



Performance Monitoring System

Get total insight into your ship's performance with real-time performance monitoring

MARINE

www.insatechmarine.com

A valid baseline for performance optimisation



Insatech – taking the guesswork out of it!
Get an overview of your vessel performance and improve it
Don't use guess work when you can act on knowledge



Want to stay competitive in a tough market? “Pick the low hanging fruits” and increase your competitive advantage by improving performance and efficiency on your vessels.

	<p>Introduction</p> <p>An increase in environmental regulations, fluctuating bunker prices, and increased competition, means smaller profit margins in the shipping industry, So stay competitive by focusing on performance and efficiency optimisation. Fuel costs constitute a major part of a vessel's operating costs, so maximize insight with the Performance Monitoring System.</p>	4
	<p>How It Works</p> <p>The system is based on high accuracy, multiple measurements such as fuel consumption, shaft power, and generator output. The data is collected, stored, displayed and distributed automatically and can be used for performance monitoring of the vessel, both real-time and historical, as well as implementing the most effective optimisation projects.</p>	6
	<p>Operation</p> <p>Data is displayed on a touch screen providing you with an easy overview of your vessel's performance. The Performance Monitoring System is fully automated and does not need hands-on operation.</p>	8
	<p>Performance Monitoring in Detail</p> <p>Get an overview of the performance system, the instruments it contains and the signals it uses, as well as our modular performance concept made to suit your current and future measurement and management needs.</p>	12
	<p>Installation</p> <p>The system is delivered fully calibrated. During a typical installation the vessel's crew can install the equipment under the guidance of Insatech Marine technicians to ensure correct placement and connection.</p>	16
	<p>Service and Support</p> <p>The Performance Monitoring System does not have any moving parts and therefore the need for active maintenance is minimal. However should problems arise Insatech Marine technicians are ready to perform both scheduled and un-scheduled service and repair at your preferred location.</p>	19
	<p>Contacts World Wide</p> <p>Insatech Marine has a broad and international agent network, spanning from Finland to India. We want to serve you the best possible way, and our agents are ready to receive your inquiries and questions. Find your local representative to learn more about our solutions or go to www.insatechmarine.com</p>	22



Introduction



Continuously increasing the operational efficiency in shipping is a condition for staying in business. Increasing crew awareness and knowledge of accurate fuel consumption is key to getting the most out of improvement projects and new procedures. Data driven decision making in real-time is the cornerstone of securing the added profit when optimising the operation.

A valid baseline is key to performance optimisation and decision making

Performance monitoring systems will be an integrated part of (most) ship systems within the foreseeable future, because the decision-making process is made easier and more tangible when based on real-time ship data, as opposed to manually gathered data (noon-reports) and hard-to-transfer experiences of chiefs on board.

Because no performance system is better than the data it is based on, our system uses data gathered from different consumers. The system provides a valuable and efficient monitoring tool for crew on board and shore. It provides the operator with real-time indications of the vessel's immediate fuel efficiency and consumption in an environment with ever-changing dynamics. As the crew



We secure your measurement accuracy and operational efficiency – with more than 400 installations world wide.

start to understand how internal and external factors affect the vessel's fuel consumption the most cost-effective optimisation projects can be implemented and your competitive advantage maximized. The crew has a tool to accomplish their primary task; to optimize the efficiency of the ship and thereby the added profit. The crew now have the necessary information to take action, when sailing conditions or routes change.

The Performance Monitoring System is a further development of the Fuel Consumption System, which mainly consists of flow meter data. The additional data input for the performance system are: Torque, speed and power from generators. Furthermore the system is able to draw and log existing NMEA signals, e.g. GPS, anemometer, gyro and echo sounder.

Comply with SEEMP and ensure continuous improvement

Under the proposed amendments to MARPOL Annex VI, Regulation 22, all ships must have an International Energy Efficiency Certificate (IEEC), which requires the presence of a Ship Energy Efficiency Management Plan (SEEMP) on board. The SEEMP is a ship specific plan developed by the ship owner, operator or charterer; the objective is to improve the energy efficiency of a ship's operation. Using our Performance Monitoring System you can continuously log performance data, establish a valid baseline and have an easy-to-use management tool that minimizes the administrative burden on board related to the SEEMP. The system helps you evaluate vessels' performance as well as providing you with input to setting new SEEMP goals. This enables you to track the benefits of each of your initiatives.



How it works

The Performance Monitoring System allows deep insight into your vessel's performance. Use it to increase crew awareness, reduce consumption, trending, maintenance and planning. It works by gathering consumer signals and displaying real-time data on the bridge, in the engine control room or headquarters, for your organisation's benefit.

Direct measurement of fuel efficiency

By installing one or more mass flow meters, depending on engine supply line layout and desired insight, fuel consumption can be monitored closely in real-time. The main principle is to measure the flow of fuel before and after the engine and/or generators. When you combine the consumption data with measurements of actual speed and position (based on speed log and GPS signals) you are able to directly measure the fuel efficiency. If you require more detailed readings, additional flow meters can be installed. Combine our system with on board data from a propeller shaft torque meter, speed log, anemometer, gyro, motion sensor and power meters on generators, and get for instance KPI's (Key Performance Indicators) for engine and hull performance calculated and visualized.

- Fuel Consumption [ton/hour]
- Specific Fuel Oil Consumption (SFOC) [g/kWh]
- Slip [%]
- Fuel Oil per Nautical Mile [kg/Nm]
- Speed [Knots]
- Shaft Power [kW]
- Shaft Rotation [rpm]
- Torque [kN]
- Weather Influences

Easy access to measured data

The measurements from the Performance Monitoring System will be sent through Modbus signals to a collecting and processing cabinet, where the performance data will be calculated, logged and displayed on a touch screen.

Getting the data to headquarters requires the data link option. It consists of two databases: One on board the ship and one at headquarters. Data will be sent at the frequency chosen between the two databases. If the ship does not have an internet connection for a time, data will merely be stored and sent home once the connection is re-established.

Make the data work for you

Once the data is acquired and displayed, use it to:

- Optimise operational efficiency by testing your trim tool
- Implement and maintain your SEEMP
- Create KPI's for each voyage
- Evaluate improvement projects before fleet roll out
- Monitor the ship's consumption trend over time to improve your maintenance planning

And most importantly let the crew get data insight to increase crew awareness as well as improving knowledge of operational performance.

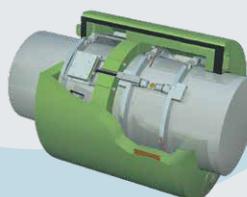
Below shown some of the main components of the performance system are shown. All instrument signals are collected centrally in the control cabinet, where data processing is carried out. Most data can be collected, and we are able to use already installed instruments (to the extent it is possible).



Coriolis mass flow meter



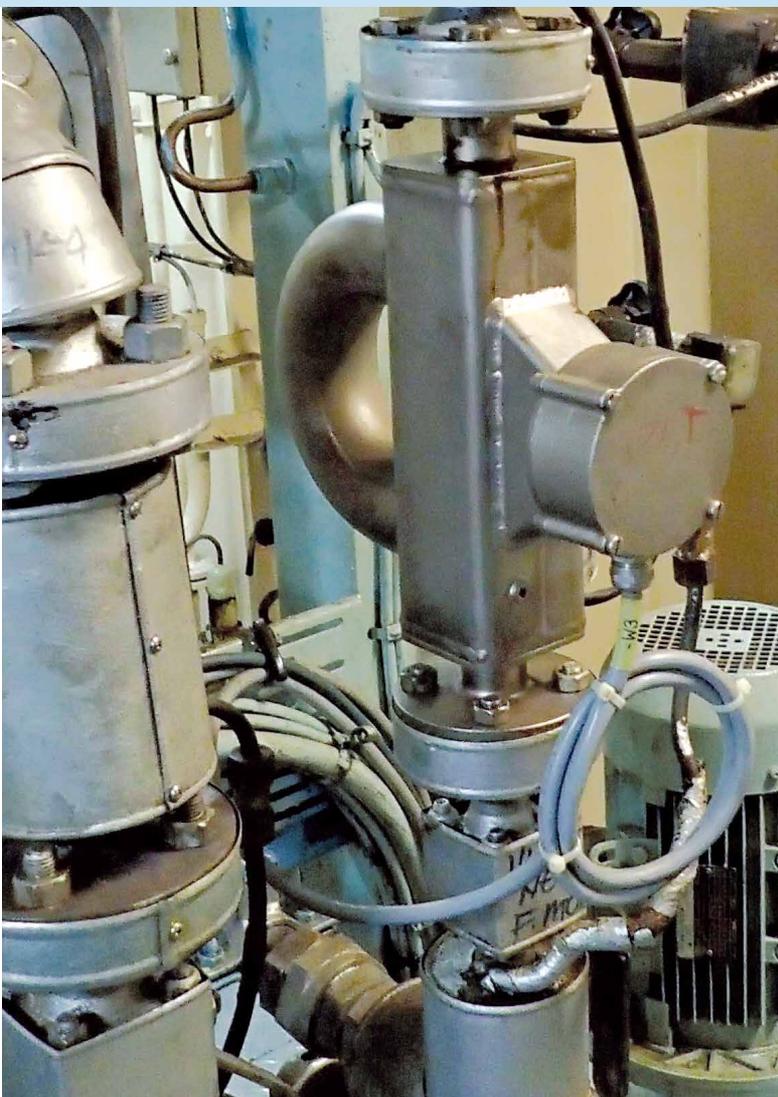
Bypass



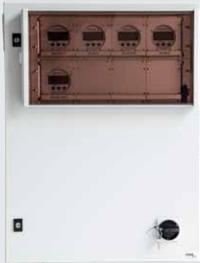
Torque & thrust meter



Power & energy meter



Wind sensor anemometer



Control cabinet



Accelerometer motion detector



Display panel

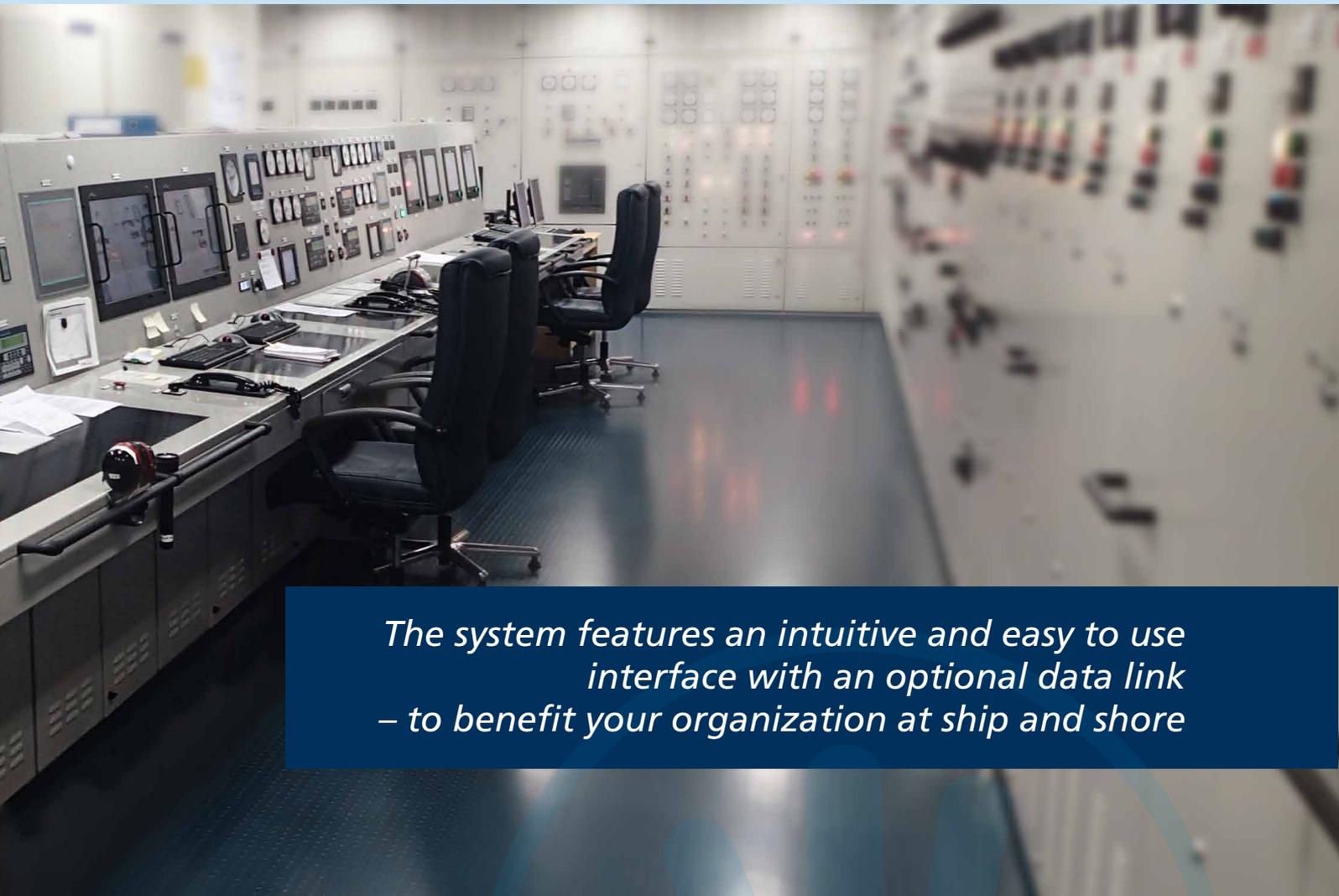
Operation



The Performance Monitoring System is fully automated and requires little attention after initial set up. The operator panel displaying the measured data can be customized to show your desired data.

Spending less time operating equipment or reading manuals, means more time for improving the current operational status of the vessel. Therefore the Performance Monitoring System draws all the signals from instruments to a central processing station, the control cabinet. Here the data is used to calculate the vessel's real-time performance. This is presented as KPI's such as Specific Fuel Oil Consumption (SFOC) and kg of fuel per nautical mile (kg/Nm).

There are several advantages to real-time data and KPI's as opposed to noon reports and manual readings. The KPI's give the crew an insight into the ship's performance that can help them sail the vessel more efficiently. This will in turn make your fleet more competitive, helping you win orders and save money. The automation of data collection will ensure that you get better data quality as well as quantity. Instead of data once a day you will get data once a minute.



The system features an intuitive and easy to use interface with an optional data link – to benefit your organization at ship and shore

This data can help you gain insight into how the vessel is being sailed right now, as well as being used to educate the crew on how to sail more efficiently. The automation will also free up crew time for other more important tasks.

Determine the influence of weather

With the motion sensor installed it is possible to determine the influences of weather on the ship. This is done by determining the state of the weather (wind and waves) for a limited period of time after the installation and manually inputting it into the system. Afterwards it will be possible to use the gathered data to calculate the ship's performance under different weather conditions.

Decision making tool on board

When the crew has the information available at all times, it allows them to view the immediate consequences of any actions taken and how it affects the vessel's overall performance.

Using the KPI's as main indicators of the vessel's performance means that any change in conditions or operation affecting performance, will result in KPI changes.

As all readings are available centrally, running conditions of monitored vessel components can be checked right away. Troubleshooting as well as corrective and optimising actions can be identified a lot easier compared to manual visual inspections, and potentially lead to savings in fuel and crew resources.



Operation of interface



Get an easy overview or detailed readings of your vessel performance immediately.



Vessel performance

The operator interface is designed to be easy to use. The main screen will immediately show the relevant information regarding current vessel performance such as consumption of the main engine, consumption per nautical mile, propeller slip etc. The user will also be able to see the development over time via the chart.



Engine performance

The *Engine performance* screen shows information about the specific fuel oil consumption of the main engines as well as shaft power in kW and %. The data is logged and shown in the chart below in order to give a historical insight into the engine performance.



Torque meter

In *Details* you can see an overview of the torque meter data such as power in kW, total power in MWh, RPM, total revolutions as well as torque in kNm. All the data are plotted on a chart in order to show the development over time.



Detailed fuel overview

In *Details* you will also find the *Detailed fuel overview* which shows the daily, actual and total consumption of each consumer, for example Main Engine(s), Auxiliary Engines and Boilers. Furthermore the view also shows the raw values from the flow meters such as mass flow, volume flow, density and temperature for both inlet and outlet.



Navigation data

The navigational data includes GPS coordinates, true course and speed, wind direction and wind speed, true heading and rate of turn, under keel clearance, rudder position and movement as well as draft signals.



Service parameters

The *Service parameters* displays raw data for each flow meter related to consumers. It shows the main menu data and provides the possibility for a manual totalizer. From here the alarm status screens are set up.

Performance Monitoring in Detail



The Performance Monitoring System is able to collect and store data from various instruments. You can choose to collect all your data or just some of it, depending on your preferences or requirements. Some of the data might already be available like GPS or Wind, and some may be purchased with the system like consumption, torque and thrust etc.



Data collected by the system

Bridge

- 
GPS
 Position and Speed Over Ground (SOG).
- 
Anemometer
 Wind speed and direction, Relative wind speed and direction.
- 
Speed Log
 Speed Through Water (STW).
- 
Gyro
 True Heading.
- 
Panel
 Shows all the data both collected and calculated. Can be installed in engine room, engine control room and bridge.
- 
Draft
 Draft signals.
- 
Echo Sounder
 Depth and under Keel Clearance.
- 
Rudder
 Movement and angle.
- 
Propeller
 Pitch.

Engine Control Room

- 
Ethernet
 In order to send data to shore the system needs access to the internet.
- 
Power Meter
 Power output data from the auxiliary engines, kW, current and cos phi.
- 
Motion Sensor
 Measures weather influences.

Engine Room

- 
Torque and Thrust
 Torque or Torque and Thrust measurements, as well as RPM and power.
- 
Flow Meter
 Consumption (Main Engines, Auxiliary Engines and Boilers).
- 
Cabinet
 The cabinet functions as a central processing station which takes in signals as well as saving them to the internal database.



The performance concept

On board

3. Act



Performance Management System

- Same as Performance Monitoring System
- PLUS** Management tool
- PLUS** Data based predictions / help
- PLUS** Data entry for Voyage Numbering, Destinations, Anchoring, Mooring, Cargo and more...

2. Learn



This is the system featured in this brochure.

Performance Monitoring System

- Same as Fuel Consumption System
- PLUS** Signals for Wind, Depth, Torque, Thrust, Draft, Rudder, Propeller, Motion Sensor and more...
- PLUS** Databases and Data Link

1. Measure



Fuel Consumption System

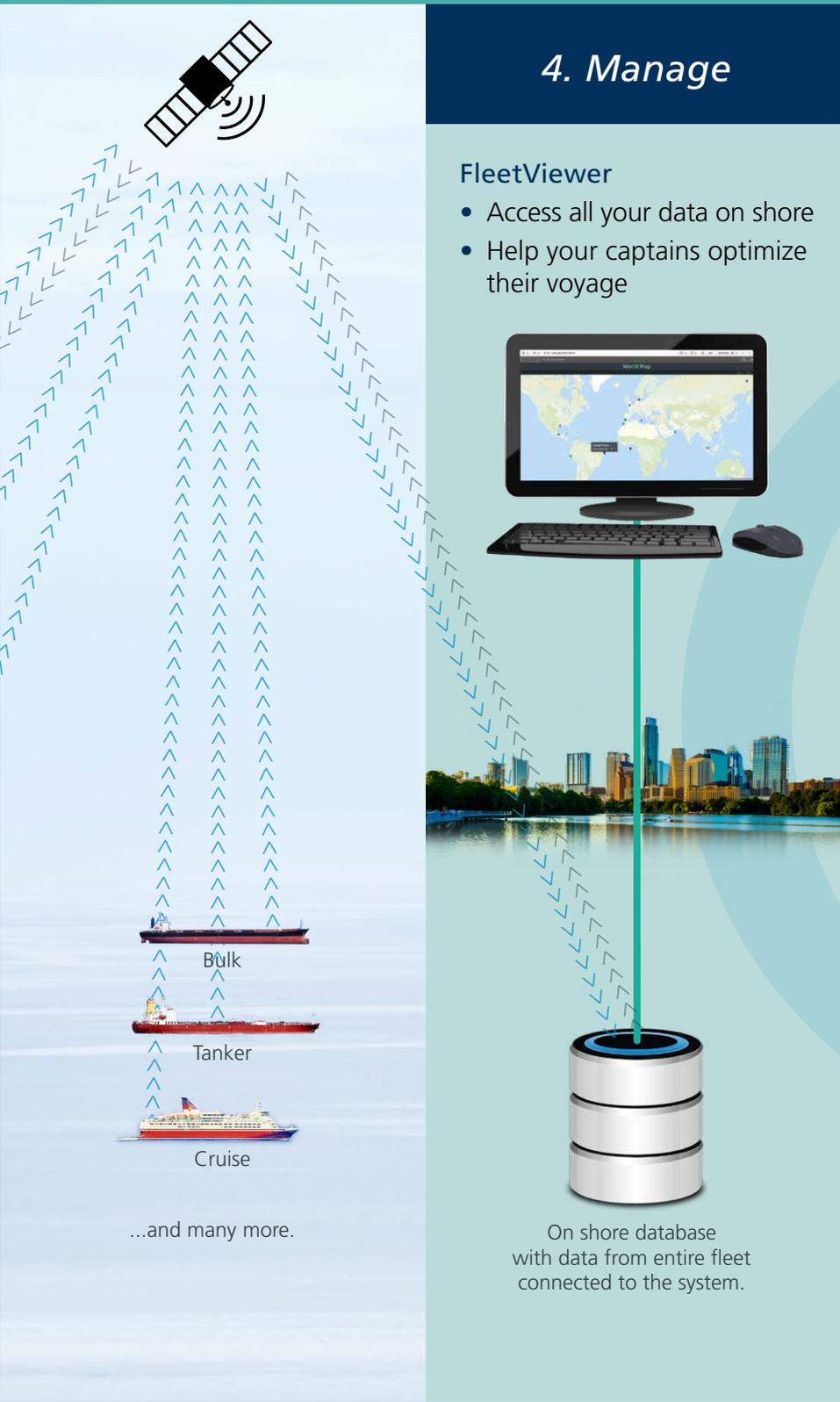
- Real-time fuel measurement
- Data saved locally on memory card
- Optional database and Data Link

On board computer with database containing ship data.



Data Link

On shore



4. Manage

FleetViewer

- Access all your data on shore
- Help your captains optimize their voyage



On shore database with data from entire fleet connected to the system.

Our modular performance concept

Build your performance systems according to your company's needs – upgrade gradually.

1. Fuel Consumption System

The entry model to the performance concept. Start with basic measuring and get knowledge of your fuel consumption.

2. Performance Monitoring System

Get more sophisticated insight into your vessel's performance by adding bridge and engine room data to the system.

3. Performance Management System

Ease management decision making on board by getting performance predictions based on current data, weather and next voyage.

4. FleetViewer

Get the complete overview of your fleet's performance and consumption, and use it to optimize in large scale.

Data Link

The database on board sends data to shore. In case of no connection, the accumulated data will be sent when back online.



Installation setup



As different owners, charterers and operators have different requirements and needs, Insatech Marine's Performance Monitoring System is designed in just as many variations; according to the required properties. The setup is customised according to the level of insight you require.

Coriolis flow meter RCCS34

Flow	MGO	HFO
Circulated Flow Min.	0,275 m ³ /h	0,21 m ³ /h
Circulated Flow Max.	2,750 m ³ /h	2,10 m ³ /h
Consumption Min.	0,092 m ³ /h	0,07 m ³ /h
Consumption Max.	0,920 m ³ /h	0,70 m ³ /h

Coriolis flow meter RCCS36

Flow	MGO	HFO
Circulated Flow Min.	1,02 m ³ /h	0,820 m ³ /h
Circulated Flow Max.	10,20 m ³ /h	8,20 m ³ /h
Consumption Min.	0,34 m ³ /h	0,273 m ³ /h
Consumption Max.	3,40 m ³ /h	2,730 m ³ /h

Coriolis flow meter RCCS38

Flow	MGO	HFO
Circulated Flow Min.	3,0 m ³ /h	2,73 m ³ /h
Circulated Flow Max.	30,0 m ³ /h	27,30 m ³ /h
Consumption Min.	1,0 m ³ /h	0,91 m ³ /h
Consumption Max.	10,0 m ³ /h	9,10 m ³ /h

1-meter setup

The simplest way of measuring fuel consumption is by installing a single flow meter, which measures the fuel transferred from the fuel tank to the settling tank. The level of fuel in the settling tank is typically maintained by level sensors, and therefore the flow to the settling tank is equal to what is consumed.

3-meter setup

If a more detailed monitoring is desired, then a 3-meter setup can be introduced. With the 3-meter system, the total fuel consumption is monitored by flow from fuel tank to settling tank. A set of flow meters are installed on the common auxiliary fuel supply line and return line, will provide the total consumption measurement of the auxiliary engines. By subtraction, the main engine fuel consumption can be calculated. By splitting the main engine and the auxiliary engines, the crew on board as well as on shore has a much more detailed overview of how the consumers perform.

Full consumer insight

To gain full understanding of the fuel consumption, you measure on each consumer inlet and outlet. This will provide a complete insight into each consumer's fuel consumption, and any deviations from performance expectations or norms, can easily be pinpointed. This can potentially aid in preventative maintenance planning and better utilisation of auxiliary engines.

Your own setup

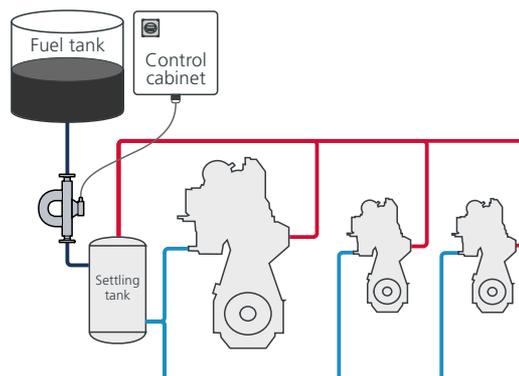
Insatech Marine is not restricted regarding setups. Therefore, if you have your own specific setup that you would prefer, we can accommodate a corresponding setup or install the system using existing flow meters. In such cases we will typically include an engine pre-inspection to ensure technical feasibility of the setup.



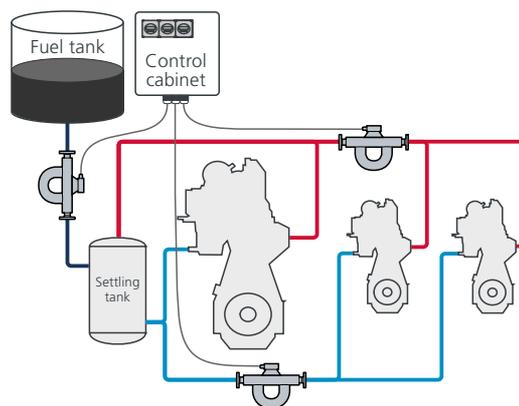
◀ **The flow ranges are calculated under the following conditions:**

HFO: 985 kg/m³, 12 cSt, 1 bar pressure loss at circulated max flow.
MGO: 895 kg/m³, 8 cSt, 1 bar pressure loss at circulated max flow.

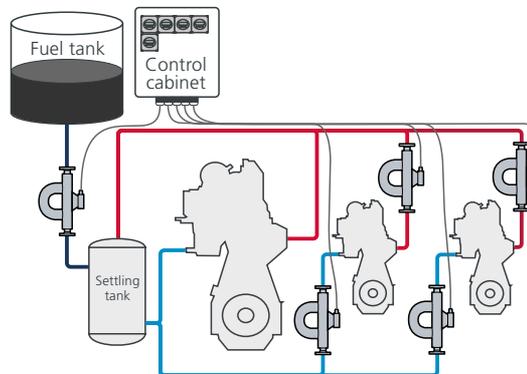
1-meter setup



3-meter setup



Full measurement setup



- Main supply line
- Feed line
- Return line
- Flow meter



Installation

The system installation does not inflict you with unnecessary costs, it will not alter your schedule or put your vessel out of service. Our experienced technicians install and commission the system while you are in service, whether at sea, in port or dry dock. We are ready to move out at your preferred destination and time.

Do it yourself – or let us install

The system is programmed, calibrated and has been initially setup by our technician to minimize installation time on board. The crew on board will in some cases be able to install the equipment under the guidance of Insatech Marine's technicians to ensure correct placement and electrical

installation. This minimizes costs and required man-hours, while ensuring maximum benefit of the system during use. However, we are also able to provide installation with commissioning, tests and training of the crew. We complete the installation at sea, in port or dry dock at your preference.

At sea



In port



In dry dock



*Turnkey solutions and installations;
at sea, in port or dry dock at your preference.*



Service maintenance and support



Our technicians are ready for service on board your vessel at all times.

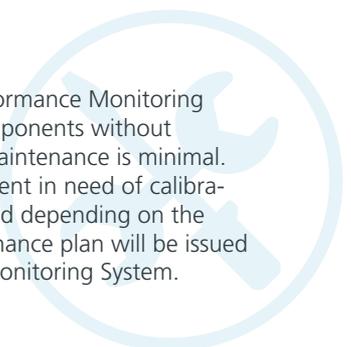
If you require a service agreement as part of the system our skilled technicians are ready to service your vessel at all times. While the system requires minimal maintenance an occasional calibration of equipment is recommended.

Service and support is readily accessible

To constantly get highly accurate measurements, your marine equipment must function optimally. This means it must be calibrated according to its purpose and therefore we provide service options, should the need arise. This is why Insatech Marine has our own technicians ready for service on board your vessel at all times, whether it is a planned service visit or a pressing and acute matter that needs immediate attention.

Minimal maintenance required

As the equipment used for the Performance Monitoring System is mostly constituted by components without moving parts, the need for active maintenance is minimal. Nonetheless there might be equipment in need of calibration or service from time to time, and depending on the specific setup, a service and maintenance plan will be issued with each individual Performance Monitoring System.



What we do



Contact us at
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or +45 5537 2095

Below is a short recap of our different solutions. Our performance concept can be entered at your preferred stage depending on the level of insight and sophistication wanted. We can also help you out with ODME and bunker systems. All systems can be delivered as turnkey solutions.

Fuel Consumption System

In addition to real-time fuel consumption the system enables logging of fuel consumption data. Historical views and over time, developed trend lines provide you with a better analysis of performance and effect of new initiatives. Furthermore, the Fuel Consumption System is ready for upgrade to a Performance Monitoring System and/or addition of an on board database synchronizing with another at headquarters.

Performance Management System

When fully developed it will become an upgraded version of the Performance Monitoring System and complete the on board management layer of the performance concept. It is decision making oriented and an open input based concept, where more factors are taken into account when evaluating the ships performance. All factors taken into the system are converted into KPI's. The crew will experience a tool that effectively allows them to contribute to a more cost effective operation.

Fleet Viewer

When fully developed it will become a system for visualizing and creating an overview of fleet performance. It enables

comparisons, voyage statistics, KPI generation via consumption, performance and maintenance planning. As such it is a tool for headquarters to plan, optimize and manage the fleet. The system is built on top of the Performance Monitoring System.

Bunker Management System

Is a Coriolis Mass Flow Meter-based Bunker Management System with a highly accurate and volume insensitive measurement of transferred bunker. The system ensures an efficient bunker operation and is a pro-active tool to ensure you get the amount of bunker you pay for.

ODME Systems/15 PPM Bilge alarm

By regulations under MARPOL, all vessels must be equipped with a system for Bilge Water Discharge Monitoring as well as Oil Discharge Monitoring and Control Equipment (ODME). Both systems monitor the oil content of ballast water discharged over board and control the discharge allowance based on whether the level of oil content is below the set limits.

A trustworthy and competent partner

Insatech Marine offers field-tested and proven solutions that meet international rules and regulations as well as helping you save money. We provide comprehensive installation, commissioning, training, service and maintenance to ensure you as little downtime as possible.

Insatech was established in 1989, and has since then grown to +70 employees. With more than 25 years of experience in the field of automation and instrumentation we are a strong partner for both our customers and suppliers. As a result of our longstanding partnerships with some of the world's leading manufacturers within instrumentation and automation, we are able to provide you with global service.

Our system users include:





Our international agent network

In order to provide the best possible customer support Insatech Marine works closely together with selected agents. This network of dedicated agents will help to ensure your positive experience with our systems and support functions. The agent network will be developed continuously to serve you locally wherever you may operate.

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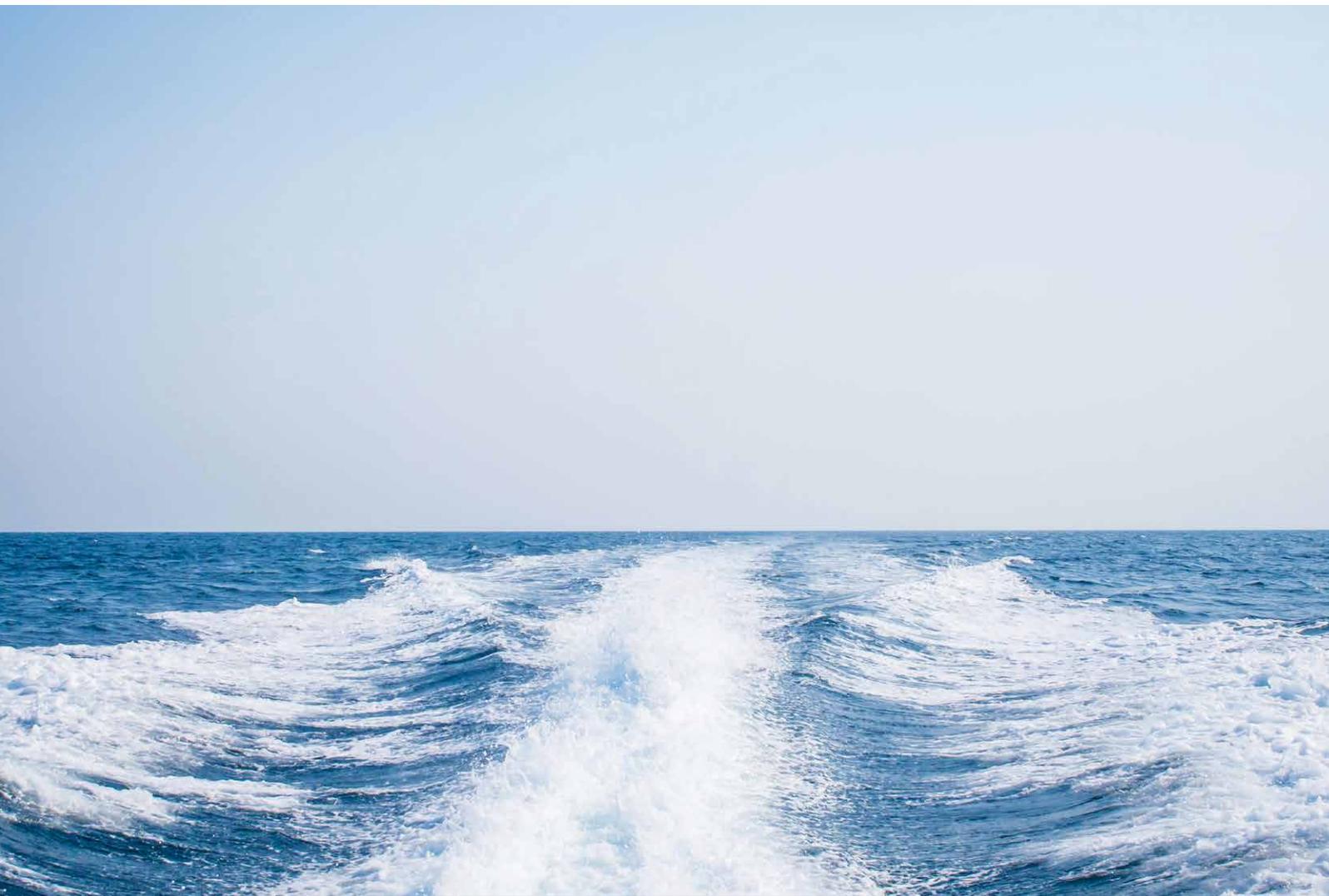
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Customer support at your preferred destination.





*Increase your competitive advantage
by reducing costs via
performance and efficiency
improvements on your vessels.*

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