

# HULLMOS<sup>®</sup>

## LBSG SENSOR INSTALLATION MANUAL

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**ROUVARI OY**

VERSION 1.5

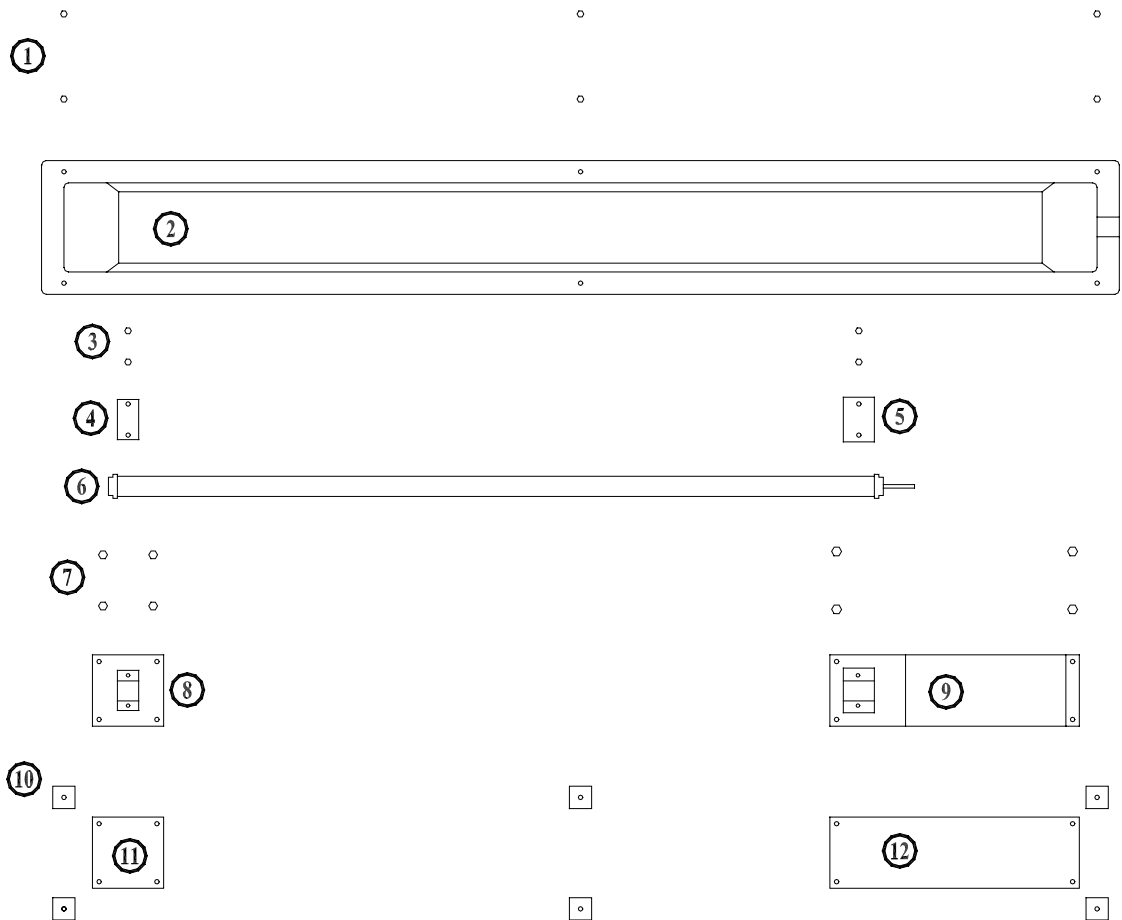
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# LBSG SENSOR

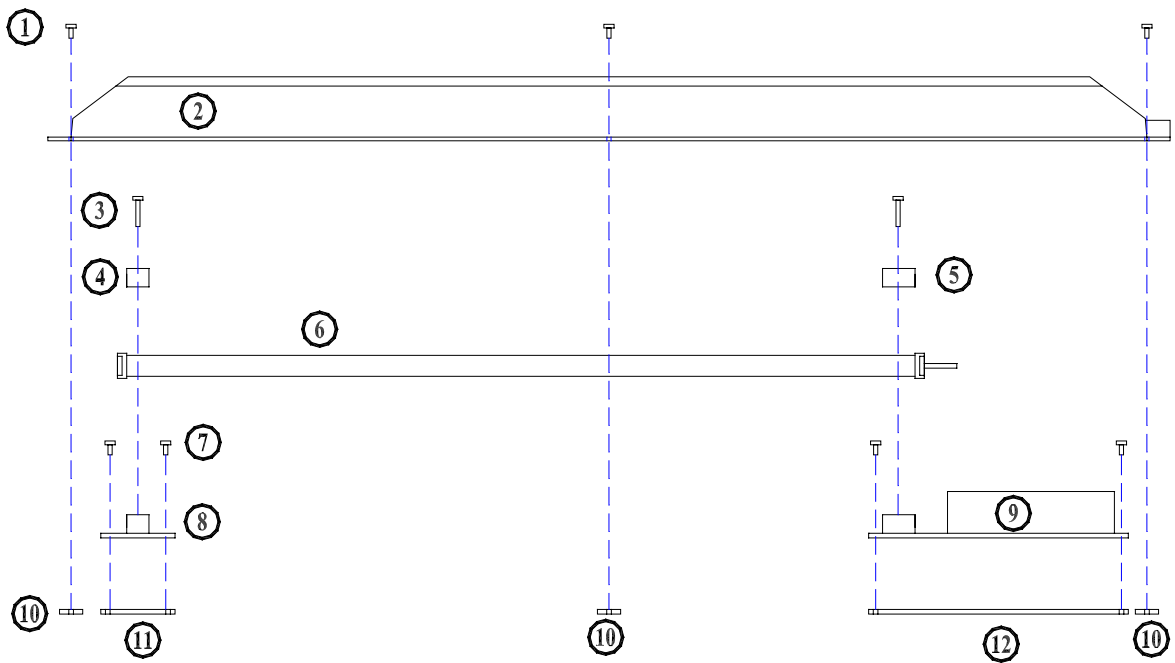
## Part List

Hullmos LBSG sensor includes the following parts:



Picture 1. Sensor parts, top view. (Side view, see picture 2.)

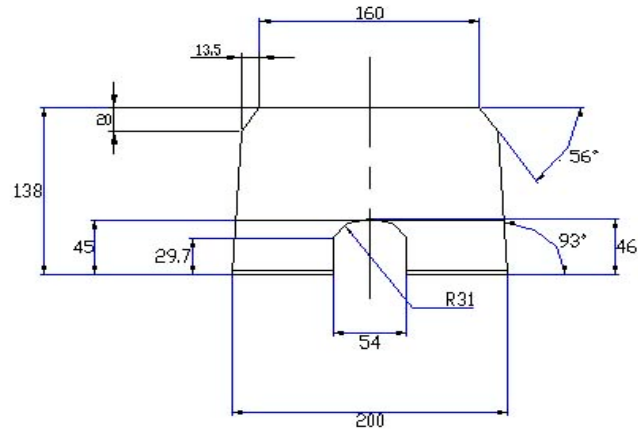
|                              |       |                                         |       |
|------------------------------|-------|-----------------------------------------|-------|
| <b>1.</b> Cover bolts        | 6 pcs | <b>7.</b> Bolts for the sensor supports | 8 pcs |
| <b>2.</b> Cover              | 1 pcs | <b>8.</b> Fixed end                     | 1 pcs |
| <b>3.</b> Bolts for rod base | 4 pcs | <b>9.</b> Moving end                    | 1 pcs |
| <b>4.</b> Fixed end, top     | 1 pcs | <b>10.</b> Cover supports               | 6 pcs |
| <b>5.</b> Moving end, top    | 1 pcs | <b>11.</b> Support for moving end       | 1 pcs |
| <b>6.</b> Rod                | 1 pcs | <b>12.</b> Support for fixed end        | 1 pcs |



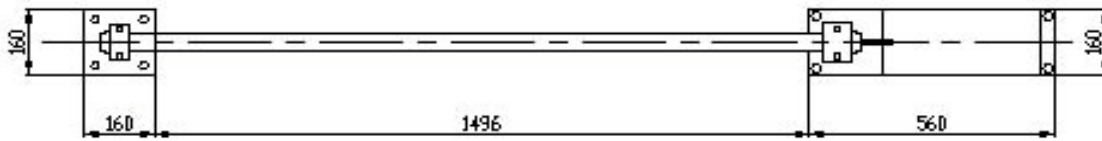
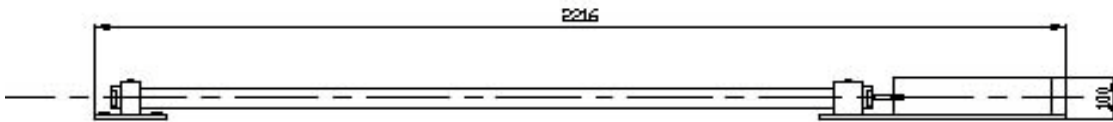
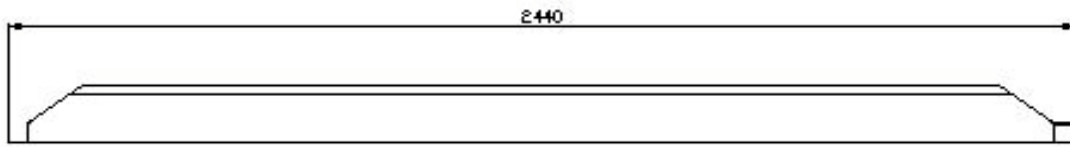
Picture 2. Sensor parts, side view.

The sensor is shipped in two packings as below

- 1 – Sensor supports (11, 12), cover supports (10) and installation tool bolts.
- 2 – Sensor (in one unit), sensor cover, cable hose, fixing bolts



COVER END

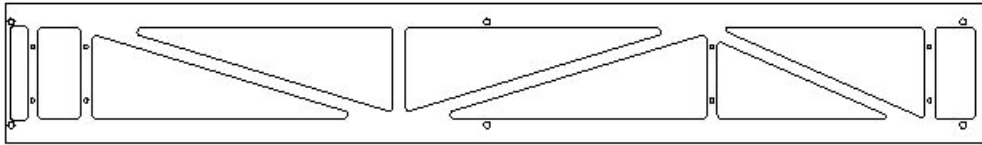


Picture 3. Sensor dimensions.

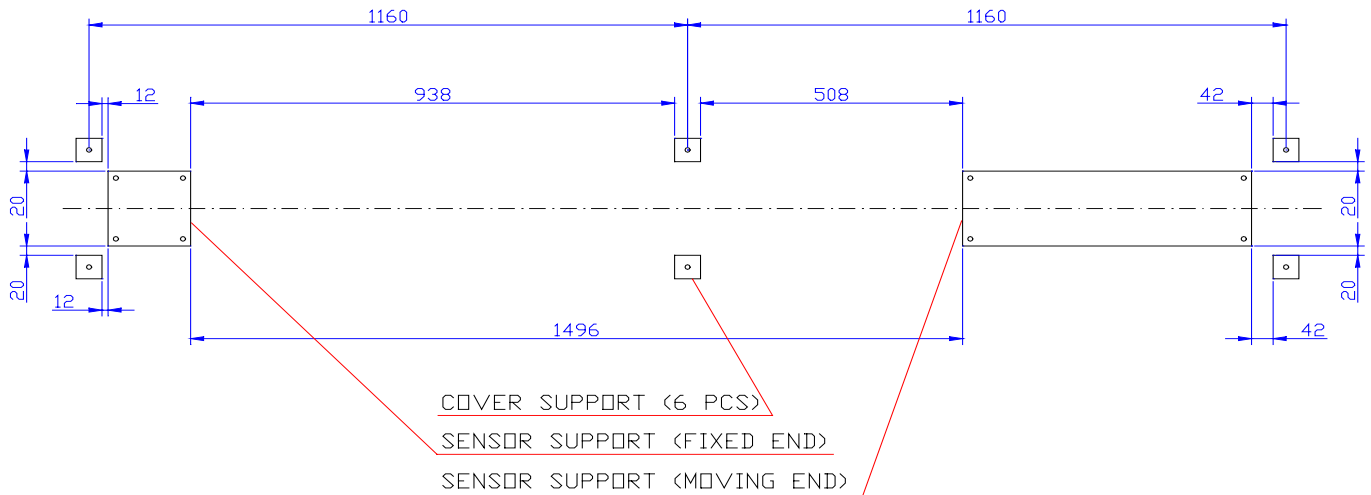
## Mounting the Sensor

The LBSG sensor and the sensor cover are fixed by bolts on supports, which are welded on the deck. Welding is done by using the Installation tool (picture 4). The sensor seats and the cover seats are fixed by bolts on the tool before welding.

The welding dimension of  $A=4$  mm should not be exceeded.



Picture 4. The installation tool



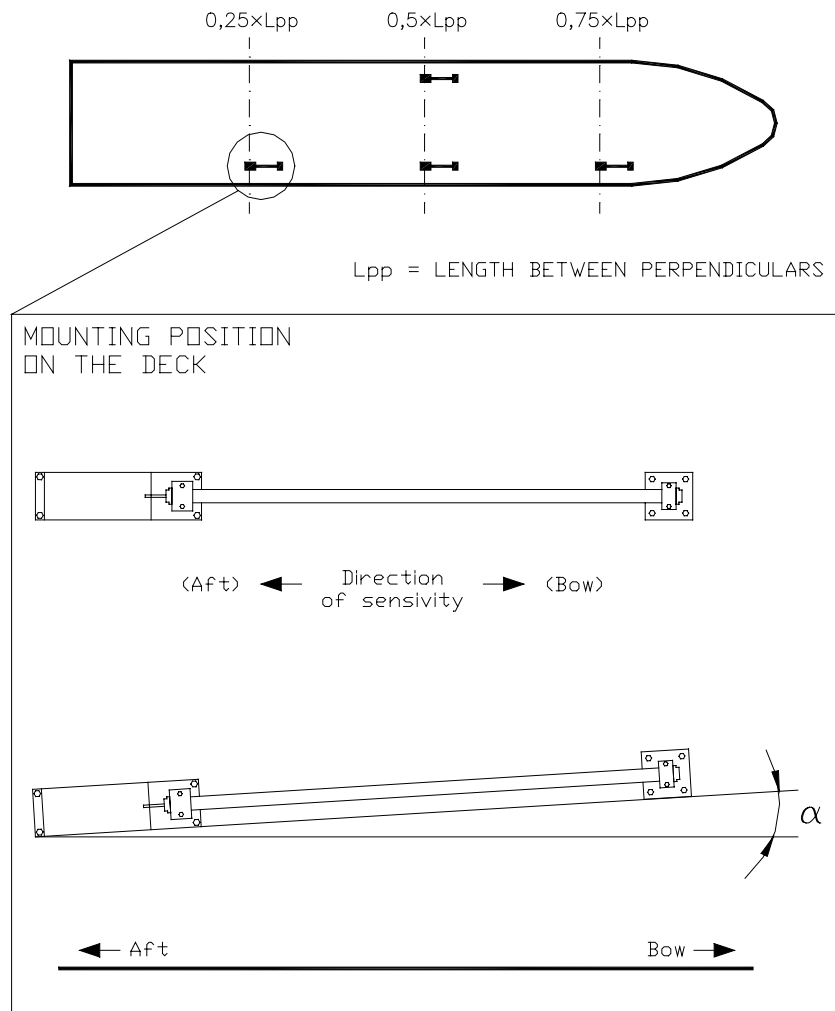
Picture 5. Welding dimensions.

If the sensor is not installed on open deck and there is no risk of mechanical damage, the sensor can be installed without the cover.

## Mounting Position

The sensors are welded on the deck on specified locations. Sensor Locations are specified for each ship in installation drawings.

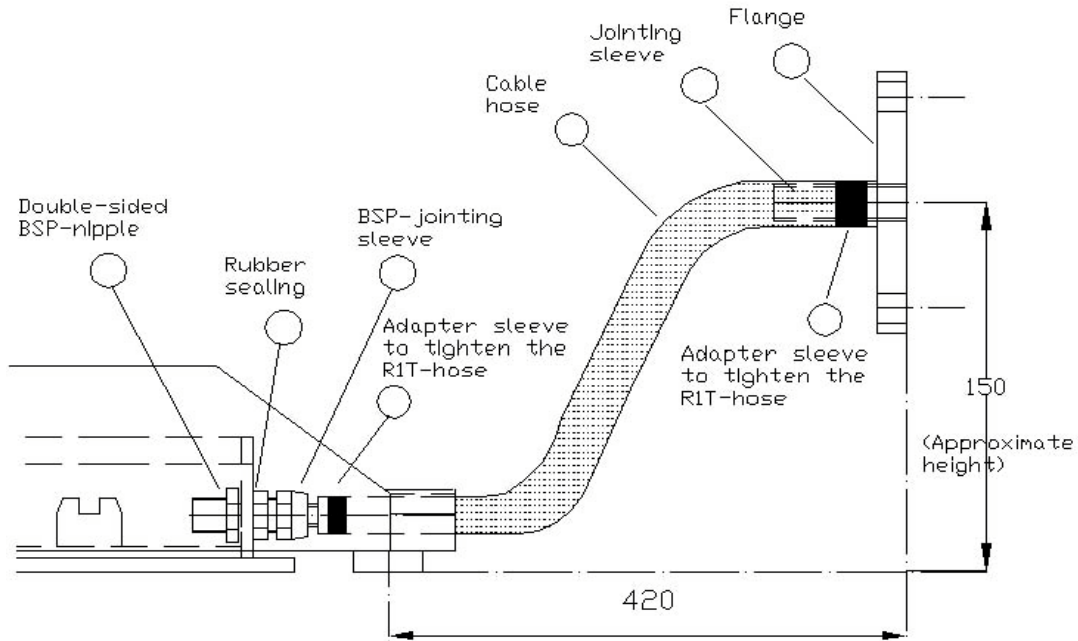
LBSG measures normal strain along the vessels central line. The installation position should be horizontally on (or below) the deck above a longitudinal. The line of sensitivity of the sensor should be as much parallel with the longitudinal as practicable. Accuracy of the orientation should be better than  $5^\circ$  ( $\alpha_{MAX} = 5^\circ$ ), see picture 6.



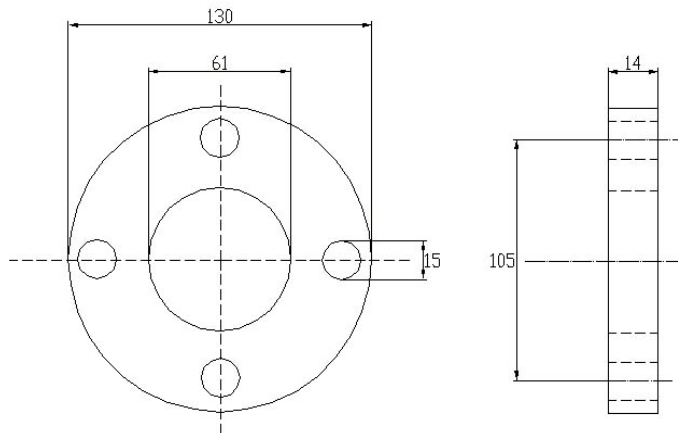
Picture 6. Sensor's mounting position.

## Connection of cable hose to electronics case

Cable hose connection from the end flange of cable pipe to electronics case is shown in picture 7. Hole of sensor case is waterproofed by sealing ring on both sides of the electronics enclosure.



JIS 5K-50A FLANGE

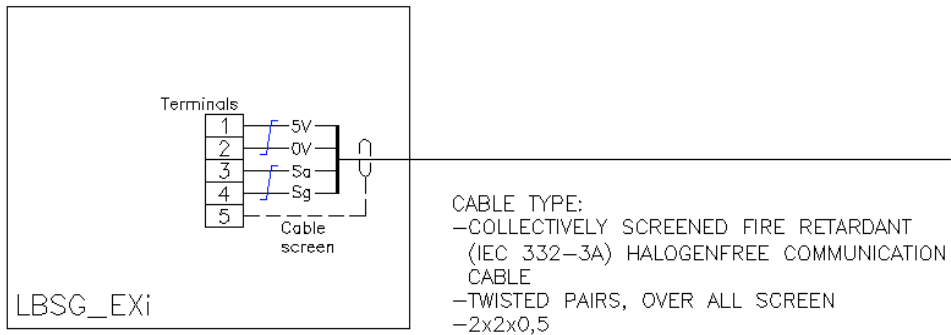


Picture 7. Cable hose connection to electronic case



## Cable connection

The cable wires are tightened in sensors screw terminals.



Picture 8. Cable connection

## 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  $10 \text{ N/mm}^2$  occur, whichever is the greater, the set-up and subsequent checking procedure is repeated.

Pre-setting of the sensor reading is done in the electronics case by moving the sled over the sled-support. Fine-tuning of the sensor is software based in the HULLMOS system.

Checking the scale is checked by inserting accurate calibration plates between the instrumented spring in the sensor.