FUEL CONSUMPTION SYSTEM
CORIOLIS MASS FLOW METER BASED
REAL-TIME FUEL CONSUMPTION MONITORING
Operation
Fully automated collection of data from flow meters and calculations of fuel consumption gives instant overview of the vessels consumers. Display is easy to read and is operated by touch screen, and the different display are easily prompted and navigated.

Installation
The Fuel Consumption 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.

Service and Support
The Fuel Consumption 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.

FUEL EFFICIENCY IS KEY TO SAVINGS

When you want to make performance and efficiency improvements, start by “picking the low hanging fruits”. One of these “low hanging fruits” is measuring the vessel’s general performance and efficiency when transforming costly bunker fuel into propulsion. The Insatech Fuel Consumption System measures fuel consumption with high accuracy Coriolis Mass Flow Meters. By using dedicated data acquisition and processing systems, the fuel consumption can be monitored and compared with position and speed. The system is a cost efficient way to get high accuracy and easy to use equipment. If you want to better the efficiency of your vessel, start by reading the results of your operation with Insatech Marine’s Fuel Consumption System.
**INTRODUCTION**

“Start by picking the low hanging fruits”
With today’s requirements toward efficiency and operations awareness, it is wise to know what investments and operation cost are spent on. And since 50% - 70% of the operational cost on board a ship are constituted by fuel costs, then fuel consumption is definitely worth monitoring. If you add to the operational fuel cost the continuously rising requirement regarding environmental issues, then a documented and fully automated measurement of the no. 1 contributor to emissions from a ship makes even more sense. Measuring the fuel consumption accurately and continuously is one of the more obvious “low hanging fruits” ready for picking.

**Accuracy matters**
How much fuel is consumed on board a ship, is directly connected with the overall performance it. The better the performance, the lower the fuel consumption during operation. And accuracy is not negligible. A offset in measurement from reality of 1% on a vessel consuming an average of 100 tons a day, equals 365 tons a year in offset. With the marine fuel oil prices today, this means a misread of approx. US$ 140,000. The Coriolis Mass Flow Meters used in Insatech Marine’s Fuel Consumption System has a accuracy better than 0.3% of nominal flow directly measured in mass, whereas most volumetric flow meters are in the range 0.5% to 2.0% - and then they rely on conversion depending on temperature to get a mass flow.

Know when you make money - and make more!
Without accurate measurements of the consumption of fuel on board, it is truly difficult to determine what effect any changes in installations, procedures or maintenance has had. Relying on either noon reports or measurement instrumentation of lower accuracy can deem it very difficult to know the exact benefit of a fuel saving action - or at least delay the proof. Furthermore, freeing the on board crew’s hands from operation and maintenance of the instruments, allows them to focus on their primary task: optimize the efficiency of the ship and thereby the related added profit.
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 Consumption 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.

<table>
<thead>
<tr>
<th>RCCS34 (DN25 PN40)</th>
<th>RCCS36 (DN40 PN40)</th>
<th>RCCS38 (DN50 PN40)</th>
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<tr>
<td></td>
<td>MGO</td>
<td>HFO</td>
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<tr>
<td>Cirkulated Flow Min.</td>
<td>0,275 m³/h</td>
<td>0,21 m³/h</td>
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<tr>
<td>Cirkulated Flow Max.</td>
<td>2,750 m³/h</td>
<td>2,10 m³/h</td>
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<tr>
<td>Consumption Min.</td>
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<td>0,07 m³/h</td>
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<tr>
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<td>0,70 m³/h</td>
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<td>0,82 m³/h</td>
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<tr>
<td>Consumption Min.</td>
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<td>0,273 m³/h</td>
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<tr>
<td>Consumption Max.</td>
<td>3,40 m³/h</td>
<td>2,730 m³/h</td>
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<tr>
<td>Consumption Max.</td>
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<td>9,10 m³/h</td>
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Easy read-out

The operator interface of the Insatech Marine Fuel Consumption System is designed to be easy to read. The user of the system will immediately get the relevant information and be able to see the development in fuel consumption over time.
SETUP VARIATIONS

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 Consumption 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.

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 accommodate a corresponding setup.

Entry level restrictions
As the Insatech Marine Fuel Consumption System is intended as a light investment entry level product, the hardware does have some restrictions. Due to the computational capacities of the system, it can handle up to 5 flow meters and does not offer advanced logging of data. Immediate fuel consumption will be displayed along with a totalized consumption. Should the requirement be for a more detailed insight into the fuel consumption or a system with possibility for historical data inclusion, then the Insatech Marine Fuel Monitoring System or Performance Monitoring system would be a better choice.
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.

Insatech Marine provides you with turnkey solutions
Most of the Fuel Consumption System setup is done at Insatech Marine’s facilities in Denmark. Our engineers and technicians will program and calibrate the system and do an initial setup before shipment, all in order to minimize required time for installation on board.

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.

INSTALLATION

SERVICE, MAINTENANCE & SUPPORT
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.

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

Our System Users Include

Our System Users Include

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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.
CONTACT

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