FloTech
FT204P
Programmable
Retain / Overfill
Onboard Monitor

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NOTES:

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Introduction

This Manual describes the features, installation, programming, operation and troubleshooting techniques for the FloTech FT203P Programmable Retain / Overfill Onboard Monitor.

Monitor Features

The FloTech FT203P Retain / Overfill Monitor have the following features:

- Operates on 12 VDC or 24 VDC systems.
- Monitors up to six overfill sensors.
- Monitors up to six retain sensors.
- Connects to Float, Thermistor or Optic style rack connections.
- The monitor is field programmable for the number of sensors.
- Simple Wiring – no jumpers, terminators or dummies required

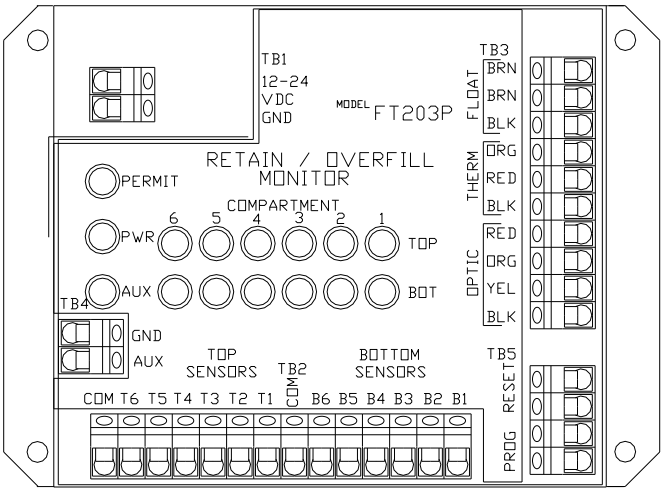


Fig. 1
FT203P Monitor

Monitor Indicators

Refer to Fig. 1.

PWR LED
Yellow LED that indicates power is connected to the monitor.

AUX LED
Green LED indicates the Auxiliary input is permissive.

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.

Monitor Connections

TB1 – 12/24 VDC Power Connections

TB2 – Overfill and Retain Sensor Connections

TB3 – Float, Thermistor and Optic Rack Connections

TB4 – AUX Input Connections

TB5 – Timer/Reset Pushbutton and Programming jumper Connections

Mounting Instructions

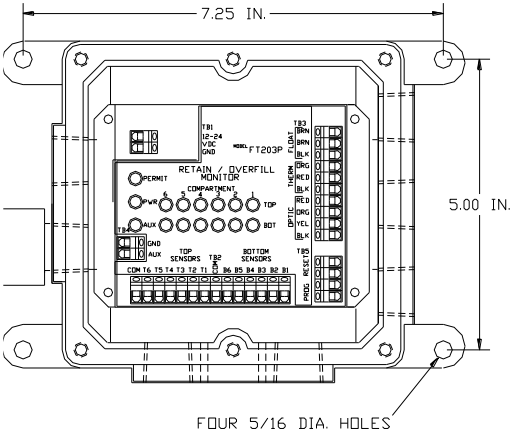


Fig. 2
Mounting Hole Pattern Detail

Monitor Housing

The FloTech model FT204 Retain / Overfill Monitor Housing is typically mounted on the trailer main frame rail, fitting storage box, or any flat surface within easy view of the bottom loading connections. Leave the top cover on the monitor housing and hold it in the position you wish to mount it. Using a black marker, transfer the pattern of the four mounting holes to the mounting surface. **BEFORE** drilling, check 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 3/8-inch nuts and bolts.

Cable Installation Instructions

FloTech recommends you use FT401 jacketed 7-conductor cable when wiring a new system. 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, Overfill Sensors, Retain Sensors (if equipped) and Socket. Route the lengths of FloTech FT401 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.

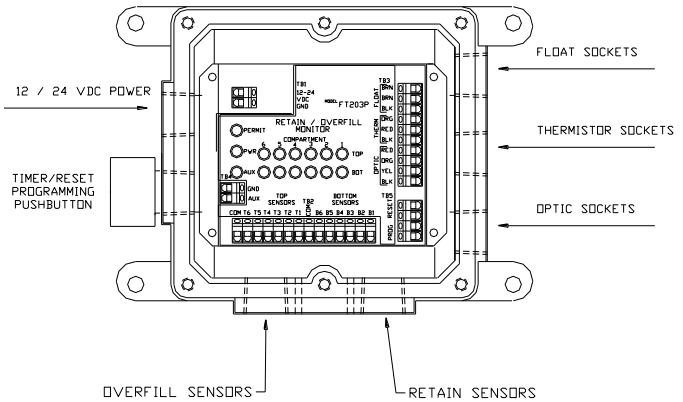


Fig. 3
Monitor Housing Cable Routing Diagram

Wiring Instructions

Proper Wire Connections

Please read this section of the manual before attempting to wire the FloTech FT203P 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 FT401 seven conductor cable to wire the Onboard Monitor System. 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 ensure 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.

BUTT SPLICE CONNECTIONS

FloTech recommends using the FT9022 or equivalent Crimp Tool for securing the Butt Splice connections. Follow this process to secure each connection:

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 ½ 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 Butt Splice 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 butt splice.
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 counterclockwise 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 ensure that a proper connection has been made.

Monitor Wiring Connections

Before attaching wires to the FT203P 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. to wire power to the monitor.

CAUTION: The FloTech FT203P Monitor will **NOT** work on **POSTIVE 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 containing a ½-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 Power Ground wire connects to the TB1 terminal marked GND.

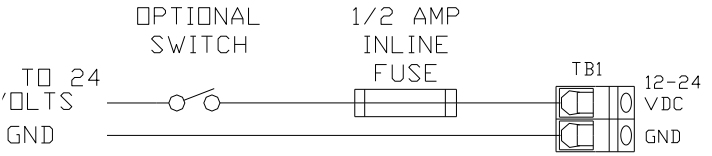


Fig. 4
Monitor Power Connections

TB2 TOP and BOTTOM SENSOR Connections

FloTech recommends wiring the sensors to the FT203P Monitor using FT401 seven wire cable using color code shown in Fig.5. **Complete wiring schematic is shown in back of this booklet.**

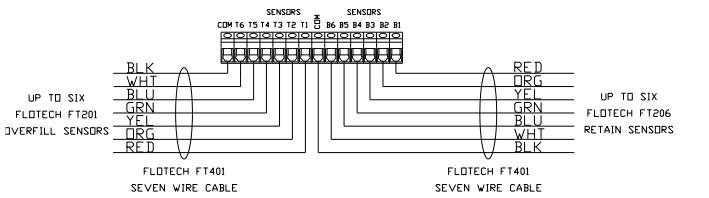


Fig. 5
TOP and BOTTOM Sensor Connections

TB3 Float, Thermistor, and Optic 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 API Optic Socket
- FT301 API Thermistor Socket
- FT302 API Float Socket
- FT303 Optic Contact Pattern with Thermistor J slot
- FT304 Canadian / Euro Thermistor Socket
- FT305 J560 Type Thermistor Socket
- FT306 J560 Type Optic Socket
- FT390 API Dual Thermistor and Optic Sockets

Refer to Figs. 6 through 9 for socket wiring.

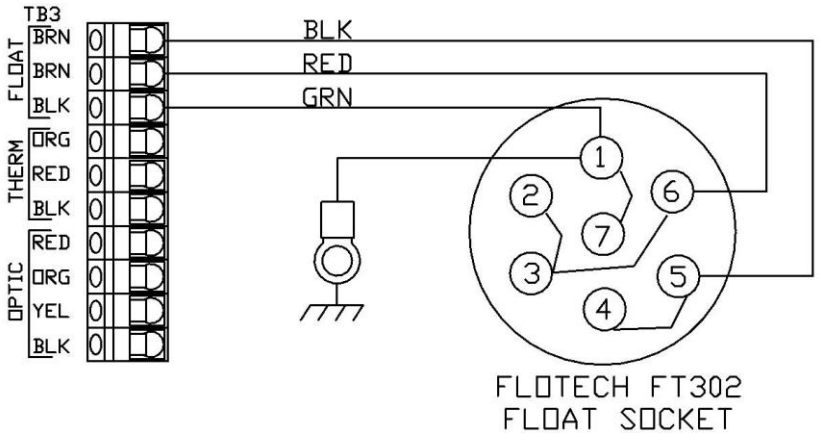


Fig 6.
Float Socket Connections

U.S. Sockets do not use pins 1&2

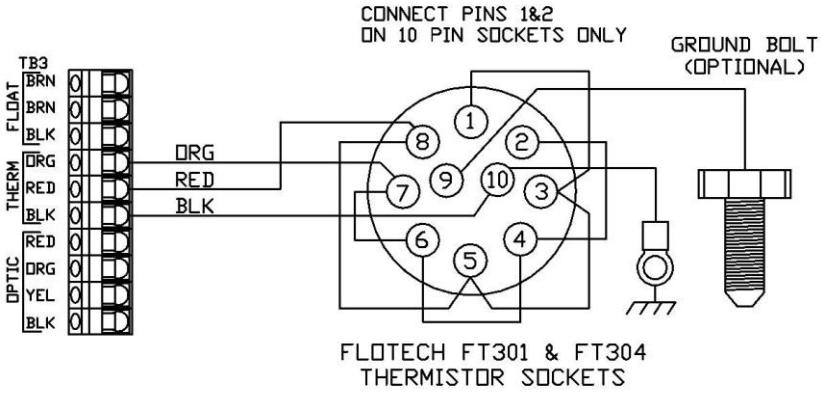


Fig. 7
Thermistor Socket Connections

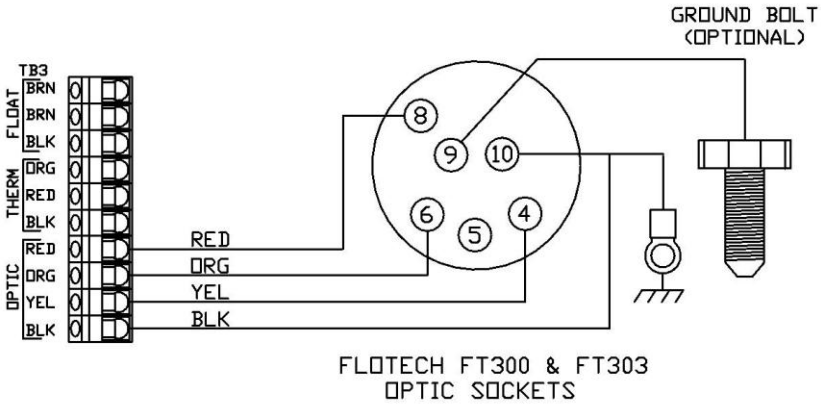


Fig. 8
Optic Socket Connections

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.

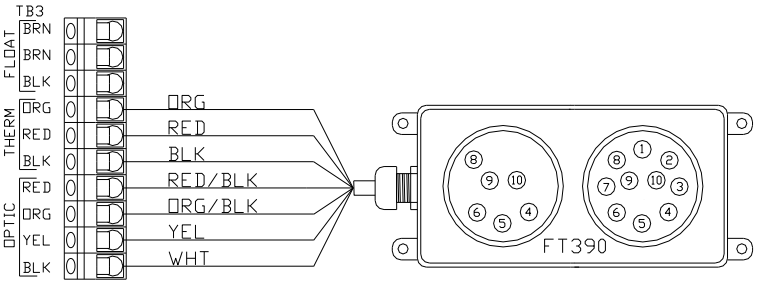


Fig. 9
FloTech FT390 Socket Connections

TB4 AUX PERMIT Connections

Refer to Fig. 6. In order for the FT203P 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 FT203P Monitor issues a PERMIT signal. Refer to the Control Drawing in the back of this booklet for the switch specifications.

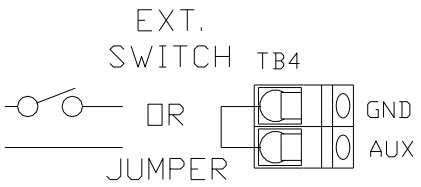


Fig. 6
AUX Terminal Connections

TB5 RESET Connections

Refer to Fig. 7. The Reset/Timer 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 FT203P Monitor will issue a Permit signal to the Rack without regard to the Retain Sensors for up to 90 minutes. 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.

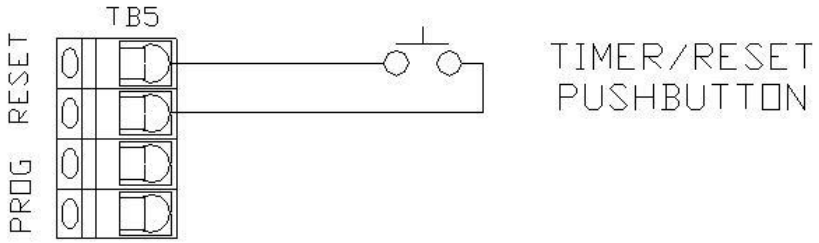


Fig. 7
Timer/Reset and Program Connections

TB5 PROGRAM Connections

Refer to Fig. 7. The FT203P/FT204P 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

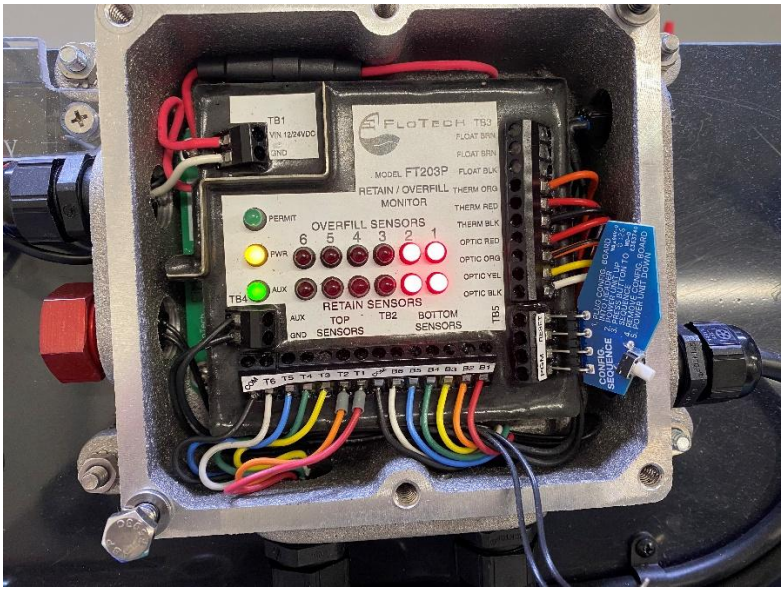
Before the FloTech FT203P Monitor can be put into service, it must be programmed. This procedure informs the monitor which inputs have sensors attached. These inputs are then labeled as ACTIVE sensors. The remaining inputs that do NOT have sensors attached are labeled as INACTIVE inputs. This ensures 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 Timer/Reset button has been pressed.
- All inactive retain sensors are disconnected.
- The AUX input has a jumper or made through an external switch contact.

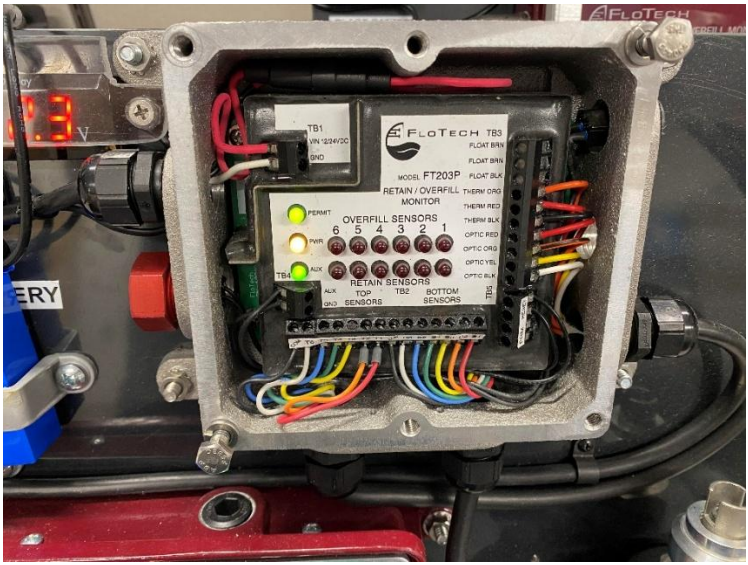
If ANY of the above conditions are not met, the PERMIT signal will not be generated.

Procedure

1) With the monitor off, remove the timer reset wires. Install as shown and then turn power on. Push the button to match the configuration of the trailer. Example: 2 compartment top and bottom.



2) Remove the board with monitor power on.



3) Replace timer reset wires.

Operation

Normal Operation

When power is applied to the FT203P 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 #6 LED then from the BOT #1 LED to the BOT #6 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 see active "dry" sensor signals.
- Any of the Retain sensors are wet and the Timer/Reset pushbutton has been pressed.
- All the sensor inputs that have been programmed as inactive "no sensors" see no signals.
- The AUX input has a jumper 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 does not have a jumper or made through an external set of contacts.

At this time if only the active BOTTOM sensors are wet, the TIMER/RESET pushbutton can be pressed to get a PERMIT signal. This action will keep the PERMIT signal active for approximately 90 minutes.

Troubleshooting

Look up symptom below and follow step by step instructions.

The PWR LED is not lit.

Measure the voltage on TB1. The input voltage must be between 11and 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 Technical Service.

System will not load, and one or more RED sensor LEDs are lit on inactive sensor inputs:

Follow these instructions for top or bottom sensors.

1. Remove onboard monitor cover.
2. Check the sensor inputs on TB2 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 on active sensor inputs:

Follow these instructions for top or bottom sensors.

1. Remove onboard monitor cover.
2. Go to TB2. 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 (yellow).
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 (yellow) with the working TOP #2 wire (orange).

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 FT203P.
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 FT201.

NOTE: A quick test of the sensor can be accomplished by connecting the sensor directly to the onboard monitor. Example: Remove sensors wires from ground (black) and the TOP sensor 1 (red) and connect the sensor to be tested. If the sensor is good the RED TOP #1 LED will **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 TB4 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 TB4. If TB4 has no connections, add a jumper.

3. If TB4 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.
- Bad ground bolt (if equipped).
- Socket output failed.

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 TB3 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 has failed, then replace with a FloTech FT9011 replacement switch.
2. If the switch tests OK, then replace the monitor.

Technical Support Hotline
(877) 582-3569

Contact the FloTech Technical Support Hotline for help:

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