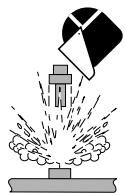


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SAFETY INSTRUCTIONS

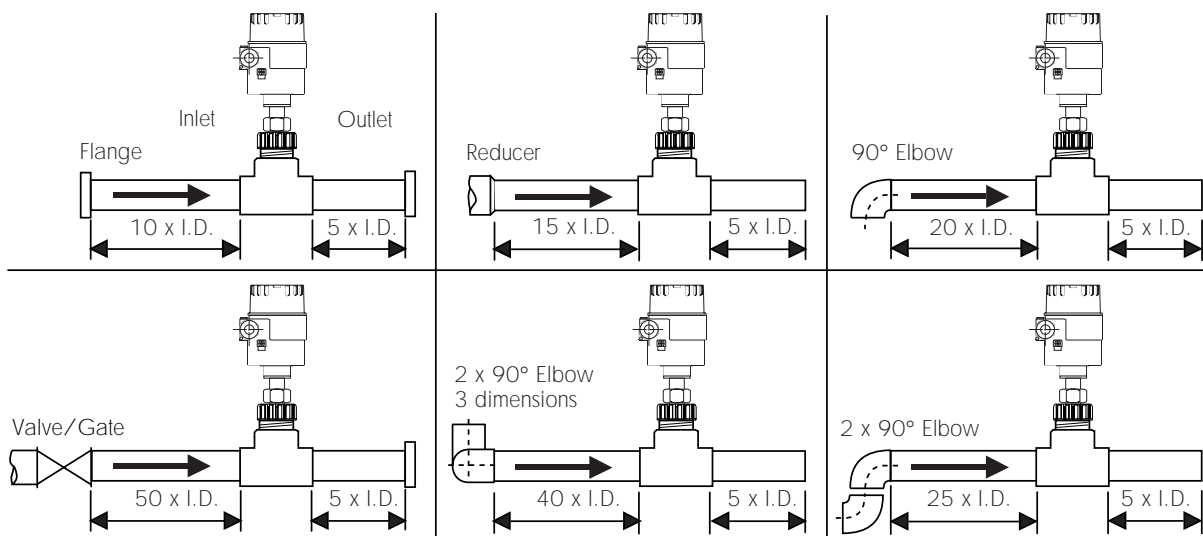
1. Do not remove from pressurized lines.
2. Do not exceed maximum temperature/pressure specifications.
3. Do not install/service without following installation instructions (see sensor manual).
4. Wear safety goggles and faceshield during installation/service.
5. Do not alter product construction.
6. Failure to follow safety instructions could result in severe personal injury!



NEVER
DISASSEMBLE!

1. Location of Fitting

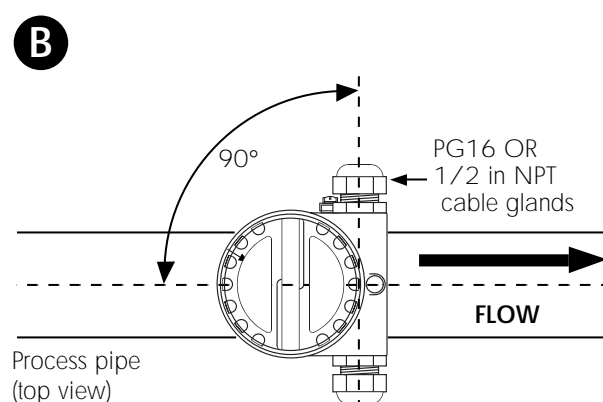
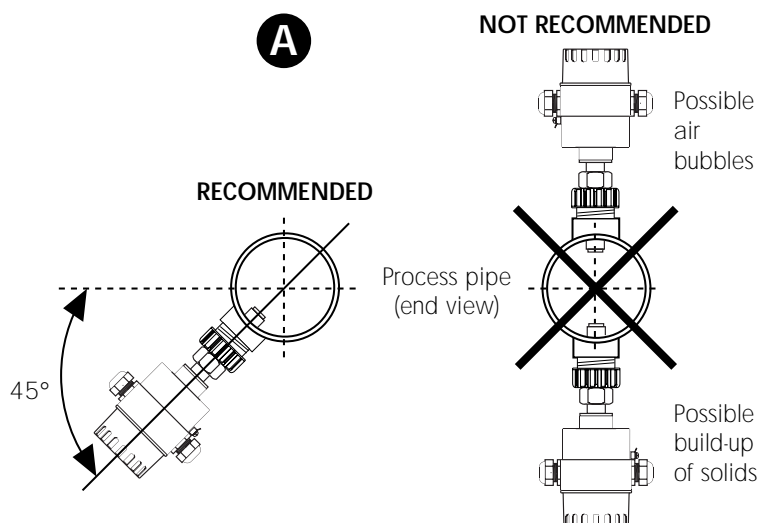
Recommended upstream/downstream mounting positions in horizontal or vertical pipe lines



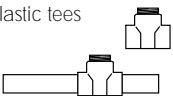

2. Mounting Position




A. The Flowmag is best mounted in vertical piping. In horizontal pipe runs, the Flowmag should be mounted at the side of the pipe. This practice ensures the electrodes are always immersed in fluid at all times, see diagram A.

B. The sensor MUST be mounted so that the electrode axis is at 90° to the direction of flow. The two cable glands can be used to visually align the electrode axis. The Flowmag is bidirectional, meaning the cable glands can be mounted to the right (as shown) or to the left, see diagram B.




3. +GF+ SIGNET Fittings

Type	Description
Plastic tees 	<ul style="list-style-type: none">• 0.5 to 4 in. male & female versions• PVC or CPVC• Mounts via glue-on fittings
PVC glue-on saddles (O-ring not required) 	<ul style="list-style-type: none">• 2 to 4 in., cut 1-7/16 in. hole in pipe• Align wedge arrows with saddle arrows during assembly.• Flowmag not compatible with fittings over 4 inch.

Type	Description
	Metric plastic saddle <ul style="list-style-type: none">• For pipes DN 65 to 100• Requires a 30 mm diam. hole in the pipe• Wedge and saddle arrows must match
	Metric wafer fitting <ul style="list-style-type: none">• For pipes DN 65 to 100• Follow the recommended installation guidelines
	Metric union fitting <ul style="list-style-type: none">• For pipes from DN 15 to 50• PP or PVDF• Follow the recommended installation guidelines


4. Installation

1. Lubricate the sensor O-rings with a silicone lubricant (e.g. GE silicone compound #G632 or equivalent). DO NOT use any petroleum based lubricant that will attack the O-rings.
2. Grasp the metal sensor nut in hand and use an alternating/twisting motion to insert the sensor body into the fitting. **Caution!** Be careful not to bump the sensor nosepiece. Excessive force on the sensor nosepiece will damage the sensor.
3. Verify the flow direction arrow decal on the Flowmag casing is pointing in the direction of flow, turn casing to align.
4. The sensor electrode axis MUST be mounted at 90° to the direction of flow. The two cable glands can be used to visually align the electrode axis. The Flowmag is bidirectional, meaning the cable glands can be mounted to the left (as shown in the side view) or to the right (as shown in the top view).
5. After establishing electrode alignment (step 5), **Hand tighten the yellow fitting cap until the sensor flange bottoms against the fitting flange.**



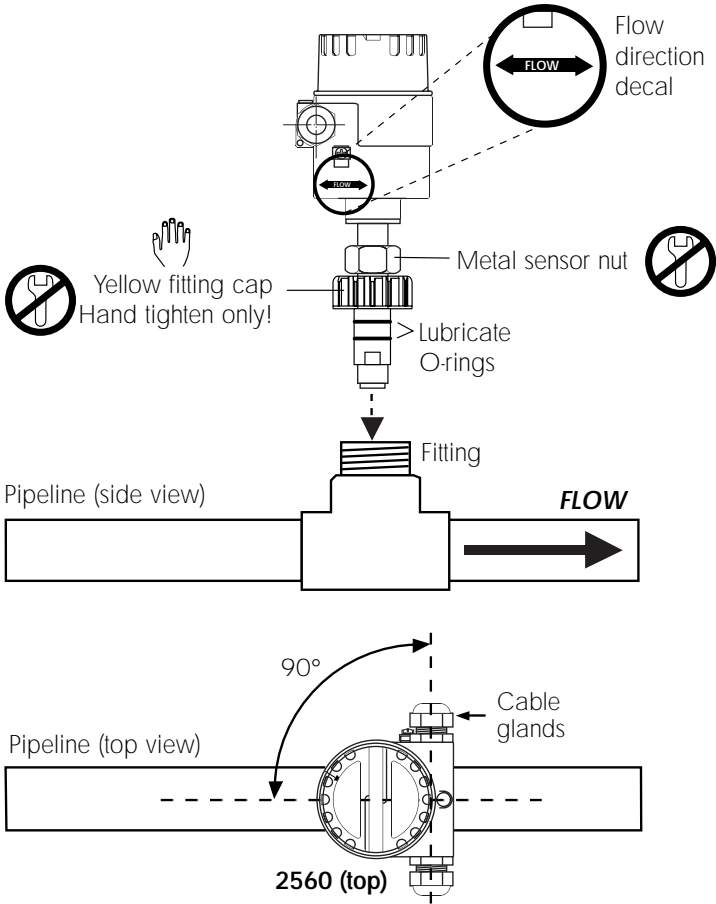
WARNING!

Damage will result to the yellow fitting cap threads and/or fitting threads if hand tools of any kind are used.



SAFETY INSTRUCTIONS

1. Do not remove from pressurized lines.
2. Do not exceed maximum temperature/pressure specifications.
3. Do not install/service without following installation instructions (see sensor manual).
4. Wear safety goggles and faceshield during installation/service.
5. Do not alter product construction.
6. Failure to follow safety instructions could result in severe personal injury!



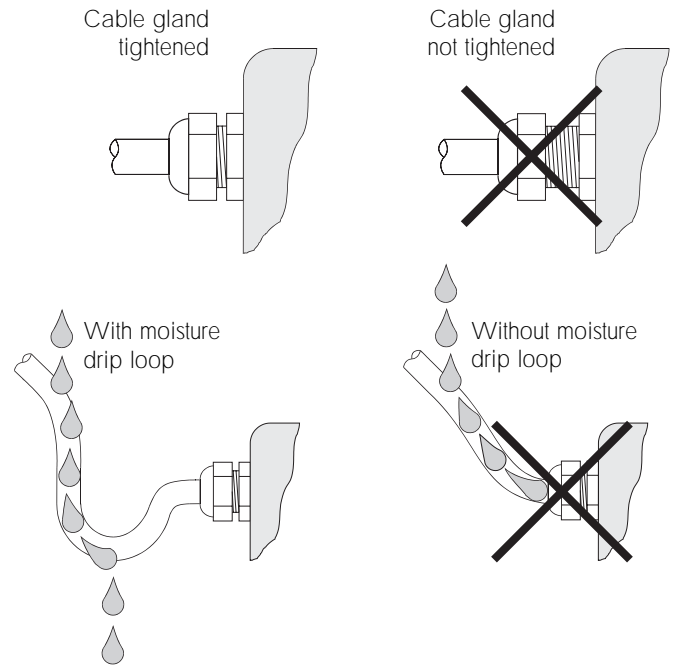


NEVER DISASSEMBLE!

5. Mounting Details

The following steps must be observed to ensure optimum operation and IP66/NEMA 4X watertight protection:

- Housing gaskets must be clean and undamaged.
- The housing cover must be tightened firmly.
- The cables used for connection must have an outer diameter of 7 to 12 mm (0.275 to 0.475 in.).
- Shielded cable should always be used for maximum noise immunity.
- The cable glands must be be firmly tightened.
- The cable must loop downward before entering the cable gland to prevent moisture from seeping into the casing.
- An unused cable gland must be replaced with a blind plug (customer supplied). Cable ports are offered with PG16 or 1/2 in. NPT threads.
- The protective bush inside the cable gland should not be removed.



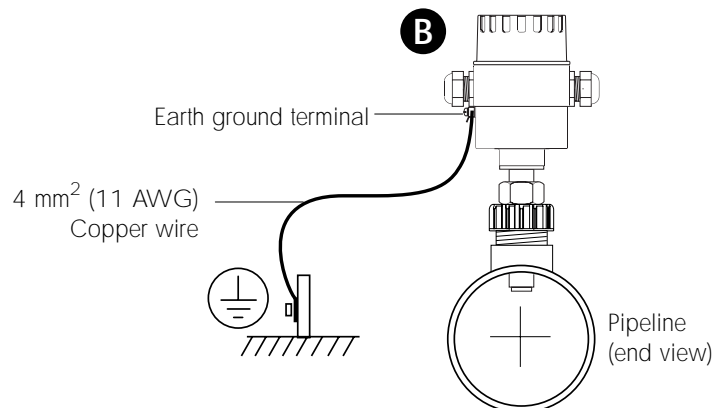
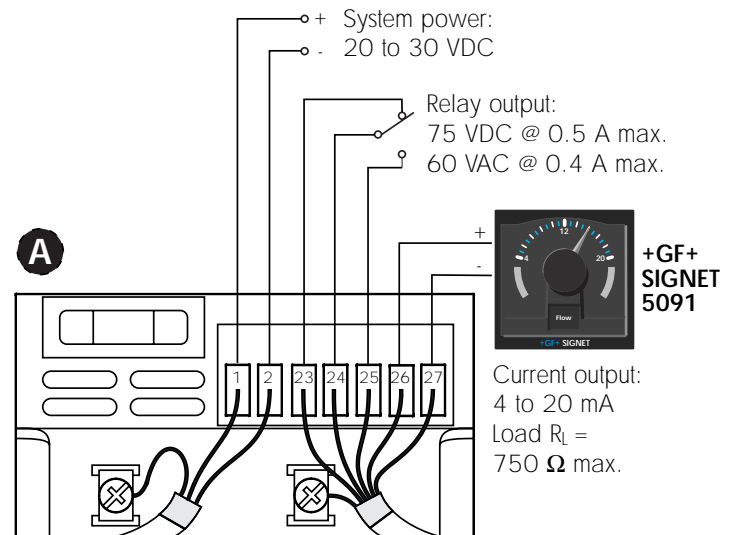
6. Wiring



CAUTION!

Never install, wire up or dismantle the instrument when power is applied. Always observe both polarity and operating voltage before applying power.

1. To reduce the possibility of AC noise interference, separate AC power and/or relay lines from the current output lines. See diagram A for wiring details.
2. Use only 7 to 12 mm (0.275 to 0.475) diameter cable in cable glands to ensure a watertight seal.
3. The Flowmag's casing terminal **MUST** be connected to earth ground to ensure complete electromagnetic compatibility and maximum performance, see diagram B.
4. Observe the mounting details outlined in section 6 after making connections to ensure maximum watertight IP66/NEMA 4X protection.



7. Calibration

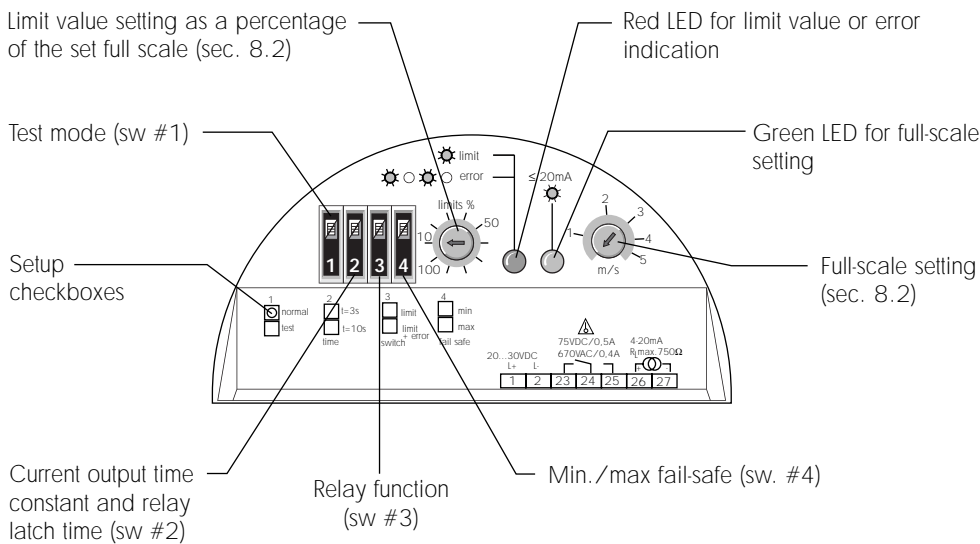
1. Set miniature switch 1 (test mode) to the "normal" position (sec. 9.2).
2. Set the miniature switches 2 to 4 as appropriate (sec. 8.2):
 - Time constant & relay latch time
 - Relay function
 - Min./max. fail-safe setting
3. After switching on the power supply, the outputs are deactivated for 5s (relay de-energized and current output remains at 0 mA). Both LEDs flash during this procedure.
4. Set the full-scale value. This can be done one of two ways (sec 8.2):

Full-scale value with actual flow (local calibration)
 - Take into account general flow rates anticipated.
 - Turn the full-scale potentiometer until the green LED lights up.

Setting the full-scale value without actual flow
 - Set the full-scale potentiometer at the mean anticipated flow rate.
5. Use the limit switch to set the relay switch point in % of the preset full-scale setting described in step 4.


8. Operation Details

8.1 Operation and display surfaces



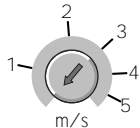
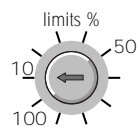



Note: Customer settings can be recorded in the checkboxes printed on the display panel for future reference.

8.2 Operation functions and display elements

Operating and display element (factory settings)	Description of function
<div><div><div>t = 3s</div><div>t = 10s</div></div></div>	<div>Time constant & relay latch time</div> <div>The times t = 3 s and t = 10 s correspond to the current output time constant and also to the relay latch time. When t = 3 s is selected, the relay switches when the flow signal exceeds either maximum or minimum fail-safe setting and remains in this state for 3 seconds. When t = 10 s is selected, the relay switches after the flow signal exceeds either minimum or maximum fail-safe setting for 10 seconds, then remains in this state for an additional 10 seconds. While the relay is switched "latched", changes in the flow rate are not taken into account.</div>

Operation functions and display elements continued...

Operating and display element (factory setting)	Description of function
	<p>Relay functions</p> <p>The relay is energized if all functions are operating correctly. The relay is de-energized immediately when an error or alarm occurs.</p> <ul style="list-style-type: none"> Limit: The relay de-energizes and the red LED lights up if the signal moves outside the upper or lower limit value (depending on the min./max. fail-safe setting). Limit + error: The same function as for "limit", and additionally: The relay de-energizes if the flow rate is larger than 5 m/s (15 ft/s) or if an instrument error occurs. The red LED flashes. "Error" has higher priority than "limit".
	<p>Min./max. fail-safe setting</p> <ul style="list-style-type: none"> Maximum fail-safe: The relay de-energizes if the signal rises above the limit value. Minimum fail-safe: The relay de-energizes and the red LED lights if the signal falls below the limit value setting.
 <p>Potentiometer</p> <p>Green LED</p>	<p>Full-scale setting</p> <p>The full-scale potentiometer can be set to any value within the 1 to 5 m/s (3 to 15 ft/s) operation range.</p> <ul style="list-style-type: none"> Turning the potentiometer: The transition from off to a lighted green LED shows agreement between the momentary flow velocity and the set full scale value, at which the current output will be set to 20 mA. <p>Green LED</p> <ul style="list-style-type: none"> Lit: The flow rate is smaller than the set full-scale value (i.e. $I = <20$ mA).
 <p>Limit value switch</p>	<p>Limit value setting</p> <p>A limit value as a % of the full-scale value is set using this switch. It is adjustable in 10% increments from 10% to 100%.</p>
 <p>Red LED</p>	<p>Red LED</p> <ul style="list-style-type: none"> Lit: Limit value reached Flashing (1.5 Hz): Error indication (sec. 9.1)

9. Troubleshooting

9.1 Response of the measuring system to faults

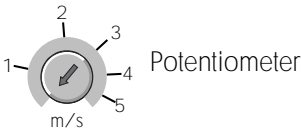
- Error messages which occur during measurement are always indicated by the current output, the preset relay function, and the relay output.
- A system or process error is always indicated when the red LED flashes.

Type of error	Relay (when set in "limit + error" position)	Red LED	Current output
System errors: Amplifier error EEPROM error	de-energized	flashing	2 mA
Process errors: Overflow	de-energized	flashing	2 mA

9.2 Checking the electronics

The Flowmag can be verified with an internal test mode as follows:

- 1. Set test mode switch number 1 to the "test" position.
- 2. Turn the full-scale potentiometer counterclockwise until it comes to the mechanical stop.
The measured current output must be exactly 20 mA at this time.
- 3. If the current output (step 2) is not 20 mA, the electronics module must be replaced.

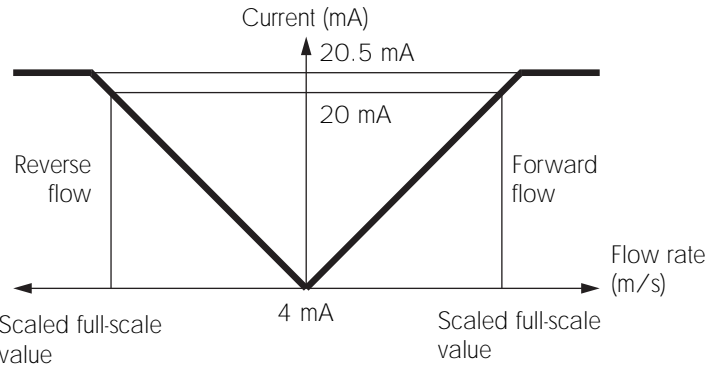


10. Specifications

General
Operating range: 0.1 to 7 m/s (0.3 to 20 ft/s)
Full scale range: 1 to 5 m/s (3 to 15 ft/s) recommended
Conductivity: ≥20 µS/cm
Accuracy: ±2% of range with local calibration at flow velocities >1 m/s (3 ft/s)
Repeatability: ±2% of range
Enclosure rating: IP66/NEMA 4X
Housing material: Aluminum, epoxy powder coated

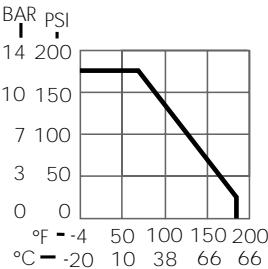
Wetted Materials
Sensor tip: PVDF
Sensor electrodes: 316L SS
Sensor body: 316L SS
Fitting adapter: 316L SS
Fitting adapter O-rings (2): Viton®
Fitting adapter/sensor body seal: Nitrile rubber (NBR)
Sensor cap: Glass-filled Polypropylene

Electrical
Power supply: 20 to 30 VDC (24 VDC nominal)
Power consumption: <2.5 W
Current output: 4 to 20 mA, non-isolated, internally powered (see diagram)
The measuring system can measure flow in both directions (i.e. bidirectionally). The current output is always positive. The relay responds to both flow directions.



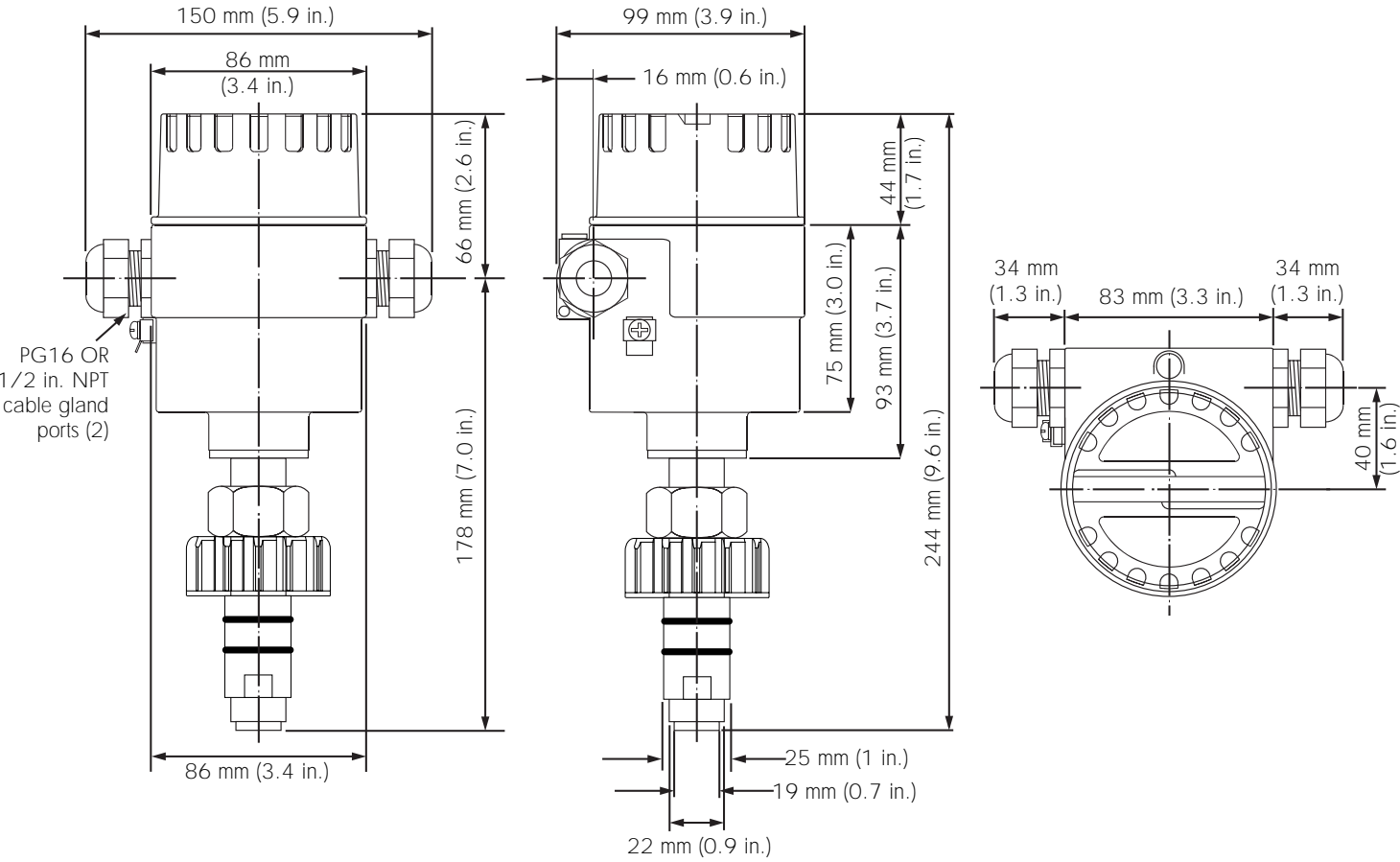
Environmental
Ambient temp.: -20 to 60 °C (-4 to 140 °F)

Max pressure./temperature ratings:
• 12.5 bar (180 psi) max @ 20 °C (68 °F)
• 1.7 bar (25 psi) max @ 85 °C (185 °F)



Quality Standards
• CE
• Manufactured under ISO 9001

Dimensions:



NOTES:

+GF+ SIGNET

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