
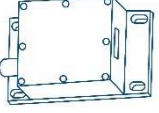

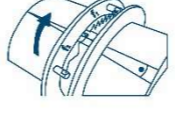




# COMPONENTS MATRIX

Groups Devices	Signals	Supported Protocols and Signal Types	Maker / Partner
<b>Nautical</b>			
ECDIS / VDR / Autopilot	All available standard NMEA 0183 - sentences	<ul style="list-style-type: none"> <li>Serial RS485/422 NMEA 0183:                             <ul style="list-style-type: none"> <li>IEC61162-1 (4800bps)</li> <li>IEC61162-2 (38400bps)</li> </ul> </li> <li>Ethernet / LAN 10/100 Mbit:                             <ul style="list-style-type: none"> <li>IEC61162-450</li> <li>UDP</li> </ul> </li> </ul> Necessary NMEA buffer or multiplexer for NMEA signal acquisition will be supplied.	Furuno • Transas • Kongsberg • Raytheon • Consilium • Raymarine • Sam Electronics • Saab • Sperry Marine • Veinland • Transas • SAM Electronics • JRC • ChartWorld • Wärtsilä • Yokogawa • Interschalt • DanElec • Tokimec
Speedlog	Speed Trough Water • Distance through Water (with SPM) • Slip through Water (with SPM)		
GPS 	GPS Position • Course Over Ground • Distance over Ground • Slip over Ground (with SPM)		
Echosounder	Water Depth / Keel Clearance		
Anemometer	Wind Direction Rel / True • Wind Speed Rel / True • Wind Speed Max		
Rudder Indicator	Rudder Angle • Rudder Angle Max • Rudder Activity	<ul style="list-style-type: none"> <li>NMEA or:                             <ul style="list-style-type: none"> <li>0/4-20mA</li> <li>0-10V</li> <li>+/-10V, +/-12V, +/-15V</li> <li>Syncro</li> </ul> </li> </ul>	
Motion Sensor 	Roll Angle • Roll Period • List Angle • Accelerations X,Y,Z • Pitch Angle • Pitch Period • Trim Angle • Dynamic Trim (with Draught Sensors) • Period Ratio	<ul style="list-style-type: none"> <li>UDP, NMEA serial protocol</li> </ul>	<b>Hoppe Marine (HOSIM 2)</b>
Electronic Inclinometer 	Roll Angle (max) • Roll Period • List Angle • Pitch Angle (max) • Pitch Period • Trim Angle • Comfort Level		<b>Hoppe Marine</b>

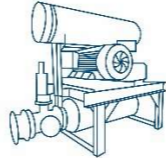
# COMPONENTS MATRIX

<b>Performance Monitoring Sensors</b>			
Shaft Power Meter (SPM) 	Shaft Power • Shaft Speed • Shaft Torque • Shaft Energy Counter • Main Engine Power • Main Engine Speed • Main Engine Torque • Main Engine Energy Counter • Main Engine Running Hour Counter • Main Engine Load • Main Engine Light Run • Main Engine SFOC (with Flowmeter)	<ul style="list-style-type: none"> <li>RS485/422 (Modbus or NMEA)</li> <li>Ethernet (Modbus TCP or NMEA UDP)</li> <li>0/4...20mA</li> <li>0-10V</li> <li>Pulse</li> </ul>	<b>Hoppe Marine • MAIHAK • Kyma • Lemag / Chris Marine • Brolich • Datum • Kongsberg • Means • VAF • Trelleborg • BMT</b>
Flowmeter (Volumetric + Massflow) 	Volume Flow • Mass Flow • Density • Temperatur • Counter	<ul style="list-style-type: none"> <li>RS485/422 (Modbus)</li> <li>Ethernet (Modbus TCP)</li> <li>0/4...20mA</li> <li>0-10V</li> <li>Pulse</li> </ul>	<b>Hoppe Marine • Endress+Hauser • Krohne • Kral • Emerson • Aquametro • VAF • SAAKE • Tricor / KEM • GEA • Alfa Laval • ABB • Nitto Seiko • Tokico</b>
Autoflushing Filter	Flushing volume counter • Flushing counter	<ul style="list-style-type: none"> <li>Pulse</li> </ul>	<b>Boll &amp; Kirch</b>
<b>Tank Content / Draft Measurement</b>			
Draft Measurement 	Draft FWD, AFT, MID • Draft PP • Dynamic Draft (with Motion Sensors)	<ul style="list-style-type: none"> <li>Modbus TCP / IP • OPC UA • RS422/RS485</li> </ul>	<b>Hoppe Marine</b>
Tank Content Measurement	Tank Volume • Tank Mass • Tank Filling Height • Tank Density	<ul style="list-style-type: none"> <li>Modbus TCP / IP • 4-20mA • RS422/RS485</li> </ul>	<b>Pleiger • Panasia • Musasino • Hamla</b>

# COMPONENTS MATRIX

Groups Devices	Signals	Supported Protocols and Signal Types	Maker / Partner
<b>Performance Monitoring - Devices and aggregates (Processed signals and KPIs)</b>			
Main Engine Fuel Consumption	Main Engine Fuel Consumption (volumetric + mass) • Fuel Density • Fuel Temperature • Fuel Heating Value Management • Fuel Grade Detection • Fuel Counter Daily / Total • Fuel Counter by Grade • Main Engine SFOC (with Shaft Power Meter)	<ul style="list-style-type: none"> <li>RS485/422 (Modbus)</li> <li>Ethernet (Modus TCP)</li> <li>OPC UA</li> <li>0/4...20mA</li> <li>0-10V</li> <li>Pulse</li> </ul>	Hoppe Marine • Endress+Hauser • Krohne • Kral • Emerson • Aquametro • VAF • SAAKE • Tricor / KEM • GEA • Alfa Laval • ABB • Nitto Seiko • Tokico
Main Engine Cyl. Oil Consumption	Cyl. Oil Consumption • TBN Management and Counter		
Auxiliary Engine Consumption	Aux Engine Fuel Consumption • Fuel Density • Fuel Temperature • Fuel Heating Value Management • Fuel Grade Detection • Fuel Counter Daily / Total • Fuel Counter by Grade		
Auxiliary Boiler Consumption	Aux Boiler Fuel Consumption • Fuel Density • Fuel Temperature • Fuel Heating Value Management • Fuel Grade Detection • Fuel Counter Daily / Total • Fuel Counter by Grade • Aux Boiler Running Hours		
Auxiliary Engine Power	Aux Engine Power • Aux Engine Load • Aux Engine Running Hours • Aux Engine SFOC (with Flowmeter)	<ul style="list-style-type: none"> <li>RS485/422 (Modbus)</li> <li>Ethernet (Modus TCP)</li> <li>OPC UA</li> <li>0/4...20mA</li> <li>0-10V</li> <li>Pulse</li> <li>By Rogowski Coil</li> </ul>	Schneider • Deif • Himap • Praxis • Phoenix Contact • Kongsberg • Aconis • Samsung • Siemens • Valmet • ABB • Terasaki • Hyundai • Eekels
Scrubber	Signal acquisition upon request	<ul style="list-style-type: none"> <li>RS485/422 (Modbus)</li> <li>Ethernet (Modus TCP)</li> <li>OPC UA</li> </ul>	Aalborg • EcoSpray • Bilfinger

# COMPONENTS MATRIX

<b>Electrical Consumer</b>			
Main Switchboard	Main Consumer Power • Main Consumer Energy Counter •	<ul style="list-style-type: none"> <li>RS485/422 (Modbus)</li> <li>Ethernet (Modus TCP)</li> <li>0/4...20mA</li> <li>0-10V</li> <li>Pulse</li> <li>By Rogowski Coil</li> </ul>	Schneider • Deif • Himap • Praxis • Phoenix Contact • Kongsberg • Aconis • Samsung • Siemens • Valmet • ABB • Terasaki • Hyundai • Eekels
Reefer Consumption Monitoring			
Pumps			
Cargo Hold / Engine Room Fans			
Ballast Water Treatment Unit	<i>TBD with Stefan Seidel / Ralf Groth</i>		
<b>On Board Data Collector Monitoring Systems / MlOT - Additional Sensors</b>			
Alarm Monitoring System (AMS)	Signal acquisition upon request acc. providers tag list.	<ul style="list-style-type: none"> <li>RS485/422 (Modbus)</li> <li>Ethernet (Modus TCP)</li> <li>OPC UA</li> <li>0/4...20mA</li> <li>0-10V</li> </ul>	Kongsberg • Aconis • SIEMENS • ABB • Terasaki • Valmet • Lyngsø Marine • Eekels
PMO Makers	Signal acquisition upon request acc. providers tag list.	<ul style="list-style-type: none"> <li>RS485/422 (Modbus or NMEA)</li> <li>Ethernet (Modus TCP or NMEA UDP)</li> <li>OPC UA</li> <li>0/4...20mA</li> <li>0-10V</li> </ul>	
Loading Computer	General stability information		Navis
ME Diagnostic Tools			

