As a significant player in this market for over 3 decades, KROHNE Skarpenord offers a complete product line for all types of ships. Our tank level gauging products have been installed on almost all types of ships, giving us an unbeaten know-how in the field of marine tank monitoring.

We offer an experienced world wide support network, covering all the busiest ports and areas. With regular training, our support network is up to date on both sailing systems and on the very latest technology.

Read more and see why our solutions offer the highest quality, are most cost effective, and bring easiness to your daily work!
CARGOMASTER® is the complete solution for tank monitoring and alarm. The system can combine readings from all tanks onboard into modern and easy-to-use software running on marine computers. Draught sensors may be used as basis for precise trim and list compensation. All necessary monitoring of loading lines and ballast pumps may also be included in the system.

As we say in KROHNE Skarpenord:
- The sensors are the heart in the system, and our main focus on sensor technology secures the best results every day for you as an operator.

Reliability, accuracy and cost saving benefits for the customer is our focus through all development, engineering and design.

KROHNE Skarpenord - A leading provider of advanced tailor made tank level gauging
The complete solution

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<th>No.</th>
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<td>OPTIWAVE 8300 C Marine Level Radar Reliably, accurate and stand alone radar for marine applications</td>
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<td>Cargo Manifold Pressure and Pump Pressure Sensor Instant response and alarm</td>
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<td>Cargo Temperature Sensors 2 or 3 sensors per cargo tank, either mounted in pump or separate pipe</td>
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<td>Bracket Mounted Ballast Sensor P-130 / P-140 Titanium submerged in tank</td>
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<td>Independent High Level System For overfill alarm, either magnetic float or solid state</td>
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<td>13</td>
<td>Loading Computer System 3D model based or tabular based full damage stability loading calculator</td>
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<td>Gas Detection System Gas detection in ballast tanks, pump rooms and others</td>
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Possible options:

- **Cargo Temperature Sensors**: 2 or 3 sensors per cargo tank, either mounted in pump or separate pipe.
- **Bracket Mounted Ballast Sensor**: P-130 / P-140 Titanium submerged in tank.
- **Air Purge Ballast System**: May be offered as alternative to pressure sensors.
- **Independent High Level System**: For overfill alarm, either magnetic float or solid state.
- **Loading Computer System**: 3D model based or tabular based full damage stability loading calculator.
- **Gas Detection System**: Gas detection in ballast tanks, pump rooms and others.
The CARGOMASTER® system includes versatile and easy-to-use software, providing the full picture of what is happening on deck and in tanks. With selectable screen setup, the user may choose to show only the tanks of interest (manually or automatically), leaving unwanted information in the background. Should something unexpected happen, automatic warnings will give notice to the operator and consequently alarms will occur.

**Flexibility**

The software is extremely flexible to fit all different needs for information. Our CARGOMASTER® software has been developed throughout the years based on customer feedback, providing the right solutions to simplify daily work onboard. It can be set up to fit all types of ships, from the simplest oil tankers to the most complex chemical tankers. With extensive functions for reporting, you can make printouts covering your needs.

**Integration and redundancy**

Integration to ship’s automation system, vessel management systems or loading computers is obtained over serial links (ModBus RTU). Also, sub systems like air purge ballast systems and fuel level gauging systems may easily be integrated, providing the operator with the full overview.

The CARGOMASTER® can be set up in multiple configurations, for full redundancy and distribution of information. We offer several options to fulfill all monitoring needs and cost levels.

**Maintenance friendly**

Based on MS Windows, which is well known to people onboard, potential service and maintenance can normally be performed by crew. With our experts on line, a problem may be corrected quickly and easily, saving time and money.

**Pioneers**

The CARGOMASTER® was in its original version 1, the world’s first computer based cargo monitoring system. Automatic level gauging combined with calculations of volumes did save our customers a lot of time in port. We are maintaining a lead in the field of software development for tank monitoring.
The OPTIWAVE cargo level radar is a highly accurate and reliable instrument for reading the ullage/level. With its heavy duty stainless steel housing, it is submersible (IP68) and designed to withstand the roughest conditions on deck. It carries a backup display, well protected by a stainless steel cover, for redundant indication. Loading may continue with a man on deck, if level information is lost on the main monitoring station.

State of the art technology

The OPTIWAVE 8300 C introduces well tested and proven state of the art radar technology in the marine sector. First of all the KROHNE 24GHz technology (FMCW principle with 2GHz sweep) is a giant leap when it comes to signal to noise ratio. In more spoken words; the radar’s ability to see the actual tank contents under the most difficult situations is well secured. By minimizing the effect of fog, foam, movements, sloshing, disturbances and low reflection, the OPTIWAVE 8300 C Marine gives you the ullage under all conditions.
Redundant display
All our level radars have stand-alone operation. This means that the radar calculates all level data locally, before transmitting to the main system in cargo control room. This is a much safer way, as the level always will be provided locally on the integrated display [standard]. Most suppliers in the level gauging market are not supplying stand-alone radars, and are therefore depending on a few components in the master cabinet for computing tank levels.

Closed service
Closed service on the OPTIWAVE means that the unit can be replaced without opening the tank and releasing tank vapours. Replacement of complete electronics (including antenna transmitter) can be done by the ship’s crew and at any time (with tank pressure maintained), even during cargo operations. A replacement radar is always pre calibrated, and will give you the actual ullage as soon as it is turned on.

Closed cleaning
Closed cleaning of the radar’s antenna is extremely convenient and is also protecting ship’s crew from being exposed to cargo vapours. With KROHNE Skarpenord’s closed cleaning facility you can give exposed parts thorough cleaning with steam, hot water or cleaning solvents without opening the tank. This is done through a washing connection protected by a ball valve. With crude oil in the tank, you might even wash it before you discharge your cargo, as the amount of steam/water used is minimal.

Joint development
Together with KROHNE’s radar research and development expert centres in Germany and France, we have developed the OPTIWAVE to be the most modern and cost saving radar gauge in the market. With unbeaten operational benefits, time and money may be saved on daily routines and unwanted situations.

Technical features hard to match
- Redundant display. Ullage/level will always be shown locally.
- Tank seal
- Effective cleaning inside antenna
- Protection cover
- You will be able to load cargo using only the instrument
- The radar is equipped with touch screen user interface
- Why should you risk to go offhire due to a computer problem?
- Disconnect cables and unbolt the radar head
- Install new radar unit on existing bottom part
- Run empty tank spectrum for optimum accuracy
- Connect cleaning hose to quick coupling on ball valve
- Open ball valve
- The antenna will be cleaned thoroughly
- Tank is closed during all cleaning
Can cargo level be measured with a pressure sensor?

Yes! Since 1979 we have installed 40,000 pressure sensors for measuring level in cargo tanks, ballast tanks and fuel tanks. Most of our sensors are still in operation, providing operators with a good level every day. KROHNE Skarpenord has been successful with this technique for 30 years for all kinds of tankers.

Our P-105 high precision pressure sensor is unbeaten as a cargo measuring instrument for cargoes in tanks that are difficult to measure with radar. Many chemical carrier operators rely on this type of measurement, because it is unaffected by foaming and heavy condensation. As the pressure sensors are submerged, they will give you the ullage no matter what is happening on top of the cargo. Made in Inconel, the sensor is suitable for installation in tanks carrying acids.

In tanks like slop and retention, radar signals may be disturbed due to tank shape and obstructions. In such cases, a pressure sensor installation will provide you accurate and reliable level measurement. As supplier of both techniques, we can offer the optimum technology to secure reliable measurements for all tanks and conditions. By combinations of these techniques, we offer hybrid solutions unaffected by any disturbance.
CARGOMASTER®
Covering all applications

OPTIFLEX 4300 C Marine

Measurement of level and oil/water interface
The OPTIFLEX 4300 C (TDR) offers accurate and reliable level gauging in various applications not fully covered by radars. The instrument signal is guided by a stainless steel wire, reducing the requirement for free space. Where a traditional radar would require a still well for guiding the beam, the OPTIFLEX 4300 C offers an open and easy to clean solution. In slop tanks, the OPTIFLEX 4300 C will even give you the oil/water interface.

Measurement of low reflecting cargoes
Without the need for a costly still well or fragile float installation, the OPTIFLEX 4300 C offers reliable and accurate level measurements in low reflecting cargoes like LPG.

Hybrid level gauging
With KROHNE Skarpendorf’s hybrid level gauging solutions, we cover all thinkable conditions in a cargo tank. By combinations of different measurement techniques we will always provide you the tank level.

Some of our CARGOMASTER® applications:
- Tankers:
  - Chemical tankers (IMO I, II, III)
  - Product tankers
  - Oil tankers
  - Juice tankers
  - Tank barges
  - FPSOs
- Supply ships (AHTS, PSV, DSV)
- Bulkers
- Container ships
- Reefers
- Cruise ships and ferries
- Heavy lift vessels
- Drilling rigs
- Production platforms
- LPG FSUs

The all-in-one-system
With the CARGOMASTER®, we have something good to offer for any application. In addition to highly accurate cargo level gauging, our product line includes everything from the simplest (but robust) ballast applications, to complete fully redundant ballast measurements for the most precise stability calculations.
From Norway, KROHNE Skarpenord takes well care of all activities related to marine systems and supplies within the KROHNE group. Our main office and production factory is located in Brevik which is on the beautiful south coast of Norway. From here we are supporting a wide network of sales representatives, service companies and joint ventures, all well secured within the main shipping hubs and shipbuilding countries.

Being in the marine business for over 50 years, we know well what it takes to deliver high quality products to demanding ship operators and yards. By combining our long traditions and new groundbreaking technology into the CARGOMASTER® product, we offer a system which stands out from the competition.

Tailoring systems
In Brevik, our skilled engineers are tailoring the systems to fit your ship. Delivering the needed quality in every aspect is our number one rule. We are focusing on lifetime costs for our customers, with minimum maintenance needs and high serviceability. With more than 650 systems on our reference list, we know what we are doing.

**System supplier**
KROHNE Skarpenord is responsible for all activities:
- Development of technology and solutions
- System design
- Engineering
- Deliveries
- Maintenance and service
KROHNE

As owner of KROHNE Skarpenord since 2004, KROHNE has an important leg in marine business. KROHNE ranks among the world’s leading companies in the development and production of innovative reliable process measuring technology. With modern factories world wide, KROHNE is delivering a large number of instruments to system builders and plants. The world wide network of KROHNE is dedicated to industrial applications and instrumentation.

Focused on quality

KROHNE is focusing on technology, innovation, application and reliability. The products for measuring flow and level are number one in many fields of instrumentation. Through the research and development centers in Germany and France, KROHNE is introducing innovation on a wide scale.

Calibration at KROHNE

KROHNE operates calibration stations, which serve as a model for dimensioning and accuracy. Comprehensive safety measures guarantee a measurement which is independent of external interface along with reliable protection of the operators.

KROHNE - Facts & Figures

Turnover: 273M. Euro [2007]
Number of employees: 2,439
Equity to assets ratio: 45,5%
The KROHNE Company is 100% owned by the Radermacher-Dubbick family.

14 production facilities in 10 countries, 41 KROHNE-owned companies and Joint Ventures as well as 45 exclusive representatives.

Current as of: December 2007
After-sales Service

To support you and your operations, our world wide network of service stations is trimmed to provide you high quality and right support at any time. Our first priority is always to try to solve problems remotely, guiding your own crew. Should our attendance be necessary, we are only a call away. We have spares available world wide.

Customer satisfaction is our priority number one

The enhanced quality measures that have been put in place, will ensure that you will not be left alone. Our team of service engineers receives regular training, both in the newest technology and sailing installations. By contacting KROHNE Skarpenord, we ensure you that our skilled engineers and application technicians will follow any case until a successful result has been achieved.

support@krohne.no

Upgrades

KROHNE Skarpenord has supplied level gauging products for 30 years and we take pride in maintaining our installations onboard for the lifetime of your ship. At a certain point, an overhaul or exchange of old computers or electronics may be necessary. In such cases we can offer tailored upgrading kits that will prolong the lifetime of the system, at a minimum cost.

Most of our CARGOMASTER® version 1 systems have been upgraded after 20 years of service and have got a new life. Now the ships are sailing with new top end electronics and monitoring computers, with original sensor installations kept as installed in tanks.
KROHNE Skarpenord’s marine world wide network of support
For more information and offers/quotes, do not hesitate to contact us:

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