OIL / WATER INTERFACE SINGLE, DUAL, TRIPLE FLOAT SWITCH
MODEL FOWS 40U B & S, FOWS 50U B & S, FOWS 60U B & S

1. GENERAL DESCRIPTION

1.1. Fluid Electronics Oil/Water Interface Sensors by Containment Solutions (Single float model FOWS 40U, Dual float model FOWS 50U, and the triple float model FOWS 60U) provide reliable and accurate monitoring of the oil/water interface level witthin oil/water separators. The buoyancy design of the floats provides precision monitoring of the oil at either one or two different levels.

1.2. The single float model and the top float of the dual float model provide a High Oil alarm when the oil should be pumped out of the oil/water separator. The dual float model also provides a High-High Oil alarm when the oil level has accumulated to the point that the effluent quality of the oil/water separator may be affected. The triple float model is for an automatic oil pump control.

1.3. These sensors can be used in conjunction with CSI's Fluid Electronics' family of Control Panels.

2. FEATURES

2.1. The Single and Dual Sensors are approximately 18" and 20" long respectively and can be installed in all tank diameters. They are available with either a Brass stem (FOWS 40U-B, FOWS 50U-B, or FOWS 60U-B) or Stainless Steel stem (FOWS 40U-S, FOWS 50U-S, or FOWS 60U-S). The sensors are designed for easy and accurate field installation. As an option, the sensors can be installed at the factory before shipment.

2.2. The sensors consist of one, two, or three floats installed on a single stem, with reed switches at fixed positions (one for each alarm condition) hermetically sealed within the stem. The floats are constructed of Stainless Steel with buoyancy designed for the specific gravity of the liquids they monitor.

2.3. "Float stops" are set immediately above and below the switches. These stops limit the movement of the floats on the stem. The "standard" float stem is constructed of ½" diameter brass tubing. An optional Stainless Steel stem is available. As little as a 1/8" movement of a float will actuate its reed switch. The switch is normally in the closed position and opens when the change in liquid level causes the float to move.

2.4. Ten feet of connector wire extends from the top of the sensor. A separate double tap bushing (2" x ½" x ½") is included along with an explosion proof junction box. These items, along with the correct length of contractor provided "positioning" conduit, are assembled by the contractor at the job site, after the tank has been installed, to provide alarm points at the correct oil levels in the tank. The sensor may be located up to 5000 feet from the Control/Alarm Panel.

2.5. The FOWS 40U, FOWS 50U, and FOWS 60U Sensors are intended to be used in conjunction with CSI's Fluid Electronics' control/alarm panels.

3. SENSOR OPERATION

3.1. The sensors are designed for "Vertical" installation in the tops of Oil/Water Separator tanks. The sensor assembly consists of one, two or three floats. The buoyancy design of the floats allows them to float on water and sink in oil. When the float sinks, in the presence of oil, the magnet in the float opens the reed switch. The opened circuit sends a signal to the control panel indicating an alarm condition.

3.2. The single or top float will set off an alarm when the oil buildup reaches the predetermined "High Oil" level.

3.3. The lower float (dual float model only) will alarm when the oil buildup reaches the "High High Oil" level where the water effluent quality will be affected if operation continues without oil removal.

3.4. The triple float sensor is for automatic oil pump operation only. Triple float sensors will start and stop oil pumps at the appropriate oil levels.

3.5. The sensors are designed to operate in WET environments within oil/water separators.

4. SPECIFICATIONS

Floats (1 or 2)	1.6" Dia., Stainless Steel
Float Stem (1)	1/2" Dia. Brass (Stainless Steel Optional)
Connector Cable	2 Conductor AWG, (each switch)
Float Stem Housing	10' Length, PVC coated Die Cast Aluminum Explosion Proof
Single Float Model (FOWS 40U) or Dual Float Model (FOWS 50U)	1/2" NPT Conduit Fitting on top 4' - 10' Diameter Tank
Installation Distance	Up to 5000' from CSI's Fluid Electronics Control Panel
Float Stem Bushing	2" x 1/2" x 1/2" NPT, Cast Iron Construction
Sensors (1 or 2)	Reed type Switch (Hermetically Sealed)
Alarm Set Point	1/8" from Retainer Clip (2 ½" Distance between Alarms on Dual Float Model)
Temperature Range	-20° F to 180° F (-29° C to 82° C)
Pressure	Full Vaccum to 150 PSI
Switch Rating	400 Watts, 3 AMPS at 120 VAC (max)

5. INSTALLATION

CUSTOMER SUPPLIED ITEMS

No.	Description
1	1/2" Nipple
2	1/2" NPT conduit pipe (Dimension "C")
3	1/2" NPT coupling
4	2" Riser pipe
5	2" Pipe coupling
8	4" to 2" Reducer

FACTORY SUPPLIED ITEMS

6	2" x 1/2" x 1/2" Bushing
7	Sensor

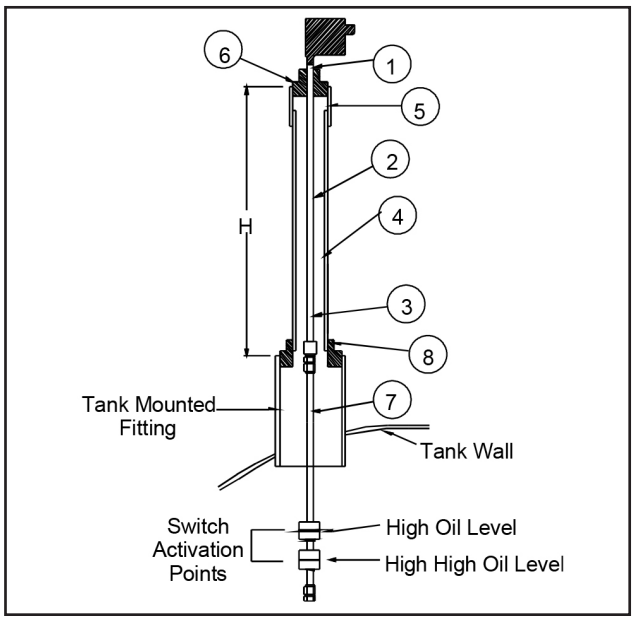
SENSOR PLACEMENT

Note: Aboveground Oil/Water Separator Sensors come in single, double, or triple float. Single float sensors are installed so that the when the float is in the down position it is 1" below the oil draw pipe. A dual or triple float is installed so that the 2nd float is 1" below the oil draw pipe. Always install the sensor in marked fitting and wire in accordance with panel wiring instructions.

5.1. The sensor must be placed in the designated 4" NPT fitting in the top of the Oil/Water Separator tank in the vertical position for proper operation. See Figure 5-1 and follow the steps below to locate the sensor alarm points at the correct positions in the tank.

5.2. After the tank and sensor riser have been installed, the contractor must measure the distance from the top of the sensor fitting, to the top of the riser pipe with the 2" coupling installed (dimension H in Figure 5-1).

Figure 5-1



For the single float model, the sensor will have only one float located at the "High Oil Level" position in Figure 5-1.

H = Field measurement from the top of the 2" coupling to the top of the tank mounted fitting

C = Length of conduit contractor must cut (Table 5-1)

5.3. A length of ½" rigid conduit with male threads at each end, suitable for immersion in the oil/water mixture (brass, stainless steel, PVC, etc.), must be cut to Dimension C in Table 5-1. When this length of conduit is used and assembled as shown in Figure 5-1, the floats will be correctly placed within the tank to provide the correct alarm positions.

5.4. Next connect a ½" coupling to the top of the sensor and then connect the conduit, from Section 5 3, to the coupling. The 10' length of wire must be placed through the coupling and conduit so that it protrudes from the open-end of the conduit.

5.5. Place the wire through the double tap bushing and then screw the bushing into the conduit from Section 5.4. Before lowering the sensor unit into the riser, test the sensor, following the Testing Procedures in Section 6.

5.6. After the sensor has been tested (and passed), screw the double bushing (with the conduit and sensor attached) into position in the riser.

Table 5-1

Tank Diameter	Tank Model	Flow Direction	Dimension C (See Figure 5-1 for H Dimension)
48"	UL CSI 10 CSI 10 CSI 15	Cross or Straight Through	H + 2"
72"	UL CSI 10 CSI 10 CSI 15	Cross or Straight Through	H + 8 ¾"
92"	UL CSI 10 CSI 10 CSI 15	Cross or Straight Through	H + 14 ¾"
120"	UL CSI 10 CSI 10 CSI 15	Cross or Straight Through	H + 21 ¾"

5.7. Connect the sensor cable to the control panel wire according to the Wiring Detail. An explosion proof junction box has been provided in which this connection can be made.

5.8. Upon completion of the wiring connections, test the sensor following the Testing Procedures in Section 6.

Important: These connections must be watertight since these connections will be immersed in the oil/water mixture at all times.

WIRING

5.9. The sensor is wired differently for various control/alarm panels and must be connected correctly with the alarm panel in order for the system to operate properly. See the control panel manufacturer's instructions for the type of wire to be used and for the most recent wiring diagrams.

5.10. Single Float Model Wiring (See Figure 5-2).

5.11. Dual Float Model Wiring (See Figure 5-3).

5.12. See the Panel wiring guide for triple float sensors.

5.13. All conduit and electrical junction boxes must be watertight to prevent intrusion of groundwater or rainwater from entering conduits and junction boxes. Ensure that the wiring meets all local, state and national codes.

Figure 5-2

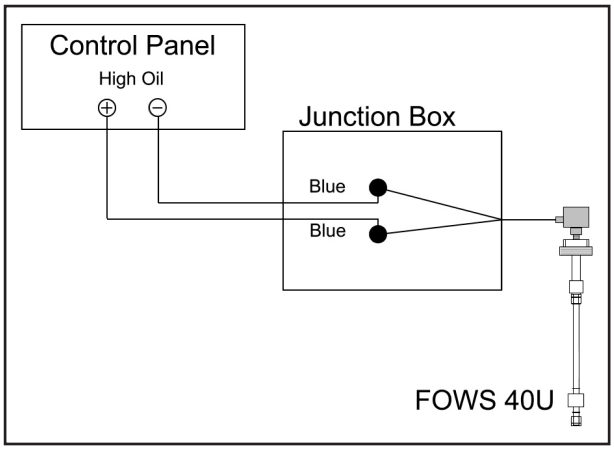
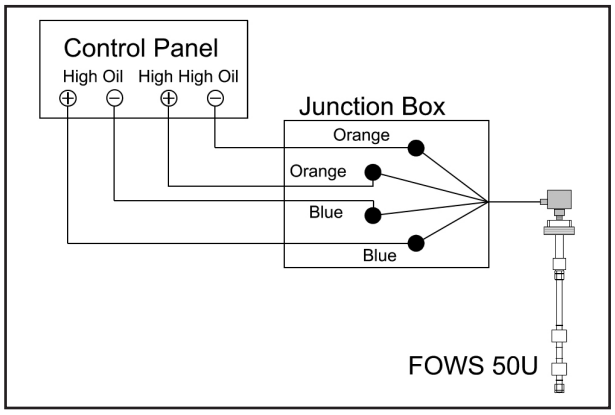


Figure 5-3



6. SENSOR TESTING AND MAINTENANCE

6.1. The sensor consists of one, two or three reed switches and one, two or three floats. To determine if the float switches are functioning properly these steps must be followed prior to installation, at least annually or when an alarm condition exists.

6.2. Prior to Installation

6.2.1. Connect the sensor to the control panel.

6.2.2. While holding the sensor assembly vertically in one hand, allow the floats to rest on the lower retainer clips. Both red LED's (one for the single float model) should illuminate and the buzzer should sound.

6.2.3. While still holding the sensor assembly vertically, lift each float in turn until they touch the upper retainer clips. For the top float or single float, the "High Oil" LED should go out. Next lift the bottom float and the "High High Oil" LED should go out. Now lift both floats and the buzzer should silence.

6.2.4. Reset the alarm panel. The sensor is ready for installation according to Section 5.

6.2.5. Triple float sensors used for automatic oil pump control should be tested in accordance with Section 7 Automatic Oil Pump Out. Section 7 describes the standard float operation if the custom float is purchased please contact Containment Solutions for operation and testing instructions.

6.3. Periodic Testing

6.3.1. Remove sensor from the tank.

6.3.2. Follow steps in Section 6.2.1 through Section 6.2.3.

6.3.3. Reinstall the sensor per Section 5. Reset the alarm panel.

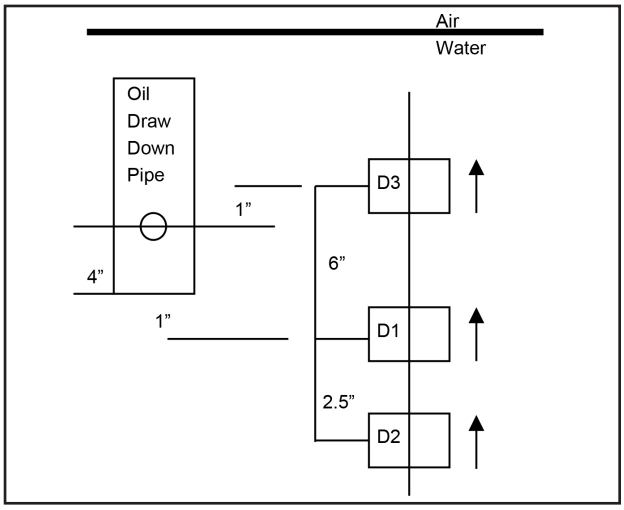
7. AUTOMATIC OIL PUMP OUT

7.1. Condition "A" Pump is De-energized (See Figure 7-1)

7.1.1. No oily/water flow into system

7.1.2. No oil accumulation in tank

Figure 7-1



D3 - Circuit **Closed** when Float **Up** (floating in water or oil) Non-weighted float for turning Pump Off

D1 - Circuit **Open** when Float **Up** (floating in water or oil) Weighted float for turning Pump On

D2 - Circuit **Open** when Float **Up** (floating in water or oil) Weighted float for High Oil Alarm

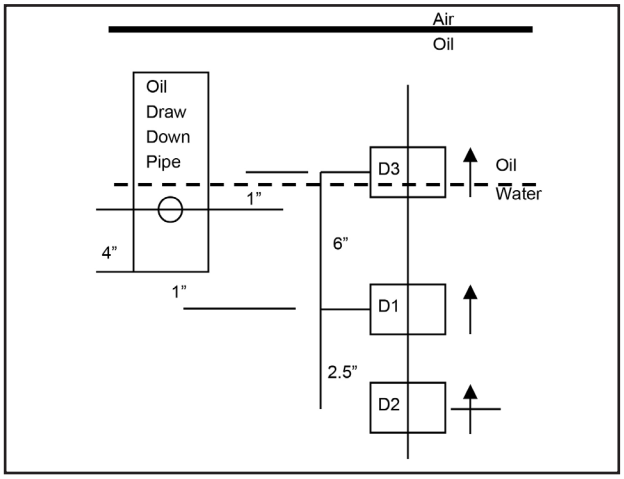
7.2. Condition "B" Pump is De-energized (See Figure 7-2)

7.2.1. An oily/water liquid begins to flow into the system.

7.2.2. Oil begins accumulating in the tank.

7.2.3. The Oil/Water interface drops below Float D3.

Figure 7-2



D3 - Circuit **Closed** when Float **Up** (floating in water or oil)

D1 - Circuit **Open** when Float **Up** (floating in water)

D2 - Circuit **Open** when Float **Up** (floating in water)

7.3. Condition "C" Pump Energizes (See Figure 7-3)

7.3.1. An oily/water liquid continues to flow into the system.

7.3.2. Oil continues accumulating in the system.

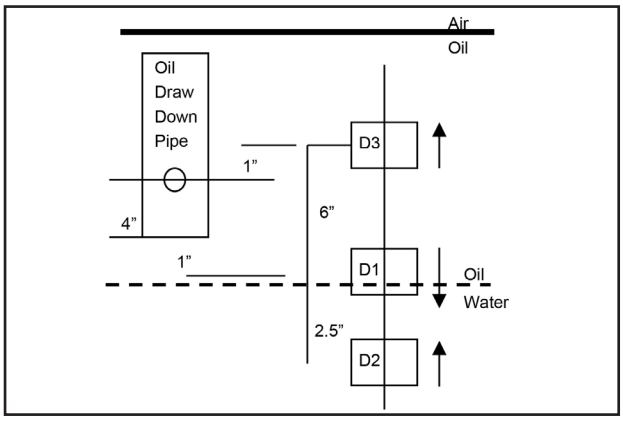
7.3.3. The Oil/Water interface drops below Float D1, energizing the pump.

7.3.4. The pump will de-energize when:

7.3.4.1. Condition D occurs (See Section 7.4).

7.3.4.2. Condition E occurs (See Section 7.5).

Figure 7-3



D3 - Circuit **Closed** when Float **Up** (floating in water or oil)

D1 - Circuit **Closed** when Float **Down** (sinking in oil)

D2 - Circuit **Open** when Float **Up** (floating in water)

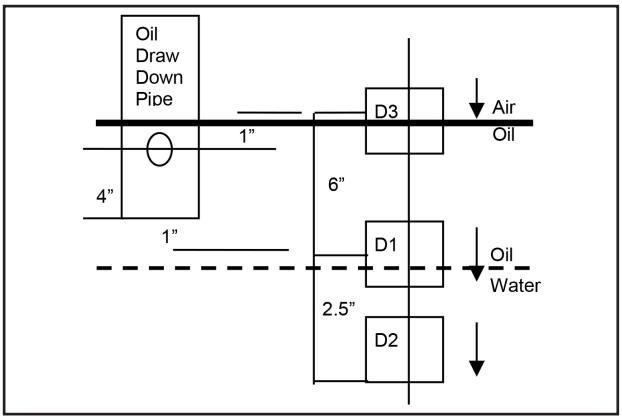
7.4. Condition "D" Pump De-energizes (See Figure 7-4)

7.4.1. Liquid is not flowing into the system or is at a rate less than the oil pump-out rate.

7.4.2. The Oil/Water interface remains below Float D1.

7.4.3. The Air/Oil interface drops below Float D3, thus de-energizing the pump.

Figure 7-4



D3 - Circuit **Open** when Float **Down** (air)

D1 - Circuit **Closed** when Float **Down** (sinking in oil)

D2 - Circuit **Open** when Float **Up** (floating in water)

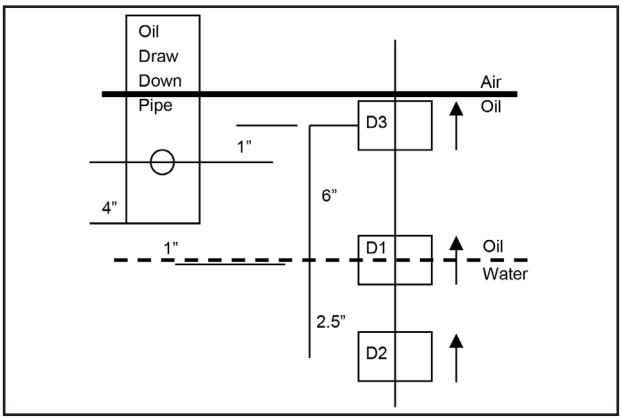
7.5. Condition "E" Pump De-energizes (See Figure 7-5)

7.5.1. Liquid is flowing into the system or at a rate greater than the oil pump-out rate.

7.5.2. The Air/Oil interface remains below Float D3.

7.5.3. The Oil/Water interface drops below Float D1, thus de-energizing the pump.

Figure 7-5



D3 - Circuit **Closed** when Float **Up** (floating in water or oil)

D1 - Circuit **Open** when Float **Up** (floating in water)

D2 - Circuit **Open** when Float **Up** (floating in water)