

## Operating Instructions

IP4001, Rev. AA

January 2007

Level

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# VLS Series

Vibrating Level Switch



**mobrey**

[www.mobrey.com](http://www.mobrey.com)

  
**EMERSON**  
Process Management

# 1. Introduction

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" sealing, for BSP only
- 2 off Pg 16 cable glands

## 1.2 Order code

K Standard model with 1 x SPDT alarm relay  
H High temperature model with 1 x SPDT relay

B R 1½" BSPT mounting  
N 1½" NPT mounting

1 Standard length rod, 235mm insertion length  
3 Extended rod, 300-3000mm insertion length  
4 Cable extended, 1000-20000mm insertion length  
8 Extended rod 300-3000mm with adjustable gland

3 Aluminium Alloy housing, powder coated  
9 Remote electronics

1 85 – 265V ac  
2 19 – 55V dc

A ATEX Dust certification II 1/2 D  
Z Notification, safe area use only

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

# 2. Installation

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

Prior to installation, it is advised to check the switching function for proper adjustment on a sample quantity of material (see Calibration). The unit may not work with mediums within the specified density range but having very large size of granules or extremely 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)

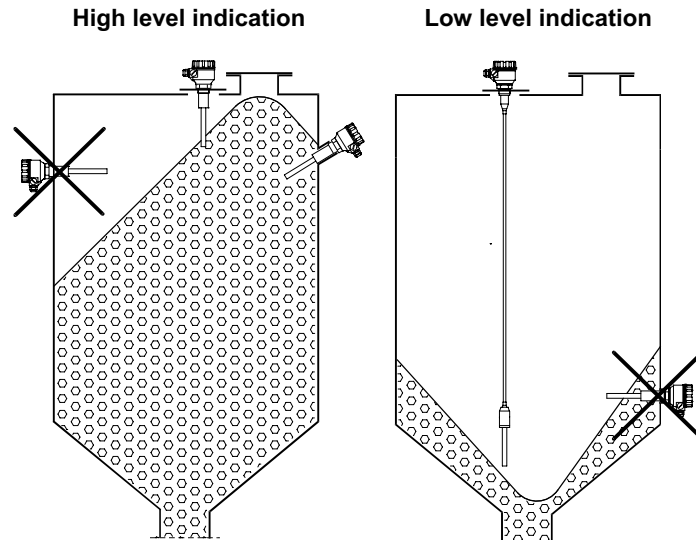


Figure 1

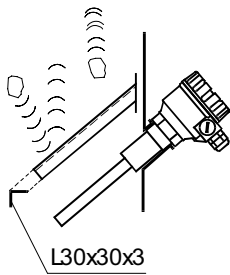


Figure 2

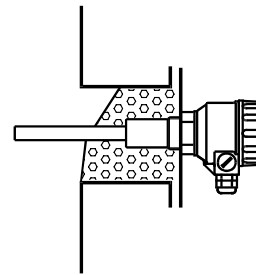
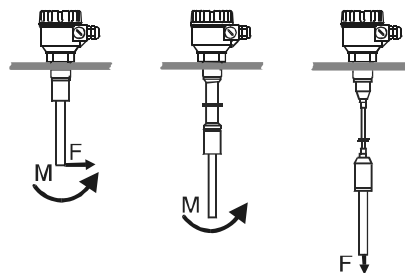


Figure 3

With powder level detection, 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 vibrating rod that might substantially reduce the self-cleaning effect. Also, avoid mounting the rod in a recess (see Figure 3)

In 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).



<b>STANDARD</b>	<b>EXTENDED</b>	<b>CABLE</b>
<b>F = 445 N.</b>	<b>M = 85 Nm.</b>	<b>F = 45 kN.</b>
<b>M = 85 Nm.</b>		

Figure 4 Maximum Torque and force

### 3. Adjustments

Remove the top cover of the housing to access the connection terminals and adjusting switches.

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

After proper installation and the electrical connection established, 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 density of the material:

- **LOW position:** recommended for loose and light materials with **density** below  $0.1 \text{ kg/dm}^3$  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  $0.1 \text{ kg/dm}^3$  represents vibration with **great energy** and **amplitude** and **small sensitivity** of detection.

To obtain FAIL SAFE alarm (switch **C**), use the de-energised or open state of the output as an alarm, thus a power breakdown will also be considered as alarm (see Table1).

The delay (switch **B**) is to be selected to comply with requirements of the process control technology the units is used for.

**Note:** The instrument may be damaged via switches by electrostatic discharge (ESD), thus the precautions commonly used to avoid ESD is to be applied.

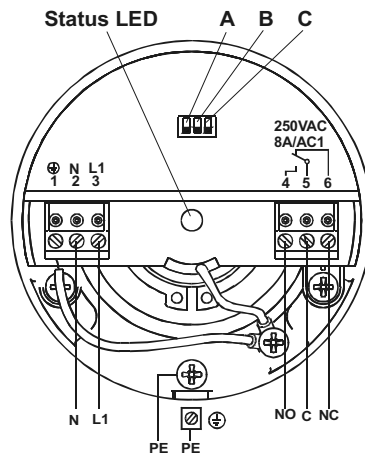

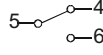

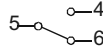

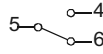

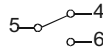
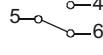


Figure 5: Electrical connection

## 4. Operation

Table 1: Operation

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

**Note:** The regulations of EN 50281-1-2 European Standard must be fulfilled (temperature, dust layer thickness etc.)


## 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.**

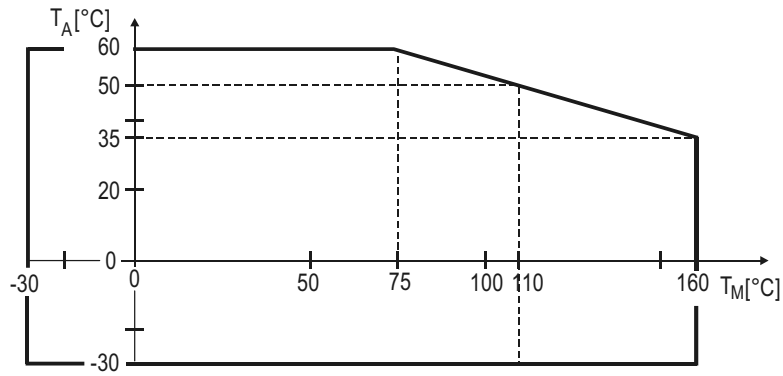
Repairs during or after the guarantee period are effected by Mobrey Measurement. The equipment sent back for repairs should be cleaned or neutralised (disinfected) by the User.

## 6. Specification

Table 2: General Data

Category		Standard	Rod extended	Cable extended
Probe length		235mm	0.3 to 3m	1 to 20m
Parts protruding into the tank		1.4571		Probe: 1.4571 Cable: PE coated
Housing material		Aluminium: Powder paint coated (R-300)		
Process connection		1 1/2" BSP 1 1/2" NPT		
Temperature ranges		see Table 3 and Figure 6		
Maximum pressure (absolute)		25bar (2.5MPa) **	6 bar (0.6MPa) **	
Minimum medium density *		0.05kg/dm <sup>3</sup> (maximum granular size: 10mm)		
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)		Voltage version I: 85 to 265V AC (50/60Hz) / 120 to 375V DC Voltage version II: 16 to 40V AC (50/60Hz) / 19 to 55V DC		
Power consumption		Voltage version I: ≤ 2.5 VA, 1.3 W    Voltage version II : ≤ 2.5 VA, 1.2W		
Electrical connections		2 off Pg16 for Ø8 to 15 mm cables. 2 off plug-in type terminal blocks for maximum 1.5mm <sup>2</sup> wire cross-section.		
Ingress protection		IP67 (NEMA6) MSZ EN 60529:2001		
Electrical protection		Class I.		
Explosion proof protection mark		 II 1/2D IP65 (1D sensor/2D housing)		
Weight (with extension)	aluminium housing	1.94 kg	1,94 kg (+1.4 kg/m)	1.94 kg (+ 0.6 kg/m)

\* May depend on friction and granular size of the medium. \*\* In the presence of explosive atmosphere 0.8 to 1.1 bar.



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

**Table 3: Temperature Data**

Temperature data			
	STANDARD	CABLE	HI-TEMP
Medium temperature range (category 1D)	-30°C to +110°C	-30°C to +95°C	-30°C to +160°C
Max. surface temperature T	+110°C	+95°C	+160°C
Ambient temperature range (category 2D)	-30°C to +50°C	-30°C to +60°C	-30°C to +35°C
Max. surface temperature T at process connection (cable gland) category 2D	+90°C	+85°C	+135°C

**Table 4: Output Data**

Output versions	
Output	SPDT (potential free)
Output rating	250V ac, 8A, ac 1
Output protection	–
Voltage drop (switched off state)	–
Residual current (switched on state)	–

## 7. Storage Conditions

**Ambient temperature:** -35 to +60°C

**Relative humidity:** max. 98 %

## 8. Warranty

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



# Level

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