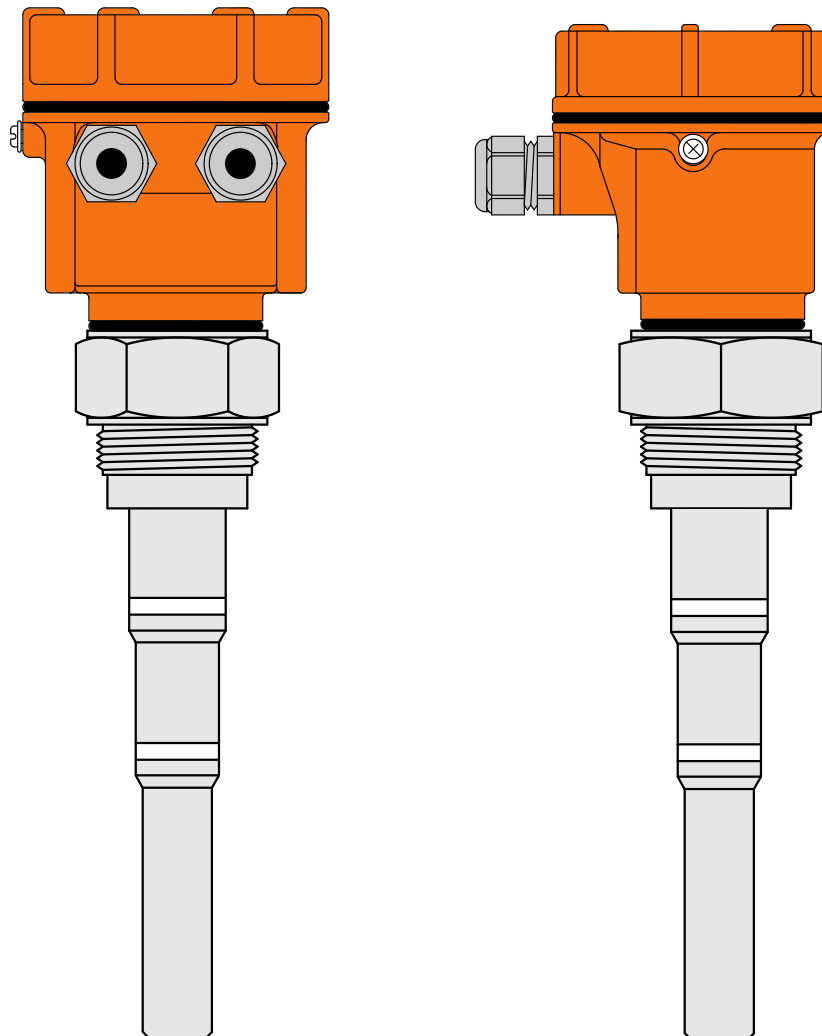


LSY:  
RF Admittance Type Level  
Limit Switch for Solids



# Instruction Manual

**Trumen Technologies Pvt. Ltd.**

39 Mangal Nagar, Behind Sai Ram Plaza, Near Rajiv Gandhi  
Circle, AB Road, Indore, MP 452 001, India  
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**Customer Support**

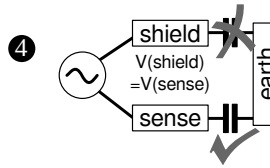
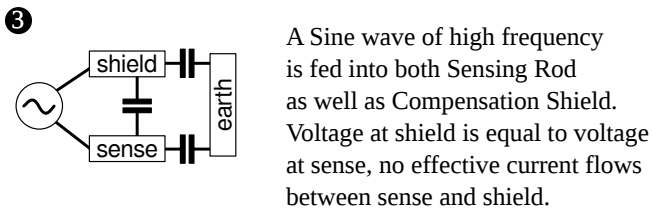
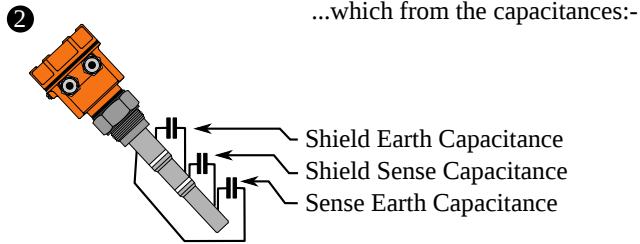
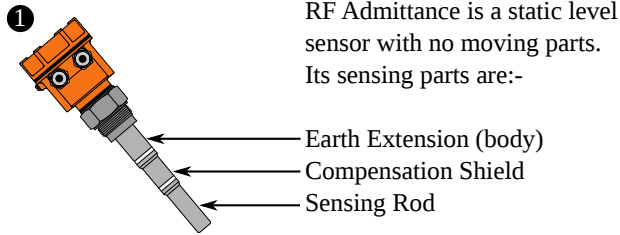
Phone: +91-731-656 2425  
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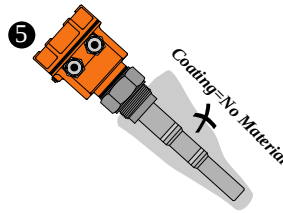
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# Operating Principle

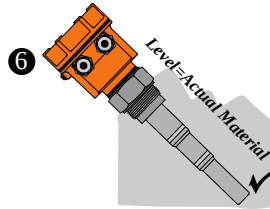


This same voltage or equi-potential drive to sense and shield removes shield-sense capacitance from the measurement. Shield-earth capacitance is ignored by circuit.

This removes the effect of material coating on probe.



Which makes the probe selectively sensitive and by virtue of electrostatic loading of shield, it actually makes admittance device reverse sensitive in the shield-earth region.



Since, level is detected by measuring sense-earth capacitance only, level is not sensed until sufficient amount of material covers sense & earth combined.

Note:- Excessive buildup after first calibration may cause false material present situation at probe. A second calibration after material buildup will be required for proper operation.

# Technical Specification

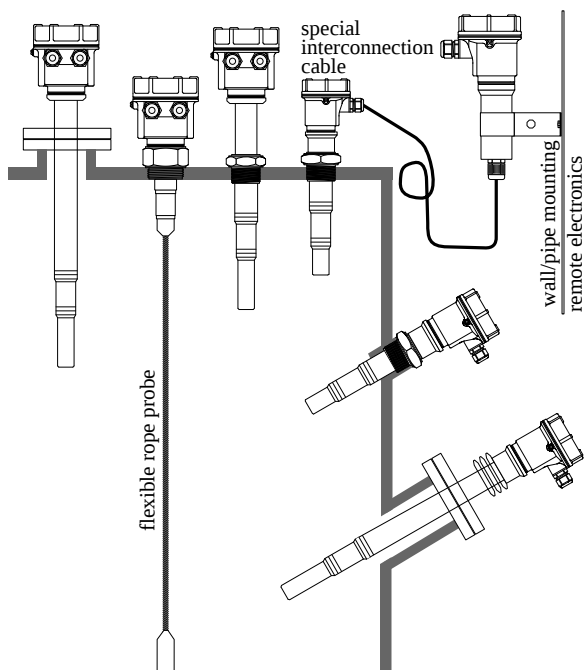
## Features

1. Fast Switching Response 2 sec
2. High temperature endurable probes
3. 90° Phase shifted admittance measurement
4. Easy calibration with or without material
5. Remote electronics with std 10 meters cable length
6. Electrostatic discharge protected electronics
7. Tropicalized & potted electronics module
8. Threaded & Flanged Mountings
9. Electronic Inserts support all requirements
10. Ingress protection : IP 68/66 (as per IS-13947)
11. Ex-proof (Ex d T6 IP-66 IIC )
  - Flameproof as per IS/IEC 60079-1:2007
  - Weatherproof (IP-66) as per IS/IEC 60529:2001
  - Suitable for Gas Group : IIC
  - Suitable for Zone 1 & 2 atmospheres
12. Compact size
13. Low power consumption
14. Active shield compensation against material build-up

## Applications

1. Suitable for all sticky/non-sticky bulk solids & liquids
2. Suitable for side as well as top mounting
3. Minimum and maximum failsafe field selectable
4. Process temperature max 600°C (ceramic insulation)
6. Process pressure max. 15 bar

## Typical Mountings



## Specifications

### EIUD / ERUD Supply & Output

Integral / Remote Electronics DPDT Output  
Universal Power Supply, DPDT Relay Output  
15 to 80 VDC and 15 to 260 VAC 50/60Hz  
Potential Free DPDT Relay Output  
5 A each @ 24VDC or 220VAC

### Relay Type

### EIDP / ERDP Supply & Output Output Limit

Integral / Remote Electronics for PNP Output  
15 to 60 VDC, PNP  
250mA max. Short Circuit Safe

### Sensor Cable

Remote electronics require special admittance cable from probe to controller.  
10 meter standard length  
more available on demand

### Min. Dielectric Constant

1.6 (non-hygroscopic)

### Ambient Temp.

-20 °C ... 70 °C (-4 °F ... 158 °F)

### Process Temp.

-20 °C ... 100 °C (-4 °F ... 212 °F)

### Extended Process Temperature

PTFE Insulation:  
-30 °C ... 250 °C (-22 °F ... 482 °F)  
Ceramic Insulation:  
-30 °C ... 600 °C (-22 °F ... 1,112 °F)  
(extensions & heat sinks required)

### Process Pressure

absolute / max. 15 bar (with PTFE insulation)  
absolute / max. 2.5 bar (with Ceramic insulation)

### Wetted Parts

SS-304, SS 316, SS-316L, PTFE, part ceramic

### Process Connection

NPT / BSP 1", 1¼", 1½", 2" etc  
Flanged : ANSI/JIS/DIN/ASA/custom

### Probe Insertion Length:

#### Rigid Rod

50mm to 3,000mm

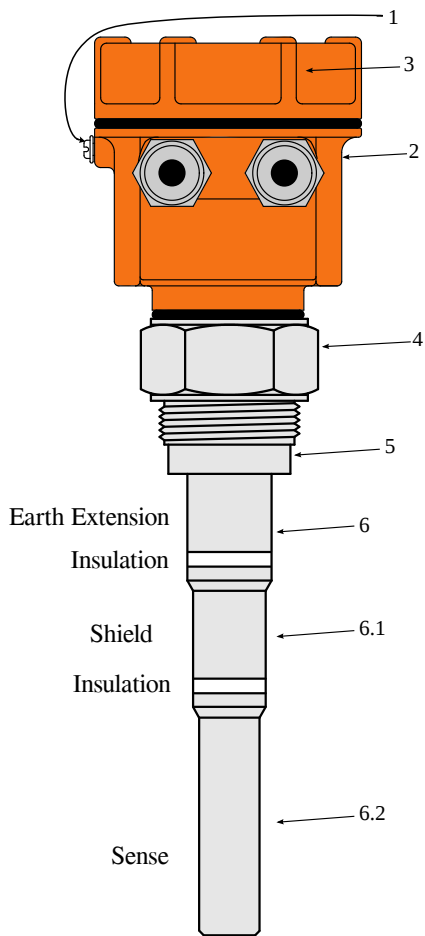
#### Flexible Rope

100mm to 20,000mm

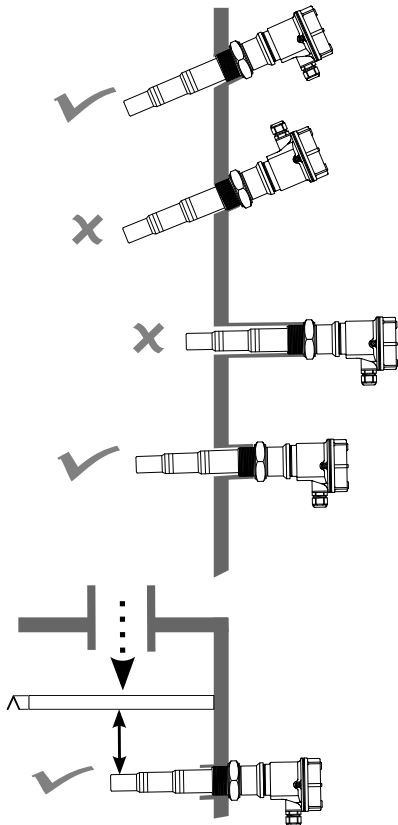
Specifications are subject to change without prior notice

# Do's and Don'ts

## Installation Precaution



1. Always connect the "Earth" to the external "Earthing" screw
2. Tighten the cable entries & glands properly
3. Secure the top aluminium cover at its place properly once the electrical connections and other settings are completed
4. Always tighten the process connection using proper wrench never try to tight by rotating the aluminium housing
5. Make sure process connection is same as that in hopper/tank
6. RF Admittance Probes:-
  - 6.1 Should never be bent closer
  - 6.2 Should never be bent apart
  - 6.3 Should never be cut or machined in any way
  - 6.4 Should never be extended by welding or machining

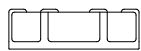


7. Cable entries must face downwards only
8. Nozzles should never be longer than the admittance probe
9. If mounted directly under the material entry, always install a canopy of suitable strength at proper height from the probe
10. Never climb either by gripping or stepping over either the admittance probe or its aluminium housing
11. Observe other safety precautions as required at the place of application

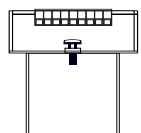
# Troubleshooting

Indication	Probable cause	Work-around	Solution
No switching output or sensor is permanently in alarm  Proper voltage is available but 'power' LED is still OFF	Power is not available  Power section of sensor electronic insert is failed	See if 'power' LED is ON  If power LED is OFF check voltage on terminal 1 and 2	Sensor electronic insert is needed to be replaced.
After calibration no switching when sense part of probe is touched	Sensor and earth part of probe are shorted	Remove electronic insert and calibrate without probe, test calibration by touching and releasing rightmost pin of 4-pin male connector, with your finger	Admittance probe is needed to be replaced, check for any visible damages on probe and inside LSY enclosure.
Abrupt switching	Material is agitated	Set time delay to 5 second in both dry and wet condition (turn switch 2, 3 ON)	Time delay solves switching issues in agitated materials.
Device shows material present even when material is well below the probe	Sticky material or calibration was done at too sensitive setting  High dielectric material	Recalibrate and choose higher hysteresis by turning off more LED's at calibration	Recalibrate at insensitive setting reduces effect of sticky material.  Turn 'ON' DIP Switch no.5 and recalibrate.
Device shows material absent even when probe is fully covered with material	Very low dielectric material not causing enough change of capacitance	Recalibrate at sensitive setting or consider ordering probe with longer and wider sense part	If recalibration doesn't seem to solve then probe with bigger sense surface has to be ordered. Turn 'OFF' DIP Switch no.5 and recalibrate.
Calibration and settings are all OK but device switches abruptly or chatters continuously	Power supply carrying extra noise and admittance amplifier picking the noise	Make necessary arrangements to filter the noise in power-line before being fed to the device  Provide an exclusive earthing to terminal# 3, admittance enclosure earthing screw and admittance probe process connection (device mounting screw or flange)	Device contains sufficient filtering of power supply noise inside, but sometimes external earth is needed to make filters sink the extra power supply noise back to earth.
Device worked for few months / years but now shows material present permanently	Material deposition sensor  Not enough thermal extension spacer used in material with high temperature	Clean up deposited materials on admittance probe as a part of maintenance schedule  Order device of proper thermal grade for proper service life of device	Care is needed to be taken while ordering.  Scheduled cleaning of sense probe in sticky material application is recommended.

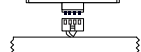
# Maintenance and Spares



Top Cover



Electronic Insert  
connection terminals  
electronic insert fixing screw



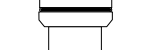
4-way male connector for sensor (admittance)



4-way female connector from sensor (admittance)



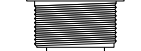
Device enclosure  
Cable glands



Thermal spacer (where needed)



Process connection



Earth extension



Shield



Sense

Shown on the left are various parts of LSY level switch.  
Separable parts are

1. Electronic insert in short called 'electronics'
2. Probe + Enclosure + Cover + Glands collectively called 'mechanical'

For maintenance issues involving replacement of 'electronics', just a single fixing screw is needed to be released.

Lift the electronics slowly by holding electronics with one hand and mechanical with other, as wires are connected using rigid 4-way connectors to it.

Disconnect 4-way connector by holding electronics with one hand and female of connector by other hand, while the rest of the device is at rest.

Connect the new replaced sensor. 4-way connector is unidirectional and only connects in proper direction.

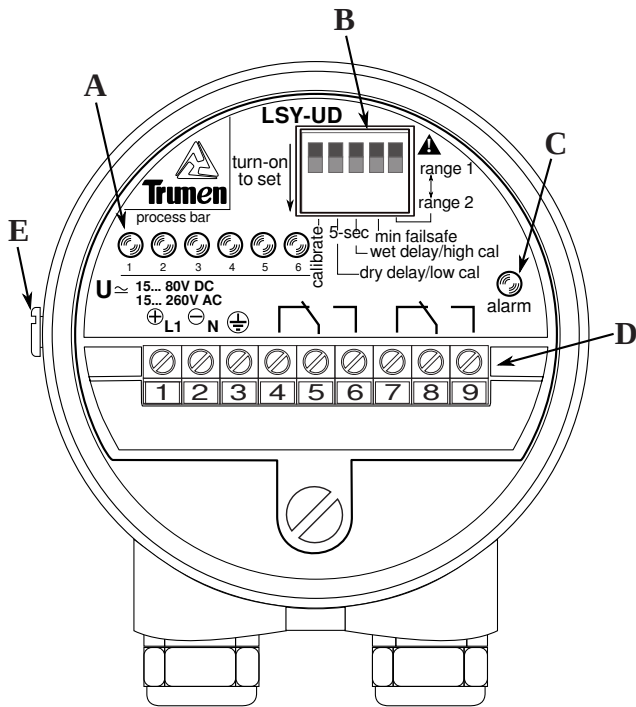
Set the electronics properly to its position.

Match the mounting screw hole of electronics with that of enclosure and fix the screw.

For mechanical issues please send the entire device back to Trumen.

# Annexure-1

## Introduction - LSY-UD (EIUD / ERUD)



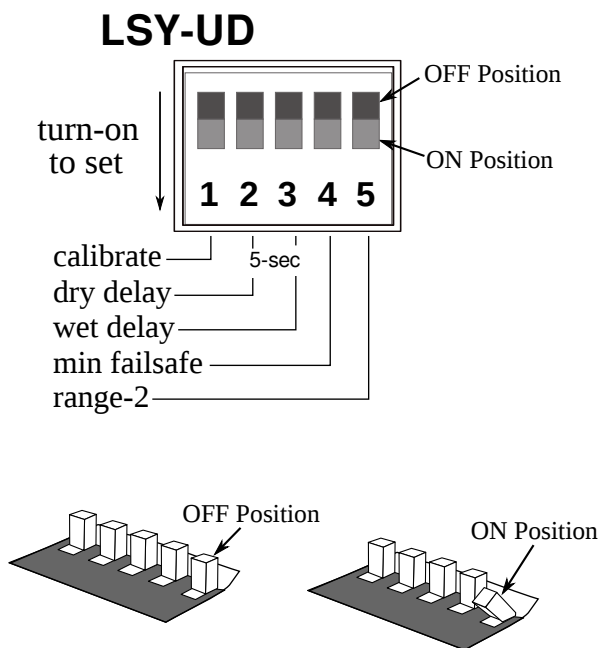
### controls & indicators

- A Process indicating LED bar
- B Configuration switches
- C Alarm indication
- D Connecting terminals
- E External Earthing terminal

### connection terminals

- 1 + of DC or Live of AC Supply input
  - 2 - of DC or Neutral of AC Supply input
- Supply:  
15 to 80VDC or 15 to 260VAC 50/60Hz
- 3 Supply earth terminal for safety
  - 4 Normally connected terminal of contact 1
  - 5 Common terminal of contact 1
  - 6 Normally open terminal of contact 1
  - 7 Normally connected terminal of contact 2
  - 8 Common terminal of contact 2
  - 9 Normally open terminal of contact 2

### configuration switches



Example of Switch in On and Off Positions

- 1 “calibrate” switch: This switch allows calibration in two calibration modes:
  - 1.1 Single Point (switches 2 & 3 must be open)
  - 1.2 Mid Point (requires switches 2 & 3)Please refer next page for calibration process.
- 2 “dry” (or uncovered) delay switch: During normal operation, this switch is turned ON if 5 second uncover delay is required. During 'high precision' calibration this switch is turned ON to set without material switch point.
- 3 “wet” (or covered) delay switch: During normal operation, this switch is turned ON if 5 second covered delay is required. During 'high precision' calibration this switch is turned ON to set with material switch point.
- 4 “minimum” failsafe select  
Failsafe means alarm is same as power failure.  
Failsafe=high (maximum) for overflow detection (device will give alarm in covered condition)  
Failsafe=low (minimum) for underflow detection (device will give alarm in uncovered condition)
- 5 "range1 & range2" switch: For small probes and/or low dielectric materials range 1 (switch #5 OFF) is used, for long probes and/or high dielectric materials range 2 (switch #5 ON) is used.

# Annexure-1

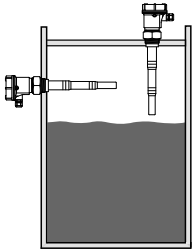
## Calibration - LSY-UD (EIUD / ERUD)

Before starting the calibration procedure, we need to decide the range / position of DIP Switch.5. In case the sensing probe is having shorter length (less than 500 mm) and / or the service material is having low dielectric eg. fly ash, telcum powder, PVC chips, PVC resin, bottle crush, plastic granules, capsule shell etc, keep the DIP Switch 5 in OFF condition (Range-1 position).

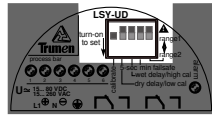
In case the sensing probe is having longer length (greater than 500 mm) and / or the service material is having high dielectric eg. cement, sand, food grains, iron ore, kitchen flour etc, keep the DIP Switch 5 in ON condition (Range-2 position).

Excessive buildup after first calibration may cause false material present at probe. A second calibration after material buildup will be required for proper operation.

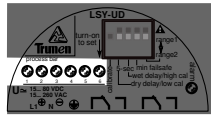
## Calibration Single Point (No-Material)



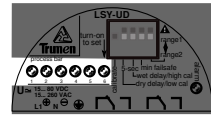
Make sure material is not touching the probe and it is away from the probe



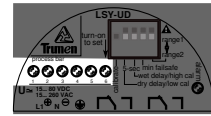
Turn "calibrate" switch ON  
Make sure that switch 2, 3 & 4 are OFF (as shown above)  
Switch no.5 (ON or OFF) as per service material requirement as described above.



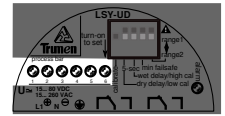
process bar  
1 2 3 4 5 6  
All LEDs On  
All LEDs of process bar will turn ON. This indicates that current level recognized as switching level.



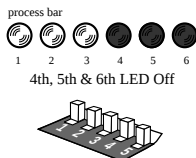
process bar  
1 2 3 4 5 6  
6th LED Blinking  
6th LED will then start blinking. This means that the device is setting itself 1/2 pF insensitive to current material level.



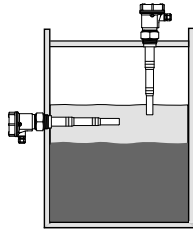
process bar  
1 2 3 4 5 6  
6th LED Off  
6th LED will then turn OFF. This means that the device is setting itself 1 pF insensitive to current material level.



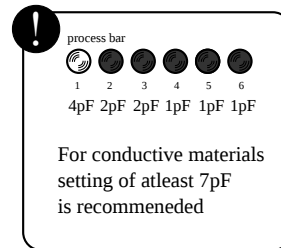
process bar  
1 2 3 4 5 6  
4th, 5th & 6th LED Off  
This sequence will repeat itself. When 4th, 5th, 6th LEDs are off, the device has set itself 3 pF insensitive to current material level.



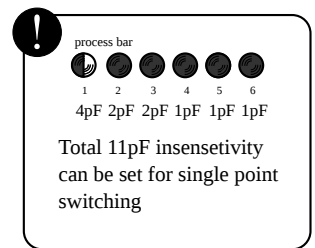
When required insensitivity is reached  
Turn "calibrate" switch OFF.  
(3pF setting shown above)  
(3pF is most common setting)



device is now ready for use as single point level switch.

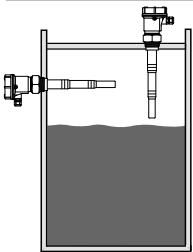


For conductive materials setting of atleast 7pF is recommended

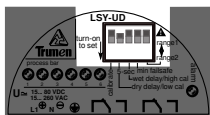


Total 11pF insensitivity can be set for single point switching

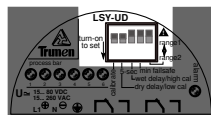
## Calibration (With and Without Material-High Precision (Mid Point Calibration))



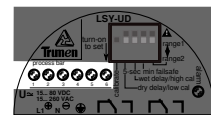
Empty the material so that it is away from probe



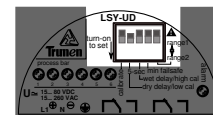
Turn dry delay switch ON  
Make sure that switch 1 & 3 are OFF (as shown above)  
Switch no.5 (ON or OFF) as per service material requirement as described above.



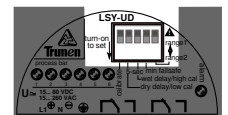
Turn calibrate switch ON  
Make sure that switch 3 is OFF (as shown above)



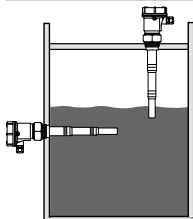
process bar  
1 2 3 4 5 6  
LED 1 blinking, other LEDs Off  
LEDs will turn on, wait for 3-4 seconds here. Then only LED 1 will blink. This shows that level is read as low level by device.



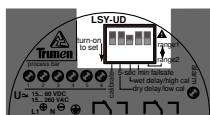
Turn calibrate switch OFF.



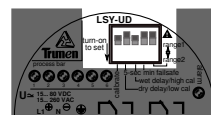
Turn dry delay switch OFF.  
This sequence of turning off the switches is important. Without material switch point has been calibrated.



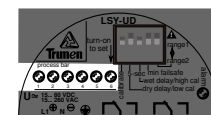
Fill the material up-to the required level where material sensing is required.



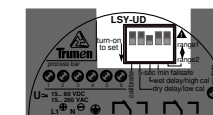
Turn wet delay switch ON  
Make sure that switch 1 & 2 are OFF (as shown above)



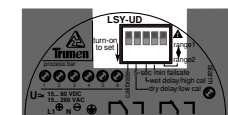
Turn calibrate switch ON  
Make sure that switch 2 is OFF (as shown above)



process bar  
1 2 3 4 5 6  
LED 6 blinking, other LEDs ON  
LEDs will turn on, then wait for 3-4 seconds here. only LED 6 will blink. This shows that level is read as high level by device.



Turn calibrate switch OFF.



Turn wet delay switch OFF.  
This sequence of turning off the switches is important. Mid point calibration has been calibrated. Device is ready for use.

When device is calibrated in mid-point (high-precision cal) process bar LEDs will follow material level while in use.



Low Level



Switch Point



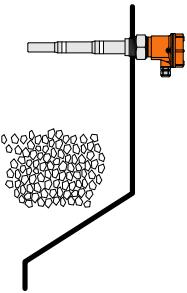
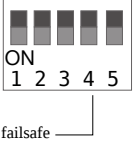

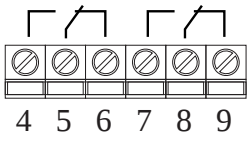
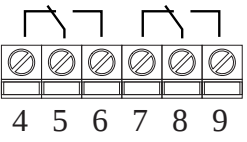
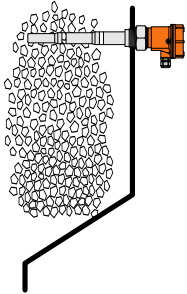
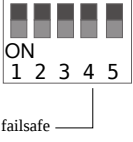

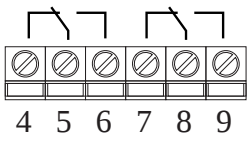
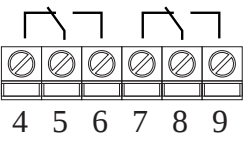
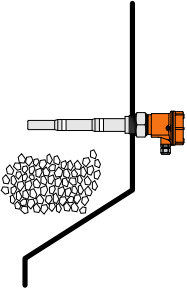
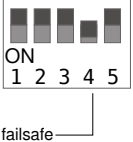

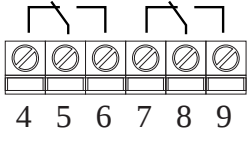
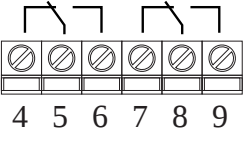
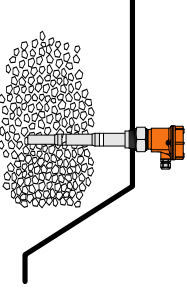
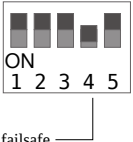

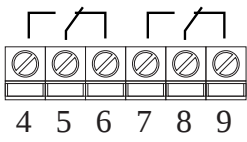
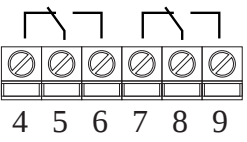
High Level



# Annexure-1

## Operation Matrix - LSY-UD (EIUD / ERUD)

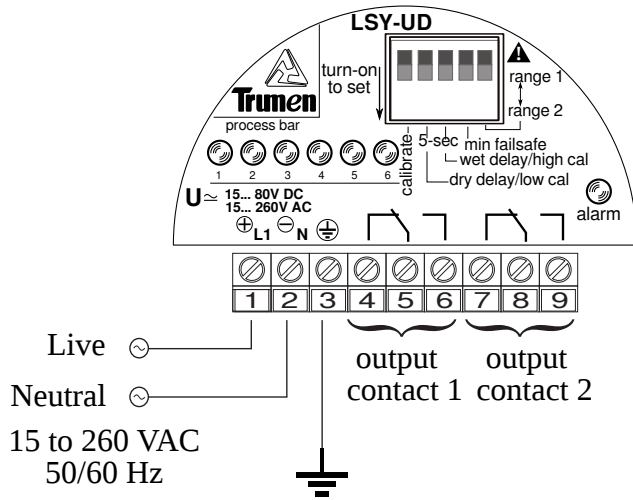
Failsafe defines that the alarm and power failure / device failure conditions are same to the external system. Failsafe operation is best understood with the type of installation and following matrix.

Material & Installation		Material Status	Failsafe Setting	Status LED	DPDT Relay Contacts	
					Power ON	Power OFF
High level / overflow detection		No material at high level.	 <p>Switch no. 4 is off, failsafe high/maximum.</p>	 <b>Off</b> Indicating normal or healthy status.	 <p>Relay 'ON' normal or healthy contacts.</p>	 <p>Relay 'OFF' alarm contacts. (due to power failure)</p>
		Material is above the high level or probe is covered with material.	 <p>Switch no. 4 is off, failsafe high/maximum.</p>	 <b>On</b> Indicating alarm status.	 <p>Relay 'OFF' alarm contacts.</p>	 <p>Relay 'OFF' alarm contacts. (as it is)</p>
Low level / underflow detection		No material at low level.	 <p>Switch no. 4 is on, failsafe low/minimum.</p>	 <b>On</b> Indicating alarm status.	 <p>Relay 'OFF' alarm contacts.</p>	 <p>Relay 'OFF' alarm contacts. (as it is)</p>
		Material is above the low level or probe is covered with material.	 <p>Switch no. 4 is on, failsafe low/minimum.</p>	 <b>Off</b> Indicating normal or healthy status.	 <p>Relay 'ON' normal or healthy contacts.</p>	 <p>Relay 'OFF' alarm contacts. (due to power failure)</p>

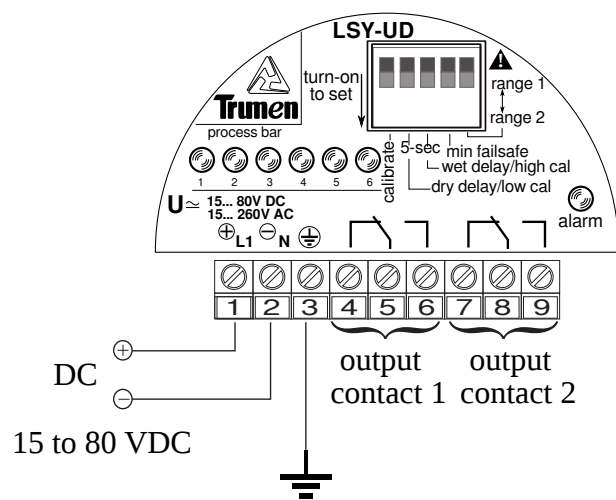
# Annexure-1

## Electrical Connections - LSY-UD (EIUD / ERUD)

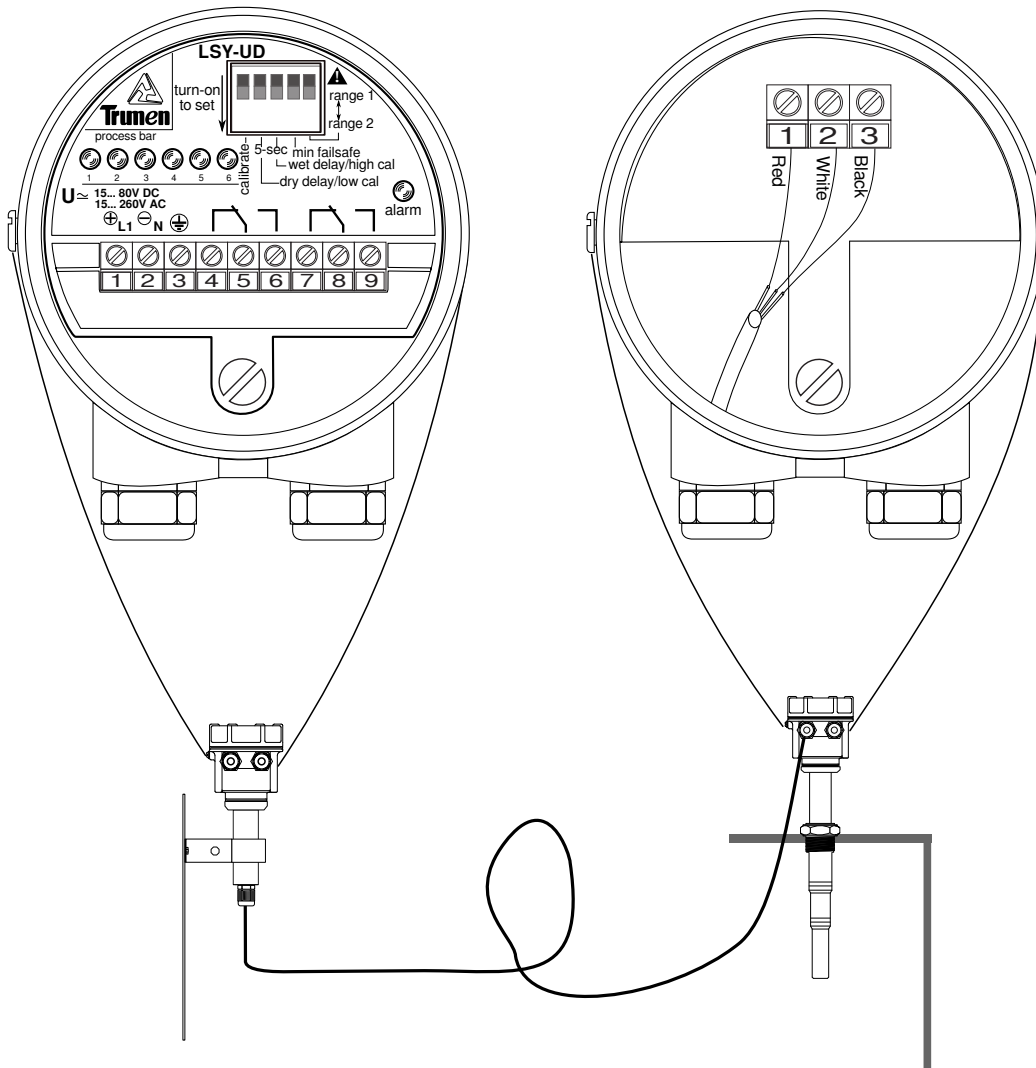
### electrical connections (AC)



### electrical connections (DC)



### Remote probe connections for LSY-UD (ERUD)



**Proper connection to supply earth terminal (3) and the external earth terminal (screw) is must.**