



Grown...to meet challenges

Vibrating Rod Level Limit Switch

VIBROSONDE

User's Manual

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INTRODUCTION:

SAPCON ‘VIBROSONDE’ level limit switch consists of a cylindrically shaped coaxial resonator which is kept vibrating at its natural frequency by piezo-electric elements. When one of the vibrating elements is covered by the material, the mechanical vibrations are damped. This damping is sensed electrically and the signal used to cause a relay to change state. The base of the ‘vibrosonde’ is relatively insensitive as compared to the tip, so moderate amounts of material buildup from vessel wall to base do not affect operation. The various salient features of this instrument are given as follows:

- Simple installation, no adjustments, no moving parts, no wear and tear, no maintenance, extremely long life
- Operation not affected by electrical properties of material and moisture content
- Only one vibrating element in contact with the material increases reliability
- Field selectable fail safe mode
- Insensitive to moderate material buildup
- Suitable for powdered and granulated solids

SAPCON ‘VIBROSONDE’ is suitable for high and low level limit control of free flowing powders and granules. It is particularly suitable for low bulk density products. It can be used for the control of filling and emptying cycles. Typical applications include plaster, cement, chalk, paper scrap, washing powder, gravel, coal, plastic granules, sugar, milk powder, cereals, flour etc. It can be used for aggressive materials and for applications wherein different types of material are processed in the same vessel.

TECHNICAL SPECIFICATIONS:

EVALUATION UNIT: (SLP-C)

Housing	Cast aluminium, weather proof, stoving enamel painted, suitable for back panel/wall mounting
Tolerable ambient temp.	-20°C to +60°C
Material temp. in vessel	-20°C to +80°C
Power supply	230V/110V AC (-10% to +10%), 50Hz (as specified while ordering); 24V DC (on request)
Power consumption	5VA (approx.)
Output	one set of potential free change over contacts rated at 6A, 230V, AC, 50Hz for non-inductive loads
Cable entries	2 x ½”
Indication	Red LED for Alarm; Green LED for Normal
Fail-safe	High/Low field selectable
Response time	2-7 seconds

ELECTRONIC INSERT (SLP-I):-

Input supply	15VDC Regulated, derived from evaluation unit
Output Signal	High or Low 15VDC
Input Signal	Via Piezo elements in the resonator

PROBE:

Vibrating element	SS316
Length	230mm to 3meters
Frequency of resonance	330Hz (approx.)

SYSTEM DESCRIPTION:

The ‘Vibrosonde’ level-detecting system consists of a cylindrical coaxial resonator probe of stainless steel fitted to a suitable mounting arrangement of the screwed or flanged type that can be installed either from top or side of the vessel. An electronic insert is housed in the probe head and consists of an oscillator, de-modulator and a comparator circuit. The resonator is set into mechanical vibrations via the sender and receiver Piezo elements. The electrical vibrations thus produced are de-modulated and compared with a reference and the comparator output (available as High or Low voltage signal) is transmitted to the evaluation unit. The evaluation unit consists of a regulated power supply, a switching delay circuit and an electromagnetic relay. The relay output contacts are brought out on terminals for external connections. They are potential free and meant for switching a maximum resistive load of 6A at 230VAC. The electronics is housed in a cast aluminium weatherproof enclosure suitable for integral/remote back panel installation. It is provided with 2 nos. of ½” cable entries. Output in the form of potential free changeover contacts is available for alarm/control. The

electronics is assembled on a glass epoxy PCB, duly lacquered for resisting moisture and fungus.

INSTALLATION:

The probe is provided with a suitable mounting arrangement such as screwed bush or is flanged. If the mounting is screwed, a suitable nozzle should be welded to the vessel and the probe should be screwed-in via the mounting bush. If it is a flanged mounting, a matching counter flange should be welded to the vessel top or side as the case may be. In both cases the sensitive portion of the probe i.e. the vibrating rod should be placed in the active portion of the vessel where it can sense the material movement. The instrument is meant for detecting free flowing powders and granules. It may not be used for detecting the level of material that has sluggish flow or is sticky and forms lumps due to moisture absorption. The resonator (sensitive vibrating portion) must be well protected from the impingement of material caused by installations directly below the material inlet by installing the probe away from the inlet. It should not be used to detect lumpy material chunks that can cause damage to the resonator. For low level detection in tall vessels a baffle should be provided over the side mounted probe so that the material column does not directly act on the resonator causing excessive lateral loading.

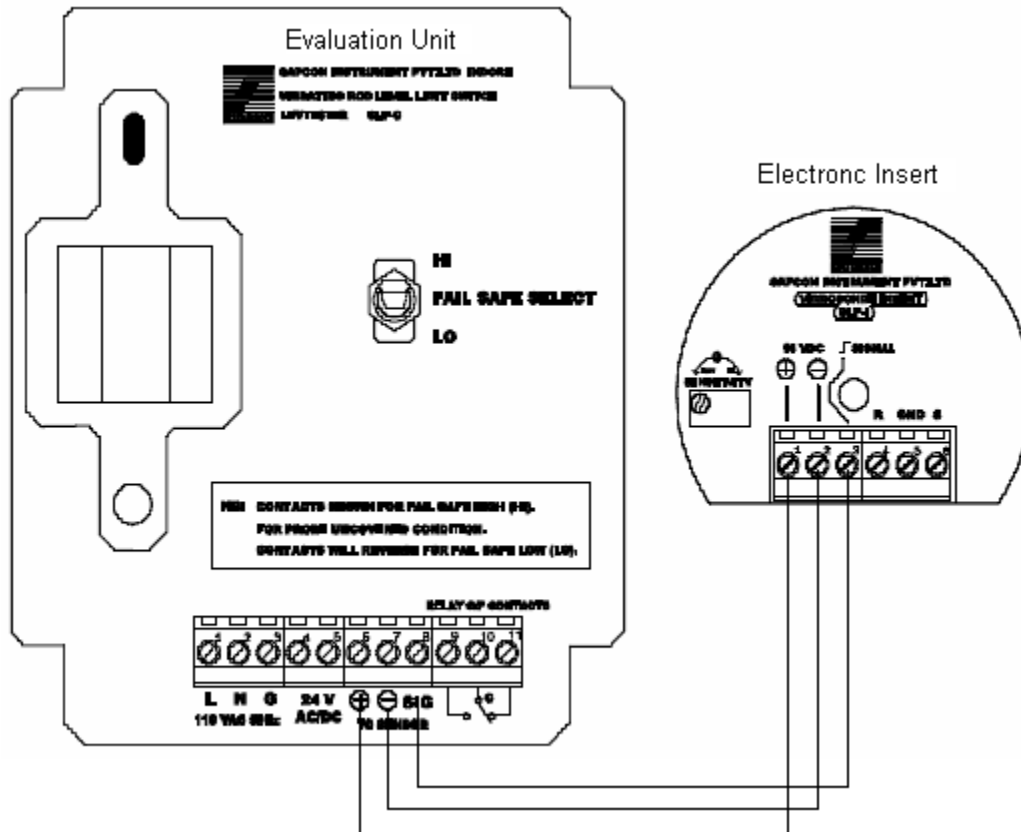
WIRING:

After the installation proceed with the wiring. Refer to the connection diagram given below. Locate the PCB mounted terminals for making connections. Terminals 1, 2 and 3 of the evaluation unit are provided for connection to the mains. Line (L), Neutral (N) and Ground (G) should be connected to terminals 1, 2 and 3 respectively. Separate terminals 4, 5 are provided for 24VDC operation. Terminals 5, 6, 7 are connected to the electronic insert terminals 1, 2, 3 respectively. Terminals 4, 5, 6, of the electronic insert are pre-connected to the Piezo elements before shipping. Suitable cable glands have been provided for running the cables in and out.

CAUTION:

Connecting 230 V mains to units configured for 110 V AC can cause permanent damage. In no case should you connect both 230/110VAC and 24VDC simultaneously.

Connection Diagram



Connect relay output contacts of the evaluation unit as per desired operation for annunciation or control as the case may be. Ensure that the connected load voltage and current do not exceed the specified value given in the technical data. The relay output contacts are potential free and so any desired source can be connected in series with them as long as the specifications are not exceeded. Terminals 9, 10 & 11 are provided for the relay contacts.

SENSITIVITY ADJUST:

A potentiometer has been provided on the electronic insert panel for sensitivity adjustment. Refer to the figure above. Rotating the pot clockwise increases the vibration amplitude and so decreases the sensitivity, while rotating it counter-clockwise decreases the amplitude of vibrations and so increases the sensitivity. Sensitivity is factory set when shipped and so need not be adjusted in most of the applications.

FAIL SAFE SELECT:

Desired fail safe mode can be selected with the help of a toggle switch provided on the evaluation unit panel. For location of the switch refer to the figure given on the previous page. The position shown in the figure is for fail safe High mode. By switching it to the other side, fail safe Low mode will be selected. The relay is de-energized when material covers the probe and is energized when the material leaves the probe, in case of fail safe high selection. In case of fail safe low selection, the relay is energized when the material covers the probe and is de-energized when the material leaves the probe.

LED INDICATORS:

Two LED indicators have been provided. For location refer to the figure given on the previous page. Green LED indicates Normal condition when the relay is energized. Red LED indicates Alarm condition when the relay is de-energized.