

Figure 1. Float Sensor physical layout

Features

- Hermetically sealed
- Additional epoxy seal
- Accurate control of the open and closure points
- Current limiting
- Stalled rotor detection
- Designed for current surges up to 30 amps
- Retaining current product functionality
- Lower cost
- Added functionality
- Billions of hot switching operations
- Reduced size
- Minimal current draw
- Ability to sound an alarm or light in a stalled rotor condition
- Ability to sound an alarm or light if the motor does not stop running when there is no water
- Ability to turn off the motor if it fails to shut down with no water present

Applications

- Bilge pump on boats
- Sump pumps in basements
- Air conditioners detecting high water levels
- Reed applications requiring complete solutions

Introduction

Design engineers today look for procuring a complete solution. If they can't find this, they look for its component parts. This application refers to the development of a bilge pump on a boat, which senses accumulating water in the bottom of the boat, which in turn operates a pump removing the water. Currently the majority of boat companies use a mechanical float and switching system. This has been wrought with quality and reliability problems that can endanger the lives of boat owners and their passengers. MEDER has developed a complete solution vastly expanding capabilities, while improving quality and reliability.

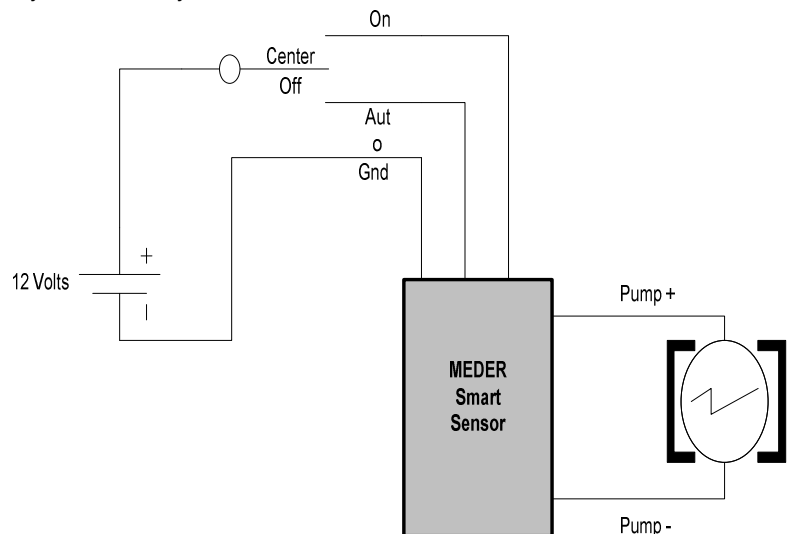


Figure 2. Smart sensor circuit diagram.

MEDER's Bilge Pump Approach

MEDER has developed a small float sensing system approximately the size of our LS02 using reed technology coupled with smart electronics, all of which is housed in the stem of the sensor. Since the bottom of a boat is a very dirty environment, the pump and sensing system will encounter salt water, leaves, oil, gasoline, etc. Contacts of a mechanical system exposed to this environment will introduce quality and reliability issues. MEDER's hermetically sealed reeds and epoxy sealed package is unaffected.

MEDER's Smart Reed Sensor Advantages

The main power source on many boats is its battery, which produces typically 12 volts. For that reason DC voltage polarity sensitive induction motors are used as the pump. The smart sensor will also detect polarity reversal and sound an alarm or accept the option depending upon customer requirements. This can clearly not happen with other technologies.

The sensor is designed not to turn on until water depths reach a minimum of 45mm. Conversely, the pump will continue to pump the water out until the depth has reached only 20mm. In this way the motor does not sit and chatter on and off in rapid succession. The sensor is capable of operating between 0°C and 90°C.

The sensor will switch and carry current up to 10 amps DC continuously, with the capability of handling typical motor inrush currents up to 30 amps.

In the event of a stalled rotor fault, a condition that can occur if debris is trapped in the motor compartment, the MEDER smart sensor will detect this and shut down the pump. Motors in a stalled rotor condition can easily overheat and cause of potential disastrous fire on board the boat.

Specifications

Operate specs	Min	Max	Units
Must close distance	45	60	mm
Must open distance	15	20	mm
Hysteresis			

Load Characteristics	Min	Max	Units
Switching voltage		15	V
Switching current		10	Amps
Carry current		10	Amps
Contact rating		30	mA
Standby current		6	mA
Voltage drop	1 typical		V
Min Voltage	2		V
G-S on resistance		8	mΩ
Vgs			V
Operate Temp	-20	90	°C
Storage Temp	-25	100	°C

Smart Sensor Uses: (internal use only)

Microchip PIC processor PIC16HV616 16 pin 8-bit flash Microcontroller (2 page spec available)

- Voltage operating range 2 V to 15 V
- Operating current 100µA @ 2V
- Standby current 1 nA @ 2V
- 100,000 Flash Indurance
- 40 year programming retention
- 11 I/O ports 3 internal & 8 external

Infineon OptiMOS P Power-Transistor BSC080P03LSG P-Channel Vgs +/- 25V (9 page spec available)

- Vgs 30V

On resistance:

- 6 typical 8 max mΩ
- Id 30 Amps

MEDER's smart sensor will sense this and turn off the motor. Also, if the motor is not pumping water and continues to run, MEDER's sensor will detect this and shut down the motor. Remaining on, both conditions would prematurely discharge the battery.









When any of these mishaps occur, flashing lights and alarms can automatically be turned on by the smart sensor.

We can also sense if the battery voltage is low, also turning on an alarm or flashing lights.

MEDER's Smart Reed Sensor is a one stop solution based on the customers specifications. Currently most customers must buy a float sensing system, a mechanical switch that will turn on the motor and currently have no solutions to detect faults, polarity issues, and additionally incur short switching life. MEDER's complete solution is 'all in one' with 100s of millions of reliable operational life.

Consult our engineering group with your specific applications.

Consider some of the below surface mount and through hole options for smart sensor application.

Surface Mount Series				
Series	Dimensions			Illustration
		mm	inches	
MK15	W	2.5	0.098	
	H	2.5	0.098	
	L	19.50	0.768	
MK16	W	2.3	0.091	
	H	2.3	0.091	
	L	15.60	0.614	
MK17	W	2.1	0.083	
	H	2.1	0.083	
	L	9.61	0.378	
MK22	W	2.7	1.060	
	H	2.3	0.091	
	L	15.60	0.614	
MK23-35	W	2.2	0.087	
	H	1.95	0.077	
	L	15.75	0.620	
MK23-66	W	2.2	0.087	
	H	2.7	1.060	
	L	19.60	0.772	
MK23-80	W	2.0	0.079	
	H	2.1	0.083	
	L	13.00	0.512	
MK23-87	W	2.0	0.079	
	H	2.1	0.083	
	L	15.60	0.614	



Through Hole Series				Illustration
Series	Dimensions	mm	inches	
		MK06-4	W	3.3
H	3.3		0.130	
L	12.06		0.475	
MK06-5	W	2.8	0.110	
	H	3.2	0.126	
	L	14.30	0.563	
MK06-6	W	3.3	0.130	
	H	4.2	0.165	
	L	17.24	0.679	
MK06-7	W	3.3	0.130	
	H	4.2	0.165	
	L	19.78	0.779	

**Consult the factory for more options not listed above.