

## World leading in sensor technology

KROHNE Skarpenord has for more than 25 years worked closely with our sensor manufacturers, for development of sensor technology. We have about 30000 level sensors (radar and pressure sensors) in service on ships world wide.



### KROHNE BM 70MP level radar

Reliable, accurate and stand alone radar for marine applications.



### P-105 pressure sensor

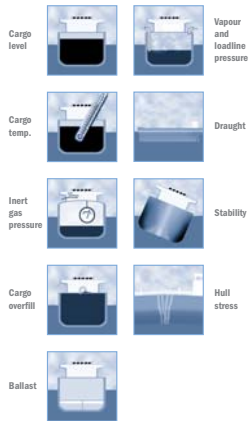
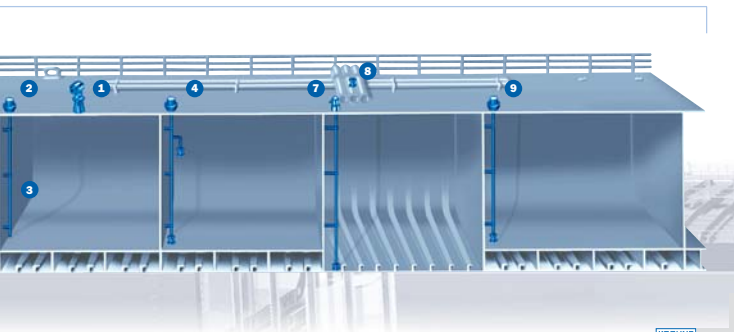
With integrated temperature measurement. Exclusively made for the CARGOMASTER®



### P-130 pressure sensor

For ballast, fuel, service, and draught measurement. Exclusively made for the CARGOMASTER®

### Hazardous area



## KROHNE offers you complete capability



With manufacturing facilities and sales offices strategically located in all major industrial markets, KROHNE is ideally placed to provide both front line and after sales service and support for end-users and contractors alike.



KROHNE is one of the very few manufacturers who can offer a comprehensive range of level and flow products ensuring that the right solution is available for each application.



The KROHNE range includes the following products and technologies:

- Flowmeters: Electromagnetic, Ultrasonic, Vortex, Variable Area
- Mass Meters: Density/concentration Coriolls
- Flow Switches: Moving Vane and Electromagnetic
- Level Gauges: Radar (Microwave & TDR) & Float
- Level Switches: Capacitance and Vibrating Probe
- Communications: HART®, FF, PROFIBUS, MODBUS, PDM and AMS
- Pressure, temperature, conductivity

For more information visit our websites:

[www.KROHNE-skarpenord.com](http://www.KROHNE-skarpenord.com)

[www.KROHNE-marine.com](http://www.KROHNE-marine.com)

[www.KROHNE.com](http://www.KROHNE.com)

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## CARGOMASTER®

The all-in-one system for tank monitoring



The All-in-one system comprises:  
A highly developed Windows 2000 system •

Cargo monitoring:

- Precision Radar Level Gauging
- Stand alone level radar units - redundancy
- Local display of ullage
- Temperature and IGP monitoring and alarm

Ballast, fuel and FW tanks:

- Titanium level sensors with high accuracy
- Draught measurement, cargo manifold pressure •



The all-in-one system for tank monitoring

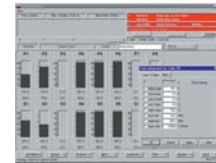
**CARGOMASTER® version 5 – Windows 2000**

KROHNE Skarpenord, Langesund has delivered equipment for marine applications since 1959. The worlds first computerised level gauging system, the CARGOMASTER® was introduced in 1979, and has been installed on more than 450 ships world wide. The 5th version of the system summarise all our experience for the last 20 years, for all types of tanker ships.

**Knowledge and experience**

The CARGOMASTER® modular arrangement is flexible to suit any size and type of ship. Our engineers work closely with our customers in finding the ideal solution and configuration for each project. Our knowhow secures quality and keeps prices and service costs at a minimum. We have extensive retrofit experience, and may offer complete turnkey solutions for all applications.

**Bar graphs** gives the easiest overall information during loading and discharge.



**Integrated loading computer** program offers numeric as well as graphical presentation for the ships strength and stability. As it is working on-line during cargo and ballast operations, it offers alarming if danger occurs.

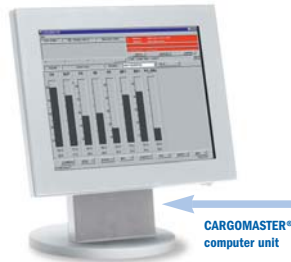


**Value table** presents all known values for tanks. This picture is also used for planning purposes with the integrated loading computer software.



**Signal control unit**

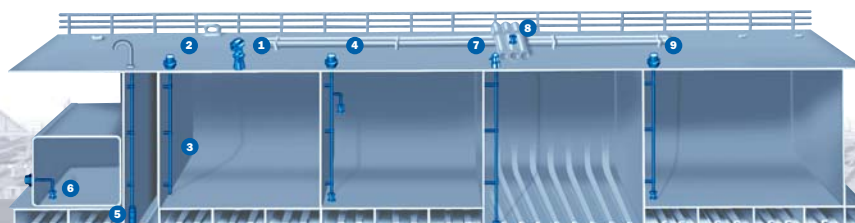
- 1 Cargo level
- 2 IGP
- 3 Cargo temperature
- 4 Cargo IGP level/temp.
- 5 Draught measurement
- 6 Misc.tanks level/temp.
- 7 Ballast level
- 8 Cargo manifold pressure
- 9 Fuel Tank level/temp.



Safe area

Hazardous area

- Chemical tankers
- Product tankers
- Crude tankers
- FPSOs
- Barges
- Gas carriers



**Benefits and functions**

**Windows 2000 software**

To give the customer multiple configuration options, the CARGOMASTER® v.5 runs on Windows PCs. Depending on demands, we offer several cost steps for hardware up to the most sophisticated marine PC. The standardisation on Windows makes service easier.

**Network and integration**

CARGOMASTER® work stations can be networked for full redundancy or distributed use. In addition we offer terminal stations for distribution of information. Integration to ships automation systems or stand-alone loading computer systems are obtained over serial links. We are integrating to most of the major suppliers.

**Level Radar Technology**

Our Marine Precision Level radar, the BM 70MP has important features not found amongst competitors:

- Stand alone unit technology:  
Level Radar units calculates correct ullage/level locally before transmitting to main computer system. This means added safety, as a general breakdown on main computer is not interfering with the local ullage presentation.
- Local ullage/level reading:  
A backlit LCD display is standard on all BM 70MPs. Ullage will always be presented locally as long as the unit has 24VDC supply.
- Closed service:  
The radar unit (including antenna) is totally sealed from the tank contents by a special glass/teflon sealing. Service on the unit can be performed without letting vapours out.
- Closed cleaning:  
A highly effective cleaning function is included, for closed cleaning of radar antenna.

For special cargoes, a pressure sensor system can be installed alternatively to a radar system, with even more adaptivity to the cargo.

**Hybrid solutions**

For tanks with mechanical obstructions and difficult shapes disturbing the radar beam, KROHNE Skarpenord has successfully installed hybrid solutions combining radar and pressure sensor technology.

**SOLAS II reg. 59 – IGP monitoring**

Standard in the CARGOMASTER® is inert gas pressure monitoring and alarm. This fulfills the requirements for a separate system.

**Functions**

- Ullage / level
- Volume
- Weight
- Temperature
- Pressure
- Cargo density
- Trim / list
- Empty tank detection
- Load / discharge rate
- Finish time
- Hull stress / stability
- Alarms
- Draught

**Technical data**

**Approvals**

Ex EEx ia IIC-T6  
Type approval DNV, ABS, LR, GL, BV, CCS, NKK

**KROHNE BM 70MP Level Radar**

Ex EEx de - IIC, T1...T6, Zone 0, 1, 2  
Local readout of ullage/level  
Radar principle modulated FMCW (frequency continuous wave) 10 GHz  
Typical accuracy +/- 2 mm

**P-105 Transducer**

Principle of measurement Absolute pressure  
Pressure element Strain gauge, Wheatstone bridge  
Sensor material Inconel 825 / Incoloy 625  
Typical accuracy +/- 0,03% FRO

