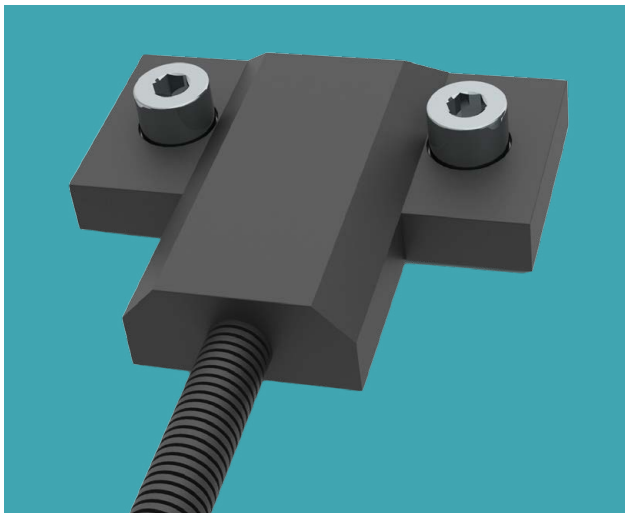
**Datum Electronics offer many types of bolt-on strain sensor that have been developed to provide rugged and robust production sensor.**

They have been designed to measure tensile, compressive and bending stresses ranging from 50 to 1,100 micro-strain. The gauges have been designed for use in applications including on:

vehicles, civil engineering structures, silos, hoppers and specialist engineering projects.

They can also be used for other applications including bridges, oil rigs, ship hulls and building roofs to evaluate tensile and compressive strain.

Datum Electronics also specialises in volume OEM solutions for customers who need an application specific product. Talk to our sales team to discuss at [web@datum-electronics.co.uk](mailto:web@datum-electronics.co.uk) or 01983 282834.



### 2-HOLE BOLT-ON SENSOR

The standard 2-Hole sensor can be bolted direct to the structure for use in a range of applications and environments. We recommend that the structure on to which sensor is to be bolted should be at least 10 times larger than the sensor, for accurate and reliable measurement data.

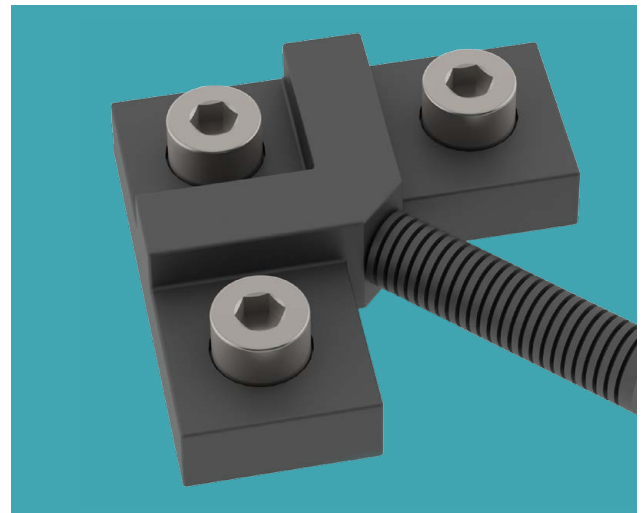
The 2-Hole sensor has a standard hole size of 10.2mm. There is an option for a sensor with a hole size of 8.2mm if required in addition to the 10.2mm option.

## SPECIFICATIONS

Our Bolt-on strain sensors are quick and easy to install without any fine wiring or soldering. Its practical robust design allows the sensor to work in almost any environment, in any weather and even underwater if required. Rated to IP68 this is a truly universal product that will give you reliable accurate strain indication whatever the application or environmental condition. All sensors are pre-tested and checked during final assembly ensuring the reliability and quality of all our sensors.

## DIVERSITY

Using the latest strain gauge techniques and technologies it gives you the accurate and reliable data you require in a number of challenging environments. The sensors are fully compatible with our wide range of load and strain indicators and amplifiers allowing you to operate any number of sensors in parallel for your application. A direct serial link to a PC, or an analogue input to a data logger or PLC, is also an option and also very easy to achieve. The Series 460 Bolt-on strain sensor is not only an essential product for measuring micro-strain, but it can also become an integral part of a strain monitoring system.



### 3-HOLE BOLT-ON SENSOR

The 3-Hole bolt-on strain sensor is a dual element sensor that corrects any differential temperature between the sensor and the structure. Typically, a vehicle axle can be 5 degrees hotter than the sensor as the axle heats due to braking and drive loads, in this case the surface strain of the axle due to temperature can be 60 micro-strain greater than the sensor.

The 3-Hole bolt-on sensor has been designed to eliminate this potential strain difference. Highly sensitive with effective temperature compensation built in, this product makes an incredibly useful and cost-effective method of measuring strain.

## FULL SPECIFICATIONS FOR BASIC STANDARDS

SPECIFICATION	
Rated Strain Range	10 - 1,100 micro-strain <i>*OEM can be catered to your requirements</i>
Maximum Strain (single operation)	1,500 micro-strain
Rated Output	1.5mV/V for 1,000 micro-strain
Linearity & Repeatability	0.1% of rated output (FSD)
Hysteresis	0.1% of rated output (FSD)
Temperature Effect on Output	0.005 of applied load
Temperature Effect on Zero	0.005 of rated load
Bridge Resistance	350ohm (nominal)
Electrical Connection	3 meter, 4-core integral cable
Excitation Voltage	10VDC
Excitation (max)	15VDC
Environmental Protection	IP68
Operating Temperature	-20C to +80C
Storage Temperature	-40C to +100C
Humidity	0% - 100%
Chemical Splash	Resistant to chemicals including: Dust, Water, Salt Stray, Urine, Paint, Dilute Acid  Fuels: Diesel, Gasoline, Bio Diesel Oils: Lubricating, Hydraulic  Coolant: Ethylene Glycol, Coolant Conditioner, Freon
Acceptable Bolt Down Error	+/-40% of scaled measurement range
Connections	Red Excitation positive (ex+ve) Blue Excitation negative (ex-ve) Green Signal positive (sig+ve) Yellow Signal negative (sig-ve)

## APPLICATION EXAMPLES



VEHICLES



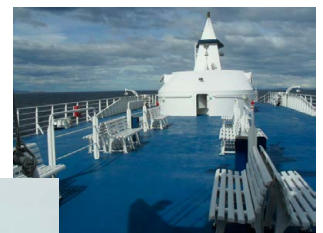
OIL RIGS



SILOS



HOPPERS



SHIP HULLS

## TYPICAL SENSOR INSTALLATION

### SURFACE PREPARATION

The sensor mounting surface must be flat and clean. The sensor has two pads or 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.

### FLATNESS

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 to the structure the better the systems performance. The adhesives used to bond sensors, will be affected by dirt, grease or any other contamination on the surface. We strongly 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.

Level of Contamination  
Clean to the naked eye

Cleaning Agents  
Loctite 7063 degreasing agent or equivalent

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

## TYPICAL APPLICATION

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

Remove the bolts/  
Apply adhesive to either  
(a) Both surfaces or

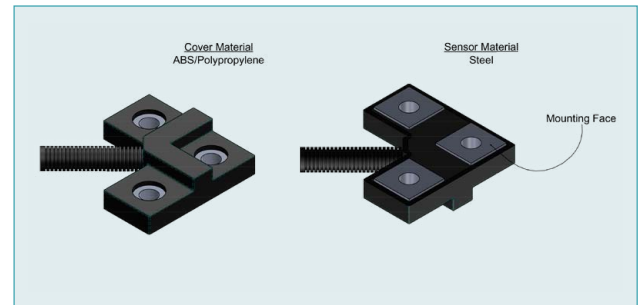
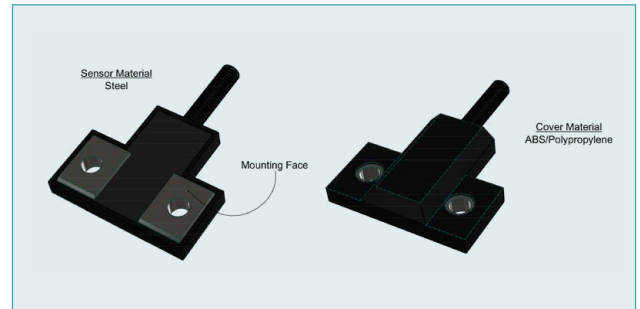
(b) One surface and catalyst to the other as directed.

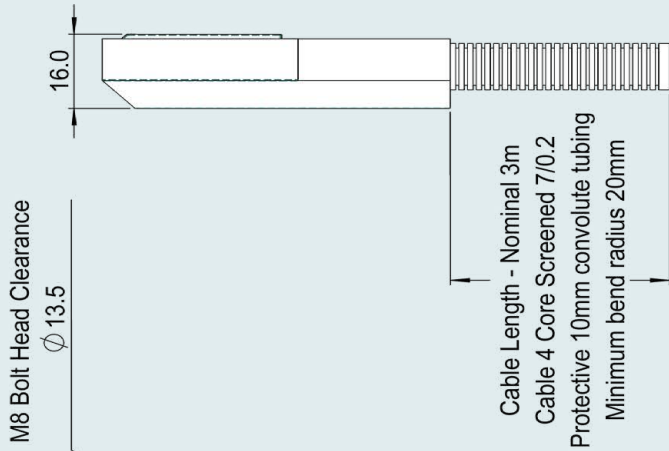
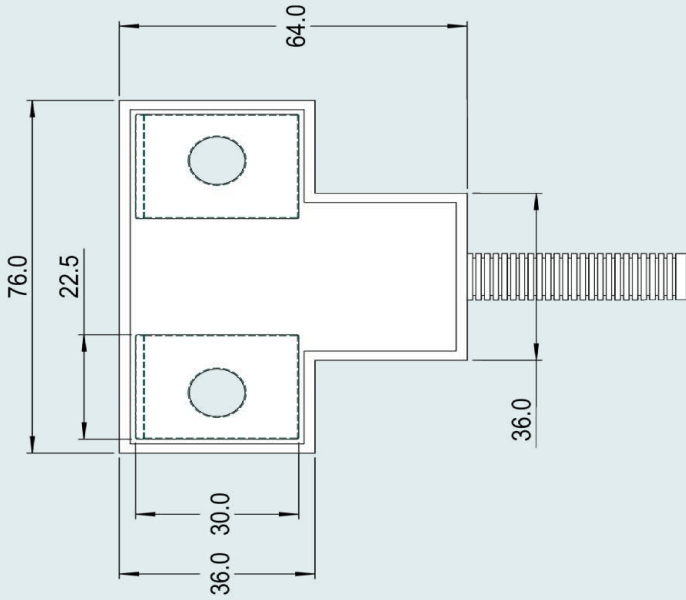
Present the sensor to the structure and loose bolt it. Tighten alternatively to achieve an even torque for each of the bolts. The bolt tightening should be carried out in a minimum of three even steps. The glue line should be thin and even but will vary according to the instructions of the specified adhesive.

## ACCEPTABLE ADHESIVE & FITTINGS

Loctite Retaining Compound 638 or equivalent

Loctite 330 with 737 activator or equivalent



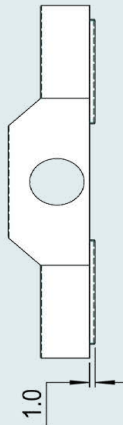


M8 Bolt Head Clearance

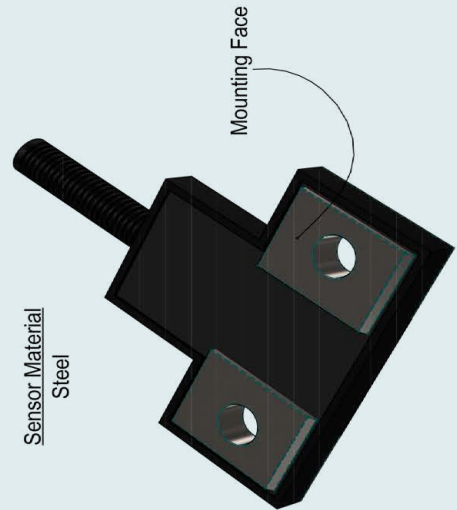
$\phi$  13.5

$50.0 \pm 0.1$

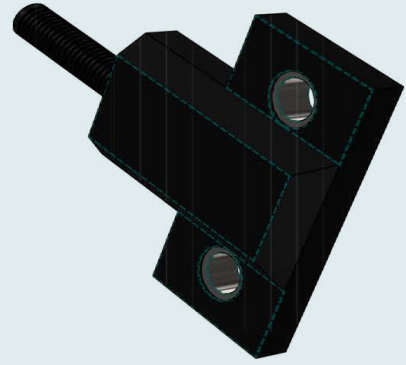
M8 Mounting Holes  
 $\phi$  8.2  $\pm 0.1$



Sensor Material  
Steel



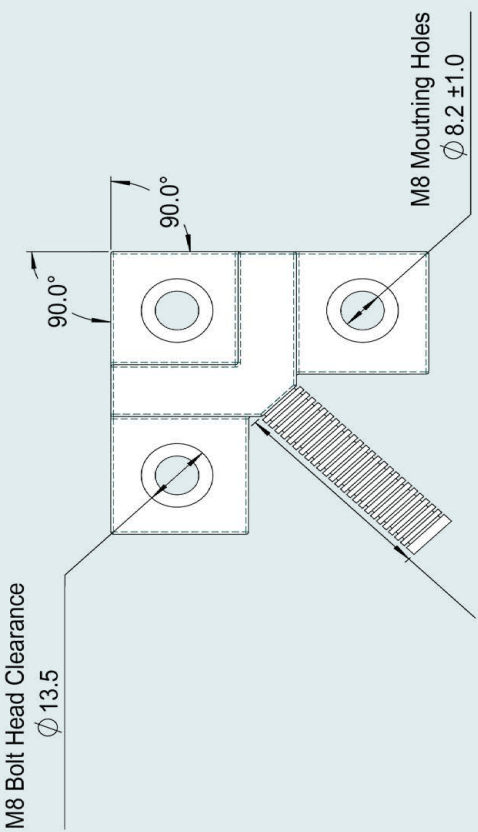
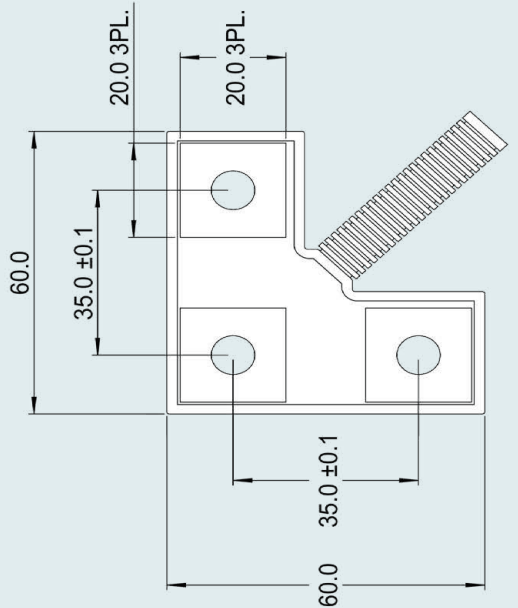
Cover Material  
ABS/Polypropylene



Sensor should be mounted using 2 x M8 cap head screws, combined with a suitable adhesive between mounting face and surface

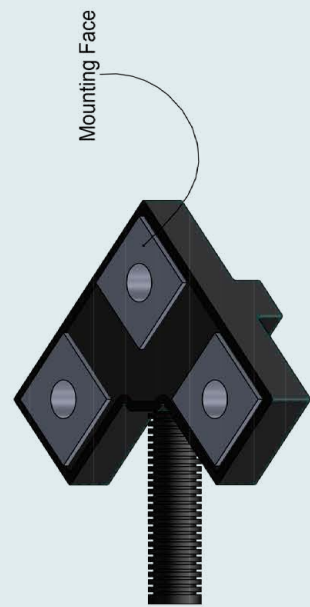
The surface being mounted to should be flat, clean, free from paint, grease and any other possible interferences to the sensor. Surface roughness should ideally be between 0.5 & 1.6  $\mu$ m

Refer to mounting instructions for process details.

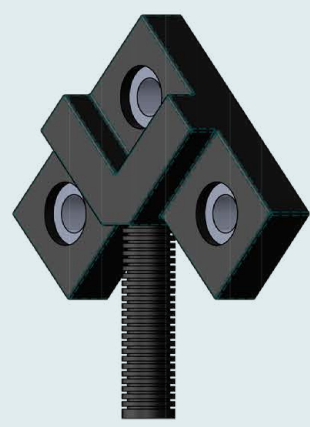


Cable Length - Nominal 3m  
 Cable 4 Core Screened 7/0.2  
 Protective 10mm convolute tubing  
 Minimum bend radius 20mm

Sensor Material  
 Steel



Cover Material  
 ABS/Polypropylene



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For more information please contact our sales team on [web@datum-electronics.co.uk](mailto:web@datum-electronics.co.uk) or call +44 (0) 1983 282834.



DATUM ELECTRONICS LIMITED  
TELEPHONE: +44 (0) 1983 28 28 34  
FAX: +44 (0) 1983 28 28 35  
EMAIL: [support@datum-electronics.co.uk](mailto:support@datum-electronics.co.uk)  
WEB: [www.datum-electronics.co.uk](http://www.datum-electronics.co.uk)