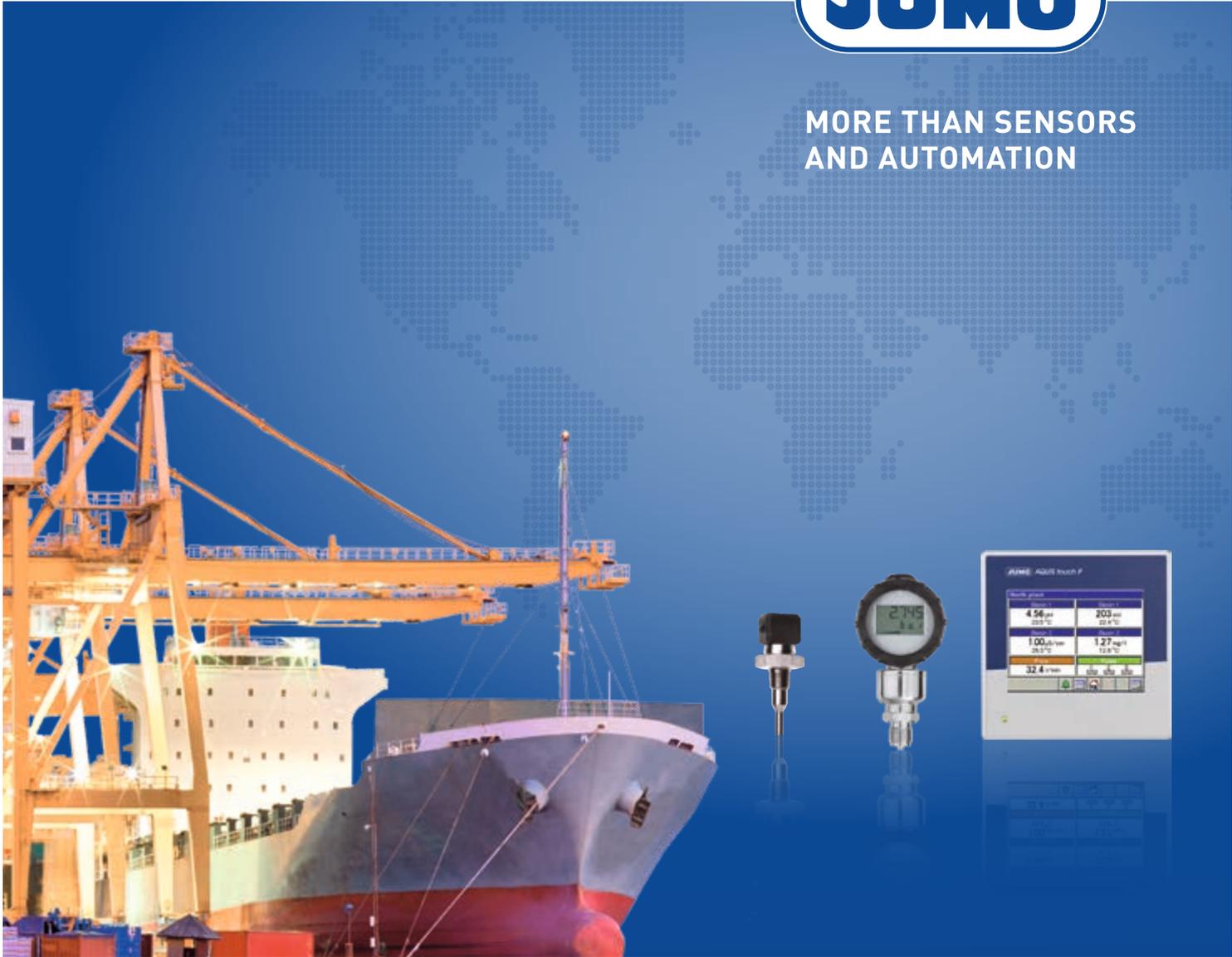




MORE THAN SENSORS
AND AUTOMATION



Shipbuilding Industry

Innovative solutions for your success



Contact

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Email: industry@jumo.net



Dear Reader,

The shipbuilding industry places complex and versatile demands on measuring devices. Equipment for this industry must have a secure process, long-term stability, and be unsusceptible to the salty humid sea air. In addition to the salty air, the devices are exposed to strong vibration, shocks, heat, cold, and dust. Various country-specific guidelines (e.g. GL, Det Norske, or Bureau Veritas) develop and verify design and material standards for the construction and operation of ships. These standards ensure that the deployed equipment meets the above requirements.

For both cruise ships as well as cargo ships JUMO – as your reliable partner – is at your side, assists you with all your questions, and provides quick solutions.

JUMO has already been a leading manufacturer of measurement and control systems for more than 70 years and, consequently, has been a professional partner to the shipbuilding industry. New developments, improvements to

existing products, and more economical production methods are particularly important to us because only by following this strategy can the highest level of innovation be ensured. JUMO provides the best for the shipbuilding industry with a large number of solutions for a variety of different applications.

This brochure provides an overview of the products that are available for the shipbuilding industry. Of course we would be delighted to work out specific, individually customized solutions with you.

Further information about our products can be found under the specified type/product group number at www.industry.jumo.info.



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Heating and cooling systems

Heat exchangers are technical devices which are used to transfer thermal energy from one medium to another. Usually heat exchangers use water to transfer heat. But sometimes other fluids and even solids may be used. Normally the function of heat exchangers is to maintain heat during ventilation or passive cooling. In addition, heat exchangers are used to recycle heat from engines and exhaust gas.



Heating and cooling systems

Operation

A heat exchanger helps to transfer heat from one liquid or gas to another. Some types of heat exchangers mix the two different liquids, but other types include a solid wall which separates the liquids and prevents them from mixing. In addition, heat exchangers are available in which so-called fins are used in connection with the wall to increase the

surface while reducing the resistance. To make the most efficient heat exchangers possible usually the wall space between fluids has to be maximized while minimizing fluid flow resistance. JUMO's temperature and pressure sensors control and monitor the process.

JUMO DICON touch

Two-channel process and program controller with paperless recorder and touchscreen
Type 703571



JUMO MarineTemp

Screw-in RTD temperature probe for maritime applications
Type 902850



JUMO dTRANS p20

Process pressure transmitter with display
Type 403025



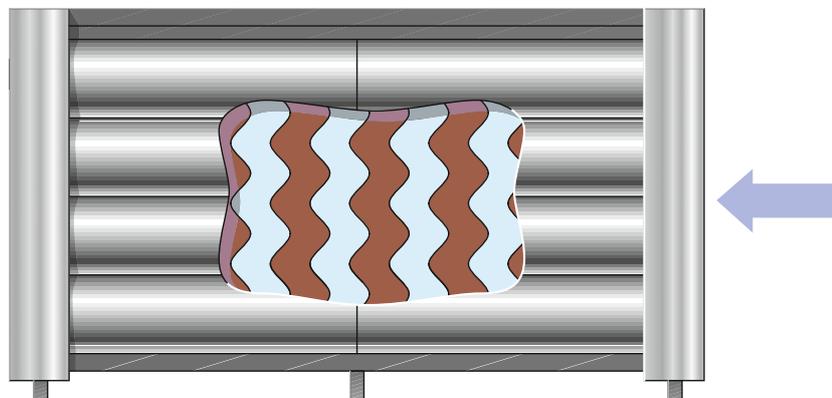
JUMO dTRANS T08

Temperature transmitter
Type 707101



JUMO dTRANS S08

Signal and isolating converter
Type 707203





Engine room

Ships generate extreme loads on the components of the engines and compressors. The high temperatures this process produces mean that some of the mechanical components have to be constantly monitored. Reliable measurement technology from JUMO helps you monitor temperature and pressure in engines and compressors.



Engine room

Temperature monitoring in the ship's engine

The engine room of a ship typically contains several engines for different purposes. Main or propulsion engines are used to turn the ship's propeller and move the ship through the water. They typically burn diesel oil or heavy fuel oil and can sometimes switch between the two. Many propulsion arrangements for motor ships are available. These include multiple engines, propellers, and gear-boxes. One of the main features of the JUMO VIBROtemp screw-in RTD temperature probe is its robustness in demanding installation situations. It provides accurate temperature values for the engine and lubricating oil as well as for engine control.

Temperature and pressure monitoring in the compressor

Two generic principles for the compression of air (or gas) exist: positive displacement compression and dynamic compression. Some of the positive displacement compressors include reciprocating (piston) compressors, orbital (scroll) compressors, and different types of rotary compressors. Temperature and pressure measurement are important measurands in a compressor. JUMO Pt100 sensors are an excellent choice to maintain a secure process. The temperature probe recognizes if the temperature is too high or low and gives the control system a signal if something is wrong. A pressure sensing body such as a diaphragm is used to measure pressure. The mechanical signal from the diaphragm is then converted to an electrical signal (4 to 20 mA or 0 to 5 V). The JUMO MIDAS pressure transmitter series is a perfect choice to control the pressure in the compressor.

JUMO VIBROtemp

Screw-in RTD temperature probe with plug connector
Type 902040



JUMO MIDAS S07 MA

Pressure transmitter
Type 401021



High precision pressure switch

HNSPX-Ex-1 - HNSPX-Ex-2 "i" and "t" series
Type 405071



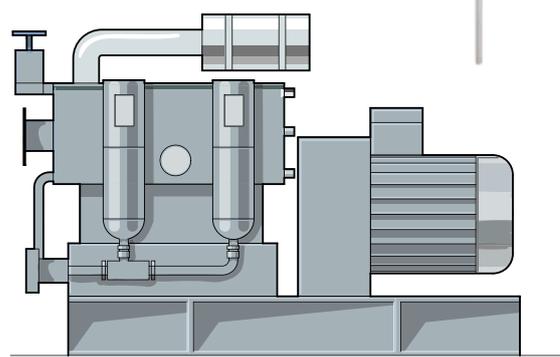
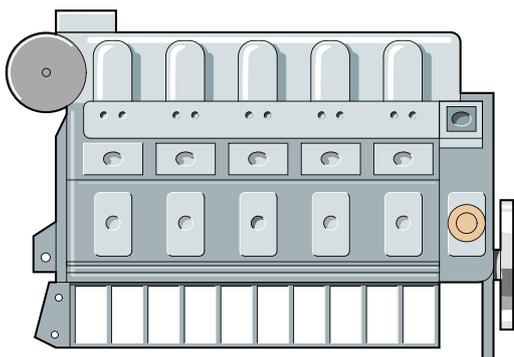
Single and double surface-mounted thermostat

With capillary or rigid thermowell
Type 605060



RTD temperature probe

With BV (Bureau Veritas) marine certification
Type 903564





Separator

The separator is the principle component of several high-efficiency heavy fuel oil separation systems in the ship. Untreated oil that is heated to the correct temperature is fed continuously to the separator so that impurities can be cleaned. After centrifugal separation, cleaned oil is continuously pumped away while separated sludge and water accumulate at the bowl periphery.

A water transmitter in the clean oil outlet measures the capacitive resistance and signals changes to a control unit. Depending on the water content, the control unit either opens the drain valve or expels the water through the bowl discharge ports during sludge discharge.

JUMO heatTHERM

Panel-mounted thermostat
Type 602031



JUMO eTRON M

Electronic microstat
Type 701060



JUMO MarineTemp

Screw-in RTD temperature probe for maritime applications
Type 902850



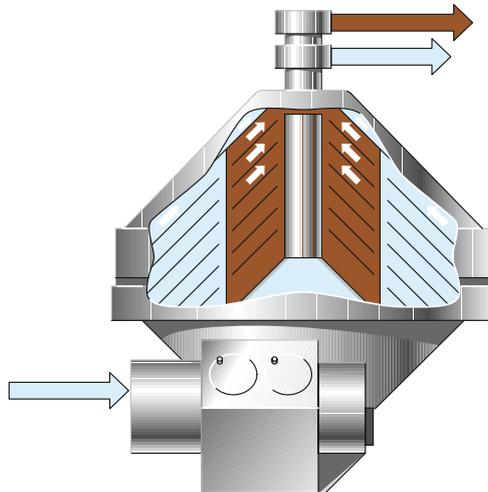
JUMO dTRANS T08

Temperature transmitter
Type 707101



JUMO dTRANS S08

Signal and isolating converter
Type 707203





Gas and oil tanks

Temperature and level measurement in gas and oil tanks

The liquefaction of the gas can be carried out under a pressure of approximately 10 bar while the medium can be cooled at the same time. Due to the pressure and temperature stress on the material the tanks are made of special stainless steel and insulated from the hull. Usually spherical tanks that rise halfway out of the ship's deck line are used to transport oil or liquid gas.

LNG pressure measurement at low temperatures

The pressure inside the tank must be continuously monitored because the liquefaction process strongly depends on it. To monitor the pressure inside the tank at these extremely low temperatures, the medium to the pressure transmitter must be heated to $-40\text{ }^{\circ}\text{C}$ via evaporation lines. The JUMO dTRANS p20 masters this measuring task.

JUMO NESOS R20 LT
Level transmitter via float
Type 408320



JUMO dTRANS p20
Process pressure transmitter with display
Type 403025



JUMO NESOS R02 LS
Standard version float switch
Type 408302



High precision pressure switch
HNSPX-Ex-1 - HNSPX-Ex-2 "i"
and "t" series
Type 405071



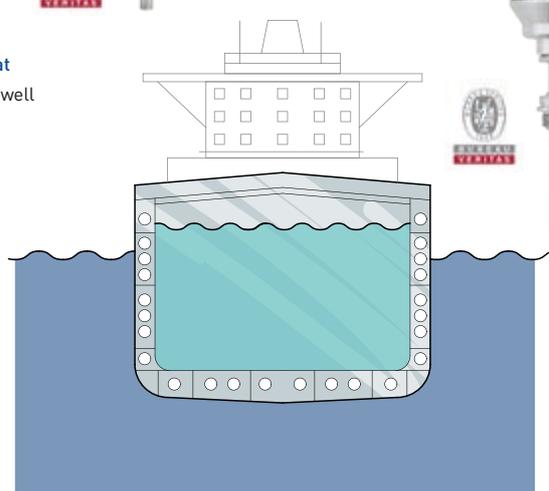
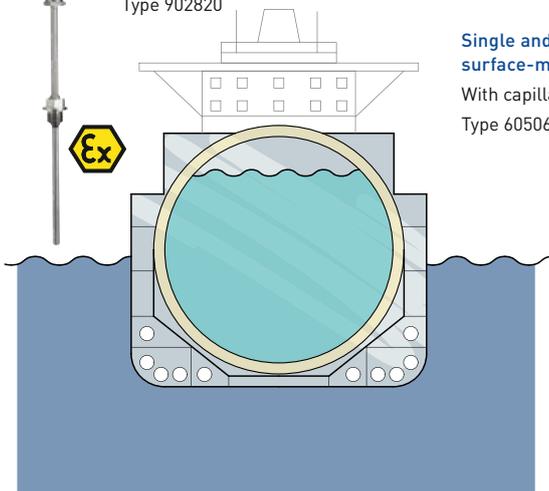
JUMO PROCESStemp
RTD temperature probe
for process technology
Type 902820



RTD temperature probe
With BV (Bureau Veritas)
marine certification
Type 903564



Single and double surface-mounted thermostat
With capillary or rigid thermowell
Type 605060





Water and wastewater treatment

Water is crucial on ships. Water must always be treated regardless of whether it will be stored or directly gained from seawater. JUMO probes for pH, conductivity, pressure, and level support the process while at the same time ensuring that the water has a consistently high quality.



Water and wastewater treatment

Drinking water preparation

The reverse osmosis unit is the key component of the desalination system for drinking water preparation. During reverse osmosis, the seawater is pushed through a semi-permeable membrane at high pressure. This membrane acts like a filter and only allows certain ions and molecules to pass through. Because seawater has such high salinity, a pressure of 60 to 80 bar is required. To ensure safe system operation, the pressure before reverse osmosis must be monitored. The obvious choice for this task is the JUMO MIDAS C18 SW pressure transmitter.

Wastewater treatment

Depending on the size of the ship, wastewater is either stored or processed directly on board. The ships that store waste dispose of it in the appropriate waste disposal facilities that are available at ports. Ships that handle wastewater directly use either membrane or biological treatment. The level needs to be monitored in all systems to prevent overflow. pH value and conductivity measurement is necessary to check the water quality before and after the water treatment in both systems. You can measure, control, record, and display all tasks in water and wastewater treatment.



JUMO MAERA S29 SW
Titanium level probe
Type 404393



JUMO AQUIS touch S/P
Modular multichannel measuring devices for liquid analysis with integrated controller and paperless recorder
Types 202580/202581



JUMO tecLine CR
Conductive two-electrode conductivity sensor
Type 202924



JUMO MIDAS C18 SW
OEM seawater pressure transmitter
Type 401012



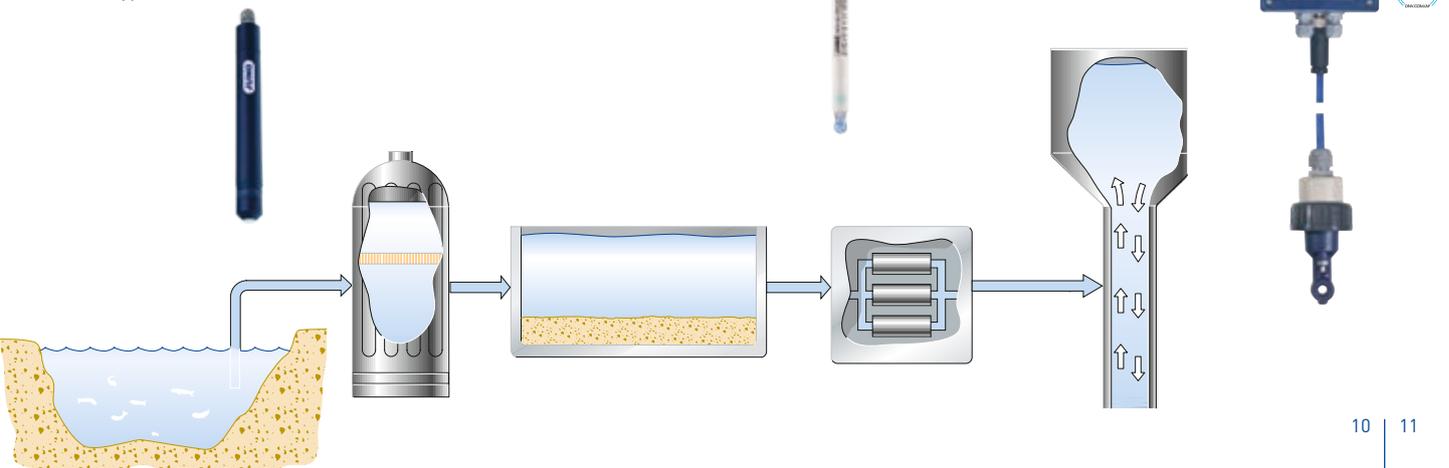
JUMO CTI-500
Inductive conductivity/concentration and temperature transmitter with switching contacts
Type 202755



JUMO tecLine Cl2
Sensor for free chlorine
Type 202630



JUMO tecLine HD
pH combination electrode
Type 201021

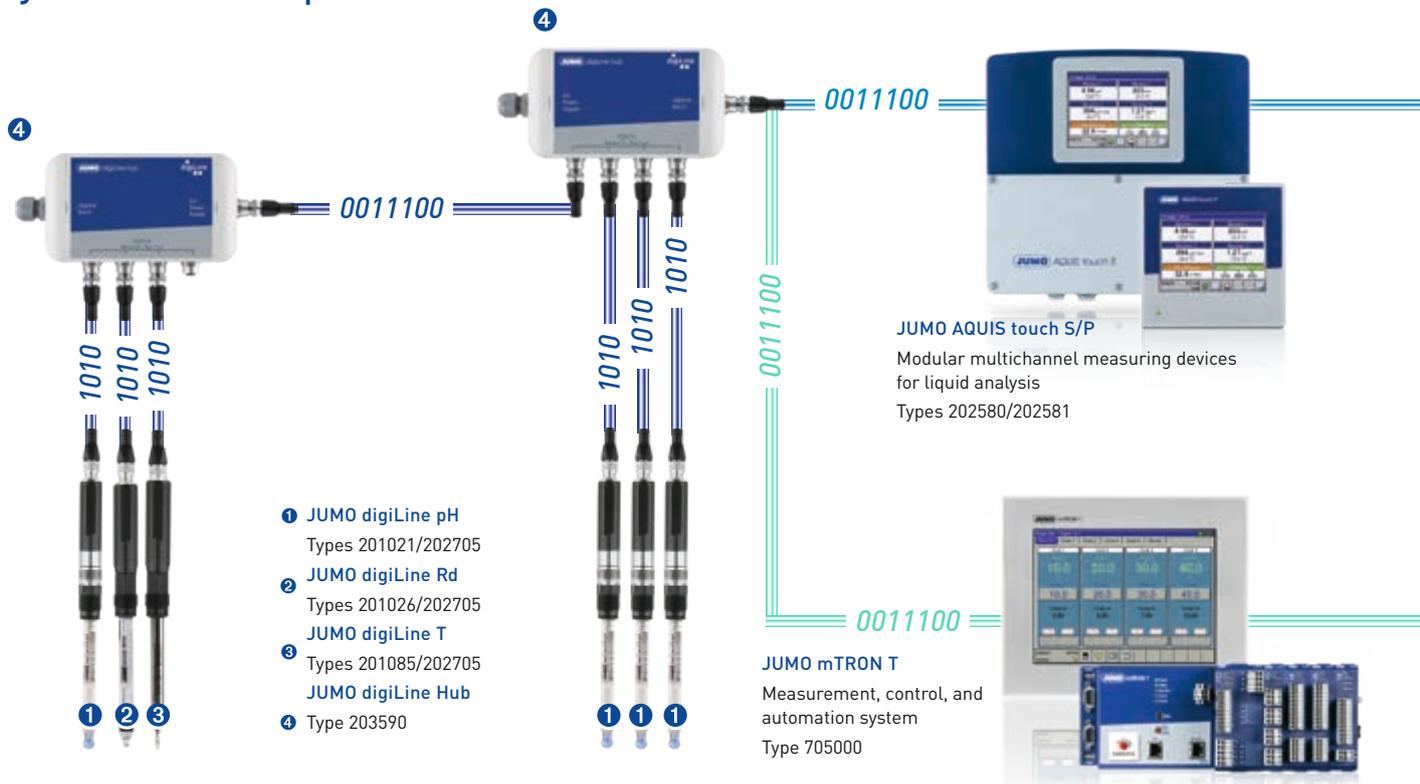


JUMO digiLine

Intelligent, bus-compatible connection system for digital sensors

With JUMO digiLine, JUMO presents a bus-compatible connection system for digital sensors in liquid analysis which also offers Plug and Play functionality. JUMO digiLine allows for the simple creation of sensor networks by connecting a wide array of sensors in various bus topologies (linear, star). A single shared signal line is used for communication with the next evaluation unit or controller. This way plants in which several parameters need to be measured at the same time in different places can be wired efficiently and quickly.

System example

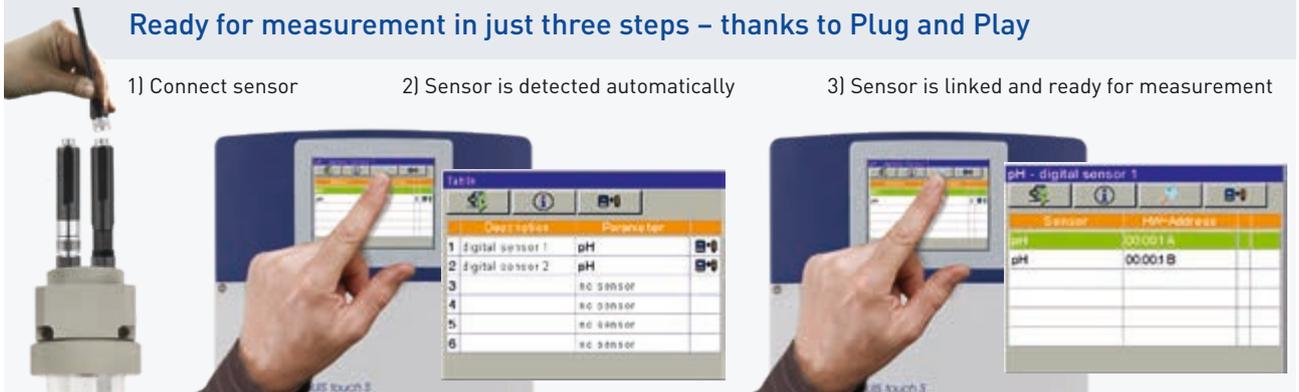


Ready for measurement in just three steps – thanks to Plug and Play

1) Connect sensor

2) Sensor is detected automatically

3) Sensor is linked and ready for measurement





Connection option 1

The multichannel measuring devices in the JUMO AQUIS touch series were designed especially for liquid analysis. They are ideal as a central platform for the display and further processing of measurement data. Up to 6 digiLine sensors can be connected to the modular devices and as many as 25 sensors can be connected using corresponding input modules and interfaces. In addition to measured value recording, up to 4 independent control loops can be implemented and process values can be recorded in a tamper-proof manner with an integrated paperless recorder.

Connection option 2

JUMO digiLine sensors can also be connected to the universal measuring, control, and automation system JUMO mTRON T. This means that entire automation solutions can be implemented while the scalability also enables individual adaptation to a particular task. An integrated PLC is used to integrate up to 62 digiLine sensors.

Measure various liquid analysis measurands with just one system

- Measurands: pH value, temperature, redox potential, conductivity, oxygen concentration, turbidity
- Disinfection measurands for industrial applications in the process, food, pharmaceutical, and water industry
- Fail-safe digital data transfer for optimal process monitoring
- Modular system: for both individual measuring points and for setting up sensor networks
- Plug and Play function for connection to transmitters from the JUMO AQUIS touch series: facilitates the replacement of expended sensors or the brief exchange of sensors for calibration purposes
- The digiLine electronics can still be used when the sensor becomes worn
- Simple and reliable calibration of sensors as well as comprehensive measuring point management can both be easily done on a PC with the JUMO DSM (Digital Sensor Management) software tool



Ballast water management systems

Cruise ships, large tankers, and bulk cargo carriers use a tremendous amount of ballast water. It is often taken on in the coastal waters in one region after ships discharge wastewater or unload cargo. Then the ballast water is discharged at the next port of call where more cargo is loaded. Ballast water typically contains a variety of biological materials including plants, animals, viruses, and microorganisms. These materials often include non-native, exotic species that can cause extensive ecological and economic damage to aquatic ecosystems. The reliable measurement of JUMO products provides support in the treatment of ballast water.



Ballast water management systems

Tank management with JUMO sensors (including both the level and temperature sensors) provides full access for control and monitoring in tanks of all ship types and offshore installations. JUMO products can monitor the level in tankers, bulk carriers, passenger ships, suppliers, and offshore rigs with JUMO pressure sensor JUMO MIDAS C18 SW. Controlling systems (e.g. JUMO mTRON T) allow the mon-

itoring of alarm and separate parameters such as level, pressure, temperature, and flow. The system controls valves, pumps, actuators, motors, and other equipment as required. The user interface can be adapted to match any application and customer-preferred layout. JUMO also provides conductivity sensors and sensors for chlorine to measure the quality of the ballast water.

JUMO dTRANS AS 02

Transmitter/controller for standard signals and temperature
Type 202553



JUMO screw-in RTD temperature probe

Probe with plug connector according to DIN EN 175301
Type 902044



JUMO surface-mounted thermostat

Model ATH.-SE
Type 603031



JUMO tecLine Cl2

Sensor for free chlorine
Type 202630



JUMO MIDAS C18 SW

OEM seawater pressure transmitter
Type 401012



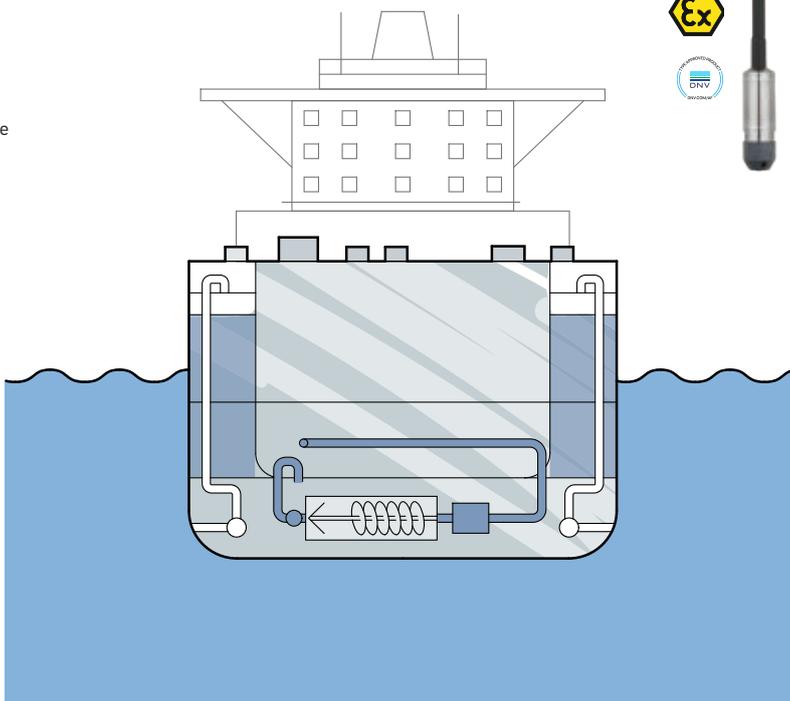
JUMO MAERA S29 SW

Titanium level probe
Type 404393



JUMO CTI-500

Inductive conductivity/concentration and temperature transmitter with switching contacts
Type 202755





Heating, ventilation, and air-conditioning

Heating, ventilation, and air-conditioning (HVAC) – three closely related fundamental functions found in ship transport. HVAC is also known as a climate control system. This is because these three functions are essential in maintaining comfort in every dwelling and in every ship. The primary use of HVAC is to regulate temperature, humidity, and air flow to ensure that these measured values remain within the normal range. High-quality measuring devices from JUMO are the ideal solution to ensure these applications.



Heating, ventilation, and air-conditioning

Heating is significant in maintaining adequate temperature especially during colder weather conditions. Two classifications of heating exist: local and central. The latter is more commonly used because it is more economical. Furnace or boiler, heat pump, and radiator make up the heating system. Ventilation, on the other hand, is associated with air movement. Ventilation is necessary to allow carbon dioxide to go out and oxygen to get in. This process ensures that people inhale fresh air. Stagnant air causes the spreading of sickness (through airborne pathogens) and allergies.

But it is also essential to maintain an efficient ventilation system. Insufficient ventilation usually promotes the growth of bacteria and fungi such as molds because of high humidity. The air-conditioning system controls the heat as well as ventilation. Alternatively, the split system or remote coils can be used. However, air ducts must be properly cleaned as pathogens thrive there otherwise. Return-air grills are also vulnerable to chemical, microbiological, and radiological elements.

JUMO frostTHERM AT
Surface-mounted thermostat
Type 604100



JUMO MIDAS S07 MA
Pressure transmitter
Type 401021



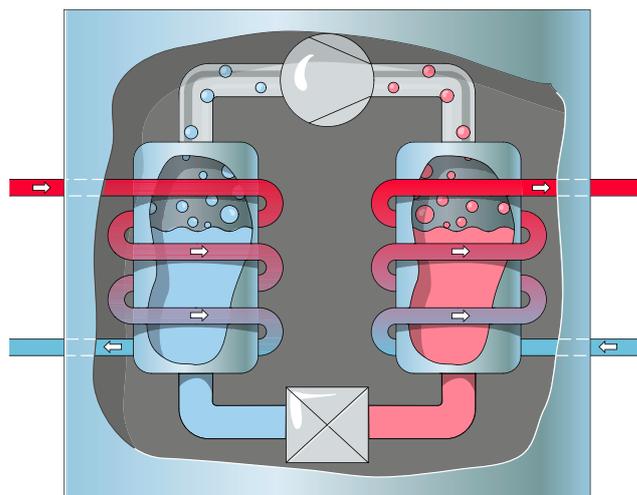
JUMO surface-mounted thermostat
Model ATH.-SE
Type 603031



JUMO safetyM STB/STW
Safety temperature limiter and safety temperature monitor according to DIN EN 14597, also possible in Ex version
Types 701150, 701155



JUMO mTRON T
Measuring, control, and automation system
Type 705000



JUMO push-in RTD temperature probe
With connecting cable
Type 902150



JUMO VIBROtemp
Screw-in RTD temperature probe with plug connector
Type 902040



JUMO dTRANS T08
Temperature transmitter
Type 707101



JUMO dTRANS S08
Signal and isolating converter
Type 707203



JUMO NESOS R03 LS
Float switch with reference vessel
Type 408303





Services & Support

It is the quality of our products that is responsible for such a high level of customer satisfaction. But our reliable after-sales service and comprehensive support are also valued. Let us introduce you to the key services we provide for our innovative JUMO products. You can count on them – anytime, anywhere.

JUMO Services & Support – so that it all comes together!

Manufacturing Service



Are you looking for a competitive and efficient system or component supplier? Regardless of whether you seek electronic modules or perfectly fitting sensors – either for small batches or mass production – we are happy to be your partner. From development to production we can provide all the stages from a single source. In close cooperation with your business our experienced experts search for the optimum solution for your application and incorporate all engineering tasks. Then JUMO manufactures the product for you.

As a result you profit from state-of-the-art manufacturing technologies and our uncompromising quality management systems.

Customer-specific sensor technology

- Development of temperature probes, pressure transmitters, conductivity sensors, or pH and redox electrodes according to your requirements
- A large number of testing facilities
- Incorporation of the qualifications into application
- Material management
- Mechanical testing
- Thermal test

Electronic modules

- Development
- Design
- Test concept
- Material management
- Production
- Logistics and distribution
- After-sales service

Metal technology

- Toolmaking
- Punching and forming technology
- Flexible sheet metal machining
- Production of floats
- Welding, jointing, and assembly technology
- Surface treatment technology
- Quality management for materials





Information & Training



Would you like to increase the process quality in your company or optimize a plant? Then use the offers available on the JUMO website and benefit from the know-how of a globally respected manufacturer. For example, under the menu item "Services and Support" you will find a broad range of seminars. Videos are available under the keyword "E-Learning" about topics specific to measurement and control technology. Under "Literature" you can learn valuable tips for beginners and professionals. And, of course, you can also download the current version of any JUMO software or technical documentation for both newer and older products.

Product Service



We have an efficient distribution network on all continents available to all of our customers so that we can offer professional support for everything concerning our product portfolio. Our team of professional JUMO employees is near you ready to help with consultations, product selection, engineering, or optimum use of our products. Even after our devices are commissioned you can count on us. Our telephone support line is available to give you answers quickly. If a malfunction needs to be repaired on site our Express Repair Service and our 24-hour replacement part service are available to you. That provides peace of mind.

Maintenance & Calibration



Our maintenance service helps you to maintain optimum availability of your devices and plants. This prevents malfunctions and downtime. Together with the responsible parties at your company we develop a future-oriented maintenance concept and are happy to create all required reports, documentation, and protocols. Because we know how important precise measurement and control results are for your processes we naturally also professionally calibrate your JUMO devices – on site at your company or in our accredited DAkkS calibration laboratory for temperature. We record the results for you in a calibration certificate according to EN 10 204.



www.jumo.net