Vibrating Fork Level Switch

User Manual

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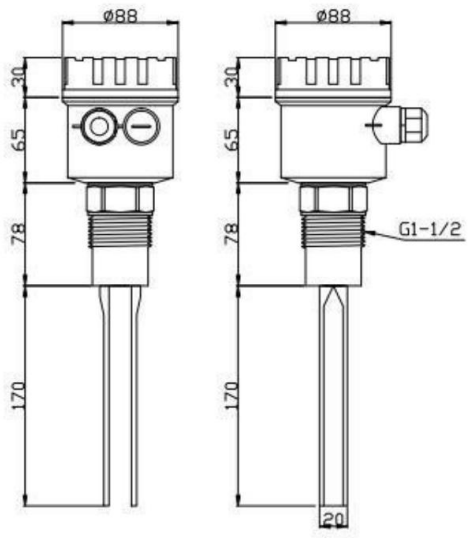
1. Overview



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The Vibrating Fork level switch is a new type of level switch. The Vibrating Fork is excited by a piezoelectric element to generate vibration. When the fork is immersed in the material, its vibration frequency changes. This frequency shift is detected by the electronic circuit, which then outputs a switching signal.

Its working principle is based on the damping effect of the material on the vibrating fork. When the material reaches or exceeds a certain level, the vibration of the fork is hindered, and a switch signal is triggered. This principle requires no significant mechanical movement, consumes low driving power, requires no calibration, and allows for quick and low-cost commissioning. The structure is simple, with no mechanical moving parts—meaning no maintenance, no wear, long service life, and reliable sensitivity.

The Vibrating Fork sensor vibrates at its natural frequency. When the fork comes into contact with a liquid or other material, its natural frequency decreases, and the energy is dissipated due to friction between material particles. This causes the vibration amplitude to sharply decay and eventually stop. The frequency change activates the level switch to generate an on/off signal.

Also known as an "electrical float," the Vibrating Fork level switch can be used in situations where traditional float switches cannot function reliably due to structural constraints, turbulence, agitation, bubbles, or vibrations. Since it has no moving parts, it requires no maintenance or adjustment, making it an ideal upgrade from conventional float switches.

Vibrating Fork level switches are widely used in industries such as petrochemical, light industry, food processing, and water treatment, providing reliable high/low level alarms and control.

2. Product Features

- **Strong Adaptability:** Measurement is not affected by the electrical parameters or density of the liquid. Conditions such as scaling, agitation, turbulence, bubbles, vibration, medium viscosity, high temperature, or high pressure have no impact on detection.
- **No Calibration Required:** Since detection is not influenced by the electrical parameters or density of the medium, there is no need for on-site calibration regardless of the type of liquid measured.
- **Maintenance-Free:** The detection process is fully electronic and involves no moving parts. Once installed and commissioned, the device requires no maintenance.

3. Operating Instructions

Insert the fork into the material to a depth of approximately 10 cm, then **press and hold the SET button**. During this time, the **red and green lights will alternately flash**. Once the **red light flashes continuously at least twice**, immediately **release the SET button**. The **red light will then blink continuously**.
Next, **briefly press the SET button** again. The **red and green lights will alternate flashing**, and then **both lights will remain on simultaneously**.
Then, **remove the fork from the material**:

- The **green light will be on**, and the **red light will be off**
- The **NO terminal and COM terminal will be open**, while the **NC terminal and COM terminal will be closed**

Now, **place the fork back into the material**:

- **Both lights will be on simultaneously**
- The **NO terminal and COM terminal will be closed**, while the **NC terminal and COM terminal will be open**

At this point, the calibration is complete.
(**Note:** The product is already calibrated at the factory. Recalibration is unnecessary unless a malfunction occurs.)

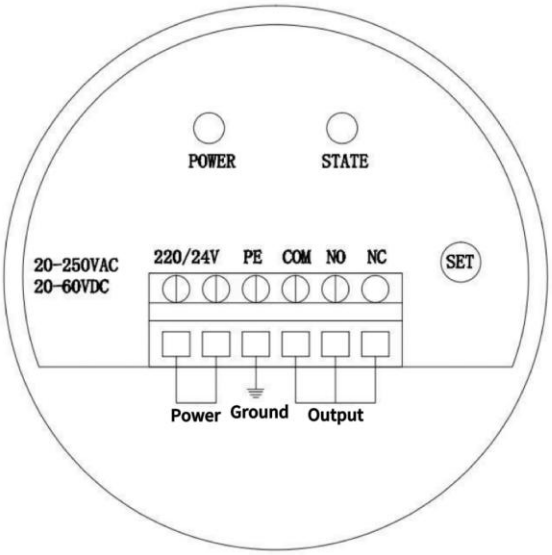
4. Special Notes

1. This intelligent Vibrating Fork switch includes a **self-checking function**. This serves two purposes: to compensate for vibration damping that may occur after installation on tank walls, and to prevent false triggering caused by electrical noise interference.
2. The **factory default calibration** is based on the density of **water (1 g/cm³)** as the reference switching point. If the material to be measured has a **density**

lower than 1 g/cm³, recalibration is required.

3. **Sensitivity is factory-set to the highest level**, suitable for stable material surfaces. If the surface of the material is **subject to significant fluctuations**, the sensitivity should be **reduced** to avoid false alarms.
4. During installation, avoid locations with **significant vibration** to prevent incorrect operation. If vibration cannot be avoided, perform a **recalibration** at the installation site or **restore factory settings**.

5. Wiring Terminal Diagram



As shown in the diagram above:

- The **power terminal** is for the power supply to the device and should match the actual supply voltage.
- **COM** is the **common terminal**.
- **NO (Normally Open)** means the circuit is open when no material is detected.
- **NC (Normally Closed)** means the circuit is closed when no material is detected.

6. Technical Specifications

Item	Specification
Power Supply Voltage	20–60 VDC / 20–250 VAC, 50/60Hz
Switching Time	Approx. 2 seconds when material is present; approx. 3 seconds when material is absent
Ambient Temperature	-40°C to +70°C
Storage	-40°C to +85°C

Temperature	
Medium Temperature	-40°C to +150°C
Operating Pressure	-1 to +40 bar
Measured Materials	- Powders and granules ≥10 mm, density > 0.1 g/cm³ - Liquids, viscosity ≤ 10000 mm²/s, density > 0.7 g/cm³
Process Connection	G1-1/2” or G1”
Electrical Connection	M12 × P1.0 connector
Housing Material	ABS / Aluminum Alloy
Fork Material	Stainless Steel S304 / S316
Output Type	- Relay output: up to AC250V/4A or DC60V/4A - Open collector NPN output, max 400 mA - Open collector PNP output, max 400 mA
Power Consumption	Max. 3W (DC supply); Max. 15W (AC supply)

7. Installation Methods

1. Correct Installation Methods:

A. Top Installation:
Install the probe **vertically downward** from the top. It can be installed at **any position on the top**, preferably **away from the inlet**.

B. Horizontal Installation (Angled):
Install the probe with a **15–20° downward tilt** to **reduce material impact** and **prevent material buildup** on the probe.

C. Horizontal Installation with Baffle Plate:
Install the probe with a **15–20° downward tilt**, and place a **baffle above the level switch** (approx. **10" (250 mm) long and 8" (200 mm) wide**) to **prevent improper accumulation of materials** around the switch and **reduce impact**.

D. Installation Inside a Discharge Hopper:
When installed inside a hopper, the **distance between the bottom of the threaded part of the level switch and the tank wall** should **not exceed 2.4" (60 mm)**. This helps **avoid false alarms** due to improper material accumulation.

2. Incorrect Installation Methods:

A. Horizontal Installation Directly Under Filling Port or Against Wall:
Avoid installing the probe **horizontally under the filling port** or against a wall, as this can lead to **malfunction due to direct material impact**.

B. Incorrect Installation Angle:
Avoid improper tilt or flat installation, as **excessive load from material inflow/outflow** may cause **malfunction or damage** to the probe.

C. Excessive Distance from Tank Wall:
If the **distance between the bottom of the threaded part and the tank wall exceeds 2.4" (60 mm)**, the level switch may **not function correctly**.

8. Installation Precautions for Storage Tanks

1. **Mount the switch at a 15–20° downward angle** from horizontal to reduce material impact and prevent buildup on the probe.
2. **Install the switch as far away as possible from the tank inlet** to avoid direct impact and false alarms.
   If installation near the inlet is unavoidable, a **baffle plate must be installed** between the inlet and the level switch to protect it.
3. The **cable entry of the junction box must face downward**, and the **cable gland locking nut must be securely tightened** to prevent moisture ingress.
4. When personnel are working inside the tank, it is **strictly forbidden to climb on the probe or use it to hang any ropes or objects**.

9. Installation Diagram