



Sender Averaging Module

Part Numbers:

2701-180 for 0-180 Ohm Senders

2701-240 for 240-30 Ohm Senders

Installation and Operating Instructions

Introduction

The Sender Averaging Module is designed to mathematically average two resistive tank level sender outputs and drive tank level gauges with the single averaged output.

It's application is typically with large fuel or water tanks, where heeling or a bows up attitude of the boat whilst under power, can make a single tank level sender produce misleading readings when the fluid moves to one end of the tank.

The module is connected to two sender units at different parts of the tank and outputs an average value to the tank level gauge. Thus the average fluid level is measured and displayed.

The module has two outputs and can drive up to two gauges at the same time. These could be, for example, a gauge at the main navigation station and a second gauge on the flybridge without the need for any gauge switching.

Specification

Operating Voltage	10 - 30 Volts
Power Consumption	approx 100mA
Reverse Battery Protection	Yes
Load Dump Protection	Yes
Sender Compatability	0 - 180 & 240 - 30 Ohm
Environmental Sealing	IP68
Accuracy	1% limited by senders

Safety Instructions

The module should be installed by a person competent and experienced in the installation of electronic equipment on board boats.

Before beginning work the battery negative lead should be disconnected to avoid the risk of a short circuit, a fire or an explosion.

Before drilling any holes to mount the unit or run the cabling always make sure it is safe to do so.

Always follow the safety instructions of any tools being used during the installation.

Location and mounting

The module should be mounted on a flat surface close to the tank sender units. The module is waterproof and damage resistant but in order to protect the wiring connections to the module choose a location that is dry and secure from physical damage.

The senders should be mounted in the tank so that the fluid movement is "seen" by both senders. We recommend that they are mounted about one quarter of the way from each end of the tank. Note that due to the inherent non-linearity of the existing sender/gauge design that if one sender sees a completely full tank and one sender sees a completely empty tank the average reading may not be exactly 50%. Under normal usage where both senders see some fluid the average reading is accurate.

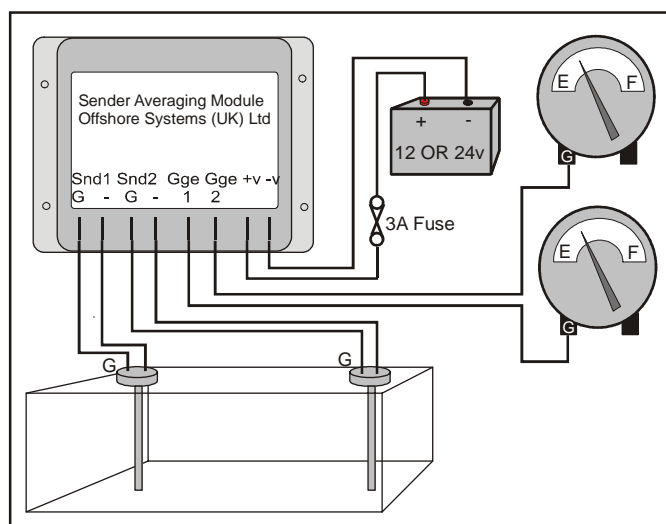
Mount the module using 5mm diameter screws or bolts through the holes provided in the module flanges.

Wiring

All connections to the module should be made using insulated copper wire of a suitable size terminated with insulated 1/4" crimp spade receptacles.

All wiring runs should be secured at regular intervals to prevent chafe and vibration damaging the cables.

Connect the "G" terminal on the first tank sender to the "sender 1 G" terminal on the module. Connect the "-" terminal on the sender to the "sender 1 -" terminal on the module. Do the same for the second sender to the module connections for sender 2.



Note that it doesn't matter which sender is connected to which of the sender connections on the module as the module's output is a mathematical average of the two sender inputs.

Note also that the sender "-" terminals on the module are connected to battery - as they would be if the tank gauge was connected directly to the sender.

Connect the module's "gauge 1" terminal to the first tank level gauge's "G" terminal. Connect the module's "gauge 2" terminal to the (optional) second tank level gauge "G" terminal.

Connect the module to the ships battery via a 3A fuse or circuit breaker. Take care to connect the module + connection to the ship's + supply and the module - connection to the ship's - supply. The unit is designed to withstand an accidental reversed connection during installation but will not work under these conditions.

Operation

Once the module has been installed there is no operator intervention required.

Fault Finding

In the event that the module is suspected of malfunctioning it is a simple procedure to check the complete system:

- remove power from the Sender Averaging Module
- link the first sender unit "G" terminal directly to the gauge "G" terminal
- verify that the gauge accurately displays the first senders tank level
- disconnect the first sender from the gauge
- link the second sender "G" terminal directly to the gauge "G" terminal
- verify that the gauge accurately displays the second senders tank level

If the gauge does not function with either sender suspect a possible gauge fault. If there is a second gauge try the senders with that gauge to confirm your finding.

If one sender works but the other does not then there is a sender fault.

If the senders and the gauges work without the Sender Averaging Module installed but do not work the the module installed then check the module is receiving the correct power on it's power terminals and none of the module wiring is damaged. If the power and wiring appear to be OK it is possible that the module is faulty and needs to be returned for repair. In that event a temporary link between the most appropriate sender "G" output and the most appropriate gauge "G" input will leave the system functional until the module is re-instated.

Linearity

It is important to remember that resistive fuel senders and their gauges are inherently non-linear. As most marine tanks do not have a regular cross section from bottom to top this also produces non-linear results. The Sender Averaging Module calculates the mathematical average of the two input senders resistances values and drives each of the display gauges with exactly that value. This means that any non-linearity from the senders will be passed through to the display gauges. In practice this non-linearity is of little consequence.

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