Introduction

Overview

Mobrey 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.

Accessories

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

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 Aluminum Alloy housing, powder coated
9 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 rod extended versions.
1.4 Dimensions

Figure 1-1. Mobrey Series VLS Dimensions

- **Standard version**
  - A. 2 off M20x1.5 conduit entries
  - B. 2 off NPT 1/2-in. conduit entries
  - C. 1 1/2-in. BSP or NPT threaded process connection
  - Dimensions are in mm.

- **Extended rod version**
  - L=300-3000

- **Cable extended version**
  - L=1000-2000

2.0 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” on page 6). 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 inset, right) 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 (up to maximum of 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 1-2).

Figure 1-2. Examples of Correct and Incorrect Installations
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. Avoid mounting the rod in a recess (Figure 1-3).

**Figure 1-3. Avoid Mounting Rod in Recess**

Incorrect

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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 1-4. Maximum Torque and Force**

**Standard version VLS**

\[ F = 500 \text{ N.} \]
\[ M = 100 \text{ Nm.} \]

**Extended rod version VLS**

\[ M = 100 \text{ Nm.} \]

**Cable extended version VLS**

\[ F = 45 \text{ kN.} \]
3.0 **Adjustments**

⚠️ **WARNING**

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

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 1-5 on page 7) 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 setting (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/dm³.
  - 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/dm³.
  - 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/dm³ or with very small internal friction.

To obtain FAIL SAFE alarm (switch C), use the de-energized state of the output as an alarm. A power breakdown will then also be considered to be an alarm (see Table 1-1 on page 7).

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 is ~5 seconds) or fast response (switching delay is ~2 seconds) can be selected.

**Note**

When operating the switches, standard electrostatic discharge precautions should be taken to avoid damaging the instrument.
**Figure 1-5. Electrical Connections**

**Table 1-1. Operation**

<table>
<thead>
<tr>
<th>Power</th>
<th>Probe</th>
<th>Fail-safe mode</th>
<th>LED</th>
<th>Relay</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>Not vibrating (covered)</td>
<td>Low</td>
<td>Green</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>High</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vibrating (free)</td>
<td>Low</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>High</td>
<td>Green</td>
<td></td>
</tr>
<tr>
<td>Fails</td>
<td>Low or high</td>
<td>Low or high</td>
<td>Not lit</td>
<td></td>
</tr>
</tbody>
</table>

Legend:
- **A**: Status LED
- **B**: A
- **C**: C

Diagram:
- Status LED
- A
- B
- C

Legend:
- **1**: N
- **2**: L1
- **3**: L3
- **4**: PE
- **5**: N
- **6**: L1

Legend:
- **250VAC**
- **10A/AC1**

Legend:
- **Relay 4-6**: Energized
- **Relay 4-6**: De-energized
4.0 **Maintenance**

Mobrey Series VLS 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 Delta Mobrey. Equipment sent back for repairs must always be cleaned or neutralized (disinfected) by the user.

5.0 **Specifications**

Table 1-2. Specifications for Standard, Rod Extended, and Cable Extended Versions

<table>
<thead>
<tr>
<th>Category</th>
<th>Standard</th>
<th>Rod extended</th>
<th>Cable extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probe length</td>
<td>207 mm</td>
<td>0.3 to 3 m</td>
<td>1 to 20 m</td>
</tr>
<tr>
<td>Wetted-parts materials</td>
<td>1.4571</td>
<td>Probe: 1.4571</td>
<td>Cable: PE coated</td>
</tr>
<tr>
<td>Housing material</td>
<td>Aluminum: Powder paint coated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process connection</td>
<td>1½-in. BSP or 1½-in. NPT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature ranges</td>
<td>See Figure 1-6 and Table 1-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum pressure (absolute)</td>
<td>25 bar (2.5 MPa)</td>
<td>6 bar (0.6 MPa)</td>
<td></td>
</tr>
<tr>
<td>Minimum medium density(1)</td>
<td>0.05 kg/dm³ (maximum granular size: 10 mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time (selectable)</td>
<td>Not vibrating (covered): &lt; 1.8 seconds or 5±1.5 seconds</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vibrating (free): &lt; 2 seconds or 5±1.5 seconds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply voltage (universal)</td>
<td>Normal type: 20...255 Vac/Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ex type: 20...250 Vac (50/60 Hz) or 20...50 Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>≤ 2.5 VA, 2 W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical connections</td>
<td>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 mm² wire cross section internal thread for 2x ½-in NPT cable protection pipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td>SPDT (potential free), 250 Vac, 8 A, ac 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ingress protection</td>
<td>IP67 (NEMA6) EN 60529:2001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical protection</td>
<td>Class I. (to be grounded)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ex protection mark</td>
<td>ATEX: II 1/2 D Ex ta/tb IIIC T90 °C... T170 °C Da/Db</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (with extension)</td>
<td>1.88 kg</td>
<td>1.88 kg (+1.4 kg/m)</td>
<td>1.88 kg (+ 0.6 kg/m)</td>
</tr>
<tr>
<td>Storage conditions</td>
<td>Ambient temperature range: -35°C to +60 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relative humidity: 98% (maximum)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. May depend on friction and granular size of the medium.
### Figure 1-6. Ambient (TA) Versus Process (TP) Temperatures

![Graph showing ambient and process temperatures](image)

### Table 1-3. Thermal Data

<table>
<thead>
<tr>
<th></th>
<th>VLS**435A</th>
<th>VLSK*(1/3)35A</th>
<th>VLSH**35A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process temperature (Tp) (EPL Da – category 1D)</td>
<td>+60 °C</td>
<td>+70 °C</td>
<td>+80 °C... +95 °C (1)</td>
</tr>
<tr>
<td></td>
<td>+60 °C</td>
<td>+50 °C</td>
<td>+60 °C</td>
</tr>
<tr>
<td>Maximum surface temperature (process connection)</td>
<td>+85 °C</td>
<td>+85 °C</td>
<td>+95 °C</td>
</tr>
<tr>
<td>Maximum surface temperature (T)</td>
<td>+85 °C</td>
<td>+85 °C</td>
<td>+95 °C</td>
</tr>
<tr>
<td>T Class</td>
<td>T90°C</td>
<td>T100°C</td>
<td>T90°C</td>
</tr>
<tr>
<td></td>
<td>T100°C</td>
<td>T115°C</td>
<td>T115°C</td>
</tr>
<tr>
<td></td>
<td>T160°C</td>
<td>T170°C</td>
<td>T170°C</td>
</tr>
</tbody>
</table>

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

Minimum ambient air temperature (Ta) = –30 °C
Minimum process temperature (Tp) = –30 °C