The simple solution to keeping track of fuel with 100% digital accuracy
The Guard Level®

ENGINE ROOM

**ALL CABLES ARE YARD/OWNER SUPPLY**

1 PAIR TWISTED SHIELDED X 16 AWG

3 PAIR TWISTED SHIELDED X 16 AWG
3 PAIR TWISTED SHIELDED X 16 AWG
3 PAIR TWISTED SHIELDED X 16 AWG
3 PAIR TWISTED SHIELDED X 16 AWG

FWD PORT AFT PORT FWD STBD AFT STBD

OPTIONAL DFG SENSOR DAY TANK

DIGITAL FLOAT GAUGE
Fuel Management System

ELECTRONIC EQUIPMENT ROOM

110/220 VAC

UPS

SHIPYARD SUPPLY

110/220 VAC

NOTEBOOK BERGAN SUPPLY

ETHERNET

CUSTOMER SUPPLY WHEELHOUSE PC

S A F E  A R E A

H A Z A R D O U S  A R E A

O P T I O N A L  F L O W  S E N S O R

2 PAIR TWISTED SHIELDED X 18 AWG

FUEL TRANSFER

OUTLET FLOW SENSOR

BERGAN TO TERMINATE WIRES AT FLOW SENSOR

LEAVE 3 FT. SERVICE LOOP AT FLOW SENSOR
The Guard Level®

Typical deck installation of DFG sensor
Note! The DFG sensor and local display can be supplied as one unit.
Shown here is DFG with standard 6” mounting flange.
Other sizes are available

Fuel tanks with DFG sensor installed
Unit shown with stainless steel float
Fuel Management System

DFG local display in engine or pump room. Optional DFG sensor for day tanks
The Guard Level®

Optional instrumentation for fuel transfer station
Fuel Management System

Wheelhouse station with fuel management screens

Master Control Unit fitted in an electrical equipment space
Key Features:

- Standard Fuel Tank Gauging with digital accuracies for consistent and repeatable fuel level measurements
- Convenient local fuel level display on tank top or remotely in engine room (customer choice)
- Accurate volume computation with automatic trim and list corrections
- Small Workstation Display with built-in GPS receiver
- PC Windows application program with dashboard for Captain viewing
- Gross Fuel Usage
- Low Sulfur Fuel Usage with GPS coordinates (if dedicated to tank)
- Engine consumption
- Calculated generator consumption
- Fuel transfer (if equipped) measurement
- Distance traveled calculations Fuel levels and volumes
- **Automated trip and fuel report** for on-board print-out or automated wireless transmission to HQ without crew input
- **Automate fleet fuel analysis** for end customer report, fleet efficiency optimization, internal reporting and fuel tax and CO2 calculations
- Simple and reliable, ideal for retrofit and very cost effective
- Type approved hardware by ABS, DNV, LR, GL and BV
- Optional fuel gauge for day tanks for quick fuel burn display
- Optional clamp-on ultrasonic flow meters for fuel transfer
- Optional software extensions per customer requirements
Fuel Management System

Considerations:

The Guard Level® Fuel Management System (FMS) is a simple system that utilized the ultra reliable Guard Level® DFG, Digital Float Sensor technology to accurately measure the fuel tank volumes. By compensating for vessel trim and list corrected volume is achieved.

The core system does not need flow meters to the engines, but should the customer require fast update flow calculations for the engines, optional DFG sensor for the day tanks are provided.

The generator standard fuel consumption data is stored in system memory and is simply subtracted from the gross volume change to derive actual engine fuel consumption.

If the vessel has a fuel discharge line this is instrumented with a high accuracy ultrasonic clamp-on flow meter, so this can be accounted for in the fuel report.

The system in its basic form gives the crew a valuable tool by eliminating manual fuel sounding and the inherent inaccuracies. For this feature alone the crew love the system.

The company HQ gains valuable insight into the operation of each vessel and can generate in their back offices any and all data.

The Guard Level® Fuel Management System can by timely and accurate data be a change agent for vessel efficiency improvement. Our customers report back that this tool is invaluable in driving down costs and rewarding fuel conservation.
# Specifications

## Pilot House Display

<table>
<thead>
<tr>
<th>Computer</th>
<th>Dell Netbook, with wireless/wired Ethernet for communication with vessel Pilothouse PC. Mounting bracket included</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS</td>
<td>Built-in</td>
</tr>
<tr>
<td>Operating software</td>
<td>Microsoft XP embedded. Restricted access</td>
</tr>
<tr>
<td>Fuel Management Software</td>
<td>Custom run time application with password protection</td>
</tr>
<tr>
<td>Power supply</td>
<td>110-240VAC 50-60Hz,</td>
</tr>
</tbody>
</table>

## MCU (Master Control Unit)

<table>
<thead>
<tr>
<th>Computer</th>
<th>Industrial embedded fan-less PC. Solid state memory (no hard-drive) Door mounted USB port</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O</td>
<td>Bergan proprietary digital interface. Maximum 32 DFG sensors. Modbus interface to optional flow meters</td>
</tr>
<tr>
<td>Intrinsic Safety</td>
<td>All DFG sensor protected by Intrinsic safety barriers</td>
</tr>
<tr>
<td>Enclosure</td>
<td>NEMA 4 steel enclosure with hinged door.</td>
</tr>
<tr>
<td>Size H x W x D</td>
<td>24” x 20” x 10” (610mm x 508mm x 254mm)</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 63Lbs (28.5Kg)</td>
</tr>
<tr>
<td>Power supply</td>
<td>110-240VAC 50-60Hz, 10A from ships source (UPS is recommended)</td>
</tr>
</tbody>
</table>

## DFG sensor and local display

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Loop powered, through Bergan approved I.S. Barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power consumption</td>
<td>Nominal 25mA</td>
</tr>
<tr>
<td>Output signal</td>
<td>Current modulated serial pulse signal 2 core cable including power supply</td>
</tr>
<tr>
<td>Maximum Tank Depth</td>
<td>64Ft (20M)</td>
</tr>
<tr>
<td>Measurement accuracy</td>
<td>+/-5mm (1/4”) absolute (No drift and no need for calibration ever)</td>
</tr>
<tr>
<td>Fuel Type</td>
<td>Jet, Diesel, MDO, HFO</td>
</tr>
<tr>
<td>Tank Volume Accuracy</td>
<td>Limited by tank table accuracy</td>
</tr>
<tr>
<td>Alarms</td>
<td>Standard HL and LL for each tank measured. (User adjustable)</td>
</tr>
<tr>
<td>DFG flange connections</td>
<td>ANSI 6” standard (optional DIN/JIS or custom rectangular)</td>
</tr>
<tr>
<td>Electrical Safety</td>
<td>Intrinsically Safe Class I, Div 1 Groups C&amp;D</td>
</tr>
<tr>
<td>Display</td>
<td>LCD, reflective with LED front lighting, 2 lines by 20 characters, sunlight viewable through tempered glass lens</td>
</tr>
<tr>
<td>Material</td>
<td>Stainless steel (304L and 316L). Float Polyethylene or stainless</td>
</tr>
<tr>
<td>Approvals</td>
<td>ABS, DNV, LR, GL, BV</td>
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</tbody>
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Bergan Marine Service

We offer complete Installation and Commissioning services. Turnkey installation is available. Please contact Service Department: service@icbergan.com
Represented by: