OPERATING INSTRUCTIONS

VIBEX 2000™ LSV2
VIBRATING LEVEL SWITCH

Introduction

Please read carefully! No liability can be accepted for damage caused by improper use or installation of the Vibex 2000™ Vibrating Level Switch for solids

The Vibex 2000™ vibrating level switch is an ideal instrument for accurate point level detection in solids. When the vibrating rod is immersed in the product, the vibration frequency change is detected by the integrated electronics module and converted into a switching command. If the vibrating rod is not covered by solids, its natural resonant frequency changes back and so does the state of the switching output. The ideal rod design esures a reliable function in solid applications. Typical applications include bulk solids such as non-adhesive powders, plastic granules, pellets and fine-grained bulk solids.

⚠ Safety Precautions

If you are unsure of the suitability of the Vibex™ Vibrating Level Swtich for installation, please consult your FLO-CORP representative for further information.

Flammable or Explosive Applications

FLO-CORP manufactures several different display models with different mounting and internal configurations. It is the user's responsibility to select a controller model that is appropriate for the application, install it properly, perform tests on the installed system, and maintain all components.

Disclaimer

The information contained in this document is subject to change without notice. FLO-CORP makes no representations or warranties with respect to the contents hereof and specifically disclaims any implied warranties of merchantability or fitness for a particular purpose.

Incorrect Wiring

FLO-CORP assumes no responsibility for users incorrectly wiring their Vibex™ Vibrating Level Switch. Please refer to the wiring diagrams for correct wiring of the Vibex™ Vibrating Level Switch.

DESCRIPTION

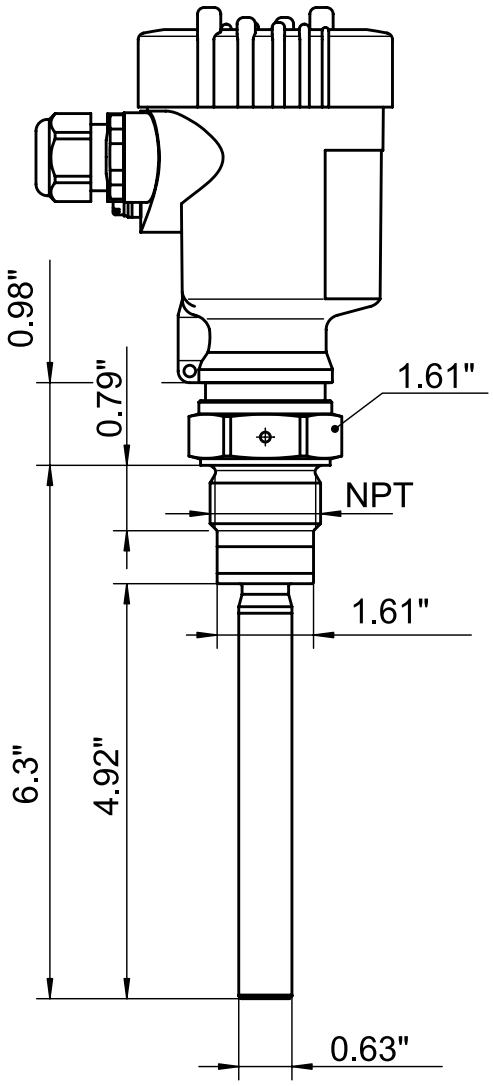
The Vibex 2000™ vibrating level switch is an ideal instrument for accurate point level detection in solids. When the vibrating rod is immersed in the product, the vibration frequency change is detected by the integrated electronics module and converted into a switching command. If the vibrating rod is not covered by solids, its natural resonant frequency changes back and so does the state of the switching output. The ideal rod design esures a reliable function in solid applications. Typical applications include bulk solids such as non-adhesive powders, plastic granules, pellets and fine-grained bulk solids.

SPECIFICATIONS

Measuring Range	Bulk solids from 20 g/l
Process Fitting	Threaded 1" NPT
Process Temperature	-50°F to 482°F (-50 to 250°C)
Process Pressure	-14.5 psig to 232 psig
SIL Qualification	Optionally up to SIL2
Wetted Parts	316L Stainless Steel
Housing	Aluminum di-casting powder coated and primed
Weight	69 oz.
Max. Lateral Load	214 lbs ft
Output	Relay Output (DPDT) 2 floating spdts
Voltage Supply	20 - 253 VAC, 50/60 Hz, 20 - 72 VDC
Power Consumption	1-8VA, Approx 1.3 W (DC)
Turn-on Voltage	min: 10mV, max: 253 VAC, 253 VDC
Switching Current	min: 10 uA, max: 3 A AC, 1 A DC
Delay Time Approx:	When immersed: 0.5s, empty/bare: 1s

Note: Specifications subject to change

DIMENSIONS



FEATURES & BENEFITS

- Simple setup without adjustment
- Product-independent switching point
- Insensitive to build up
- Wear and maintenance free
- Robust and reliable
- Detection of bulk solids from 0.0007 lbs/in
- Ability to sense very low bulk solid densities down to 20 g/l
- Easy setup even without filling or emptying the bin or silo
- Insensitive to buildup

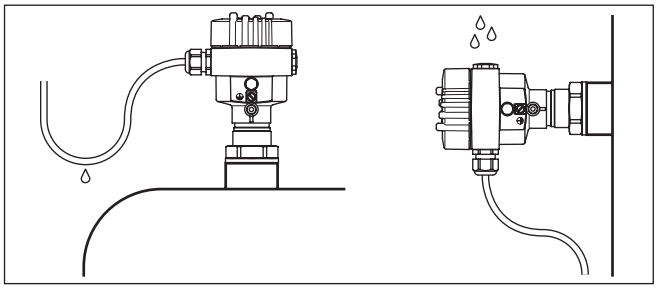
MOUNTING

GENERAL INSTRUCTIONS

Make sure that all parts of the instrument coming in direct contact with the process, especially the sensor element, process seal and process fitting, are suitable for the existing process conditions, such as process pressure, process temperature as well as the chemical properties of the medium.

Switching Point
In general, Vibex™ can be installed in any position. The instrument only has to be mounted in such a way that the vibrating element is at the height of the desired switching point.

Moisture
Use the recommended cables (see chapter “Connecting to power supply”) and tighten the cable gland.
You can give your instrument additional protection against moisture penetration by leading the connection cable downward in front of the cable entry. Rain and condensation water can thus drain off. This ap- plies mainly to outdoor mounting as well as installation in areas where high humidity is expected (e.g. through cleaning processes) or on cooled or heated vessels.



Transport
Do not hold the Vibex™ on the vibrating element. Especially with flange and tube versions, the sensor can be damaged by the weight of the instrument. Remove the protective cover just before mounting.

Pressure / Vacuum
The process fitting must be sealed if there is gauge or low pressure in the vessel. Before use, check if the seal material is resistant against the measured product and the process temperature.

The max. permissible pressure is specified in chapter “Technical data” or on the type label of the sensor.

Warning
The housing must not be used to screw the instrument in! Applying tightening force can damage internal parts of the housing. Use the hexagon above the thread for screwing in.

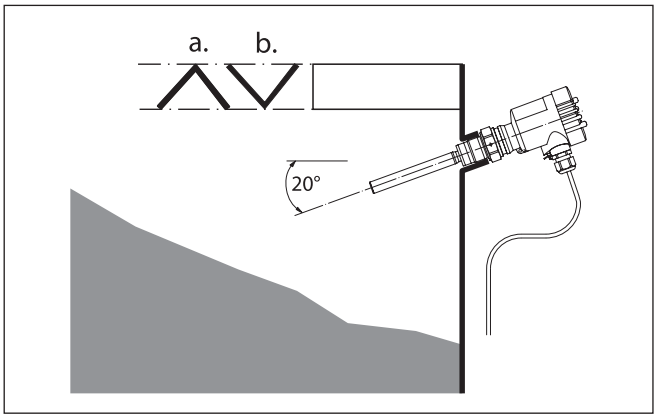
MOUNTING INSTRUCTIONS

Socket

The vibrating element should protrude into the vessel to avoid buildup. For that reason, avoid using mounting bosses for flanges and screwed fittings. This applies particularly to use with adhesive products

Filling Opening

Mount the instrument in such a way that the vibrating rod does not protrude directly into the filling stream.



a) Protective Sheet
b) Concave protective sheet for abrasive solids

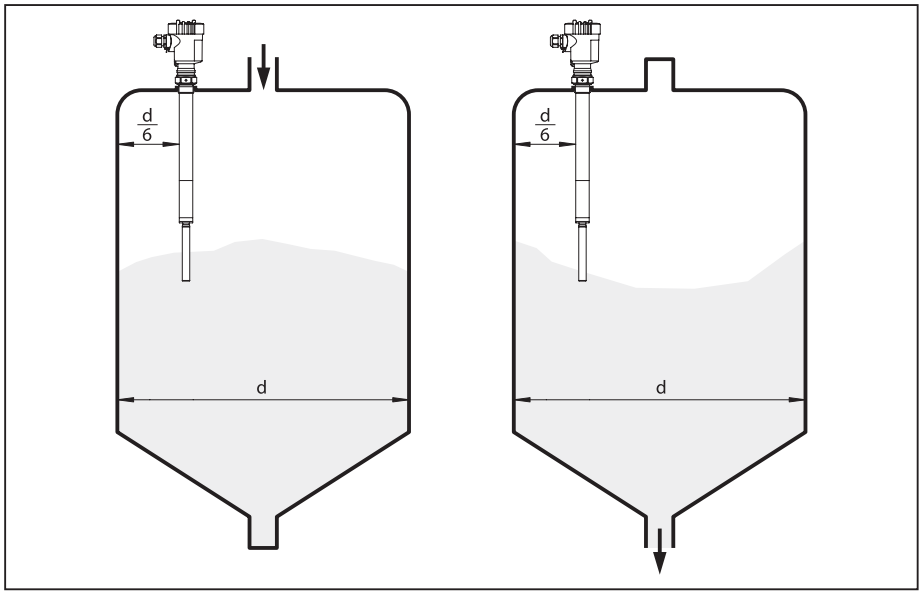
If such an installation location should be necessary, mount a suitable protective sheet above or in front of the vibrating element, see illustration “a”.

In abrasive solids, mounting according to illustration “b” has proven. A spout forms in the concave protective sheet preventing wear of the protective sheet.

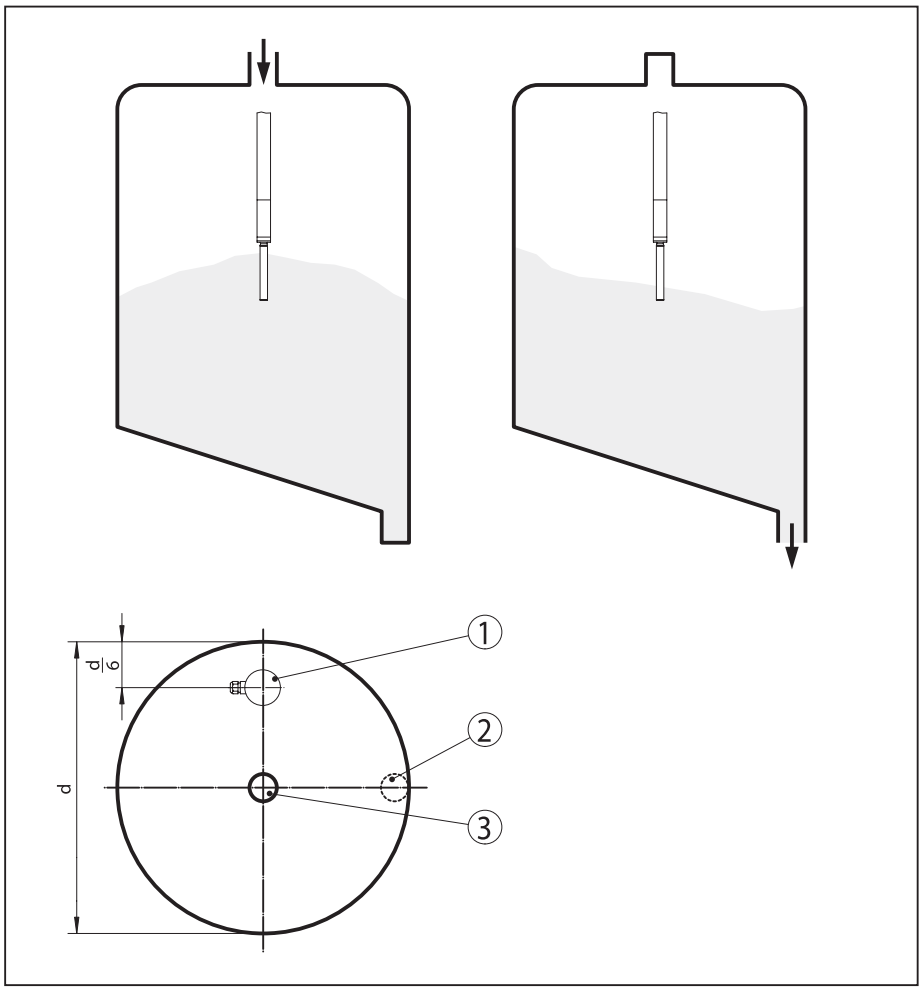
Material Cone

In silos for bulk solids, material cones can form and change the switching point. Please keep this in mind when installing the sensor in the vessel. We recommend selecting an installation location where the vibrating rod detects an average value of the material cone.

The vibrating rod must be mounted in a way that takes the arrange- ment of the filling and emptying apertures into account. To compensate measurement errors caused by the material cone in cylindrical vessels, the sensor must be mounted at a distance of d/6 from the vessel wall.



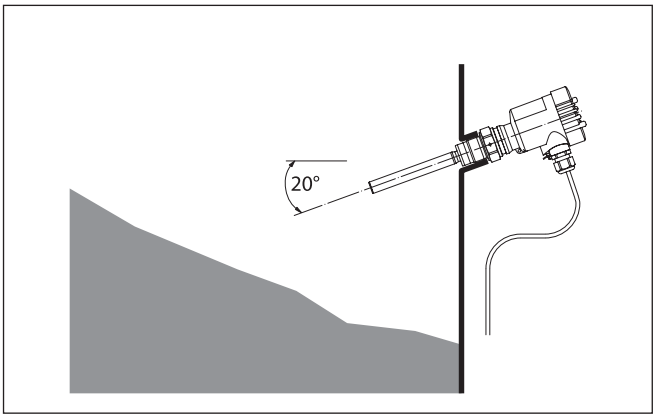
Filling and emptying centred



Filling in the centre, emptying laterally

1 Vibex™ Switch
2 Discharge opening
3 Filling opening

Horizontal Installation
To achieve a very precise switching point, you can install the Vibex™ horizontally. However, if the switching point can have a tolerance of a few centimeters, we recommend mounting the Vibex™ approx. 20° inclined to the vessel bottom to avoid buildup.



Inflowling Medium
If the Vibex™ is mounted in the filling stream, unwanted false meas- urement signals can be generated. For this reason, mount the Vibex™ at a position in the vessel where no disturbances, e.g. from filling openings, agitators, etc., can occur.

CONNECTION

Preparng the connection
Always keep in mind the following safety instructions:
• Connect only in the complete absence of line voltage

Voltage Supply
Connect the operating voltage according to the connection diagrams. The electronics module with relay output is designed in protection class I. To maintain this protection class, it is absolutely necessary that the earth conductor be connected to the inner earth conductor terminal. Keep the general installation regulations in mind. Take note of the corresponding installation regulations for hazardous areas with Ex applications.

The data for power supply are specified in chapter “Technical data”.

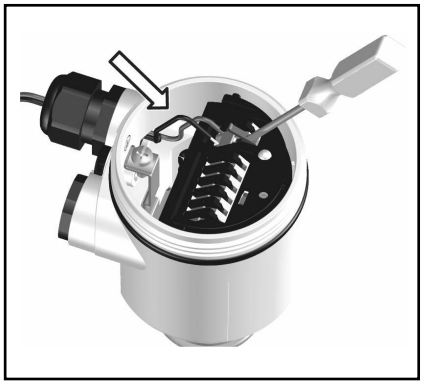
Connection Cable
The instrument is connected with standard three-wire cable without screen. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used.

Use cable with round cross-section. A cable outer diameter of 0.2 ... 0.35 in ensures the seal effect of the cable gland. If you are using cable with a different diameter or cross-section, exchange the seal or use a suitable cable gland.

Connection Procedure

Proceed as follows:

1. Unscrew the housing cover
2. Loosen compression nut of the cable entry gland
3. Remove approx. 4 in of the cable mantle, strip approx. 1 cm (0.4 in) of insulation from the ends of the individual wires
4. Insert the cable into the sensor through the cable entry
5. Lift the opening levers of the terminals with a screwdriver (see following illustration)

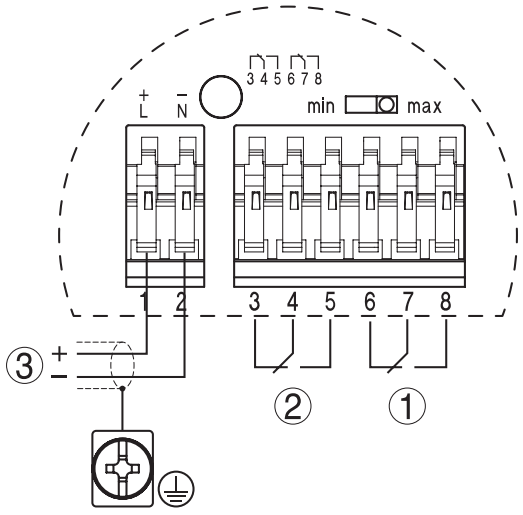


6. Insert the wire ends into the open terminals according to the wirng plan
7. Press down the opening levers of the terminals, you will hear the terminal spring closing
8. Check the hold of the wires in the terminals by lightly pulling on them
9. Tighten the compression nut of the cable entry gland. The seal ring must completely encircle the cable
10. If necessary, carry out a fresh adjustment
11. Screw the housing cover back on
12. The electrical connection is finished.

Wiring

We recommend connecting the Vibex™ in such a way that the switching circuit is open when there is a level signal, line break or failure (safe state).

The relays are always shown in non-operative condition.



1. Relay Output
2. Relay Output
3. Voltage Supply

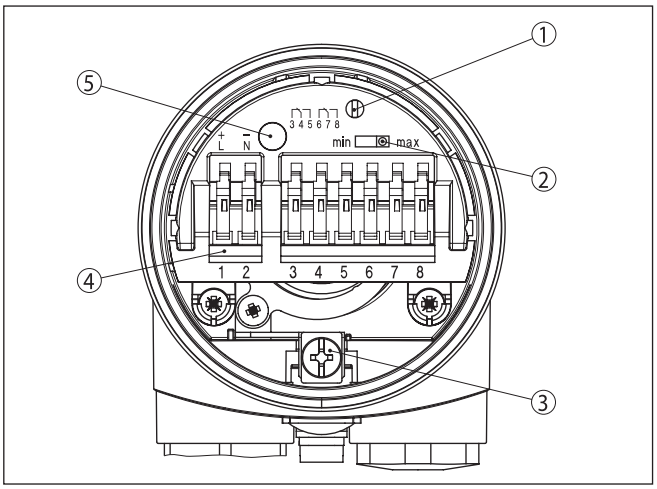
SETUP

Function / Configuration

On the electronics module you will find the following display and adjustment elements:

- Potentiometer for adaptation to the product density (1)
- DIL switch for mode adjustment - min./max. (2)
- Signal lamp (5)

Note: As a rule, always set the mode with mode switch (2) before starting the setup of the Vibex™. The switching output will change if you set the mode switch (2) afterwards. This could possibly trigger other con- nected instruments or devices.



1. Potentiometer for switching point adaptation
2. DIL switch for mode adjustment
3. Ground terminal
4. Connection terminals
5. Control lamp

Switching Point Adaptation (1)

With the potentiometer you can adapt the switching point to the solid. It is already preset and must only be modified in special cases.

As a default setting, the potentiometer of the Vibex™ is set to the complete right position (> 0.3 g/cm3/0.011 lbs/in3). In very light solids you have to turn the potentiometer to the complete left posi- tion (0.02 ... 0.1 g/cm3 or 0.0007 ... 0.0036 lbs/in3). By doing this, the Vibex™ will be more sensitive and light solids can be detected more reliably.

For instruments detecting solids in water, these settings are not applicable. The switching point adaptation is preset and must not be changed.

Mode Adjustment (2)

With the mode setting (min./max.) you can change the switching condition of the relay.You can set the required mode according to the “Function chart” (max. - max. detection or overflow protection, min. - min. detection or dry run protection).

We recommend connecting according to the idle current principle (relay contact deenergizes when the switching point is reached), because the relay always takes on the same (safe) state if a failure is detected.

Signal Lamp (5)
Control lamp for indication of the switching status
- green=relayenergized
- red=relaydeenergized
- red(flashing)=failure

Function Chart
The following chart provides an overview of the switching conditions depending on the set mode and the level.

	Level	Switching status	Control lamp
Mode max. Overflow protection		 3 4 5 (6) (7) (8) Relay energized	 Green
Mode max. Overflow protection		 3 4 5 (6) (7) (8) Relay deenergized	 Red
Mode min. Dry run protection		 3 4 5 (6) (7) (8) Relay energized	 Green
Mode min. Dry run protection		 3 4 5 (6) (7) (8) Relay deenergized	 Red
Failure of the supply voltage (min./max. mode)	any	 3 4 5 (6) (7) (8) Relay deenergized	
Fault	any	 3 4 5 (6) (7) (8) Relay deenergized	 flashes red

Maintenance
If the instrument is used properly, no special maintenance is required in normal operation

Failure Reasons
The Vibex™ offers maximum reliability. Nevertheless, faults can occur during operation.
These may be caused by the following, e.g.:
- Sensor
- Process
- Voltage supply
- Signal processing

Trouble Shooting

ERROR	CAUSE	RECTIFICATION
The Vibex™ signals “covered: without being submered (overfill protection) The Vibex™ signals “uncovered” when being submerged (dry run protection)	Operating Voltage too low	Check operating Voltage
	Electronics defective	Press the mode switch. If the instrument then changes the mode, the vibrating element may be covered with buildup or mechanically damaged. Should the switch- ing function in the correct mode still be faulty, return the instrument for repair.
		Press the mode switch. If the instrument then does not change the mode, the electronics module may be de- fective. Exchange the electronics module.
	Unfavourable installation location	Mount the instrument at a location in the vessel where no dead zones or mounds can form.
	Buildup on the vibrating element	Check the vibrating element and the sensor if there is buildup and remove it.
	Wrong mode selected	Set the correct mode with the mode switch (overflow protection, dry run protection). Wiring should be carried out according to the idle current principle.
Signal lamp flashes red	Error on the vibrating element	Check if the vibrating element is damaged or extreme- ly corroded.
	Interference on the electronics module	Exchanging the electronics module
	Instrument defective	Interference on the electronics module

Ordering Information

FLO-CORP MODEL NUMBER BUILDER For Assistance Call **(877) 356-5463**

Use the diagram below, working from left to right to construct your FLO-CORP Model Number.
Simply match the category number to the corresponding box number.

Example: LSV2-01

Vibex™ 2000 Vibrating Level Switch for Solids with Threaded 1” NPT Process Fitting