

Type 2100 Pneumatic and Type 2100E Electric Liquid Level Switches

The on-off Type 2100 pneumatic switch (figure 1) and Type 2100E electric switch (figure 2) sense 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. The Type 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.

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 Type 2100 and 2100E switch construction comes in a left-hand as well as a right-hand mounting version. The explosion-proof, hermetically sealed Type 2100E switch is offered as both a factory mounting and as an electric switch retrofit to the proven Type 2100 switch.

- Installation Versatility**—The displacer cage has two 1-inch 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 Type 2100 and 2100E switches is field-reversible from high-level to low-level or vice versa without additional parts.



Figure 1. Type 2100 Pneumatic Liquid Level Switch



Specifications

Input Signal⁽¹⁾

Liquid level

Minimum Process Liquid Specific Gravity

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

Output Signal⁽¹⁾

Type 2100 Switch: 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

Type 2100E Switch: Same as supply signal

Supply Signal

Type 2100 Switch: ■ 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)

Type 2100E Switch: 11 amperes, 1/4 horsepower at 125/250 volts ac; 5 amperes resistive, 3 amperes inductive at 28 volts dc

Supply Medium (Type 2100 Switch)

Air or Natural Gas⁽²⁾

Steady-State Air Consumption^(1,3) (Type 2100 Switch)

Less than 0.03 normal m³/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⁽⁴⁾

■ 153 bar (2220 psig) WOG⁽⁵⁾ except ■ 24 bar (350 psig) WOG is the maximum working pressure for sight window construction

Operative Temperature Range^(1,4)

Type 2100: -29 to 204°C (-20 to 400°F)

Type 2100E: -29 to 82°C (-20 to 180°F)

Displacer Diameter

102 mm (4 inches)

Process Connection Size

153 bar (2220 psig) WOG: ■ 1-inch female NPT, ■ 2-inch Schedule 80 buttwelding ends, or ■ 2-inch Schedule 160 buttwelding ends

Type 2100 Switch Supply Pressure Connection Size

1/4-inch NPT female

Type 2100E Switch Electrical Connection Size

1/2-inch NPT male

Hazardous Area Classification

The Type 2100 and 2100E switches have no hazardous area approvals.

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



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



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 EEx d IIC

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

Construction Materials

Cage: ■ SA-105 forged steel (standard)
■ SA-105 solution annealed carbon steel (NACE MR0175-2002)

Displacer: ■ 304L stainless steel (standard)
■ 316L solution annealed stainless steel (NACE MR0175-2002)

Torque Rod & Tube Assembly: N05500

Bearing: Glass-filled PTFE

O-Rings: Fluorocarbon

Cover Gasket:

Type 2100 Switch: Chloroprene

Type 2100E Switch: Cellulose/Nitrile

Other Gaskets: Silicone rubber

-continued -

Specifications (continued)

Construction Materials (continued)

Nozzle Block Assembly (Type 2100 Switch Only): Aluminum & stainless steel
Nozzle (Type 2100 Switch Only): Stainless steel
Flapper & Clamp Assembly (Type 2100 Switch Only): Stainless steel
Flapper Seat (Type 2100 Switch Only): Fluoroelastomer
Magnet (Type 2100 Switch Only): Special material
Body Block: Steel
Cover:
Type 2100 Switch: Clear plastic
Type 2100E Switch: Acrylic
Housing (Type 2100E Switch Only): Stainless steel
Other Metal Parts: Stainless steel

Options

Type 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 Type 2100 or Type 2100E that installs in place of the pipe plug, as illustrated in figure 2.
NACE Option: Constructions are available which comply with the metallurgical requirements of NACE MR0175-2002. Environmental restriction may apply.

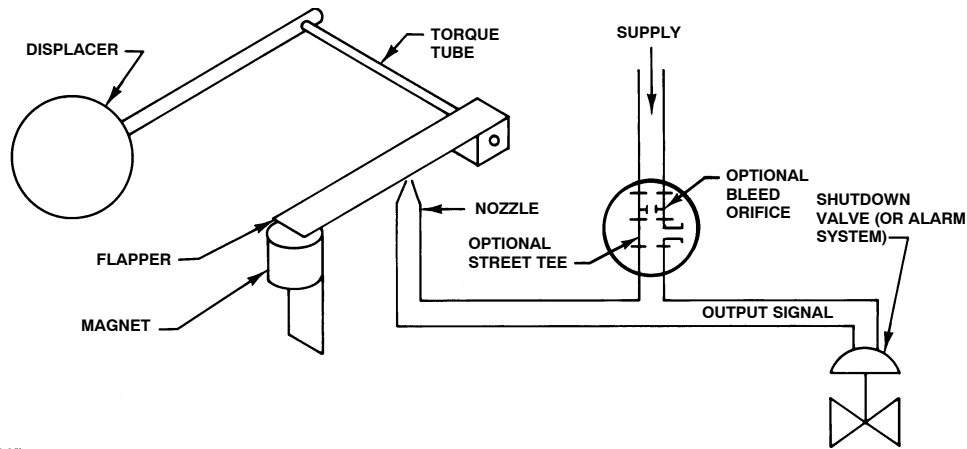
Shipping Weights

153 bar (220 psig) WOG Construction: 17.2 kg (38 pounds)

1. These terms are defined in ISA Standard S51.1.
2. Natural gas should contain no more than 20 ppm of H₂S.
3. Normal m³/h--normal cubic meters per hour at 0°C, 1.01325 bar, absolute (Scfh--standard cubic feet per hour at 60°F, 14.7 psia)
4. Pressure and temperature limits in this document and any applicable standards or code limitations should not be exceeded.
5. 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.

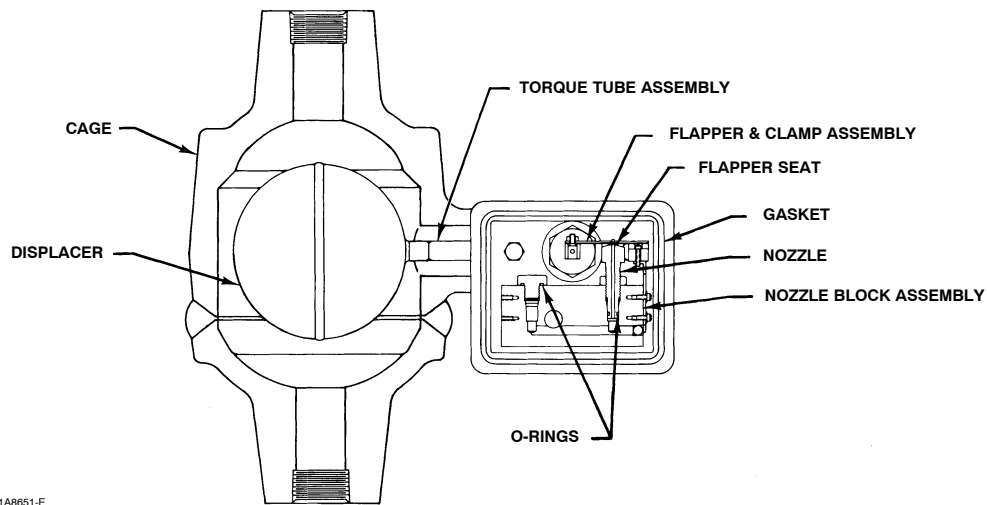


Figure 2. Type 2100E Electric Liquid Level Switch



A3619-2/LL

Figure 3. Principle of Operation for High-Level Type 2100 Switch



S1A8651-E
A1053-2/LL

Figure 4. Construction Details of Low-Level Type 2100 Switch

Principle of Operation

Figure 3 shows the Type 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.

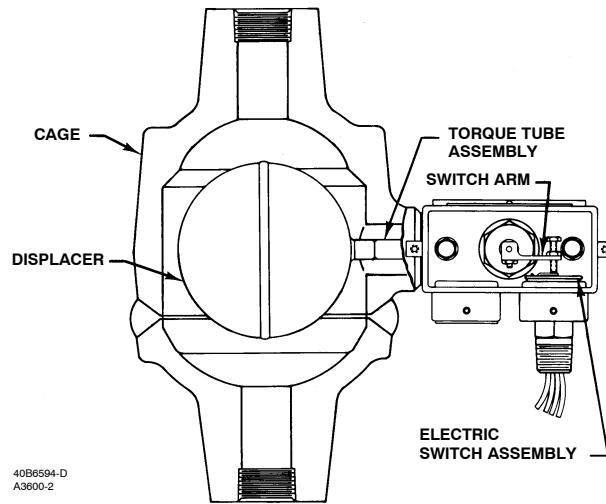


Figure 5. Construction Details of Type 2100E Switch

Figure 4 shows a sectional view of the Type 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 Type 2100E switch (figure 5), 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 Type 2100 or Type 2100E displacer cage indicates the approximate switching point. When mounted, the Type 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 6 and table 1.

Ordering Information

Application

When ordering, specify:

- Supply pressure (Type 2100 switch only)
- SPDT or DPDT switch construction (Type 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.

2100 and 2100E Level Switches

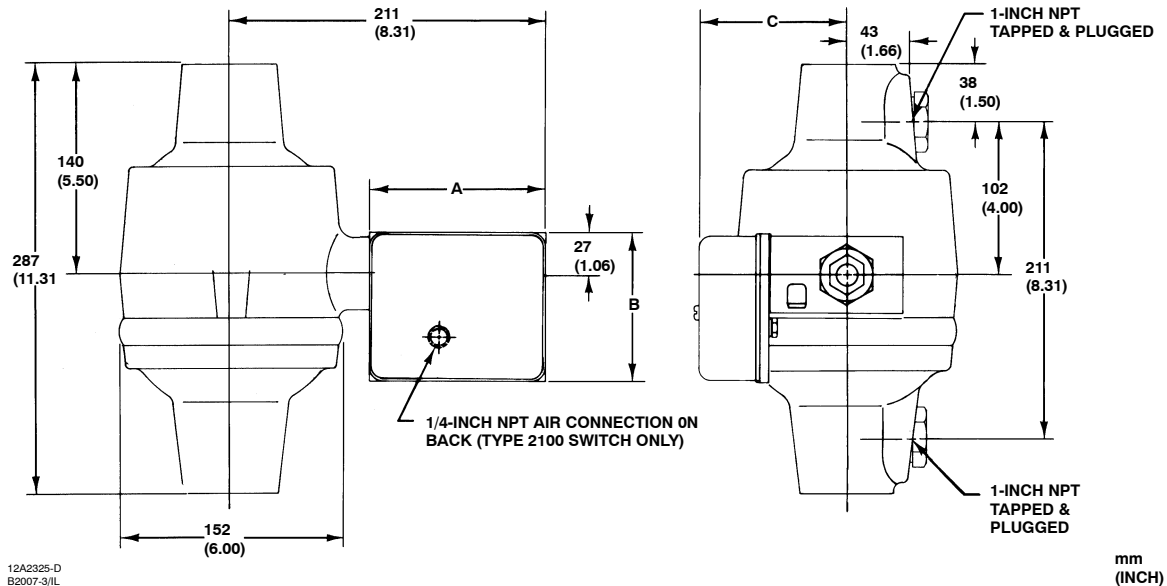


Figure 6. Dimensions (also see table 1)

Table 1. Dimensions

TYPE	DIMENSIONS					
	mm			Inches		
	A	B	C	A	B	C
2100	117	99	99	4.62	3.88	3.88
2100E	130	57	108	5.12	2.25	4.25

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