SCAD TM1 and TM2 Tank Monitor Manual

Firmware 3.4

Introduction

The monitor can be used with SCAD's electronic external or internal rod sensors for water and holding tanks, and standard 240-33 Ohm or 10-180 Ohm float sensors. Additional related information is available at **www.scadtech.com/TMHelp**

Included Parts	Required Tools and Materials
1. Monitor display 2. Wire harness 3. Inline 1 Amp fuse 4. Electronic external sensor module 5. 60 inches of aluminum sensor tape 6. 5 self tapping mounting screws	1. Drill with 1/2 inch (13mm) drill bit. 2. 22-18 AWG butt-splice terminations (preferably waterproof with heat shrink adhesive) and wire termination tools 3. 22 AWG (20 or 18 AWG will also work) stranded tinned copper stranded, preferably 3-conductor cable. Must span from the display to each sensor. 4. Isopropyl alcohol to clean any residue off the tank. 5. #1 Phillips screwdriver

Installation

Display Mounting

1. Choose a location for the monitor display that is away from weather or spilled fluids. Be sure there is sufficient access behind the panel to route the wires.
2. Hold the display with the face toward the mounting surface and mark the location of each of the four screw holes. Draw an X connecting the screw hole marks to determine the center. Measure down 5/16" from the center mark and Drill a 1/2" hole.

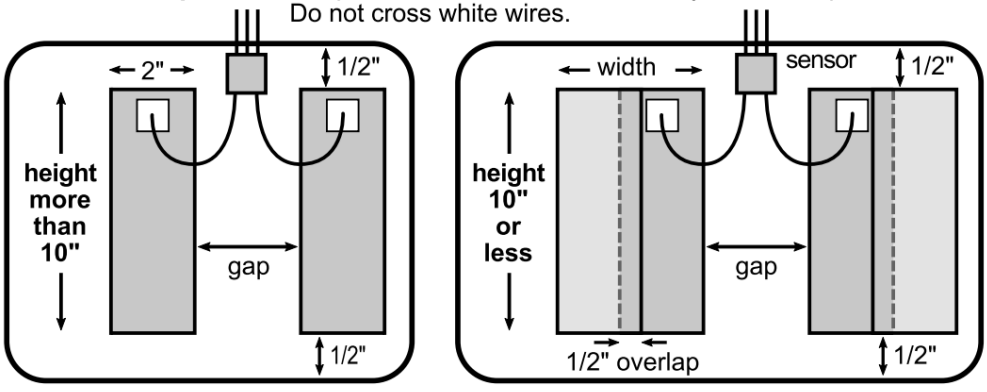
External Sensor Foil Placement for Plastic & Fiberglass Tanks

Use the table and illustration below to for placement of the sensor components. Avoid areas near conductive objects. Clean all surfaces with isopropyl alcohol before component placement. Press firmly removing air gaps when adhering components.

Component Placement Based on Foil Height (inches)

Foil Height	6-8	8-10	10-12	12-14	14-20	20-24	>24
Width	3-3.5	3	2	2	2	2	2
Gap	1-1.5	1.5-1.75	1.5	1.75	2	2.5	2.5-3

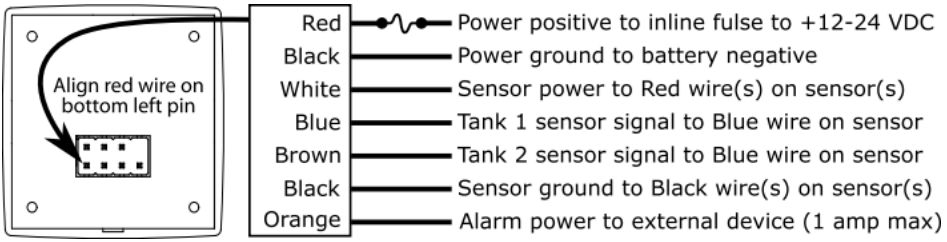
Important: Keep red, black and blue wires away from foil tapes. Do not cross white wires.



Bottom of Tank

System Wiring (For float sensors see scadtech.com/TMHelp)

1. See figure below. Power off when wiring. BLACK wires are interchangeable. Make twist or wire nut connections initially, then butt-splice after successful setup. A color diagram of the wiring can be found at www.scadtech.com/TMHelp

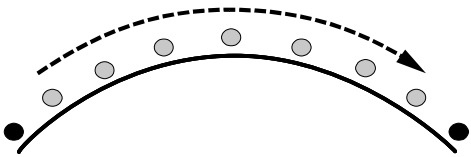


2. Route 3-conductor #22 AWG wire (not supplied) to each of the sensor modules. Pull the wire through the 1/2 inch hole you drilled in the Display Mounting instructions. Leave enough slack to strip and splice to the wire harness that plugs into the monitor display.
3. Strip about 5/16 inches from the wires and connect the wires as described in the figure above. Use 22-18 waterproof heat shrink butt splice crimp connectors for your final connections.
4. Plug the wire harness into the monitor with the power off. Check for proper plug alignment. ***WARNING: Plug misalignment can cause damage to the monitor!***
5. Screw the panel to the wall with the supplied #2 sheet metal screws. Hint: While not recommended, if using in a wet location, place a bead of silicone around the back edge of the monitor before screwing it to the wall to create a seal.

Software Setup

1) Enter Setup

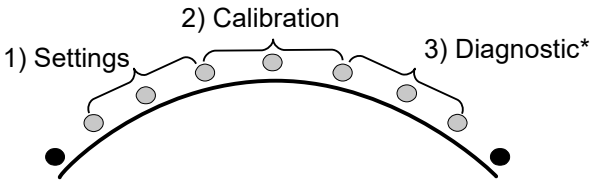
Touch and hold the pad associated with the tank being set up until lights turn on from 1/8 through 7/8. Remove your finger when the lights turn off.



2) Select Mode

You will be presented with groups of blinking lights, in the following order, to chose from:

1) 1/8 + 1/4 + 3/8 lights = **Settings** – Touch the pad if you want to set options for Sensor Type, Tank Shape and Alarm Type (further described below).
2) 3/8 + 1/2 + 5/8 lights = **Calibration** – Touch the pad if you want to calibrate for empty and full tanks (further described below).
3) 5/8+3/4+7/8 lights = **Diagnostic** – See Diagnostic Mode at scadtech.com/tmhelp

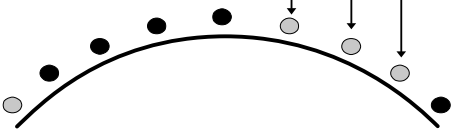


Settings

Options for Sensor Type, Tank Shape and Alarm Type are displayed sequentially every 5 seconds. Blinking lights represent selectable options and solid lights represent selected options. Touch the pad to select an option.

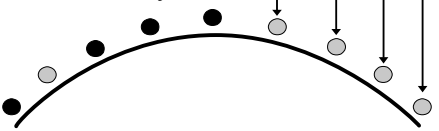
Sensor Type
(E light on)

7/8 = SCAD Sensor (default)
3/4 = Float Sensor 240-30 Ohm
5/8 = Float Sensor 10-180 Ohm



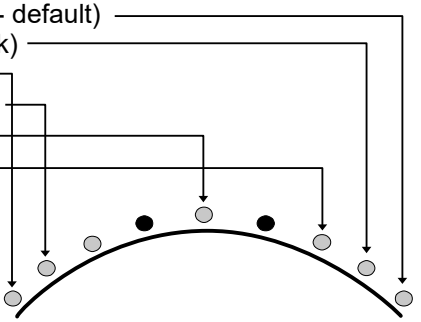
Tank Shape
(1/8 light on)

F = Rectangle (default)
7/8 = Mild Taper
3/4 = Severe Taper
5/8 = Horizontal Cylinder



Alarm Type
(1/4 light on)

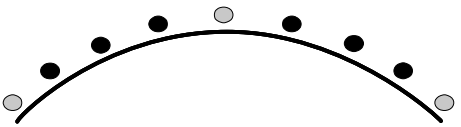
F = > 7/8 tank (holding tank - default)
7/8 = > 3/4 tank (holding tank)
E = < 1/8 tank (water tank)
1/8 = < 1/4 tank (water tank)
1/2 = No Alarm
3/4 = External Alarm Wire Energized during alarm condition.



Calibration

(1/2 light on)

The E light will flash first, then F. Touch the pad associated with the tank you're calibrating. For example, if you're calibrating for a full tank, touch the pad when the F light blinks and ignore the bilking E light.



E = Calibrate Empty

F = Calibrate Full

NOTE: The monitor must be calibrated for both empty and full tanks to display properly. Calibrations can be performed in any order.

Operation

- **Power On –** When the monitor is powered on, all lights will cycle through, then turn off, followed by the firmware version, which is determined by counting lights to the left and right of the 1/2 light, which represents the decimal point. For example, three lights to the left of 1/2 and four lights to the right is firmware version 3.4.

- **Checking Tank Level** – Touch the pad to check the tank level. If monitor detects and error, an error code will be displayed (see Troubleshooting). For extended level display (approximately 20 minutes), touch the pad again within the 3 seconds. This feature is for monitoring the level while filling or pumping out a tank. The TM2 model will indicate the tank being monitored by a light next to the number 1 or 2. To exit extended read mode, touch the pad.

- **Alarm Function** – The monitor automatically checks for an alarm condition and displays a blinking F or E light, depending on which option is selected in the Alarm Type section of the Settings. On model TM2, lights 1 or 2 will indicate which tank is alarming. If the External Alarm Wire option is set on, it will energized with the battery voltage level capable of current up to 1 amp, which can be used to power an indicator light, audible alarm or relay.

Troubleshooting (Additional help at scadtech.com/TMHelp)

The codes are displayed as blinking lights after touching the pad to take a tank level reading. Faults for Firmware Version 3.4 are defined in the following table:

Blinking Lights	**Symptom:** Possible causes. Action
SENSOR FAULTS	
1/2	**Sensor signal too low:** 1) No sensor connected. 2) No power to sensor. Put monitor in extended read mode and look for flashing lights at sensor. If not blinking, check wiring and connections. 3) No signal returning from blue wire on sensor. Check crimp connections from sensor blue wire. 4) White wires not connected to external sensor foil strip. 5) Faulty float sensor.
1/2 + 5/8	**Sensor signal too high:** 1) Sensor Type mistakenly set to float sensor when actually using SCAD sensor. Set Sensor type to SCAD Sensor. See above section Software Setup → Settings → Sensor Type. 2)Metal object bridging external sensor foil strips. 3) Black ground wire disconnected or blue signal shorted to white power wire. 4) Float sensor wiring open or faulty sensor. 5) Faulty monitor.
CALIBRATION FAULT	
5/8 + 3/4	**Difference between empty and full too small.** 1) Full is calibrated before empty, which will be fixed once empty is calibrated. 2) Calibrated with no signal from sensor. See sensor fault signal too low. 3) Empty and full calibrated at the same signal level. 4) Short tank less than 7". See foil placement section. 5) Full and empty calibrations are reversed.
3/4	**Incomplete calibration.**