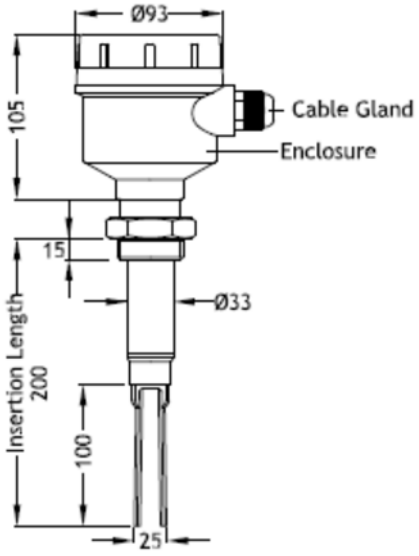
INSTRUCTION & MAINTENANCE MANUAL

Techtrol Vibrating Fork Switch for Solid – VFSS

Techtrol
Innovating Level Solutions Since 1984

Every Techtrol product should be installed properly, maintained regularly and used within its specified limits to ensure accurate & trouble free performance with extended working life.



Std. Integral Probe x WP Enclosure

Integral System

Two Part System

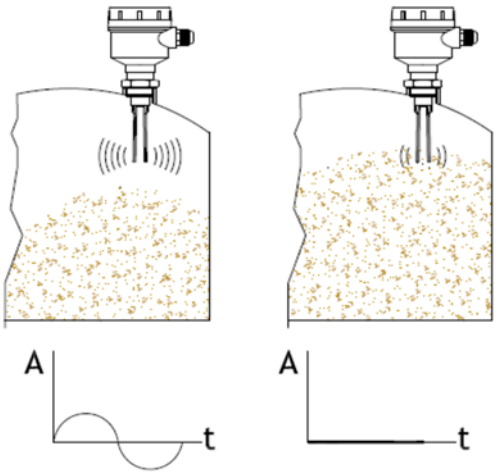
1. Introduction

VFSS is used for free flowing powders, granules to detect level in silos.

The fork vibrates in air at its mechanical resonance frequency of approx. 350 to 390 Hz in air. If the bulk material covers the fork, its vibration damp and detected in electronics to actuate relay to changeover of the contacts. The vibration of the fork has self-cleaning properties. The light deposit on the container wall does not affect the operation of the VFSS.

Vibrating Fork Switch is available in two type integral and two-part system. In integral system, electronics is housed in enclosure on probe top whereas in two-part system probe and electronics are separate.

Fig 1

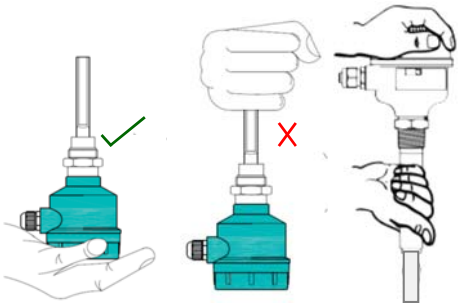


A: amplitude, t: time

2. Pre-Installation Check

- Ensure that forks are not bent and electronics is not damaged in transit.
- Do not hold the switch by its fork. Hold it by its enclosure. (Fig 2)
- Handle the fork carefully. Do not bang the forks on ground or wall.
- Open the enclosure cover and connect appropriate power supply to respective terminals. Refer figure 6.
- Hold the fork switch in hand by its enclosure and switch on the supply. As the forks vibrate in air, find blue (normal) LED glows and red LED (alarm) is off.

Fig 2



- Now touch the forks with hand so that its vibration gets damped. **Do not hold it tightly**. Observe red LED (alarm) glows showing level /alarm detection and blue LED is off. Check changeover of relay contacts using continuity tester. Now switch is ready to install.

WARNING:

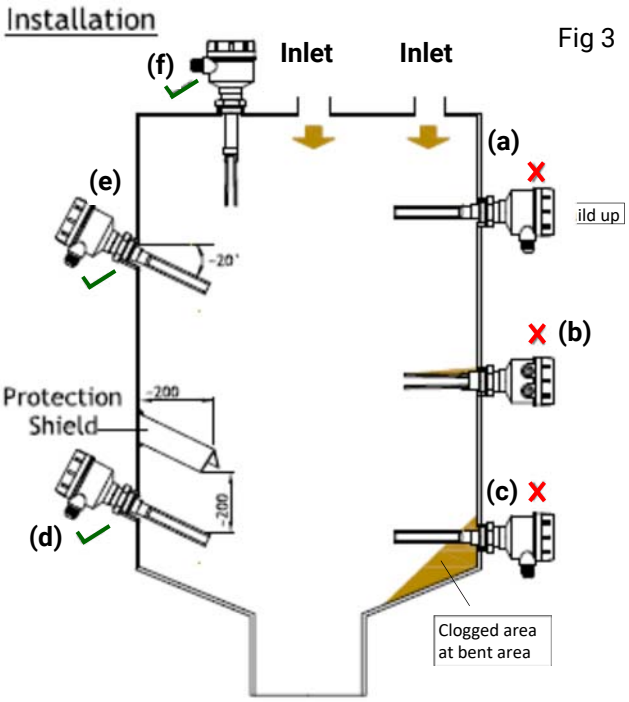
- Ensure that switch is installed by qualified person.
- The fork blades should not be bent and altered for its mechanical dimensions. Deforming the shape of the fork blades may affect the fork's operating frequency and its functioning.

3. Installation

3.1 Precautions during Installation –

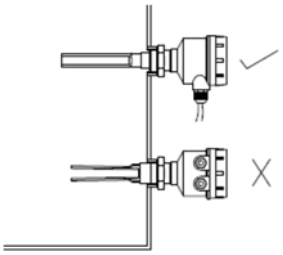
1. During installation, please ensure that –
2. Mounting location should be away inlet of the material feed to prevent unwanted switching. Refer fig. 3(a)
3. Angle of repose due to material build up should be taken into consideration while selecting mounting location.
4. Ensure the forks of the switch protrude sufficiently into the vessel and are free to vibrate.
5. The switch can be side mounted in such a way that surface of the fork blade is parallel to material flow. Hence material can flow freely through gap between fork blade. (fig 4)

Fig 3



6. It is recommended to mount the switch on side wall at 20 ° inclined such that, its knife edges of the fork should face the downward and point no. 5 is fulfilled. Refer fig. 3 (e)
7. To achieve precise switching point, switch can be mounted exact in horizontal position fulfilling point no. 5
8. In side mounted position at low level or near the inlet, use protection shield over the forks above 200 mm approx. to avoid material build up / loading on fork. Refer fig.3(d)

Fig 4



9. Do not mount the switch on silo near bend area where there are chances of material build up. Refer fig 3(c). Mount the switch above 200 mm approx. above the bend.
10. Cable gland of the switch housing should point downward to prevent ingress of water/ moisture inside the enclosure.
11. Ensure that material is free flowing and particle size is less than 10 mm, else material get clogged between the fork blade.

3.2 Mounting of Switch

The switch has screwed or flanged mounting connection.

- Top Mounting – The switch can be mounted on tank top. Insertion length of the switch should be such that forks are at height where the switching point is required.
- Side Mounting - It can be side mounted on the container wall at the desired level of the material to be controlled.

Provide suitable gasket between the flanges and appropriate thread sealant between threads before bolting / tightening to ensure sealing.

WARNING:

Ensure that the switch is operated within its specified limits and under the designated operating conditions. (Max. temperature 150 ºC and max. pressure 10 kg/cm2)

4. Termination and Wiring

- Ensure power supply is turned off during wiring to prevent accident and ensure safety.
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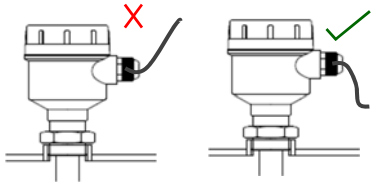
- The switch with a relay output is compatible with a universal power supply. You can connect either an AC supply (20 to 265 VAC) or a DC supply (20 to 265 VDC) to the same terminals.
  Connect the power supply to the L, N and E terminals of the switch.
  Ensure correct polarity while connecting 24 VDC to the +ve and -ve terminal.

Top mounted Fig 5



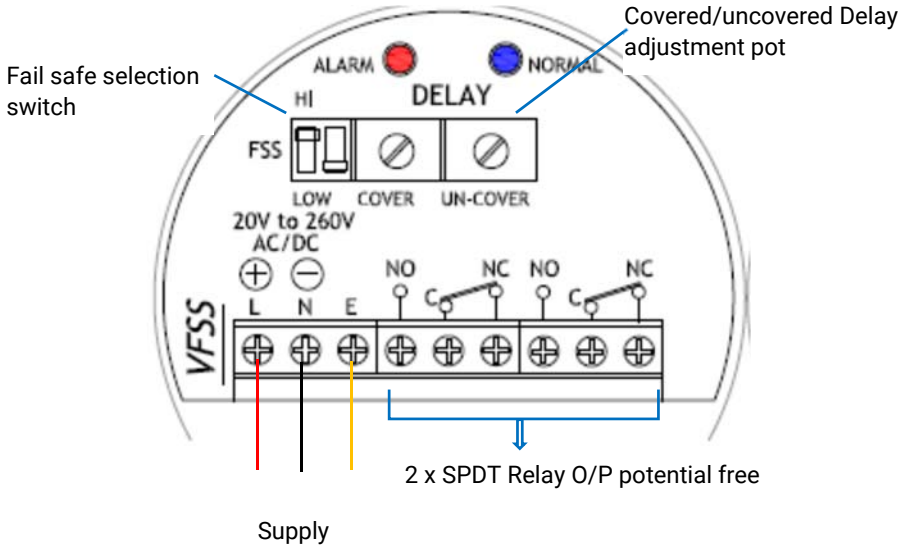
- In two-part system, use 3 core, 1.5 mm^2 PVC cable to connect the probe and controller as shown in

fig 6b.

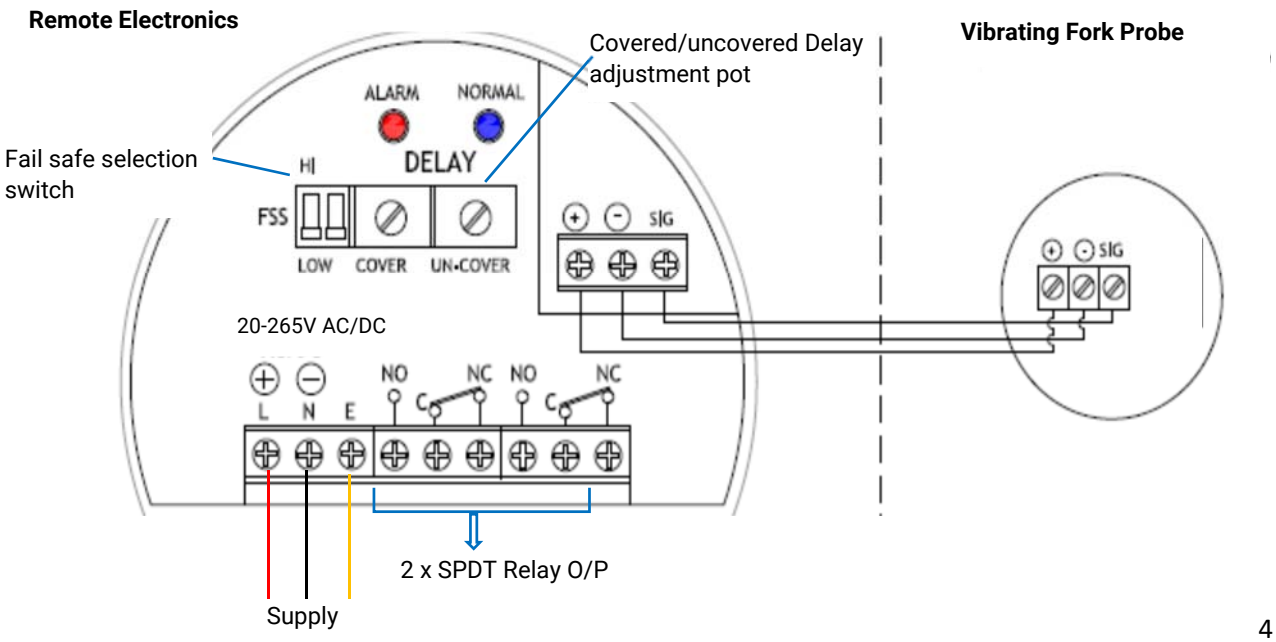
- For top mounting, route cable in downward direction as shown fig 5.
- In two-part system, ensure remote controller is located in areas having ambient temperature < 60ºC.
- Route the wiring away from high voltage cables, contactors and inductive loads.
- Ensure that the enclosure cover is properly closed with gasket for its weather proof ness and there is no gap between cable gland ID and cable OD to prevent ingress of moisture into the enclosure.
- Before switching on supply, ensure wiring is correct and completed as per termination & wiring diagram.

a) Integral System

Fig 6



b) Two Part System



5. Adjustment of Covered & Uncovered Delay Time

Relay contacts change over, when fork gets covered or uncovered.
Actuation of relay can be delayed using trim pot. Refer figure 5, find two trim pots, one for covered delay and another for uncovered delay.

You can set delay time from 2 to 25 sec for relay actuation for the fork covered. That is when forks get covered with material, relay will actuate after set delay time.

Similarly, delay time for relay de-actuation while uncovered condition is set using trim pot.

Rotate trim pot in clock wise direction to increase the delay time.

6. Selecting Fail Safe Mode

Fail safe condition can be selected high or low using DIP switch as shown in figure 6.

Keep 1st DIP switch at 'HI' for fail safe high selection and at 'LOW' for fail safe low selection.

Refer table below to understand relay output condition at fail safe high and fail safe low condition.

Relay Output-

At FSH: Relays are de-energized, when forks are covered by the material and red LED glows.

At FSL: Relays are de-energized, when forks are un-covered by the material and red LED glows.

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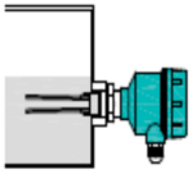
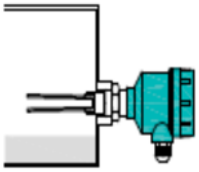
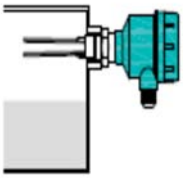
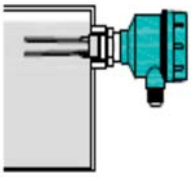
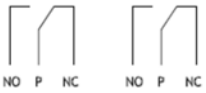
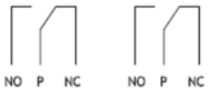
	FSL – Fail Safe Low		**FSH – Fail Safe High**		**Power OFF Condition**
Level					
Relay Contacts					
Indication	○ ●	● ○	● ○	○ ●	
Status	Normal Condition	Alarm/Fail Condition	Normal Condition	Alarm/Fail Condition	

7. Maintenance

- Before starting maintenance work, ensure that the power supply is disconnected.
- In case of hazardous area, do not open the enclosure cover before disconnecting the power supply.

- If the material has built up tendency over a period of time, fork blades should be cleaned as and when required.
- After completion of maintenance work, ensure that the probe /electronics enclosure cover is in its place and closed with gasket for its weather proof ness.
- Ensure that there is no gap between cable gland ID and cable OD to prevent moisture and ingress of water inside the enclosure.

8. Troubleshooting

SL	Problem	Cause	Solution
1.	Switch not working	1. Loose connection or disconnected power supply connection 2. Incorrect power supply 3. Wrong probe connections in case of two-part system	1. Check and tighten connection 2. Check and connect correct power supply. Ensure correct polarity for 24 VDC supply 3. Check and make correct connection of fork probe and controller.
2.	Incorrect Switching	Check fail safe setting	Keep DIP 1st switch at high or low position as required.
3.	Alarm LED continuous on	Check whether the material has been clogged Switch forks does not protrude in the vessel. Switch mounted where material is build up on vessel wall	Check and ensure material particle size is less than 10 mm. Clear the clogged material. Ensure fork blade protrude inside the vessel and vibrates freely. Check for build-up and ensure mounting position is free of material build up