

+GF+ SIGNET 2222 Magnetostrictive Level Sensors

English



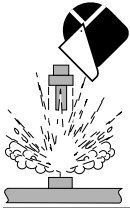
3-2222.090



C (10/01) English

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SAFETY INSTRUCTIONS

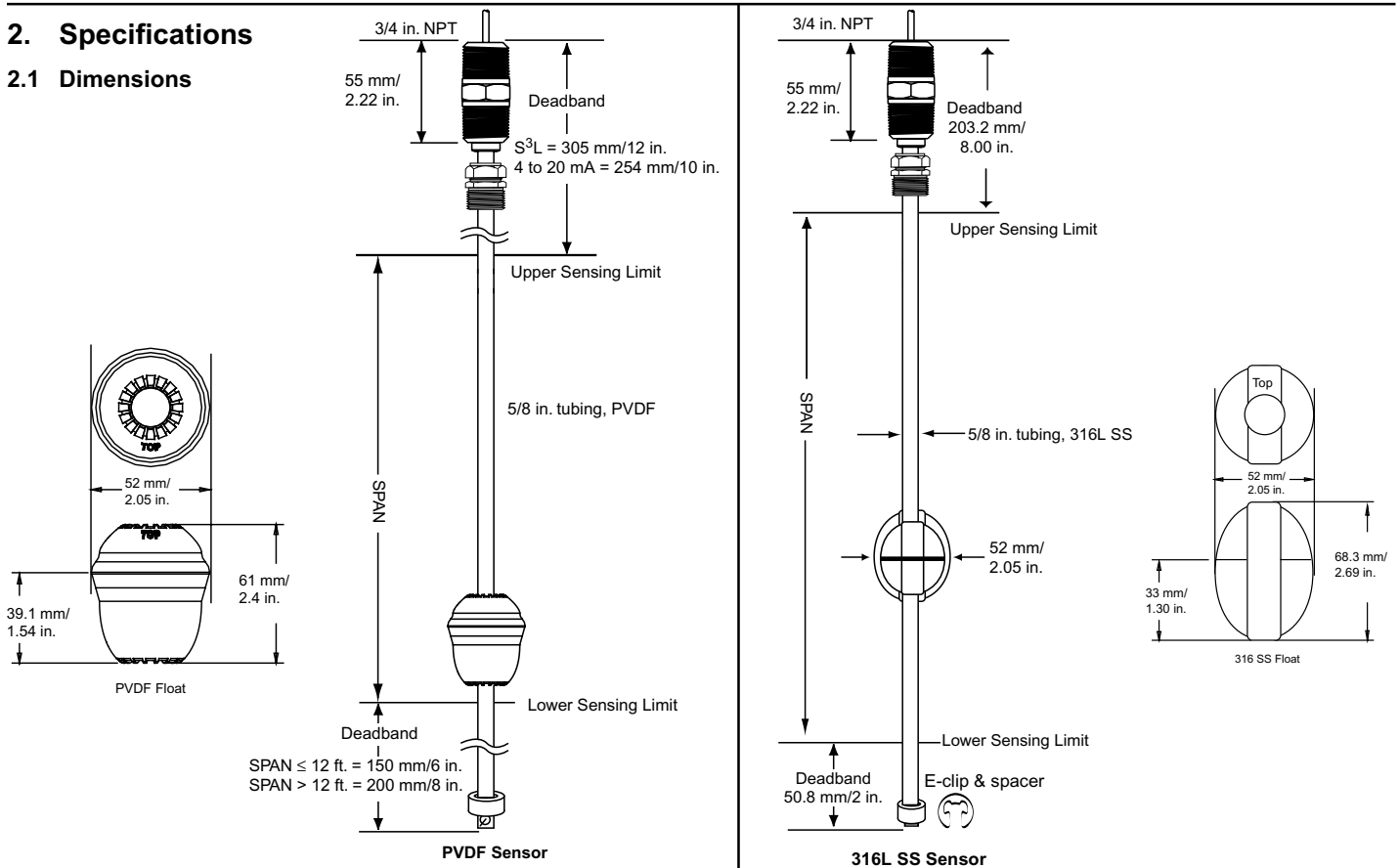
1. Depressurize and vent system prior to installation or removal.
2. Confirm chemical compatibility before use.
3. Do not exceed maximum temperature/pressure specifications.
4. Wear safety goggles or faceshield during installation/service.
5. Do not alter product construction.

1. Description

+GF+ SIGNET 2222 Magnetostrictive Level Sensors consist of a NEMA 6/IP68 tube which houses the sensor electronics, a magnetostrictive wire and a float with an embedded magnet. The position of the magnet in the float is precisely determined by the interaction with signal pulses in the wire. Float position is then converted to a 4-20 mA output in the current out version, or processed into a level measurement via the serial output in the S³L version. S³L output versions are for use with other +GF+ SIGNET instrumentation such as the 8250 Level Transmitter.

2. Specifications

2.1 Dimensions



2.2 General

Sensor Material: 316SS or SYGEF® PVDF
 Rating: NEMA 6/IP68
 Float Material: 316SS (standard on steel sensor)
 SYGEF® PVDF (standard on PVDF sensor)
 Active span: Standard: 6 ft. to 16 ft. in two ft. increments
 Add deadband to active span for overall length
 For other lengths consult factory
 Cable length: 152 mm (6 in.)
 Process connection: 3/4 in. NPT
 Compression coupling: 316 SS with steel sensor
 Nylon with PVDF sensor

Shipping weight: 2.2 kg per m (1.45 lb per ft.)

Electrical

Input Power (S³L™): 5VDC (provided by 3-8250)

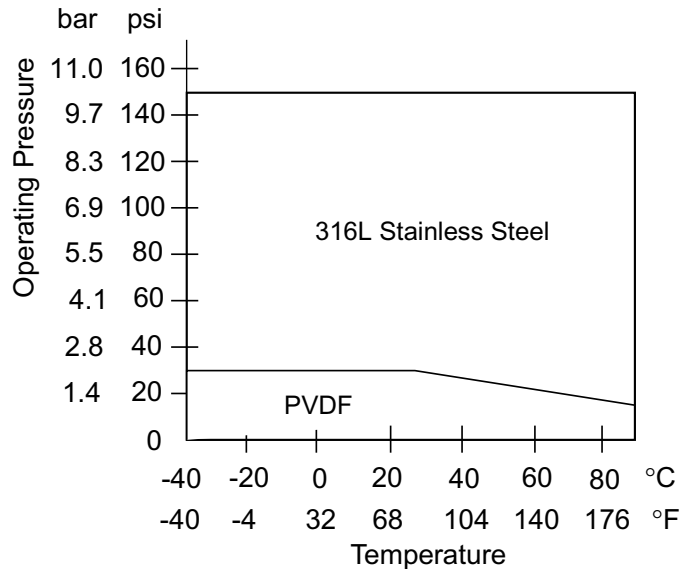
+GF+ SIGNET 2222 Magnetostrictive Level Sensor

Input Power (4-20mA): 24VDC ±10%
 Reverse polarity protected
 4-20 mA loop output: 4 mA = lower sensing limit
 20 mA = upper sensing limit
 Loop impedance: 500Ω @ 24VDC
 Accuracy: ± 0.1% of span or ± 0.2 in. (0.05 cm)
 whichever is greater, at 25°C
 Thermal stability: 0.01% of reading per °C from 25°C
 Repeatability: ± 0.01 in. (0.025 cm)
Standards/Approvals:
 • S³L™ serial output sensors: CE
 • Current output sensors: CE pending

S³L™ is Signet Sensor Serial Link
 SYGEF® is a registered trademark

2.3 Temperature-Pressure Derating Graph

PVDF:	30 psi @ 80°F (2.1 bar @ 27°C)
	14.7 psi @ 185°F (1 bar @ 85°C)
316L SS:	150 psi @ -40 to 185°F (10.3 bar @ -40 to 85°C)



3. Operation

The magnetostrictive sensor cannot measure from the bottom of the vessel and you may not be able to position the sensor so the upper sensing limit is located at the maximum level. The drawings below illustrate where the lower and upper sensing limits are located on the sensor. Section 4 explains how to reference these points to your vessel and how to determine the level based on the current output.

The span (distance between lower sensing limit and the upper sensing limit) is indicated in the sensor part number.

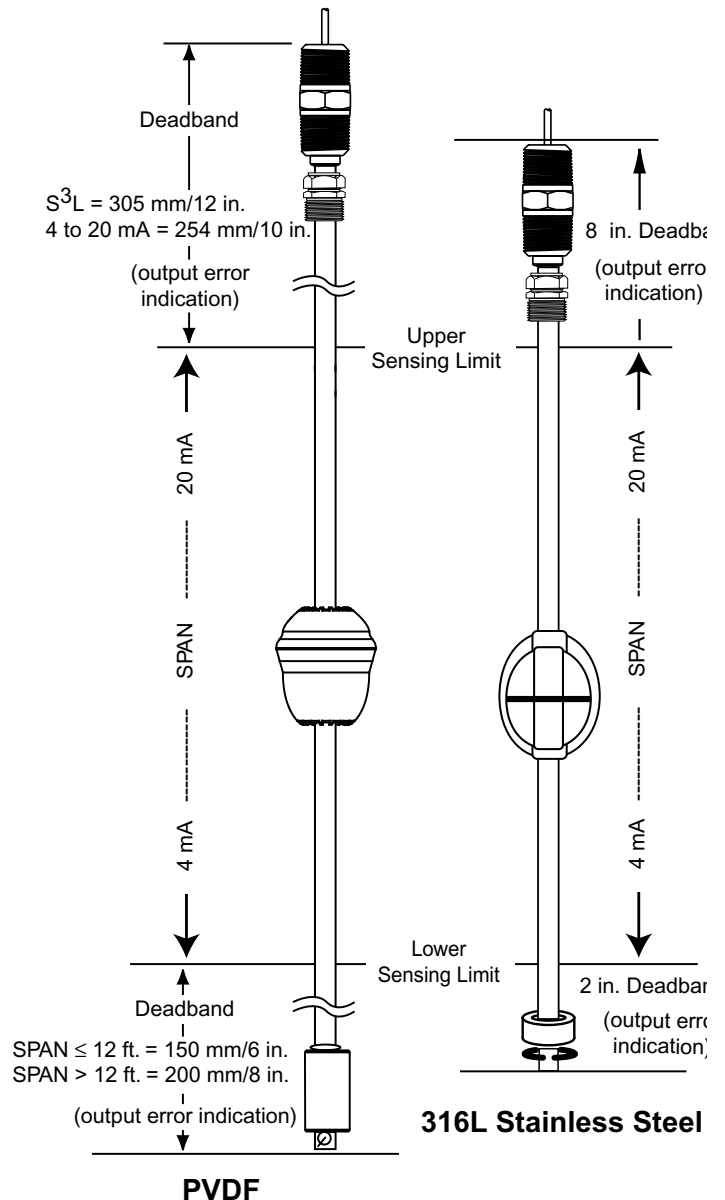
- Standard span lengths are 72 in. to 192 in. in 24 in. increments. Custom lengths can be provided up to 288 in.

If the float travels beyond the upper or lower sensing limits:

- The error indication of the current out sensor is 3 mA.
- The error indication of the S³L sensor is 9999.

PVDF sensors have 10 or 12 inches of deadband above the span and 6 or 8 inches of deadband below the span.

316 SS sensors have 8 inches of deadband above the span and 2 inches of deadband below the span.



4. Level calculations

1. Measure 10 in./25.4 cm or 12 in./30.5 cm from the top of a PVDF sensor, or 8 in./20.3 cm from the top of a steel sensor.
 - Identify this point as " = 20 mA " or 100% of the level range.
2. Measure down the vessel the length of your sensor span. Mark this point as " = 4 mA " or 0% of the range.
3. Determine the actual current output (mA).
4. Calculate the float position based on the following formula:

$$\left(\frac{\text{mA} - 4}{16} \right) \cdot \text{SPAN} = \text{Level}$$

This formula converts the current output to a level measurement referenced to the lower sensing limit. Example:

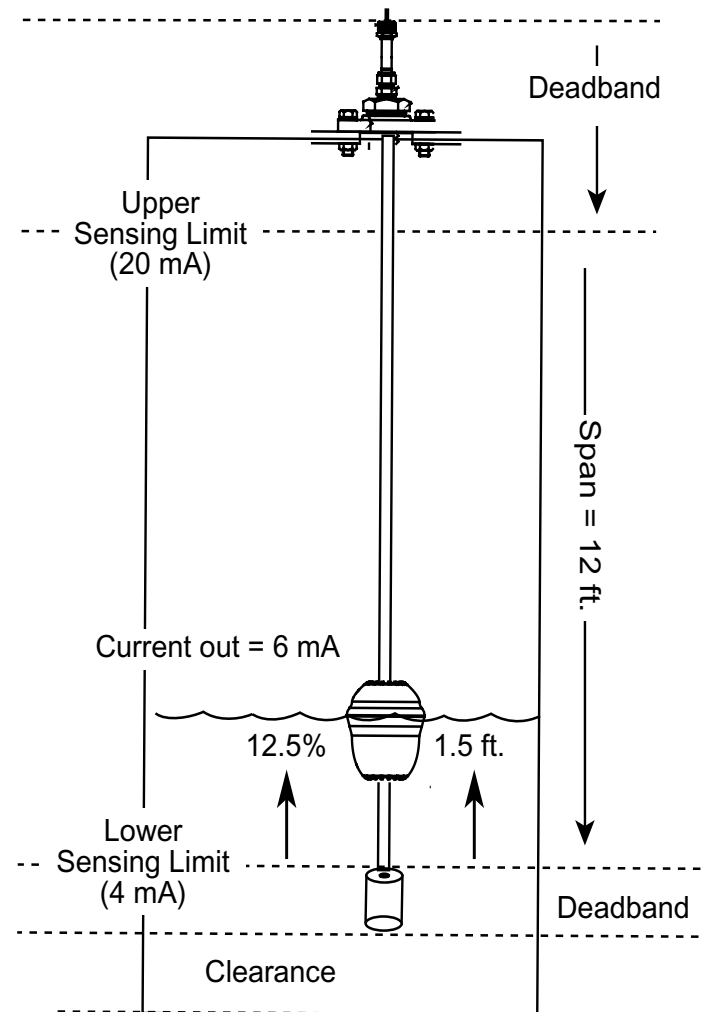
- mA = 6
 - Span = 12 ft.
 - $6 - 4 = 2$
 - $2 \div 16 = 0.125$
 - $0.125 \times 12 = 1.5 \text{ ft.}$
- When the current out is 6 mA, the float is 1.5 ft. from the lower sensing limit.

$$\left(\frac{\text{mA} - 4}{16} \right) \cdot 100 = \% \text{ of Span}$$

This formula converts the current output to a percent of the sensor span referenced to the lower sensing limit. Example:

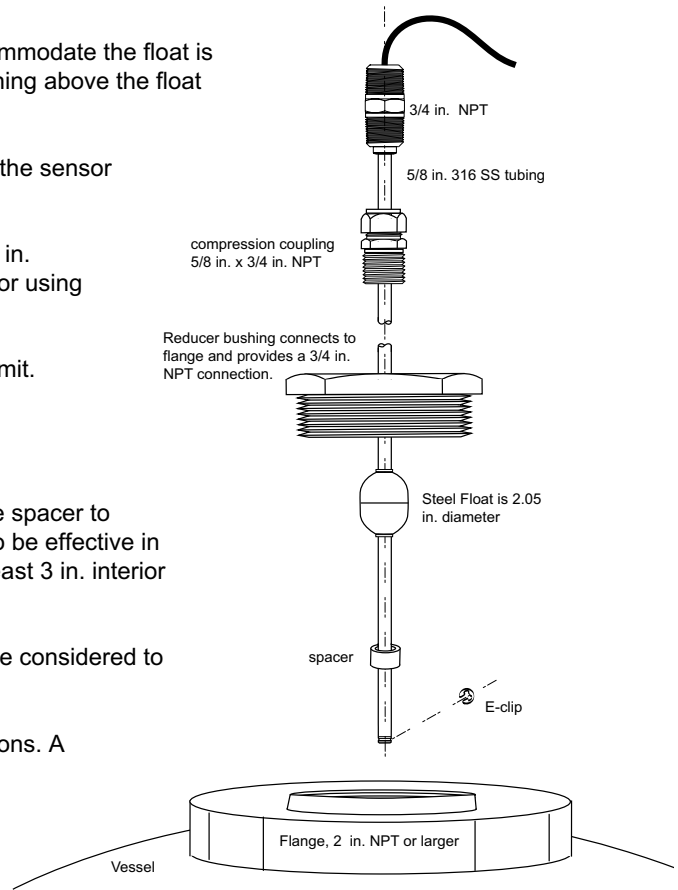
- mA = 6
 - $6 - 4 = 2$
 - $2 \div 16 = 0.125$
 - $0.125 \times 100 = 12.5\%$
- When the current out is 6 mA, the float is 12.5% up from the lower sensing limit.


Example shown is a PVDF sensor with a span of 12 ft.



5. Installation

- The 2222 floats are 2.05 in. wide. The smallest fitting that will accommodate the float is a 2 in. NPT flange (2.375 in. opening). Install a 3/4 in. reducer bushing above the float to secure the sensor to the top of the vessel.
- If the top of the vessel is curved, use a self-aligning flange to keep the sensor vertical.
- Attach the sensor to the flange reducer bushing using the 5/8 x 3/4 in. compression coupling, or remove the coupling and attach the sensor using the 3/4 in. NPT threads at the top of the sensor.
- A spacer keeps the float from traveling beyond the lower sensing limit.
- The PVDF tube may stretch as much as 2 in. over the operating temperature range.
- In vessels with turbulence, a weight may be installed in place of the spacer to stabilize the PVDF sensor. Installation inside a stand pipe may also be effective in protecting the sensor in turbulence. The stand pipe should be at least 3 in. interior diameter to allow float clearance.
- The expansion and contraction characteristics of the vessel must be considered to prevent damaging the sensor.
- PVDF sensors will flex enough to be installed into tight-fitting locations. A minimum clearance of 24 in. above the vessel is required.
- Do not bend the top 24 in. of the PVDF tube. Electronic circuitry may be damaged.
- Do not lift the sensor by the cable.
- Do not twist the PVDF sensor during installation.



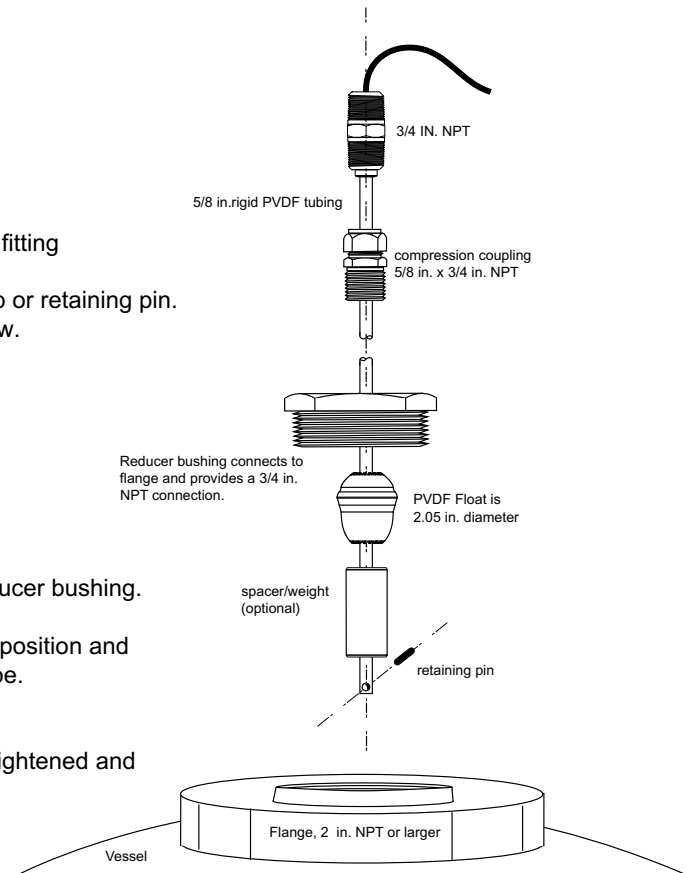


Warning:

- Exercise caution during installation.
- Use appropriate support equipment for vessel, sensors and personnel.

5.1 Installation procedure

1. Assemble the installation fittings:
 - Remove the E-clip or retaining pin from the end of the sensor.
 - Slide the spacer and float off of the sensor.
 - If the compression coupling will not be used, remove it now.
 - Install a 3/4 in. reducer bushing that will connect to the flange fitting on the vessel.
 - Replace the float and spacer, then secure them with the E-clip or retaining pin.
 - If you are installing the optional weight, replace the spacer now.
2. Lower the sensor into the vessel:
 - Do not suspend the sensor by the cable.
 - Do not twist the PVDF sensor during installation.
 - Steel sensors should not rest on the bottom of metal vessels.
3. Thread reducer bushing into flange.
4. Thread compression fitting (or 3/4 in. sensor connection) into reducer bushing.
5. If the compression fitting is used, adjust the sensor to the proper position and secure it by tightening the compression fitting onto the sensor tube. (Finger tight plus 1-1/4 turns.)
6. Inspect the installation. Be certain all bolts and screws are fully tightened and that the sensor is secured.



6. Wiring

General information

- Do not route sensor or output cables in conduit containing AC power wiring. Electrical noise may interfere with sensor signal.
- Routing cable in grounded metal conduit will help prevent electrical noise and mechanical damage to the cable.
- Seal cable entry points to prevent moisture damage.
- The 2222 is supplied with a standard 6 in. cable. Consult the factory for extended lengths. Accessory junction boxes are available for convenience.
- For best performance, ground the sensor SHIELD wire to a local earth ground at a point near the sensor.

8250 I/O Terminals

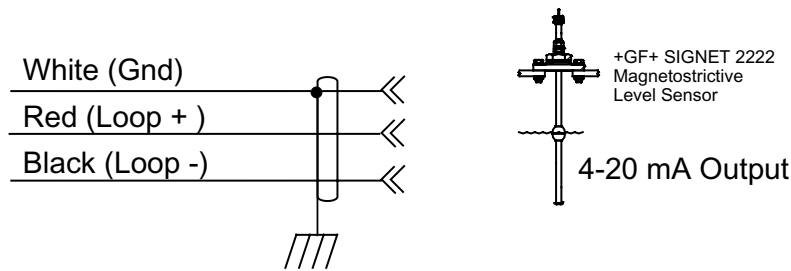
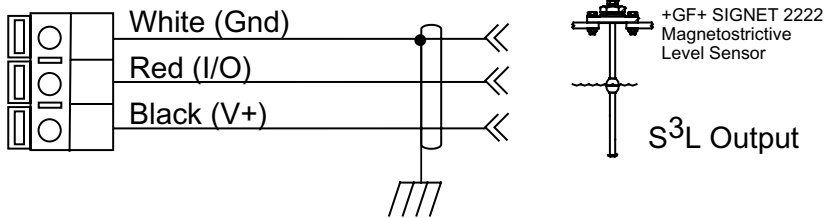


Figure 1

Figure 2

Figure 3

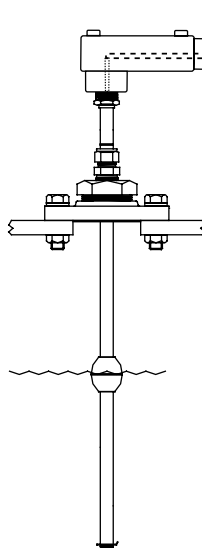
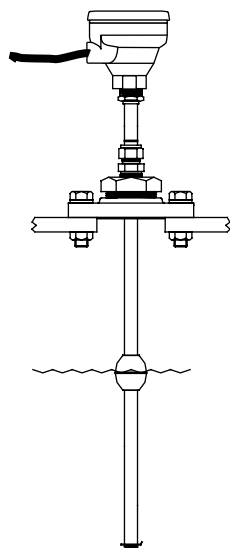
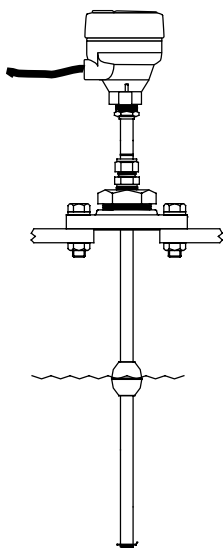


Figure 1:

Use the 3-8052 Integral mount kit to attach the 8250 Field mount transmitter directly to the 2222 sensor.

Figure 2:

Use the 3-8052-1 Junction box kit to connect the 2222 to equipment mounted within 122 m (400 ft.)

Figure 3:

Connect the extended 2222 cable directly into external equipment (8250 panel mount illustrated) or use the 3-8050 Universal mount kit to connect to the 8250 field mount transmitter.

Not shown:

The 3-8050-1 Universal Junction box mounts onto a wall, pipe or post using screws or tie wraps.

7. Troubleshooting

Troubleshooting

Symptom	Possible Causes	Suggested Solutions
<ul style="list-style-type: none">• Constant 0 mA out• No serial data out	<ul style="list-style-type: none">• No power• Electronic components damaged	<ul style="list-style-type: none">• Check power source• Replace sensor
<ul style="list-style-type: none">• Constant 4 mA or 16 mA out• Constant output	<ul style="list-style-type: none">• Float stuck• Defective sensor	<ul style="list-style-type: none">• Clean float and sensor• Replace sensor
Constant 3 mA output	<ul style="list-style-type: none">• Float is stuck outside of sensor range• Float is missing	<ul style="list-style-type: none">• Clean float and sensor• Replace float

Notes:

8. Ordering Information

Mfr. Part No.	Code	Material	Active span	Output
3-2222-S072-1	159 000 703	316 Stainless Steel	72 in.	S ³ L
3-2222-S096-1	159 000 704	316 Stainless Steel	96 in.	S ³ L
3-2222-S120-1	159 000 705	316 Stainless Steel	120 in.	S ³ L
3-2222-S144-1	159 000 706	316 Stainless Steel	144 in.	S ³ L
3-2222-S168-1	159 000 707	316 Stainless Steel	168 in.	S ³ L
3-2222-S192-1	159 000 708	316 Stainless Steel	192 in.	S ³ L
3-2222-S072-2	159 000 709	316 Stainless Steel	72 in.	4-20
3-2222-S096-2	159 000 710	316 Stainless Steel	96 in.	4-20
3-2222-S120-2	159 000 711	316 Stainless Steel	120 in.	4-20
3-2222-S144-2	159 000 712	316 Stainless Steel	144 in.	4-20
3-2222-S168-2	159 000 713	316 Stainless Steel	168 in.	4-20
3-2222-S192-2	159 000 714	316 Stainless Steel	192 in.	4-20
3-2222-V072-1	159 000 715	PVDF	72 in.	S ³ L
3-2222-V096-1	159 000 716	PVDF	96 in.	S ³ L
3-2222-V120-1	159 000 717	PVDF	120 in.	S ³ L
3-2222-V144-1	159 000 718	PVDF	144 in.	S ³ L
3-2222-V168-1	159 000 719	PVDF	168 in.	S ³ L
3-2222-V192-1	159 000 720	PVDF	192 in.	S ³ L
3-2222-V072-2	159 000 721	PVDF	72 in.	4-20
3-2222-V096-2	159 000 722	PVDF	96 in.	4-20
3-2222-V120-2	159 000 723	PVDF	120 in.	4-20
3-2222-V144-2	159 000 724	PVDF	144 in.	4-20
3-2222-V168-2	159 000 725	PVDF	168 in.	4-20
3-2222-V192-2	159 000 726	PVDF	192 in.	4-20

Consult factory for other sensor spans up to 288 in. (24 ft.)

Accessories

Mfr. Part No.	Code	Description
3-2220.391	159 000 699	Float, SS 2.05 in. (Includes float and E-clip)
3-2220.395	159 000 700	Float, PVDF, 2.05 in. (Includes float and retaining pin)
3-2220.393	159 000 701	Weight kit, 4.5 LBS, 316 SS
3-2220.394	159 000 702	Weight kit, 6.5 LBS, 316 SS
3-8250-2	159 000 766	Level Transmitter, Field Mount
3-8250-2P	159 000 767	Level Transmitter, Panel Mount
3-8250-3	159 000 768	Dual Channel Level Transmitter, Field Mount
3-8250-3P	159 000 769	Dual Channel Level Transmitter, Panel Mount
3-8050-1	159 000 753	Universal Mount Junction Box
3-8052-1	159 000 755	3/4 in. NPT Integral Junction Box
3-8052	159 000 188	3/4 in. Integral Mounting Kit

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