

# ScuL Sense™

## Scully Five-Wire Optic Overfill Prevention Sensors

Model SP-FU "ScuL-Sense" Series / Installation Instructions (ATEX)

### APPLICATION

The Scully SP-FU Five-Wire Optic Overfill Prevention Sensor employs infrared optic technology to detect the presence of liquid in a tank or vehicle compartment. It is intended to be used either:

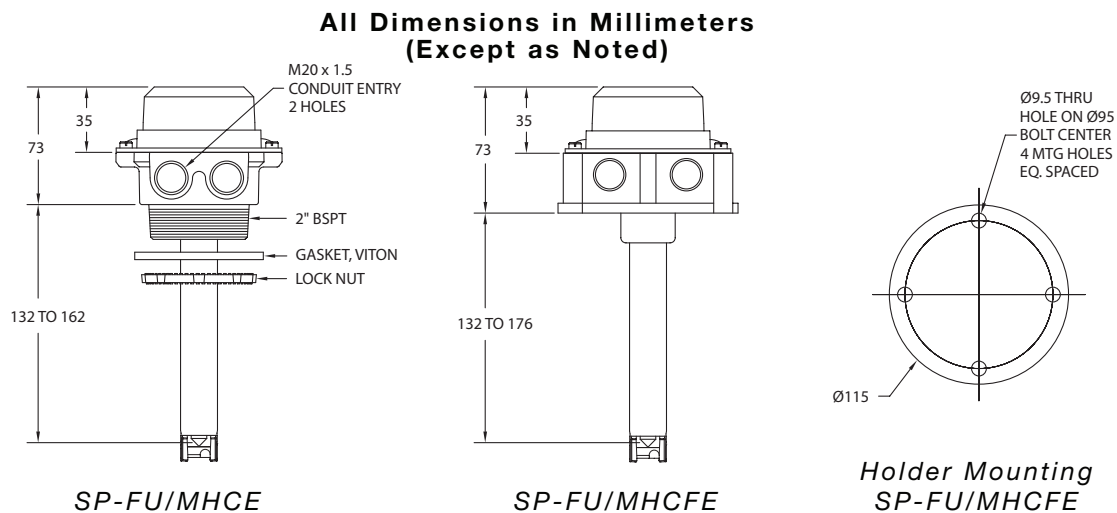
- As part of the Scully IntelliCheck® II Overfill & Retained Product Monitoring System or the Scully Load Anywhere® Monitoring System.
- As a stand-alone overfill prevention sensor in conjunction with the appropriate Scully overfill prevention control monitor mounted at the loading rack or fill stand.

When properly installed in a tank trailer compartment, at a point just above the compartment's normal fill capacity (marker), the SP-FU Overfill Prevention Sensor will sense an impending overfill condition and signal for immediate shutdown.

The SP-FU is available in two different holders for mounting on a tank. The holder(s) provide space for wiring connections inside the holder. Model SP-FU/MHCE is five-wire optic sensor with a 2" BSP threaded holder. Model SP-FU/MHCFE is the sensor with a flanged style holder.

### SENSOR OUTLINE DRAWING

Standard shaft length of 175mm and standard 35mm height holder cover provides sensing level adjustability as shown. Longer shaft lengths and 54mm height holder cover are also available to accommodate most tank trailer mounting configurations (consult factory for details).



### TECHNICAL SPECIFICATIONS

**Operating Temp. Range:** -40°C to +60°C  
**Petroleum Product Range:** Petroleum Blends through #2 Oil  
**Exposed Materials:** Aluminum, zinc, borosilicate (Pyrex®) glass, epoxy, conductive nylon and Viton® seals

**Level Repeatability:** ±1 mm  
**Electrical Leads:** 40 cm long, 0.33 mm<sup>2</sup> (22 AWG)  
**Cable Entry:** Two holes, M20 x 1.5 threads  
**Detection Level and Size:** The detection level is adjustable, refer to sensor outline drawing on preceding page, shown for 175mm shaft length.

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SYSTEMS

61631 Rev C

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**TECHNICAL SPECIFICATIONS (cont.)**

**Approvals:** The sensor is intrinsically safe for mounting in Zone 0 according to ATEX Directive 94/9/EC Ex ia IIB T5 Ga (-40°C ≤ Ta ≤ +60°C)

**BAS98ATEX1225X**

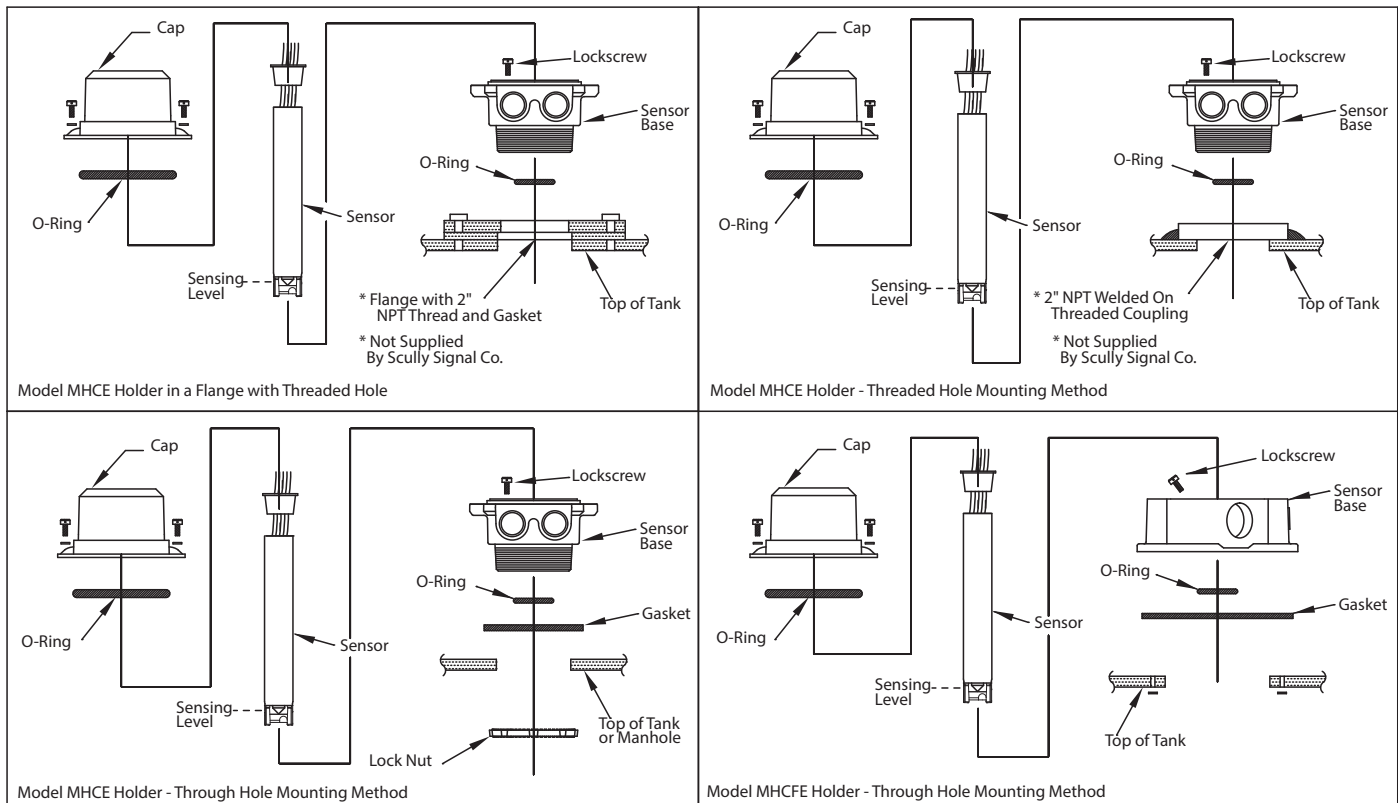


Special Conditions for Safe Use:

- The flying leads should be protected and segregated from other electrical apparatus.
- The flying leads should be connected to terminals which are adequately separated from the terminals of other circuits. The terminals should be located in an enclosure which provides a degree of protection of at least IP20.
- The equipment enclosure is made from light metal which must be protected against impact friction.

**MECHANICAL INSTALLATION**

The sensor is designed to withstand vibrations in road transport. However, the sensor should not be subjected to any mechanical impact as it may damage the sensor.



**MOUNTING LOCATION**

The sensor assembly should be mounted in the top of a tank trailer compartment close to the longitudinal centerline of the tank. In many cases, it is most practical and convenient to mount the sensor holder in the manlid assembly of the compartment. Many manlid manufacturer's provide a threaded or through-hole opening for an overfill prevention sensor in the manlid assembly. In choosing a mounting location other than in the manlid assembly, consider locating the holder in an area where the sensor can be conveniently reached from the access opening in the manlid assembly. This will greatly simplify any future maintenance to the sensor.

**MOUNTING INTO THREADED OPENING**

Sensors with Model MHCE holder may be mounted (threaded) directly into a 2-inch BSP threaded opening (bushing). This is the preferred mounting method as it provides the most secure installation, requiring the least amount of periodic maintenance. When installing the sensor holder in this manner, the gasket and conduit nut is not used. Before installation, always apply a liberal amount of Anti-Seize/Thread Lubricant to the threads of the holder. This will assure a vapor tight joint which will be able to be easily disassembled, if required, in the future. Scully recommends FEL-PRO® C5A® Copper Based Anti-Seize/Thread Lubricant or equivalent.



## MOUNTING INTO THROUGH-HOLE ENTRY

Scully does not recommend this mounting method. If this method is chosen, the Model MHCE sensor holder may be mounted directly through a 60.5 mm (2 3/8 inch) diameter opening (hole) using the nut and gasket supplied. The gasket is positioned on the sensor holder threads outside the opening, and the conduit nut secures the sensor holder to the tank from inside the opening. This mounting method requires the conduit nut be tightened securely against the inside of the tank opening to compress the gasket sufficiently to effect a vapour tight seal. In addition, like all threaded connections subject to vibration, this mounting method requires that the conduit nut be periodically checked for proper and continued tightness. We recommend at least a yearly check.

## FLANGED HOLDER MOUNTING

Sensors with MHCFE style holders (shown in Sensor Outline Drawing) have a 4-bolt pattern to be mounted directly onto a man lid or tank shell. Install the gasket supplied between the holder and the tank. The sensor holder is secured to the tank using (4) four M8 x 25-mm flat head screws, nuts and lock-washers. If there is a mating flange welded on the tank, use appropriate screws to thread into the mating flange. Tighten the screws securely to compress the gasket sufficiently and effect a vapour tight seal.

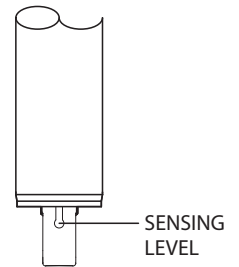
**CAUTION:** Do not install the sensor in aggressive substances that may attack the exposed materials on the sensor.

## SENSING LEVEL - HEIGHT ADJUSTMENT

The SP-FU sensing level is marked on the sensor with an arrow on the prism protector. Adjust the sensing level by loosening the extension shaft locking screw located inside the sensor holder.

After loosening the lock screw, slide the sensor shaft up or down using a twisting motion. Sensor Outline Drawing shows the adjustment range for a standard sensor shaft length of 175mm. Longer shaft lengths and a 54mm high cap are also available. Consult Scully for part numbers. Care must be taken that the cap does not exceed height specifications for the construction of the tank.

The sensor shaft length may be shortened if necessary. See instructions following



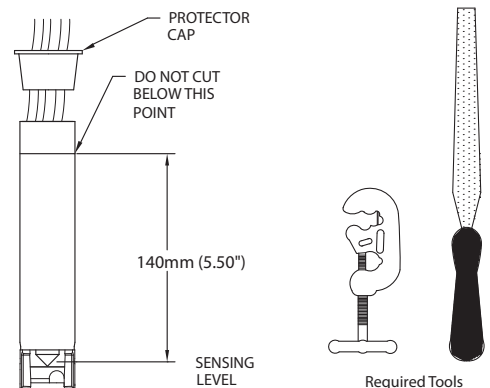
**CAUTION:** The liquid level sensing point for an overfill prevention sensor is generally set at a point 15 to 25mm above the compartment's normal fill capacity (marker). When setting this level, it is important to take into account the ullage remaining in the compartment and the emergency shutdown times at the terminals where the vehicle will be loading. If insufficient ullage remains above the overfill prevention sensor's sensing level to contain the excess product which will flow into the compartment, a spill CAN OCCUR before the flow completely stops. European Standard requires a minimum of 150 liters of product to flow into the tank after the liquid reaches the sensing level.

## SHORTENING THE SENSOR SHAFT

The sensor shaft may be shortened to a minimum of 140mm (5 1/2") when measured as shown. A three (3) wheel tubing (pipe) cutter is required.

Grasp the sensor shaft in a padded vise. **Do not use an unpadded vise.** Crushing the shaft will damage the sensor and void the warranty. Using the pipe cutter, trim the shaft length by carefully cutting away the excess upper part of the shaft.

File the top edge of the shaft both inside and outside. Filing the edge will prevent damage to the sensor holder O-ring. Insert the wire protective cap into the top of the sensor shaft to prevent damage to the sensor wires.



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## SENSOR REPLACEMENT

It should be noted that a sensor can not be repaired. A damaged or faulty sensor (shaft) must be replaced with an equivalent Scully sensor and may be mounted into the existing holder. The O-ring inside the holder may incur damage when removing the faulty sensor. The Scully replacement sensor assembly is supplied with a replacement O-ring for the holder. After removing the faulty sensor from the holder, remove the old O-ring from the O-ring groove located in the bore of the holder using an O-ring pick or other suitable tool. Be careful not to damage the O-ring groove. Apply lubricant, either petroleum jelly or white grease, to the O-ring before installation. Install the new sensor into the holder per the installation instructions.

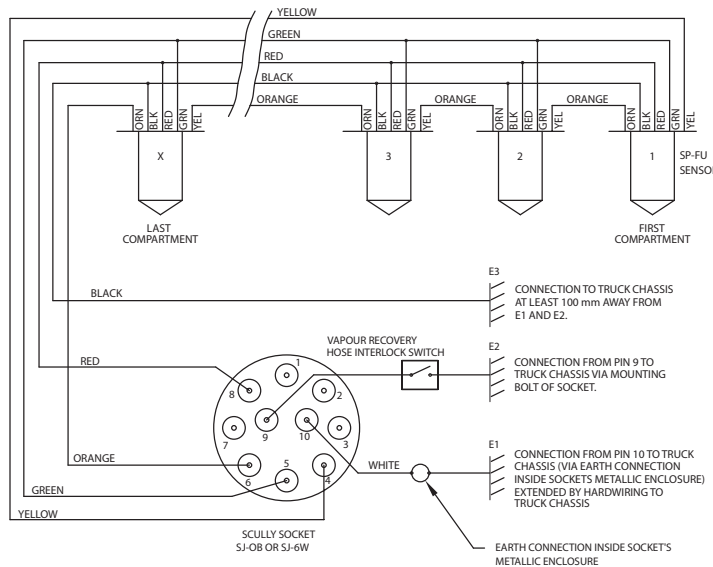
## ELECTRICAL INSTALLATION

All connections between the sensor leads and vehicle (truck) wiring are to be made inside the sensor holder. Use appropriate cable glands for strain relief and watertight installation. If conduit is used, its connections to the holder must be watertight and free from sharp edges. Unused holes must be plugged with blanking plugs. The sensor features five wires: Red (Power), Black (Ground), Yellow (Pulse In), Green (Diagnostic) and Orange (Pulse Out). The connections should be made using crimp connectors or other permanent means. It is suggested that electrically non-conductive grease is applied to the connections to further prevent corrosion problems. Leave sufficient wiring length as service loop in each holder for future maintenance. **DO NOT REMOVE (OR CUT OFF) THE LABEL THAT IS ATTACHED TO ONE OF THE SENSOR WIRES.**

Scully recommends the use of our special cable for wiring on a vehicle. If using conduit, 0.33 mm<sup>2</sup> (22 AWG) or larger wires should be employed. The SP-FU Sensor should be wired in accordance with the appropriate Scully Wiring Diagram.

### Notes:

- Vapour recovery hose interlock switch is connected to pin 6 (of socket) and orange wire (from sensor) in some applications. Consult factory.
- First compartment is the compartment nearest to the cab or tractor.
- Socket SJ-OB has 10 contact pins and 4 J-slots per European standard EN 13922. It connects to SC-8OB plug at the loading terminal. Socket SJ-6W has 6 contact pins and 3 J-slots. It connects to SC-6W plug at the loading terminal.
- In countries where European Standard is not applicable, the E1, E2, and E3 connections to chassis are omitted. Instead, black wire from the sensors is connected to the earth connections inside socket. If vapor recovery hose interlock switch is employed, connect one wire of the switch to pin 6 of socket and the other wire to orange wire from sensor.
- In countries, which employ Scully Ground Bolt, pin 9 of the Scully socket is wired to the Ground Bolt which is mounted on the vehicle chassis.
- If Scully IntelliCheck® II is used on the vehicle, the sensors are wired per IntelliCheck wiring diagram. Consult factory.



Vehicle Wiring per European Standard EN 13922

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