

# Wellmark Series 9321

## Caged Pneumatic & Electric Liquid Level Switch

### Application

The Series 9321 On-Off Pneumatic Liquid Level Switch operates shut-down valves or alarm systems when liquid in a vessel reaches a predetermined level. This switch uses an externally mounted displacer that operates a nozzle-flapper to vent the supply pressure when the switch is activated. The nozzle-flapper has a soft seat for tight shut-off when the switch is in its normal position (flapper against the nozzle).

The 9321E is an external cage-mounted electric liquid level switch. Rising liquid exerts a buoyant force on the displacer, producing a torque in the tube. This force will either trip or reset an electrical switch. Falling liquid will trip or reset the same switch if so desired. The 9321E electric switch uses the displacer and torque tube movement to trip and reset an electric switch for on-off condition. The displacer can withstand up to 1-1/2" times the maximum working pressure, allowing it to remain in the cage during hydrostatic testing.

### Features

- Pneumatic or Electric
- Left Hand or Right Hand
- Hi-Level Alarm or Lo-Level Alarm

### Specifications

Output signal:

Pneumatic Output equal to supply pressure when the switch is in the normal position. Output reduced to approximately atmospheric pressure, depending upon size of the bleed orifice and piping configuration, when the switch is activated. Electric output same as supply signal.

| Supply Signal        |                               |
|----------------------|-------------------------------|
| Pneumatic            | Standard 30 - 60 psi          |
| Electric (SPDT)      | .11 AMP, 1/4 HP @ 125/250 VAC |
|                      | 5 AMP RES @ 28 VDC            |
|                      | 0.5 AMP RES @ 125 VDC         |
| Leads Factory Sealed |                               |

Steady-state air consumption:

Less than 1.0 scfh for all supply pressures when the liquid level is one inch below the normal switch position for high-level switching or one inch above the normal switch position for low-level switching.



(Right hand mount as shown)



| Maximum Working Pressure        | 2500 psi            |
|---------------------------------|---------------------|
| Operating Temperature           | -20°F to 400°F      |
| Displacer Diameter              | 4 in.               |
| Process Connection Size         | 1" Female NPT       |
| Supply Pressure Connection Size |                     |
| Pneumatic                       | 1/4 inch female NPT |
| Electric                        | 1/2 inch conduit    |
| Shipping Weight                 | Approx. 35 lb.      |
| Materials                       |                     |
| Displacer                       | Stainless Steel     |
| Cage                            | Cast Steel          |
| Torque Tube                     | Monel®              |
| Body                            | Carbon Steel        |
| Nozzle Block                    | Aluminum            |
| Switch Box                      | Stainless Steel     |

# Snap-acting and throttle pilots

## Principle of operation

The 9321 (Figure 1) is an external, cage-mounted pneumatic liquid level switch. 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 in the tube. When this torque exceeds the torque exerted on the flapper by the magnet, the flapper snaps away from the nozzle. This action allows 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 systems. 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. On applications where low-level switch operation is required (Figure 2) the nozzle, flapper and magnet are positioned on the opposite side of the torque tube so that downward displacer travel moves the flapper away from the nozzle.

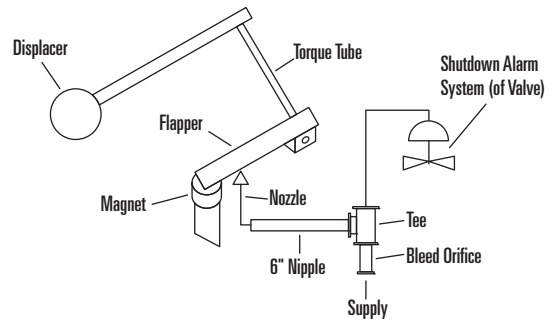


Figure 1: Principle of operation for Hi-level

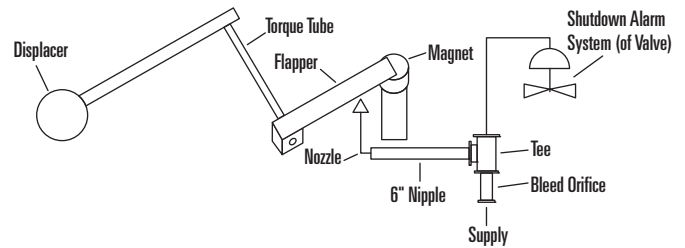
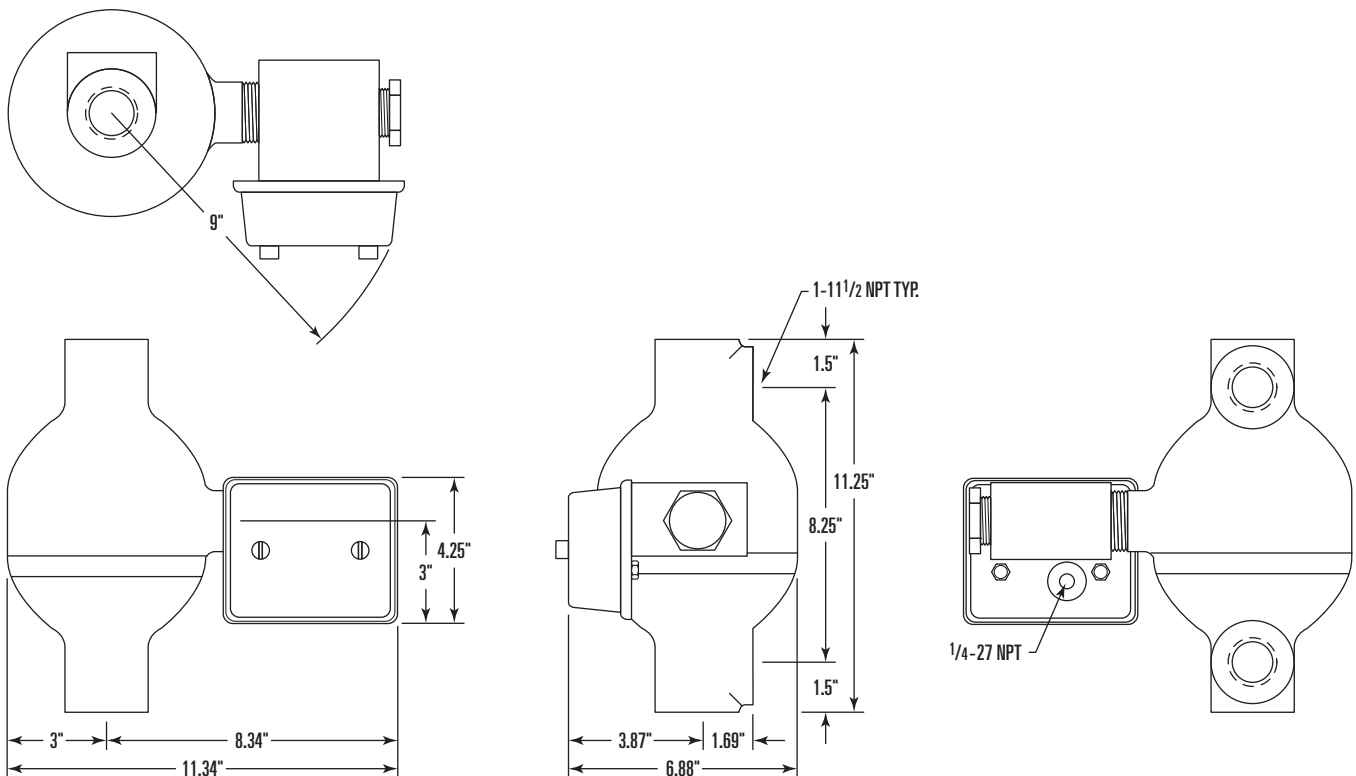


Figure 2: Principle of operation for Lo-level

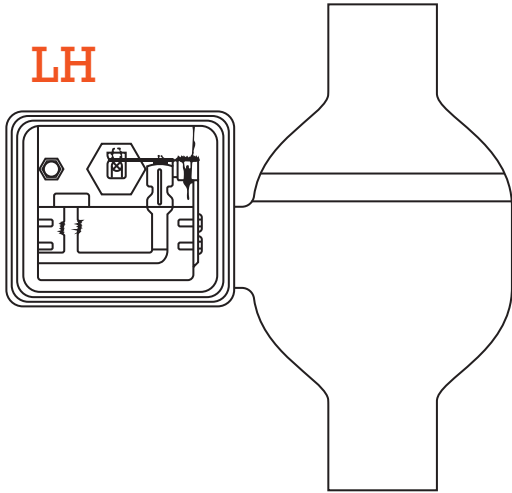
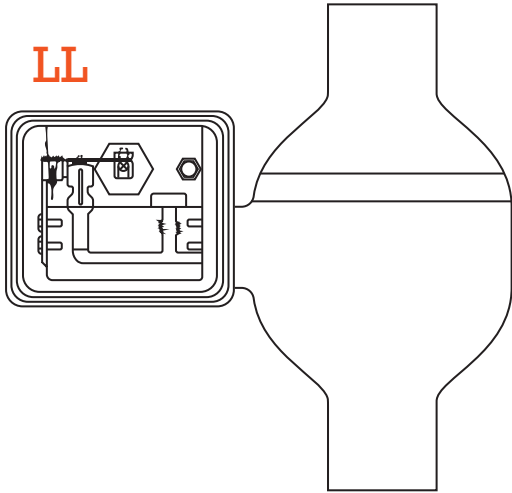
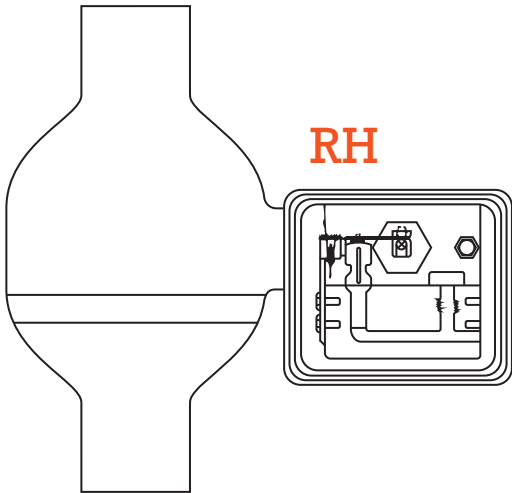
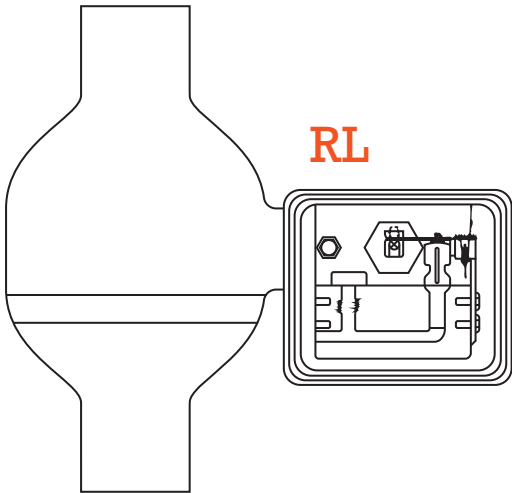
## Dimensional data



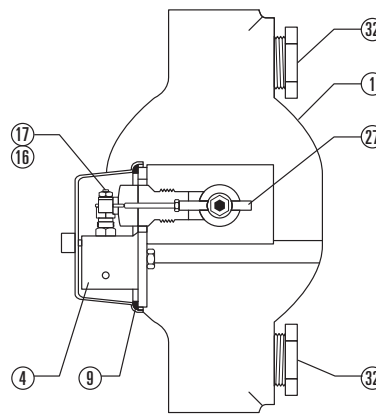
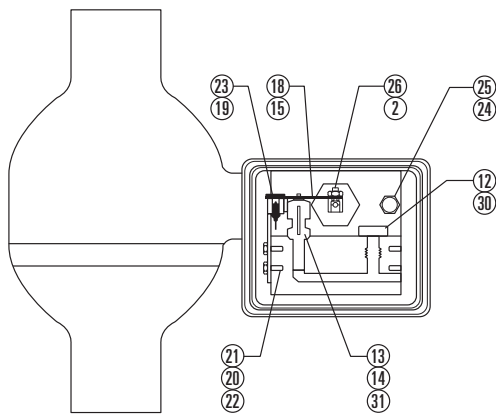
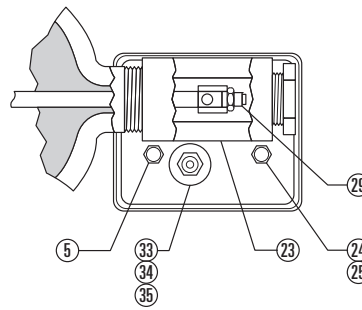
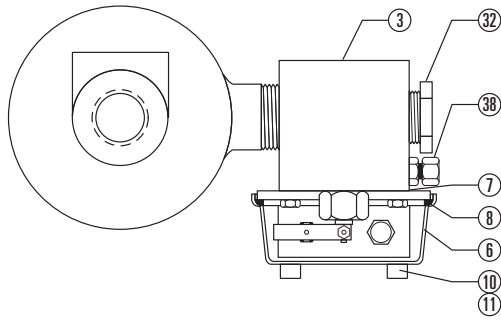
# Orientation Diagram

## How to order

| Pneumatic  |         |
|--|---------|
| Left Hand Hi                                       | 9321 LH |
| Left Hand Lo                                       | 9321 LL |
| Right Hand Hi                                      | 9321 RH |
| Right Hand Lo                                      | 9321 RL |
| Electric   |         |
| Add the Letter "E" after 9321<br>Example: 9321E-LH |         |



# Series 9321 parts list

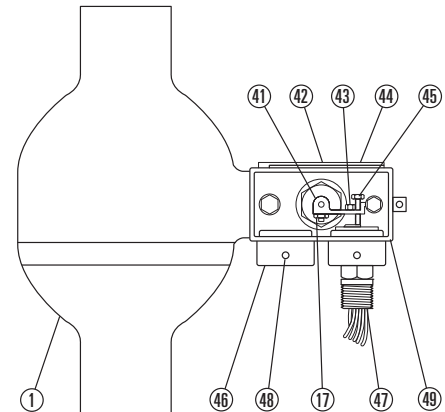
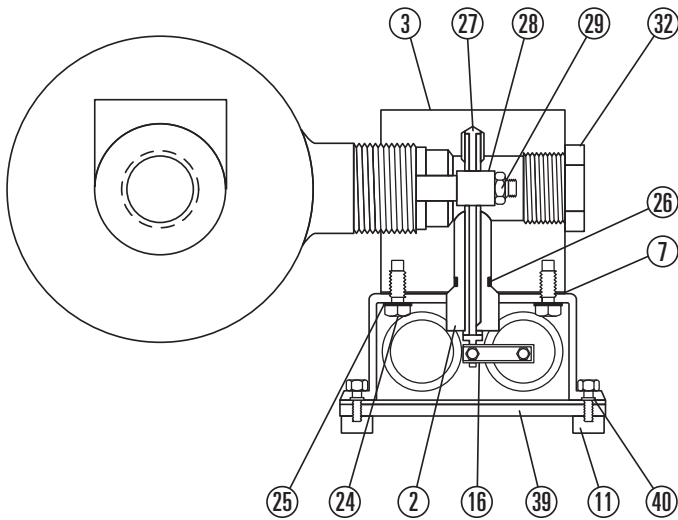


| ITEM | DESCRIPTION              | QTY. | Part No. |
|------|--------------------------|------|----------|
| 1    | CHAMBER WELD ASSEMBLY    | 1    | 1120924  |
| 2*   | TORQUE ARM WELD ASSEMBLY | 1    | 1120219  |
| 3    | BODY BLOCK               | 1    | 1123172  |
| 4    | NOZZLE BLOCK             | 1    | 1120786  |
| 5    | MOUNTING PLATE           | 1    | 1121665  |
| 6    | COVER, PLASTIC           | 1    | 1123139  |
| 7*   | GASKET, BODY BLOCK       | 1    | 1121216  |
| 8*   | GASKET, NOZZLE BLOCK     | 1    | 1121859  |
| 9*   | GASKET, PLASTIC COVER    | 1    | 1125689  |
| 10*  | SEAL, COVER SCREW        | 2    | 1123631  |
| 11   | THUMB SCREW, COVER       | 2    | 1119626  |
| 12   | PLUG, PILOT PRESSURE     | 1    | 1122835  |
| 13   | NOZZLE, 30-60 PSI        | 1    | 1122836  |
| 14   | JAM NUT, THIN (NOZZLE)   | 1    | 1119605  |
| 15*  | FLAPPER, WELDMENT        | 1    | 1126832  |
| 16*  | CLAMP, FLAPPER           | 1    | 1125696  |
| 17*  | JAM NUT, FLAPPER CLAMP   | 1    | 1124113  |
| 18*  | SEAT, NOZZLE             | 1    | 1120778  |

| ITEM | DESCRIPTION                        | QTY. | Part No. |
|------|------------------------------------|------|----------|
| 19   | MAGNET                             | 1    | 1126833  |
| 20   | BRACKET, MAGNET                    | 1    | 1124114  |
| 21   | S.S. MACHINE SCREW, MAGNET BRACKET | 2    | 1125748  |
| 22   | S.S. FLAT WASHER, MAGNET BRACKET   | 2    | 1126763  |
| 23   | S.S. MACHINE SCREW, MAGNET         | 1    | 1122687  |
| 25   | S.S. LOCK WASHER                   | 4    | 1119635  |
| 26   | O-RING, VITON® (TORQUE TUBE)       | 1    | 1120226  |
| 27   | BEARING SLEEVE (TORQUE TUBE)       | 1    | 1122135  |
| 28   | SLEEVE CLAMP, FLOAT ARM            | 1    | 1119789  |
| 29   | S.S. JAM NUT, SLEEVE CLAMP         | 1    | 1126769  |
| 30   | O-RING, VITON®                     | 1    | 1121860  |
| 31   | O-RING, VITON®                     | 1    | 1120677  |
| 32   | PIPE PLUG 1" NPT                   | 3    | 1126761  |
| 33   | 1/4 X 6 S.S. NPT                   | 3    | 1125690  |
| 34   | 1/4 S.S. TEE                       | 1    | 1126336  |
| 35   | IN-LINE ORIFICE                    | 1    | 1119131  |

\*Recommended Spare Part

# Series 9321E parts list



| ITEM | DESCRIPTION            | QTY. | Part No. |
|------|------------------------|------|----------|
| 1    | CHAMBER WELD ASSLY     | 1    | 1120924  |
| 2*   | TORQUE TUBE WELD ASSLY | 1    | 1120219  |
| 3    | BODY BLOCK             | 1    | 1123172  |
| 7*   | GASKET                 | 2    | 1121216  |
| 11   | THUMB SCREW            | 1    | 1119626  |
| 16*  | CLAMP                  | 1    | 1125696  |
| 17*  | JAM NUT                | 2    | 1124113  |
| 25   | S.S. LOCK WASHER       | 1    | 1119635  |
| 26*  | O-RING, VITON®         | 1    | 1120226  |
| 27*  | BEARING SLEEVE         | 1    | 1122135  |
| 28   | SLEEVE CLAMP           | 1    | 1119789  |
| 29   | S.S. JAM NUT           | 1    | 1126769  |
| 32   | PIPE PLUG              | 3    | 1126761  |

\*Recommended Spare Part

| ITEM | DESCRIPTION    | QTY. | Part No. |
|------|----------------|------|----------|
| 39   | COVER & GASKET | 1    | 1125925  |
| 41   | SWITCH ARM     | 1    | 1118846  |
| 42   | DRIVE SCREW    | 2    | 1117817  |
| 44   | NAMEPLATE      | 1    | 1125119  |
| 45   | S.S. CAP SCREW | 1    | 1123650  |
| 47*  | SPDT SWITCH    | 1    | 1119227  |
| 48   | S.S. SET SCREW | 2    | 1122823  |
| 49   | SWITCH BOX     | 1    | 1120157  |

## Repair kits

| Minor Repair Kit<br>Consists of:                | 1120661<br>Part No. |
|---|---------------------|
| GASKET  | 1121216             |
| GASKET  | 1121859             |
| GASKET  | 1123631             |
| FLAPPER SEAT                                    | 1120778             |
| O-RING  | 1120226             |
| BEARING SLEEVE                                  | 1122135             |
| GASKET  | 1125689             |
| FLAPPER ASSEMBLY                                | 1126832             |
| HOLDING MAGNET                                  | 1126833             |
| O-RING  | 1121860             |
| O-RING  | 1120677             |
| Major Repair Kit<br>Consists of:                | 1126809<br>Part No. |
| Same as 20735 (above)<br>plus torque tube assy. | 1120219             |

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