Fisher® 2100 Pneumatic and 2100E Electric Liquid Level Switches

Fisher 2100 on-off pneumatic switch and 2100E electric switch sense (shown in figure 1) high or low liquid levels. Typically, these switches pneumatically or electrically operate safety shutdown systems for field processing equipment in oil and gas production applications. 2100 and 2100E switches both use a displacer-style sensor located in an external cage that mounts on the outside of a vessel.

Unless otherwise noted, all NACE references are to NACE MR0175-2002.

FISHER 2100 PNEUMATIC LIQUID LEVEL SWITCH

Features

- Proven Rugged Construction—The switch is isolated and sealed from the process through a corrosion-resistant displacer and torque tube assembly for maximum reliability. The displacer can withstand up to 1-1/2 times the maximum working pressure, allowing it to remain in the cage during hydrostatic testing.
- Sour Service Capability—Materials are available for applications handling sour fluids and gases. These constructions comply with the metallurgical requirements of NACE MR0175-2002. Environmental restrictions may apply.
- Application Versatility—The 2100 and 2100E switch construction comes in a left-hand as well as a right-hand mounting version. The explosion-proof, hermetically sealed 2100E switch is offered as both a factory mounting and as an electric switch retrofit to the proven 2100 switch.
- Installation Versatility—The displacer cage has two 1 NPT pipe plugs that you can remove and relocate for horizontal instead of vertical equalizing piping, or for installation of a bleed or drain valve.
- Easy Reversibility—Switching action for both the 2100 and 2100E switches is field-reversible from high-level to low-level or vice versa without additional parts.

Specifications

Input Signal

Liquid level

Minimum Process Liquid Specific Gravity

0.5 (consult your Emerson Process Management sales office for specific gravities below this value)

Output Signal

2100: Equal to the supply pressure when the switch is in the normal position (flapper against nozzle) and reduced to approximately atmospheric pressure, depending upon the bleed orifice size and the piping configuration, when the switch is activated
2100E: Same as supply signal

Supply Signal

2100: ■ 2.1 to 4.1 bar (30 to 60 psig), ■ 4.1 to 6.9 bar (60 to 100 psig) or ■ 6.9 to 10.3 bar (100 to 150 psig)
2100E: 11 amperes, 1/4 horsepower at 125/250 volts ac; 5 amperes resistive, 3 amperes inductive at 28 volts DC

Supply Medium (2100)

Air or Natural Gas(1)

Steady-State Air Consumption(2) (2100)

Less than 0.03 normal m^3/hour (1.0 scfh) for all supply pressures when the liquid level is 25.4 mm (1 inch) below the normal switch position (flapper against nozzle) for high-level switching or 25.4 mm (1 inch) above the normal switch position for low-level switching

Maximum Working Pressure(3)

■ 153 bar (2220 psig) WOG(4) except ■ 24 bar (350 psig) WOG is the maximum working pressure for sight window construction

Operative Temperature Range(3)

2100: –29 to 204°C (–20 to 400°F)
2100E: –29 to 82°C (–20 to 180°F)

Displacer Diameter

102 mm (4 inches)

Process Connection Size

153 bar (2220 psig) WOG(4): ■ 1 NPT internal
■ DN 50 (NPS 2) Schedule 80 buttwelding ends, or
■ DN 50 (NPS 2) Schedule 160 buttwelding ends

2100 Switch Supply Pressure Connection Size

1/4 NPT internal

2100E Switch Electrical Connection Size

1/2 NPT external

Hazardous Area Classification

Approvals on the electrical switch component in the 2100E, supplied by ITT NEO-DYN are as follows:

CSA— Class I Division 1, Groups A,B,C,D
Class II Division 1, Groups E,F,G ; Dual Seal

FM— EXP - Class I Division 1 Groups A,B,C,D
DIP - Class II Division 1 Groups E,F,G

UL— Class I Division 1 Groups A,B,C,D
Class II Division 1 Groups E,F,G

ATEX— Ex d IIC

IECEx— Ex d IIC

Approvals on the complete 2100E assembly are as follows:

Russian GOST-R—1ExdIICT4/T5/T6

Russian FSETAN

Contact your Emerson Process Management sales office if additional information is required.

Construction Materials

Cage: ■ SA216 Cast Steel (WCC) cage, ■ SA216 Cast Steel (WCC) cage (NACE MR0175-2002) and ■ SA351 316 SST (CF8M) cage
Displacer: ■ S30400 stainless steel (standard) ■ S31603 solution annealed stainless steel (NACE MR0175-2002)
Torque Rod & Tube Assembly: N05500
Bearing: Glass-filled PTFE
O-Rings: Fluorocarbon
Cover Gasket:
2100: Chloroprene
2100E: Silicone rubber
Other Gaskets: Silicone rubber
Nozzle Block Assembly (2100 only): Aluminum & stainless steel
Nozzle (2100 only): Stainless steel

-continued -

Specifications (continued)

Construction Materials (continued)

Flapper & Clamp Assembly (2100 only): Stainless steel
Flapper Seat (2100 only): Fluorocarbon
Magnet (2100 only): Special material
Body Block: Steel
Cover:
2100: Clear plastic
2100E: Aluminum
Housing (2100E only): Aluminum
Other Metal Parts: Stainless steel

Options

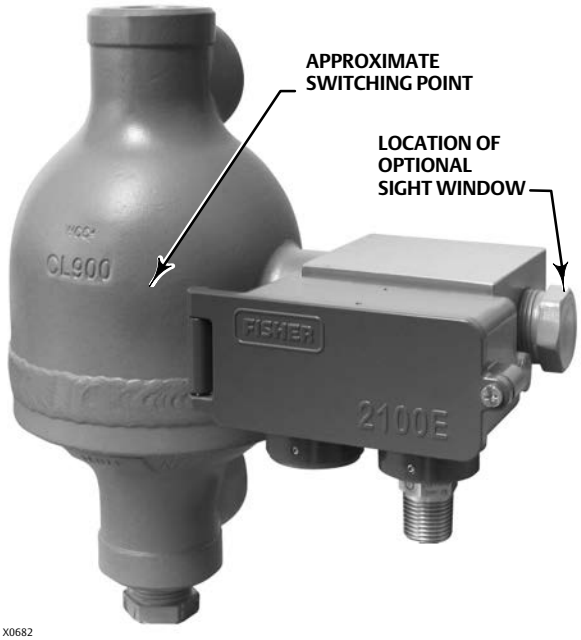
2100 Switch Option: Individual street tee and bleed orifice (when it is not desired to supply several level switches from one common block and bleed restriction)
Sight Window Option: A sight window is available for either the 2100 or 2100E that installs in place of the pipe plug, as illustrated in figure 1.
NACE Option: Constructions are available which comply with the metallurgical requirements of NACE MR0175-2002. Environmental restriction may apply.

Shipping Weights

17.2 kg (38 pounds)

NOTE: Specialized instrument terms are defined in ANSI/ISA Standard 51.1 - Process Instrument Terminology.
1. Natural gas should contain no more than 20 ppm of H_2S.
2. Normal m^3/--normal cubic meters per hour at 0°C, 1.01325 bar, absolute (Scfh--standard cubic feet per hour at 60°F, 14.7 psia)
3. Pressure and temperature limits in this document and any applicable standards or code limitations should not be exceeded.
4. Water, Oil, Gas maximum working pressure. Corresponds to Cold Working Pressure: the maximum pressure rating allowed under normal ambient temperature conditions, which are usually understood to be -29 to 38°C (-20 to 100°F). Refer to MSS SP-25.

Figure 1. Fisher 2100E Electric Liquid Level Switch



Principle of Operation

Figure 2 shows the 2100 switch with the nozzle, flapper, and magnet positioned for high level activation. When the switch is in the normal position with the flapper against the nozzle, output pressure cannot bleed off and remains the same as full supply pressure. Rising liquid level exerts a buoyant force on the displacer, producing a torque on the torque tube. When the torque transmitted by the torque tube exceeds the torque exerted on the flapper by the magnet, the flapper snaps away from the nozzle, allowing output pressure to bleed through the nozzle faster than supply pressure can enter through the bleed orifice. The reduced pressure in the output signal line activates the shutdown or alarm system. When the liquid level lowers, the falling displacer forces the flapper into the field of the magnet, letting the magnet snap the flapper against the nozzle and causing output pressure to build to full supply pressure.

Figure 2. Principle of Operation for High-Level Fisher 2100 Switch

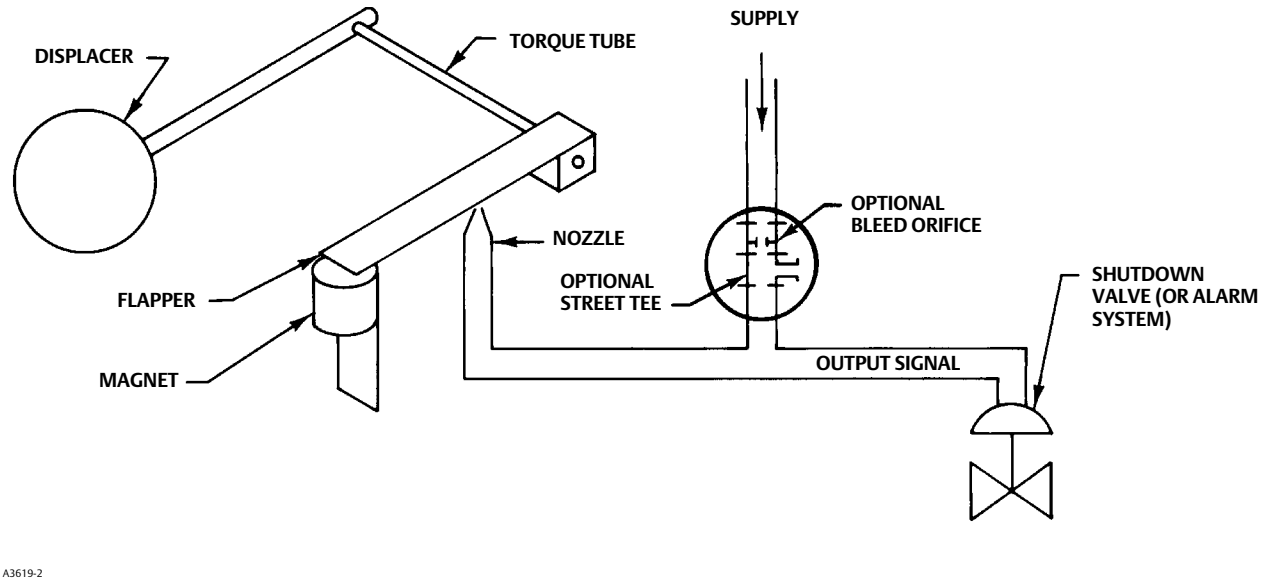


Figure 3. Construction Details of Low-Level Fisher 2100 Switch

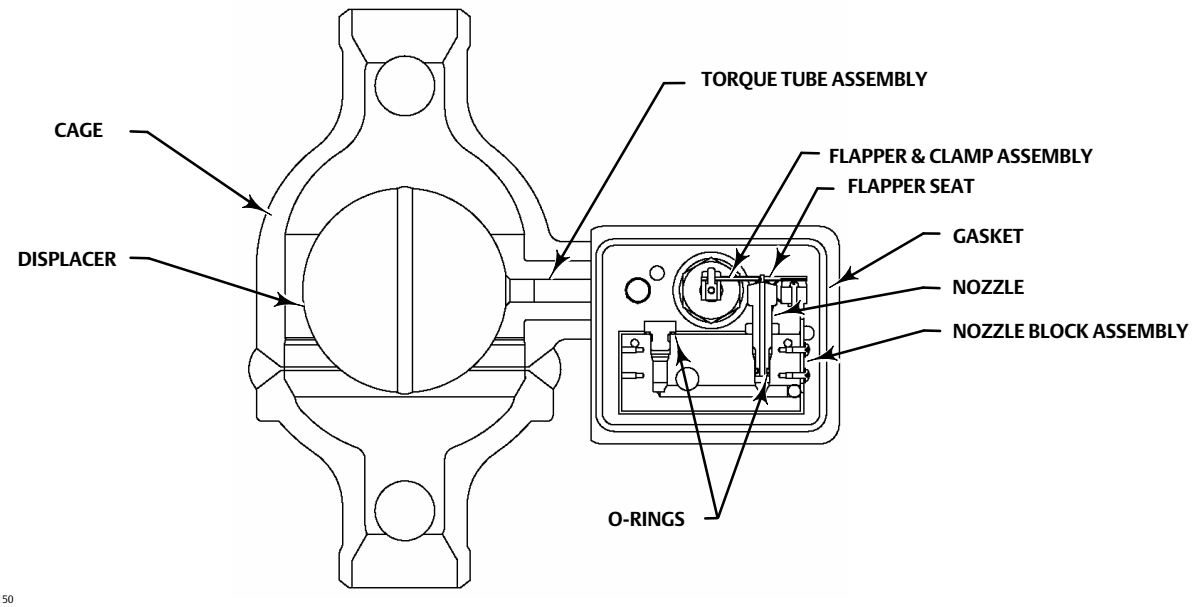


Figure 4. Construction Details of Fisher 2100E Switch

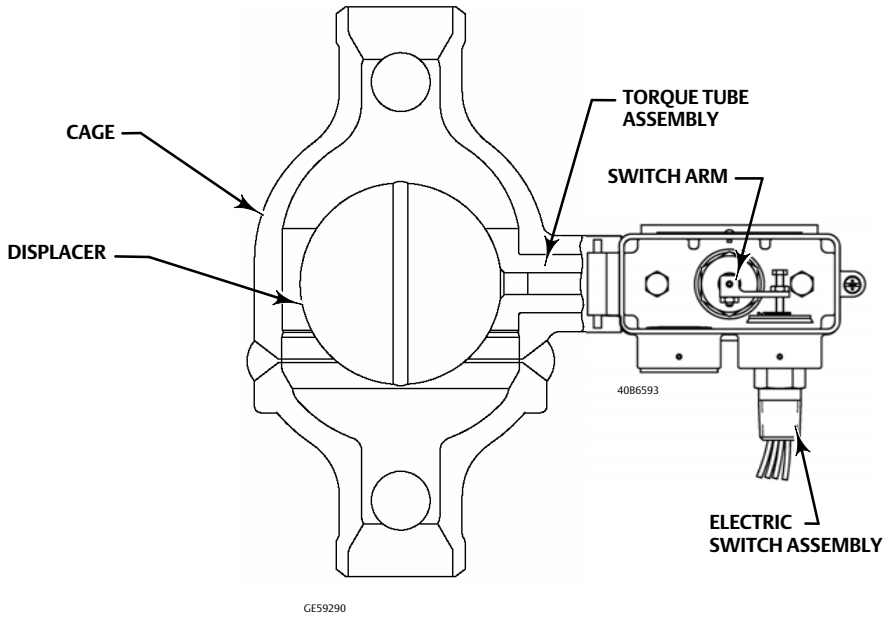


Figure 3 shows a sectional view of the 2100 switch positioned for low level activation. The nozzle, flapper, and magnet are on the opposite side of the torque tube, so that downward displacer travel moves the flapper away from the nozzle.

With the 2100E switch (figure 4), rising liquid level exerts a buoyant force on the torque tube that either activates or deactivates an electrical SPDT or DPDT switch depending on the switching action desired. Falling liquid level deactivates or activates the same switch depending on the action desired.

Installation

The forged-in horizontal line on a 2100 or 2100E displacer cage indicates the approximate switching point. When mounted, the 2100 or 2100E switch is positioned so that the horizontal line corresponds to the level at which switching is desired. Isolating valves should be installed in the equalizing piping between the tank and the cage. Dimensions are shown in figure 5 and table 1.

Ordering Information

Application

When ordering, specify:

- Supply pressure (2100 switch only)
- SPDT or DPDT switch construction (2100E switch only)
- Maximum working pressure and temperature
- Switching action for high or low level alarming

Construction

Refer to the specifications. Review the information under each specification and in the referenced figures; specify the desired selection whenever there is a choice to be made. High level switching and right-hand mounting will be supplied automatically unless otherwise specified. Always specify the complete type number of the desired equipment.

Figure 5. Dimensions (also see table 1)

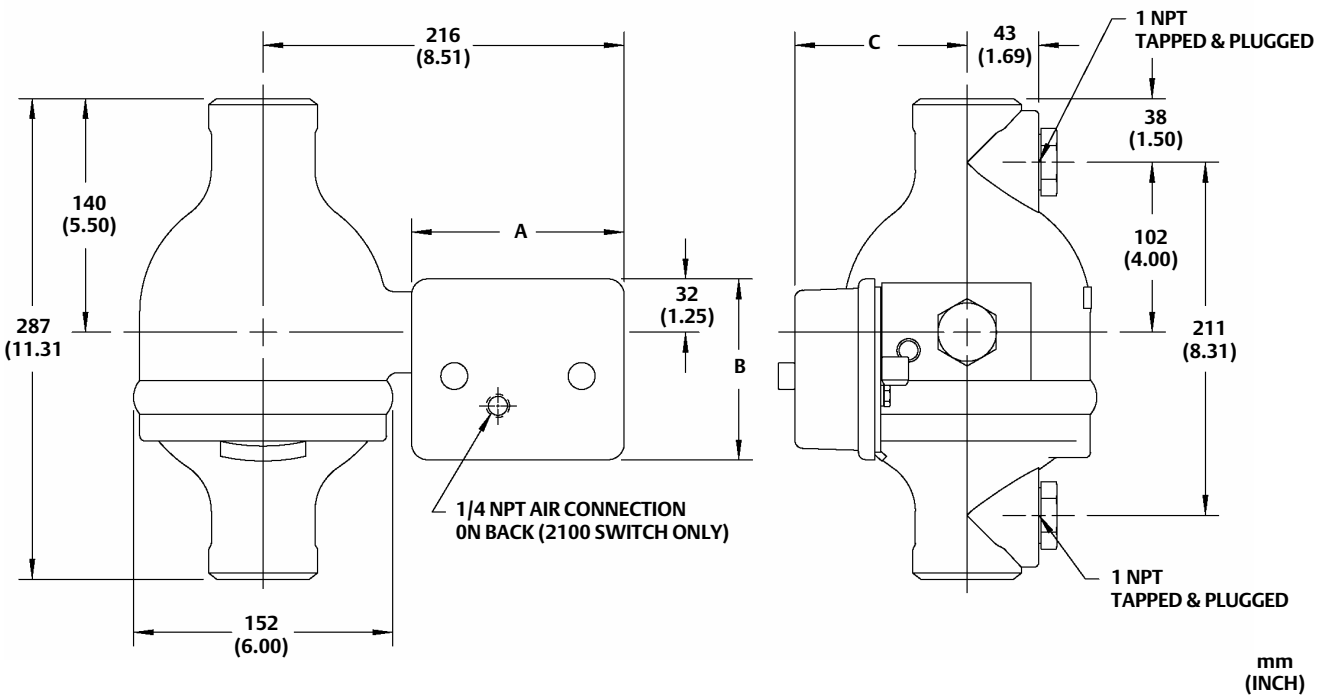


Table 1. Dimensions

TYPE	DIMENSIONS					
	mm			Inches		
	A	B	C	A	B	C
2100	127	108	103	5.00	4.25	4.06
2100E	130	57	111	5.12	2.25	4.38

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