

# 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.

## 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 Gas Service Capability**—Materials are available for applications handling sour gases. These constructions comply with the recommendations of the National Association of Corrosion Engineers (NACE) standard MR0175.

- **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



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## Specifications

### Input Signal<sup>(1)</sup>

Liquid level

### Minimum Process Liquid Specific Gravity

0.5 (consult your Fisher Controls sales office or sales representative for settings below this value)

### Output Signal<sup>(1)</sup>

**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:** ■ 30 to 60 psig (2.1 to 4.1 bar), ■ 60 to 100 psig (4.1 to 6.9 bar), or ■ 100 to 150 psig (6.9 to 10.3 bar)

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

### Steady-State Air Consumption<sup>(1,2)</sup> (Type 2100 Switch)

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

### Maximum Working Pressure

■ 2220 WOG<sup>(3)</sup> except ■ 350 WOG is the maximum working pressure for sight window construction

### Operative Temperature Range<sup>(1)</sup>

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

**Type 2100E:** -20 to 180°F (-29 to 76°C)

### Displacer Diameter

4 inches (102 mm)

### Process Connection Size

**2220 WOG:** ■ 1-inch female NPT, ■ 2-inch Schedule 80 butt welding ends, or ■ 2-inch Schedule 160 butt welding 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. For approvals on the electrical switch component of the Type 2100E, see the Hazardous Area Classifications bulletin.

### Construction Materials

**Cage:** SA-105 forged steel

**Displacer:** 304L stainless steel

**Torque Rod & Tube Assembly:** K-Monel<sup>(4)</sup>

**Bearing:** Glass-filled PTFE

**O-Rings:** Fluoroelastomer

**Cover Gasket:**

*Type 2100 Switch:* Neoprene

*Type 2100E Switch:* Cellulose/Nitrile

**Other Gaskets:** Silicone rubber

**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 recommendations of the National Association of Corrosion Engineers (NACE) standard MR0175.

### Shipping Weights

**2220 WOG Construction:** 38 pounds (17.2 kg)

1. These terms are defined in ISA Standard S51.1-1979.

2. Scfh at 60°F, 14.7 psia (normal m<sup>3</sup>/h at 0°C, 1.01325 bar, absolute)

3. Water, Oil, Gas maximum working pressure rating designation in psi. Corresponds to Cold Working Pressure: the maximum pressure rating allowed under normal ambient temperature conditions, which are usually understood to be -20°F to 100°F (-29°C to 38°C). Refer to MSS SP-25-1978.

4. K-Monel is a mark owned by International Nickel Co.



Figure 2. Type 2100E Electric Liquid Level Switch

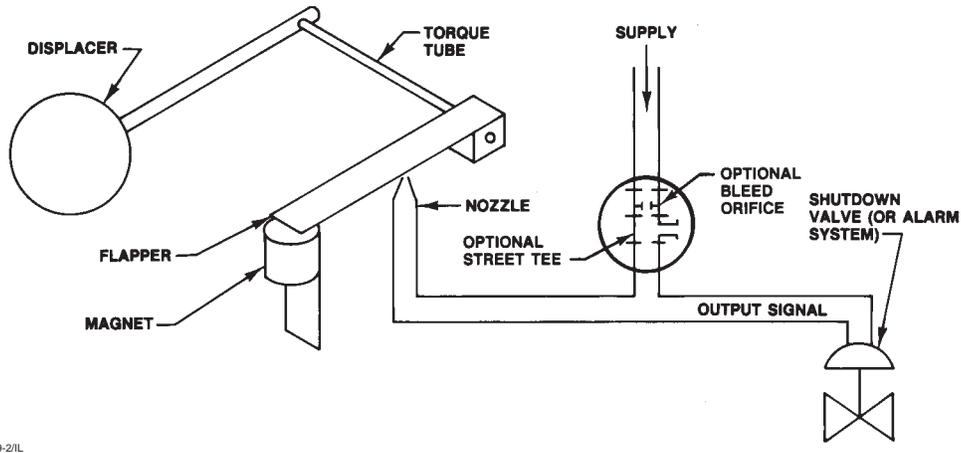
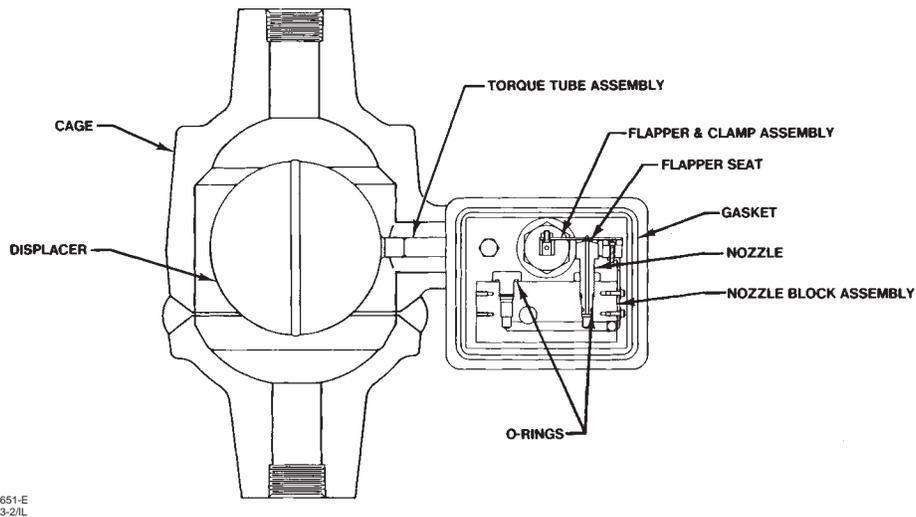


Figure 3. Principle of Operation for High-Level Type 2100 Switch

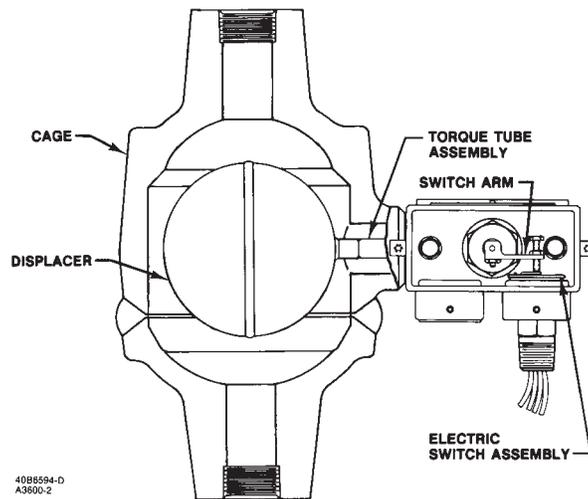
### Principle of Operation

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 ex-

ceeds 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 4.** Construction Details of Low-Level Type 2100 Switch



**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.

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

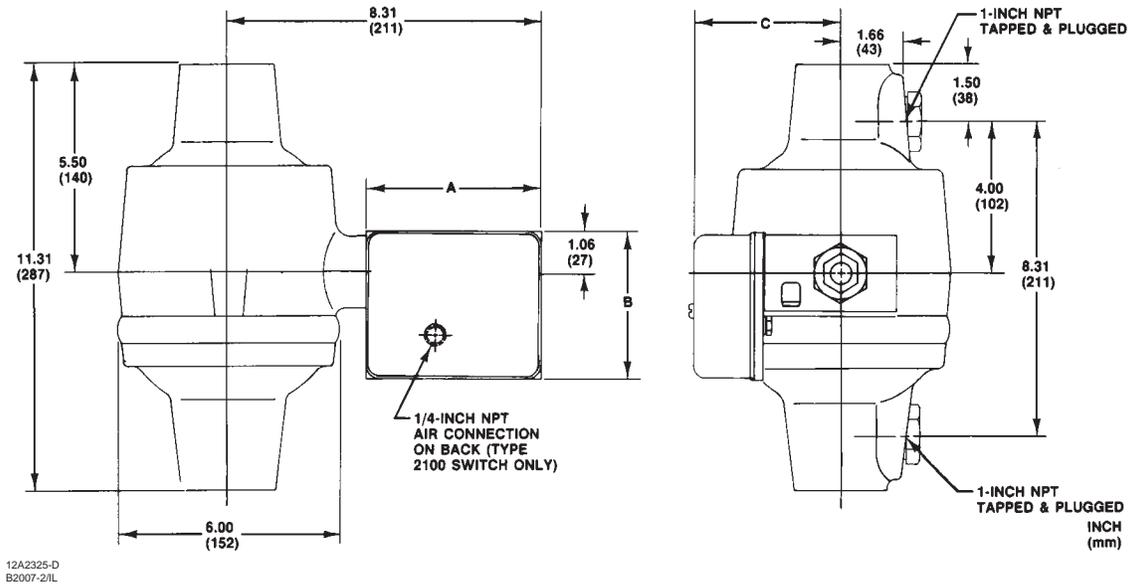


Figure 6. Dimensions

## 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.

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## 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.

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