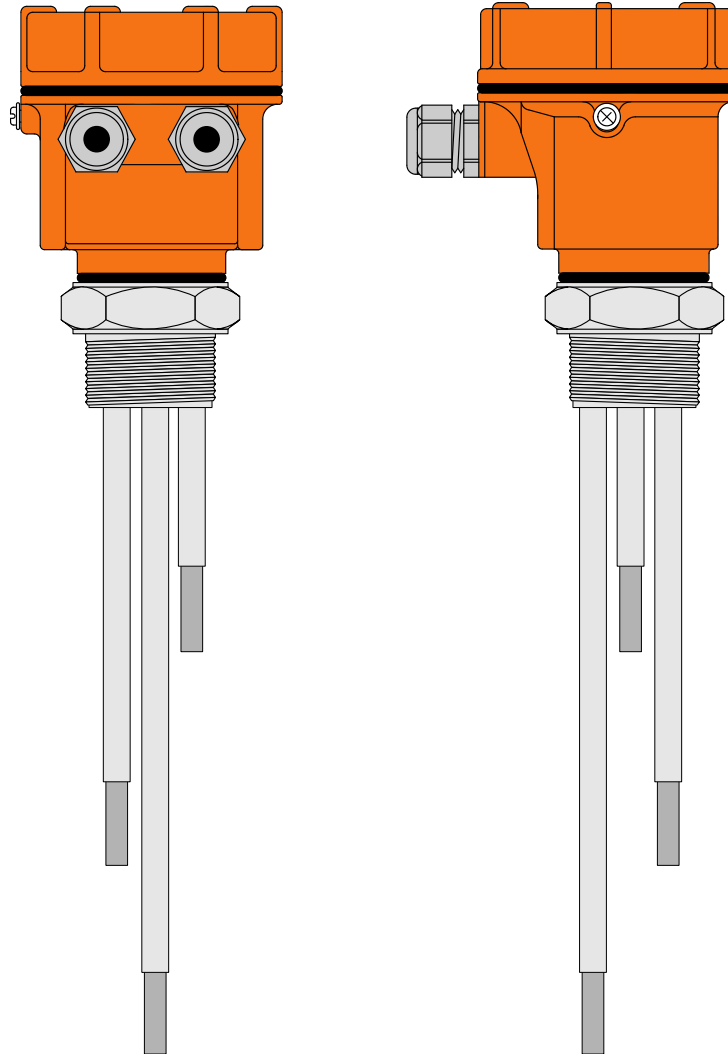


LWS: Conductivity Level Switch for Conductive Liquids



Instruction Manual



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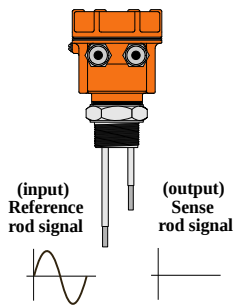
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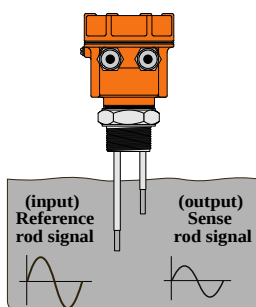
Operating Principle



LWS Conductivity level limit switches are static rendered furnished devices with no moving parts.

A low voltage sine-wave is provided into the liquid using a reference rod (or electrode).

The electronics continuously scans the sense rod (or electrode) for the presence of sine-wave signal on it.



As soon as liquid bridges the two electrodes, the signal appears on sense-electrode.

Device gives the switching output by analyzing the received signal at sense electrode.

Technical Specification

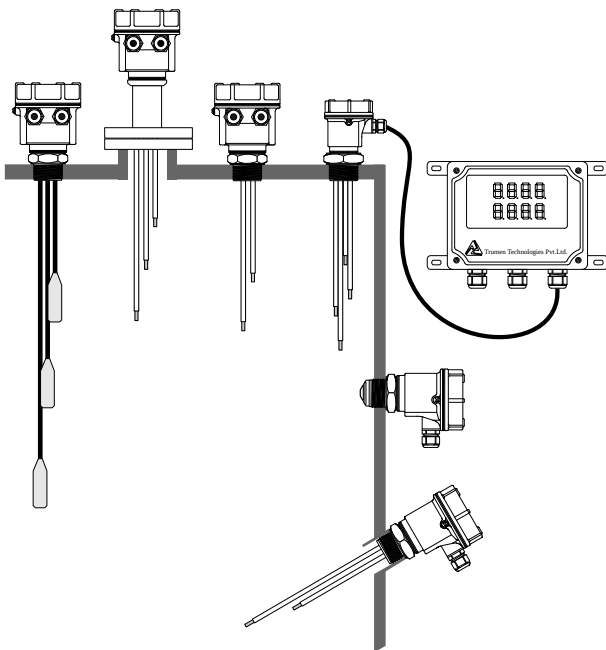
Features

1. Fast Switching Response
2. High temperature durable probes
3. High sensitivity selection for low conductivity liquids
4. Calibration less operation
5. Remote electronics requires ordinary shielded cable
6. Threaded & Flanged Mountings
7. Electronic Inserts support all requirements
8. Ingress protection : IP 68/65 (as per IS-13947)
9. 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
10. Compact size
11. Integral version with universal power supply (15 to 80 VDC & 15 to 265 VAC)
12. Split models with controller+probe with 80 to 260 VAC / 15 to 80 VDC
13. Low power consumption

Applications

1. Suitable for conductive liquids like water
2. Top mounting & side mounting options
3. Minimum and maximum failsafe field selectable
4. Single point/multipoint/pump-control switching
5. Process temperature max. 200°C
6. Process pressure max. 3 bar

Typical Mountings



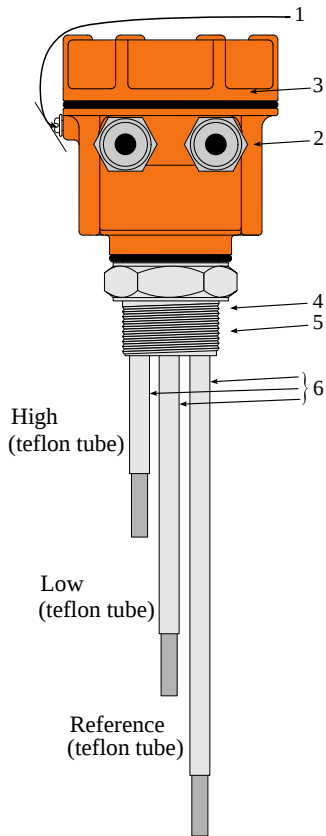
Specifications

EIUD / ERUD Supply & Output	Integral / Remote Electronics DPDT Output Single point sensing Universal Supply DPDT Output 15 to 80 VDC 15 to 260 VAC 50/60Hz 5 A @ 24VDC or 220VAC
Relay Contact	
EIUSI / ERUSI Supply & Output	Integral Electronics 2 SPDT Relays for 2 Single point independent sensing Universal Supply SPDT Output 15 to 80 VDC 15 to 260 VAC 50/60Hz 5 A each @ 24VDC or 220VAC
Relay Contact	
EIUDP / ERUDP Supply & Output	Integral Electronics DPDT Relays for Pump-control sensing Universal Supply DPDT Output 15 to 80 VDC 15 to 260 VAC 50/60Hz 5 A @ 24VDC or 220VAC
Relay Contact	
EIUSH / ERUSH Supply & Output	Integral / Remote Electronics 2 SPDT Relays For 1 single point & 1 pump control sensing Universal Supply SPDT Output 15 to 80 VDC 15 to 260 VAC 50/60Hz 5 A each @ 24VDC or 220VAC
Relay Contact	
EIDPD / ERDPD Supply & Output Output Limit	Integral Electronics for PNP Output Single/2 point (Pump) field settable 10 to 60 VDC, PNP 250mA max. Short Circuit Safe
EIDPI Supply & Output Output Limit	Integral Electronics with 2 PNP for 2 Single point sensing 10 to 60 VDC, PNP 150mA max. Short Circuit Safe.
EIARD Supply & Output Output Limit	Integral Electronics AC series relay single/pump field settable Two Wire 18 to 260 VAC, Series Relay less than 4mA to release external relay Maximum 150mA to magnetize relay Use relays/contactors with less than 4mA holding current
EIDL Supply & Output Output Limit	Integral Electronics 4-20mA Loop Powered single/pump settable Two Wire DC 8 / 16 mA 15 to 60 VDC 8mA (-1mA max) / 16mA (+1mA max)
ERR2R/ERR3R Supply & Output Relay Contact	Remote Electronics Dual / Three SPDT Output, special cable 80-270VAC, 50/60Hz 5 A each @ 24VDC or 220VAC
	Enclosure for Remote Electronics is IP-65 and probe is IP-68
	Remote electronics is needed when number of switching output are more than two
Sensor Cable (Shielded)	Ordinary 2/3/4 core shielded cable as probe contains sensor unit.
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	-30°C ... 600°C (-22°F ... 1,112°F) (extensions & heat sinks required)
Process Pressure	absolute / max. 15 bar
Wetted Parts	SS-304, SS-316, SS-316L, PTFE, part ceramic
Process Connection	NPT / BSP ½", ¾", 1", 1¼", 1½", 2" etc Flanged : ANSI/JIS/DIN/ASA/custom
Probe Length	flush installation to 3,000mm for rod probe and upto 20,000mm for rope probe

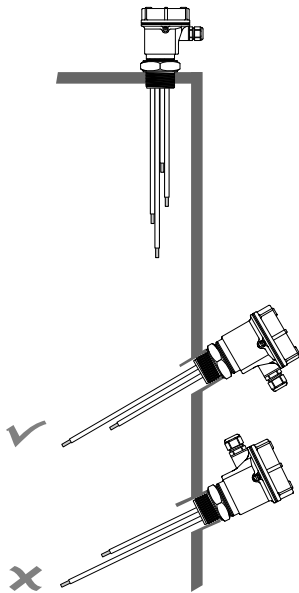
Specifications are subject to change without prior notice

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. "Sensing probes" should never be:-
 - 6.1 Bent

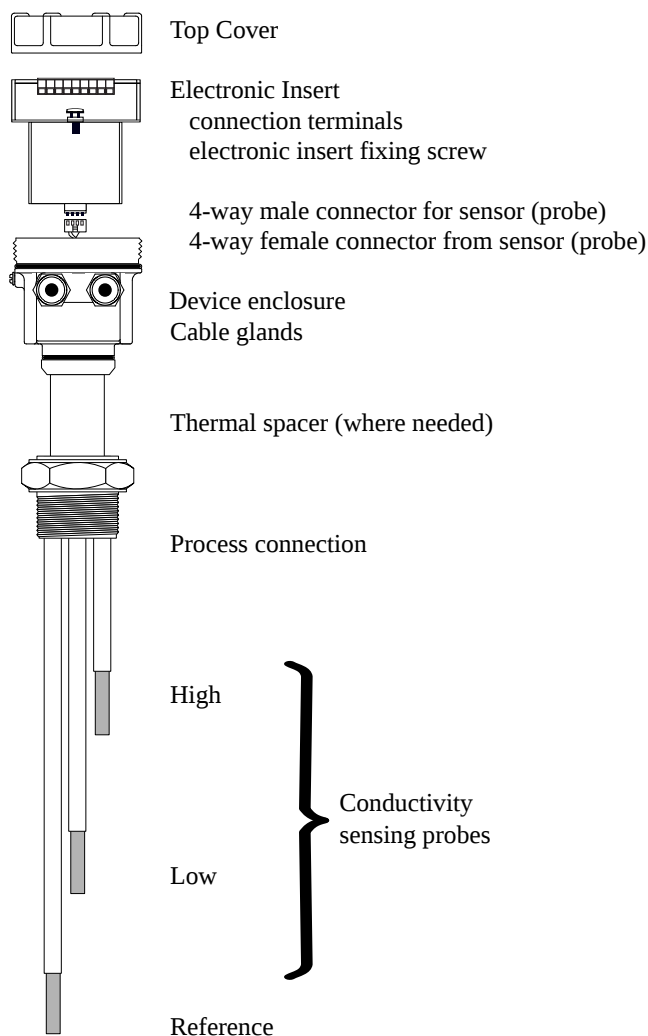


7. Cable entries must face downwards only
8. Never climb either by gripping or stepping over either the sensor probe or its aluminium housing
10. Observe other safety precautions as required at the place of application

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, sensor electronic insert internal power section 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 .
No sensing even while testing without any probe	Sensor electronic insert conductivity or evaluation section failed		Sensor electronic insert is needed to be replaced.
Abrupt switching (in case of LWS-UD)	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 conductive material forming layer between probes or probes are shorting together	See inside the tank and observe probe if shorting	Rectify by cleaning the probe or if any probe shorting.
Device shows material absent even when probe is fully dipped with material	Material may be non-conductive or connector between electronic insert and probe is not connected	Material should be conductive, or open the electronic insert from probe and check the proper connection between electronic insert and probe	Instrument should be used in conductive material only, if connector is break, replace it with a new connector.
Device worked for few months / years but now shows material present permanently	Material deposition sensor	Clean up deposited Materials on probe as a part of maintenance schedule	Scheduled cleaning of sense probe in sticky material application is recommended.

Maintenance and Spares



Shown on the left are various parts of LWS level switch. separatable 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.

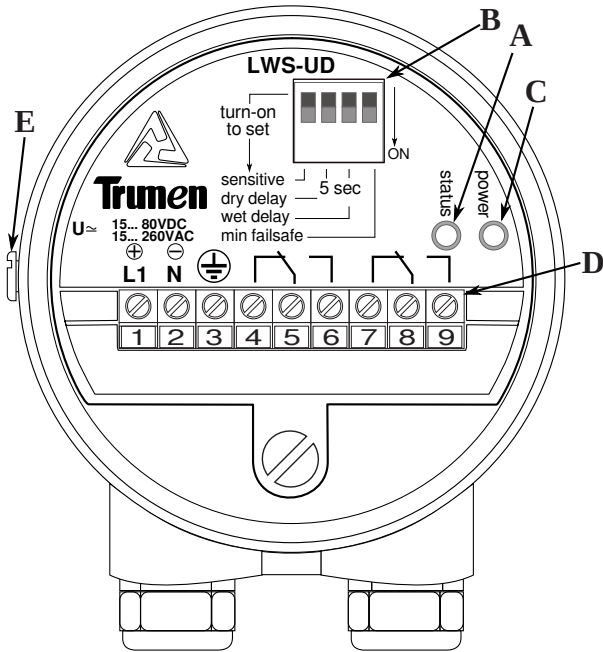
For mechanical issues please send the entire device back to Trumen.

Annexure-1

Introduction - LWS-UD (EIUD / ERUD)

controls & indicators

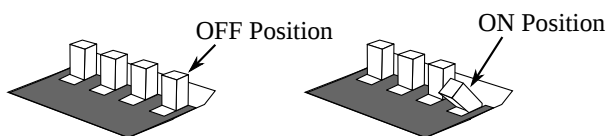
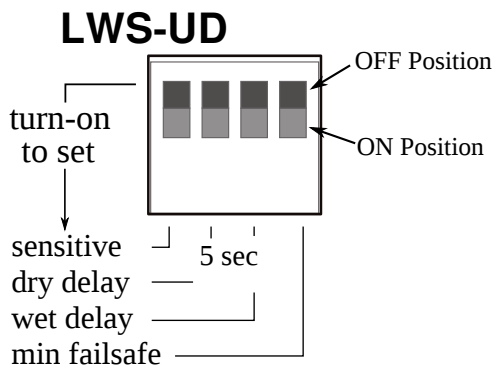
- A Alarm Indicating LED
- B Configuration Switches
- C Power ON LED Indicator
- D Connecting Terminals
- E External Earthing Terminal



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 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

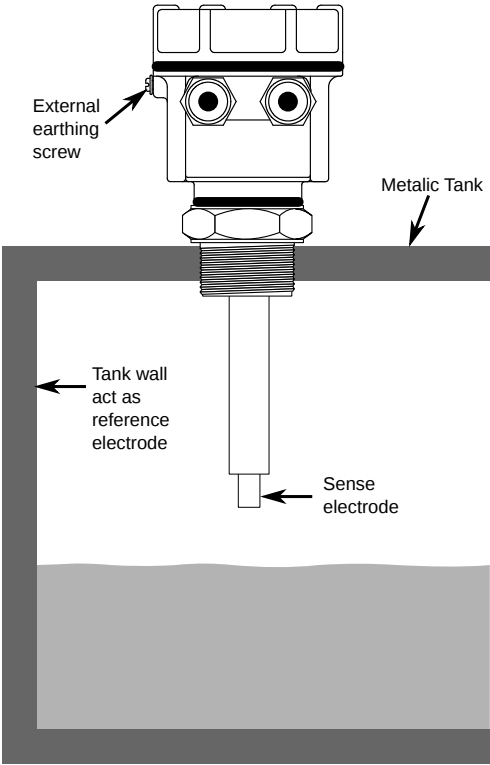
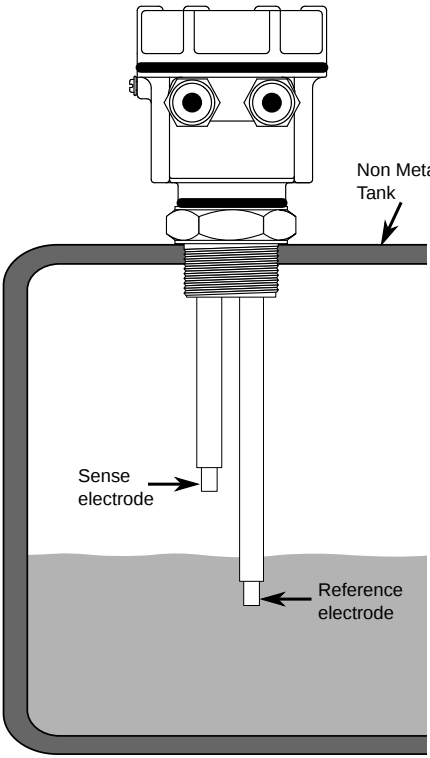
- 1 sensitivity control switch
 - switch 1 - Off = "Normal" for high conductive liquids (the resistance of water / liquid up to max. 26k Ω)
 - switch 1 - On = "Sensitive" for low conductive liquids (the resistance of water / liquid between 26k Ω to 40k Ω)
- 2 dry delay switch
 - switch 2 - Off = Switching delay 1 sec
 - switch 2 - On = Switching delay 5 sec (after water / liquid leaves the sensing probe)
- 3 wet delay switch
 - switch 3 - Off = Switching delay 1 sec
 - switch 3 - On = Switching delay 5 sec (after water / liquid touches the sensing probe)
- 4 minimum failsafe select switch
 - switch 4 - Off = Maximum failsafe - Instrument gives alarm when water / liquid touches the sensing probe.
 - switch 4 - On = Minimum failsafe - Instrument gives alarm when water / liquid level goes below sensing probe

Annexure-1

Probe Variants - LWS-UD (EIUD / ERUD)

There are two types of probe used for single point level switching:

1. Single sense rod probe (Sense rod / rope only)
2. 2 in 1 rod / rope probe (1. Sense rod / rope 2. Reference rod / rope)

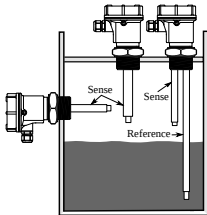


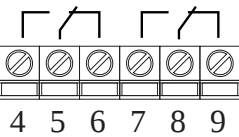
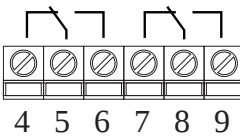
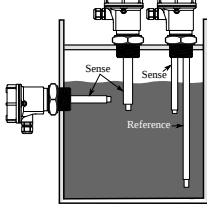


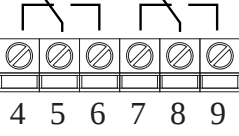
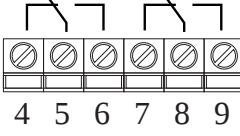
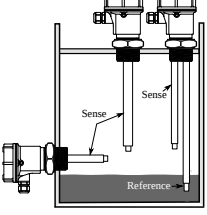


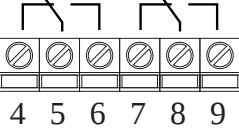
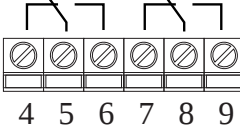
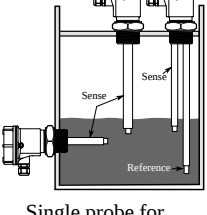


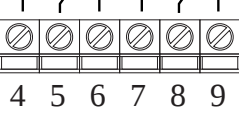
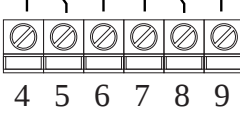
Single Rod Probe	2 in 1 Probe
 <p>The diagram shows a cross-section of a metallic tank with a liquid level. A single rod probe is mounted on the top. The probe's upper part has an external earthing screw. The rod extends down into the liquid. The tank wall is labeled as the reference electrode, and the tip of the rod is labeled as the sense electrode.</p>	 <p>The diagram shows a cross-section of a non-metallic tank with a liquid level. A 2-in-1 probe is mounted on the top. It has two rods extending down into the liquid. The tank wall is labeled as non-metallic. The shorter rod is labeled as the sense electrode, and the longer rod is labeled as the reference electrode.</p>
<p>Single rod probe (1 in 1) is used where process tank is metallic or there is any fitting constraint in tank. In this case make sure process connection (thread / flange) must be galvanically connected with the metallic tank wall because tank wall is the reference electrode in this case. External earthing connection between earthing screw and metallic tank wall is recommended.</p>	<p>2 in 1 rod / rope probe can be used in any type of process tank, metallic or non metallic because sense electrode and reference electrode both are available in the probe. In this case reference electrode is always merged in conductive liquid.</p>

Annexure-1

Operation Matrix - LWS-UD (EIUD / ERUD)

This model is suitable for single point level switching operation and only one level is selected for alarm and normal condition. Two types of probes available

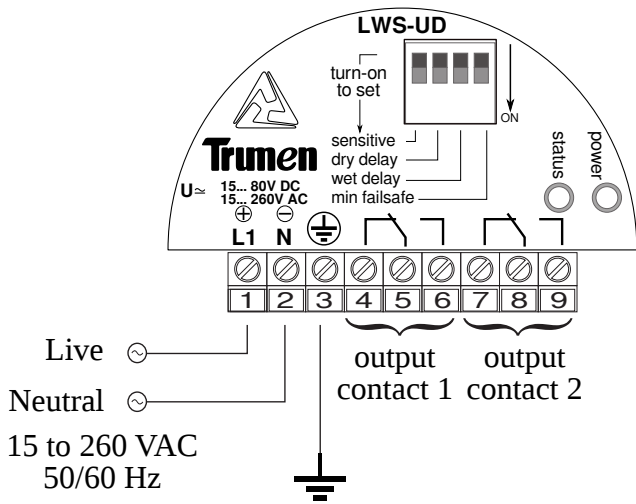
1) Single rod probe (1 in 1) and 2) 2 in 1 rod probe. Single rod probe should be used only where metallic tank is available. 2 in 1 probe can be used in metallic / non metallic tanks. Failsafe defines that the alarm and power failure / device failure conditions are same to the external system. Failsafe operation is best understood with the type of installation and following matrix. Power off condition will provide alarm.

	Material & Installation	Material Status	Failsafe Setting	Status LED	DPDT Relay Contacts	
					Power ON	Power OFF
High level / overflow detection	 <p>Single probe for metallic tank, 2 in 1 probe for non metallic tank)</p>	No material at high level.	 <p>min failsafe _____</p> <p>Switch no. 4 is off, failsafe high/maximum.</p>	 Off Indicating normal or healthy status.	 <p>Relay 'ON' normal or healthy contacts.</p>	 <p>Relay 'OFF' alarm contacts. (due to power failure)</p>
	 <p>Single probe for metallic tank, 2 in 1 probe for non metallic tank)</p>	Material is above the high level or probe is covered with material.	 <p>min failsafe _____</p> <p>Switch no. 4 is off, failsafe high/maximum.</p>	 On Indicating alarm status.	 <p>Relay 'OFF' alarm contacts.</p>	 <p>Relay 'OFF' alarm contacts. (as it is)</p>
Low level / underflow detection	 <p>Single probe for metallic tank, 2 in 1 probe for non metallic tank)</p>	No material at low level.	 <p>min failsafe _____</p> <p>Switch no. 4 is on, failsafe low/minimum.</p>	 On Indicating alarm status.	 <p>Relay 'OFF' alarm contacts.</p>	 <p>Relay 'OFF' alarm contacts. (as it is)</p>
	 <p>Single probe for metallic tank, 2 in 1 probe for non metallic tank)</p>	Material is above the low level or probe is covered with material.	 <p>min failsafe _____</p> <p>Switch no. 4 is on, failsafe low/minimum.</p>	 Off Indicating normal or healthy status.	 <p>Relay 'ON' normal or healthy contacts.</p>	 <p>Relay 'OFF' alarm contacts. (due to power failure)</p>

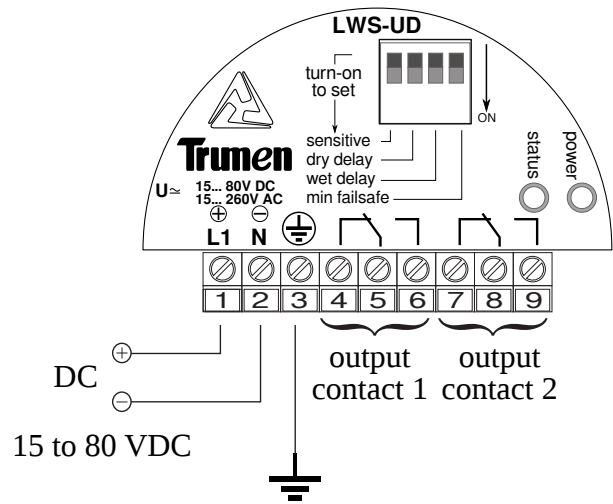
Annexure-1

Electrical Connections - LWS-UD (EIUD / ERUD)

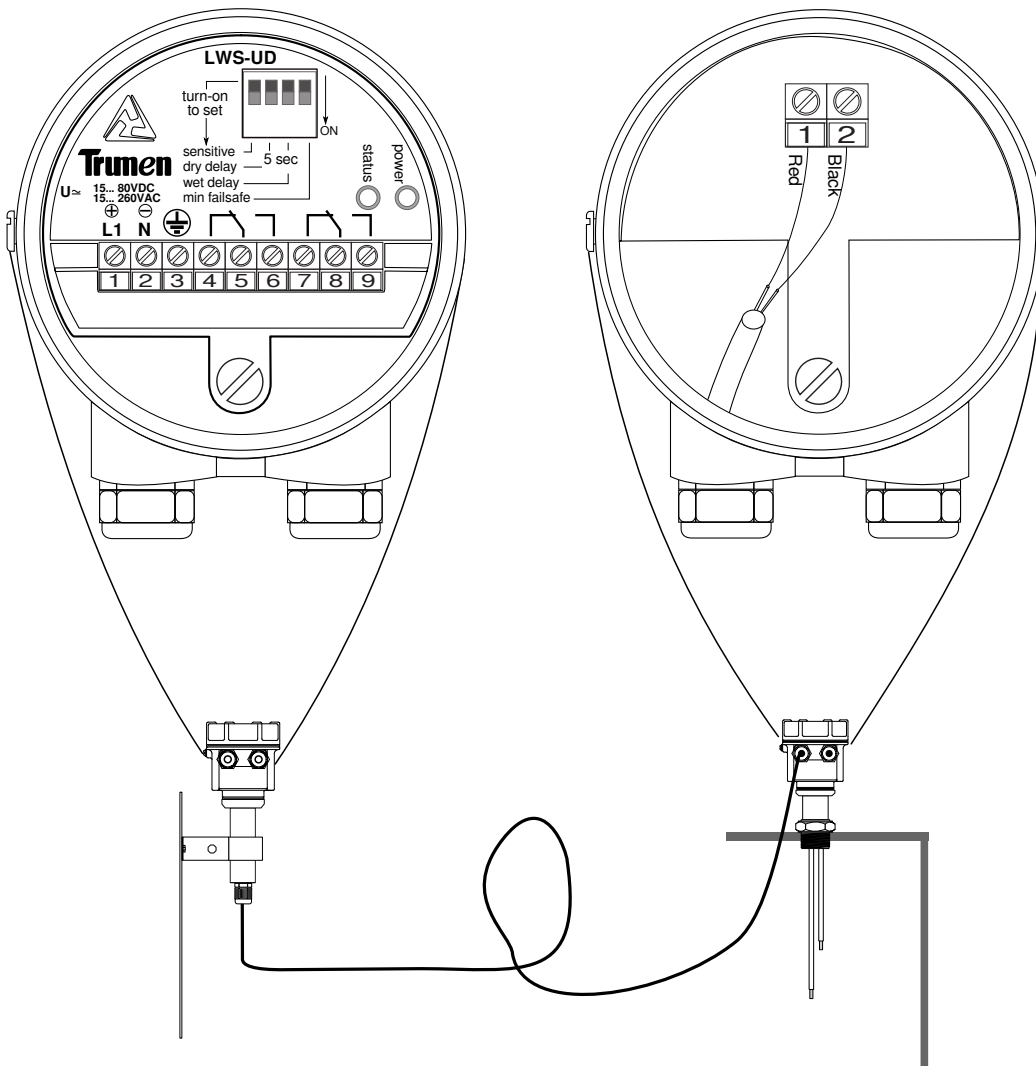
electrical connections (AC)



electrical connections (DC)



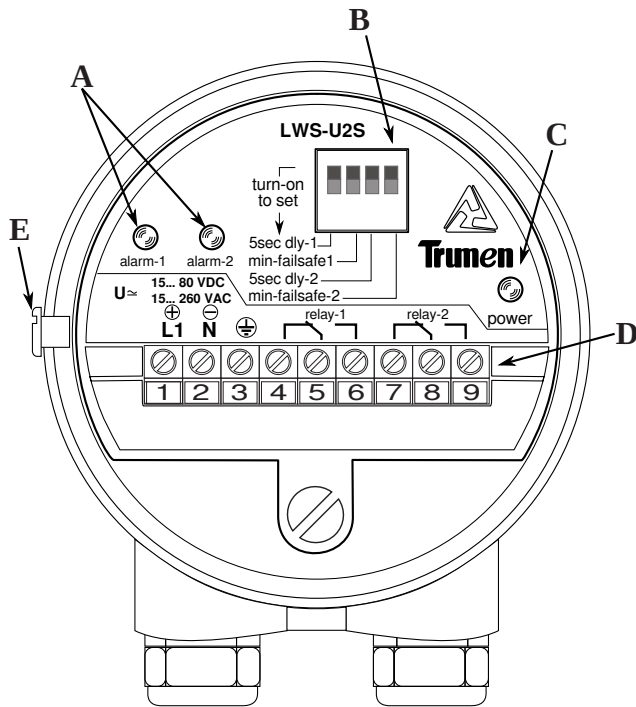
Remote probe connections for LWS-UD (ERUD)



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

Annexure-2

Introduction - LWS-U2S (EIUSI / ERUSI)



controls & indicators

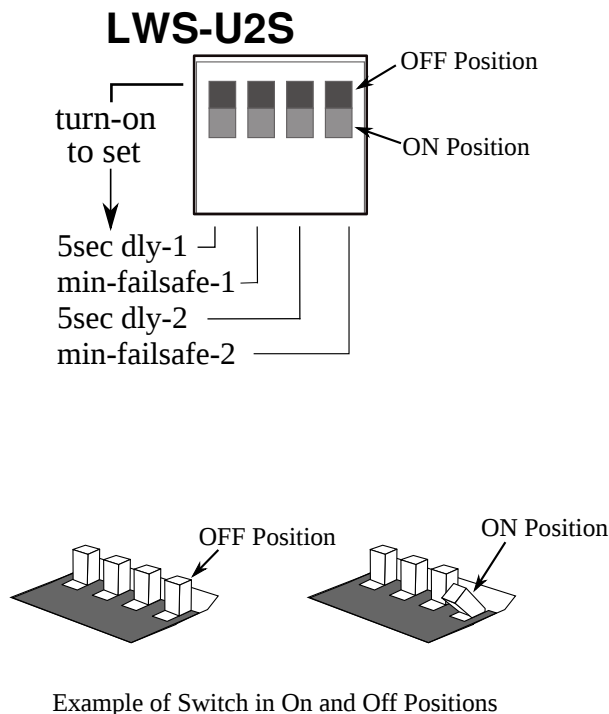
- A Output Indication LEDs
- B Configuration Switches
- C Alarm Indication
- D Connecting Terminals
- E External Earthing Terminal

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 Earth terminal for safety
- 4 Normally connected terminal of channel 1
- 5 Common terminal of channel 1
- 6 Normally open terminal of channel 1
- 7 Normally connected terminal of channel 2
- 8 Common terminal of channel 2
- 9 Normally open terminal of channel 2

configuration switches



- 1 5 sec dly - 1 switch
switch Off = Sets 1 sec delay for relay 1 output in both dry and wet conditions
switch On = Sets 5 sec delay for relay 1 output in both dry and wet conditions
- 2 min failsafe -1 switch
when kept On = Low level alarm, when water level goes below to low level probe, relay 1 gives alarm
- 3 5 sec dly - 2 switch
switch Off = Sets 1 sec delay for relay 2 output in both dry and wet conditions
switch On = Sets 5 sec delay for relay 2 output in both dry and wet conditions
- 4 min failsafe - 2 switch
when kept Off = High level alarm, when water level touches the high level probe, relay 2 gives alarm

Note :- Always keep minimum failsafe

Switch-1 On and minimum failsafe

Switch-2 in off condition for true failsafe performance

When all switches are off (higher side): default time delay will be 1 seconds in both dry and wet conditions for both relays.

Alarm will occur in wet condition for both relays.

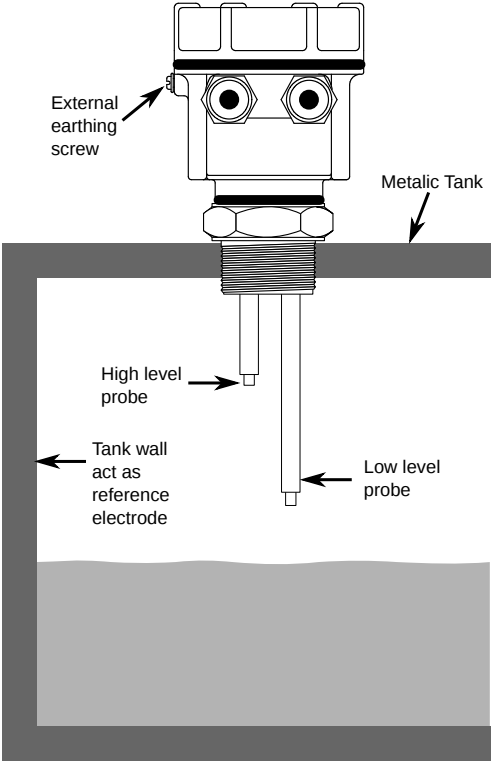
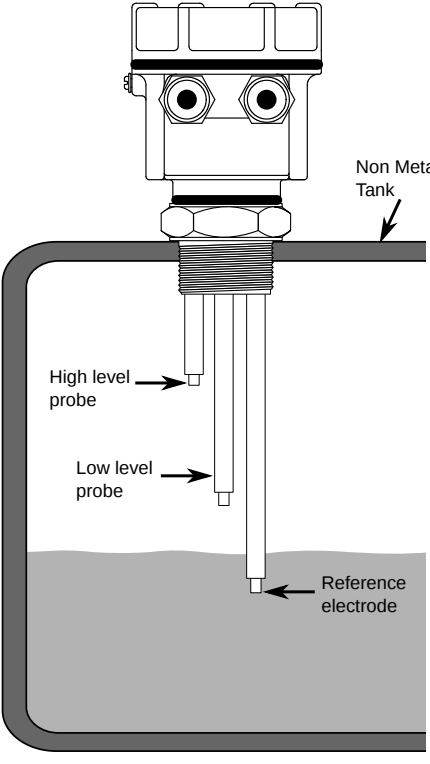
Power off condition will provide alarm.

Annexure-2

Probe Variants - LWS-U2S (EIUSI / ERUSI)

There are two types of probe used for 2 point independent level switching:

1. 2 in 1 probe (1. High level rod / rope probe 2. Low level rod / rope probe)
2. 3 in 1 probe (1. High level rod / rope probe 2. Low level rod / rope probe 3. Reference electrode (rod / rope))

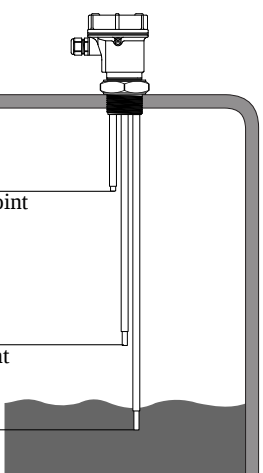

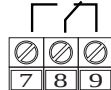
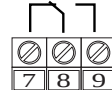



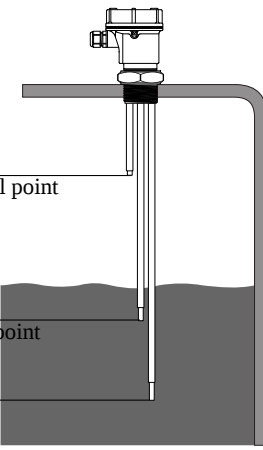
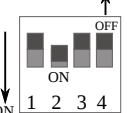

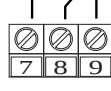
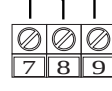

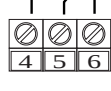
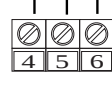
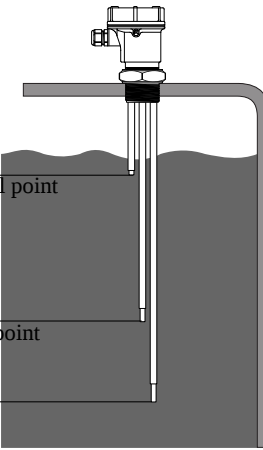

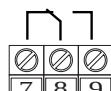
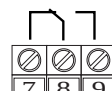

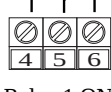

2 in 1 Probe	3 in 1 Probe
 <p>External earthing screw</p> <p>Metalic Tank</p> <p>High level probe</p> <p>Tank wall act as reference electrode</p> <p>Low level probe</p>	 <p>Non Metallic Tank</p> <p>High level probe</p> <p>Low level probe</p> <p>Reference electrode</p>
<p>2 in 1 rod / rope probe is used where process tank is metallic or there is any fitting constraint in tank. In this case make sure process connection (thread / flange) must be galvanically connected with the metallic tank wall because tank wall is the reference electrode in this case. External earthing connection between earthing screw and metallic tank wall is recommended.</p>	<p>3 in 1 rod / rope probe can be used in any type of process tank, metallic or non metallic because reference electrode with both sense electrode is already available in the probe. In this case reference electrode is always merged in conductive liquid.</p>

Annexure-2

Operation Matrix - LWS-U2S (EIUSI / ERUSI)

This model is suitable for two point independent level switching operation. Low point switching for relay-1 and high point switching for relay-2. Failsafe defines that alarm and power failure / device failure conditions are same to the external system.

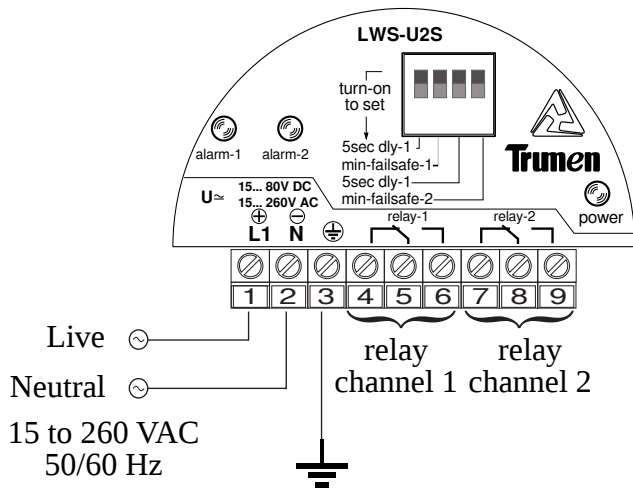
To achieve failsafe operation keep DIP switch no. 2 is always ON, and DIP switch no. 4 is always in OFF condition. Failsafe operation is best understood with the material position relative to high & low level probe. Power off condition will provide alarm.

Material Position Relative to High Level & Low Level Probes	Material Status	Failsafe Setting	Alarm LED Status	Relay Contacts	
				Power ON	Power OFF
 <p>Relay 2 High level point</p> <p>Relay 1 Low level point</p> <p>Reference level</p>	No material at high and low level		Alarm LED Relay 2  OFF Indicating normal or healthy status	 <p>Relay 2 ON normal or healthy contacts</p>	 <p>Relay 2 OFF alarm contacts (due to power failure)</p>
			Alarm LED Relay 1  ON Indicating alarm status (low level alarm)	 <p>Relay 1 OFF alarm contacts</p>	 <p>Relay 1 OFF alarm contacts (as it is)</p>
 <p>Relay 2 High level point</p> <p>Relay 1 Low level point</p> <p>Reference level</p>	Material is above the low level for relay 1 probe. But below the high level for relay 2 probe	Relay 2 is in failsafe high / maximum (high level alarm) because min. failsafe-2 switch is off  <p>min failsafe-1 switch is on i.e. Relay 1 is in failsafe low / minimum (low level alarm) because min. failsafe-2 switch is off</p>	Alarm LED Relay 2  OFF Indicating normal or healthy status	 <p>Relay 2 ON normal or healthy contacts</p>	 <p>Relay 2 OFF alarm contacts (due to power failure)</p>
			Alarm LED Relay 1  OFF Indicating normal or healthy status	 <p>Relay 1 ON normal or healthy contacts</p>	 <p>Relay 1 OFF alarm contacts (due to power failure)</p>
 <p>Relay 2 High level point</p> <p>Relay 1 Low level point</p> <p>Reference level</p>	Material is above the high level		Alarm LED Relay 2  ON Indicating alarm status (high level alarm)	 <p>Relay 2 OFF alarm contacts</p>	 <p>Relay 2 OFF alarm contacts (as it is)</p>
			Alarm LED Relay 1  OFF Indicating normal or healthy status	 <p>Relay 1 ON normal or healthy contacts</p>	 <p>Relay 1 OFF alarm contacts (due to power failure)</p>

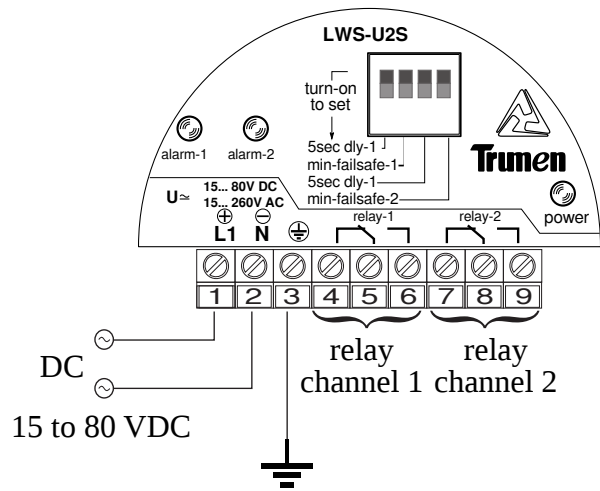
Annexure-2

Electrical Connections - LWS-U2S (EIUSI / ERUSI)

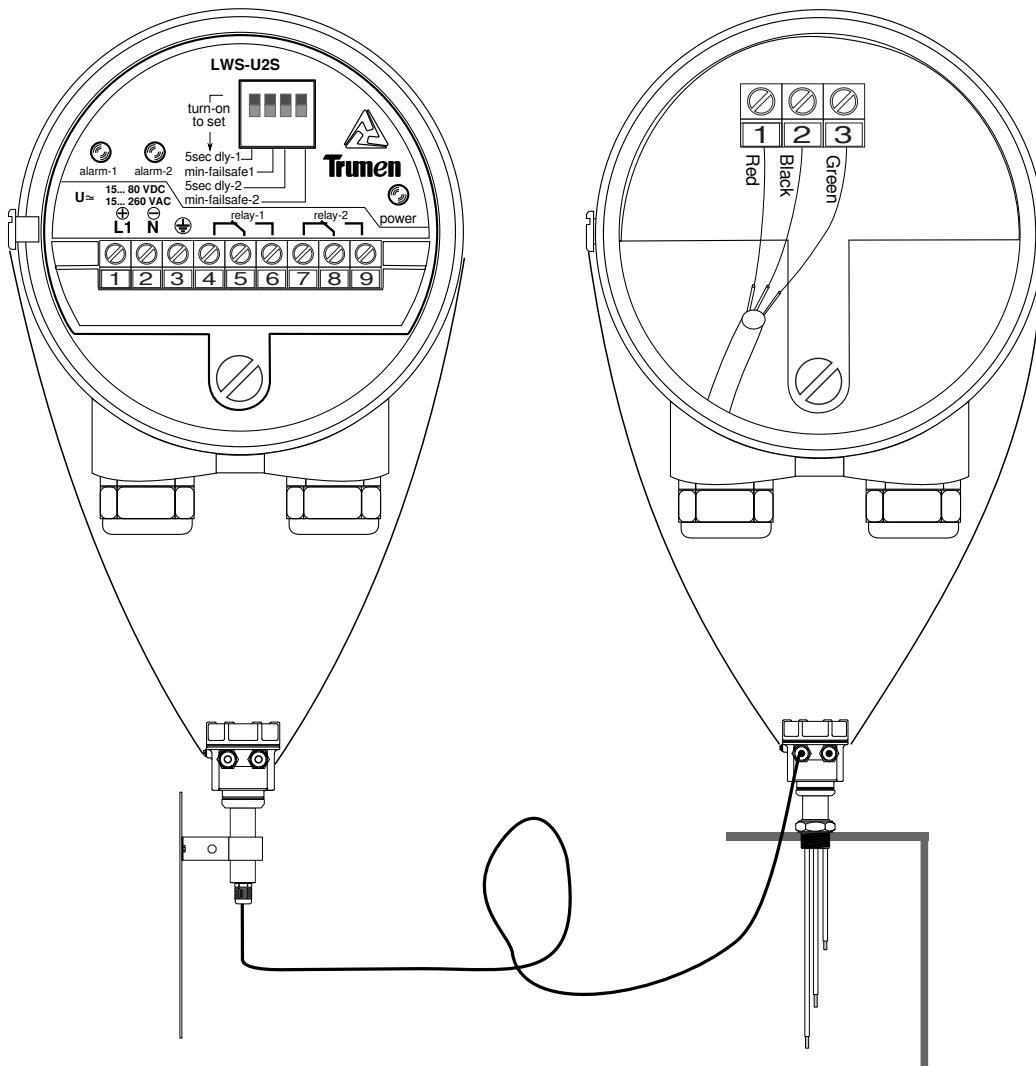
electrical connections (AC)



electrical connections (DC)



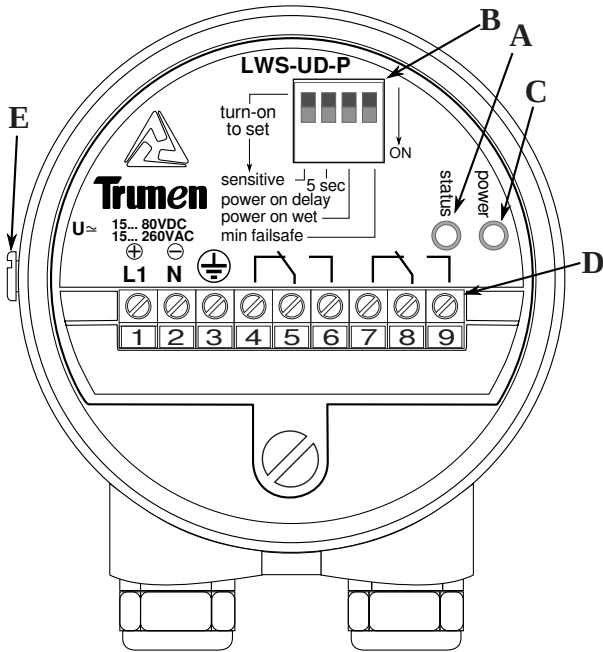
Remote probe connections for LWS-U2S (ERUSI)



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

Annexure-3

Introduction - LWS-UD-P (EIUDP / ERUDP)



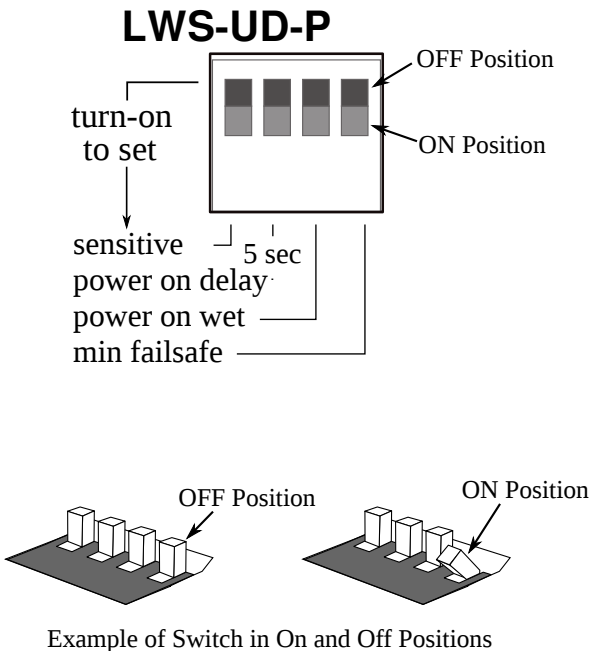
controls & indicators

- A Alarm Indicating LED
- B Configuration Switches
- C Power ON LED Indicator
- 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 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



- 1 sensitivity control switch
 - switch 1 - Off = "Normal" for high conductive liquids (the resistance of water / liquid up to max 26k Ω)
 - switch 1 - On = "Sensitive" for low conductive liquids (the resistance of water / liquid between 26k Ω to 40k Ω)
- 2 power on delay switch
 - switch 2 - On = Whenever instrument power supply switch on
 - For 5 sec the instrument show normal status, there is no response from level side, after 5 sec instrument shows running status
 - switch 2 - Off = Delay will be 1 sec
- 3 power on wet switch
 - If level is in between high and low switch point and "power on wet" switch is
 - On = Whenever instruments power supply switch on, the level is considered high till it goes lower than low switch point
 - Off = Whenever instruments power supply switch on, the level is considered low till it goes above high switch point.
- 4 minimum failsafe select switch
 - switch Off = Maximum failsafe, instrument gives alarm when water / liquid touches the

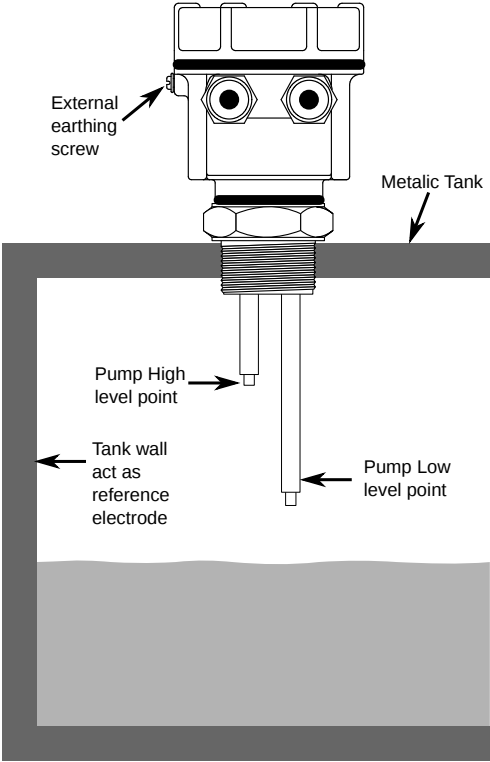
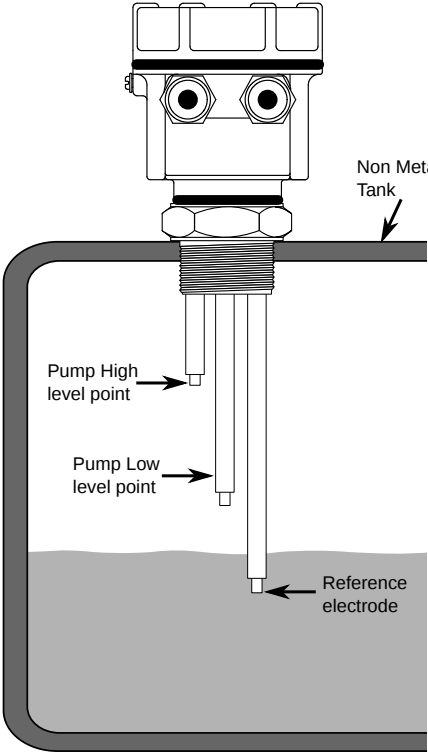
switch On = high level probe ←
= minimum failsafe, instrument gives alarm when water / liquid level goes below to the low level probe

Annexure-3

Probe Variants - LWS-UD-P (EIUDP / ERUDP)

There are two types of probe used for pump control / differential level switching:

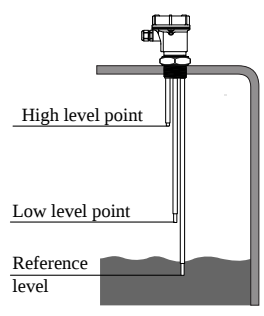
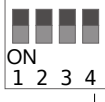

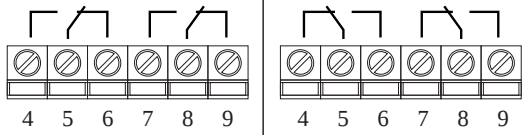


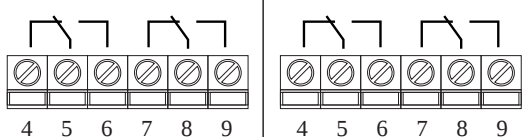
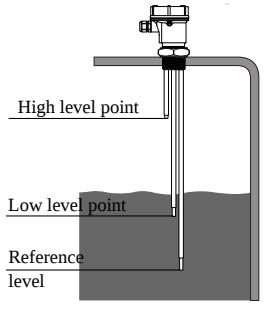
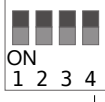

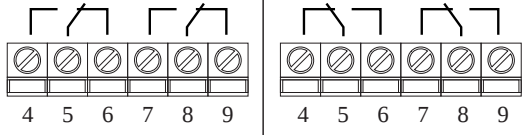


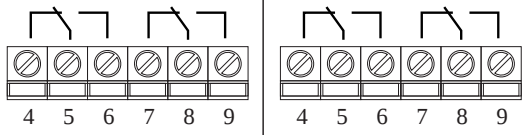
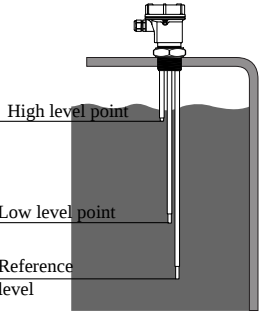


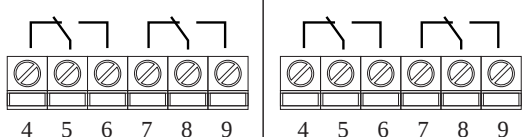
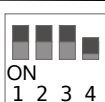

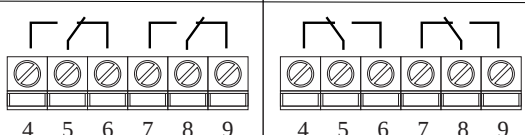
1. 2 in 1 probe (1. High level rod / rope probe 2. Low level rod / rope probe)
2. 3 in 1 probe (1. High level rod / rope probe 2. Low level rod / rope probe)
3. Reference electrode (rod / rope)

2 in 1 Probe	3 in 1 Probe
 <p>External earthing screw</p> <p>Metalic Tank</p> <p>Pump High level point</p> <p>Tank wall act as reference electrode</p> <p>Pump Low level point</p>	 <p>Non Metalic Tank</p> <p>Pump High level point</p> <p>Pump Low level point</p> <p>Reference electrode</p>
<p>2 in 1 rod / rope probe is used where process tank is metallic or there is any fitting constraint in tank. In this case make sure process connection (thread / flange) must be galvanically connected with the metallic tank wall because tank wall is the reference electrode in this case. External earthing connection between earthing screw and metallic tank wall is recommended.</p>	<p>3 in 1 rod / rope probe can be used in any type of process tank, metallic or non metallic because reference electrode with both sense electrode is already available in the probe. In this case reference electrode is always merged in conductive liquid.</p>

Annexure-3

Operation Matrix - LWS-UD-P (EIUDP / ERUDP)

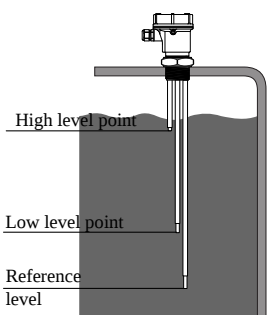
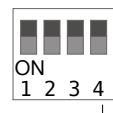

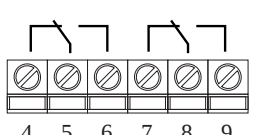
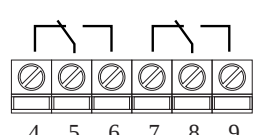


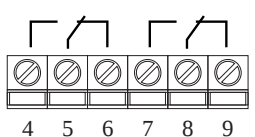
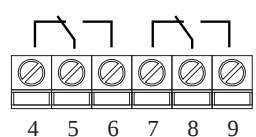
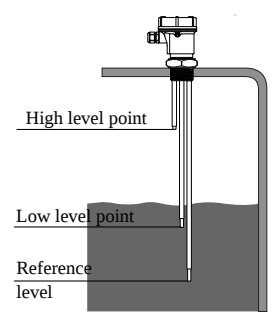
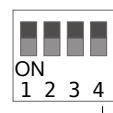

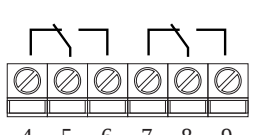
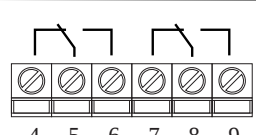


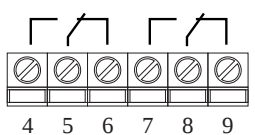
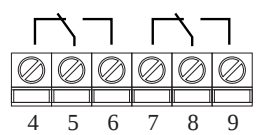
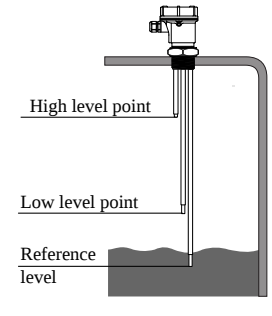
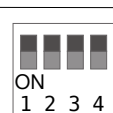

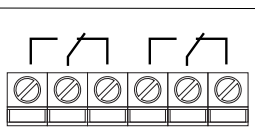
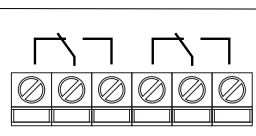
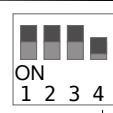

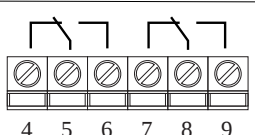
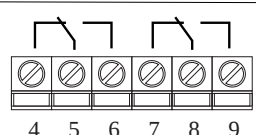
This model is suitable for pump control operation between high level & low level. It means when there is no material in tank and filling pump is on then pump will be off when material touches the high level probe and will be on when material goes below to the low level probe. Failsafe defines that alarm and power failure / device failure conditions are same to the external system. Failsafe operation is best understood with the type of installation. Power off condition will provide alarm.

Status LED and Relay Contacts during material filling in the tank					
Material & Installation	Material Status	Failsafe Setting	Status LED	DPDT Relay Contacts	
				Power ON	Power OFF
 <p>High level point</p> <p>Low level point</p> <p>Reference level</p>	Material is below the low level.	 <p>min failsafe</p> <p>Switch no. 4 is off, maximum failsafe. (high level alarm)</p>	 Off Normal or healthy status.	 <p>Relay 'ON' normal or healthy contacts.</p> <p>Relay 'OFF' alarm contacts. (due to power failure)</p>	
		 <p>min failsafe</p> <p>Switch no. 4 is on, minimum failsafe. (low level alarm)</p>	 On Alarm status.	 <p>Relay 'OFF' alarm contacts.</p> <p>Relay 'OFF' alarm contacts. (as it is)</p>	
 <p>High level point</p> <p>Low level point</p> <p>Reference level</p>	Material is above the low level but below the high level.	 <p>min failsafe</p> <p>Switch no. 4 is off, maximum failsafe. (high level alarm)</p>	 Off Normal or healthy status because material is not reached at high level point.	 <p>Relay 'ON' normal or healthy contacts.</p> <p>Relay 'OFF' alarm contacts. (due to power failure)</p>	
		 <p>min failsafe</p> <p>Switch no. 4 is on, minimum failsafe. (low level alarm)</p>	 On Alarm status because material is not reached at high level point.	 <p>Relay 'OFF' alarm contacts.</p> <p>Relay 'OFF' alarm contacts. (as it is)</p>	
 <p>High level point</p> <p>Low level point</p> <p>Reference level</p>	Material is above the high level.	 <p>min failsafe</p> <p>Switch no. 4 is off, maximum failsafe. (high level alarm)</p>	 On Alarm status because material touched to high level point. (high level alarm)	 <p>Relay 'OFF' alarm contacts.</p> <p>Relay 'OFF' alarm contacts. (as it is)</p>	
		 <p>min failsafe</p> <p>Switch no. 4 is on, minimum failsafe. (low level alarm)</p>	 Off Normal or healthy status because material touched to high level point. (low level alarm)	 <p>Relay 'ON' normal or healthy contacts.</p> <p>Relay 'OFF' alarm contacts. (due to power failure)</p>	

Annexure-3

Operation Matrix - LWS-UD-P (EIUDP / ERUDP)

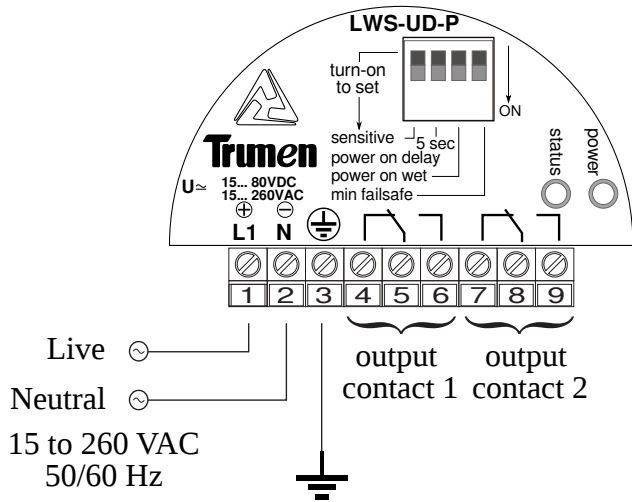
This model is suitable for pump control operation between high level & low level. It means when there is no material in tank and filling pump is on then pump will be off when material touches the high level probe and will be on when material goes below low level probe. Failsafe defines that alarm and power failure / device failure conditions are same to the external system. Failsafe operation is best understood with the type of installation. Power off condition will provide alarm.

Status LED and Relay Contacts during material draining from the tank					
Material & Installation	Material Status	Failsafe Setting	Status LED	DPDT Relay Contacts	
				Power ON	Power OFF
 <p>High level point</p> <p>Low level point</p> <p>Reference level</p>	Material is above the high level.	 <p>min failsafe</p> <p>Switch no. 4 is off, maximum failsafe. (high level alarm)</p>	 On Alarm status. (High level alarm)	 <p>Relay 'OFF' alarm contacts.</p>	 <p>Relay 'OFF' alarm contacts (as it is)</p>
		 <p>min failsafe</p> <p>Switch no. 4 is on, minimum failsafe. (low level alarm)</p>	 Off Normal or healthy status. (Low level alarm)	 <p>Relay 'ON' normal or healthy contacts.</p>	 <p>Relay 'OFF' alarm contacts. (due to power failure)</p>
 <p>High level point</p> <p>Low level point</p> <p>Reference level</p>	Material is below the high level but above the low level.	 <p>min failsafe</p> <p>Switch no. 4 is off, maximum failsafe. (high level alarm)</p>	 On Alarm status because material is not goes below to low level point (high level alarm)	 <p>Relay 'OFF' alarm contacts.</p>	 <p>Relay 'OFF' alarm contacts (as it is)</p>
		 <p>min failsafe</p> <p>Switch no. 4 is on, minimum failsafe. (low level alarm)</p>	 Off Normal or healthy status. because material is not goes below to low level point (low level alarm)	 <p>Relay 'ON' normal or healthy contacts.</p>	 <p>Relay 'OFF' alarm contacts. (due to power failure)</p>
 <p>High level point</p> <p>Low level point</p> <p>Reference level</p>	Material is below the low level.	 <p>min failsafe</p> <p>Switch no. 4 is off, maximum failsafe. (high level alarm)</p>	 Off Normal or healthy status. because material is at below to low level point (high level alarm)	 <p>Relay 'ON' normal or healthy contacts.</p>	 <p>Relay 'OFF' alarm contacts. (due to power failure)</p>
		 <p>min failsafe</p> <p>Switch no. 4 is on, minimum failsafe. (low level alarm)</p>	 On Alarm status because material is at below low level (low level alarm)	 <p>Relay 'OFF' alarm contacts.</p>	 <p>Relay 'OFF' alarm contacts (as it is)</p>

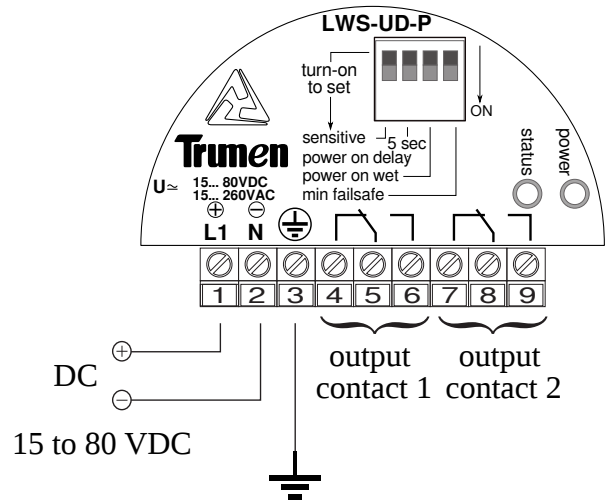
Annexure-3

Electrical Connections - LWS-UD-P (EIUDP / ERUDP)

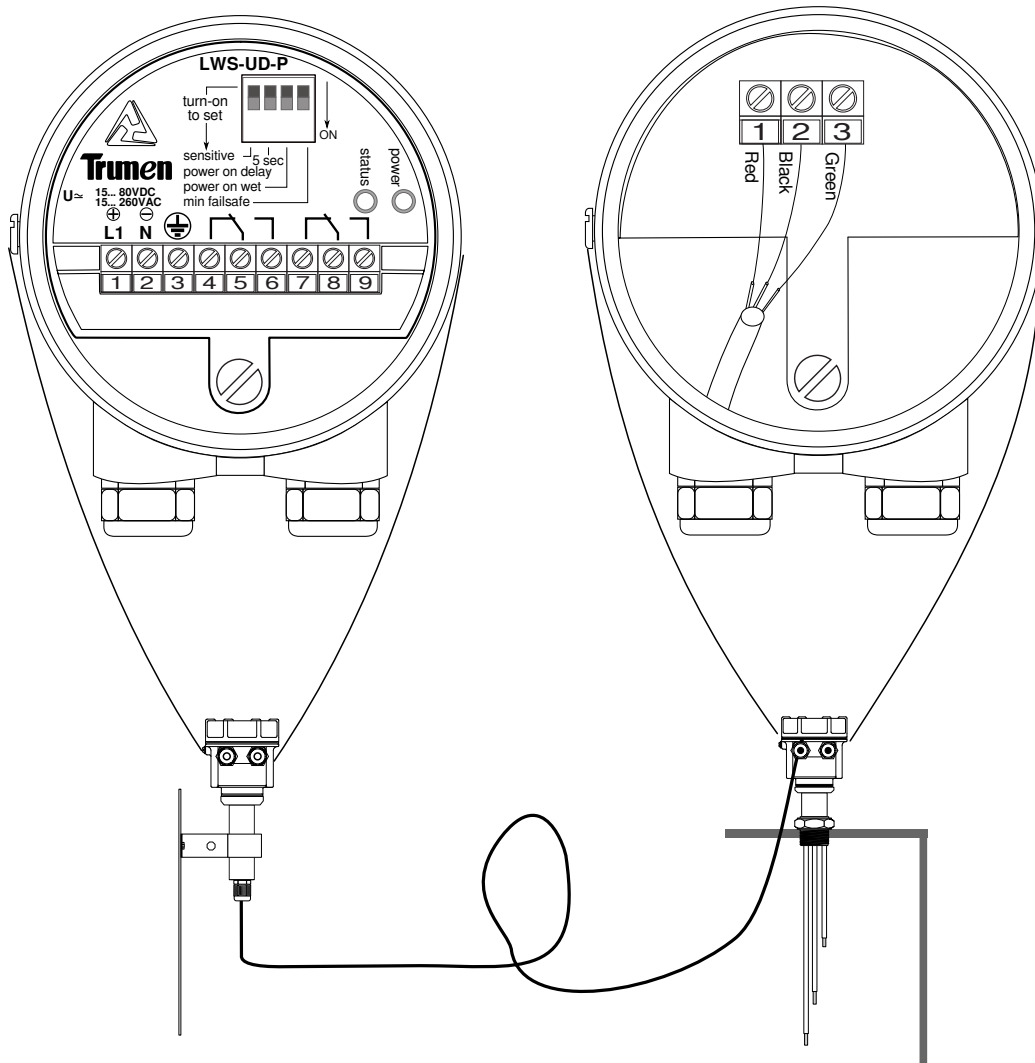
electrical connections (AC)



electrical connections (DC)



Remote probe connections for LWS-UD-P (ERUDP)



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