

Mobrey VLS Series

Vibrating Level Switch



VLS Series

1. Introduction

Vibrating rod level switches are suitable for low and high level indication of granules and powders with a minimum 0.05 kg/dm³ density such as cement, lime, sand, grain, feed, sugar, etc. Dust Ex versions are available for using the instrument in an explosion-proof environment.

The vibrating rod is a mechanical resonant system, excited and kept in resonance by an electronic unit. The medium to be measured, when reaching the vibration rod end, will damp the vibration. The change in vibration intensity is sensed by an electronic unit, which, upon the elapse of the delay time, actuates the output circuit.

1.1 Accessories

- User manual (IP4001)
- 2 off 3-pole terminal blocks
- 1½-in, sealing, for BSP only
- 2 off M20x1.5 cable glands

1.2 Order code

K Standard model with 1 x SPDT alarm relay

H⁽¹⁾ High temperature model with 1 x SPDT relay (not available with Extended Cable option)

B R 1½-in. BSPT mounting

N 1½-in. NPT mounting

- 1 Standard length rod, 207 mm insertion length
- 3 Extended rod, 300-3000 mm insertion length
- 4 Cable extended, 1000-20000 mm insertion length

3 Aluminium Alloy housing, powder coated

8 As code 3, but with Remote Electronics

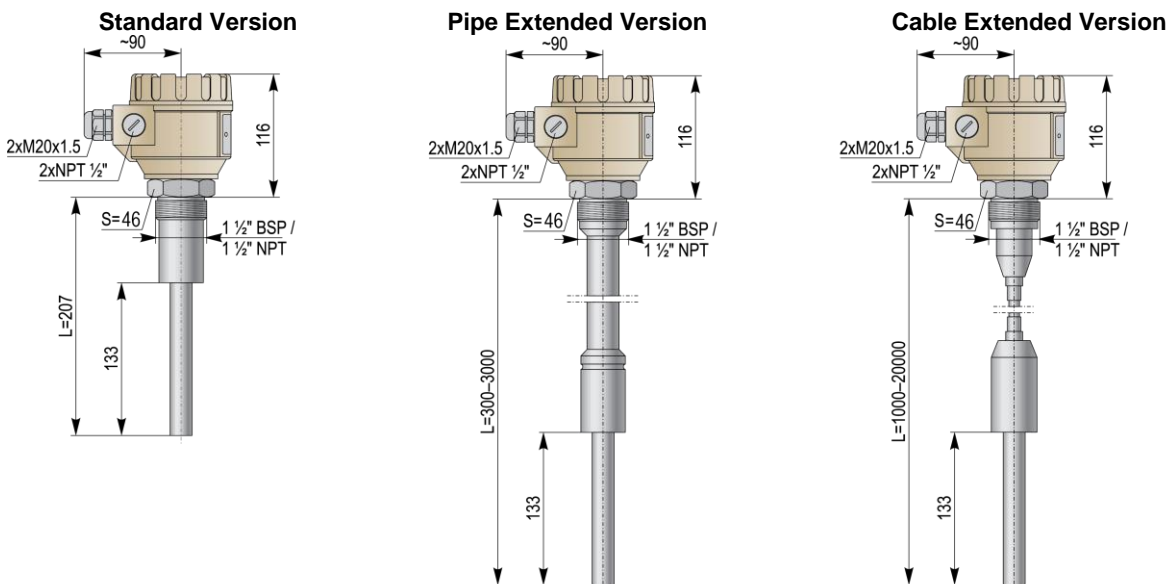
1Z 20-255 Vac / Vdc, no hazardous area approval

5A 20-250 Vac / 20-50 Vdc, ATEX Dust Certification II 1/2 D

/**** State rod or cable extension length in mm

1. Only for standard and pipe extended versions

1.3 Dimensions



2. Installation

When installed in a potentially explosive atmosphere, reference should be made to IP4001/SI.

Prior to installation, it is advisable to check the switching function for proper adjustment on a sample quantity of material (see Adjustments). The unit may not work with mediums that are within the specified density range, but have very large granules or have too little friction.

⚠ WARNING

Handle the device with great care, especially the sensing probe. Any impact on the sensing probe may ruin its resonance system. A protective shield should be installed (see **Figure 2**) if the probe is exposed to falling material or an excessive mechanical load.

Screw in the device by its hexagon neck. After screwing tight the process connection, the housing can be rotated (maximum 300°), to adjust the cable gland to the required position.

It might be necessary to install the device at an offset level position relative to the switching level actually required, taking into account caving or arching of the material in the silo (see **Figure 1**).

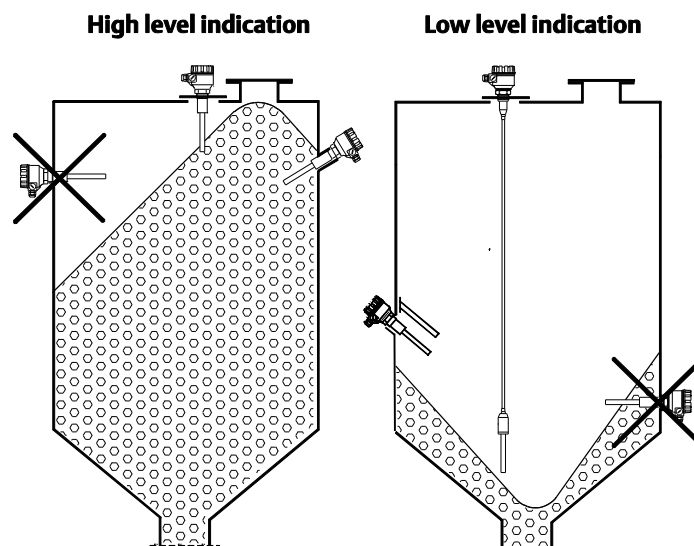


Figure 1

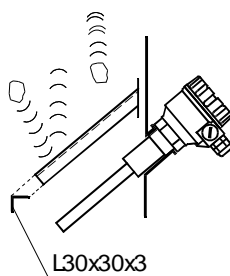


Figure 2

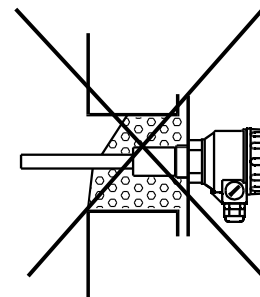


Figure 3

VLS Series

With powder level detection, the device should be installed at an inclination exceeding the angle of repose (or vertically in case of high level detection), to prevent powder deposition on the vibrating rod that might substantially reduce the self-cleaning effect. Also, avoid mounting the rod in a recess (see **Figure 3**)

In the case of tanks that are likely to be exposed to intense vibrations, necessary provisions shall be made for damping the vibrations acting on the device (e.g. vibration damping inserts made of rubber have to be applied).

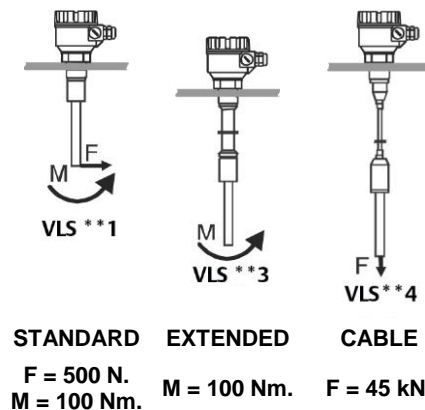


Figure 4 Maximum Torque and Force

3. Adjustments

Remove the top cover of the housing to access the connection terminals and adjusting switches. In case of Dust Ex instruments, the housing cover can only be opened after the removal of the cover securing clamp.

Do not remove the wire from terminal pin 1 (**Figure 5**) as it is an internal connection. For grounding the unit, use the PE grounding screw terminal PE.

After correct installation, the electrical connections established, the housing cover fitted and secured, the device is ready for operation. The switched-on state is indicated by the lighting of the LED.

The DENSITY switch (switch **A**) is to be set in accordance with the material density:

- LOW position: recommended for loose and light materials with **density** below 0.1 kg/dm^3 . Represents **small energy** and **amplitude** of vibration as well as **great sensitivity** of detection.
- HIGH position: recommended for (thick and heavy) materials with **density** over 0.1 kg/dm^3 . Represents vibration with **great energy** and **amplitude**, and **small sensitivity** of detection.

The instrument may not switch correctly in mediums with a density of less than 0.05 kg/dm^3 or with very small internal friction.

To obtain FAIL SAFE alarm (switch **C**), use the de-energised state of the output as an alarm, thus a power breakdown will also be considered to be an alarm (see **Table 1**).

The delay (switch **B**) is to be selected to comply with requirements of the process control technology the unit is used for. Standard (switching delay: approx. 5 sec) or fast response (switching delay: approx. 2 sec) can be selected.

Note: When operating the switches, standard electrostatic discharge precautions should be taken to avoid damaging the instrument.

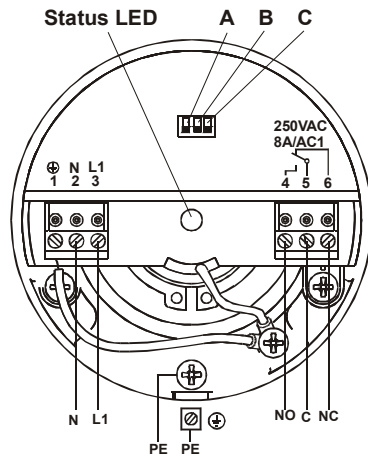


Figure 5 Electrical Connections

4. Operation

Table 1: Operation

Power	Probe	Fail-safe mode	LED	Relay
On	Not vibrating (covered)	Low	Green	 Energized
		High	Red	 De-energised
	Vibrating (free)	Low	Red	 De-energised
		High	Green	 Energized
Fails		Low or High	Not lit	 De-energised

⚠ WARNING

The enclosure must not be opened when the equipment is electrically energised.

VLS Series

5. Maintenance

The VLS Series devices do not require maintenance on a regular basis. In some instances, however, the vibrating section may need a cleaning from deposited material. **This must be carried out gently, without harming the vibrating section of the vibrating rod.**

Repairs during or after the guarantee period are affected by Rosemount™ Measurement Ltd. The equipment sent back for repairs should be cleaned or neutralised (disinfected) by the User.

6. Specification

Table 2: General Data

Category	Standard	Rod extended	Cable extended
Probe length	207 mm	0.3 to 3 m	1 to 20 m
Wetted-parts materials	1.4571		Probe: 1.4571 Cable: PE coated
Housing material	Aluminium: Powder paint coated		
Process connection	1½-in. BSP 1½-in. NPT		
Temperature ranges	see Table 3 and Figure 6		
Maximum pressure (absolute)	25 bar (2.5 MPa)		6 bar (0.6 MPa)
Minimum medium density ⁽¹⁾	0.05 kg/dm ³ (maximum granular size: 10 mm)		
Response time (selectable)	Not vibrating (covered)	< 1.8 sec or 5±1.5 sec	
	Vibrating (free)	< 2 sec or 5±1.5 sec	
Supply voltage (universal)	Normal type: 20...255 Vac/Vdc Ex type: 20...250 Vac (50/60 Hz) or 20...50 Vdc		
Power consumption	≤ 2.5 VA, 2 W		
Electrical connections	2 pcs. M20x1.5 cable glands with Ⓢ ta IIIC protection type or for normal types M20x1.5 plastic glands for cable Ø 6 to 12 mm, 2 pcs. plug-in type terminal blocks for 0.25 to 1.5 mm ² wire cross section internal thread for 2x ½-in NPT cable protection pipe		
Ingress protection	IP67 (NEMA6) EN 60529:2001		
Electrical protection	Class I. (to be grounded)		
Ex protection mark	ATEX	Ⓢ II 1/2 D Ex ta/tb IIIC T90 °C... T170 °C Da/Db	
Weight (with extension)	aluminium housing	1.88 kg	1.88 kg (+1.4 kg/m) 1.88 kg (+ 0.6 kg/m)

1. May depend on friction and granular size of the medium.

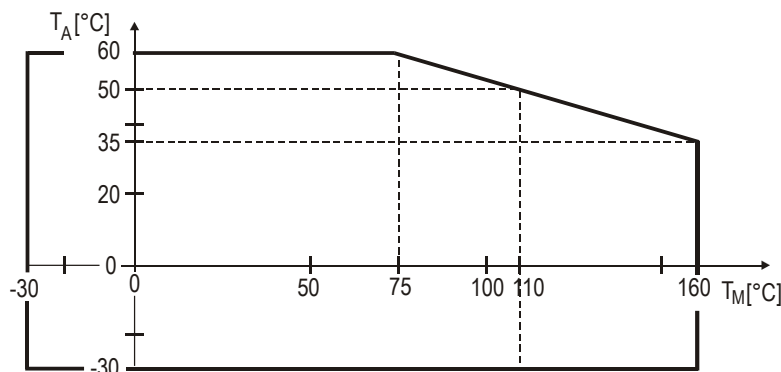


Figure 6: Ambient temperature (T_A) versus medium temperature (T_M)

Table 3: Special Data

Thermal Data								
	VLS**435A			VLSK*(1/3)35A				VLSH**35A
Process temperature (Tp) (EPL Da – category 1D)	+60 °C	+70 °C	+80°C... +95 °C ⁽¹⁾	+60 °C	+70 °C	+95 °C	+110 °C	+160 °C
Ambient air temperature (Ta) (EPL Db – category 2D)	+60 °C	+50 °C	+60 °C	+60 °C	+50 °C	+60 °C	+50 °C	+35 °C
Max. surface temperature (process connection)	+85 °C	+85 °C	+95 °C	+85 °C	+85 °C	+95 °C	+95 °C	+135 °C
Max. surface temperature (T)	+85 °C	+85 °C	+95 °C	+85 °C	+85 °C	+95 °C	+110 °C	+160 °C
T Class	T90 °C		T100 °C	T90 °C		T100 °C	T115 °C	T170 °C

Minimum ambient air temperature (Ta): -30°C.

Minimum process temperature (Tp): -30°C

1. The process temperature can reach +95 °C for a maximum period of 1 hour.

Table 4: Output Data

Output Versions	
Output	SPDT (potential free)
Output rating	250 Vac, 8A, ac 1

7. Storage Conditions

Ambient temperature: -35 to +60 °C

Relative humidity: max. 98 %

8. Warranty

This product is warranted to be free from defects within one (1) year from the date of purchase.

VLS Series

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