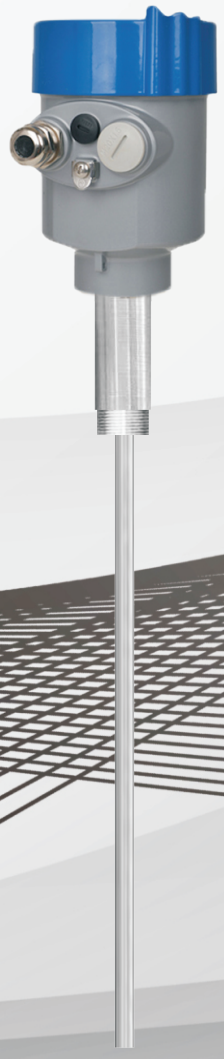
Vibrator Level Switch

Operating instruction



Vibrator Level Switch

The vibrator level switch is a new type of level switch. It is suitable for almost all liquid media and also for measuring freely flowing solid powders or granules with medium density. Since the tuning fork level switch has basically no moving parts, mechanical wear is minimal, eliminating the need for maintenance and adjustment, and making it simple and convenient to use.

In addition, this level switch adopts foreign new technologies and original imported chips, featuring long service life, stable performance, safety and reliability. It also boasts strong adaptability (the different electrical parameters and density of the measured medium have no impact on the measurement), no need for calibration (no on-site calibration is required regardless of the medium being measured), and maintenance-free operation. It is widely used in the process control of level in industries such as metallurgy, building materials, chemical engineering, light industry, and grain processing.

Working Principle

The vibrator level switch is designed and manufactured based on the principle of tuning fork vibration.

At the base of the switch ' s sensing rod, a piezoelectric wafer drives the tuning fork rod, while another piezoelectric wafer receives the vibration signal. This enables the vibration signal to circulate, causing the sensing rod to resonate. When the material comes into contact with the sensing rod, the vibration signal gradually weakens until resonance stops, at which point the control circuit outputs an electrical contact signal.

Due to the natural principle that the sensitivity of the sensing rod decreases sequentially from the front end to the rear base, no false signals will be generated when the material in the tank accumulates upward around the tank wall, touches the base (rear part) of the sensing rod, or during discharge.

Simply put, the tuning fork generates mechanical vibration under the excitation of piezoelectric crystals, with a specific frequency and amplitude. When the tuning fork is submerged in liquid or solid, its vibration frequency and amplitude will change. This frequency variation is detected by the electronic circuit, which then outputs a switching signal.

Design feature

◎ It is suitable for measuring freely flowing solid powders or granules with medium density, as well as almost all liquid media. This series of tuning fork level switches can measure multiple levels, featuring functions such as high/low fail-safe limit switching, overflow or dry-run protection, pump control, and indication of presence/absence of flow in pipelines.

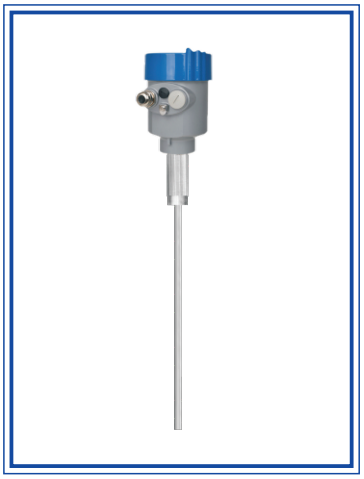
◎ It is not affected by foam, eddy currents, or gases, and is suitable for point alarm or control of solid material levels in various silos and liquid levels in various containers. Multiple models are available to meet the application needs of different occasions, with long service life, stable performance, safety and reliability.

◎ Strong adaptability: The different electrical parameters and density of the measured material have no impact on the measurement. Harsh conditions such as scaling, agitation, turbulence, bubbles, vibration, medium viscosity, high temperature, and high pressure also do not affect the detection.

◎ No calibration required: Unaffected by the dielectric constant and density of the measured medium, so no on-site calibration is needed regardless of the liquid being measured.

◎ Maintenance-free: The measurement process of the tuning fork switch is completed by an electronic circuit with no moving parts. Once installed and put into operation, no on-site calibration or maintenance is required.

Technical parameters



Typical Applications: Level control of liquids, powders, granules, and solids

Probe Material: 304 stainless steel, 316 stainless steel (optional)

Probe Length: 300mm (customizable upon request)

Power Supply: 24VDC, 220VAC (optional)

Process Temperature: -40～+130℃

Process Pressure: ＜2.0MPa

Process Connection: Threaded connection, flange connection (optional)

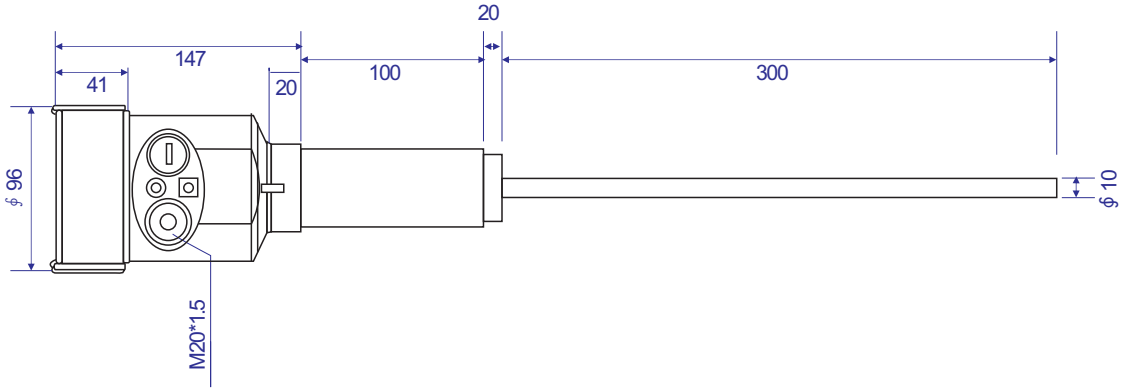
Time Delay: 0~30s adjustable

Power Failure Protection: Normally open, normally closed (field-switchable)

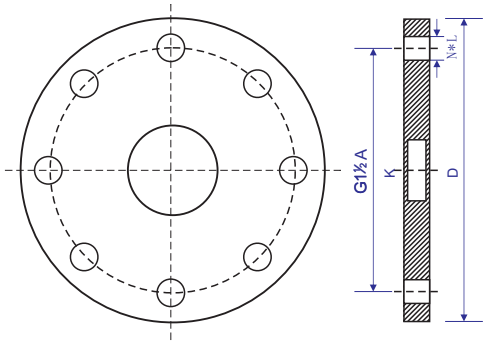
Instrument Output: Relay output

Protection/Explosion-Proof Rating: IP67/Exia Ⅱ CT6 (optional)

● Structural dimension diagram (unit: mm)



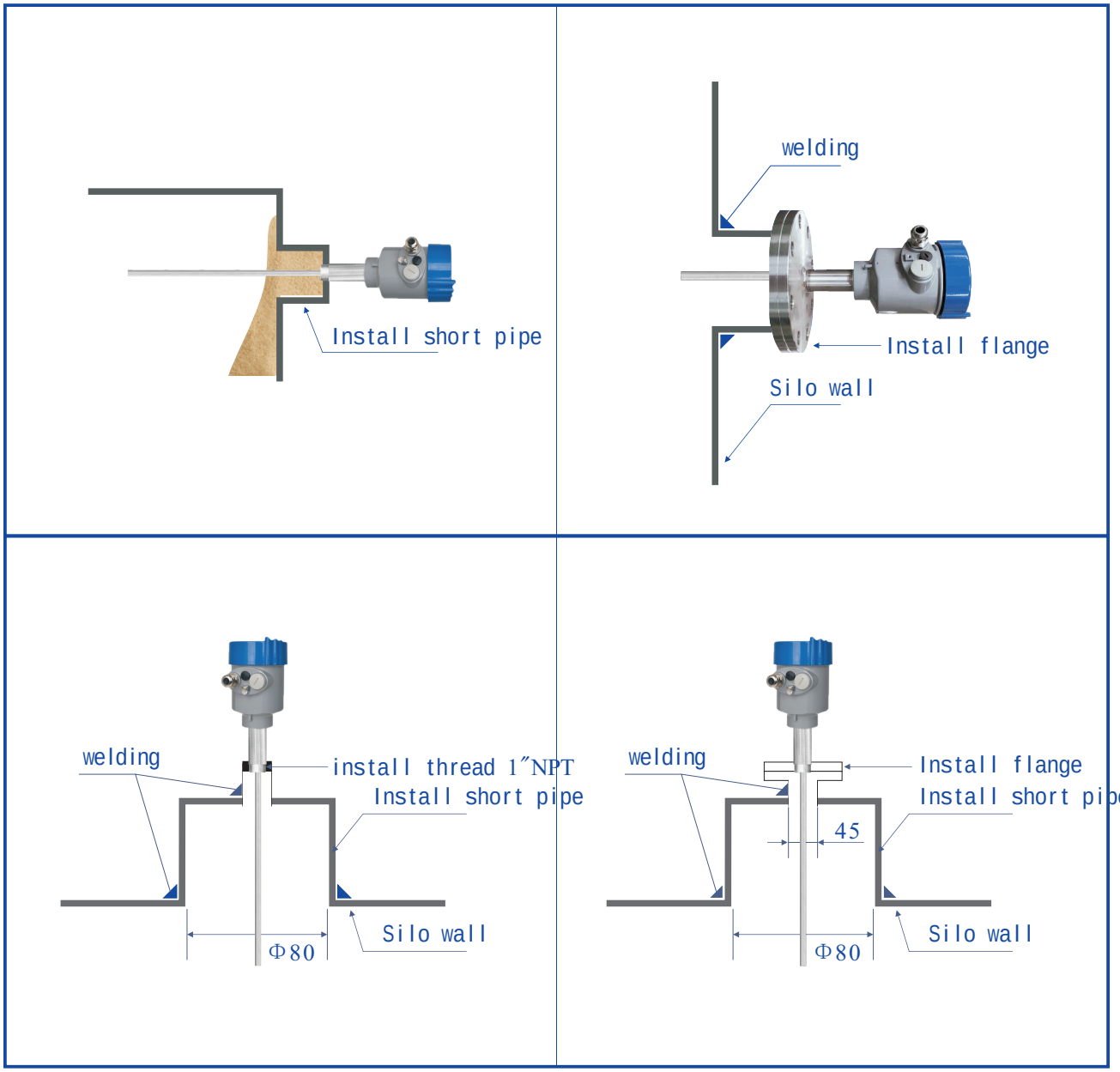
● Flange selection (special models/sizes/specifications/standards can be customized)



Flange	Outer diameter D	Center hole distance K	number of holes N	Aperture L
DN50	165	125	4	18
DN80	200	160	8	18
DN100	220	180	8	18
DN125	250	210	8	18
DN150	285	240	8	22
DN200	340	295	8	22
DN250	395	350	12	22

Installation requirements

◎ Inspection: Carefully remove the tuning fork level switch from the box and check for any transportation damage.
◎ Probe Installation
The standard installation method is 1"NPT threaded installation; flange installation is also available.
Both horizontal and vertical installations are acceptable.
The dimension of the probe rod extending outside the container is shown in the figure.
Screw the 1"NPT thread of the probe into the 1"NPT fitting on the container wall or top.

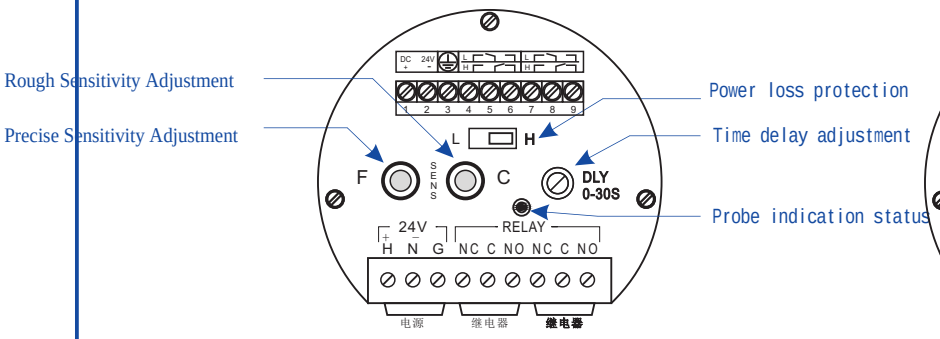


Note: When installing the tuning fork level switch horizontally, the length G of the probe protective sleeve must extend into the container wall. When installing vertically, the total length S of the probe must be equal to or greater than the position of the control point.

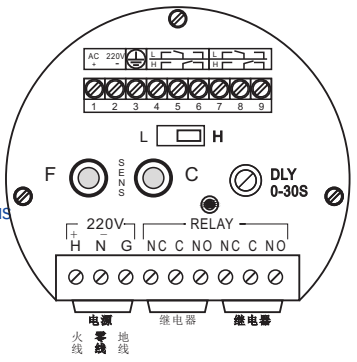
Electrical connection

Before wiring the level switch of the vibrating rod, please confirm that the instrument and power supply are consistent (e.g. 220V AC instrument and 220V AC power supply).

● 24vDC wiring diagram



● 220vAC wiring diagram



Loosen the two 2×M8 mounting screws for the electronic circuit shown in Figure 1, remove the electronic circuit board, and pull the wires into the 3/4NPT electrical interface of the instrument. After the wires pass through the wiring port, place the electronic circuit board back with its flat side facing the wiring port. Connect the wires to the connector and reinstall the two 2×M8 screws.

A. Power Supply Type (220VAC) - AC Power Line Connection

Connect the live wire (H), neutral wire (N), and ground wire (G). If the wires are not colored the standard black, white, and green, be careful not to mix them up.

Note: Grounding is mandatory.

B. Power Supply Type (24VDC)

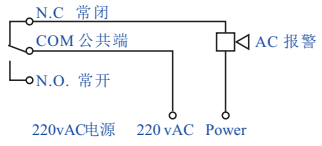
24VDC Power Line Connection: The original (H) terminal is -24V (+), the original (N) terminal is the common terminal (-), and the original (G) terminal remains the ground wire (G).

Note: Grounding is mandatory.

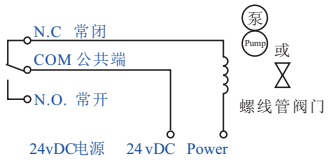
C. Connection of Control Relay

The relay output contacts are of C-type, with 2 groups of double-pole double-throw (DPDT), rated for 220VAC (impedance specified). Light-duty low-inductance loads can be used for solenoid valves or alarms. Heavy-duty inductive loads must be driven through an intermediate relay. The figure below shows the connection methods for three common point-level control functions.

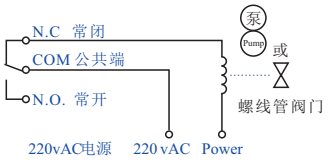
A.Alarm activated in case of malfunction



B.Control device opens in case of malfunction



C.Control device shutdown in case of malfunction



Notes

All applications are based on the correct connection of the fault alarm switch.

All relay contacts are in the "valve-set" state.

The equipment power supply is separate from the power supply for alarms/pumps/valves.

Instrument debugging

When conducting debugging, please note the following general rules:
◎ Turn the two sensitivity adjustment potentiometers clockwise to increase sensitivity, and counterclockwise to decrease sensitivity.
◎ After adjusting the two sensitivity controls, the green light illuminates to indicate the presence of material on the probe, while the red light illuminates to indicate the absence of material.
◎ Two installation methods are available: horizontal or vertical. To ensure stable operation of the equipment, a 5-minute warm-up period is required.

A.Sensitivity Calibration

For an empty container without material:
Adjust the fine (F) sensitivity control to the middle position. Slowly turn the coarse (C) sensitivity control until the status indicator just turns red. Readjust the fine (F) sensitivity control to find the exact point where the indicator switches to red, then mark the " empty" position as shown in Figure 6. Immerse the probe in the material, then readjust the fine (F) sensitivity control (do not touch the coarse sensitivity control) until the indicator just turns green. Mark this "material present" position. Note the difference between the two marks and set the fine (F) sensitivity control to the midpoint between them. This completes the full calibration process. For non-aqueous process liquids (non-conductive liquids), the optimal installation method is vertical mounting, with an alarm triggered when the liquid reaches the midpoint level.

B). Calibration for Aqueous Liquids (Conductive Liquids)

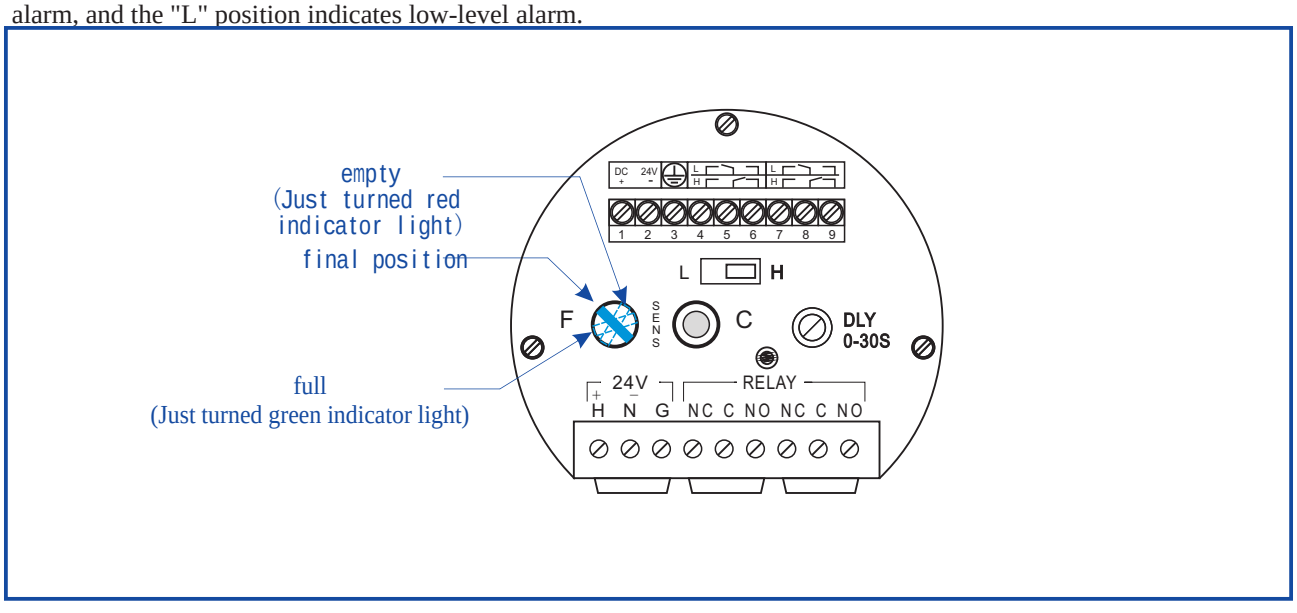
Turn the sensitivity control counterclockwise. Aqueous liquids are easy to measure—they only need to touch the sensing probe. This adjustment provides maximum anti-adhesion capability.
This completes the full calibration process.

B. Time Delay

It includes an adjustable time delay ranging from 0 to 30 seconds, with delay-on/delay-off modes (see Figure 1).
This mode is typically used to eliminate "chattering" of the control relay or control the cycle sequence. Initially, set the delay control to zero (fully counterclockwise position). When using the delay to eliminate relay chattering, only a minimal rotation is required.
The delay will cause fluctuations above or below the process level control point, but the average level will still equal the control point. The overshoot and undershoot are proportional to the delay time.

C. Fault Alarm/(Power Failure Protection) Mode Selection

The fault alarm function responds to most major fault conditions, including power supply failures, which will cause the control relay to de-energize. Therefore, the de-energized state of the relay is referred to as the "alarm" state. This means an alarm will also be triggered if the power supply is lost.
The RF admittance switch series is equipped with high-level or low-level fault alarms. This function is configured via a small jumper located near the center of the control panel (to the left of the time delay adjustment). The "H" position indicates high-level alarm, and the "L" position indicates low-level alarm.



Application field

◎ Casting machinery: detecting sand particle level;

◎ Environmental water treatment: detecting sewage liquid level;

◎ Hydraulic machinery: detect the level of lubricating oil;

◎Construction machinery: detect the material level of cement silo and mixing tank;

◎Flour mill: detect the level of flour and wheat grains;

◎ Feed factory: detect soybean meal level

◎ Power plant: detecting the level of fly ash material;

◎Glass factory: Testing quartz sand and broken glass material levels;

◎Chemical plant: detect the liquid level of chemical materials such as polyester, spandex, acid, alkali, etc;

◎Boiler factory: detect the water level of the steam drum and other pressure vessels;

◎Other occasions: Testing natural gas, fruit juice, tomato sauce, etc.

Appreciation of working condition diagram