FUEL MONITORING SYSTEM

Coriolis Mass Flow Meter based
Fuel Consumption Monitoring System

Taking the guesswork out of it!

www.insatechmarine.com
**FUEL EFFICIENCY IS KEY TO SAVING MONEY**

When you want to improve performance and efficiency start by "picking the low hanging fruits" by measuring general performance and efficiency of the vessel when transforming costly bunker fuel into propulsion. The Insatech Fuel Consumption System measures fuel consumption with high accuracy mass flow meters. By using dedicated data acquisition and processing systems, the fuel consumption can be monitored and compared with position and speed as well as historical data. The system is compatible with the Insatech Performance Management System ensuring an easy transition, should you at a later time choose to upgrade the Fuel Consumption System to our Performance Management System at a later point.

**Operation**
The fuel consumption measurements are displayed on a touch screen providing you with an easy overview. If you have chosen to measure the consumption of all generators you will be able to compare their consumption of each up against the others. The Fuel Monitoring System is fully automated and does not need hands-on operation.

**Installation**
The Fuel Monitoring System is delivered fully calibrated with most of the system setup in order to minimize installation time. During a typical installation the vessel’s crew will mount the equipment under the guidance of Insatech Marine technicians to ensure correct placement and electrical connection. Commissioning can be carried out by the ships technician, however Insatech Marine can also assist with commissioning and tests as well as crew training. The Fuel Monitoring System is ready made for upgrade to Performance Monitoring.

**Service and support**
The Fuel Monitoring System does not have any moving parts and therefore the need for active maintenance is minimal. However if problems should arise Insatech Marine technicians are ready to perform both scheduled and unscheduled service and repair.

**Contacts World Wide**
Insatech Marine has a broad and international agent network, from Cyprus 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 Insatech Marine's solutions.
Start by “picking the low hanging fruits”
Rising bunker prices, an increase in enforcement of environmental regulations, as well as smaller profit margins in the shipping industry have over the last couple of years made performance and efficiency two key themes within the maritime world. When you want to improve performance and efficiency start by “picking the low hanging fruits”. One of the easiest and most obvious places to start is by measuring general performance and efficiency of the vessel when transforming costly bunker fuel into propulsion. By measuring the fuel consumption with high accuracy mass flow meters and using dedicated data acquisition and processing systems, the fuel consumption can be monitored and compared with position and speed as well as historical data.

Fuel efficiency is key to saving money
Since fuel costs constitutes between 50% to 70% of a vessel’s operating costs, fuel efficiency is key to saving money. This is the same reason engine manufacturers, hull coating manufacturers and propeller designers are constantly trying to develop products with fuel saving properties. However, without monitoring fuel consumption, it is not possible to confirm the effect of implemented improvements. Furthermore, without fuel monitoring it is impossible to track and understand which factors are influencing the operational efficiency of the ship.

Real-time data is the foundation for decision-making
By implementing even the simplest Fuel Monitoring System from Insatech Marine, the operator will get live and real-time indications of the vessel’s immediate fuel efficiency. These indications provide the crew on board with data-based and accurate knowledge of the ship’s fuel consumption in an environment with ever-changing dynamics. When the crew understand how both on board and external influents affect the vessels fuel consumption, the most cost-effective optimisation projects can be implemented.

Detailed insight for land based operation
With the Fuel Monitoring System, it is possible to send extensive fuel consumption data to shore. By adding a database to the system, no data is lost, and developments in fuel consumption can be sent to Headquarters for deeper analysis. This can help the land based operations to identify fuel saving potential, but also help in proving the level of savings caused by executed efficiency projects. The result is better fuel utilisation and thereby savings.

Modular and scalable: step 1
If you intend to invest in performance monitoring systems and decision making tools on board, either at a later time or prefer integrating the system in small steps, the Fuel Monitoring System provides the ideal start, where future upgrades to the more extensive Performance Management System is fully prepared. You can read more about the Insatech Marine Performance Management System on www.insatechmarine.com.
Direct measurements of fuel efficiency
By installing one or more flow meters, depending on engine supply line layout and desired insight, the consumption can be monitored closely in real-time. The main principle is to measure the flow of fuel before the engine and/or generators and again after. When you combine the consumption data with measurements of actual speed and position (based on GPS signals) you are able to directly measure the fuel efficiency. Depending on how detailed readings you require, additional flow meters can be installed, for example one set of meters per consumer or one set for the ship’s entire consumption.

Measurement data is easy to access
The measurements from the Fuel Monitoring System will be sent through Modbus signals to either a screen or a collecting and processing cabinet, where the consumption will be calculated, displayed and logged. Furthermore, the resulting data can be sent to the ship’s own performance system or to a display on the bridge. The results of the readings can also be sent electronically to Head Quarters for further analysis.

“Future-proof” expandable and modular system
You only need to install the one system as the Fuel Monitoring System easily can be expanded. This makes it simple for you to expand the system, for example from one set of meters to a set per consumer. Furthermore, the system is compatible with the Insatech Performance Monitoring System ensuring easy transition should you choose to upgrade the Fuel Monitoring System to our Performance Monitoring System at a later point. The signals and readings from all instruments can be reused, and the upgrade can be done in cooperation with Insatech Marine without having to change large parts of the system.

<table>
<thead>
<tr>
<th>RCCS34 (DN25 PN40)</th>
<th>MGO</th>
<th>HFO</th>
</tr>
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<tbody>
<tr>
<td>Circulated Flow Min.</td>
<td>0,275 m³/h</td>
<td>0,21 m³/h</td>
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<td>Circulated Flow Max.</td>
<td>2,750 m³/h</td>
<td>2,10 m³/h</td>
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<td>Consumption Min.</td>
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<td>0,07 m³/h</td>
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<td>Consumption Max.</td>
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<td>Circulated Flow Min.</td>
<td>1,02 m³/h</td>
<td>0,82 m³/h</td>
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<tr>
<td>Circulated Flow Max.</td>
<td>10,20 m³/h</td>
<td>8,20 m³/h</td>
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<td>Consumption Min.</td>
<td>0,34 m³/h</td>
<td>0,273 m³/h</td>
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<tr>
<td>Consumption Max.</td>
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<td>2,730 m³/h</td>
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<th>RCCS38 (DN50 PN40)</th>
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<td>2,73 m³/h</td>
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<td>Circulated Flow Max.</td>
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<td>Consumption Min.</td>
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<td>0,91 m³/h</td>
</tr>
<tr>
<td>Consumption Max.</td>
<td>10,0 m³/h</td>
<td>9,10 m³/h</td>
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Measure the cost
As the cost of operating a vessel typically is within the range of 50% to 70% of the total OPEX, fuel consumption monitoring by Insatech Marine’s Fuel Monitoring System is an efficient way of getting an insight into how spendings are utilised on board. This measurement can be done in different ways with different levels of insight.

Mix tank supply measurement
The most simple way of measuring the fuel consumption, is by installing a single flow meter, which monitors the fuel transferred from the day tank to the mix tank. The level of fuel in the mix tank is typically maintained by level sensors, and therefore the flow to the mix tank is equal to what is consumed.

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

Full consumer insight
If a full understanding of the fuel consumption is wanted, then measuring on inlet and outlet of each consumer is a possibility. This will provide for complete insight into each consumers fuel consumption, and any deviations from expectations or norms in performance, can very easily be pinpointed. This can potientially aid in preventive maintenance planning and better utilisation of auxiliary engines.

Your own setup
Naturally, Insatech Marine is not restricted in any way to only install systems as described, and should you have your own specific setup that you would prefer, we can accomodate a corresponding setup.
A fully automated system

Insatech Marine’s Fuel Monitoring System is fully automated and does not require hands-on operation during normal conditions. The screen that displays the measured consumption has different options for data display, but otherwise needs little attention. Most of the setup is done at Insatech Marine’s facilities in Denmark, where our engineers and technicians will program the system and do an initial setup before shipment, all in order to minimize required time for installation on board.

System and data display matching your requirements

The data displayed depends on the system you choose to install, from the smallest system which simply shows the consumption over one or two consumers to the more extensive systems that display a large number of consumers. Common for all the systems are that they do not need any input or activation to run once they have been installed. If you have chosen the signal and data forwarding option, the system enables real-time monitoring on below deck in Engine Control Room and on the bridge, and data can be scrutinized at head quarters. Furthermore the system can be setup to automatically compile and send periodical reports.
THE MODULAR PERFORMANCE CONCEPT

Insatech Marine’s modular Maritime Performance Concept is a flexible and fully integratable system, starting with measurements of performance relevant factors and ending with a complete fleet overview with data mining possibilities from land-based operations. Each level can be customized to specific needs, and are constituted by measurements, data collection & logging, operational displays, on board advanced views, land based fleet data base and land based fleet comparison & data mining views.

ON BOARD FUEL MONITORING SYSTEM

ON BOARD PERFORMANCE MANAGEMENT SYSTEM

ON BOARD COMPUTER WITH DATABASE CONTAINING SHIP DATA

ON BOARD PERFORMANCE MONITORING SYSTEM

ON SHORE FLEET PERFORMANCE MANAGEMENT SYSTEM

ON SHORE DATABASE WITH DATA FROM ENTIRE FLEET CONNECTED TO THE SYSTEM

This is the system featured in this brochure
Service and support is readily accessible
The equipment you carry on board is no better than anything else if it is not working properly, is not calibrated according to its purpose or there is no service to get in case of any issues that needs being resolved. This is why Insatech Marine at all times has its own technicians ready for service on board your vessel, be it a planned service visit or a more 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 sensors and analysers that will need calibration or service from time to time, and depending on the specific setup, a service and maintenance plan will be issued with each individual Fuel Monitoring System.

Do it yourself - or let us install
If most of the required equipment is already installed, the crew on board will in some cases be able to mount the equipment under the guidance of Insatech Marine technicians for correct placement and electrical placement. This installation method helps minimize cost and required man-hours, while ensuring that the crew gets the maximum benefit of the system during use. However, Insatech Marine can also provide installation with commissioning, tests and training of the crew in the system’s functionality.

Insatech Marine provides you with turnkey solutions
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WHAT WE DO

Fuel Consumption System
The system works by installing high accuracy mass flow meters before and after consumers, for example the main engine and generators, giving an overview of instant fuel consumption and total fuel consumption over time. This information is a useful and money-saving tool used in the decision process on the bridge.

Fuel Monitoring System
The Fuel Monitoring System in addition to real-time fuel consumption display enables logging of fuel consumption data. Historical views and over time developed trend lines provides for better analysis of performance and effect of new initiatives. Furthermore, the Fuel Monitoring System is ready for upgrade to a Performance Monitoring System and/or addition of a database on board.

Performance Monitoring System
The system provides an overview of the ships performance based on direct on-line measurements. It is versatile and can be customized according to any measurements that you would like to monitor. Fuel consumption is measured with high accuracy mass flow meters, together with propeller shaft torque and rpm. For generators a power meter will be installed. This gives valuable information about fuel consumption, but also KPI values (Key Performance Indicator) as g/kWh & g/Nm.

Bunker Management System
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 where 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 over board discharged water from the bilge and the ballast tanks and controls the discharge allowance based on whether the level of oil content is below the set limits.

Cargo Management System
InsaCargo is a very flexible cargo and ballast management system which is ideal for retrofitting of either full or partial systems on board vessels. By using only known and proven suppliers with global service and marine experience and approvals, InsaCargo ensures very low down-time risk and high performance.

A TRUSTWORTHY & COMPETENT PARTNER

Insatech Marine offer 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, which ensure as little downtime as possible. Insatech was established in 1989 by Alan Christoffersen, and has since then it has grown to more than 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
In order to provide the best possible customer support, Insatech Marine work closely together with selected agents. This network of dedicated agents will help to ensure the best possible customer experience when new and existing customers require our support. This network of agents will be developed continuously to serve our customers locally wherever they operate.
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