

## Pressure Sensors

### General description

The process pressure / hydrostatic pressure sensors are based on the principle of a transducer with a pre-set pressure range and adjustable output. The sensors can be installed "dry" outside the tank, or "submerged" in medium inside the tank.

In both cases, the sensor should be installed approx. 10cm above the lowest bottom area of the tank.

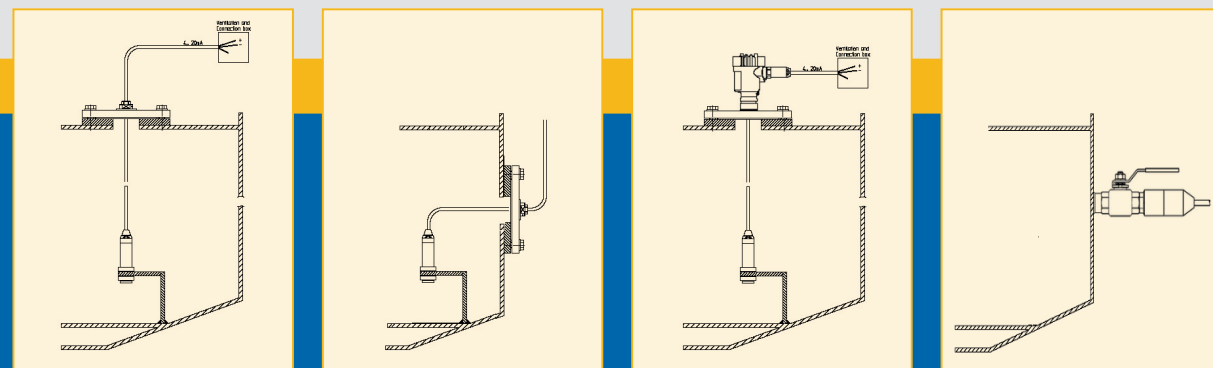
### Applications

- Ballast water tanks, fresh water tanks, grey water tanks, black water tanks, sludge tanks.
- HFO Storage tanks, HFO Settling tanks, HFO Service tanks.
- MDO tanks, lube-oil tanks, cooling water tanks.
- Draft

### SENSOR FEATURES FOR PRESSURE TRANSDUCERS: A

Principle:	process pressure/hydrostatic pressure
Exactitude:	better <0,25 %
Overpressure:	at least 25 bar overpressure-safe
Temperatures:	body -10 ..+ 100 °C
Materials:	membrane is sapphire-ceramic, body 1.4404, sealing FFKM double sealing
Protection:	D = IP67 / S= IP 68 , on request ATEX II 2G EEx ia IIC T6
Power supply:	24 V DC, 11 ... 32V, output: analogue 4 – 20 mA
Electrical connection:	via vented junction box with PG 13,5 cable glands
Approvals:	GL, LRS, ABS, CCS, RINA, DNV

### Examples of possible sensor installations

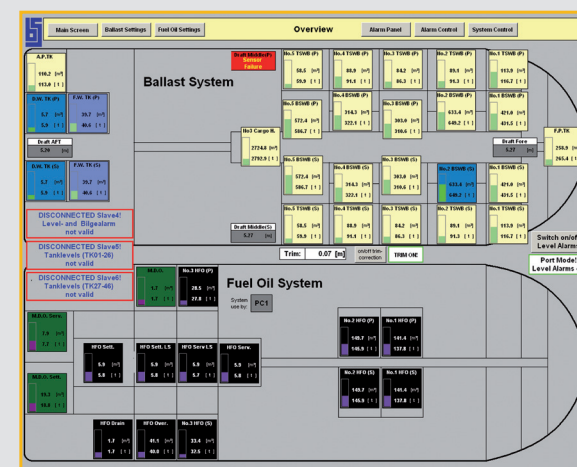


## Tank Level Gauging and Draft Measurement for continuous level management

### Visualization of tank levels

The visualization of tank and draught levels is realized on an existing control panel of the **RCV remote controlled valve system**, ballast system, ship automation / alarm system, or as a stand-alone solution on a colour touch panel display. The panels are available from 10.4" up to 19".

The **TLG system** can be used as a stand-alone application or as an integrated solution in the **RCV system**. The interface to the **Alarm & Monitoring System (AMS)** and / or ship management system is via RS485 or Ethernet. Both interface types are most common and, furthermore, are highly reliable and flexible.



### REFERENCES

## Partnership in Flow Management

We associate with nearly all major shipyards worldwide. Until this moment, more than 4000 ships and offshore facilities have been equipped with BESİ systems. To get a complete reference list, please get in contact with us.



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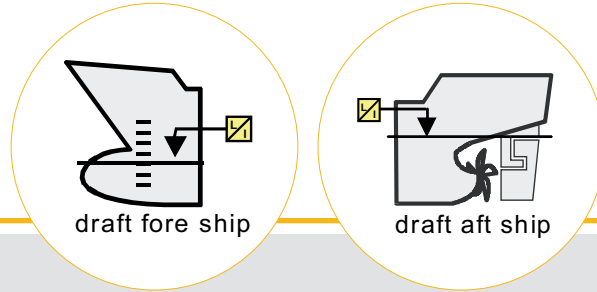


## TLG Tank Level Gauging and Draft Measurement





## Tank Level Gauging and Draft Measurement



**BESI Marine's TLG system** is especially designed to gauge filling levels of tanks in marine applications. To fulfill this task, various types of sensors are available.

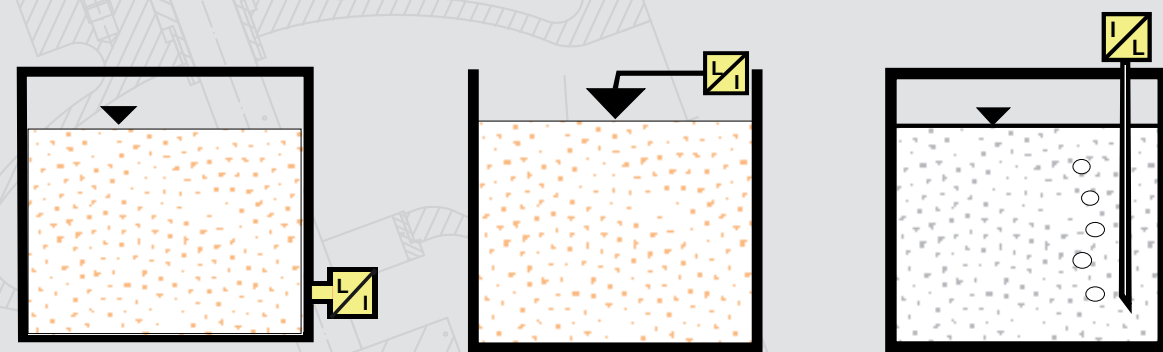
**BESI-supplied sensors** are specific to the application for which they are designed, as **each medium measured is different in density and chemical aggressiveness**. Thus the sensors have special sealings, housing materials, different membranes and electronic components. The sensors are technology-based on the principle of a pressure transducer with a pre-set pressure range and adjustable output.

The technology, which is based on relative atmospheric pressure, requires the sensor to be vented. To provide this pressure equalization between sensor and environment, the sensors are equipped with special cables which have a pressure relief line.

The analogue inputs (0-20mA), which are fed with the sensor signals presenting the actual medium pressure in the corresponding tank, are installed in the control cabinet.

A software in a **PLC (Programmable Logical Controller)** will translate the values from the sensors with the help of so-called tank tables into tank content values.

During its calculations of tank contents and draft measurement, the **PLC** considers medium densities (provided by the system operator) as well as trim and heel corrections of the vessel. The system does not only calculate tank contents but also visualizes them in a very user-friendly manner.



Certificates

BESI possesses the required certificates from major classification societies.

## Tank Level Gauging and Draft Measurement for continuous level management

**BESI's Pneumatic Electronic Sounding System (PESS)** has been designed as a **Tank-Level** and **Draft sensor system** for continuous level measurement on board of vessels.

### Installation

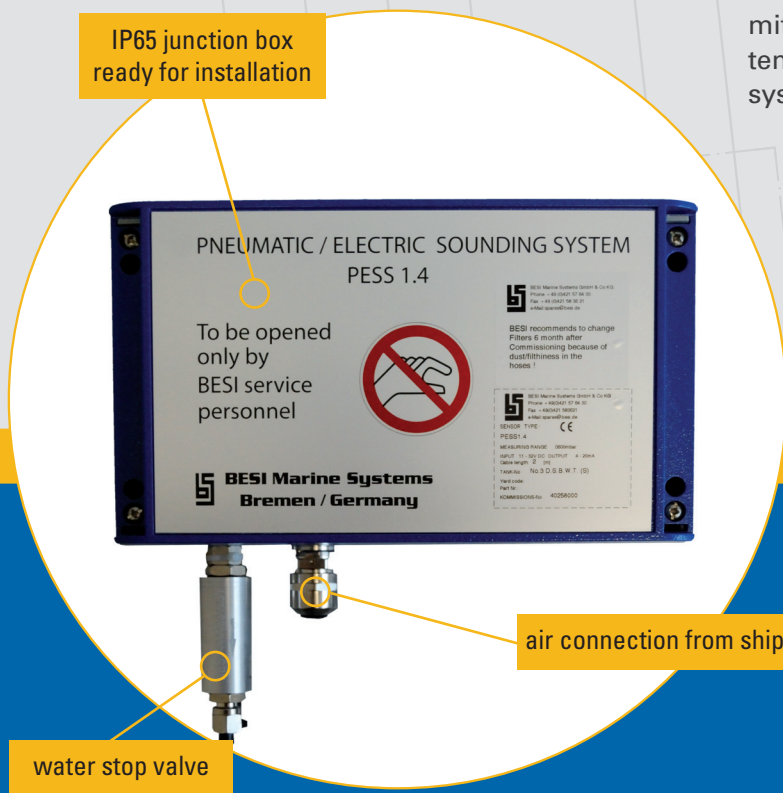
The versatile **PESS** sensor system provides measurement access from the top or from the side of the tank. It can be mounted close to or distant from the measuring point. The sensor is connected to the tank via a measuring pipe which is guided into the corresponding tank to a level of approx. 30mm above tank bottom. Approved by **Germanischer Lloyd (GL)** and **ABS**, the tank sounding pipes can be used as **PESS** measuring pipes as well if they are closed airtight to prevent any leakage.

### Design benefits

The **PESS** sensor system consists of a ready-assembled and pre-adjusted sensor box with an air-throttle valve, a non-return valve, an electronic pressure transmitter, a stop-cock and a test connection for testing the sensor even when the tank is empty.

Based on the principle of an air purge system (or **"bubble system"**), the measuring cell of the pressure sensor never makes contact with the liquids to be measured. The permanent air flow (**bubbles**) keeps the measuring tube permanently free from fluid and protects the pressure sensor against dirt and heat. This means that the **PESS** sensor will never be damaged or influenced by adherent sediments.

Another important design benefit of the proximity measuring principle is that the medium temperature is totally irrelevant. Service to the system can be done from outside the tank.



### Special features and adjustments

The throttle valve reduces the airflow to the tank or draft measuring point to approx. 10 – 20 l/h. The non-return valve - assembled with the gauge head - secures the air-circuit and the pressure transmitter against tank fluid flowing back into the pneumatic circuit in case there is a breakdown in air supply.

The signal pick-off is rendered by an electronic pressure transducer with a ceramic sensor cell containing high purity aluminium membrane providing analogue signals 4 – 20mA which corresponds with the air pressure in the measuring pipe. The sensors are pre-calibrated and available in almost every range : with standard types for 4, 6, 10, 16 or 20m **LC (liquid column)**.

### Applications:

- Ballast water tanks, fresh water tanks, grey water tanks, black water tanks, sludge
- **HFO** Storage tanks, **HFO** Settling tanks, **HFO** Service (day) tanks, **MDO** tanks
- Lube-oil, cooling water
- Draft



### SENSOR FEATURES:

Exactitude:	better 0,2 % FR
Overpressure:	at least 6 bar overpressure-safe
Temperatures:	body -25 ... + 80 °C, membrane -40 ... + 125 °C
Materials:	membrane AL2 O3 , body stainless steel 1.4305
Protection:	IP 68 for pressure transmitter, on request EEx d II, IP 65 for junction box
Power supply:	24 V DC, 11 ... 32V, output: analogue 4 – 20 mA
Air Connection:	Cut ring connection 8mm OD to air supply and towards tank
Electric connection:	via junction box with PG 13,5 cable glands, shielded marine cable

For detailed information about the components shown please refer to the specific datasheets.