Wire Float Level Sensor Model TG-EL-WF-7-C Model TG-EL-WF-12-C

Installation & Operation Instructions

Manual: SDI-TG-EL-WF-xx-C

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INTRODUCTION

This manual describes the installation and operation of a **TG-EL-WF-xx-C** Wire Float level sensor.

The **TG-EL-WF-xx-C** sensor transmits a 4-20 mA Ullage signal to a Preferred Instruments TG-EL-D4A or TG-EL-D5 tank gauge, and also to a wide variety of PLC, BAS, SCADA and other similar systems.

The **TG-EL-WF-7-C** has a 7 ft (84") range. The **TG-EL-WF-12-C** has a 12 ft (144") range.

The TG-EL-WF-x-C is Intrinsically Safe when installed in a Class I, Zone 0, Group C or D Hazardous Location and connected to an Intrinsically Safe Associated Apparatus, such as the TG-EL-D4A or other I.S. devices or barriers.

WARNING

If this sensor will be located in a hazardous area, then you must follow all instructions in this manual in order to maintain the Intrinsically Safe design and ratings. Failure to follow all procedures voids the intrinsically safe design, and may create a hazardous condition

<u>OPERATION</u>

TG-EL-WF-x-C measures Ullage

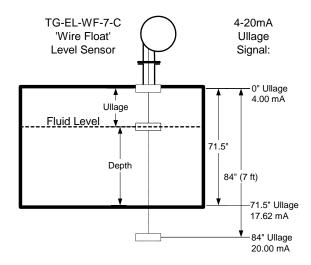
"Ullage" is the distance from the top of the tank to the top of the fluid. **TG-EL-WF-x-C** measures oil tank ullage, and the 4-20mA output is scaled to the ullage distance.

The 4-20 mA output is factory calibrated as shown below. The 4-20mA output is not intended to be custom calibrated to the inside height of each tank.

TG-EL-WF-x-C factory calibration

	Ullage	mΑ	Ullage	mΑ
TG-EL-WF-7-C	0"	4	84"	20
TG-EL-WF-12-C	0"	4	144"	20

The Preferred **TG-EL-D4A** or **TG-EL-D5** tank gauge (or other data acquisition system) scales the 4-20mA signal to inches (or cm) and then determines Fluid Depth as follows: Fluid depth = Inside Height – Ullage.



INSTALLATION

Examine the Shipment

The sensor consists of an aluminum head with 4" integral flange, a float attached to the head via a stainless steel cable, full-faced gasket, 3 butt splice crimp connectors, and epoxy filled waterproof splice kit. If any parts are missing contact the factory for replacements.

The cable storage pulley inside the sensor head has been restrained with a shipping screw and spring at the factory. DO NOT LOOSEN THE "DRAG BRAKE SPRING SCREW" AT THIS TIME.

Verify Job Match

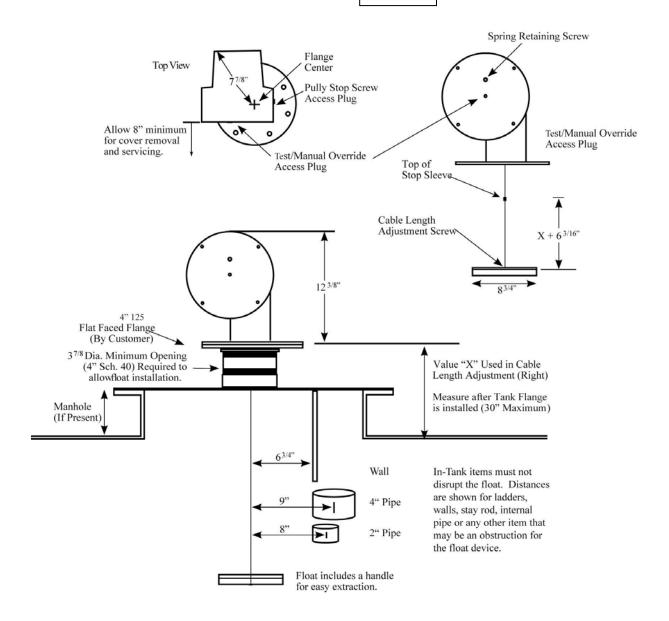
Verify that the tank height is compatible with the **TG-EL-WF-xx-C** range ratings:

TG-EL-WF-7-C 7 ft (84") range **TG-EL-WF-12-C** 12 ft (144") range.

Standard construction is suitable for most petroleum products.

For potentially corrosive liquids, verify the liquid's compatibility with stainless steel, aluminum, Teflon, nylon, and Buna N.

Figure 1



Select Installation location

The level sensor assembly should be installed through a 4" 125# flat faced flange (or 150# flange with raised face removed) in the top of the tank as shown in the figure below. It is recommended that a strike plate be situated directly below the coupling on the bottom of the tank. If the unit is to be standpipe mounted, the standpipe must be less than 30" above the tank I.D.

Sufficient clearance (14" min.) must be provided above the tank flange face to permit installation and removal of the level float assembly.

Make sure there is sufficient clearance inside the tank to prevent the float from touching any obstructions. See the figure below.

When the tank is underground, a suitable chamber and cover should be provided to permit installation and removal of the level sensor assembly. This is especially important when the tank is to be covered with pavement or concrete. Do not bury the level sensor.

Installation

Install a 4" 125# flat faced flange on the tank (flange, and bolts supplied by customer, full face gasket supplied with sensor).

After installing the tank flange, measure the distance "X" as shown on figure 1.

Gently pull the cable from level sensor head until the stop sleeve is visible. Do not pull the cable out with rapid jerking motions. Do not allow the cable to snap back into the housing. Rapid movements in either direction may cause the cable to jump out of the pulley groves.

Insert the cable through the center hole in the float. Then loop it back up and through the offset hole. Adjust the distance from top of the float to the top of the stop sleeve to ("X" + $6^{3}/_{16}$ "), as shown in figure 1.

Wrap the cable 2 times clockwise around the binding screw on the float. Tighten the screw on the float to secure wire at proper length. **DO NOT** over tighten. Cut off excess wire.

WARNING: DO NOT ALLOW THE FLOAT TO FREE-FALL INTO THE TANK!!

Allowing the float to free-fall into the tank can permanently damage the internal sensor.

Put the sensor head on the ground close to the tank flange with the sensor flange facing up. Lay the gasket on the tank flange.

While **slowly** pulling the cable out of the sensor head, lower the float into the tank. Continue to **slowly** pull out the cable until the float is 1-2 ft above the fluid (or the bottom of the tank), and then place the sensor on the tank flange.

Slowly unscrew the spring retaining screw to allow the float to move the final 1-2 ft down to the fluid (or the bottom of the tank).

Remove and discard the **spring**. Securely reinstall the spring retaining **screw**.

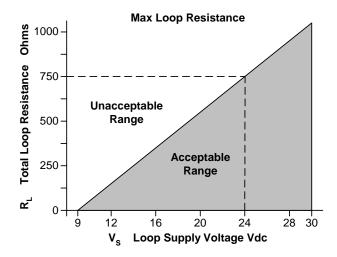
Tighten the tank flange bolts.

Wiring

The TG-EL-WF-xx-C is a 2 wire, loop powered, reverse polarity protected, 4-20 mA level xmtr. Maximum loop power supply voltage: 30 Vdc

White wire: + Black wire: -

See the diagram below for the maximum acceptable total 4-20mA loop resistance:



Acceptable Total Loop Ohms: $R_L \leq ((V_S - 9V) / 0.020A)$

The shielded cable carries low voltage DC; do not run cable in conduits with AC wiring.

Water/Moisture must not contact any of the field wiring. Use the 190271 epoxy encapsulation wiring splice kit to water proof all cable splices in areas that may be wet or damp. Do not encapsulate the wiring splices until after all calibrations and tests are completed.

If mounted in a Class I, Zone 0, Group C or D Hazardous Location, the TG-EL-WF-xx-C is Intrinsically Safe if all of the following are true:

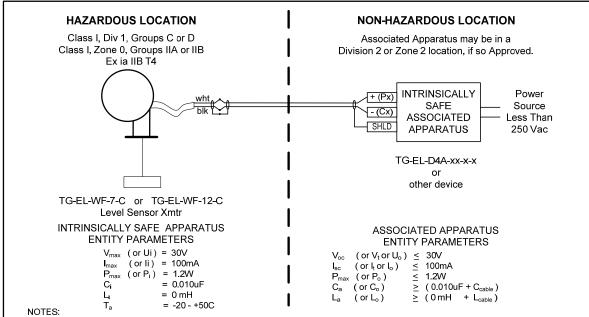
- The TG-EL-WF-xx-C is connected to an Intrinsically Safe Associated Apparatus with I.S. Parameters specified on drawing 190785.
- 2) All other requirements of drawing 190785 are complied with.
- 3) All Installation requirements of the Associated Apparatus are complied with.

The Preferred TG-EL-D4A is a compatible Associated Apparatus.

WARNING Aluminum Housing: Impact or Friction Spark Ignition Hazard

Mount the TG-EL-WF so that it is inaccessible to Impacts or Friction.

Use non-sparking tools when installing or servicing.



- 1. 'Electric Code' means: ANSI/NFPA 70 National Electrical Code, or Canadian Electrical Code, or Local installation Codes, as applicable.
- 2. The Capacitance and Inductance of the field wiring cable from the TG-EL-WF-xx-C to the Associated Apparatus must be calculated and included in the calculations in Note 3. Ccable = Cable Capacitance for the installed length, Ci = Intrinsically Safe Apparatus Internal Capacitance (marked on the device), C_a = Associated Apparatus Max Allowed Connected Capacitance (marked on the device). The same descriptions apply for inductance: L_{cable}, L_i, and L_a. If the cable capacitance and inductance per foot is not known, use: Ccable = 0.0006 uF/foot and Lcable = 0.0002 mH/foot.
- 3. Third Party Listed, Entity Rated, Associated Apparatus can be connected to TG-EL-WF-xx-C **IF** it is suitable for the application **AND** it is installed in accordance with the manufacturers instructions **AND** all wiring is in accordance with the TG-EL-WF-xx-C instructions **AND** it satisfies ALL of the following relationships:

Associated Apparatus

TG-EL-WF-x-C (Intrinsically Safe Apparatus)

If the Associated Apparatus 'Po' is not known, calculate as follows: $P_o = (V_{oc} * I_{sc}) / 4 = (U_o * I_o) / 4$

- 4. Intrinsically Safe wiring from the TG-EL-WF-xx-C to the Associated Apparatus must remain physically separated from non-Intrinsically Safe wiring by means of conduit, raceways, partitions, or tie-downs which permanently maintain at least 2" separation. See the Electric Code and ANSI/NFPA article 504.
- 5. Multiple Intrinsically Safe circuits may be run in the same conduit or raceway IF the total insulation thickness separating conductors of different circuits is at least 0.020" (0.50mm). See ANSI/NFPA 70 article 504.
- 6. TG-EL-WF-xx-C is provided with a permanently connected 6 ft. long cable with ratings: 2 wire shielded cable, 20 ga solid, 350 V, 60 C direct burial rated, conductor insulation: 0.013", jacket insulation: 0.035".
- 7. Associated Apparatus must be installed in accordance with the manufacturer's Control Drawing and in accordance with the Electric Code (ANSI/NFPA 70 article 504 in the U.S., Section 18 of the Canadian Electric Code in Canada).
- 8. When required by the Associated Apparatus manufacturer's Control Drawing, The Associated Apparatus must be connected to a suitable ground electrode per the Electric Code. The resistance of the ground path must be less than 1 ohm.
- 9. Associated Apparatus must not be used in combination unless permitted by the Associated Apparatus certification.
- 10. WARNING: No User serviceable Parts. Return to factory for all repairs.

PROPRIETARY INFORMATION NOTICE					Prefe	rred Utilities
PROPRIETARY INFORMATION NOTICE					31-35 Sc	outh St., Danbury, CT
THIS DOCUMENT CONTAINS PROPRIETARY	6	Put NEC Section References back in per UL	12/7/10	PL	TO EL ME	
INFORMATION OF PREFERRED UTILITIES AND IS		Removed specific NEC section references	11/22/10	PL	TG-EL-WF-xx-C	
SUBMITTED IN CONFIDENCE SOLEY FOR THE	4	per UL comments	9/22/10	PL	Intrinsically S	Safe Entity Parameters
PURPOSE OF USE BY THE SELLER/PURCHASER IN CONSIDERING THE MERITS OF THE	3	rev Ta range	9/1/10	PL	Cor	ntrol Drawing
DOCUMENT, NO OTHER USE, DIRECT OR 2		Major revision per UL Investigation.	2/25/10	PL		
INDIRECT, OF THE DOCUMENT OR INFORMATION	1	"Compatible" + alternate Entity symbols	8/2/09	PL	DRAWN: PL 8/4/09	190785
	REV.	DESCRIPTION	DATE	BY	SCALE: none	130703

Note: This drawing is part of the Intrinsic Safety Design and Approval. Do not implement any changes without the approval of the Preferred Eng Mgr and the Approval Agency.

CALIBRATION

The 4-20 mA output is factory calibrated as shown below:

	Ullage	mΑ	Ullage	mΑ
TG-EL-WF-7-C	0"	4	84"	20
TG-EL-WF-12-C	0"	4	144"	20

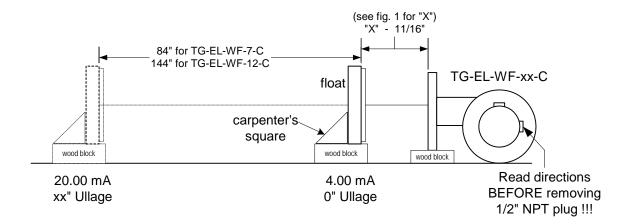
The 4-20mA output is not intended to be custom calibrated to the inside height of each tank. The 4-20mA output does not need to be calibrated during installation, and does not need routine re-calibration.

This procedure is provided for those who wish to check the calibration of the TG-EL-WF-xx-C. While re-calibration in the field can be accomplished, it is not normally required.

Test / Calibration Procedure:

- Remove the TG-EL-WF-xx-C from the tank. NOTE: Do not allow the TG-EL-WF-xx-C flange to rest on the wire cable for the float. This can put a 'kink' in the wire cable
- 2. Setup the TG-EL-WF-xx-C as shown below
- 3. Verify that the float is attached to the wire float cable as detailed in figure 1 in the installation section.

- 4. Connect the TG-EL-WF-xx-C to a 24Vdc power supply and a precision mA test meter.
- Move the float to the 4mA and 20 mA positions and check the mA signal to determine if the mA output needs to be recalibrated.
- 6. If re-calibration is required, re-check step 3.
- 7. Clean the area around the ½" pipe plug shown in the sketch. position a clean container under the pipe plug to catch the silicone oil that may flow out as the pipe plug is removed.
- 8. Remove the pipe plug to provide access to the 4-20mA calibration trim pots.
- Position the float at the 4.00 mA position and adjust the "4" trimpot until the output is 4.00 mA.
- 10. Position the float at the 20.00 mA position and adjust the "20" trimpot until the output is 20.00 mA.
- 11. The 4 and 20 adjustments affect each other. Repeat steps 9 & 10 until both values are correct.
- 12. Pour the silicone oil back into the wire float and replace the plug. The oil should not fill the cavity, the level should be just above the cavity centerline.



NOTES

Preferred Utilities Mfg. Corp. www.preferredutilities.com

31-35 South Street Danbury, CT 06810 Pone: (203) 743-6741 (203) 798-7313 Fax:

Email: info@preferred-mfg.com