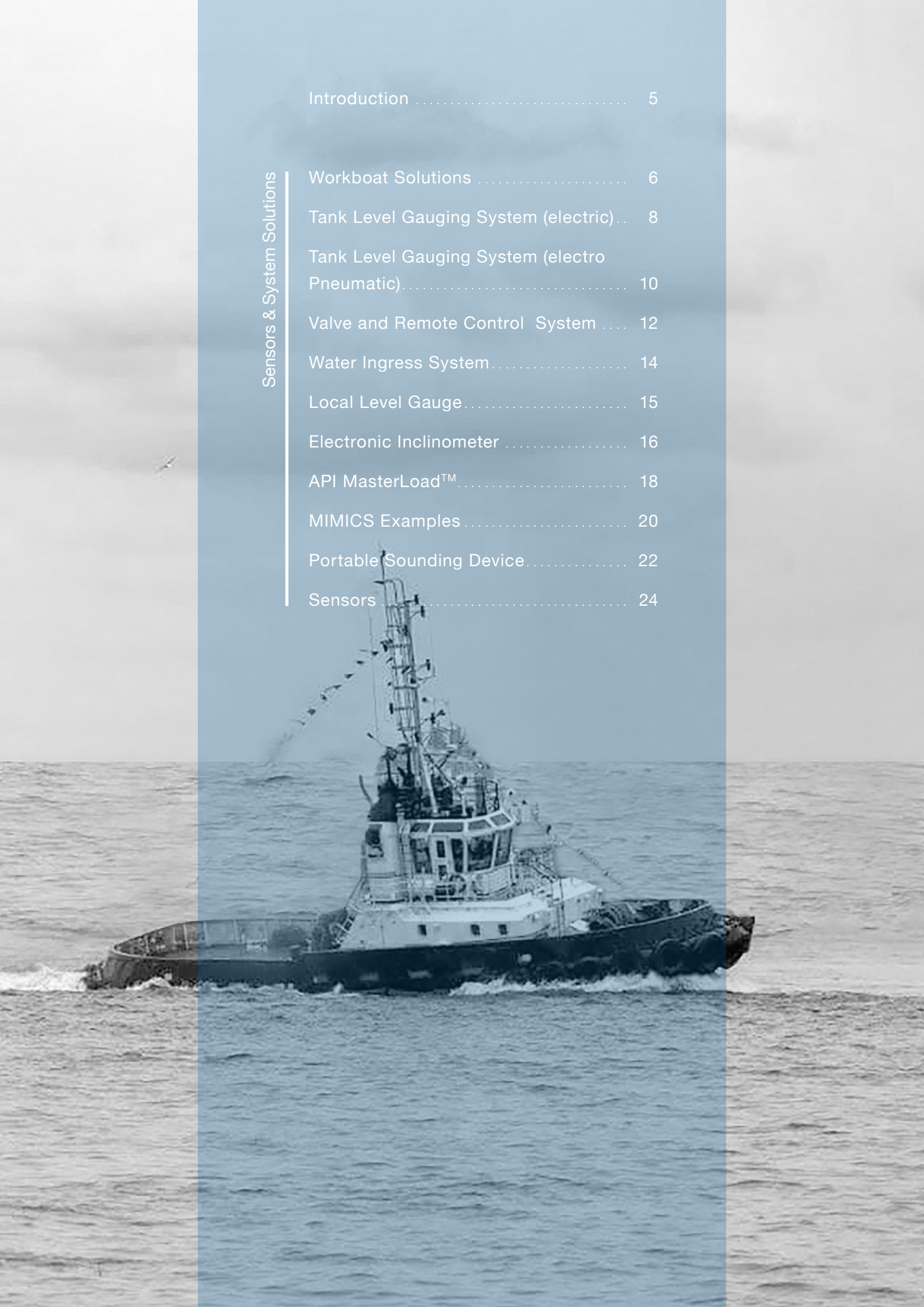
A. P. I.
marine

Advanced Tank Technology

Sensors and Automation Systems

A. P. I.
marine

Sensors & System Solutions




IMO 7644582
GLADIATOR

Introduction

API Marine Profile and History

The API Marine International Headquarter and Factory are situated in Aalborg, Denmark.

The company was established with the aim of bringing cutting-edge measurement technology for tank management, operation, and control into the 21st century and has brought sensors and systems with exceptional accuracy and reliability to the market.

API Marine supplies complete range of sensors in addition to calculation and administration software combining integrated automation solutions of Smart Tank Management and Control Systems.

The API Marine range of high-quality Sensors, Integrated Automation, Remote Sounding and Cargo Control Systems meet all IMO and US Coast Guard requirements for any type of ships.

API Marine is certified according to ISO 9001:2015 and PQAN for production procedures according to the ATEX / IECEx requirements.

API Marine sets the standard by bringing proven measurement technologies of the 21st century into use on tank installations within marine and industry, providing customers with improved and high level of accuracy and efficiency in tank measurements.

We want to contribute to our customers profitability by supplying high quality sensors and systems, excellent service, and state-of-the-art high-tech solutions, where reliability and durability are keywords.

What we do

API Marine is a leading manufacturer of control, monitoring and alarm systems.

API Marine provides tailormade system solutions for all types of vessels, such as workboats, specialized supply vessels, product oil & chemical tankers, bulk carrier, larger commercial fishing vessels, floating dock as well as others.

The system solutions consist of high-quality sensors, control cabinets and a modern and user-friendly software package providing full automation of the vessel's operations.

Our sensors are designed for precise measurement of level, temperature and pressure in harsh environments and heavy conditions for all types of liquids within marine and industry.

We want to contribute to our customers profitability supplying high quality products, excellent service and state-of-the-art high-tech solutions.

Workboats/Tugboats

API Marine can provide a wide range of high quality and reliable systems and solutions for **Workboats and Tugboats.** The solutions are tailormade to meet the individual requirements of most types of **Workboats/ Tugboats.**

Scope of supply for **Workboat/Tugboat:**

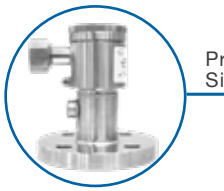
- Tank Level Gauging System for Ballast and Service Tanks
- Valve and Remote Control System
- Water Ingress Alarm System

The system is modular and can be supplied as stand-alone system or fully integrated into a combined system.
The tailormade solutions will meet most types and sizes of modern **Workboats and Tugboats.**

Main Functions and features:

- Monitoring and control valves and pumps
- Tank sounding system for ballast and service tanks

The unmatched design of the system hardware and software is 100% developed by API Marine



Pressure Transmitter – Side mounting

Pressure Transmitter – Submerged

Ultrasonic Level Switch

Electro Pneumatic Tank Sounding

Marine Class Panel/PC

Electric Actuators & Valves

Local Level Gauges

Portable Sounding Device

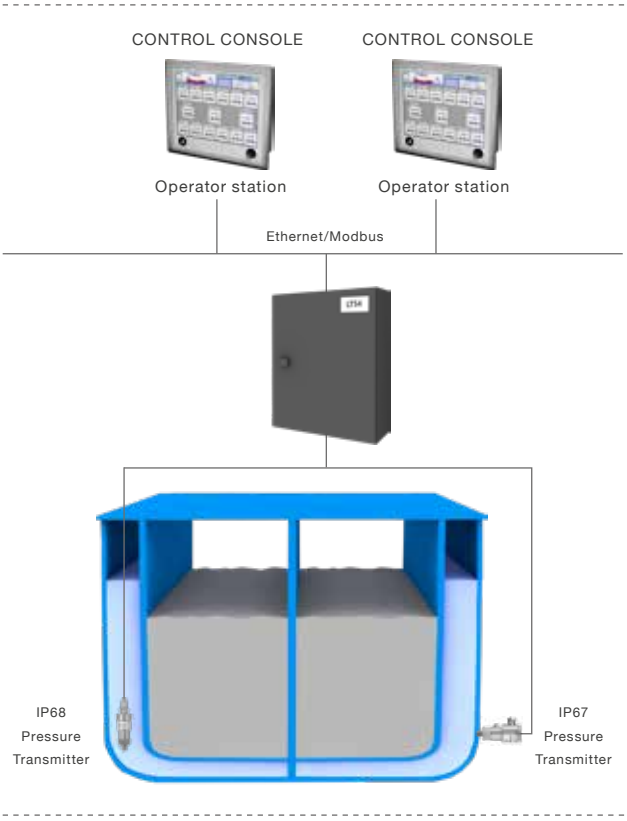
Tank Level Gauging System (electric)

TSS/UPT™ is a well proven system for level and draft measurement in ballast and service tanks. The system is based on electric type pressure transmitters, and fully developed by API Marine with modular design to meet specification and demand of most applications.

TSS/UPT™ is designed to measure the level in ballast and service tanks and the vessel's draft, with pressure sensors for both dry compartments as well as submerged applications.

The pressure transmitters provide a standard 4-20mA output, which are connected directly to the control cabinet. The system is fully integrated into API Marine's integrated solutions, however can also be supplied as a stand-alone system with local operation station.

TSS/UPT™ can easily be extended to handle inputs from other measuring points i.e. temperature and/or pressure sensors and level switches. With its modular design the system is easily adapted to handle required numbers of tanks or inputs in a cost-effective manner. This makes the system well suited also for retrofit installation.



Main Advantages

- Level measurement in ballast and service tanks
- Draft measurement
- Can be supplied as stand-alone system with local operator station, and is easily integrated to most automation systems
- Level alarm functionalities
- System can be easily extended with input from other sensors, such as temperature sensors and level switches
- Suitable for retrofit installations
- Sensors available in a wide variety of versions – both for dry as well as sub-merged applications

System Configuration

- Electric pressure transmitters
- Cabinet including safety barriers and interfaces for other sensors
- MODBUS/Ethernet output
- Operator stations & software (optional)

The API Marine remote sounding system based on electric type pressure transmitters is a proven and reliable system

Tank Level Gauging System (electro pneumatic)

TSS/BMS4™ is the next generation of electro-pneumatic systems for level and draft measurement, developed by API Marine and featuring improved modular design, enhanced capabilities and reduced costs.

TSS/BMS4™ is designed to measure the level in ballast and service tanks and the vessel's draft. The system can also be used for level measurement in onshore storage tanks.

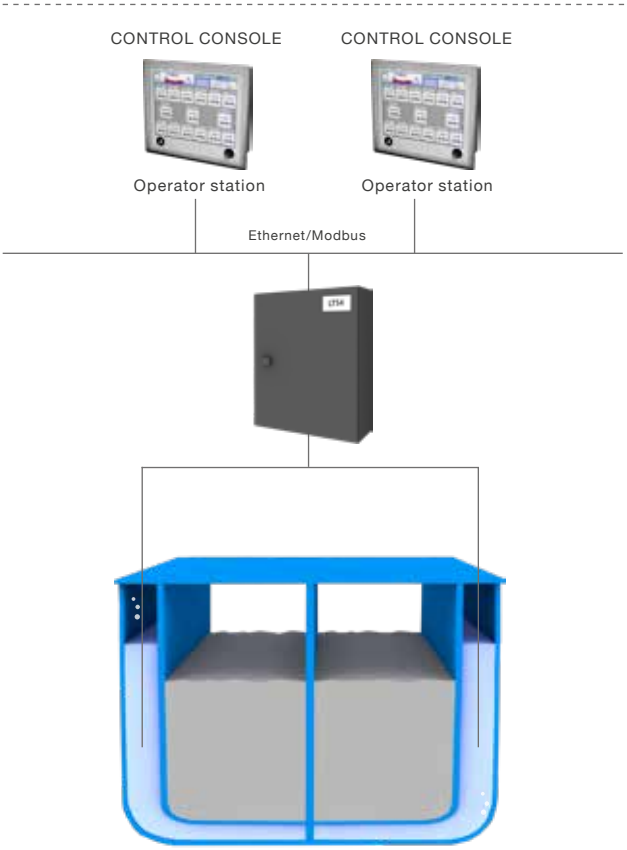
The level measurement principle of the TSS/BMS4™ is based on periodic purging of compressed air from the system to the tank bottom through an air tube and measurement of the settled air pressure in the tube. For draft measurement the air tube is led out to the bottom of the vessel. The density measurement principle of the system is based on measuring the pressure difference in two air tubes, mounted in the tank and the known distance between these tubes.

Main Advantages

- Automatic calibration and diagnostics during operation
- Automatic and continuous cleaning of pipes during operation
- Less dependent on air quality
- Adaptive sequence measurement
- Equipped with a back-up pressure sensor for continuous operation even if the main sensor fails
- Extremely compact and space-saving design
- Modular concept – standard configuration or tailormade solutions for any application
- Ideal for retrofit installations – can be easily adapted to existing/onboard installations

System Configuration

- Works with any pressure, level and temperature of liquid
- Control cabinet with 12, 24 or 36 channels
- Cabinet includes filter and regulator
- MODBUS output
- Operator stations & software (optional)

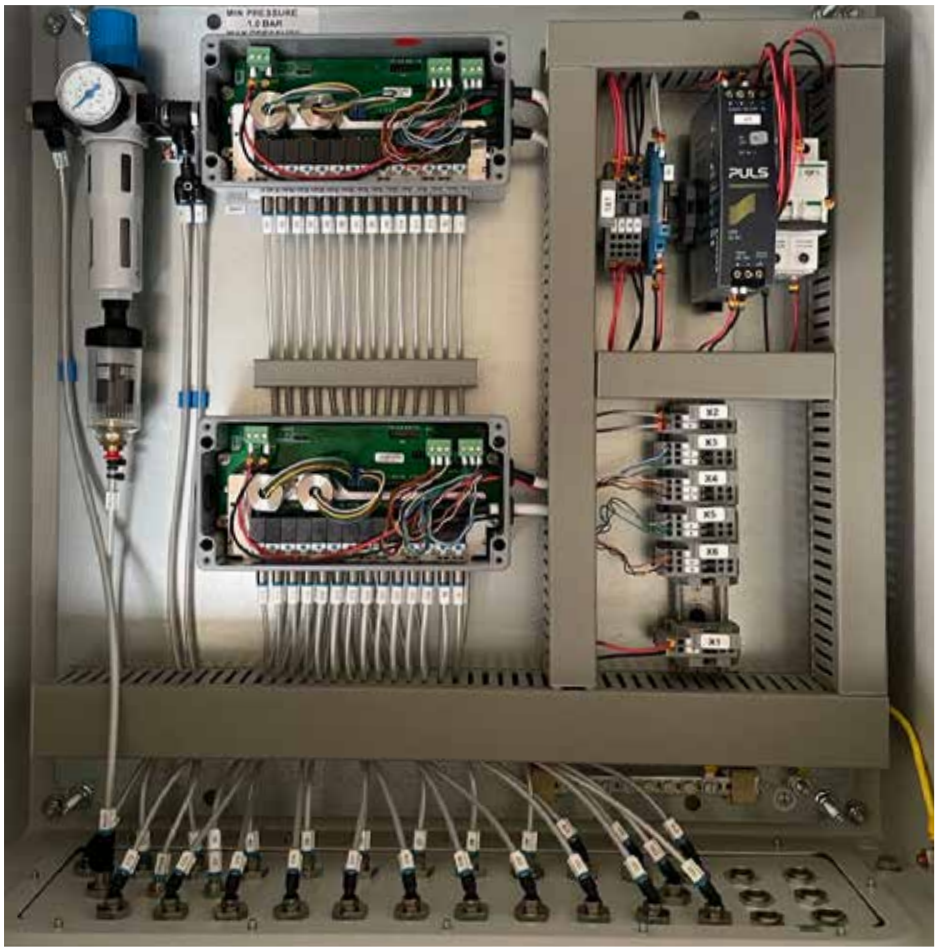


1:1 converter

In-line Non-return valve

Non- return-valve flange type

The API Marine remote sounding system is among the most compact and flexible solution on the market today



Electric Valve and Remote Control System

The Electtric Valve Remote Control System consist of a series of electrical actuators that arewired together by CANBUS and / or MODBUS, and then connected to a control cabinet.

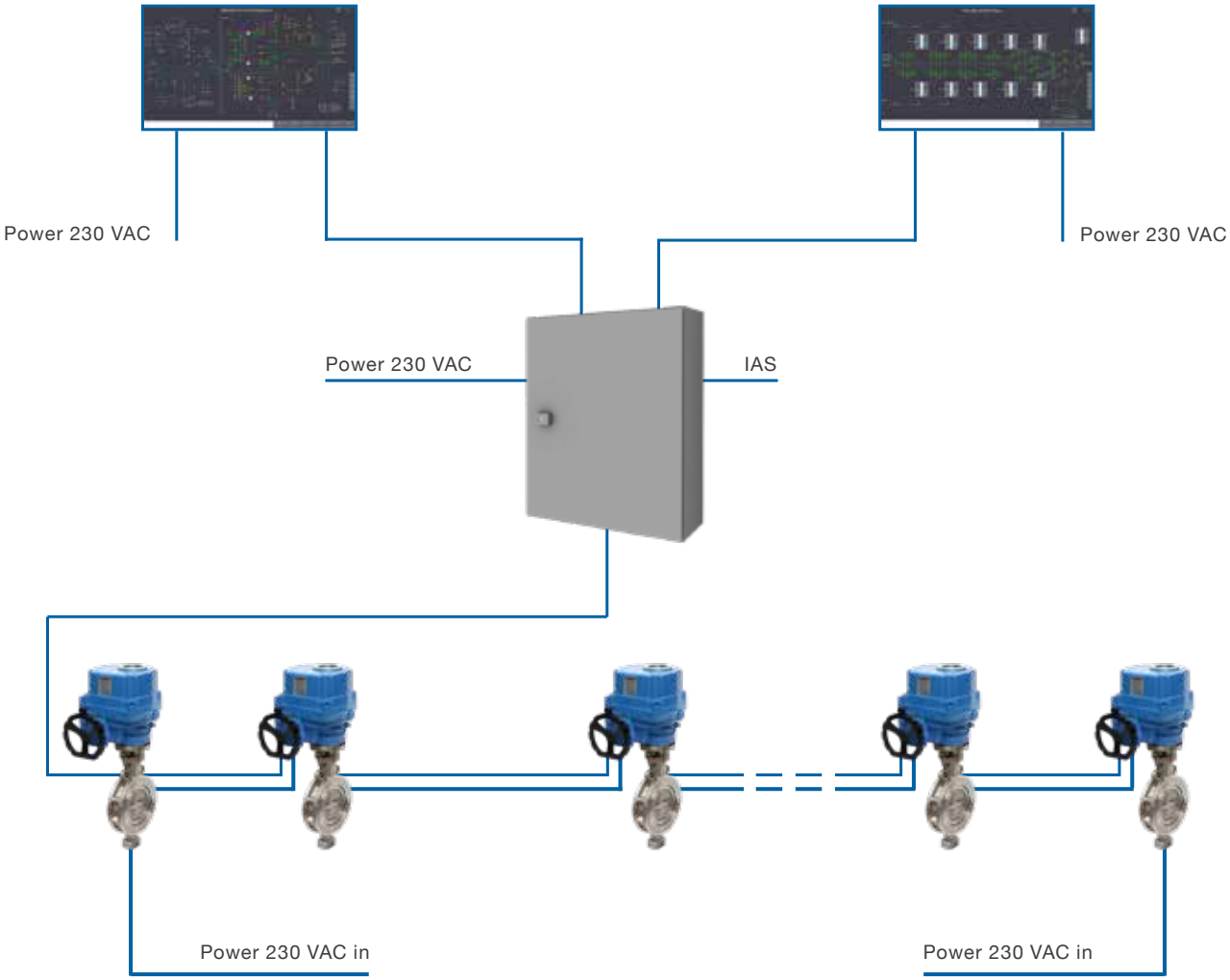
The system could control the pumps such as fire pump, bilge pump, ballast pump, fuel transfer pump etc.

Valves can be operated directly from panel in control cabinet and/or from seperate operator sations

The Electric Valve Remote Control System is ideal to meet cost effective and flexible reequiements in the marine industry.

Main features

- Individual configuration of actuator functions via CANBUS/ MODBUS control
- Installation savings by cable loop design
- Space savings due to reduced cabinet dimensions



Actuator Enclosure

The anodized aluminum enclosure with powder coating is highly corrosion-resistant and explosion proof. Standard with IP67 protection and IP68 available as option.

Motor

Fully enclosed squirrel-cage motor with compact size, large torque, little inertia force and F class insulation rating. Built-in overheat protection switch avoids damaging of the motor.

Manual Handwheel

The compact and convenient handwheel would be used to operate the valve on/off when the actuator power off. Pulling the clutch to right side and then the handwheel could be operated. When the actuator power on the clutch would return to left side automatically.

Position Indicator

Installed on the top center for observing the position of valve. The convex lens design avoid condensation of the water.

Heater and Thermostat

To heat the actuator space in cold environment which let the actuator workable at a wide temperature range and protect the motor and the parts out of the damage.

Limit Switch

Both mechanical and electronic limit switch equipped. Mechanical limit screw is adjustable, safe and reliable.
Electronic limit switch SPDT controlled by the cam. Position of limit switch can be set accurately and conveniently by an easy adjustment.

Torque Switch

The built-in and preset torque switch provides overload protection (Except type UED-050/100) and to make the the valve and actuator out of damage by cutting off the power supply automatically when the valve is jammed.

Long Life and Maintenance Free

Precise worm gear transfer large torque efficiently with low noise (max. 50 dB) and long life. The self-lock function prevents inversion and insure stability and reliability. High effective lubricant oil has been filled in before the actuator dispatch, which keep the actuator running during the life circle.

Installation

The flange fitting the valve at the bottom of Electric Actuator meets ISO 5211 and DIN 3337 standard. The actuator can be installed vertically or horizontally.

Analog Signal and Bus Control

The analog signal and bus control offered by a separate module attached to the actuator by fixing screw with inner cable tunnel. Such design would be help for the control part out of the motor heat and electric interference.

Fail Safe

UED Series supply fail safe function as option that the actuator would be driven by a built-in battery to operate the valve open or close when the power off.

Water Ingress Detection System

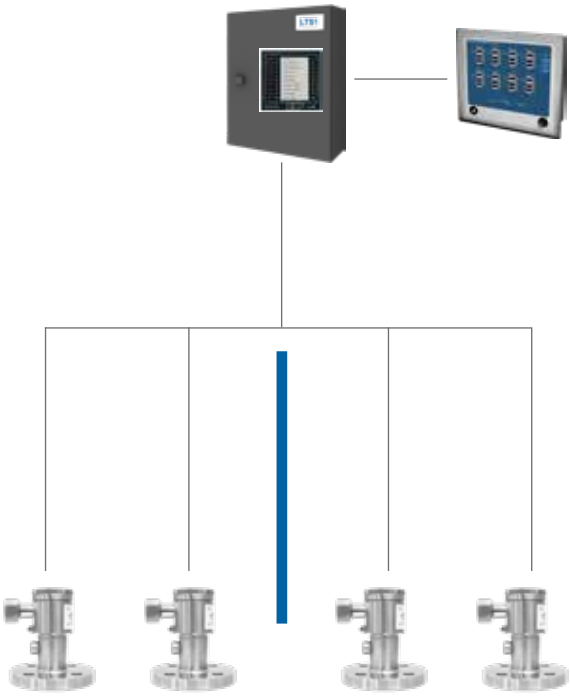
The system comprises of a central control cabinet with built-in alarm panel and interfacing to UTS Level switches.

Audible and visual alarms can be provided on the bridge in case water being detected. The system can be interfaces to an Integrated Automation System or can operate as a stand-alone system.

The system can be combined with Tank Level Gauging System.

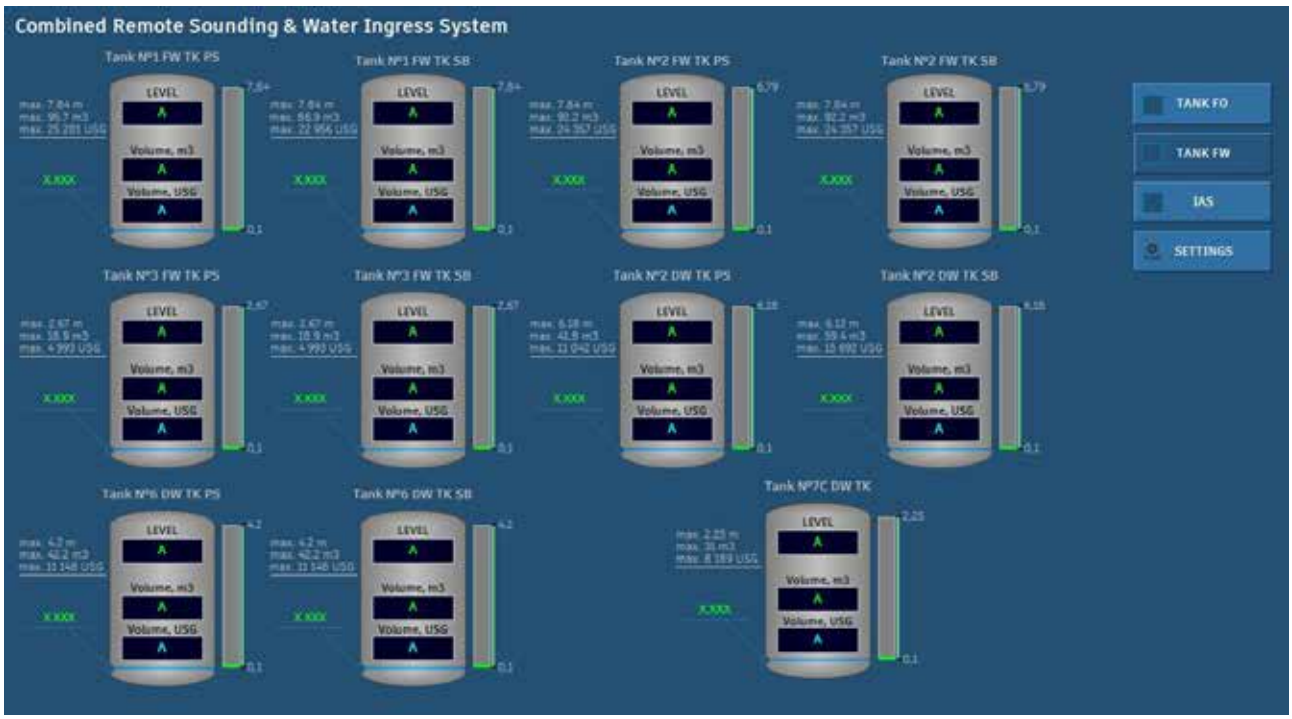
Main Features

- Unique and patented Ultrasonic Level Switches (UTS)
- UTS - Ruggedized design for harsh environments
- Flexible and modular design
- Can be combined with Tank Level Gauging System
- Low “total cost of ownership”
- Simple and user friendly operation
- Suitable for retrofit installations



Level Switch for Water Ingress Control

Pressure Transmitter for Tank Level Gauging



Local Level Gauge

Application

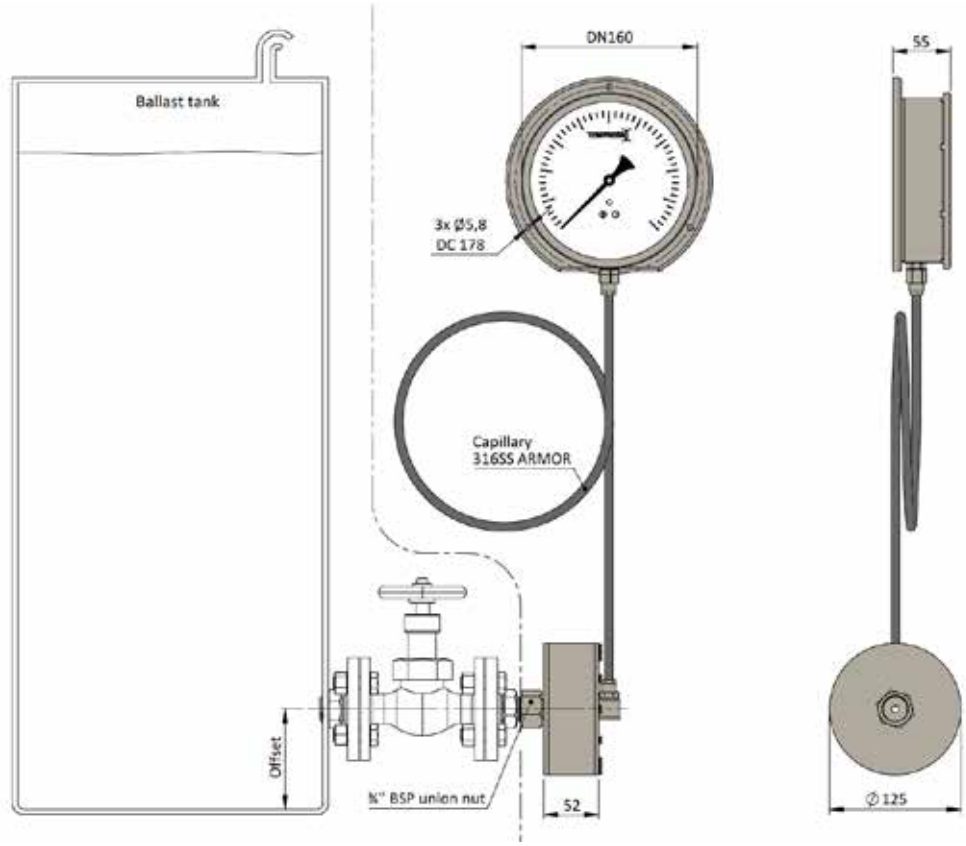
This Tank Level System is well suited for application in marine and general industry. The stainless steel sensor can be used for water, ballast water and other liquids.

System

The tank level system consists of a sensor, which is mounted on the tank. This converts the hydrostatic pressure of the liquid in the tank to a display on the manometer, thereby giving a continuous measurement of the contents of the tank. View can be calibrated to display pressure, fluid height and volume content.

Tank Level System

- The Tempress A90 Tank Level System has been designed and constructed using AISI 316 stainless and acid-proof steel
- Requires no power
- No floats or probes
- Completely automatic
- Can be used in all level applications with freely ventilated tanks
- Calibration after requirements



SEI-100

Electronic Inclinometer

The SEANET Electronic Inclinometer is an advanced roll and pitch measuring device which is not sensitive to horizontal and vertical accelerations. This will provide information to a better understanding of the ship's movement and steering behavior, supervision of trim, cargo status and stability status.

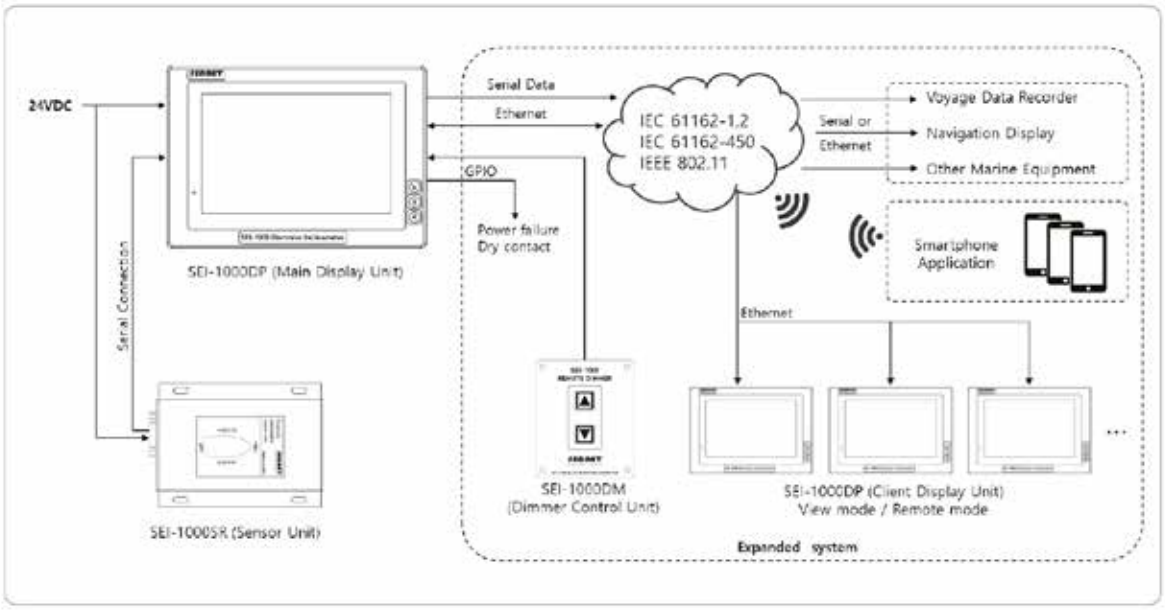
KC approved / IEC60945 EMC test passed

Advantages:

- Roll-Pitch Angle, STBD-PORT Angle
- Selectable 3 display view mode (Main, Antique, Simple)
- Touch control panel
- Optional remote dimmer control unit
- Simplified operation
- Provides multiple interface system (IEC61162-1/2/450, Ethernet)
- Provides smart-phone App (only Android OS)

Electronic Inclinometer

System Configuration



Specification

Display Unit	
System Configuration	ARM Cortex-A9 processor / OS : Android 5.1.1
Display	7" LCD, Touch Screen(Projected capacitive)
Interface	RS422 x 1, Ethernet x 1, GPIO
Protocols	IEC61162-1/2, IEC61162-450
Operating Voltage	24 VDC (or Optional 220VAC)
Approval	KC approved, IEC 60945 EMC test passed

Sensor Unit	
Dimension & Weight	H: 25mm, W: 84mm, D: 113mm / 0.2kg
Resolution & Accuracy	0.1° / ± 5% of measured value or ± 1°
Protocols	IEC61162-1
Operating Voltage	24 VDC (or Optional 220VAC)
Approval	KC approved, IEC 60945 EMC test passed

API MasterLoad™

Vessel Stability Calculation and Monitoring

API MasterLoad™ for calculation, examination and monitoring ships stability, strength and floatability.
API MasterLoad™ is certified by international classification societies as an onboard loading computer for strength and stability assessments. API MasterLoad™ is user-friendly simple to operate in both manual as well on-line mode.
Off-line mode makes it possible to compile a preliminary loading and ballasting scheme and to automatically generate output documents - “for sailing/for arrival”.
On-line mode allows data input to the calculation program directly from sensors, which ensures the accuracy of trim, stability and strength calculations.

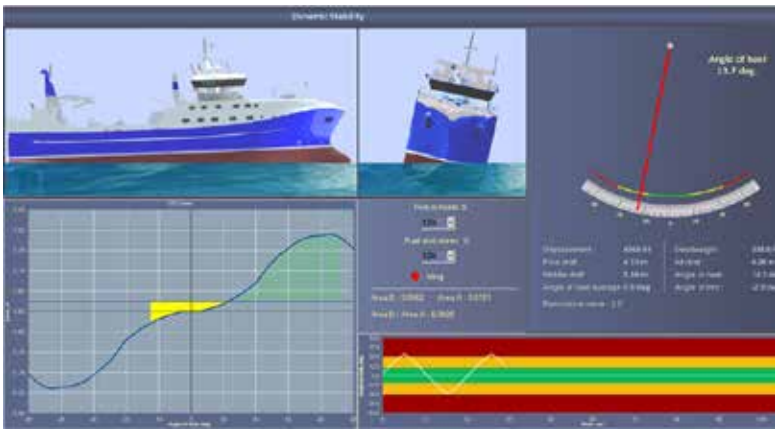
For special operations, where conditions at sea will have important influence on safe stability, such like fishing and supply vessel offshore activities, a MasterLoad™,

Dynamic Stability function can be supplied for safety. Dynamic Stability function will provide the crew an audible and visible warning if intact stability conditions are close to limits, which gives a possibility to change parameters of current situation of the vessel to avoid any risk of capsizing.

API MasterLoad™

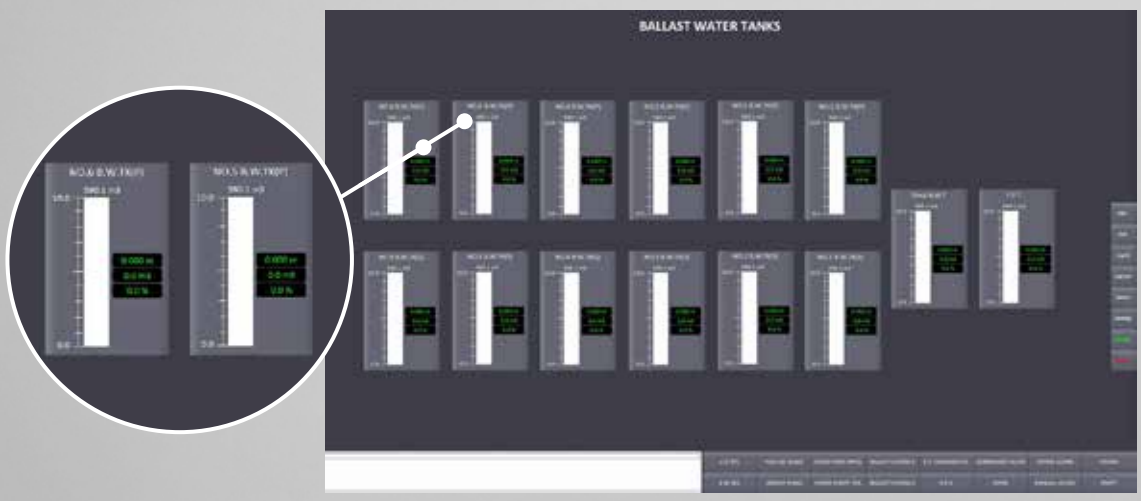
API MasterLoad™ features:

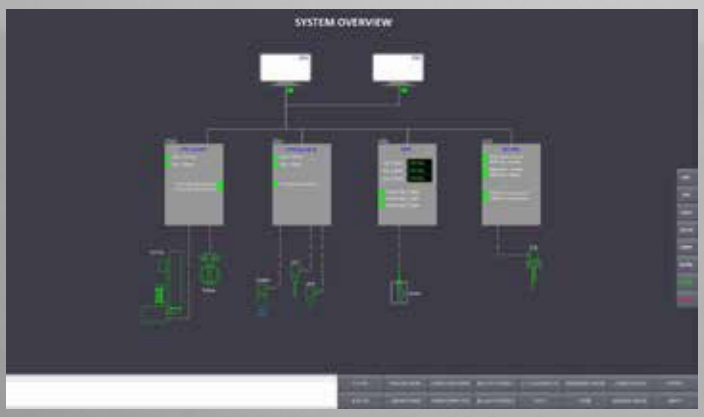
- Create loading and ballasting plan of the vessel in online mode – saved in database
- Develop a ballasting scheme for the vessel (floating platform), based on specific draft.
- Calculate trim/heel, stability and strength of undamaged vessel in current load status.
- Create a virtual model of emergency and calculate trim and stability when specified compartments are flooded.
- With DS (Dynamic Stability) option, API MasterLoad™ will by audible and visual l alarm should intact stability conditions come close to limits.

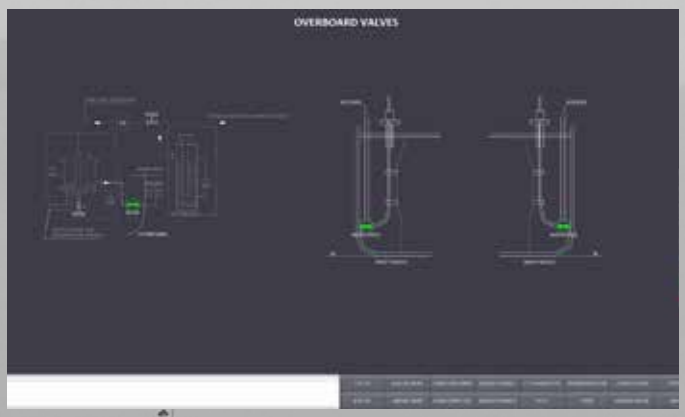


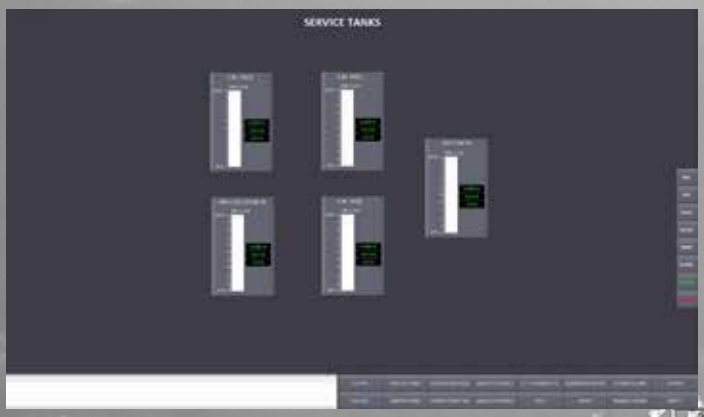
API MasterLoad™ main advantages:

- Online communication with sensors in cargo, ballast and service tanks.
- Damage stability calculation.
- Dynamic stability monitoring and warning (option).
- Automatic calculation of the amount of loaded/unloaded cargo.





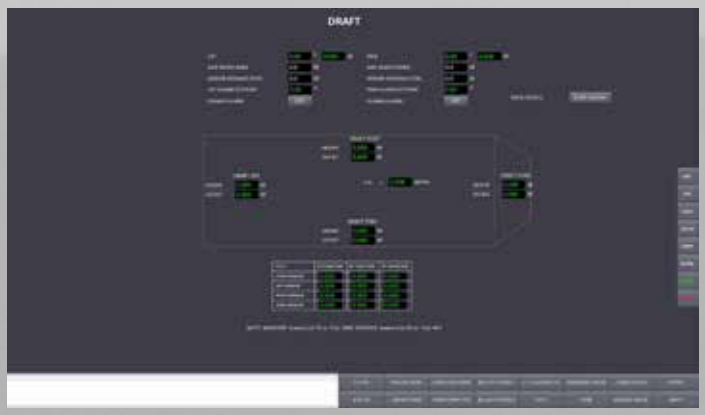




API Marine MIMICS

Flexible and modular MIMICS adapted to customer requirements


CARGO OIL TANKS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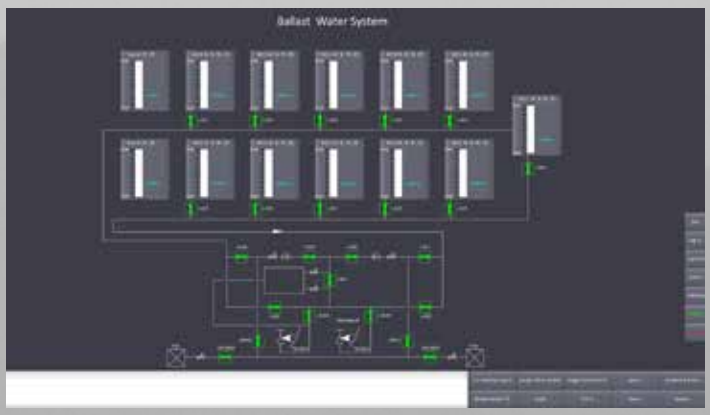

Ballast Water System


FUEL OIL TANKS

PSD

Portable Sounding Device

Portable Sounding Device – for easy, quick and accurate measurement of liquid substance with high transparency and low connectivity for a broad range of applications.

API Marine Portable Sounding Device is a stand-alone device, that complies with IMO's new ship exhaust gas regulations as of January 1, 2020, in order to accurately measure the level to liquid in a tank.

API Marine Portable Sounding Device consist of a highly advanced and reliable sensor that streamlines the process of level measurement of the liquid in tanks, but also accurate measurements of bunkered oil in case of cappuccino bunker.

With API Marine Portable Sounding Device, you will be able to determine the distance from the point of measurement to the surface of the liquid with high accuracy as an alarm will sound when the liquid sensors comes into contact with the liquid inside the tank.

Advantages

- No sensitivity to foam
- Short measuring time (ullage measurement)
- Possible to detect transparent liquid
- Portable type
- Weight : 1.36kg
- Compact size

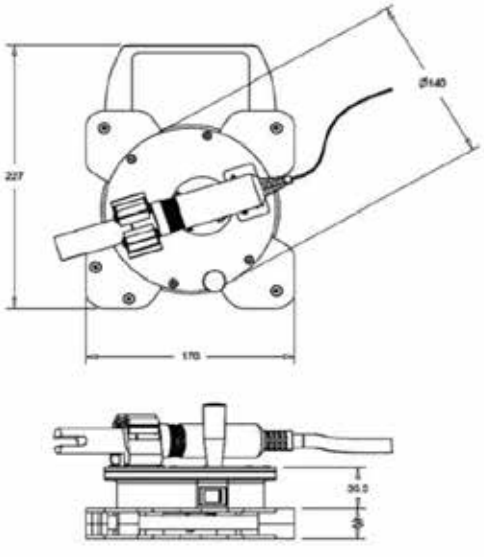
Operation Principle

API Marine Portable Sounding Device was developed to realize portable tank sounding with an ultrasonic sensor. When ultrasonic sensor tip is covered with liquid, an ultrasonic signal is sent through a measuring tape to the main unit, and a buzzer/a lamp in the body are activated at the same time. Then a level between a tank top and a liquid surface (ullage) can be measured by reading figures on a measuring tape.

Specifications

- Power Supply: 9V alkaline battery (Type 006P JIS/IEC 6LR/61 6LF/22)
- Sensor Accuracy: ±mm
- Sensor Material: SUS316L
- Measuring tape: Length(30m), Material(Glass fiber)
- Ambient temperature: -20~70°C
- Working temperature: -20~70°C
- Body Material: ABS

- Fuel Tank Level Measurement for marine
- Ballast Tank Level Measurement (for marine)
- Marine Draught Measurement
- Inclining Experiment (for marine)
- Well Water Level Measurement
- River Water Level Measurement



Advantages

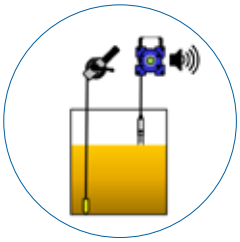
Portable type

External power source is not necessary (9V battery)

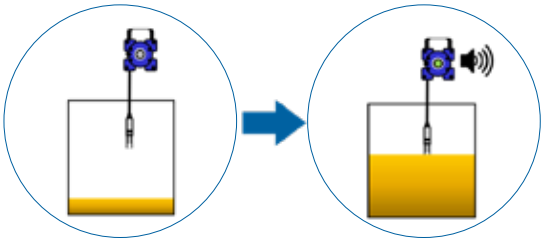
Glass fiber type measuring tape

- Strong (Breaking load: abt. 1765N)
- Small expansion by change of temperature (abt. 0.15mm/°C)

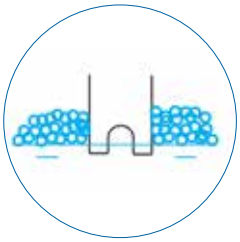
Short measuring time (75% shorter than conventional type)



Overflow prevention

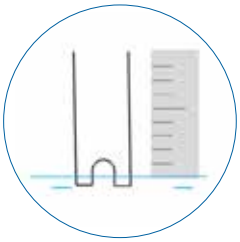


No sensitivity to foam



Possible to detect transparent liquid

High accuracy (±2mm)



As of January 1, 2020, the IMO (International Maritime Organization) will put into effect new regulations on sulfur oxide in maritime exhaust gas, in which the limit on sulfur oxide content in fuel oil that is mainly for maritime use will be changed from 3.5% to 0.5%

In complying with the new regulations, there will be an increasing number of cases in which high transparency and low viscosity compatible fuels such as MGO are supplemented.

In these cases, as is shown in the photo at right, there has been concern with conventional scales due to past experience measurement of tank contents.

< C Heavy oil>

<MGO>

API Marine Sensors

▶ **Pressure Transmitters**
UPT-67 Pressure transmitter for side mounting
UPT-68 Pressure Transmitters – submerged version

▶ **Temperature Transmitters**
UTS Liquid Level Switch

▶ **Level Switches**
UTT-67 Pressure transmitters

▶ **Tank Radars**
TGD—R96

API Marine Sensors General

The API Marine state-of-the-art range of sensors are designed and built to withstand the harsh environment and heavy conditions in marine applications.
The sensors are designed for precise measurements of level, temperature and pressure in most types of liquid.
All the sensors have a unique design with no electronics or moving parts inside the tank. This results in a longer lifespan with all sensors and transmitters being virtually service-free. Should there however be a need for maintenance – all critical and electronic parts can be accessed from outside the tank.
The majority of the API Marine sensors have “winterization” approval, and are as such ideal for application operating in the harsh arctic environment.

▶ Pressure Transmitters

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TSS/UPT™ can easily be extended to handle inputs from other measuring points i.e. temperature and/or pressure sensors and level switches. With its modular design the system is easily adapted to handle required numbers of tanks or inputs in a cost-effective manner. This makes the system well suited also for retrofit installation.

▸ Level Switches

The Ultrasonic Tank Switch UTS™ is made of stainless steel and is used for level detection of liquids in vessel tanks, storage tanks, bilge water tanks and cofferdams, as well as for controlling water ingress into the vessel's compartments.

The accuracy of measurement is ensured regardless of the shape of the tank, type of liquid or liquid's temperature. The UTS™ is installed outside the tank/pipe with only a metal rod inside the tank/pipe.

Main Advantages

- Any type of liquid
- Only a steel rod inside the tank (electronics and connections outside)
- Fully welded construction
- No moving parts
- Extended temperature range
- No maintenance required

Having only the metal rod inside the tank and no mechanical or moving parts means no maintenance is required.
The UTS™ can be easily installed in vertical, horizontal or any inclined position and is tested for operation in a wide range of media, such as water, oil, petroleum, petrochemicals, acids and wastewater, as well as many others.
The UTS™ is also supplied in a special "Arctic" version, for applications in harsh environments with ambient temperature of down to –60°C without heating the device.

- Automatic self-test
- No calibration needed
- Explosion proof
- Pre-adjustable alarm points
- No sensitivity to foam
- More than 300 possible variations

▸ Temperature Transmitter

The Universal Temperature Transmitter (UTT™) is used for the temperature measurement of various media – water, oil, petrochemicals, acids, alkalies, gases and steam.

The UTT™ is characterized by a reinforced housing manufactured in stainless steel and the option of open-air installation.

Main Advantages

- General purpose pressure transmitters
- Easy installation
- Customized solutions
- Resistant to aggressive media
- Resistant to temperature drop
- Easy connection to most interfaces

The option of ordering the sensor with the required probe length, with or without a thermowell, in explosion proof or standard construction, with any thread or flange connection makes the UTT™ the most convenient solution for most ship applications.

▸ Tank Radar

The API Marine Tank Radar is especially designed for marine applications. The tank radar is a very compact solution with measuring range up to 35 meters. It can be delivered with flange size from DN100 to DN200, and as such with small on-deck space requirements.
The tank radar provides a standard analogue output of 4-20mA to the control cabinet.

Main Advantages

- Applicable for oil, product & chemical tankers
- Non-contact measuring, no wear and tear
- High accuracy
- Customized variations
- Easy installation & maintenance
- Measuring range 0-35m

With state-of-the-art technology we bring efficiency to our customers

API Marine is a house of competence, where development, design and production processes are united in unique solutions for advanced tank control. Complete liquid cargo control systems can be supplied – from sensors in the tank and operators' stations to the calculation software, all fulfilling IMO requirements.
API Marine is certified according to ISO 9001:2015 and our products carry the ATEX PQAN approval.

We want to contribute to our customer's profitability by supplying high quality products, excellent service and state-of-the-art high-tech solutions, where reliability and durability are keywords!

A. P. I.
marine

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