OPERATING INSTRUCTIONS

VIBEX PLUS™ LSVP
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 liquids.

The Vibex Plus™ is a universal level switch for liquids. It reliably detects level within millimeter precision regardless of installation position. The Vibex Plus can be used as an empty or full detector, as overfill protection, dry run protection, or pump protection in vessels and pipelines. The artificial intelligence within the Vibex brain will ignore any coating or deposit on the sensors to provide trouble free service for years. The smart power supply can detect an AC power circuit or DC power. The DPDT relay can be used to switch a pump on or off and also provide a set of contacts for an audible alarm or light. The rugged enclosure provides protection in wet, dirty and hazardous environments.

⚠ 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 Plus™ is a universal level switch for liquids. It reliably detects level within millimeter precision regardless of installation position. The Vibex Plus can be used as an empty or full detector, as overfill protection, dry run protection, or pump protection in vessels and pipelines. The artificial intelligence within the Vibex brain will ignore any coating or deposit on the sensors to provide trouble free service for years. The smart power supply can detect an AC power circuit or DC power. The DPDT relay can be used to switch a pump on or off and also provide a set of contacts for an audible alarm or light. The NEMA 6 enclosure provides protection in wet, dirty environments.

SPECIFICATIONS

MATERIAL	
Process Fitting	316L
Tuning Fork	316L
Aluminum Die-Casting Housing	Aluminum die-casting AlSi10Mg, powder-coated - basis: Polyester
Stainless Steel Housing - Precision Casting	316L
Seal Between Housing and Housing Cover	NBR (stainless steel housing, investment casting), silicone (Aluminum/plastic housing, stainless steel housing, electro-polished)
LENGTH	
Sensor Length - 3/4" NPT	2.6 in (66mm)
PROCESS FITTING	
American Pipe Thread, Conical	3/4 NPT
High Voltage Test (Enamel)	< 5 KV
OUTPUT	
Turn-on Voltage Min.	10mV
Turn-on Voltage Max.	253 VAC, 253 VDC
Switching Current Min.	10 µA
Switching Current Max	3 A AC, 1 A DC
Contact Capacity Min.	50 mW
Contact Capacity Max.	750 VA AC, 54 W DC *Note: The contact is no longer suitable for switching low-level signal circuite

CONTACT MATERIAL	
Relay Contacts	Material: Copper
MODES	
A	Max. detection and overflow/overfill protection
B	Min. detection or dry run protection
OPERATION SPECIFICATIONS	
Repeatability	0.004 in (0.1mm)
Hysteresis	approx. 0.08 in (2mm) with vertical installation
Switching Delay	approx. 500 ms (0n/off)
Frequency	approx. 1200 Hz
AMBIENT CONDITIONS	
Ambient Temp. on the Housing	-40 to +158° (-40 to 70°C)
Storage and Transport Temperature	-40 to 176°F (-40 to 80°C)
PROCESS CONDITIONS	
Process Pressure	-14.5 to 928 PSIG (-1 to 64 bar/-100 to 6400 kPa) depending on process fitting
Process Temp	-58 to + 302°F (-50 to +150°C)
VOLTAGE SUPPLY	
Operating Voltage	20 to 253 V AC, 50/60 Hz, 20 to 72 V DC (at U > 60 V DC, the ambient temperature can be max. 50 oC/122 oF)
Power Consumption	1 to 8 VA (AC), approximately 1.5W (DC)
Enclosure Rating	IP66/IP67
Certification	FM CSA (XP) CL I, II, III, DIV1, GP EFG

Note: Specifications subject to change

FEATURES & BENEFITS

- Setup without adjustment
- Product-independent switching point
- Very high reproducibility
- Wear and maintenance free
- SIL qualified

TECHNOLOGY

The Vibex Plus uses a piezo drive to energize the tuning fork. The tuning fork vibrates at its resonance frequency (1250 Hz) when it is not in contact with the medium. When covered, the frequency of the fork decreases. This frequency change is processed by the integrated electronics and converted into a switching command. Artificial intelligence allows the tuning fork to learn a new resonance frequency when a coated surface attenuates the sensors. Additionally, this level switch is insensitive to mist, foam, fog, pressure, or vacuum and therefore gives accurate level detection even in harsh conditions. The Vibex is a universal level switch solution for any liquid.

DIMENSIONS IN (MM)

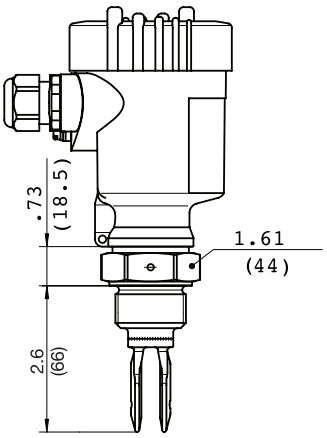
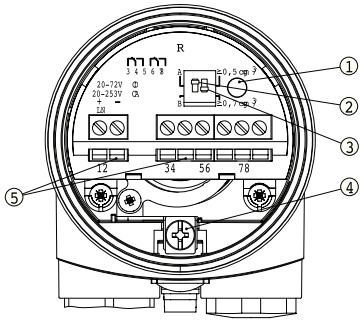


Figure 1: Vibex Plus™ Dimensions

CONNECTION DIAGRAM



1) Control Lamp
2) DIL switch for mode adjustment
3) DIL switch for switching point adaptation
4) Ground terminal
5) Connection terminals

INSTALLATION AND SETUP

Make sure that all parts of the instrument exposed to the process, in particular the sensor element, process seal and process fitting, are suitable for the existing process conditions. These include above all the process pressure, process temperature as well as the chemical properties of the medium.

In general, Vibex Plus can be installed in any position. The instrument simply has be mounted in such a way that the tuning fork is at the height of the desired switching point.

The tuning fork has lateral markings (notches) that indicate the switching point with vertical mounting. The switching point refers to water with the basic setting of the sensitivity switch ≥ 0.025 lbs/in3 (0.7 g/cm3). When mounting Vibex Plus, make sure that this marking is at the height of the requested switching point. Keep in mind that the switching point of the instrument is shifted if the medium has a density other than water - water 0.036 lbs/in3 (1 g/cm3). For products < 0.025 lbs/in3 (0.7 g/cm3) and > 0.018 lbs/in3 (0.5 g/cm3) the density switch must be set to ≥ 0.5 g/cm3.

Keep in mind that foams with a density > 0.016 lbs/in3 (0.45 g/cm3) are detected by the sensor. This can cause faulty switchings particularly when used as dry run protection system.

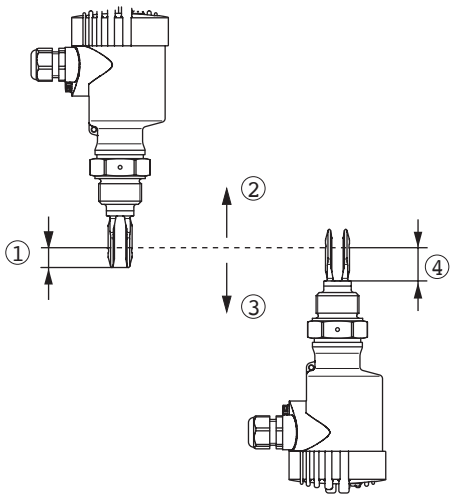


Fig. 2: Vertical Mounting

1) Switching Point Approx. .51 inches
2) Switching Point with Lower Density
3) Switching Point with Higher Density
4) Switching Point Approx. 1.06 inches

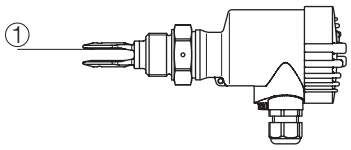


Fig. 3: Horizontal Mounting

1) Switching Point

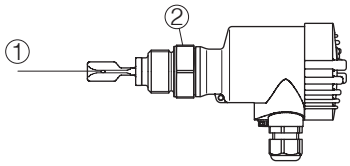


Fig. 4: Horizontal Installation (recommended installation position, especially for adhesive products)

1) Switching Point
2) Marking with screwed version on top with flange versions directed to the flange holes

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 applies 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 Vibex Plus on the tuning fork. The tuning fork can be damaged just by the weight of the instrument. Transport coated instruments very carefully and avoid touching the tuning fork.
Remove the packaging or the protective cover just before installation.

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.mounting as well as installation in areas where high humidity is expected (e.g. through cleaning processes) or on cooled or heated vessels.

Handling

The vibrating level switch is a measuring instrument and must be treated accordingly. Bending the vibrating element will destroy the instrument.

Adhesive Products

In case of horizontal mounting in adhesive and viscous products, the surfaces of the tuning fork should be vertical in order to reduce buildup on the tuning fork. On the screwed version you will find a marking on the hexagon. With this, you can check the position of the tuning fork when screwing it in. When the hexagon touches the seal, the thread can still be turned by approximately half a turn. This is sufficient to reach the recommended installation position.

Inflowing Medium

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

Flows

To minimize flow resistance caused by the tuning fork, Vibex Plus should be mounted in such a way that the surfaces of the blades are parallel to the product movement.

WIRING DIAGRAM

Always keep in mind the following safety instruction:
Connect only in the complete absence of line voltage.
In hazardous areas you should take note of the appropriate regulations, conformity and type approval certificates of the sensors and power supply units.

Voltage supply

Connect the operating voltage according to the following diagrams. The oscillator with relay outputs is designed in protection class 1. To maintain this protection class, it is absolutely necessary that the ground conductor be connected to the internal ground terminal. Take note of the general installation regulations. As a rule, connect Vibex Plus to vessel ground (PA). On the side of the housing there is a ground terminal between the cable entries. This connection serves to drain off electrostatic charges. In Ex applications, the installation regulations for hazardous areas must be given priority.

Connection cable

The instrument is connected with standard two-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 to 0.35 in (5 to 9 mm) 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.
In hazardous areas, only use approved cable connections for Vibex Plus. Take note of the corresponding installation regulations for Ex applications.

Connection procedure

With Ex instruments, the housing cover may only be opened if there is no explosive atmosphere present.
Proceed as follows:
1. Unscrew the housing cover.
2. Loosen compression nut of the cable entry.
3. Remove approx. 4 in (10 cm) of the cable mantle, strip approx. 0.4 in (1 cm) of insulation from the ends of the individual wires.
4. Insert the cable into the sensor through the cable entry.
5. Open the terminals with a screwdriver.
6. Insert the wire ends into the open terminals according to the wiring plan.
7. Tighten the terminals with a screwdriver.
8. Check the hold of the wires in the terminals by lightly pulling on them.
9. Tighten the compression nut of the cable entry. The seal ring must completely encircle the cable.
10. Screw the housing cover on.

The electrical connection is finished.

Wiring plan: single chamber housing

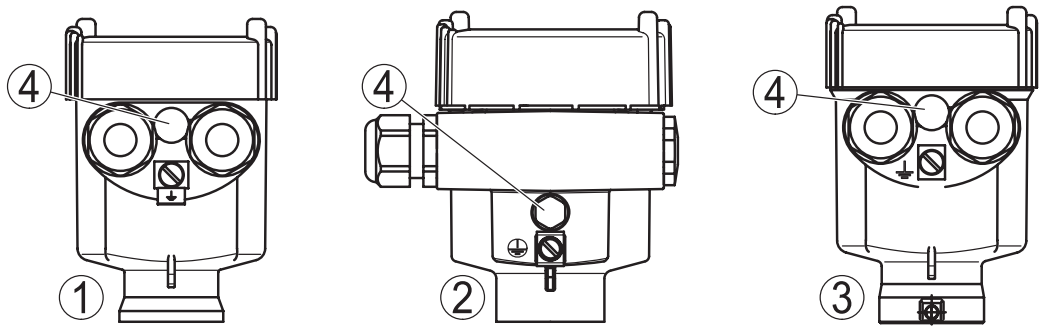


Fig. 5: Material versions, Single chamber housing

1) Plastic (not with EEx d)

2) Aluminium

3) Stainless Steel (not with EEx d)

4) Filter Element for Pressure Compensation (not with EEx d)

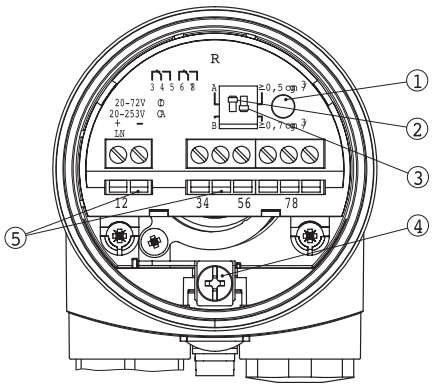


Fig. 6: Electronics and connection department, single chamber housing

1) Control lamp

2) DIL switch for mode adjustment

3) DIL switch for switching point adaptation

4) Ground terminal

5) Connection terminals

PROGRAMMING AND CONFIGURATION

On the electronics module you will find the following indicating and adjustment elements:
Signal lamp (1)
Dip switch for mode adjustment - A/B (2) Dip switch for sensitivity adjustment (3)

Note: For test purposes, immerse the tuning fork of the Vibex Plus in liquids only. Do not test the function of Vibex Plus with the hand. This can damage the sensor.

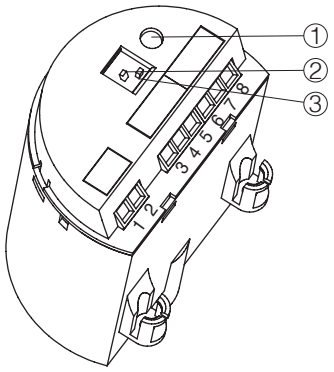


Fig. 7: Oscillator SWE60R - Relay Output

1) Signal lamp (LED)
2) DIL switch for mode adjustment
3) DIL switch for sensitivity adjustment

Signal lamp (1)
Control lamp for indication of switching status. green = relay energized
red = relay de-energized
red (flashing) = failure

Mode adjustment (2)
With the mode adjustment (A/B) you can change the switching condition of the relay. You can set the required mode according to the Functional Chart (A - max. detection or overflow protection, B - min. detection or dry run protection).
Sensitivity adjustment (3)

With this dip switch (3) you can set the switching point to liquids having a density between 0.018 and 0.025 lbs/in3 (0.5 and 0.7 g/cm3). With the basic setting, liquids with a density of > 0.025 lbs/in3 (0.7 g/cm3) can be detected. In liquids with lower density, you must set the switch to > 0.018 lbs/in3 (0.5 g/cm3). The specifications for the position of the switching point relate to water - density value 0.036 lbs/in3 (1 g/cm3). In products with a different density, the switching point will shift in the direction of the housing or tuning fork end depending on the density and type of installation.

Note:
Keep in mind that foams with a density > 0.016 lbs/in3 (0.45 g/cm3) are detected by the sensor. This can cause faulty switchings particularly when used as dry run protection.

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: LSVP-01

Vibex™ Plus Vibrating Level Switch for Liquids, 3/4" Connection Size, NPT Thread Type