# Level oscillation signaling devices for bulk materials

## WSP-1

WSP-1A

WSP-1A

WSP-1B

WSP-1C

## Application

WSP-1 oscillation signaling devices are provided to signal the boundary levels of bulk materials that fall down in open or pressure containers.

## Design

WSP-1 signaling devices are designed in shape of a tuning fork. Two bars are mounted to a membrane, on which a resonator made of piezoceramic plates is mounted to inner side. A part of signaling device that touches raw material is made of acid resistant steel. Electronic systems are located in a housing made of aluminum, ABS or steel 304. WSP-1 signaling devices may be furnished with vibration bars of lengths 100 mm, 150 mm or 200 mm. 100 mm long bars have the utmost bending strength, whereas 200 mm long bars – the highest oscillation amplitude and energy the same as well as the least oscillation frequency, i.e. abort 90 Hz. In particular they are provided to materials of the least bulk density. The housing, together with electronic system may be mounted together with a sensing device as “compact” one or separately, moreover it could be furnished with one or two cable glands. In signaling devices provided to operate in chemical, food or pharmaceutical industries, where raw materials occur that cause corrosion of acid-proof steel, elements that adjoin raw material are covered with protective PVDF, PFA or PTFE layers. Signaling devices provided to operate in 20, 21 and 22 dust explosion zones are protected by ‘t” dust-proof housing, and in 0,1 and 2 gas and vapors explosion zones by means of “d” type fire-proof housing.

## Operation mode

Each WSP-1 signaling device may operate in one of two modes: minimum - MIN or maximum - MAX. For each of these modes the safe output state and LED signaling diodes has been determined

WSP-1ER

WSP-1D

## Design version

• WSP-1A Oscillation signaling devices, a short version, have constant length 140, 190 and 240 mm depending on length of oscillating bars. Temperature of bulk raw material may equal from -40°C up to 150°C, however provided that temperature inside housing of electronic system shall not exceed +70°C.

• WSP-1B signaling devices, a prolonged version, have length from 250 mm up to 6,000 mm.

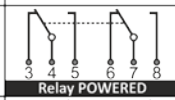
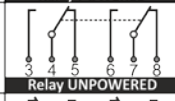
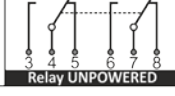
• WSP-1C signaling devices have length from 240 mm up to 6,000 mm. They are equipped with resonators, whose piezoceramic plates are adopted to operate at temperature up to 290°C. Due to raw material temperature the signaling devices are provided with so called "thermal distance". Most frequently, length of thermal distance equals 150 mm for raw material temperature up to 200°C and 220 mm in case of temperature 290°C. Due to temperature effect or due to the design reasons the thermal distance may be longer.

• WSP-1D signaling devices have 2" gland, due to which the raw material level could be determined to the object, i.e. a level that actuates. Signaling device length is 600 mm up to 6,000 mm.

• WSP-1E signaling devices are provided with housing including electronic systems connected to the sensor by means of cable. Such design causes that sensor may shift aside. If temperature of raw material is below 70°C, then a part of electronic system is located in a pipe at oscillation bars and other part is in the housing, thus there are no restrictions as regards cable length among the sensor and the housing. When raw material temperature exceeds 70°C then the length of cable that connects the sensor and the housing may not exceed 10m.

## Signaling

WSP-1 signaling devices are equipped with two LED signaling diodes located inside the housing and with diodes outside housing, optional. These diodes are actuated alternatively (green, red) depending on selected operation mode and actual state of outputs. An exemplary LED diodes state for WSP-1 signaling device provided with DPDT relay output are presented in the below Table.

| Mode of operation | Level | Output status | Signalling | |
|---|---|---|---|---|
| | | | LED diode yellow | LED diode red/green |
| Detection of maximum **MAX** (overfill protection) |  |  Relay POWERED | lack of raw material | |
| |  |  Relay UNPOWERED | detection of material | |
| Detection of minimum **MIN** (protection against dry running) |  |  Relay POWERED | detection of material | |
| |  |  Relay UNPOWERED | lack of raw material | |

Legend: - diode switched off, - diode switched on,

## Order code

| | |
|---|---|
| **1** | **Probe design: length, temperature and process pressure** |
| A | - compact version, 140...240mm, t<150°C, p<1MPa |
| B | - prolonged version, 250..6000mm, t<150°C, p<1MPa |
| C1 | - temperature version, 250..6000mm, t<200°C, p<1MPa |
| C2 | - temperature version, 250..6000mm, t<290°C, p<1MPa |
| D1 | - version with gland, 250...6000mm, G=1,5" p=0 |
| D2 | - version with gland, 250...6000mm, G=2", t<150°C, p<0,8MPa |
| E1 | - version with separate electronic module, 250...6000mm, 250...6000mm, dł. kabla do 10m, t<150°C, p<1MPa |
| E2 | - version with separate electronic module, 250...6000mm, cable length up to 10m, t<200°C, p<1MPa |
| E3 | - version with separate electronic module, 250...6000mm, cable length up to 10m, t<290°C, p<1MPa |
| ER | - version for filling sleeves, 250...6000mm, t<120°C, p=0 |
| Y | - special version |
| **2** | **Electronic module: type, supply voltage and output** |
| PSO1 | - power supply: 19...253VAC, 19...55VDC, output: DPDT relay |
| PSO2 | - power supply: 10...55VDC, output: PNP+NPN transistor |
| PSO3 | - power supply: 19...253V AC/DC, output: external relay or contactor |
| PSO4 | - power supply: 11...36VDC, output: current output 16/18mA |
| **3** | **Housing: housing material, IP, additional items** |
| A | - housing made of ABS, IP 66 |
| B | - aluminum housing, powder painted, IP 66 |
| C | - housing made of steel 304, ATEX Ex de |
| D | - housing made of steel 304, sanitary make |
| **4** | **Detector: material and surface finish** |
| 1 | - steel 316L, Ra<3,2mm |
| 2 | - steel 316L, Ra<1,6mm |
| 3 | - steel 316L, Ra<0,8mm |
| 4 | - steel 316L, fork covered with PTFE |
| 5 | - steel 316L, fork + pipe covered with PTFE |
| 6 | - steel 316L, fork + pipe covered with EFTE |
| **5** | **Process connections: thread type, flange or other** |
| G | - straight thread G=1.5" |
| R | - taper thread R=1.5" |
| N | - taper thread NPT=1.5" |
| D1 | - gland G=1,5" |
| D2 | - gland G=2" |
| K1 | - flat flange DN50, PN 10…40 |
| K2 | - flat flange DN80, PN 10…40 |
| T | - Tri-clamp DN40...50,4 |
| Y | - special make |
| **6** | **Fork: length, bulk density of medium** |
| A | - L=200mm, ρ>10g/l |
| B | - L=150mm, ρ>50g/l |
| C | - L=200mm, ρ>100g/l |
| **7** | **Cable glands: quantity and size** |
| 1 | - one gland M16x1,5 |
| 2 | - two glands M16x1,5 |
| 3 | - one gland M20x1,5 |
| **8** | **LED signaling** |
| W | - inner, on front panel of electronic module |
| Z | - external, on front panel of electronic module and on housing |
| **9** | **Certificates** |
| B | - no certificates |
| A1 | - ATEX II 1/2D Ex tD |
| A2 | - ATEX II 1/2G Ex de |
| H | - sanitary make |
| Y | - Other certific ates |

**WSP-1** [1] - [2] - [3] - [4] - [5] - [6] - [7] - [8] - [9]

Example:
WSP-1C1-PSO1-B-1-G-B-2-Z-B