



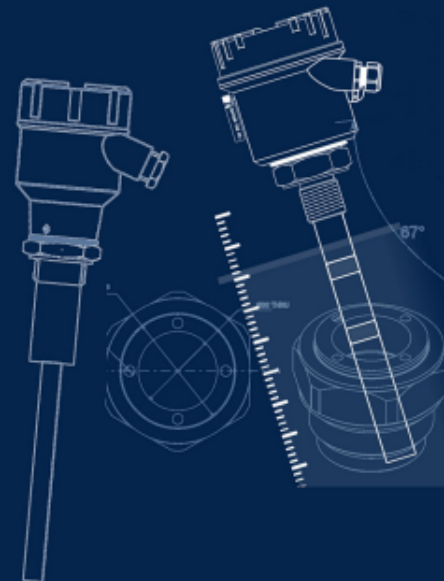
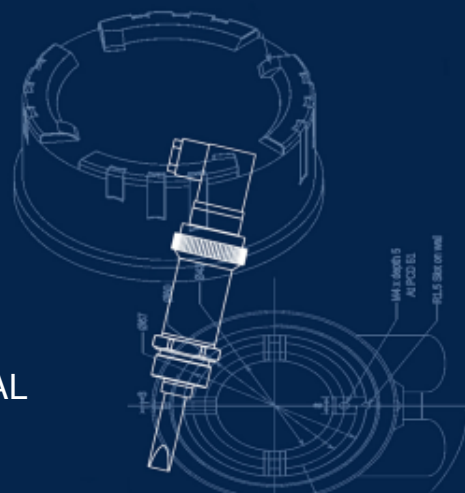
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# INSTRUCTION MANUAL

Vibe

Capacitive Level Switch

Version 1.0



## SAPCON INSTRUMENTS PVT. LTD.

39+ Years in Process Control Instrumentation

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## Revision History

Revision	Date	Author(s)	Description
1.0	1st July 2024	RND	First Version

1

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- The images shown in this manual may differ from the actual instrument / housing in terms of dimensions, color and design. Please refer to GA drawings for dimensional details.
- Values (of performance) described in this manual were obtained under ideal testing conditions. Hence, they may differ under industrial environment and settings.

### General Instructions

- Instrument shouldn't block the material filling inlet.
- For side mounting, provide a baffle to prevent the material from falling on the probe.
- Make all electrical connections as instructed in the manual. Don't power on the device before verifying the connections.

## 1 Introduction

Vibe is a microcontroller based capacitive point level switch, immune to the accumulation of lightweight materials. Its compact design allows installation in narrow spaces like small hoppers, pipelines & mixing vessels of process automation. It is well suited for free flowing materials including powders and solids.



Figure 1: Vibe - Point Level Switch

## 2 Operating Principle

Vibe works on the principle of capacitance. The probe comprises of sense electrode, electrically isolated from the metallic tank using by a suitable insulator. The sense and the vessel wall serve as the two electrodes of a capacitor with the service material acting as the dielectric. A change in the level of material causes a change in the dielectric, which in turn causes the value of this tank capacitor to change.

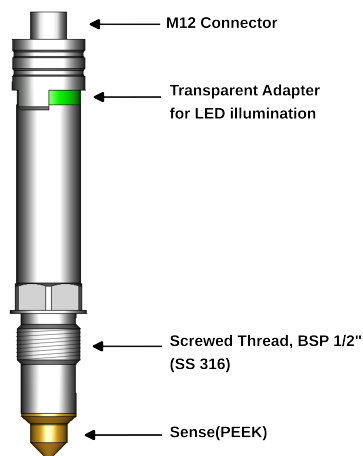


Figure 2: Description of Parts

## 3 Features

- Input Power Supply: 18-30 VDC.
- Compact size, easy to install.
- Output: PNP open collector.
- Available with fail-safe operation.
- Multicolor LED Switch Indicator.
- Electric connection : M12 4PIN

## 4 Applications

- Pharmaceutical
- Packaging
- Man-made Fibre
- Grain Handling
- Poultry & Cattle Feed

## 5 Electrical Specifications

Please refer to Table 1 for Electrical Specifications.

PARAMETER	VALUE
Input Power Supply	18-30 VDC
Output Mode	PNP output
Electrical Connector	M12 Connector
Switching	Single-Point Switching
Switching Indication	<ul style="list-style-type: none"> <li>• RED: Alarm</li> <li>• GREEN: Normal</li> </ul>
Power Consumption	<ul style="list-style-type: none"> <li>• Without Load : &lt; 1 W @ 24 V DC</li> <li>• With Load : 2.4W @ 24 V DC</li> </ul>
Output Load Current	Max 100 mA
Voltage drop	Max 2.5V
Overload protection	Yes

Table 1: Electrical Specifications

## 6 Mechanical Specifications

Please refer to Table 2 for Mechanical Specifications.

PARAMETER	VALUE
Mounting	Threaded
Operating Temperature	<ul style="list-style-type: none"> <li>Ambient Temperature - 0°C - 70°C</li> <li>Storage Temperature - 0°C - 100°C</li> </ul>
Wetted Parts	SS316 , PEEK
Radiated Frequency	40.68 MHz
Initialisation time	3 sec
Ingress protection	IP67
Process Connection	G1/2
Probe Length	48mm , 100mm

Table 2: Mechanical Specifications

## 7 Installation Guidelines

While installing the instrument, please take care of the following points:

1. The instrument should be installed horizontally or vertically.

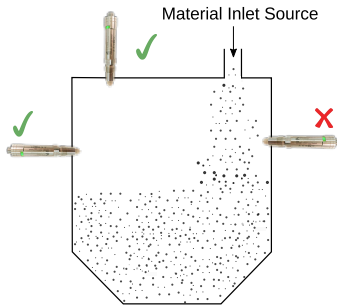


Figure 3: Mounting Arrangement

2. Observe that when installed directly under the material inlet source, a canopy called baffle of appropriate strength and size should be welded right above the instrument.

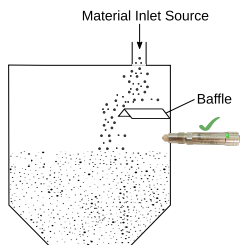


Figure 4: Baffle Position

3. For leakage protection, use vibe instrument with thread adapter as shown in given Figure 5.



Figure 5: Vibe with Mounting Adapter

4. Make all electrical connections as instructed in the manual. Don't power on the device before verifying the connections.
5. The instrument should be operated according to the process.
6. To protect instrument against moisture ingress tighten the connector properly.

## 8 Electrical Connections

### 8.1 For Fail-safe High

If a device is mounted at top of the tank then follow the instructions given below for Electrical Connections:

- First of all connect the positive terminal to pin no. 1 of the device.
- Now Connect negative terminal to Pin no. 3 of the device.
- Connect fuse between positive terminal and Pin no. 1 of the device.
- Output can be taken between Pin no. 3 and 4.

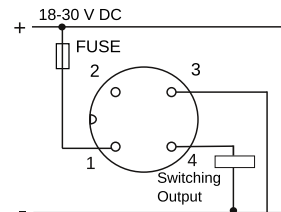


Figure 6: Fail-Safe High

M12 Connection (For Fail-safe High)		
Pin	Connection	Wire Color
1	Positive Supply	Brown
2	NC/Communication	White
3	Negative Supply	Blue
4	Output	Black

## 8.2 For Fail-safe Low

If a device is mounted at bottom of the tank then follow the instructions given below for Electrical Connections:

- First of all Connect positive terminal to Pin no. 3 of the device.
- Now Connect negative terminal to Pin no. 1 of the device.
- Connect fuse between positive terminal and Pin no. 3 of the device.
- Output can be taken between Pin no. 1 and 4.

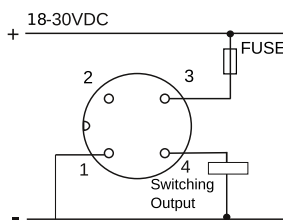


Figure 7: Fail-safe Low

M12 Connection (For Fail-safe Low)		
Pin	Connection	Wire Color
1	Negative Supply	Brown
2	NC/Communication	White
3	Positive Supply	Blue
4	Output	Black

## 9 Output Check Test

Hold the magnetic key at the marked point of the instrument, the current status of the switching LED and the PNP output will change and when magnetic key is released from the marked point, status of the switching LED and PNP output is switched to the previous (original) state.

### 9.1 Output Indications

#### Green LED Glows When:

- Level switch is Uncovered and Fail-safe is High
- Level switch is Covered and Fail-safe is Low

#### Red LED Glows When:

- Level switch is Covered and Fail-safe is High
- Level switch is Uncovered and Fail-safe is Low

## 10 Calibration

Calibration process depends on the conductivity of the application material.

### 10.1 Calibration for Non-conductive Material

**Note:** Calibration in air is specific to the tank, if the tank changes, the instrument needs to be calibrated again.

This calibration is also known as **Air Calibration** and **Calibration without material**. It should be done without the application material (i.e only air, no material). Once calibrated in the empty tank, the device can be used with a wide range of materials. Calibrating the instrument outside the tank can cause malfunctions.

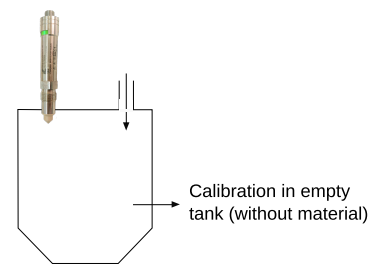


Figure 8: Calibration for Non-conductive Material

**Follow the procedure given below in order to calibrate the sensor:**

- Install Vibe in an empty tank.
- Start the calibration process, hold the magnetic key at the marked area of the instrument, the status of LED output will change and Blue LED will flash four times with the combination of 2 blinks. When Blue led light will be constant, then release the magnetic key. As shown in Figure 9.

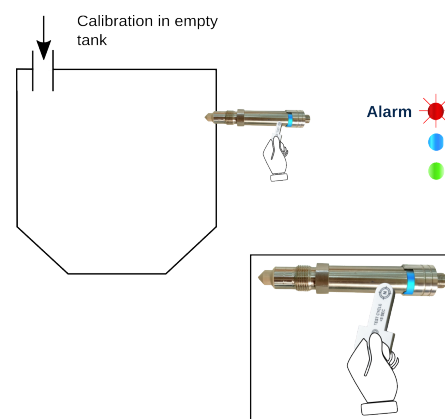


Figure 9: Hold Magnetic Key

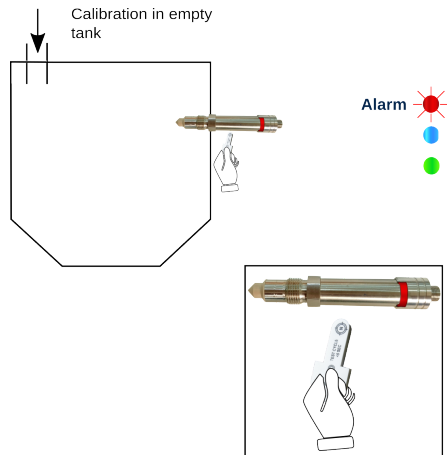


Figure 10: Released Magnetic key

- When magnetic key released from the marked point, status of Red LED output will continuously stays on. As shown in Figure 10.
- Air calibration is done.

## 11 Covered Delay

**Note:** Set the value of Cover Delay between 1-25 secs.

When the application material covers the probe, the changeover of the output can be delayed by a predetermined time. This time is called Covered Delay. For a different value of covered delay, the number of blinks can be adjusted as per requirement. Follow the procedure given below for setting covered delay:

- Hold the Magnetic key at the marked point of vibrate instrument, so the current status of PNP and LED output will change and blue LED light will flash twice with the combination of five blinks, when LED light will be constant then release the key. As shown in Figure 9.
- When magnetic key released from the marked area Red & Blue LED output will stay on continuously.
- Enable for Covered delay process firstly, hold magnetic key at the marked area of instrument at the 1 time red blink and Cover delay set by 1 sec. Same process will be proceed till 25 sec.

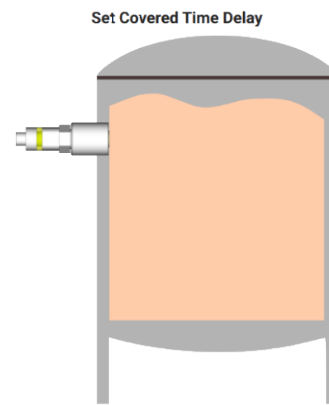


Figure 11: Covered Delay

## 12 Uncovered Delay

**Note:** Set the value of Uncover Delay between 1-25 secs.

When the application material uncovers the probe, the changeover of the output can be delayed by a predetermined time. This time is called Uncovered Delay. For a different value of Uncovered delay, the number of blinks can be adjusted as per requirement. Follow the procedure given below for setting Uncovered delay:

- Hold the Magnetic key at the marked point of vibrate instrument, so the current status of the PNP and LED output will change and blue LED light will flash twice with the combination of Six blinks, When LED light will be constant then release the key. As shown in Figure 10.
- When the magnetic key released from the marked area Red & Blue LED output will stay on continuously.
- Enable for Uncovered delay process firstly, hold magnetic key at the marked area of instrument at the 1 time red blink and Uncovered delay set by 1 sec. Same process will be proceed till 25 sec.

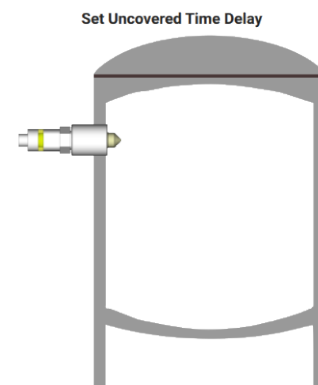


Figure 12: Uncovered Delay



## 13 Sensitivity

**Note:** Set the sensitivity value between 1-5.

Sensitivity of the level sensor need to be adjusted depending on the dielectric constant of the application media.

- Hold the magnetic key at the marked point of vibrate instrument the current status of the PNP and LED output will change and blue LED light will flash four times with the combination of four blinks, LED light will be constant then release the key. as shown in Figure 9.
- When the magnetic key released from the marked area the Red & Blue LED output will continuously on.
- Enable for sensitivity process firstly, hold magnetic key at the target area of instrument at the 1 time and sensitivity set 1. Same process will be proceed for all sensitivity Points as shown in the table.

Select the sensitivity value with the help of Table 3.

SENSITIVITY	DIELECTRIC CONSTANT
1	> 30
2	15-30
3	5-15
4	3-5
5	> 1.0 to < 3

Table 3: Sensitivity

## 14 Factory Reset

Follow the steps given below to reset the time delays and sensitivity values to default values. Factory Reset does not reset any calibration values:

The magnetic key is held at the marked area of the vibrate instrument the current status of the PNP and LED output will change and the blue LED light will flash two times with the combination of one blink, the LED light will be constant then release the key. as shown in Figure 9

## 15 Error Indication

On error the status LED starts blinking RED and GREEN alternately at a faster rate. Normal LED blinks are always at the rate of 1 blink per second, in either RED or GREEN color. In some cases, a GREEN or a RED blinking could indicate an error. Refer to Table 4 for a list of errors and their indication.

### No LED Glows

- This would happen in absence of power supply to the instrument.

INDICATION	DESCRIPTION	TROUBLESHOOTING
RED-GREEN Blinking	Calibration Error	Recalibrate the instrument, make sure that the probe is calibrated in an empty metal-body tank.
3 Times RED Blinking and 1 GREEN Blink	Circuit Error	Contact the Customer Support department at Sapcon.
GREEN Blinking	Probe Open	Contact the Customer Support department at Sapcon.

Table 4: Error Indication

## 16 Customer

Thank you for going through the instructions given in this manual. To further ease the process of installation and use, we have developed special demo videos which are hosted on YouTube.

Sapcon's YouTube channel, SAPCON INSTRUMENTS, lists all these videos: <https://goo.gl/dnxfcz>

For further information regarding installation, use or working of the instrument, please don't hesitate to contact us. Kindly provide the following information at the time of contacting:

- Instrument Model and Serial Number
- Purchase Order Number and Date of Purchase
- Description of the query
- Your contact details

In an attempt to serve you better, we are open seven days a week (9:30am to 7:30pm). We are available at:

- [www.sapconinstruments.com](http://www.sapconinstruments.com)
- [sales@sapcon.in](mailto:sales@sapcon.in)
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## 17 Product Selection Order Code

### Product

**VIBE : Vibe-Capacitive Level Switch (Use in Pharmaceutical, Packaging, Grain Handling etc.) with LED indications**

#### Probe Housing Material

PCM12 : 4 Pin, M12 Male connector

#### Output

PNP : PNP (Voltage Up to 18 To 30V DC)

#### Power Supply

DC3 : 18 To 30V DC

#### Mounting

MB5S6 : Threaded, G 1/2" (BSP), SS 316

#### Operating Temperature

10T : Upto 100°C

#### Probe Length (Depend on "Mounting")

0.48H : 48 mm

1H : 100 mm

Example -

VIBE-PCM12-PNP-DC3-MB5S6-10T-0.48H