

HULLMOS®

SBSG SENSOR INSTALLATION MANUAL

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VERSION 1.4

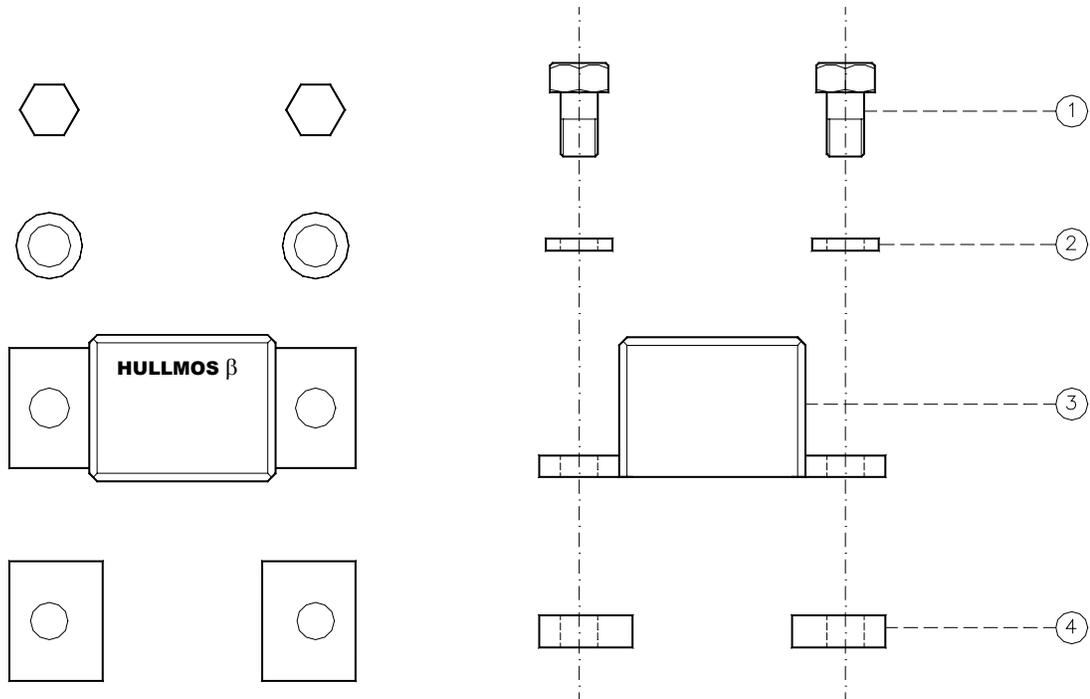
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SBSG SENSOR

Part List

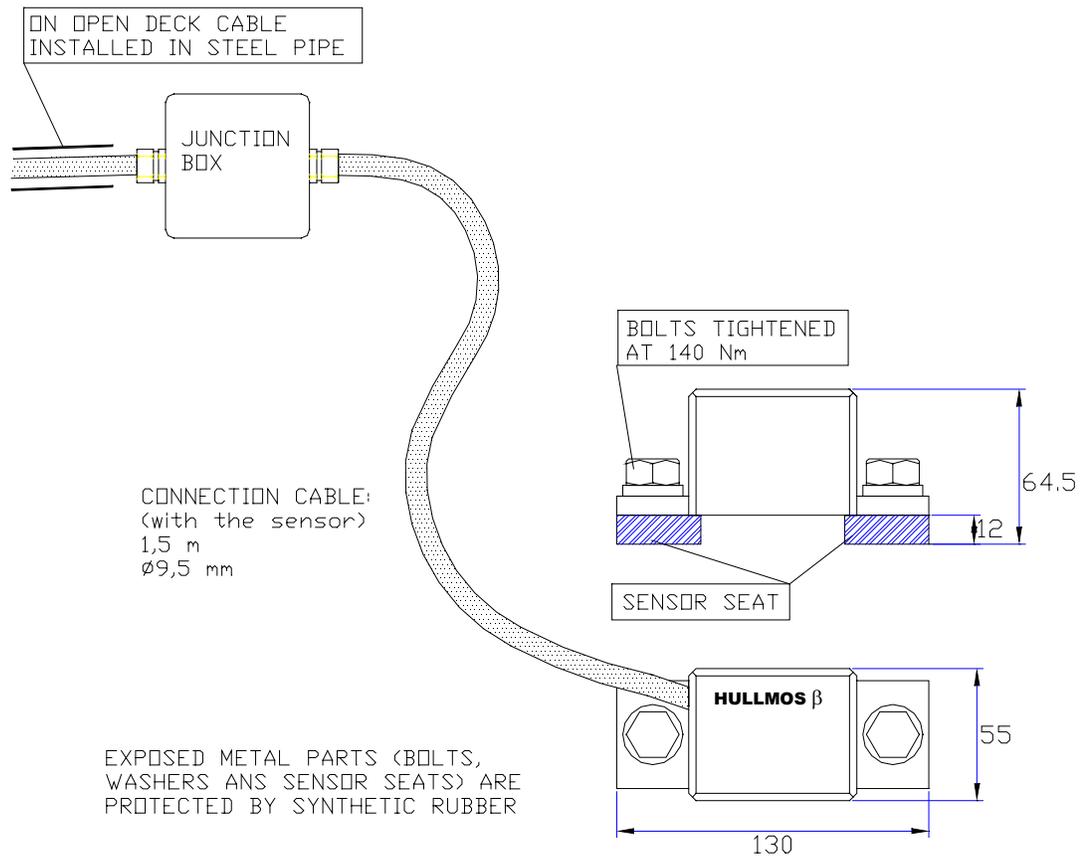
Hullmos SBSG sensor includes the following parts:



Picture 1. Sensor parts.

1. Bolt	2 pcs
2. Washer	2 pcs
3. Sensor	1 pcs (with 1,5 m connection cable)
4. Sensor Seats	2 pcs

Sensor Dimensions



Picture 2. Sensor dimensions.

Sensor Locations (specified for each ship in installation drawings)

Sensor locations:

- 1 SB Frame _____ $\frac{1}{4}$ of the ships length (Lpp) (on deck above longitudinal)
- 2 SB Frame _____ $\frac{1}{2}$ of the ships length (Lpp) (on deck above longitudinal)
- 3 SB Frame _____ $\frac{3}{4}$ of the ships length (Lpp) (on deck above longitudinal)
- 4 PS Frame _____ $\frac{1}{2}$ of the ships length (Lpp) (on deck above longitudinal)

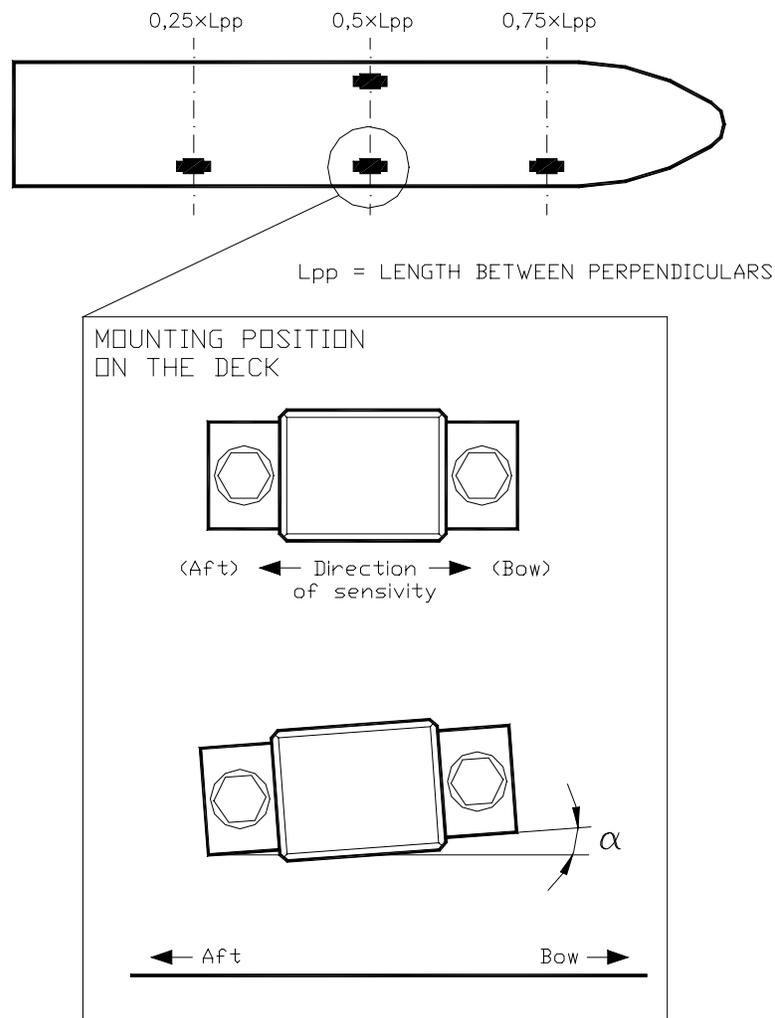
Lpp = Length between perpendiculars



Mounting Position

The sensors are welded on the deck on specified locations. The welding is done with an installation tool (see picture 5.).

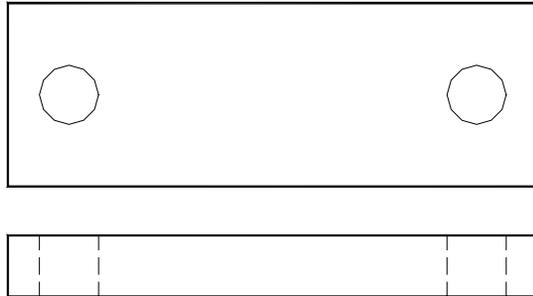
SBSG measures normal strain along the vessels central line. The installation position should be horizontally on (or below) the deck above a longitudinal. The line of sensitivity of the sensor should be as much parallel with the longitudinal as practicable. Accuracy of the orientation should be better than 5° ($\alpha_{MAX} = 5^\circ$), see picture 3.



Picture 3. Sensor's mounting position.

Mounting the Sensor

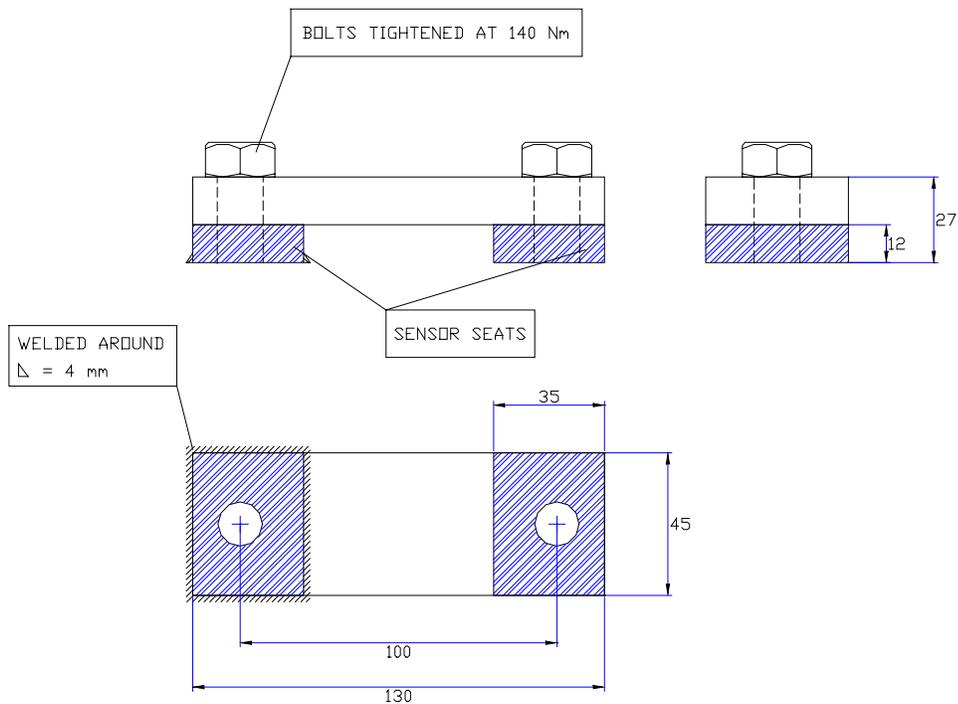
The Installation tool is needed for welding the sensor seats on the deck (see picture 5).



Picture 4. The Installation Tool.

Welding with the Installation Tool

SBSG sensor seats should be along a common plane. This is guaranteed to necessary level if the sensor seats are tightened to the welding tool during welding, see picture 5. The welding dimension of $A=4$ mm should not be exceeded. Leave the Installation Tool in the sensor seats after welding if sensor is installed afterwards.

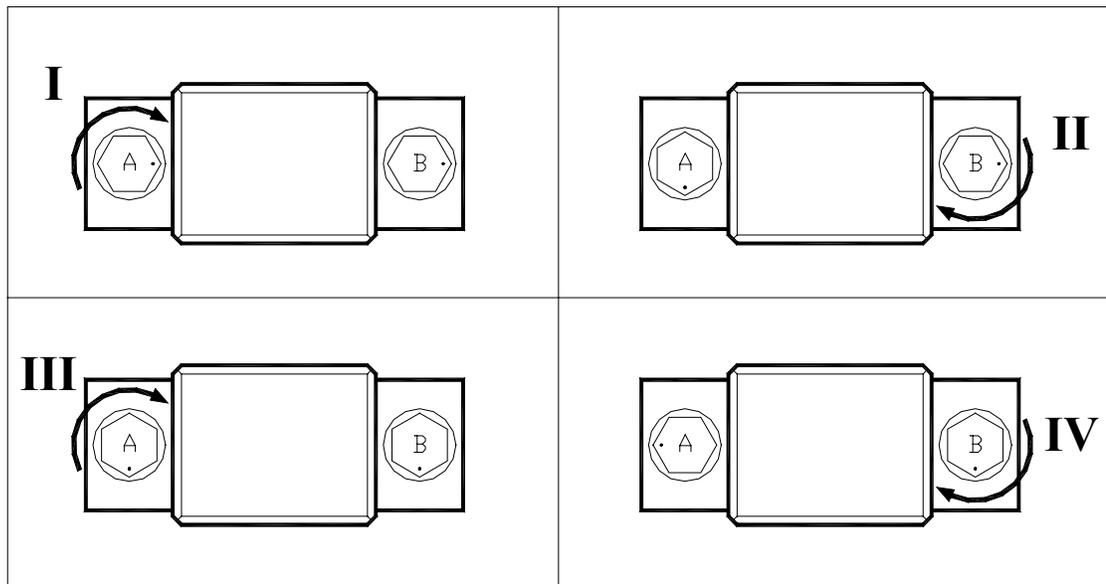


Picture 5. Welding with the Installation Tool.

Tightening the sensor bolts

The sensor bolts must be tightened in turns. If one of the bolts is tightened in to full tension and then the other bolt next, then there will be an initial strain, which shows in the sensor measurements.

At the beginning the bolts can be turned by fingers and the rest is tightened with a torque wrench. Start the tightening by turning one bolt $\frac{1}{4}$ -round and then same for the other bolt, see picture 6. Continue tightening the bolts in turns until the wanted torque (140 Nm) is achieved.

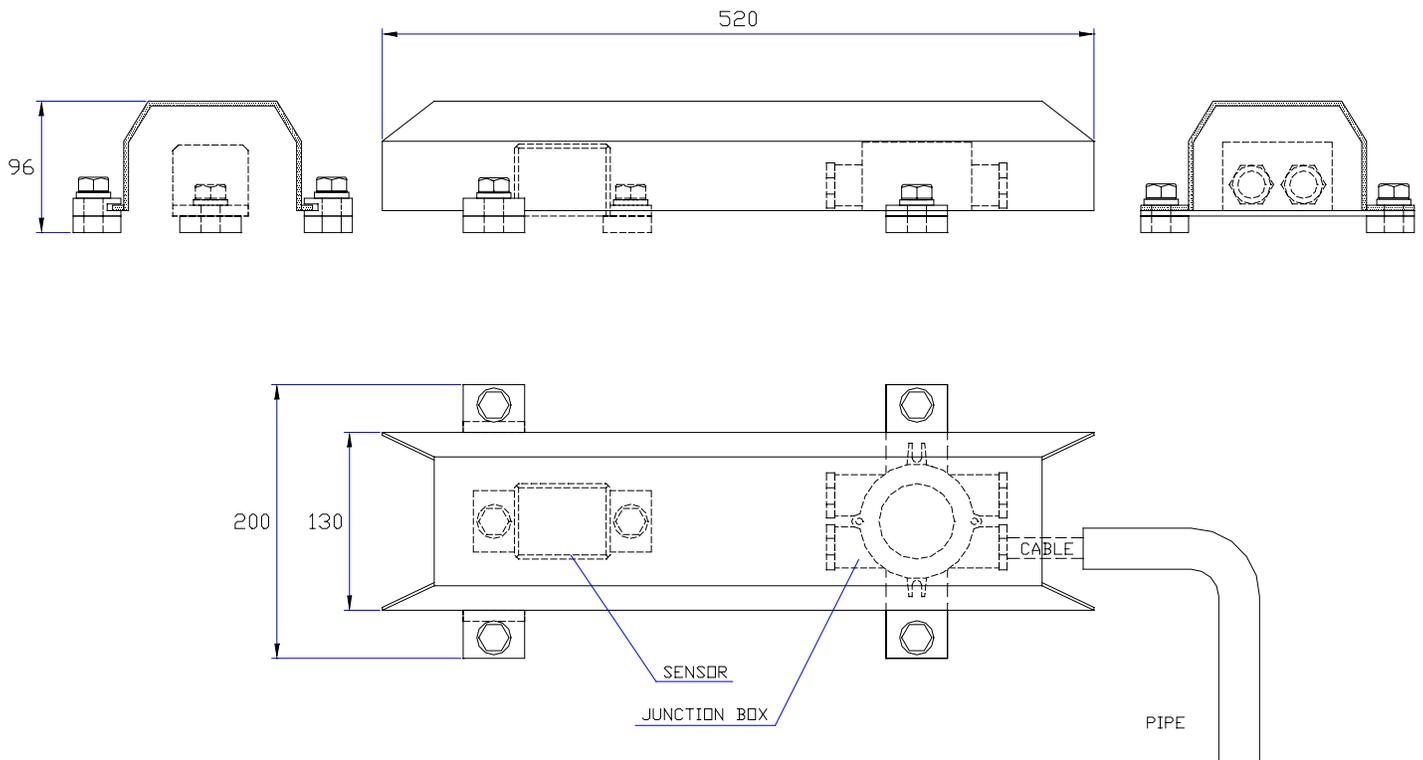


Picture 6. Tightening order

SENSOR COVER FOR OPEN DECK

The sensors, which are installed on open deck, are protected with a cover against mechanical damage.

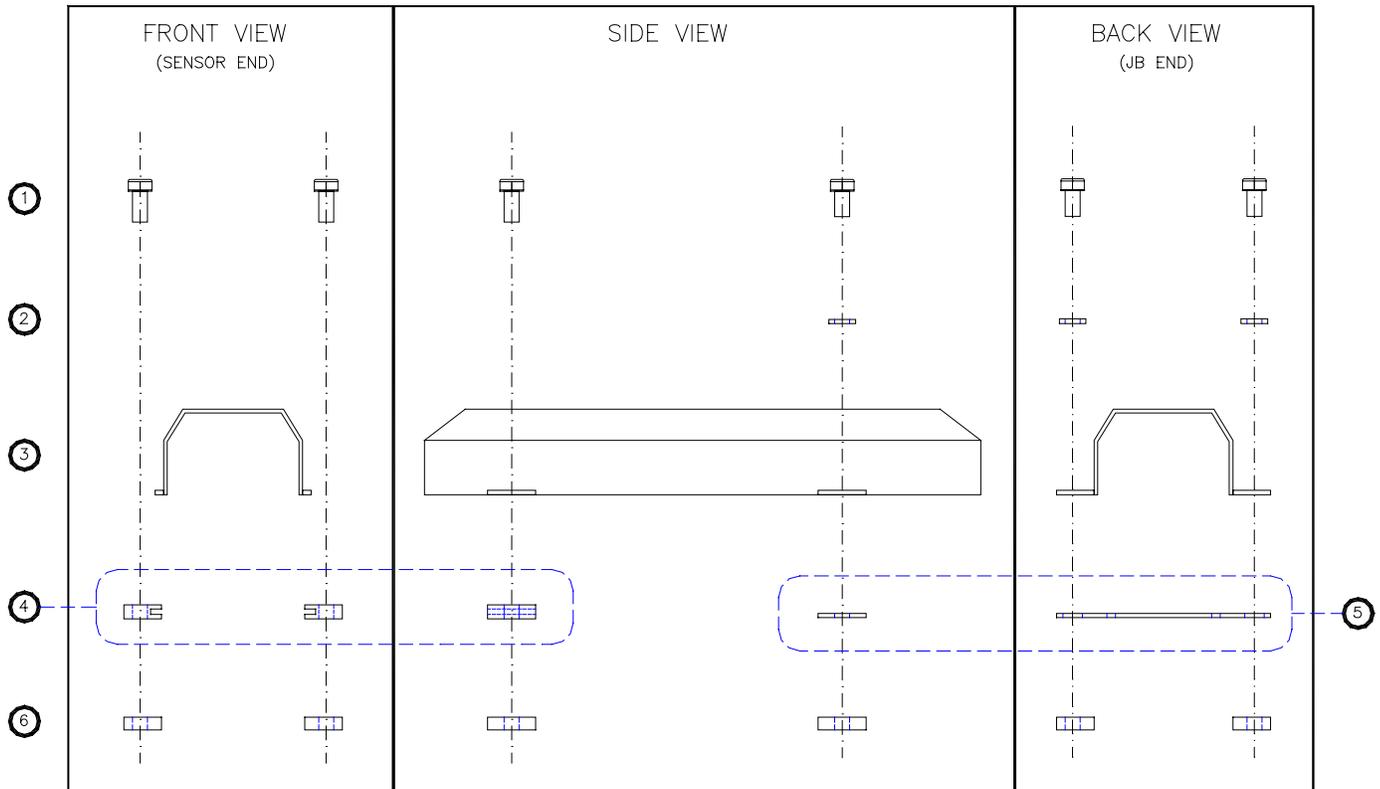
The Sensor Cover is fixed with bolts in four seats, which are welded, on the deck. The Junction box under the cover is on steel plate that is tightened to its place with the bolts.



Picture 7. Sensor Cover.

Part List

The Sensor Cover includes the following parts:



Picture 8. Sensor Cover parts.

- | | | |
|----|----------------------|-------|
| 1. | Bolt 35 mm | 4 pcs |
| 2. | Washer | 2 pcs |
| 3. | Cover | 1 pcs |
| 4. | Cover Support | 2 pcs |
| 5. | Junction box support | 1 pcs |
| 6. | Seats | 4 pcs |

CALIBRATION

Each strain gauge is initially set to a stress value calculated in an agreed loading condition. This calculated stress is compatible with the output of the loading instrument.

The initial read out of the sensor is checked against a subsequent agreed loading condition in calm water periodically. In the event that differences greater than 5% of the approved value or 10 N/mm^2 occur, whichever is the greater, the set-up and subsequent checking procedure is repeated.

Pre-setting of the sensor reading is done by applying longitudinal force to the sensor support with screw-clamp while tightening the sensor bolts to their final value. Fine-tuning of the sensor is software based in the HULLMOS system.