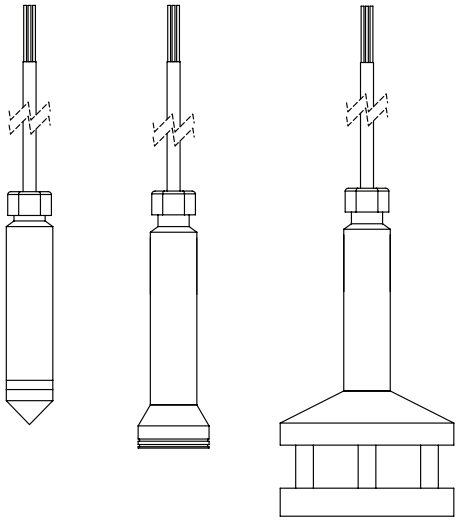


ProSense®

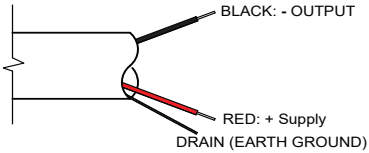
Installation Guide

GPLT/NFLT Series Submersible Level Sensors

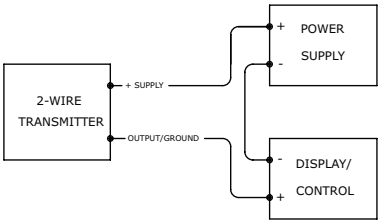
Wiring - Cable

4-20mA - IS Approved

Transmitters approved for use in hazardous areas



2-Wire Current Loop



Accessories:

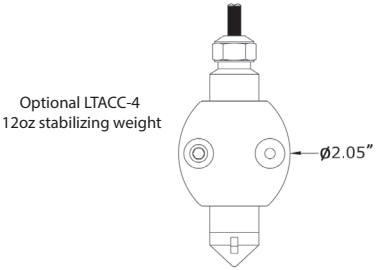
Drying Tube Assembly (LTACC-2) - Clear tube filled with indicating desiccant, attaches directly to cable vent tube, intercepts water vapor. Highly recommended when operating in high humidity conditions. Must be periodically renewed as desiccant becomes saturated, turning color from blue (dry) to pink (saturated). Purchased separately.

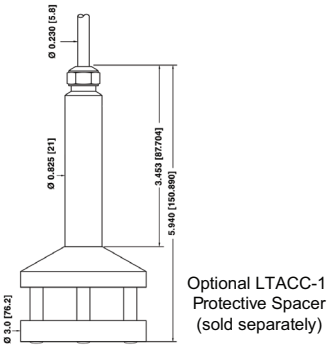
Bellows Assembly (LTACC-3) - Alternative to the drying tube, this aneroid bellows attaches to cable vent tube and requires no periodic maintenance. Note that the use of the bellows results in a closed reference pressure system subject to zero shift errors induced by changing temperatures of up to 0.0004 PSI/ °C. Not recommended for use with accuracy requirements of ±0.25% FS or better, or ranges < 2 PSI. Purchased separately.

Termination Enclosure (LTACC-5) - Convenient option complementing level transmitters, where it is desired to terminate the transmitter cable close to the measurement point. It includes a NEMA 4X clear front enclosure (7.9 X 4.7 X 3.5 inches) with two, liquid-tight cable fittings (one in, one out), a terminal strip, and ample room for mounting a drying tube or bellows assembly. Purchased separately.

Stabilizing Weight (LTACC-4) - Zinc prop shaft anode adapted to fit Ø21 mm O.D. of ProSense submersible level transmitters. Aids in corrosion resistance as well as helps ensure that the cable remains taut in turbulent conditions. Purchased separately.

Protective Spacer (LTACC-1) - Built for the ProSense NFLT wastewater level transmitter, the protective spacer anchors the ProSense NFLT in place while positioning the sensing diaphragm off the bottom to avoid false readings caused by sludge and debris. Purchased separately.





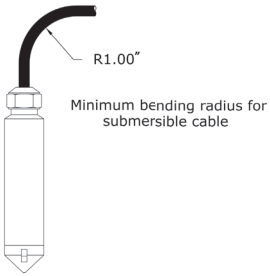
Installation:

Transmitter Submersion - Damage to submersible cable can lead to failure of the transmitter. ProSense submersibles employ a rugged cable jacket materials to minimize the risk of cuts and abrasion. Still, take care when lowering your transmitter into the well, making sure the cable does not drag over sharp edges. Avoid dropping the transmitter from the surface. Do not submerge electrical connection end of cable.

Condensation protection – Sensors cable vent size are optimized to minimize the occurrence of water vapor incursion. In areas of high humidity, it may be desirable to use a Drying Tube Assembly (desiccant) or Bellows Assembly to prevent water vapor from entering the vent tube.

Condensation protection – Sensors cable vent size are optimized to minimize the occurrence of water vapor incursion. In areas of high humidity, it may be desirable to use a Drying Tube Assembly (desiccant) or Bellows Assembly to prevent water vapor from entering the vent tube.

Bending of Cable - ProSense submersibles jacketed cables are quite flexible. However, care must be taken to ensure the vent tube integral to the cable is not crimped when bending the cable to suit your installation. It is recommended that the cable not be bent to a radius smaller than 1 inch.



Cable Compression - Many users employ a compression fitting to secure the cable as it enters a junction box. Care must be taken that the fitting is not over tightened, causing damage to the cable and/or crimping the vent tube.

Position Sensitivity - The transmitter should be installed in a vertical position, otherwise it may exhibit an offset. If the transmitter must be installed in any position other than vertical, measure the output with no pressure applied prior to connection to your display, PLC, or controller. Use the measured value for your zero point.

Safe Handling - Safe handling of ProSense submersible pressure measurement devices is accomplished if a nominal amount of care is taken.
Things to **avoid** are:
- Sharp impact against hard surfaces
- Contact with chemicals known to be corrosive to the materials of construction
- Probing of pressure sensing membrane with ANYTHING

Limits of Pressure - ProSense submersible pressure sensors, transducers and transmitters are designed to withstand a certain amount of overpressure without damage or calibration shift. It can range from 15X for the lower pressure ranges to 1.1X for the highest ranges. This value is different for each product and is referred to in the technical pages as “proof pressure”. It is the user’s responsibility to ensure that the proper product is chosen for the particular pressure conditions expected.

Environmental conditions - Each product is designed to be compatible with a particular environment. It is the user's responsibility to ensure that the product is not exposed to an environmental condition for which it is not designed. These conditions can include operating temperature range and exposure to high-pressure water jets, media not compatible with the materials of construction, or potentially explosive atmospheres for sensors without intrinsically safe approval.

Electrical conditions - Each product is designed to operate properly within a specific range of electrical conditions. The specific product label defines the rating(s), if any, that applies to the product to which it is affixed. All transmitters are designed to withstand reverse polarity as well as over voltage to a certain extent. It is the user's responsibility to ensure that all electrical connections are made to the products in accordance with recommendations as well as local electrical code. Wire colors or connector pin-outs are either printed on the label affixed to the product or provided separately.

Cleaning - WARNING! Under no circumstances should the membrane or nose cap to the level sensor be probed with any object. Damage to the sensing membrane is permanent and, in most cases, requires replacement.

Regarding media-isolated products, should the nose cap to the transmitter become fouled, it may be cleaned in the following manner:

The device should be slowly lowered membrane-end into a solution of warm, soapy water. Agitate in the solution for 20-30 seconds or until the input/nose cap to the device is clear. Finish by stirring in fresh water. Wipe dry with a soft rag or towel.

A soap scum and hard-water stain remover may also be used, if necessary, but only after compatibility with any o-ring seals in the product is determined. Follow the solvent manufacturer's recommendations for safe handling.

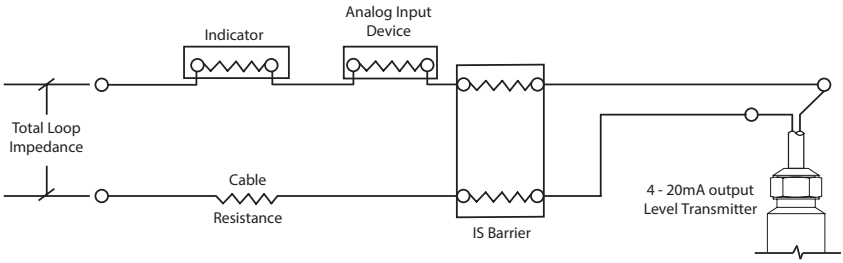
Supply Voltage - Adequate supply voltage is critical to ensure proper operation of 4-20 mA level transmitters. Without the minimum required voltage available at the transmitter, the transmitter will not output the correct analog value.

Many analog transmitters will appear to operate properly even when the supply voltage is not adequate to power the loop when the transmitter should be outputting 20 mA. For example, a 10 volt supply may appear to be enough to power an analog transmitter when it is outputting 4 mA with zero pressure applied, but as the transmitter's output increases with increasing pressure, voltage drops across other devices in the loop (analog input devices, cable and/or external barrier devices) may reduce the supply voltage to the transmitter and prevent it from providing the correct output above a certain input pressure/level threshold.

ProSense submersible 4-20 mA level transmitters feature microprocessor-based signal conditioning. During power up, the circuit performs a check sequence which determines whether there is sufficient supply voltage to power all devices on the loop, by setting the output to ~110% of the maximum value, i.e., ~22.5mA. If the supply voltage is not sufficient to supply 22.5 mA to the circuit, then the maximum possible current will be seen on the analog output, e.g., 17mA, and the transmitter will not initiate normal operation.

The benefit of this technology is that total loop impedance is accounted for prior to placing the equipment into service, preventing false indications when the voltage supply is insufficient to support the loop with maximum pressure applied.

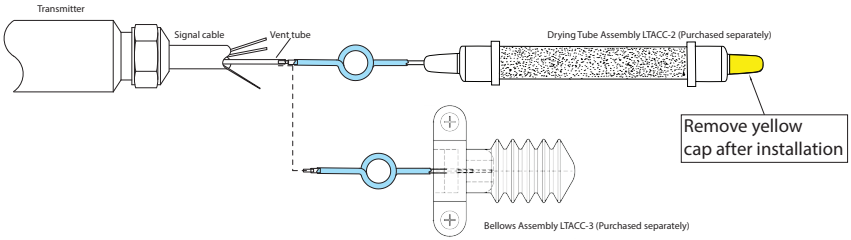
Most current loops contain analog input devices, indicators or other components having input impedances which must be considered when calculating the supply voltages needed. For example, an analog input device with a 250 Ohm Input Impedance will require an additional voltage of 5.5 VDC (250 x 0.022 = 5.5) in addition to the minimum supply voltage necessary for the transmitter to operate properly over the entire range.



Note: Control drawing GPLT/NFLT-HAZ-DWG should be referenced for all hazardous area installations.

Reference Tube

The hollow tube in the center of the cable attached to vented transmitters is an atmospheric vent for the level sensor, in order that normal changes in local barometric pressure do not affect the level transmitter accuracy. At a minimum this tube should be terminated in a clean, dry area that is vented to atmosphere. Ideally the tube should be connected to a desiccant dryer or to an aneroid bellows as shown.



Supply Voltage

	Supply	Current	Load resistance
4-20mA - IS Approved	11...30 VDC	3.2-22 mA	<(Supply-11V)/0.022A
Start-up time	250 ms		

Nominal supply values may be higher depending upon cable length. Internal lightning protection increases the minimum-required supply voltage from 8VDC to 11VDC, due to internal resistance of the surge protectors.

In addition, cable loop resistance (~76Ω / 1000ft) adds to the supply requirement. In order to ensure proper system operation, calculate the minimum required supply voltage (at the source) as follows:

For internal only protector (standard with 4-20mA output):
MINIMUM SUPPLY VOLTAGE = 11 + 0.022 (CABLE LENGTH x 0.076) VDC

For two-part (internal+external) system (recommended):
MINIMUM SUPPLY VOLTAGE = 11.6 + 0.022 (CABLE LENGTH x 0.076) VDC

Warranty

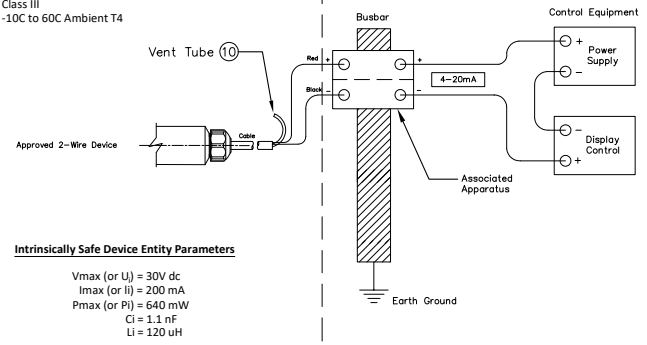
Level transmitters are warrantied for a period of 2 years from date of purchase against defects in materials and workmanship.

For further details visit www.automationdirect.com

Hazardous Location

Class I, Division 1, Groups A,B,C and D,
Class I, Division 2, Groups A,B,C and D,
Class II, Division 1, Groups E,F and G,
Class III
-10C to 60C Ambient T4

Non-Hazardous Location



Intrinsically Safe Device Entity Parameters

Vmax (or U_i) = 30V dc
Imax (or Ii) = 200 mA
Pmax (or Pi) = 640 mW
Ci = 1.1 nF
Li = 120 uH

Notes:

1. Cable parameters: L = <.36 uH/ft where C_c = conductor -to- conductor.
C_c = <20pF/ft C_s = conductor -to- shield.
C_s = <30pF/ft
R = 37.7 ohm/1000ft

2. Selected associated apparatus must be third party listed as providing intrinsically safe circuits for the application, and have Voc or Vt not exceeding Vmax (or Uo not exceeding Ui), Isc or It not exceeding Imax (or Io not exceeding Ii), and the Po of the associated apparatus must be less than or equal to the Pmax or Pi of the intrinsically safe equipment, as shown in Table 1.

3. Associated apparatus output current must be limited by a resistor such that the output voltage-current plot is a straight line drawn between open-circuit voltage and short-circuit current.

4. Cable shield is connected to the transmitter housing. To avoid potential ground loops, any earth connection of the shield must follow local codes. Refer to Article 504.30(B) of the National Electrical Code (ANSI/NFPA 70), Instrument Society of America Recommended Practice ISA RP12.06 for installing intrinsically safe equipment, and or Section 18 of the Canadian Electrical Code.

5. Capacitance and inductance of the field wiring from the intrinsically safe equipment to the associated apparatus shall be calculated and must be included in the system calculations as shown in Table 1. Cable capacitance, Ccable, plus intrinsically safe equipment capacitance, Ci, must be less than the marked capacitance, Ca (or Co), shown on any associated apparatus used. The same applies for inductance (Lcable, Li and La or Lo, respectively). Where the cable capacitance and inductance per foot are not known, the following values shall be used for two or three core cables: Ccable = 60 Pf/FT., Lcable = 0.2 µH/ft.

TABLE 1:

IS. Equipment		Associated Apparatus
Vmax (or Ui)	≥	Voc or Vt (or Uo)
Imax (or Li)	≥	Isc or It (or Io)
Pmax (or Pi)	≥	Po
Ci + Ccable	≤	Ca (or Co)
Li + Lcable	≤	La (or Lo)

UL Hazardous Location Control Drawing			GPLT/NFLT-HAZ-DWG			AutomationDirect.com 1-800-633-0405	
3rd ANGLE	NOT TO SCALE	PART DIMENSIONS MAY DIFFER SLIGHTLY DUE TO MANUFACTURER'S VARIANCES	METRIC UNITS USED FOR PART DESIGN	UNLESS OTHERWISE SPECIFIED UNITS ARE:	inch [mm]	LATEST VERSION Rev A 8/21/2023	SHEET 1 OF 3

6. Associated apparatus must be installed in accordance with its manufacture's control drawing and article 504 of the National Electrical Code (ANSI/NFPA 70) for installation in the United States, or section 18 of the Canadian Electrial Code for installations in Canada.

7. The intrinsically safe device does not provide 500 V isolation with respect to earth. Associated apparatus used must be galvanically isolated or dual channel shunt zener diode barriers with linear outputs used channel to channel.

8. Associated apparatus must not be used in combination unless permitted by the associated apparatus certification.

9. Control equipment must not use or generate more than 250 V rms or dc with respect to earth.

10. Cable vent tube, if present, must be terminated in the hazardous area.

11. The approved device is provided with a permanently connected cable having the following characteristics:

Type: XLPE jacketed vented cable
Rated Voltage: 500V
Rated Current: 2.2A
Maximum Rated Temperature: 80C
Conductor size: 26 AWG
Insulation type:
    Conductors: Polyethylene
    Outer Jacket: XLPE
Insulation thickness:
    Conductors: 0.012" minimum
    Outer Jacket: 0.025" minimum

12. Additional Ratings

Input Pressure Rating: 45 psig (NFLT), 400 psig (GPLT)
Operating Temperature: -10C to 60C, Ambient T4
Humidity: Up to 100%
Altitude: 2000m Max
Cleaning:
    The device should be slowly lowered membrane-end first into a solution of warm, soapy water. Care should be taken not to submerge the entire device, unless it is specifically designed for continuous submergence. Agitate in the solution for 20-30 seconds or until the input/nosecap to the device is clear. Finish by stirring in fresh water. Wipe dry with a soft rag or towel. A soap scum and hard-water stain remover may also be used, if necessary, but only after compatibility with any o-ring seals in the product is determined. Follow the solvent manufacturer's recommendations for safe handling.

Intrinsically Safe / Sécurité intrinsèque

WARNING: Approved devices may optionally contain titanium. Care must be taken in the installation to avoid an ignition hazard due to impact or friction.

AVERTISSEMENT : Les dispositifs approuvés peuvent éventuellement contenir titane. Il faut veiller à ce que l'installation ne soit pas un risque d'inflammation dû à un choc ou à un frottement.

UL Hazardous Location Control Drawing			GPLT/NFLT-HAZ-DWG			AutomationDirect.com 1-800-633-0405	
3rd ANGLE	NOT TO SCALE	PART DIMENSIONS MAY DIFFER SLIGHTLY DUE TO MANUFACTURER'S VARIANCES	METRIC UNITS USED FOR PART DESIGN	UNLESS OTHERWISE SPECIFIED UNITS ARE:	inch [mm]	LATEST VERSION Rev A 8/21/2023	SHEET 2 OF 3

The devices listed below are approved for installation in a Class I, Div I, Groups A-D, Class II, Div I, Groups E-G and Class III hazardous location when connected to associated apparatus per the manufacturer's control drawing.

GPLT

Base Part Number: GPLT-aaa-Lbbb

Where:

aaa = pressure range in psi: all values valid

bbb = cable length in feet (2 or 3 digits): all values valid

NFLT

Base Part Number: NFLT-aaa-Lbbb

Where:

aaa = pressure range in psi: all values valid

bbb = cable length in feet (2 or 3 digits): all values valid

UL Hazardous Location Control Drawing			GPLT/NFLT-HAZ-DWG				AutomationDirect.com 1-800-633-0405
3rd ANGLE	NOT TO SCALE	PART DIMENSIONS MAY DIFFER SLIGHTLY DUE TO MANUFACTURER'S VARIANCES	METRIC UNITS USED FOR PART DESIGN	UNLESS OTHERWISE SPECIFIED UNITS ARE:	inch [mm]	LATEST VERSION Rev A 8/21/2023	SHEET 3 OF 3