

Level and pressure instrumentation for ships



Application examples and products



Instrumentation for ships




This brochure presents examples of applied level and pressure measurement technology. Here, you'll learn which sensors fit which measuring tasks.

■ Cargo tank	Level and pressure measurement and point level detection	■ Anti-heeling system	Level measurement and point level detection
■ Crude oil storage tank	Level measurement and point level detection	■ Heavy lifter	Level and pressure measurement
■ Cargo tank in a bitumen tanker	Level measurement and point level detection	■ Ballast water tanks	Level measurement
■ Cargo tanks on LNG carriers	Level and pressure measurement and point level detection	■ Service tanks with drinking water	Level measurement
■ Manifold	Pressure measurement	■ Service tanks with grey and black water	Level measurement
■ Ship position and draught	Level measurement	■ Bilges	Point level detection




All applications can be found at

www.vega.com/shipbuilding





Continuous level measurement

Instrument type		Measuring range	Process fitting	Process temperature	Process pressure
VEGAPULS 63 Radar sensor for continuous level measurement of liquids		up to 35 m	Flanges from DN 50, 2", slotted nut	-196 ... +200 °C	-1 ... +16 bar (-100 ... +1600 kPa)
VEGAPULS 64 Radar sensor for continuous level measurement of liquids		up to 30 m	Thread from G¾, ¼ NPT, flanges from DN 50, 2", mounting strap	-40 ... +200 °C	-1 ... +20 bar (-100 ... +2000 kPa)
VEGASON 61 Ultrasonic sensor for continuous level measurement		up to 5 m	Thread G1½, 1½ NPT	-40 ... +80 °C	-0.2 ... +2 bar (-20 ... +200 kPa)

Point level detection

Instrument type		Measuring range	Process fitting	Process temperature	Process pressure
VEGASWING 61 Vibrating level switch for liquids		up to 6 m	Thread from G¾, ¼ NPT, flanges from DN 25, 1"	-50 ... +250 °C	-1 ... +64 bar (-100 ... +6400 kPa)
VEGASWING 63 Vibrating level switch with tube extension for liquids		up to 6 m	Thread from G¾, ¼ NPT, flanges from DN 25, 1"	-50 ... +250 °C	-1 ... +64 bar (-100 ... +6400 kPa)
VEGASWING 66 Vibrating level switch for liquids under extreme process temperatures and pressures		up to 3 m	Thread from G1, 1 NPT, flanges from DN 50, 2"	-196 ... +450 °C	-1 ... +160 bar (-100 ... +16000 kPa)

Pressure measurement

Instrument type		Deviation	Process fitting	Process temperature	Measuring range
VEGABAR 82 Pressure transmitter with ceramic measuring cell		0.2 % 0.1 % 0.05 %	Thread G½, ½ NPT, flanges from DN 15, 1½"	-40 ... +150 °C	-1 ... +100 bar (-100 ... +10000 kPa)
VEGABAR 83 Pressure transmitter with metallic measuring cell		0.2 % 0.1 % 0.075 %	Thread from G½, ½ NPT, flanges from DN 25, 1"	-40 ... +200 °C	-1 ... +1000 bar (-100 ... +100000 kPa)
VEGABAR 86 Submersible pressure transmitter with ceramic measuring cell		0.1 %	Straining clamp, suspension cable, threaded fitting, thread from G1½, 1½ NPT, flanges from DN 40, 2"	-20 ... +100 °C	0 ... +25 bar (0 ... +2500 kPa)
VEGAWELL 52 Submersible pressure transmitter with ceramic measuring cell		0.1 % 0.2 %	Straining clamp, thread, suspension cable, threaded fitting of 316L, PVDF, Duplex, Titanium	-20 ... +80 °C	0 ... +60 bar (0 ... +6000 kPa)



Shipbuilding



Modern, proven in service instrumentation

VEGA is an experienced instrumentation provider for ships of all types and sizes. The company has decades of know-how with on-board measurement technologies. VEGA transmitters measure level and pressure in tanks and pipes with exceptional accuracy and reliability.

Good value for money

VEGA instruments are oriented to the special requirements of the shipbuilding industry. Robust housing materials, high-quality FEP and PUR sensor cables as well as shock and vibration resistant ceramic sensors provide long-term service.

Simple handling

The sensors are really easy to connect, set up and put into operation. This makes installing and operating the instruments easy for the shipyard and the crew.

Classification

VEGA sensors are certified according to all major ship classifications such as ABS, BV, CCS, DNV, GL, LR and Rina.



Det Norske Veritas



Germanischer Lloyd



Bureau Veritas



Registro Italiano Navale



China Classification Society



Lloyd's Register of Shipping



American Bureau of Shipping

More information



plics® – easy is better

Instrument platform plics®

The plics® idea is simple: Each instrument is assembled from prefabricated components once the order is received. This modular design allows full flexibility when selecting the required sensor features. You receive your customised, user-friendly instrument within an amazingly short time. The best part: these instruments are more cost-effective and advantageous in every way – throughout their entire life cycle.

Display and adjustment

The display and adjustment module PLICSCOM is used for measured value indication, adjustment and diagnosis directly on the sensor. Its simple menu structure enables quick setup. Status messages are displayed in plain text. The optional Bluetooth feature allows wireless operation.

Connection

The VEGACONNECT connects your instrument to a PC via the USB interface. PLICSCOM with Bluetooth enables data transfer with wireless technology. The instruments are configured with the tried and trusted adjustment software PACTware and the appropriate DTM or with an app on a smartphone or tablet PC. For EDD-based systems we also offer graphics-driven EDDs.

Asset management and maintenance

The integrated self-monitoring function of plics® instruments permanently informs the user on the status of the instruments. Status messages allow proactive and cost-effective maintenance. All diagnostic data can be called up easily and quickly in plain text via the built-in memory functions.





Cargo tank

Reliable

Precise measurement regardless of the medium

Cost effective

Multi-sensor flange reduces costs in planning and commissioning

User friendly

Simple installation of the radar, pressure and high level alarm sensors in one multi-sensor flange

Measurement of level, point level and pressure in the cargo tanks on board

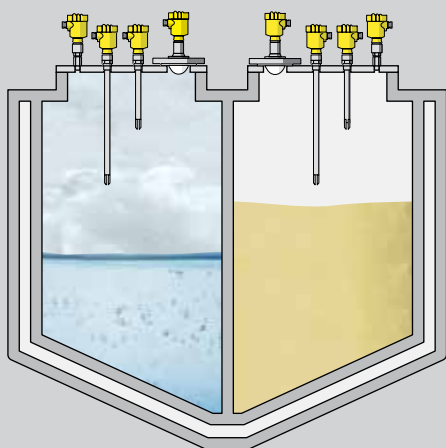
The levels in storage tanks, especially those on board chemical tankers must be continuously measured. This is especially important to monitor during loading and unloading operations, because of strict safety and environmental requirements. Any overfilling or product discharge on deck or into the sea could have devastating consequences for human life as well as the wider environment. Also, to prevent damage to the tanks caused via external temperature fluctuations, or overpressure and underpressure created by charging and discharging procedures, the internal tank pressures require continuous monitoring.



VEGAPULS 64

Radar sensor for continuous level measurement in cargo tanks

- Measurement all the way to the tank bottom, also in media with low dielectric constant
- Strong focusing of the radar beam allows accurate measurement even in tanks with heating coils



VEGABAR 82

Pressure transmitter for monitoring gas pressure in the cargo tank

- Precise measurement of the internal tank pressure by capacitive CERTEC® ceramic measuring cell
- Capacitive ceramic CERTEC® measuring cell offers excellent chemical resistance even in aggressive media



VEGASWING 63

Vibrating level switch for high alarm (95 %) and high-high alarm (98 %)

- Robust sensor in alloy or stainless steel, resistant to aggressive media
- Test key on instrument allows fast and secure verification of function



Crude oil storage tank

Reliable

Reliable and accurate measurement of the level

Cost effective

Maximising the loading capacity of the tanks

User friendly

Standard sensors for all tanks allow simple planning

Level measurement and point level detection in FPSO crude oil tanks

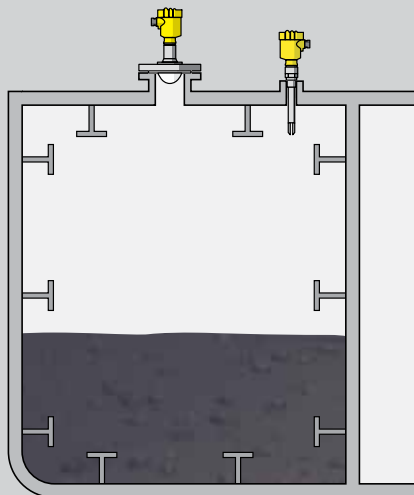
Crude oil is pumped directly into the cargo tanks on board in order to separate gas, oil and water from each other using gravity. To ensure profitable utilisation of the loading capacities as well as effective control of the pumps, the level is measured continuously and the point levels are monitored.



VEGAPULS 64

Radar sensor for continuous level measurement in the FPSO crude oil tank

- Tight focusing of the radar beam thanks to 80 GHz technology, enables reliable measurement down to the tank bottom, even with narrow rib spacing
- High accuracy independent of oil consistency
- Simple installation due to small process fittings



VEGASWING 63

Vibrating level switch as overflow protection in the crude oil tank

- Millimetre-exact detection of the switching point, independent of oil consistency
- Adjustment-free sensor allows simple installation
- Simple function test with optional test button on the sensor



Cargo tank in a bitumen tanker

Reliable

Reliable measurement solution for adhesive media

Cost effective

Accurate measurement of the tank contents, regardless of medium and degree of contamination

User friendly

Maintenance-free and reliable operation

Level measurement and point level detection in the cargo tanks of a bitumen tanker

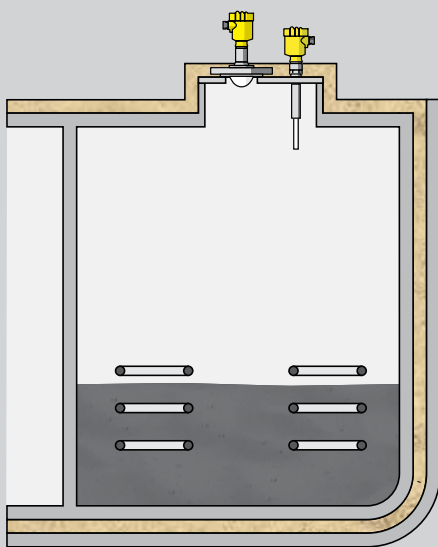
Bitumen is transported at temperatures of around 170 °C to 190 °C. The heating is supplied via an array of multi-layered heating tubes mounted on the floor and sides of the tanks. To ensure efficient utilisation of the tanks as well as a safe ship attitude, the levels in the bitumen tanks require accurate monitoring, particularly during loading and unloading.



VEGAPULS 64

Radar sensor for non-contact level measurement in the bitumen tank

- Ideal for hot and adhesive media thanks to non-contact measuring principle
- Front-flush antenna delivers precise measurement data even with heavy buildup
- High accuracy in all measuring situations
- Reliable measurement down to the bottom, even in difficult installation conditions thanks to the good focusing of 80 GHz technology



VEGACAP 64

Capacitive point level detection for overflow protection in the bitumen tank

- Proven, robust measuring principle, unaffected by high temperatures and buildup
- Reliable switch point allows optimum utilization of the tank volume



Cargo tanks on LNG carriers

Reliable

Reliable and safe measurement in all media

Cost effective

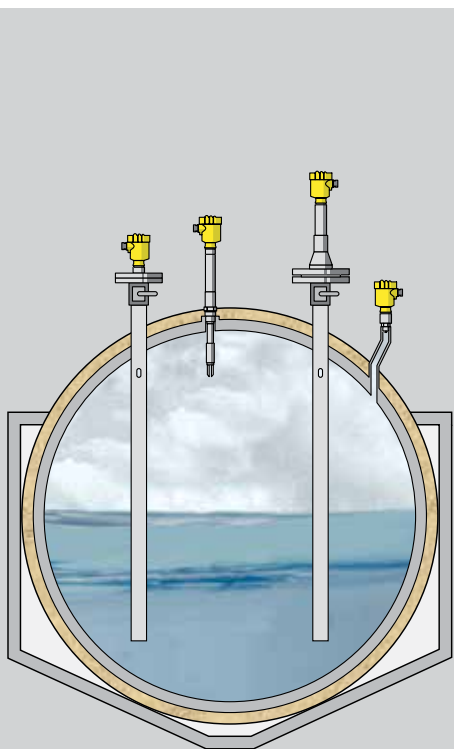
Full utilization of the tank volume

User friendly

Simple planning and commissioning

Pressure, level and point level detection in Liquid Petroleum Gas (LPG) and Liquid Natural Gas (LNG) applications

Liquefied gas is transported in insulated cargo tanks on LNG carriers at temperatures between $-20\text{ }^{\circ}\text{C}$ and $-196\text{ }^{\circ}\text{C}$. The instrumentation used must be specially designed for these extreme temperatures. Pressure, level and point level of LNG in the cargo tanks must be reliably measured for the transport.



VEGAPULS 63

Radar sensor for non-contact level measurement in LNG tanks

- Front-flush PTFE antenna means no additional sealing material is required
- Reliable measurement even at very low temperatures down to $-200\text{ }^{\circ}\text{C}$
- Exact measurement data despite low relative permittivity of the liquefied gas



VEGABAR 82

Pressure transmitter for monitoring the pressure in the liquid gas tank

- High plant availability through maximum overload resistance of the ceramic measuring cell
- A special seal material and the dry measuring cell enable measurement at temperatures down to $-50\text{ }^{\circ}\text{C}$



VEGASWING 66

Vibrating level switch for point level detection in liquid gas tank

- Sensor for applications down to a temperature of $-196\text{ }^{\circ}\text{C}$
- Switching point independent of changing media
- Reliable even with adhesive buildup



Manifold

Reliable

Maximum safety for humans and the environment

Cost effective

Low installation costs with simple setup

User friendly

Maintenance-free, robust measurement technology

Pressure measurement on the line interface during loading and unloading

Hose connecting stations, also known as manifolds, connect the pipes and hoses that are required for cargo loading and offloading on tankers. To ensure the safety of facilities on shore and on board, and to control the pumps, the pipeline pressures need to be closely monitored on the manifold. Reliable pressure transmitters are required to ensure safe loading or unloading operations.



VEGABAR 82

Pressure transmitter for monitoring manifold and pipeline pressure

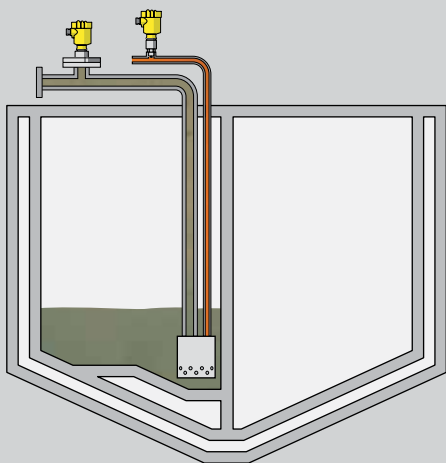
- Resistant to abrasive and aggressive media thanks to ceramic-capacitive CERTEC® measuring cell
- Optimal cleaning due to front-flush measuring cell
- Display and adjustment module PLICSCOM displays the pressure readings on site



VEGABAR 83

Pressure transmitter for controlling feed pump output

- Robust strain gauge measuring cell for hydraulic pressures up to 1000 bar
- Reliable measurement, even with overpressure or underpressure
- Display and adjustment module PLICSCOM shows the pressure readings locally





Ship position and draught

Reliable

Stable ship positioning through precise level measurement

Cost effective

Universal sensor for a variety of level measuring tasks on board

User friendly

Simple installation and maintenance-free operation

Level measurements for the control of draught, trim and list

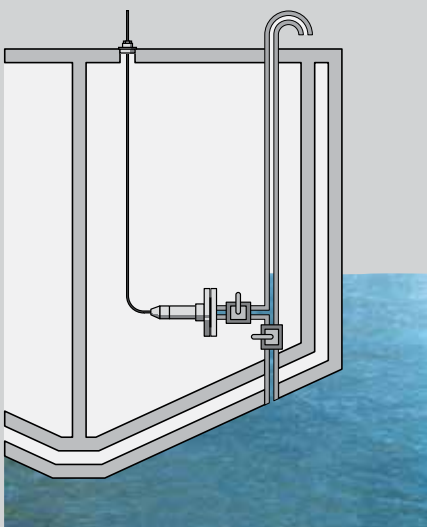
Among the most important measurements on board ships are those for determining draught, trim and list. In general, one measuring point is placed on the bow and another is used in the aft. On larger ships, two additional measuring points are installed on both the port and on the starboard. Accurate level measurements are required to determine the exact values of ship position and draught.



VEGAWELL 52

Hydrostatic level measurement for reliable and precise measurement of draught, trim and list

- Encapsulated housing with fixed cable outlet, protects electronics and measuring cell reliably even in case of flooding
- Rugged CERTEC® measuring cell can withstand pressure shocks in rough seas
- High resistance to corrosive seawater with duplex or titanium housing





Anti-heeling system

Reliable

Maximum safety for humans and the environment

Cost effective

Reliable measurement of the amount of water in all tanks

User friendly

Simple installation and maintenance-free operation

Level measurement and point level detection in the ballast water tanks

Ship heeling caused by high winds, uneven cargo loading or the forces of sharp turns is counteracted by anti-heeling systems. To counter these conditions, ballast tanks are connected to each other by means of pipe systems. Depending on the attitude of the ship, the tanks are either blown out or flooded by means of compressed air blowers or pumps. Reliable level measurement is needed to control this system.



VEGASWING 61

Vibrating level switch as overflow and pump dry run protection in the ballast tanks

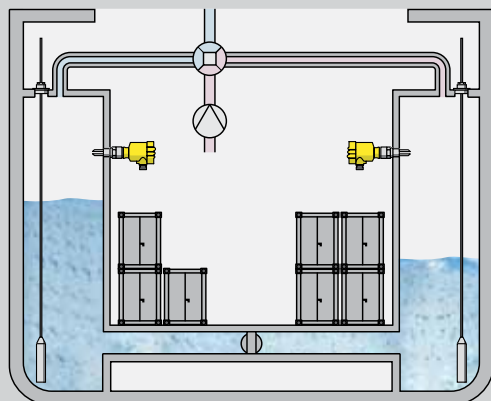
- Wear and maintenance-free, as no mechanical moving parts involved
- Reliable detection of the limit level without adjustment
- Durable device with seawater resistant materials



VEGAWELL 52

Hydrostatic level measurement in the wing tank

- Precise level measurement and control of the anti-heeling system
- Fast response and excellent long-term stability with oil-free, ceramic-capacitive CERTEC® measuring cell
- Reliable measurement even under extreme pressure shocks thanks to overload resistant ceramic CERTEC® measuring cell





Heavy lifter

Reliable

Accurate and reliable level measurement in all ballast tanks

Cost effective

Maximised operational time via maintenance-free measurement technology

User friendly

Simple installation in a service tunnel

Pressure and level measurement in the ballast water tanks of heavy lifters (Flo-Flo ship)

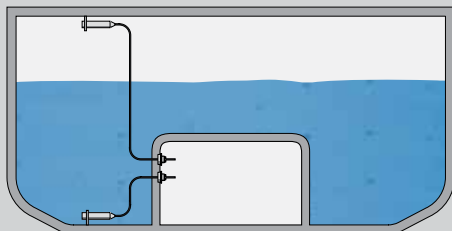
Flo-Flo (Float On/Float Off) ships are characterised by their large number of ballast water tanks. These make it possible to lower the ship until the main deck is below the waterline. This allows large floating loads to be loaded. The cargo is lifted out of the water and balanced by pumping out or blowing out the ballast water tanks. To avoid damage to the ballast water tanks from overpressure or underpressure, the internal tank pressures and levels require continuous monitoring.



VEGAWELL 52

Pressure transmitter for measuring the internal pressure and the level in the ballast water tanks

- Ceramic-capacitive measuring cell is immune to pressure shocks, abrasion and particles suspended in the ballast water
- Long-term, high operational reliability through robust sensor with high protection class IP 68
- Sensor with fixed cable outlet allows easy planning and installation





Ballast water tanks

Reliable

Exact level measurement in abrasive and aggressive seawater

Cost effective

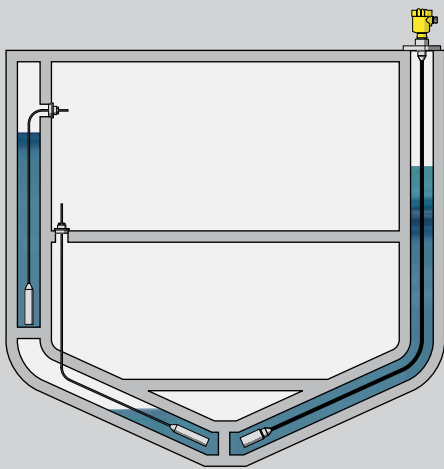
Low installation and integration costs

User friendly

Maintenance-free operation due to seawater resistant materials

Level measurement in the forepeak, wing and double bottom tanks with the ballast water

The ballast water measurements in the wing and double bottom tanks go directly into the control system for the ship trim, draught and list. Since these measuring points are virtually inaccessible during operation on board, reliability and stability are an absolute must. Pressure shocks, abrasive sand particles and seawater place additional heavy demands on the instrumentation.



VEGAWELL 52

Hydrostatic submersible pressure transmitter for level measurement in the ballast water tank

- Reliable, durable and robust, seawater-resistant sensors
- Ceramic measuring cell for exact and long-term stable measurement, even with pressure shocks and abrasion
- Simple installation from above or the side



VEGABAR 86

Hydrostatic level measurement of ballast water in the double bottom tank

- Stainless steel housing protection to class IP 69K and ceramic measuring cell, offer the perfect sensor for the conditions in a double bottom tank
- Climate compensated electronics provide complete protection against high humidity
- On-site installation and ventilation of the electronics possible



Service tanks with drinking water

Reliable

Reliable water volume measurement

Cost effective

Robust measuring technology ensures long, maintenance-free operation

User friendly

Simple installation and setup

Level measurement in tanks with drinking water

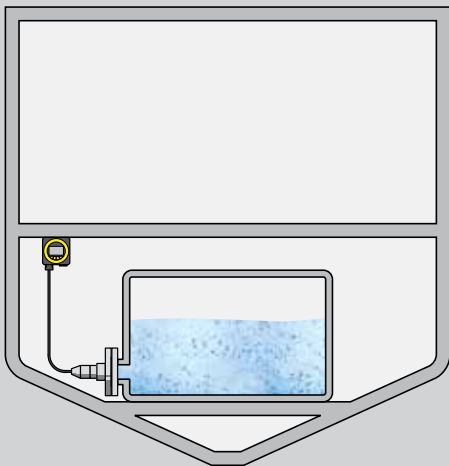
Drinking water is an essential commodity on a ship. It is stored separately in dedicated tanks. Depending on the type and size of the ship, different amounts of fresh water are required for drinking, personal hygiene and cleaning. Direct electrical measuring principles are mandatory for level measurement.



VEGABAR 82

Hydrostatic pressure transmitter for level measurement in drinking water tanks

- Drinking water compatible materials and a flush diaphragm for hygienic measurement
- Robust diaphragm of sapphire-ceramic® withstands any chemical and mechanical cleaning required
- Remote electronics can be mounted at an easily accessible location





Service tanks with grey and black water

Reliable

Reliable measurement of the waste volume

Cost effective

Robust measuring technology ensures long, maintenance-free operation

User friendly

Simple installation and setup

Level measurement in tanks with grey or black water

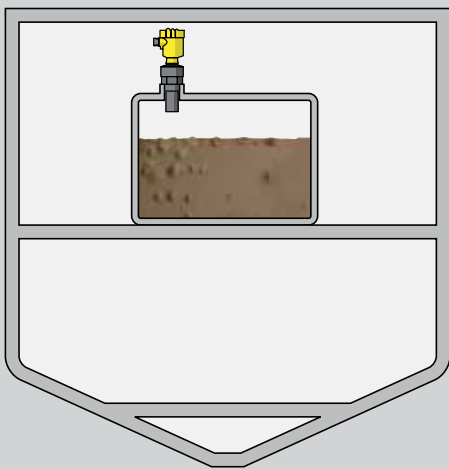
Waste water, known as grey/black water on ships, is treated on board larger vessels using ship-board clarification plants or it may be stored in special grey/black water tanks to await final disposal. Direct electrical measuring principles are mandatory for level measurement.



VEGASON 61

Ultrasonic level measurement in grey or black water tank

- Reliable measurement via non-contact measuring method, even in liquids containing solids
- Reliable measurement, as PVDF-encapsulated transducer is resistant against the corrosive gases in the tank
- Simple installation from above through small process fitting





Bilges

Reliable

Maximum safety for humans and the environment

Cost effective

Simple installation

User friendly

Maintenance-free and reliable operation

Point level detection for bilge and leakage monitoring

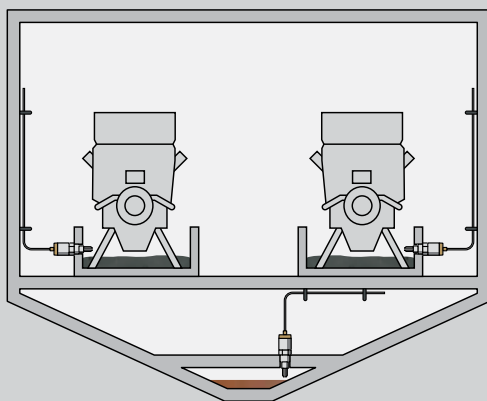
Every ship has “bilges” – this is space at the lowest point of the vessel between the floor of the engine room and the bottom of the ship. A water/oil mixture collects in this bilge area, where the mixture is pumped out and recovered and separated into water and oil by an on-board skimmer and demulsifying unit. The bilge de-oiling equipment is normally controlled by level switches. The oil sumps of the main engine and any auxiliary systems must also be monitored continuously for safety and environmental reasons.



VEGASWING 51

Vibrating level switch for point level detection in bilge and oil pan

- Compact design allows installation in almost any position
- Maintenance-free operation, as the vibrating level switch has no mechanical moving parts
- Foam, bubble formation and viscosity do not influence switching accuracy





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VEGA Grieshaber KG
Am Hohenstein 113
77761 Schiltach
Germany

Phone +49 7836 50-0
Fax +49 7836 50-201
E-mail info.de@vega.com
www.vega.com

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