

**FloTech
FT208
CheckMate
Programmable
Retain / Overfill
Onboard Monitor**

**Dixon Bayco
FloTech Division
Cincinnati, Ohio**

Table of Contents

Introduction..... 4
Monitor Features..... 4
Monitor Indicators 4
Monitor Connections 5
Mounting Instructions..... 6
 Monitor Housing..... 6
Cable Installation Instructions 7
 Monitor Housing..... 7
Wiring Instructions 7
 Proper Wire Connections..... 7
 Monitor Wiring Connections 8
 TB1 POWER Connections 8
 TB2 TOP and BOTTOM SENSOR Connections..... 8
 TB4 AUX PERMIT Connections 10
 TB5 PROGRAM Connections..... 12
 FLOAT, THERMISTOR and OPTIC Rack Connections..... 10
Programming..... 12
 Overview..... 12
 Procedure 12
Operation..... 13
 Normal Operation 13
Troubleshooting 14
Technical Support Hotline 20

Introduction

This Manual describes the features, installation, programming, operation and troubleshooting techniques for the FloTech FT208 CheckMate Programmable Retain / Overfill Onboard Monitor.

Monitor Features

The FloTech FT208 CheckMate Retain / Overfill Monitor has the following features:

- Operates on 12 VDC or 24 VDC systems.
- Monitors up to eight overfill sensors.
- Monitors up to eight retain sensors.
- Top Only or Top and Bottom configuration.
- Connects to Float, Thermistor or Optic style rack.
- Non I.S. Relay Output
 1. 12 VDC, 1 AMP. MAX.
 2. Permissive: Closed
 3. Non-Permissive: Open
- The monitor is field programmable.
- Simple Wiring – no jumpers, terminators or dummies.
- Compatible with Two Wire or Five Wire type sensors.
-

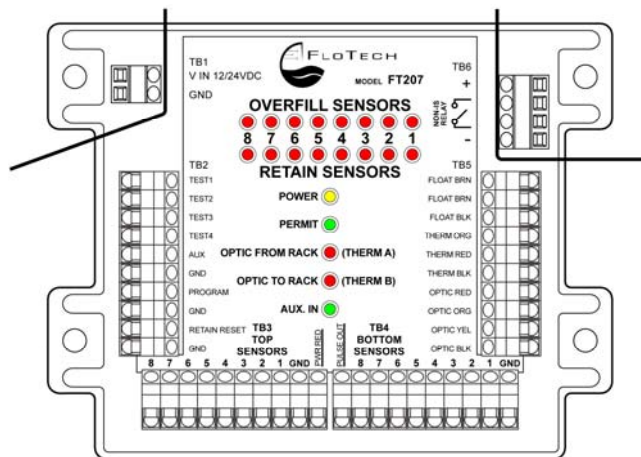


Fig. 1 FT208 Monitor

Monitor Indicators

Refer to Fig. 1.

PWR LED

Yellow LED that indicates power is connected to the monitor.

PERMIT LED

Green LED indicates to the rack the sensors are permissive.

TOP LEDs

Overfill Sensor Indicators, ON indicates a wet sensor.

BOTTOM LEDs

Retain Sensor Indicators, ON indicates a wet sensor.

OPTIC FROM RACK (THERM A) LED

FloTech Programmable CheckMate Retain / Overfill Monitor

Red LED indicates no pulse from Optic Rack Monitor (YEL) or no signal to Thermistor Rack Monitor (RED) A channel.

OPTIC TO RACK (THERM B) LED

Red indicated no signal to Optic Rack Monitor (ORG) or no signal to Thermistor Rack Monitor (ORG) B channel.

AUX LED

Green LED indicates the Auxiliary input is permissive.

Monitor Connections

TB1 – 12/24 VDC Power Connections

TB2 – Aux Input and Retain Reset. Program Key Input.

TB3 – Overfill Sensor Inputs

TB4 – Retain Sensor Inputs

TB5 – Optic and Thermistor Socket Connections

TB6 – Non I.S. Output Relay

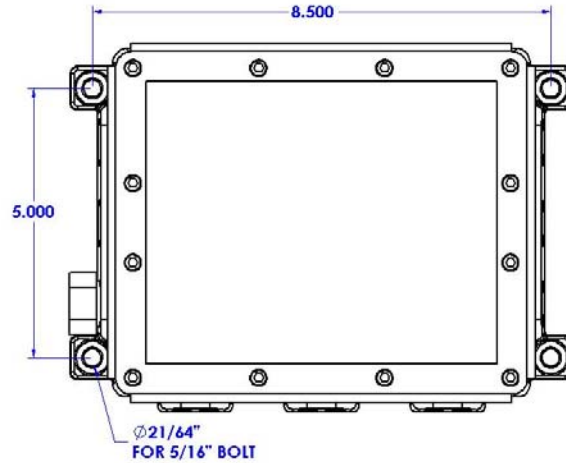
Mounting Instructions

Fig. 2
Mounting Hole

Monitor Housing

The FloTech model / Overfill Monitor mounted in the trailer flat surface within easy loading connections. the monitor housing and wish to mount it. Using a pattern of the four mounting surface.

to make sure you will not drill through or damage any existing trailer wiring or piping. Drill the holes through and mount the monitor using four 5/16 inch nuts and bolts.



Detail

FT208 CheckMate Retain Housing is typically fitting storage box or any view of the bottom Leave the top cover on hold it in the position you black marker, transfer the mounting holes to the BEFORE drilling, check

Cable Installation Instructions

FloTech recommends you use FT404 jacketed 11-conductor cable for up to 8 compartment systems. This cable is specially designed to be oil, UV, and abrasion resistant. It incorporates a noble tin-plated stranded copper wire which resists corrosion. When installed properly, this cable will provide years of reliable service. See the Proper Wire Connections section for more detailed directions about stripping and terminating the cables.

Monitor Housing

After the monitor housing is mounted, install FloTech FT402 cable glands in the openings where needed. These are, as illustrated in Fig.3: Power, Top Sensors, Bottom Sensors (if equipped) and Socket. Route the lengths of FloTech FT404 cable through the conduit openings. Cut the cables to length leaving approximately 8 inches of extra length inside the monitor housing.

Unused conduit openings in the sensor housings must have a ½ inch NPT pipe plug installed. Note that when using the FloTech FT390 Dual Socket Assembly, you only need to install one cable gland for the socket wiring.

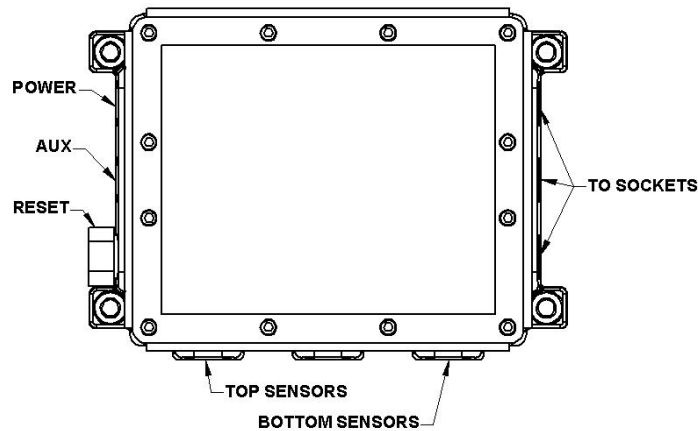


Fig. 3
Monitor Housing Cable Routing Diagram

Wiring Instructions

Proper Wire Connections

Please read this section of the manual before attempting to wire the FloTech FT208 Monitor. This section recommends some ‘guidelines’ for installing the system wiring that, when done properly, will insure a long, trouble free service life for your equipment.

CABLE STRIPPING

FloTech recommends using FT404 eleven conductor cable to wire the Onboard Monitor System for up to 8 compartment systems. When stripping the rubber jacket from the cable, FloTech recommends using the FT9023 or equivalent Cable Stripper. This stripper has an adjustable cutting blade depth setting. The depth should be set to only cut through one-half to two-thirds of the outer jacket thickness. This will insure that the insulation on the inner conductors is not nicked. Any nicks or cuts in the wire insulation can, over time, degrade the quality of the wire and lead to intermittent or total failure.

CAUTION: Razor Knives Will Cut The Inside Wire Insulation

SPLICE END CONNECTIONS

FloTech recommends using the FT9024 or equivalent Crimp Tool for securing the splice end connections. Follow this process to secure each connection:

FloTech Programmable CheckMate Retain / Overfill Monitor

1. Follow the Cable Stripping instructions in the previous paragraph to expose the individual conductors of the wire.
2. Strip the insulation back on each conductor approximately 1/2 inch. Take care not to cut off any strands of wire. If too many strands were accidentally cut off, cut the wires flush with the insulation and strip again.
3. Hold the two wires to be connected together by the insulation. Tightly twist the bare wires together. This insures a good electrical connection.
4. Fill a FloTech 10112 splice end with Silicone RTV compound. Insert the twisted wires into the filled splice. Check to see that the bare wires are fully inserted into the splice and RTV. Make certain that NO bare wire is protruding from the splice.
5. Securely crimp the wires into the splice end.
6. Give the splice and the wires a 'tug' to make sure you have a good mechanical connection.

TERMINAL BLOCK CONNECTIONS

Follow this process to secure each connection:

1. Strip approximately 3/8 inch of insulation back from the end of the wires.
2. Tightly twist the strands of wire together.
3. Rotate the terminal block screws counter-clockwise a few turns to relieve pressure on the wire retainer.
4. Insert the bare wire end into the terminal block.
5. While holding the wire in place, rotate the terminal screw clockwise to tighten the wire retainer.
6. Once fully tightened, give the wire a slight 'tug' to insure that a proper connection has been made.

Monitor Wiring Connections

Before attaching wires to the FT208 CheckMate Monitor, please read the following:

CAUTION: Turn off or disconnect power to the trailer before wiring the monitor.

CAUTION: Only use the conduit opening marked "POWER INPUT" as shown in Fig.3 to wire power to the monitor.

CAUTION: The FloTech FT208 CheckMate Monitor will not work on POSITIVE GROUND electrical systems. Any attempt to wire the monitor to a positive ground system will damage the monitor and void the warranty.

TB1 POWER Connections

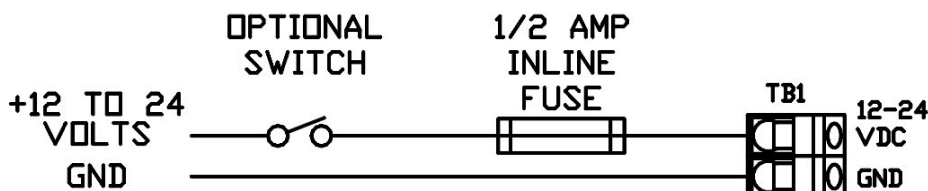
Refer to Fig. 4. FloTech recommends routing the trailer power through a weatherproof inline fuse holder (supplied) containing a 1/2 amp fast blow fuse to the monitor. Optionally, a switch can be added in series with the fuse to the TB1 input. Connect the positive power supply wire to the TB1 terminal marked "12/24 VDC". This is the upper screw on TB1. Be careful that no stray wires are touching the metal barrier or ground terminal. The Ground wire connects to the TB1 terminal marked GND.

Fig. 4
Monitor Power

**TB3 & 4 TOP
SENSOR**

FloTech FT208
work with 2 wire

API 5 wire FT101 sensors. FloTech recommends wiring the sensors to the FT208 Monitor using FT404 11



**Connections
and BOTTOM
Connections**

can be wired to
FT151 sensors or

FloTech Programmable CheckMate Retain / Overfill Monitor

conductor cable for up to 8 compartment systems. FloTech FT404 cable is color coded to ease installation and troubleshooting. A color coded wiring schematic is provided in the back of this manual.

TB5 Socket Connections

These connections are wired to the appropriate socket(s) as dictated by the Loading Terminals in your area. At this time, FloTech offers the following sockets:

- FT300 Series API Optic Socket
- FT301 Series API Thermistor Socket
- FT302 Series API Float Socket
- FT303 Series Optic Contact Pattern with Thermistor J slot
- FT304 Series Canadian / Euro Thermistor Socket
- FT305 J560 Type Thermistor Socket
- FT306 J560 Type Optic Socket
- FT390 Series API Dual Thermistor and Optic Sockets
- FT391 Series API Dual Optic and Thermistor Sockets
- FT393 API/J560 Triple Socket
- FT394 Series API/J560 Triple Socket
- FT395 Series API/J560 Triple Socket

Refer to Figs. 6 through 9 for socket wiring.

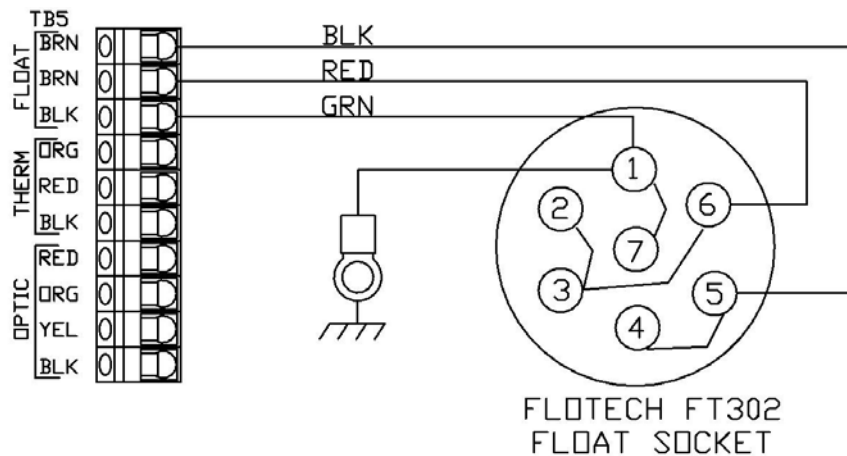


Fig 6.
Float Socket Connections

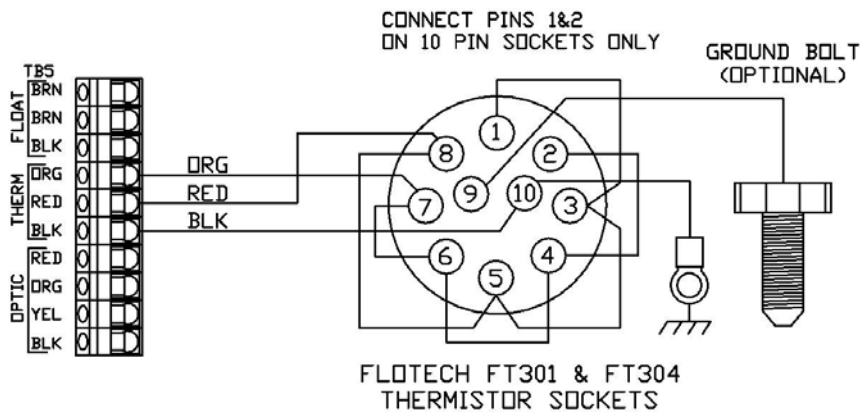


Fig. 7
Thermistor Socket Connections

FloTech Programmable CheckMate Retain / Overfill Monitor

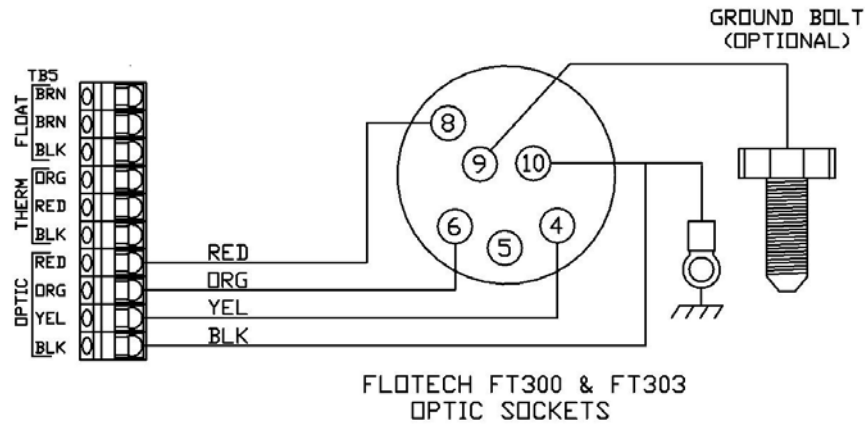


Fig. 8
Optic Socket Connections

Another Socket Option is to install the FloTech FT390 Dual Socket Assembly. This unit comes with the sockets pre-wired to a length of FloTech eleven conductor cable. Refer to Fig. 9 for wiring connections.

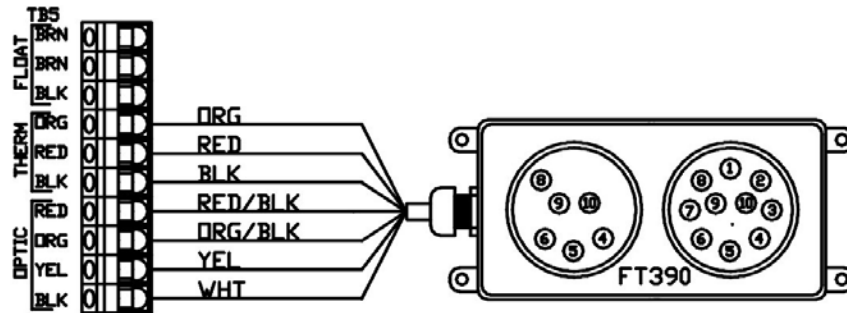


Fig. 9
FloTech FT390 Series Socket Connections

TB2 AUX PERMIT Connections

Refer to Fig. 10. In order for the FT208 Monitor to work properly, the AUX terminals must be connected together. This can be done either by placing a shorting jumper across the AUX terminals (factory installed) or by connecting the AUX terminals to a dry relay contact. Examples of this would be a Hobbs switch or a Vapor Recovery interlock switch. When the AUX connection is made, the FT208 Monitor issues a PERMIT signal.

TB2 RETAIN RESET Connections

Refer to Fig. 10. The Retain Reset terminals connect to a Normally Open push button switch. The primary function of this switch is to override wet Retain Sensors for 'Splash Blending' product. When this button is pressed, the FT208 Monitor will issue a Permit signal to the Rack without regard to the Retain Sensors. The Permit signal will be disabled if any of the Overfill Sensors become wet or there is signal activity on any Retain Sensors that have been programmed as inactive.

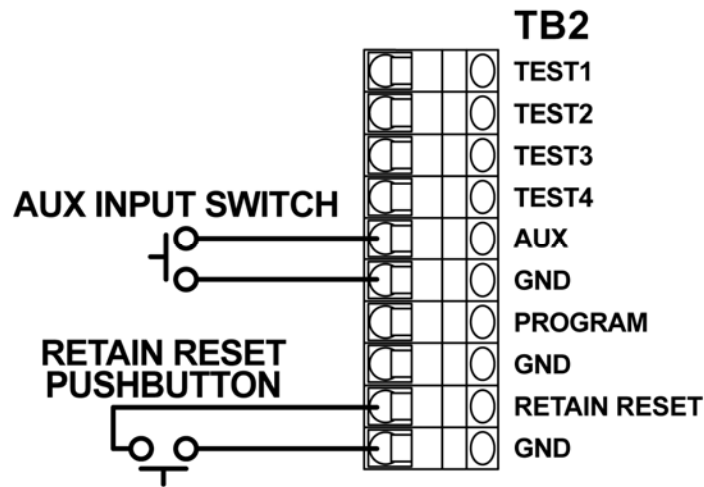


Fig. 10
Retain Reset and AUX Connections

TB2 PROGRAM Connections

Refer to Fig. 11. The FT208 Monitor must have a program module installed in the PGM terminals ONLY during programming of the monitor. This connection must be left open for normal operation. See the Programming Section of this manual for detailed instructions about programming this unit.

Programming

Overview

Before the FloTech FT208 Monitor can be put into service, it must be programmed. This procedure informs the monitor which inputs have sensors attached. These inputs are then labeled as ACTIVE sensors. The remaining inputs that do NOT have sensors attached are labeled as INACTIVE inputs. This insures that a PERMIT signal will be issued only if ALL of the following conditions are met:

- All active overfill sensors are dry.
- All inactive overfill sensors are not connected.
- All active retain sensors are dry or the Retain Reset button has been pressed.
- All inactive retain sensors are disconnected.
- The AUX input is jumpered or made through an external contact.

If ANY of the above conditions are not met, the PERMIT signal will not be generated. Programming is accomplished in the following manner:

Procedure

To program the FT208 monitor:

1. Turn the power to the unit off.
2. Remove the reset switch wires from TB2.
3. Connect the programming module (10459) into TB2 bottom four contacts marked “PROGRAM, GND, RETAIN RESET, GND”. Switches should be face up.
4. Move SW1 to “PRGM” position.

FloTech Programmable CheckMate Retain / Overfill Monitor

5. Turn on the power. The sensor LEDs will sequentially flash through the power up test pattern. This lights the sensor LEDs individually from TOP #1 through TOP #8 and then through BOTT #1 through BOTT #8.
6. The sensor LEDs will light up the last valid configuration. If the memory does not contain a valid configuration, the sensor LEDs will default to lighting the top 1 sensor.
7. Press SW2 pushbutton to light the RED Top and Bottom Sensors light to match the total number of top and bottom sensors. Each time SW2 is pressed, the sensor LEDs will shift to the next valid configuration. This sequence is Top #1 to Top #8 and then Top and Bottom #1 to Top and Bottom #8. This sequence will repeat every time the pushbutton is pressed.
8. Once the LED pattern representing the number of connected sensors is correct, move SW1 to “RUN” position. The monitor will flash the sensor LEDs sequentially through the test pattern. At this point, if all connected sensors are dry and the AUX LED is on, the PERMIT LED should light and no RED LEDs are lit.
9. Remove power from the trailer or turn power off to the monitor. Remove the programming module, reconnect the retain reset switch, and turn power back on to the monitor.
- 10.

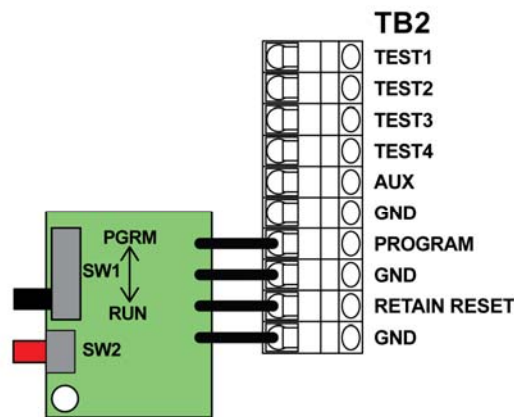


FIG. 11
PROGRAM MODULE POSITION

Operation

Normal Operation

When power is applied to the FT208 monitor, the unit will sequentially flash the sensor LEDs through the power up test pattern. This sequence is from the TOP #1 LED to the TOP #8 LED then from the BOTT #1 LED to the BOTT #8 LED.

Once this sequence is completed, the unit tests all the sensor inputs.

A PERMIT signal will be issued if:

- All the sensor inputs that have been programmed as active see dry sensor signals.
- Any of the Retain sensors are wet and the Retain Reset pushbutton has been pressed.
- All the sensor inputs that have been programmed as inactive see no signals.
- The AUX input is jumpered or made through an external set of contacts.

A PERMIT signal will NOT be issued if:

- Any of the sensors that have been programmed as active are wet or are not connected.
- Any of the sensors that have been programmed as inactive see a sensor signal.
- The AUX input is not jumpered or made through an external set of contacts.

Retain Sensor Override

Should a driver wish to load over retained product, such as splash blending, the driver must do the following:

1. Connect the API plug from the rack to the optic or thermistor socket on the trailer. The monitor will be in a non-permissive state (Green Permit led will be off).
2. Press the Retain Reset switch. The monitor is now in a permissive state (Green Permit led will be on) and a permit load signal will be sent to the loading rack.
3. The monitor will remain in a permissive state until the API plug is removed from the trailer socket. Then the monitor will switch to a non-permissive state and prevent future loading until the API plug is again connected to a rack.

Troubleshooting

Look up symptoms below and follow step by step instructions.

The PWR LED is not lit.

Measure the voltage on TB1. The input voltage must be between 11 and 24 VDC.

If the voltage is zero or low, work your way up the wiring to the trailer nose plug. Check the inline fuse holder for bad connections and for a blown fuse. Check the wiring and trailer nose plug connections.

Fuse housings may have corrosion that causes the voltage to read low.

If the input voltage to TB1 is correct then replace the monitor.

NOTE: Do **NOT** use a battery charger to power the trailer. A battery charger does not output a pure DC voltage and will damage the onboard monitor.

System powers up and runs through power on test sequence OK, then flashes all sensor LEDs in an alternating pattern:

This means that the monitor is not programmed.

1. Go to the PROGRAMMING section of this manual and program the monitor.
2. If the monitor fails to program, call FloTech for warranty status and an RGA number.

System will not load and one or more RED sensor LEDs are lit in the inactive compartments:

Follow these instructions for top or bottom sensors.

1. Remove onboard monitor cover.
2. Check the sensor inputs on TB3 and TB4 that are not being used (inactive sensor inputs). Make sure there are no wires connected.
3. Go to the PROGRAMMING section of this manual and repeat this procedure, making certain to accurately program the unit.
4. If the monitor still does not function properly, contact FloTech Technical Service for further instructions.

System will not load and one or more RED sensor LEDs are lit in the active compartments:

Follow these instructions for top or bottom sensors.

1. Remove onboard monitor cover.
2. Go to TB3. Remove sensor wire from the terminal block that corresponds with the lit LED. Example: If LED TOP #3 is lit, remove the sensor wire to terminal T3 (RED).
3. Select a compartment where the LED is NOT lit and exchange that wire with the suspect wire. Example: exchange failed sensor wire TOP #3 (RED) with the working TOP #2 wire (GRN).
4. If the lit sensor LED does not move to the new position, the monitor is defective. Example: LED TOP #3 top stays lit after the sensor wires are switched. Replace the onboard monitor chassis with a FloTech model FT207 replacement chassis.
5. If the lit sensor LED moves to the new switched compartment, the problem is with the sensor or wiring. Example LED TOP #3 go out and LED TOP #2 lights, return the wires to the original positions.
6. Open all the sensor caps and check each wiring connection. Look for pinched wires that may short the sensor signal to ground. Also, look for defective crimp connections.
7. Measure voltage across the failed sensor wires (Black to Red). Voltage should measure 8-10 VDC.
8. If steps 6 and 7 check OK, replace the sensor with a FloTech FT150.

NOTE: A quick test of the sensor can be accomplished by connecting the sensor directly to the onboard monitor. Example: Remove sensors wires from monitor ground (WHT) and the TOP sensor 1 (BRN) and connect the sensor to be tested. If the sensor is good the RED TOP #1 LED with NOT light. If the sensor is defective the Diagnostic LED WILL light.

System will not load, has no green AUX LED and no green PERMIT LED, power LED is lit and no red sensor LEDs are lit.

1. Check the TB2 AUX input. This input must have a closed switch or jumper connected to allow the monitor to load. The AUX input has its own green LED. This LED must be lit to send a permissive signal to the load rack.
2. Check to see if a jumper is connected to TB2 AUX. If TB2 AUX has no connections, add a jumper.
3. If TB2 AUX has a wire connection, follow the cable to the switch. This switch is typically connected to a vapor recovery interlock or to a brake air lines interlock. Activate the switch and see if the AUX green LED is lit. If not repair the air switch. If the air switch appears OK, then check the monitor by installing a jumper wire to force the AUX LED on. If the Aux LED can't be forced on, then replace the monitor.

Monitor's PERMIT and AUX LEDs are ON, all sensor LEDs are OFF, but the rack will not load.

This condition usually indicates:

- The sensors and sensor wiring are functioning.
- The monitor has the proper power.
- The AUX connections are OK.
- Defective ground bolt or connections (if equipped).
- Socket output failed or socket wiring problem.

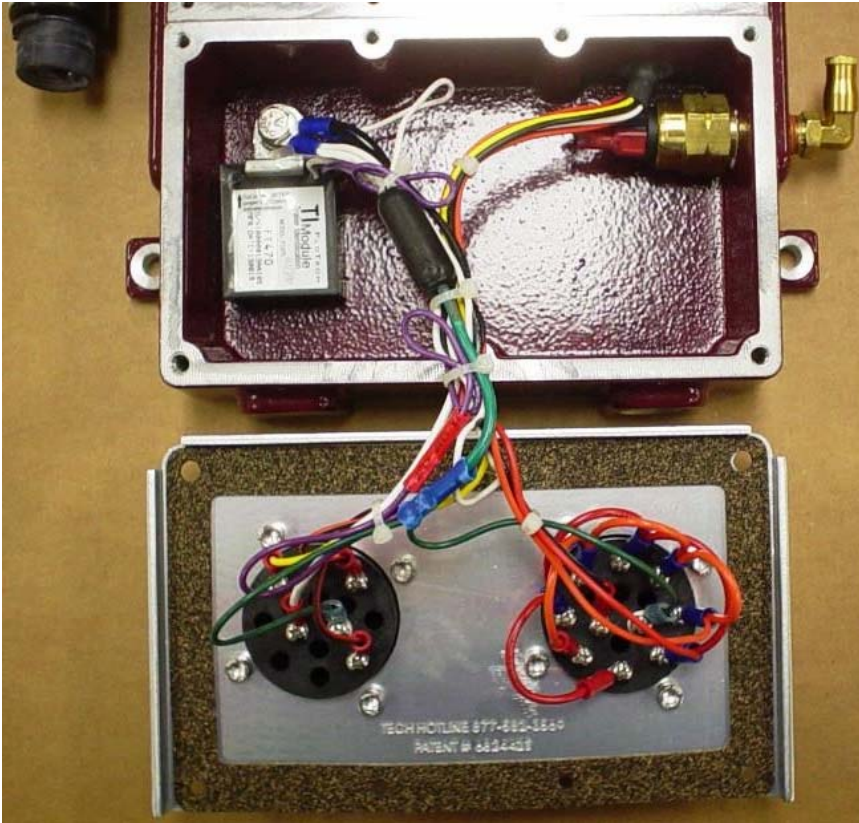
The problem usually lies in the monitor output, socket wiring or the socket itself. To troubleshoot this condition, use the FloTech FT520 Optic System Tester or a Scully Universal Tester

1. Check the system by connecting a FloTech FT520 Optic System Tester or a Scully Universal Tester to the Socket output. Check for a good light on all compartments.
2. If not permissive then check all wiring connections, poor crimp connections, or worn J slots on socket faceplate. NOTE: The ground hog bolt can fail or have a bad ground connection and not allow the tank to load. This is an independent system not part of the overfill system and is prone to problems.
3. If wiring connections check OK, test TB5 on the monitor using the FT520 Optic System Tester. The FT520 Optic System Tester is the only positive way to directly test Optic or Thermistor outputs. Follow the directions supplied with the FT520.

System with Retain sensor will not reset when splash blending.

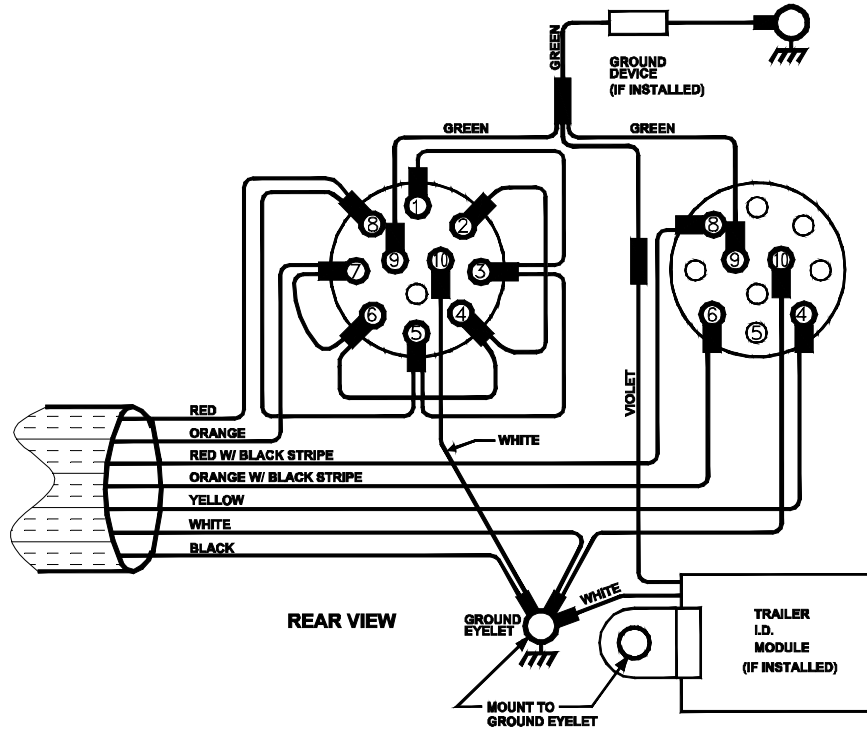
1. Check continuity of reset switch with ohmmeter. When the switch is depressed the contacts are closed. If the switch is failed, then replace with a FloTech 10200A replacement switch.
2. If the switch tests OK, then replace the monitor.

FloTech Programmable CheckMate Retain / Overfill Monitor



WIRING FOR FT208-390 SERIES

FloTech Programmable CheckMate Retain / Overfill Monitor



WIRING SCHEMATIC FOR FT208-390 SERIES

Technical Support Hotline (877) 582-3569

Contact the FloTech Technical Support Hotline for help:

- Troubleshooting overfill systems.
- Verifying defective components
- To request an RGA for defective FloTech products under warranty.