+GF+ SIGNET 2210 Ultrasonic Level Sensors

ENGLISH

3-2210.090 B (11/01) English

WARNING!

SAFETY INSTRUCTIONS
1. Depressurize and vent system prior to installation/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

The +GF+ SIGNET 2210 Ultrasonic Level Sensor provides accurate and reliable continuous level measurement up to 20 ft. The non-contacting ultrasonic technology is ideally suited for demanding level applications including chemicals and corrosive environments, slurries and dirty or coating liquids. These sensors are available with three output options: fixed 4 to 20 mA output, field-scalable 4 to 20 mA output, or S³L™ output. S³L output (Signet Sensor Serial Link) is used for connection to other +GF+ SIGNET instrumentation such as the 8250 Level Transmitter. The 8250 offers local display, automatic level-to-volume conversion, up to four relays for level control, and much more.

2. Specifications

General

Wetted material	Sensor body	Tefzel®
	Gasket	FPM (EPDM Optional)
Enclosure	Valox	NEMA 4X / IP65

Process Connection:

T120 Sensors: Multi-thread housing with:
- NPT 1 in.
- NPT 1.5 in.
- NPT 2 in.
- ISO 7/1-R 1
- ISO 7/1-R 1-1/2
- ISO 7/1-R 2

T240 Sensors: 2" NPT or ISO 7/1-R 2 threads

Relative humidity : 0 to 95%, non-condensing

Output Specifications:

T120 sensors:	Range 6 in. min. (deadband) to 10 ft. max.	
Frequency:	100 KHz	
Beam angle:	6º	
T240 sensors:	Range 12 in. min.(deadband) to 20 ft. max.	
Frequency:	50 KHz	
Beam angle:	14º	
System accuracy:	0.25% of range	
Resolution	T120 sensors	0.03 in
	T240 sensors	0.06 in.
Response time:	< 2s	

2210-1X with S³L Output (Serial ASCII, TTL level 9600 bps)

Power requirement: 5VDC ±5% regulated, 10 mA max. (provided by +GF+ Signet instrument)

Reverse polarity and short circuit protected

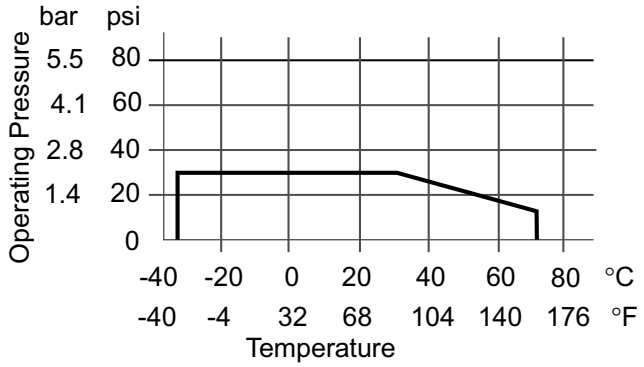
2210-2X with Current loop output (Span factory set)
- 4 mA = far end of range (10 ft or 20 ft; tank empty, for example)
- 20 mA = near end of range (sensor tip to 6 in. or 12 in. deadband distance, tank full, for example)

Loop power requirement: 24 VDC ±10%

Maximum loop impedance: 300Ω @ 24 VDC

Reverse polarity and short circuit protected

2210-3X with Current loop output and Cal Tool
- Current loop output w/Local EasyCal to scale 4-20 mA output across entire sensor range; output reversible

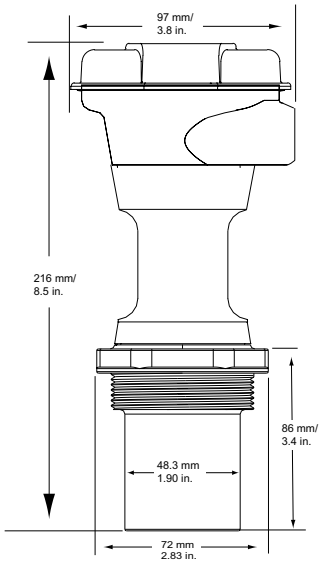


Operating/storage temperature: 70ºC max. (158ºF max.)

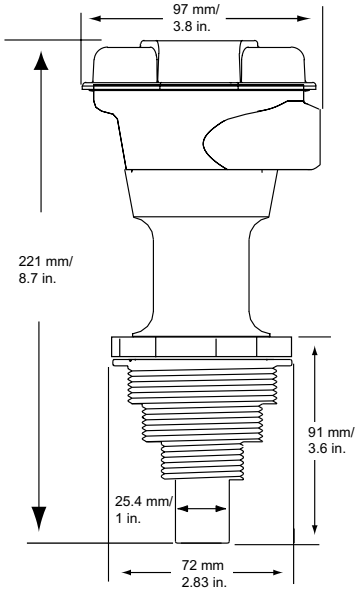
Maximum pressure: 30 psi @ 25ºC

Dimensions

3-2210-T240
0-to-20 ft. range
2 in. threaded fitting



3-2210-T120
0-to-10 ft. range
Multi-threaded fitting



Standards
- CE (pending)
- EN 50082-2 (pending) Heavy Industry Immunity
- EN 50081-1 (pending) Light Industry Emissions

3. Installation (Fig. 1)

Sensor installation should provide a clear and unobstructed path for the ultrasonic signal to travel to the surface of the fluid and back.

3.1 Alignment (Fig. 2)

The sensor must be mounted vertically ±1º; curved tank lids may require an overhead fitting or wall mount bracket.

3.2 Location

Proper sensor location will help to ensure the best possible signal integrity.

3.2.1 A clear beam path is required. (Fig. 2)

- T120 sensors (10 foot) require 13 inches of free space about the sensor for full scale operation.
- T240 sensors (20 foot) require 60 inches of free space about the sensor for full scale operation.
- Reduced ranges require less clearance, see table 1.

3.2.2 When wall mounting the sensor, the adjacent wall must be smooth and free of material which may reflect the signal. See table 1 for clearance recommendations.

3.2.3 The 2210 sensor cannot compensate for variable vapor densities produced by acid solutions in concentrations greater than 30 percent, non-vented hydrocarbons, or alcohol.

3.2.4 The 2210 sensor cannot compensate for large temperature gradients in the space between sensor and liquid surface.

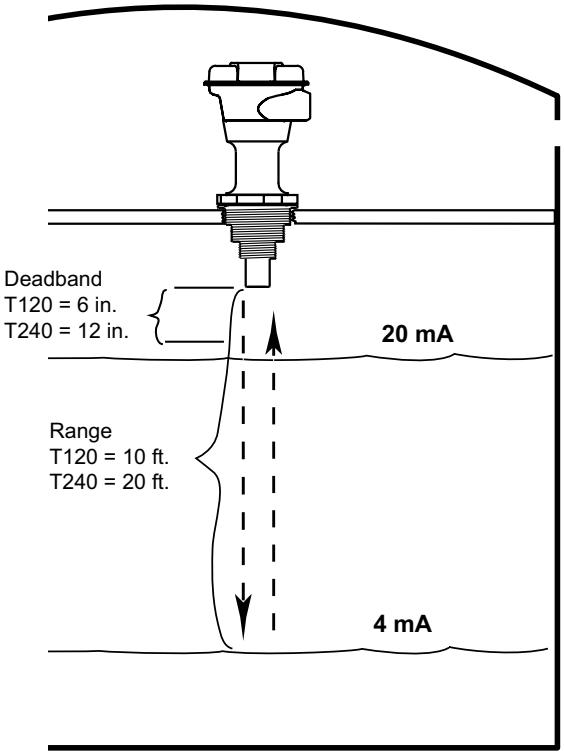


Fig. 1 Range and default current settings

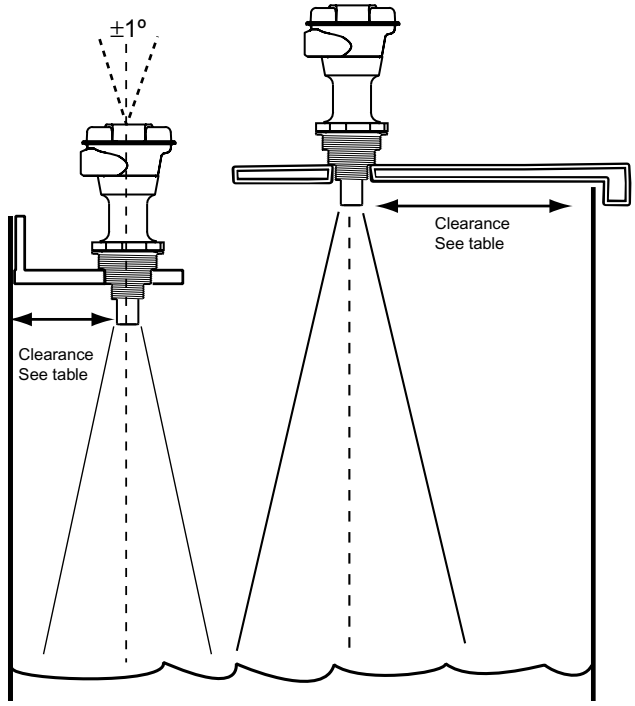
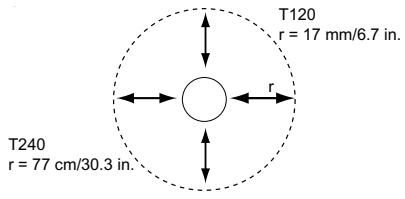


Fig. 2 Maximum alignment and clearance recommendation
See Table 1 for required clearance.

Table 1 Side-to-side clearance required about sensor

	T120 (6º cone)		T240 (14º cone)	
	in.	cm	in.	cm
60 cm	1.6	4.1	3.8	9.7
120 cm	2.9	7.3	6.8	17.2
180 cm	4.1	10.5	9.7	24.7
240 cm	5.4	13.7	12.7	32.1
300 cm	6.7	16.9	15.6	39.6
360 cm			18.6	47.1
420 cm			21.5	54.6
480 cm			24.4	62.1
540 cm			27.4	69.6
600 cm			30.3	77.1



3.3 Stand pipes (Fig. 3)

Sensing of open channels, small vessels with limited clear area, or vessels with interfering conditions may require the use of a stand pipe. The inner diameter of a stand pipe should be 4 in. minimum. Stand pipe length should be selected to maintain fluid volume within the pipe at all times. The pipe should be vented at the top, within the deadband region to prevent pressure within the stand pipe and to allow unimpeded fluid travel.

3.4 Full tank measurement (Fig. 4)

Mounting the sensor to allow full tank measure must be done in a chamber with a minimum i.d. of 8 in.
Edges or any obstructions should not be allowed to intrude into the ultrasonic signal path.
A smooth chamfer edge at the chamber/tank interface is recommended.

Mounting: Caution! If a pressure tight seal is required, use the appropriate gasket (sold separately)
+GF+SIGNET part number: 3-2210.570 (Viton) 3-2210.571 (EPDM)

- Place the gasket over the sensor threads.
- Carefully position sensor over fitting and hand tighten securely against gasket.
- If gasket seal cannot be accomplished due to uneven fitting surface, etc. use PTFE paste or tape for a pressure tight seal.

Fig. 3 Standpipe use

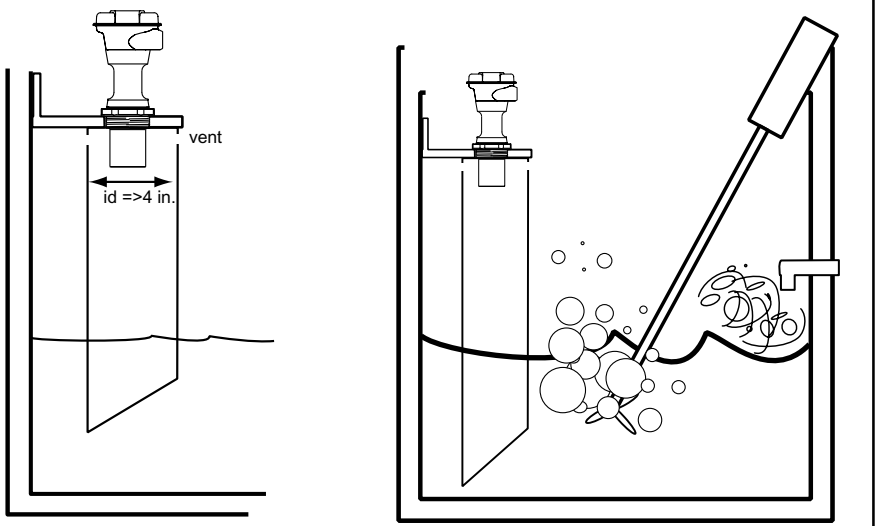
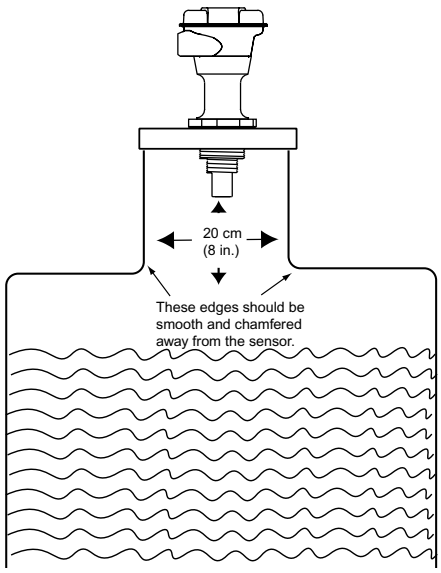


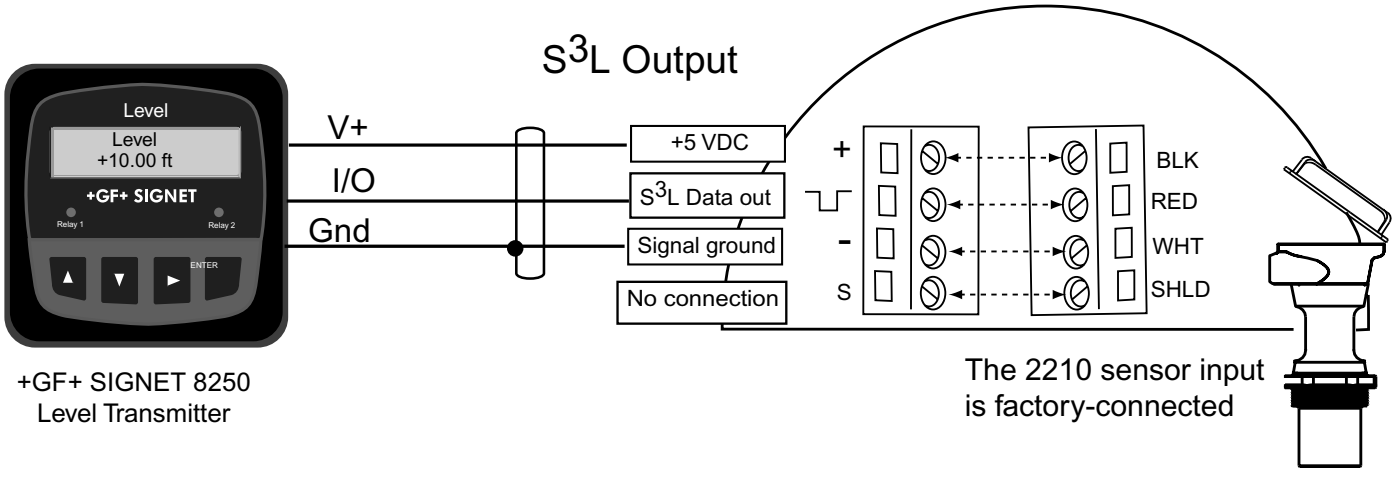
Fig. 4 Full tank measure



4. Wiring

4.1 2210-1X sensors with S3L serial output

- 2210-1X level sensors w/serial data output are for use with +GF+ SIGNET instrumentation such as the 8250 Level Transmitter.
- Refer to the instrument manual for calibration instructions.
- Do not route output cable in conduit containing AC power wiring. Electrical noise may interfere with the output 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 cable length from the sensor to the transmitter cannot exceed 122 m (400 ft.)



4.2 2210-2X sensors with fixed 4-20 mA loop output

- The 4-20 mA output is equal to the operating range:
  - 4 mA = far end of range (10 ft or 20 ft; tank empty, for example)
  - 20 mA = near end of range (sensor tip to 6 in. or 12 in. deadband distance, tank full, for example)
- The range can be modified in the field by adding the EasyCal Retrofit Kit, part number 3-2210.390.

$$\left(\frac{\text{mA - 4}}{16}\right) \bullet 100 = \%\ \text{of Span} \qquad \left(\frac{\text{mA - 4}}{16}\right) \bullet \text{SPAN} = \text{Level}$$

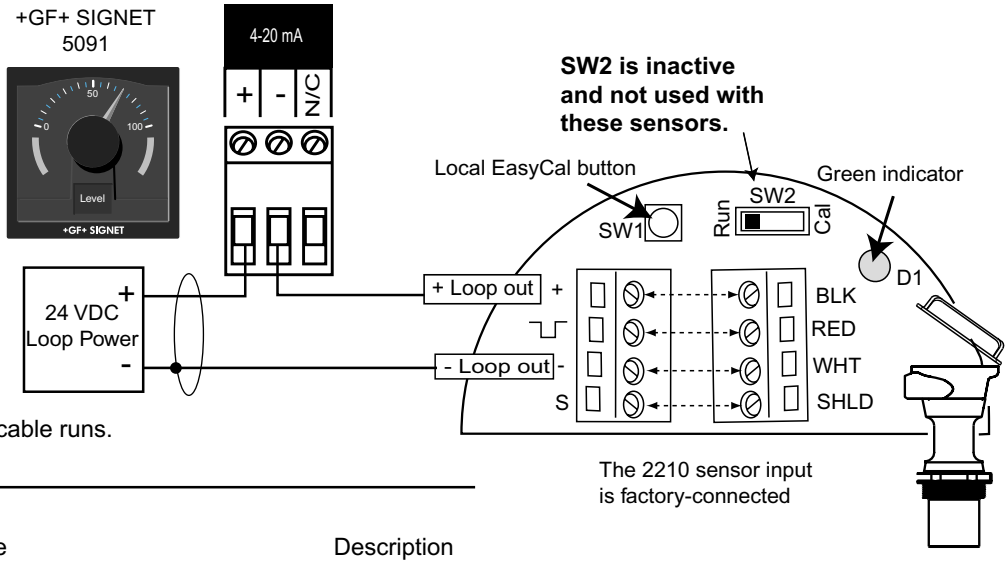
4.3 2210-3X sensors with 4-20 mA loop and local EasyCal Tool

- The local EasyCal feature allows the 4-20 mA range to be adjusted in the field.
- Calibration may be done after the sensor is installed in the vessel or before installation against a reflective target in a clear area. (see table 1)
- The fluid level or reflective target must be adjusted to levels equal to 4 mA and 20 mA.
- Hand-held calibration is not recommended due to difficulty in determining precise distance to target.
- 4 and 20 mA endpoints may be inverted or adjusted across the entire sensing range.

4.3.1 Local EasyCal Procedure

1. Adjust the fluid in the vessel or reflective target to the level/distance equal to 4 mA.
2. Press and hold the local EasyCal button.
   - The green indicator will flash once, then blink slowly two times. When you see the indicator blink rapidly, release the button.
   - The 4 mA point is now set at this level/distance.
3. Move the sensor to the level/distance equal to 20 mA.
4. Press and hold the local EasyCal button again.
   - The green Indicator will flash once, then blink slowly five times. When you see the indicator blink rapidly, release the button.
   - The 20 mA point is now set at this level/distance.

Wiring is identical for all 2210 sensors with 4-20 mA loop output.



Note: Use twisted pair wiring for long cable runs.

5. Ordering information

Part Number	Code	Description
3-2210-T120-11	159 000 733	10 ft. w/ S3L, NPT
3-2210-T120-21	159 000 734	10 ft. w/ 4-20, NPT
3-2210-T120-31	159 000 735	10 ft. w/ 4-20 & EasyCal, NPT
3-2210-T240-11	159 000 736	20 ft. w/ S3L, NPT
3-2210-T240-21	159 000 737	20 ft. w/ 4-20, NPT
3-2210-T240-31	159 000 738	20 ft. w/ 4-20 & EasyCal, NPT
3-2210-T120-12	159 000 825	10 ft. w/ S3L, ISO
3-2210-T120-22	159 000 826	10 ft. w/ 4-20, ISO
3-2210-T120-32	159 000 827	10 ft. w/ 4-20 & EasyCal, ISO
3-2210-T240-12	159 000 828	20 ft. w/ S3L, ISO
3-2210-T240-22	159 000 829	20 ft. w/ 4-20, ISO
3-2210-T240-32	159 000 830	20 ft. w/ 4-20 & EasyCal, ISO
3-2210.570	159 000 843	Gasket set, 1 in. 1 1/2 in. 2 in. FPM
3-2210.571	159 000 844	Gasket set, 1 in. 1 1/2 in. 2 in. EPDM
3-2210.390	159 000 831	EasyCal field retrofit kit for 2210-2X sensors

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