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CONDUCTIVITY LEVEL LIMIT SWITCH

User's Manual

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INSTRUCTION MANUAL

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CONDUCTIVITY LEVEL LIMIT SWITCH

TECHNICAL SPECIFICATIONS:

A. **EVALUATION UNIT (STANDARD)**:

Housing	:	Cast aluminium weatherproof stoving enamel Painted suitable for wall/back Panel mounting.
Protection	:	IP – 65.
Ambient Temperature Range	:	-20 deg.C. to +60 deg. C.
Power Consumption	:	V A (approx)
Mains Voltage	:	V / 110 V AC, 50 Hz (+10% -15%)
Output	:	Three set point of potential free change-over contacts per channel rated at 5 Amps, 230 V AC for non-inductive loads.
Indication	:	Red LED for Alarm Green LED for Normal Per Channel
Maximum Sensitivity	:	Kohms (20 micro mhos)
Operating Mode (Options)	:	A. Three independent switch points. B. Three independent switch points with continuously settable time delay for probe covered and uncovered, selectable. C. Three switch points with pump control logic for each of the two channels. D. One independent switch point with or without continuously settable time delay for probe covered and/or uncovered condition and one pump control logic for the remaining channel.
Fail Safe Feature	:	Fail safe High/Low field selectable for each channel.
Weight	:	.25 Kgs (approx.)
Overall Dimensions	:	L = 180 mm, W = 180 mm, H = 85 mm

B. **PROBE**:

Voltage	:	V AC (across probe and tank wall)
Current	:	mA maximum (between probe and tank wall through liquid)
Maximum Operating Temperature	:	deg. C. (standard version)
		deg. C. (special version)
Mounting	:	Screwed – ½" BSP / 1" BSP / 1 ½" BSP Flanged – As per requirement

INTRODUCTION

LEVTESTER SLW series of instruments can be used for level limit switching applications for single/two point action for conductive liquids. They can be used for :-

A. Switching 'OFF' pumps when the tanks are full, thereby avoiding spilling and avoid wear & tear.
B. For indicating empty tank in good time to avoid production stopages.
C. For maintaning a constant level to avoid material wastage.

They incorporate solid state circuits for better reliability. Low voltage on probes provides operational safety. AC on probes prevents electrolytic deterioration of electrodes. Wide probe choice is available for aggressive materials, high pressures and high & low temperature operation. The instrument is easy to install and long cable connection is permissible between probe and evaluation unit.

PRINCIPLE OF OPERATION

A low AC voltage is applied between the probe electrode and tank wall (or reference electrode in the case of insulated tanks). When the liquid comes in contact with the electrode tip, a conductive path is established between the electrode and the tank wall (or reference electrodes). A current, therefore flows between the two through the liquid. This current is sensed, amplified and made to operate a relay, whose contact in turn can be used for annunciation/control.

MEASURING SYSTEM

It comprises of a sensing probe and an evaluation unit. Single point control application needs one probe for a metallic container whereas an additional probe that serves the probe that serves the purpose of a ground electrode is necessary for insulated containers. For two point action two probes are necessay. One for High level and other for Low level.

SYSTEM DESCRIPTION

Level sensing is done by partly insulated rod or probes as per application demand. Rod probes are suitable for short lengths of a max. 2 meters. whereas wire rope are suitable for longer lengths. The sensing terminals are housed in a wheather proof cast aluminium housing provided with a " BSP cable entry gland and a ½" BSP screwed connection. The probe electrodes are connected the evaluation unit via two core cable. The evaluation unit comprises of power supply, amplifier, and a relay, housed in a cast aluminium weather proof

housing suitable for wall/back panel mounting. The cast aluminium housing is provided with three nos. of ½" BSP cable entries for wiring. The electrode is assembled on a glass epoxy printed circuit board duly lacquered for resisting moisture and fungus. One set of potential free change over contacts are available at the instrument terminals for anunciation/control.

INSTALLATION

PROBE -

The mechanical construction of the probe differs from application to application. Standard methods of mounting are screwed or flanged. A 1½" BSP Mounting Bush (standard) is provided for screwing on to the container having a threaded flange fitted with the probe has to be bolted on to matching flanged welded to a pipe which in turn is fixed to the container. The construction and size of the mounting bush/flange as well as material of mounting bush/flange depends on the application. Depending on the application Rod Probes can be either mounted from the top of the container or from the side of the container. Rope probes have to be mounted from the top only. For installing Rod Probes from the top of the containers, sufficient clearance between the roof and tank top is necessary as the Probe has to be hoisted-up over the tank top during installation. Accurate length adjustments can be made at site for Part Insulated Rod or Rope Probes

EVALUATION UNIT -

The Evaluation Unit is suitable for back panel mounting. Refer mounting details diagram for hole locations in the back panel and drill holes accordingly. Remove instrument cover by unscrewing the four screws provided on front cover. Box fixing holes will be clearly visible on the box bottom, above and below card. Mounting hardware consisting of 4 nos. of M4 Cheese Head Screws have Rubber 'O' Rings to render the box dust tight after fitting. After installation the cover should be refitted to avoid dust ingression. The housing is suitable for outdoor installation. However, in no case should the instrument be subjected to temperature exceeding 60° C. Through the instrument can be installed outdoors, it should never be subjected to direct sun rays. Preferably a sun shade should be provided.

CONNECTIONS

Refer to the connection diagram (enclosed herewith) as also to the one stuck on the inside cover of the evaluation unit.

Connect appropriate supply 230 V/110V 50 Hz. to terminals 1. and 2. (Line - L and neutral - N). Connect supply to the ground.

A. **For Metallic Containers -**

1.) Single point operation :- Connect probe rod to terminals 13 (max.), ang probe housing to 12 (com), ground terminal is provided on the housing for the purpose.

2.) Threeo point operation:- Connect high level probe to terminal 14 (max), probe housing to 13 (com) , low level probe to 15 (min) and very low level probe to 16 (min).

B. **For Electrically Insulated Vessels -**

1.) Single point operation :- Same as in A. (1.) but connect the grounding probe electrode to terminal 12 (com).

2.) Three point operation :- Same as in A. (2.) but connect the grounding probe electrode to terminal 13 (com).

CALIBRATION

After installing probes and making connections as mentioned above check for continuity between container and wall probe housing (for metallic containers). This should show low resistance. If possible, vary the liquid level in the vicinity of the set point and observe the LED indicators and relay switchings.

A.) **Single point operation :**

(i) **For Fail Safe High:**

Material in container (Alarm)	**High Level Probe**	**Relay**	**Indicator Green (Normal)**	**Red**
Rising	Not Covered	Energized	ON	OFF
Rising	Covered	De-energized	OFF	ON
Falling	Covered	De-energized	OFF	ON
Falling	Not Covered	Energized	ON	OFF

(ii) **For Fail Safe Low:**

Material in container (Alarm)	**High Level Probe**	**Relay**	**Indicator Green (Normal)**	**Red**
Rising	Not Covered	De-Energized	OFF	ON
Rising	Covered	Energized	ON	OFF
Falling	Covered	Energized	ON	OFF
Falling	Not Covered	De-energized	OFF	ON

B.) **Two point level limit switching with pump control logic :**

(i) **For Fail Safe High:**

Material in container (Normal)	**High Level Probe (Alarm)**	**Low Level Probe**	**Relay**	**Indicator Green**	**Red**
Rising	Not Covered	Not Covered	De-energized	ON	OFF
Rising	Not Covered	Covered	De-energized	ON	OFF
Rising	Covered	Covered	Energized	OFF	ON
Falling	Not Covered	Covered	Energized	OFF	ON
Falling	Not Covered	Not Covered	De-energized	ON	OFF

(ii) **For Fail Safe Low:**

Material in container (Normal)	**High Level Probe (Alarm)**	**Low Level Probe**	**Relay**	**Indicator Green**	**Red**
Rising	Not Covered	Not Covered	Energized	OFF	ON
Rising	Not Covered	Covered	Energized	OFF	ON
Rising	Covered	Covered	De-energized	ON	OFF
Falling	Not Covered	Covered	De-energized	ON	OFF
Falling	Not Covered	Not Covered	Energized	OFF	ON

N.B. : For two point logic the relay changes state when -

i) Material level is rising and rises above the max. level probe.
ii) Material level is falling and falls below the min. level probe.

The aforesaid control action maintains the level in the tank between maximum and minimum level as set by the respective probe lengths.
The switching differential obtained by the control action can also be used to reduce frequent switching of pumps due to ripples on the liquid surface and turbulance.

Fail Safe Operation :

Instrument operation is supposed to be fail safe if alarm condition is signalled by the relay in the de-energised condition. This necessitates a change in the state of the relay when the instrument is used for signalling either high or low alarm as the conditions are opposite. Selection switch is provided just for this purpose. It should be noted that the output contacts will change positions when the switch position is changed. Connections to external alarms should be made accordingly Red and Green LED's on the PCB indicates alarm and normal operation. Red Led glows when the relay is in de-energised position.

Switching Delay :

Incorporating a slight delay in switching, delibrately after the set level is reached gives a more stable operation. Provision is made in the Evaluation Unit to select the delay mode (i.e. either after probe is covered or uncovered) by means of switch. The delay is infinitely adjustable by means of a preset potentionmeter within the limits of 0.5 to 20 seconds.

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