



# RF-CAPACITANCE (Coat-Shield)Level Limit Switch

Levtester SLsC ...M series

## User Manual

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## Technical specification

Model Dot	SLsC 122M / 222M / 322M / 622M
<b>Evaluation Unit</b>	
Housing	Cast Aluminum weather proof stoving enamel painted/Siemens grey powder coated /Epoxy coated suitable for back panel/ wall mounting
Cable Entry	¼ " NPT DC Gland Brass
Cable Gland	Single/ Double compression Size ½ " / ¾" BSP / NPT / Brass / Stainless steel / NG20
Tolerable Ambient Temp	0°c to 60°c .
Power consumption	5VA approx
Mains Supply	90 to 265 VAC, 50 Hz (universal power supply) , 110/230,240 VAC –50Hz Optional 24 VDC
Fail Safe Mode	Max / Min field selectable
Output	One/two set of potential free c/o contacts rated at 6Amps 230Vac for non inductive loads
Indication	Red LED for alarm & Green LED for Normal condition
Sensitivity Indicator	Ten dot display for sensitivity calibration, also for showing the material trend in the vicinity of the probe
Calibration	Through multi turn potentiometer
Measuring Frequency	100 KHz
Response Time	Less than 1 second
Switching Delay	Adjustable from 5 to 20 seconds (covered & uncovered) applicable for model SLsC-322 M & 622M
Inter-Connection	Between Probe & Evaluation unit, by special coaxial cable with drain wire
Weight	2.25 Kgs
Over all dimensions	As per approved Drawings

### Immuno coat Probe –

Housing	Cast aluminum weather proof
Cable entry	One no. ½ " BSP/NPT/BRASS/Plastic/ Stainless Steel
Cable gland	Single /double Compression
Mounting connection	Screw-1 " /1 ½"/BSP/NPT Flange –As per requirement / As per drawings
Insulation	Part/ Full
Insulating material	PTFE/ Ceramic
Process Temperature	Probes types available for 80 °C /120 °C/250 °C/400C/600 °C
Extension	Rod – Stainless Steel/Mild steel (Plated) Rope- galvanized steel/Stainless steel

Sensing part	Stain less steel/ Mild steel (plated)
Grounding pipe	Galvanized steel/ Stain less steel/mild steel (plated)
Standoff	Galvanized steel/ Stain less steel/ Aluminum fin
Discharge device	In case of static charge build up

## **Safety Information**

Before installing the RF-Capacitance (Coat-Shield) level controller, please read these instruction's carefully and familiarize yourself fully with the requirement and functions of the instrument.

Please do not dispose off the carton or packing material until the unit has been inspected in all respects. If the unit is received in damaged condition, kindly note the dispatch details and inform us immediately

Interconnection must be done as per the national standards. If you find any difficulty or have any doubts about installing this product, please do not hesitate to contact our service center for instant support.

## **Introduction**

**Sapcon** RF-Capacitance (Coat-Shield) level limit switch utilizing specially designed **Immuno coat probe** offers a reliable solution to level detection problems so far difficult to solve with simple capacitance type system utilizing conventional probes. The main advantage offered by Coat Shield capacitance range of level switches is their ability to ignore build up and coating of material on the probe. Purpose of adding a shield in between sensing element and ground is to avoid RF currents from reaching the container wall via the coating. Although there would be RF current flowing between the shield and the container wall via the build up, it would not be considered by the measuring circuit and will not affect on the level measurement. This unique design enables the electronic circuitry to distinguish between significant process coating and the actual process material thereby gives reliable accurate switching.

**Coat Shief Capacitance measurement using Immuno coat probe gives satisfactory solution in tough environments where,**

- 1. Material has a tendency to coat.**
- 2. There is bridging (build up) of material between probe and sidewall.**
- 3. Material particles with electrostatic charge and varying temperature float in the vicinity of the probe.**

## **Measuring Principle**

The sensing element and the container wall (or ground electrode) form a means to measure the capacitance of the system with & without the intervening material. When all the parameters that affect the capacitance value are kept constant then its value changes only due to the difference in material level. The sensed signal is further amplified and used to actuate the relay. The relay contacts are used for alarm or control purpose.

## **Measuring System**

A complete measuring system comprises –

- I. Evaluation unit**
- II. Immuno coat probe**
- III. Interconnecting cable**

## **System Description**

Immuno coat probe is of a special construction with three concentrically positioned electrodes that are electrically insulated from each other. The innermost electrodes serve as the sense electrode whereas the one next to it is the shield, and the outermost is ground.

The sense electrode is connected to a radio frequency source and the shield is also connected to the same source but through an isolating amplifier. They therefore have identical waveforms and the shield follows the sense, maintaining equivalent potential, frequency and phase relationship.

Due to this there is no flow of RF current between the shield and the sense electrode. The flow of RF currents via the shield to sidewalls does not affect the measurement due to isolation amplifier.

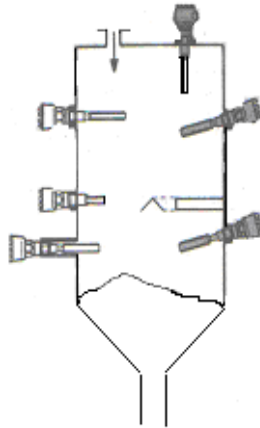
The probe head is of cast aluminum weatherproof construction provided with suitable cable glands, and fitted on to the probe mounting arrangement.

A discharge device is provided with the system where there is a possibility of generation of static charge in the service material. The Immuno coat probe is connected to the evaluation unit with a special screened cable of pre-trimmed length.

The Evaluation unit is housed in a cast aluminum weatherproof housing that is stoving enamel painted & provided with three nos. of cable entries of ½" size.

The electronics and the inter-connecting terminals are assembled on a glass epoxy printed circuit board, that is heavily lacquered for rendering it immune to moisture, dust & fungus.

## **Installation**



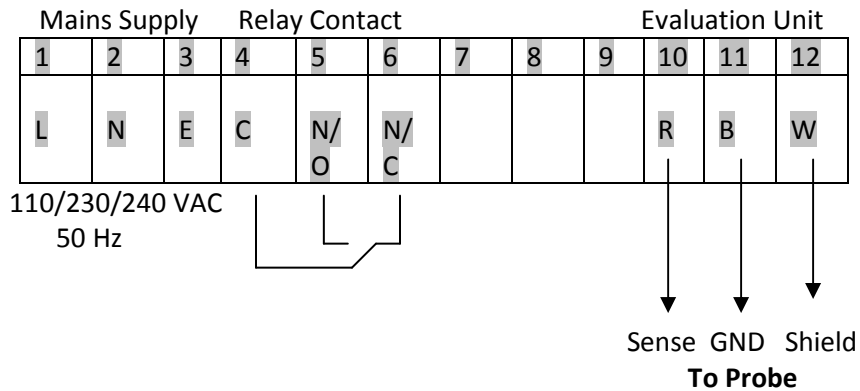
- 1) Instrument can be installed in almost any position.
- 2) Install probe in such a way that sense, shield & non active.
- 3) length must come in active zone.
- 4)The threaded mounting connection should be as short as possible to avoid deposit of material in the nozzle cavity.
- 5)When mounting is from side the cable entry should be pointing downwards, so that no moisture can enter.
- 6) Make sure that the probe insulation is not damaged when inserting the probe through the nozzle.
- 7) Probe should be installed away from the inlet. If it is not possible, fix baffle plate 300 mm above from the probe.

## **Inter Connection**

- 1) Refer the attached diagram before making the inter connection.
- 2) One such diagram is also pasted inside the evaluation unit cover.
- 3) Connect the mains supply as mentioned inside the cover.
- 4) Verify line voltage before switching on the instrument.
- 5) Inter connection between probe and evaluation unit is made by means of special PTFE co-axial cable of pre-trimmed length.
- 6) Ensure controller unit is earthed properly.
- 7) Use three-core cable of 1.5 mm sq. diameters, in case of A.C power supply& relay contacts.

## Connection diagram

### SLsC-122M/130



## Precautions

- 1) Refer the diagram pasted inside the cover before making the inter connection.
- 2) Do not immediately energize the instrument until wires are fully secured.
- 3) In case of DC power supply instrument – ve is ground.
- 4) Always tighten the housing cover and the cable entry securely.
- 5) Use appropriate size of spanner for rotating the mounting bush.
- 6) True earths must be connected to the instrument.
- 7) Use recommended cable only for interconnection.
- 8) Weatherproof ness of enclosure is guaranteed only, if the cover is in place & cable glands adequately tightened.

**N.B:** - Evaluation unit can be mounted away from the probe at a maximum distance of 15 meter's in case of dot display instrument & 30 meters in case of bar display instrument.

## Fail-safe mode

This is field selectable option depending upon the process requirement. Maximum fail safe or minimum fail-safe can be obtained by selecting the **FSS** toggle switch mounted in the centre of the PCB. Deenergized condition of the relay is used to initiate an alarm. Even if the mains supply fails or instrument doesn't work, relay will initiate an alarm.

### Maximum fail-safe

When the level rises and the material covers the probe the relay is de-energized, an alarm is initiated and **Red LED** glows. For achieving this mode of operation shift the toggle switch to fail safe high.

### Minimum fail-safe

When the level falls and the probe is un-covered, the relay is de-energized, an alarm is initiated and **Red LED** glows. For achieving this mode of operation shift the toggle switch to failsafe low.

**Calibration**  
(For DOT Display)

A **DOT LED** display serves as a sensitivity indicator. The indicator range is divided into ten parts. The divisions are as follows.

Dot Region	Color	Sensitivity	Remarks
1 to 6	Green	Low	
7 to 9	Yellow	Medium	
10	Red	High	Relay switching region

The following standard procedure should be carried out when tank is Empty.

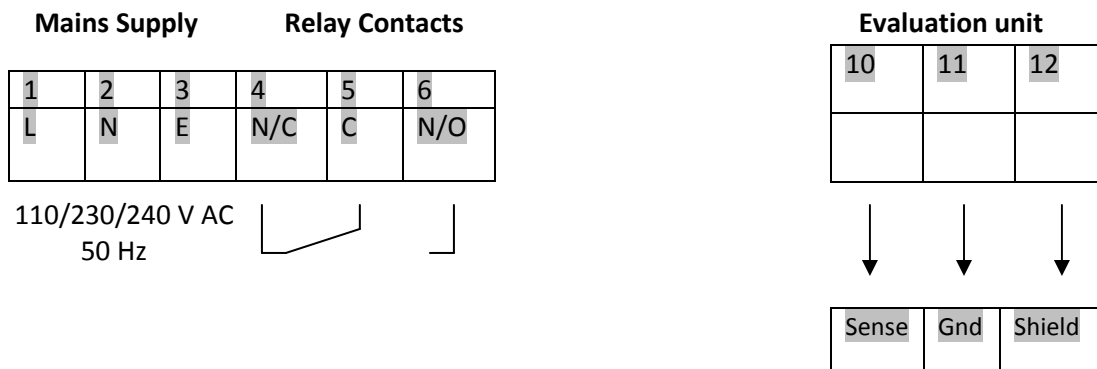
- 1) Switch on the mains supply voltage.
- 2) Select the desired fail safe by using FSS toggle switch.
- 3) For versions provided with adjustable time delay, turn the pot fully counter clockwise to the minimum delay condition.
- 4) Now rotate the sensitivity adjustment potentiometer fully counter clockwise. In this condition dot display will be green.
- 5) Fill the level up to the probe, so that it covers the probe tip sufficiently.
- 6) Rotate the sensitivity potentiometer gradually clockwise observing the dot display to move through the green and yellow region to the Red region. Continue the turning of potentiometer until the relay just operates. This should occur close to the Red region.
- 7) Without disturbing the sensitivity Pot reduce the level of the material. As the probe gets uncovered the dot display will move from red through yellow to green. Record this display indication for future calibration.
- 8) The calibration is now completed.

**Calibration**  
(For BAR Display)

The following standard procedure should be carried out when tank is Empty.

- 1) Switch on the mains supply voltage.
- 2) Select the desired fail safe by using FSS toggle switch.
- 3) For versions provided with adjustable time delay, turn the pot fully counter clockwise to the minimum delay condition.
- 4) Ensure all the four DIP switches just below SENS trimmer are in off position.
- 5) Note the display in SENS/DEV indicator.
- 6) If all the Red LEDs are glowing along with the alarm Red LED, than turn the SENS trimmer slowly towards anticlock wise.
- 7) If alarm condition does not change, than put DIP switch1 to ON condition. If the RED LED alarm still glows than put DIP switch 1to off condition & turn the DIP switch 2,3 or 4 to ON condition till Green LED glows & note if SENS/DIV indicator shows any LED glowing.
- 8) Rotate the SENS trimmer slowly towards clockwise direction till display is on. SENS/DEV indicator shows 4 LED's glowing.
- 9) Fill the level up to the probe, so that it cover's the probe tip sufficiently.
- 10) If the RED alarm LED glows along with the relay changeover, than the calibration is complete.
- 11)If the Green LED still glows, than further rotate the SENS trimmer clockwise till the RED alarm LED glows.

**Connection diagram**





## The Blind Calibration

In case it is not possible to vary the material level during calibration the standard method cannot be used. In such cases an approximate calibration can be carried out by the blind method until a standard calibration is done. **However it is not an accurate method** and should only be used when standard method is not possible.

- 1) Set the FSS to desired mode by means of the toggle switch.
- 2) Ensure that the material does not cover the sense element.
- 3) Rotate the sensitivity adjust pot fully counter-clockwise.
- 4) Turn the pot slowly clock-wise till the 6<sup>th</sup> LED of the display glows.
- 5) This setting will work well for most of the materials.

**NB: - For probe uncovered and display set to 6<sup>th</sup> LED, the Green indicator LED glows when FSS is set to High mode whereas Red indicator LED glows when FSS is set to Low mode.**

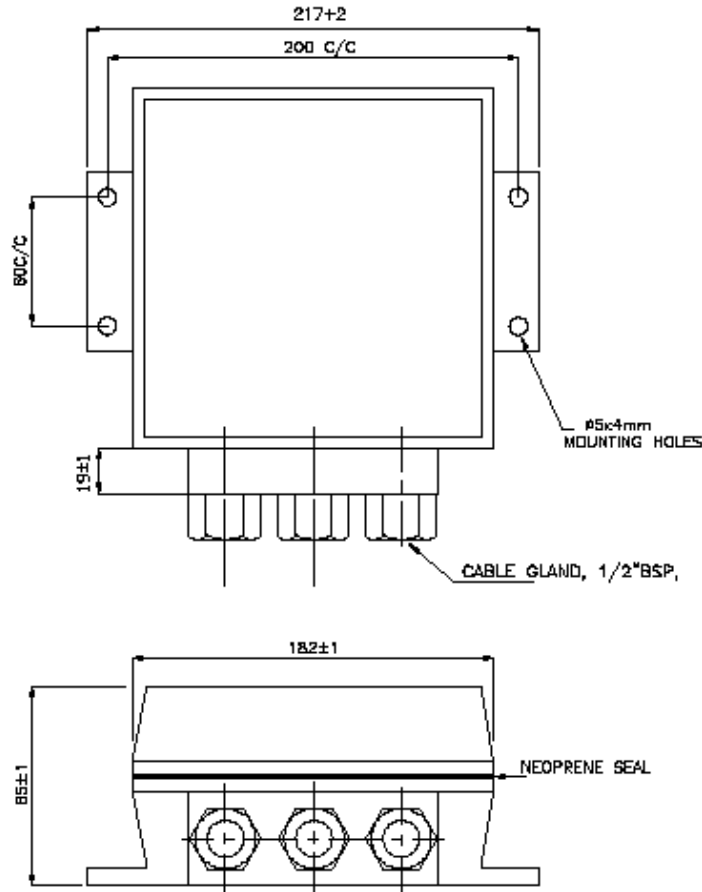
## Trouble Shooting

<b>Problem</b>	<b>Probable cause</b>	<b>Remedy</b>
1. No change in bar display	No change in the level or evaluation unit is faulty	Check level or evaluation unit with other probe
2. LED indication does not changes	LED driving circuit faulty	Diagnose the fault and remove the defective component
3. Relay not actuating but LED changes	Relay or its associated circuit is faulty	As above
4. Evaluating unit o.k. but but no change occurs when probe is connected	Probe or inter connection wire is disconnected	Check cable connectivity and probe
5. Relay actuating but no output.	Relay contact worn out /track discontinuity	Replace relay/ check tracks

## Dimension Diagram

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FILE NAME: 1R20043



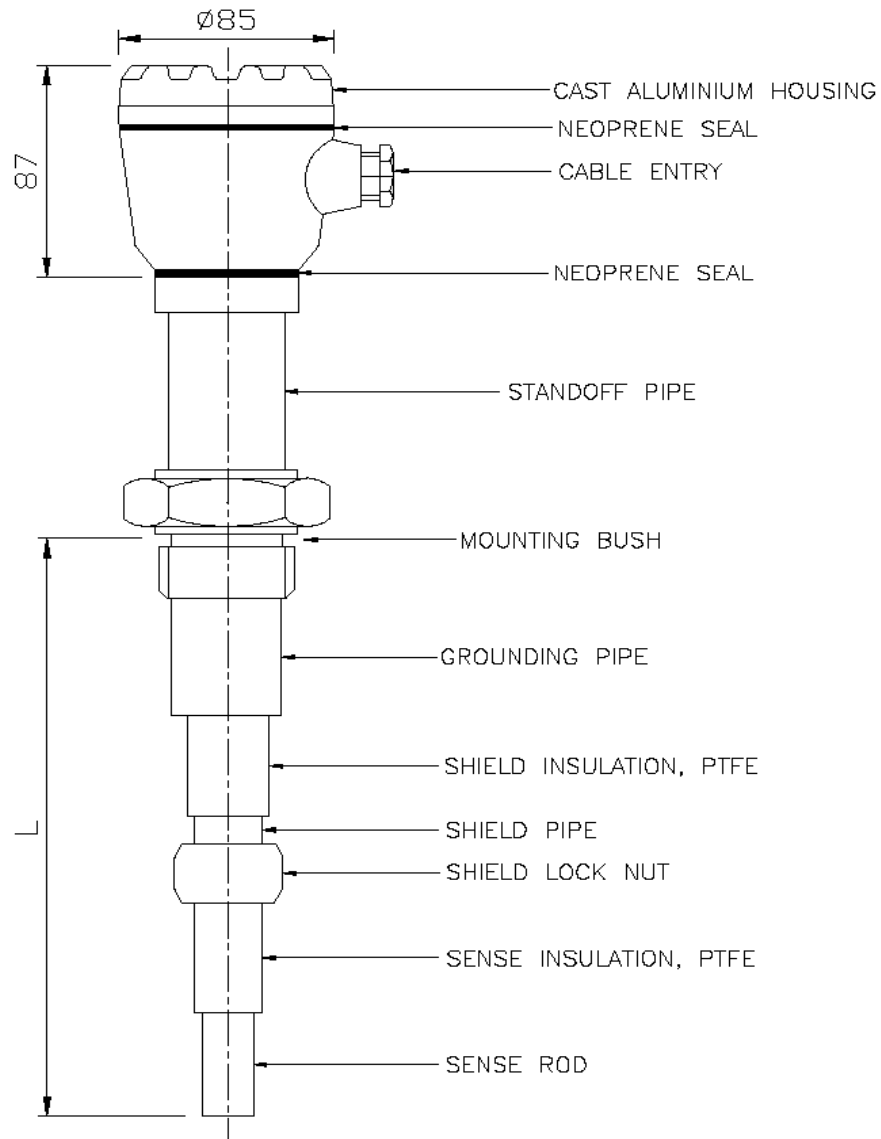
NOTES:-1\_ALL DIMENSIONS ARE IN mm.

DESCRIPTION:- EVALUATION UNIT

SCALE	DRN	CHD	APPD	REV.NO.	REV.DT.	QTY.	DRG.NO.	1R20043	Sh. No.
NTS							DRG.DT.	04-09-09	1

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### Probe Dimension diagram



2). L - PROBE LENGTH.

NOTES:-1). ALL DIMENSIONS ARE IN mm.

DESCRIPTION:- IMMUNOCOAT ROD PROBE (SUPER STRONG)

SCALE	DRN	CHD	APPD	REV.NO.		DRG.NO.	ADM-WH1TB/NRPSS
NTS				REV.DT.		DRG.DT.	06-09-08

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## Warranty

Instrument is manufactured as per the purchase order specification. Standard guarantee for twelve months from the date of commissioning or eighteen months from the date of supply. Which ever is earlier. Guarantee is against manufacturing defects. We undertake to correct such defects which are due to workmanship, at our expenses, Instrument should be forwarded to us on freight paid basis with seals unbroken. The guarantee is valid for our customer and does not extent to third parties or caused by mishandling, accident or abnormal conditions.

## Customer service

If you require any assistance or clarification please free to contact with following details at the address Given below.

**A. Instrument Model & serial no.**

**B. Purchase order no.& date**

**C. Problem observed**

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