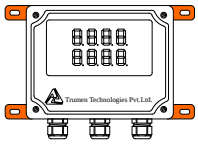
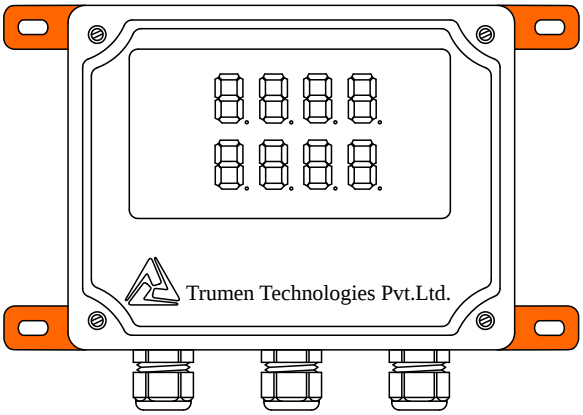
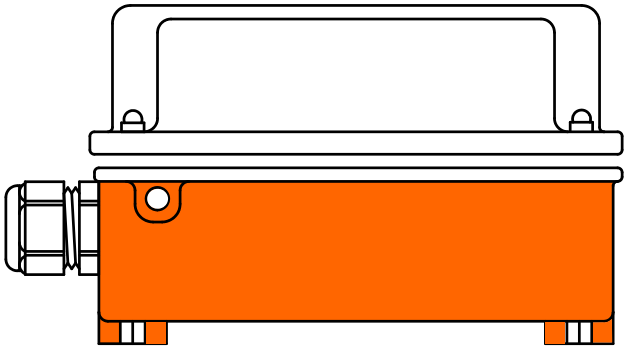


ICT2
Level Indicator
Controller and Transmitter

Trumen®
sensing matters

Instruction Manual





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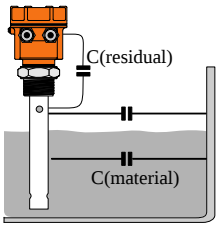
List of content

Operating Principle

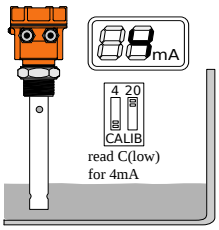


The probe forms a capacitance with the metalic tank-wall.
The capacitance is sum of three capacitance:-

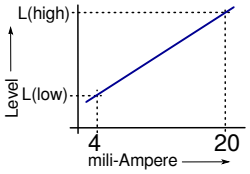
C(air)=ε(air) x P x (H-L)
C(material)=ε(material) x P x L
C(residual) is due to device itself.

Where ε(air) is the dielectric constant of air ≈1.
ε(material) is dielectric constant of material.
P is the constant of probe and installation, H is the active length of probe and L is the level of material.

Capacitance to level translation is performed with the aid of on-site calibration also called "wet-calibration".



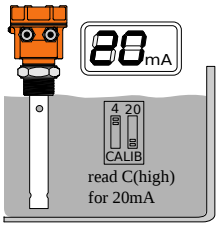
The device stores a low level capacitance as level for 4mA and high level capacitance as level for 20mA as defined by the user.



Using these values and following equation

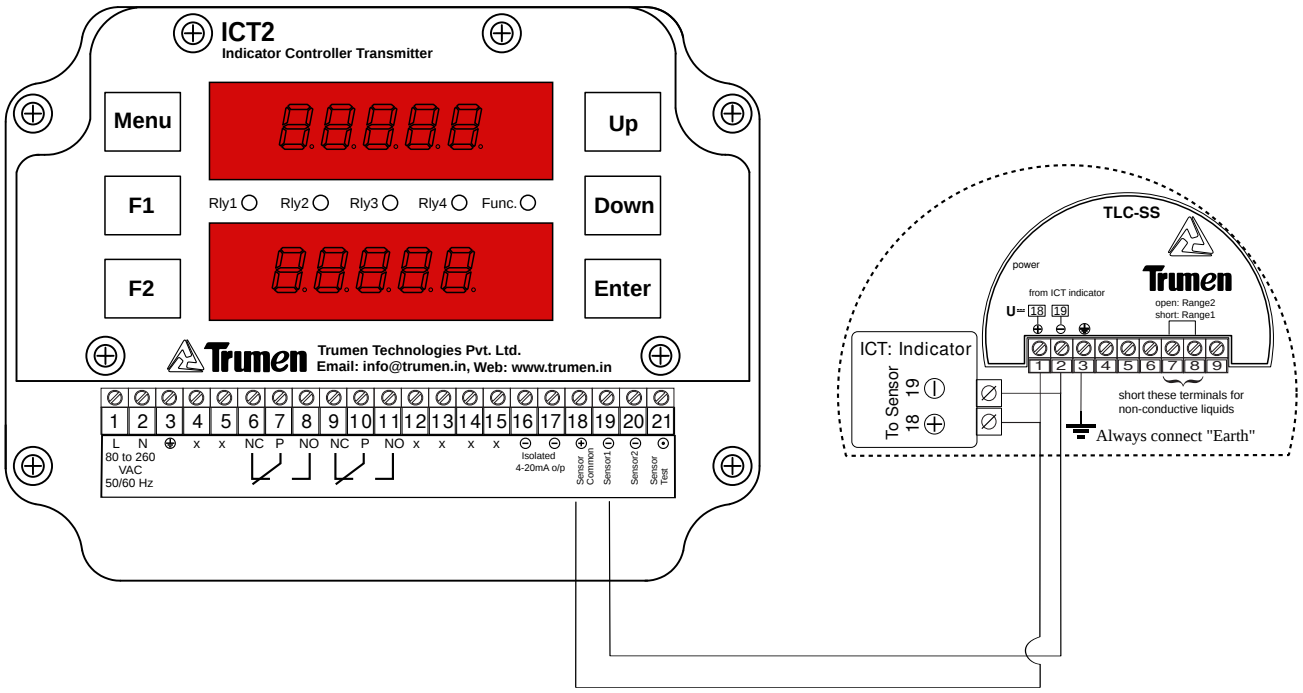
$$L(high)\ L(low) = \frac{C(high)\ C(low)}{P \times \{\varepsilon(material)\ \varepsilon(air)\}}$$

device creates a chart of level to 4-20mA translation.

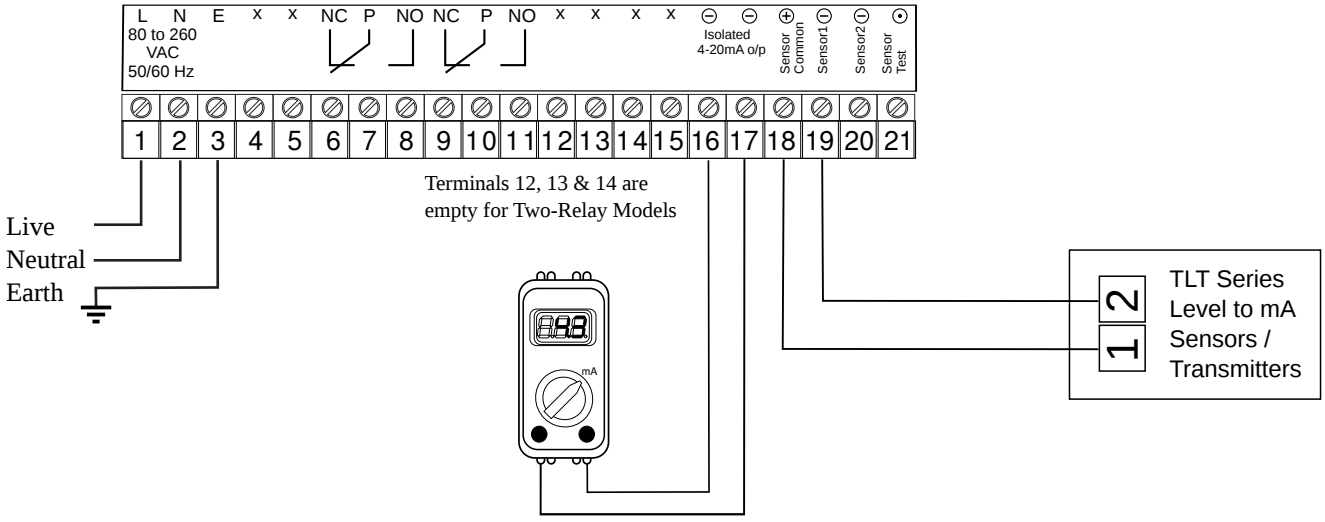


Connection Diagram

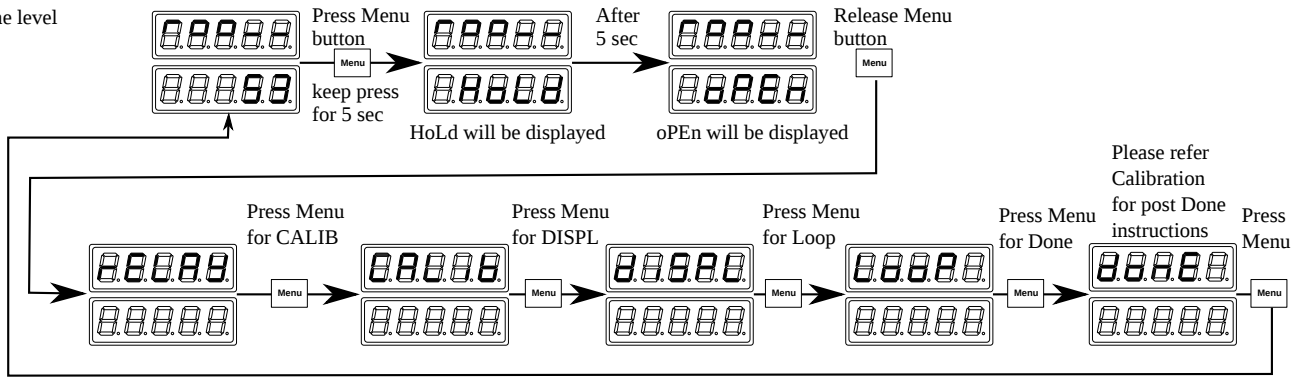
Front Panel View



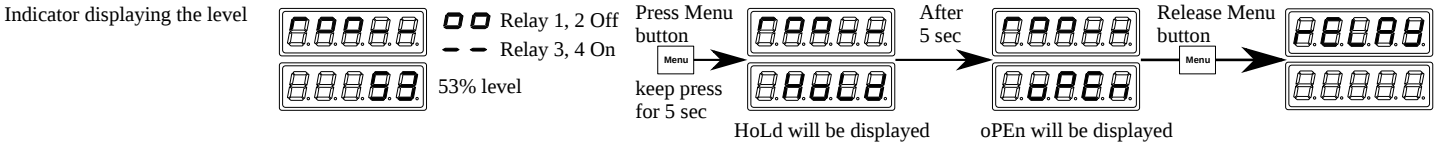
Connection Diagram

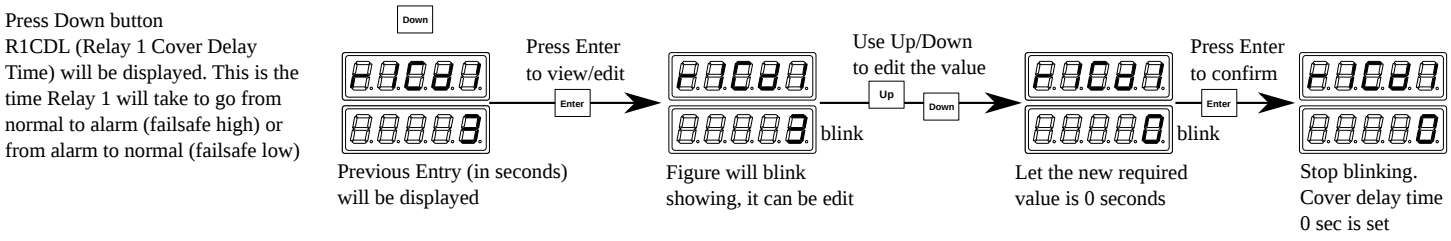


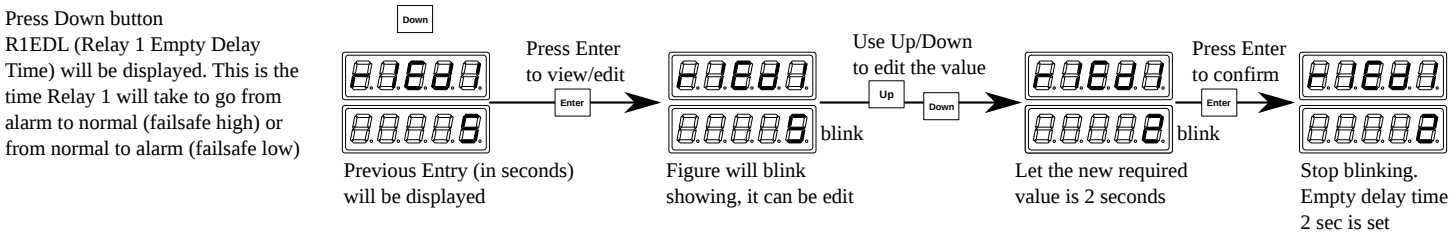
Menu

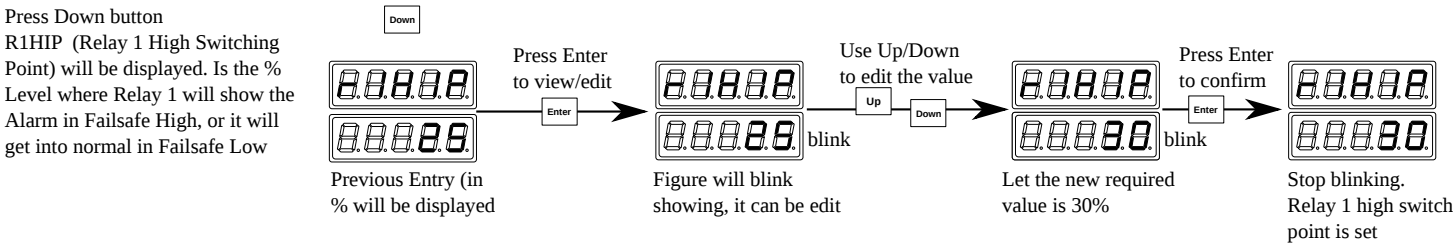


Relay Configuration



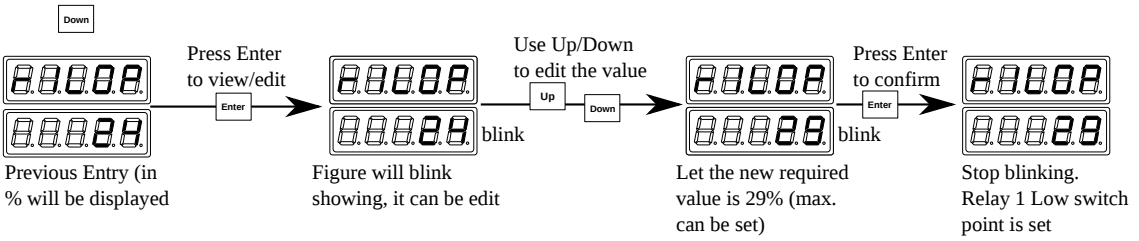




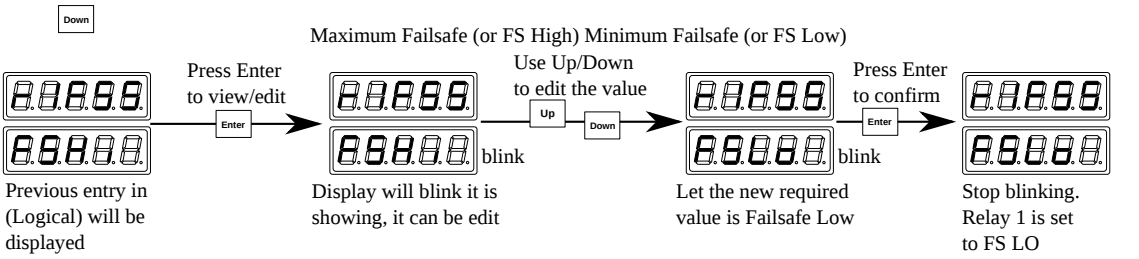


Menu

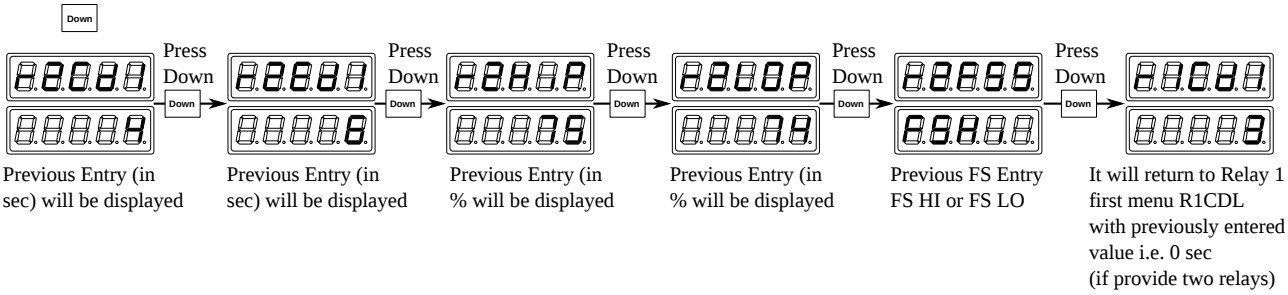
Press Down button
R1LOP (Relay 1 Low Switching Point) will be displayed. Is the % Level where Relay 1 will show the Normal in Failsafe High, or it will get into alarm in Failsafe Low



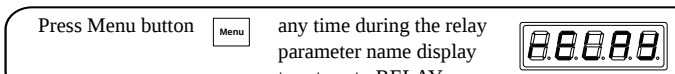
Press Down button
R1FSS (Relay 1 Filsafe Selection) will be displayed. Failsafe settings define how the level is converted to Alarm or Normal. If Failsafe selection is High than level higher than or equal to high switching point causes Alarm. For Failsafe Low the level lesser than or equal to low switching point causes Alarm.



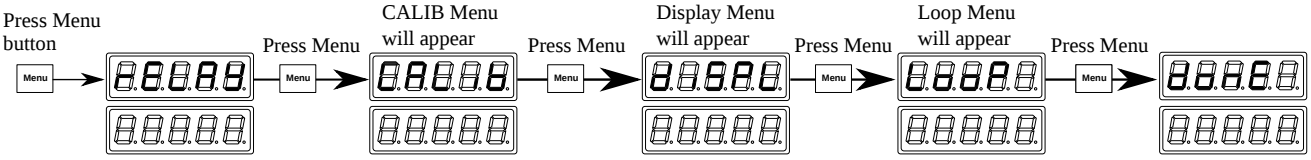
Press Down button
All the above 5 menus will be repeated for Relay 2, 3 & 4 now. The editing method and meaning will same as that of Relay 1



Press Menu button Menu any time during the relay parameter name display to return to RELAY menu

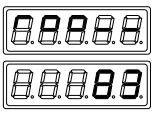


When Relay Configuration setting is over



Calibration

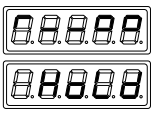
Indicator displaying the level relay status and level
- Relay 1, 2 OFF
- Relay 3, 4 ON



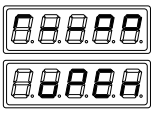
Press Menu button and keep press for 5 sec

Menu

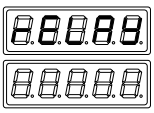
During 5 sec display will show HoLd



After 5 sec display will show oPEn



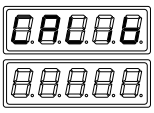
Release Menu button RELAY Menu will be displayed



Press Menu button

Menu

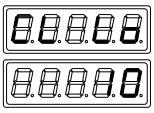
CALIB (Calibrate) will be displayed



Press Down button

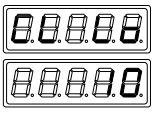
Down

CL LO (Calibrate Low Level) will be displayed
Previuos Low Level value in % will be displayed



Press Enter button

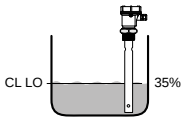
Enter



Blinking

Before change this value make sure the level in tank is lesser than 40%

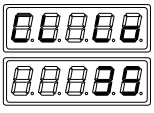
Let the actual level is 35%



Press (Up / Down) button to change the previous value to the required actual level i.e. 35%

Up

Down

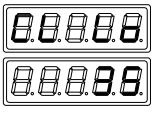


Blinking

Press Enter button

Enter

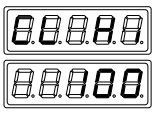
For a moment display will show HoLd then stable updated value automatically will be displayed.



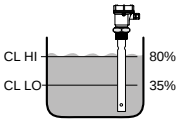
Press Down button

Down

CL Hi (Calibrate High Level) will be displayed.
Previuos High Level value in % will be displayed



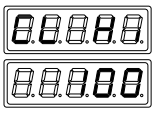
Before going further, make sure that a higher level is reached.
Let the actual level is 80%



Press Enter button

Enter

Previuos High Level value start blinking shows it can be changed

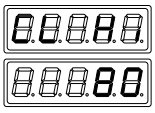


Blinking

Press (Up / Down) button to change the previous value to the required actual value i.e. 80%

Up

Down

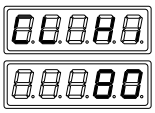


Blinking

Press Enter button

Enter

For a moment display will show HOLD then stable updated value automatically will be displayed.



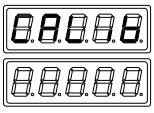
Stable Reading

Level HI / LO calibration is over

Press Menu button

Menu

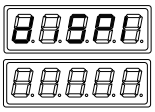
CALIB (Calibrate) will be displayed



Press Menu button

Menu

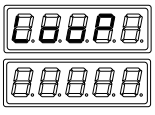
DISPL (Display) will be displayed. It is Shows the Update, Full Value as well as Base Value.



Press Menu button

Menu

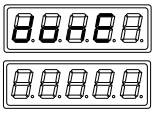
Loop will be displayed.
4mA & 20mA trimming can be done here.



Press Menu button

Menu

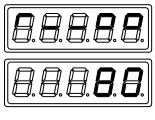
donE will be displayed.



Press Enter button

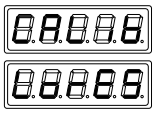
Enter

Indicator will come out of calibration mode and running level position will be displayed



If calibration was wrong then following message might appear

LORES will be displayed

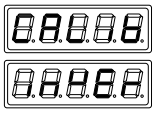


The controller has calculated that there is not enough capacitance change to show stable reading.

Probable causes: 1- Very low dielectric service material having too shorter probe length

2- Calibration has been done at about same level position

INVERT will be displayed

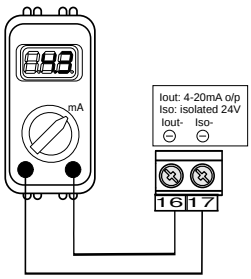


Low level was higher then the High level.
The INVER is asking for re-calibration as this is an error and level can not be displayed with this calibration.

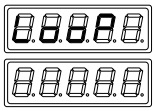
Press Menu button for 5 sec and re-calibration can be started now.

Loop Output Trimming (4-20mA loop and 4mA and 20mA Correction)

Following connection along with a multi-meter capable of mA measurement is needed.



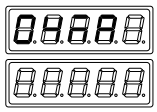
Entry for Loop Output Trimming Menu is when display is indicating LooP text

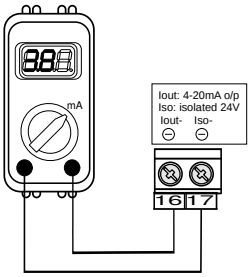


Press Down button

Down

Display indicates 4mA
This means that 4mA value can be trimmed by pressing UP (increase) or Down (decrease) buttons

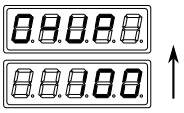




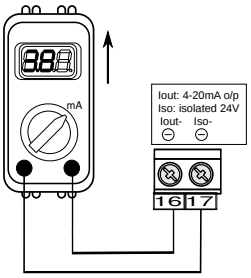
If reading in multimeter is less or more then 4.0mA and it is needed to change, it can be achieved by pressing UP & Down buttons

Press Up button for increase

Display will show 04UP with no. of counts increasing as 'UP' kept pressed

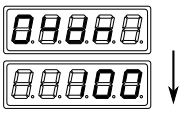


Reading in multimeter will go up as UP button kept pressed



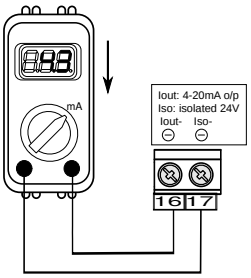
Press Down button for decrease

Display will show 04dn with no. of counts decreasing as 'Down' kept pressed



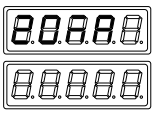
Reading in multimeter will go down as down button kept pressed

As soon as desired 4mA value is achieved release UP / Down button



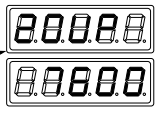
Press Enter button

Display will show 20mA

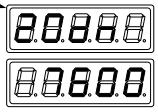


Multimeter will show 20mA.
If this reading also needed to change, it can be achieved by pressing UP & Down buttons as described above

Up



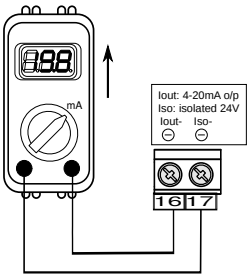
Down

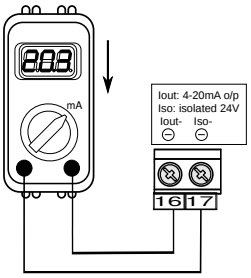


Reading in multimeter will go up as UP button kept pressed

Reading in multimeter will go down as down button kept pressed

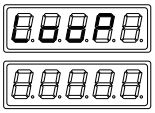
As soon as desired 20mA value is achieved release UP / Down button





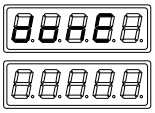
Press Enter button

Display will show LooP again



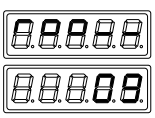
Press Menu button

Display will show done



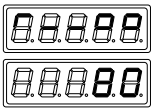
Press Enter to confirm the changes

Current level position will be Displayed



Display Menu & Settings

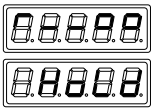
Indicator displaying the level



Press Menu button

Menu

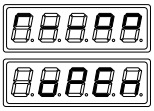
Keep press for 5 sec.
During 5 sec display
will show HoLd



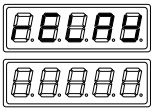
Press Menu button

Menu

After 5 sec display will
show oPEn



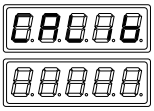
Release Menu button
RELAY Menu will be
displayed



Press Menu button

Menu

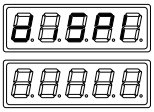
CALIB (Calibrate)
will be displayed



Press Menu button

Menu

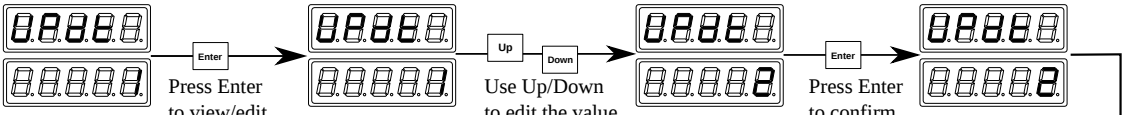
DISPL (Display)
will be displayed



Press Down button

Down

UPdt (Update) will be
displayed. Damping Rate
(Rate of Reading Update)
if readings are fluctuating,
increase this number
default value is 1.
Can be changed (1 to 100)



Previous entry will be displayed

Press Enter to view/edit

Value will start blinking indicates, it can be changed

Use Up/Down to edit the value

Let the new required value is 2

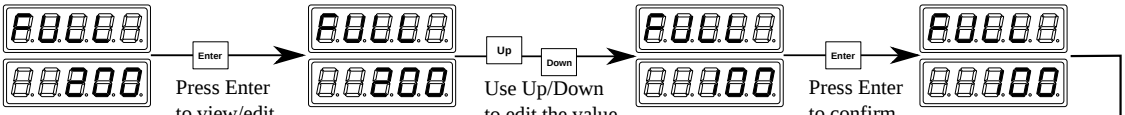
Press Enter to confirm

Value stop blinking

Press Down button

Down

FULL (Full) will be displayed
with previous entered value.
This is the value which the
display show for the level.
Default value is 100 for 100%
indication. Can be increased upto
10000 if required. (20mA of will
correspond to this full value)



Press Enter to view/edit

Value will start blinking indicates, it can be changed

Use Up/Down to edit the value

Let the new required value is 100

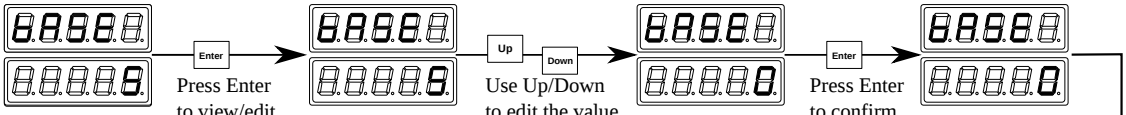
Press Enter to confirm

Value stop blinking

Press Down button

Down

bASE (Base) will be
displayed with previous entered
value. Set the Base value for
level is 0. It can be calibrate
any where on the tank.
(4mA will correspond to this
Base value)



Press Enter to view/edit

Value will start blinking indicates, it can be changed

Use Up/Down to edit the value

Let the new required value is 0

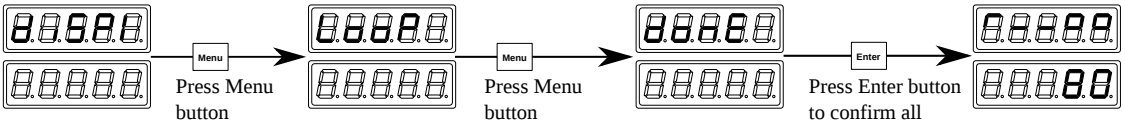
Press Enter to confirm

Value stop blinking

Press Menu button

Menu

diSPL (Display) menu
will appear again



Press Menu button

Press Menu button

Loop menu will be displayed 4mA & 20mA trimming can be done here

Done will be displayed

Press Enter button to confirm all above display settings

Current level position will be displayed

Failsafe Operation

Failsafe operation means that Alarm and Power Failure or Instrument Failure conditions are same. This indicator controller has provision for 4 Relay for 4 different level switching. 2 relays are provided built in with indicator controller and 2 relays are optional or customer requirement.

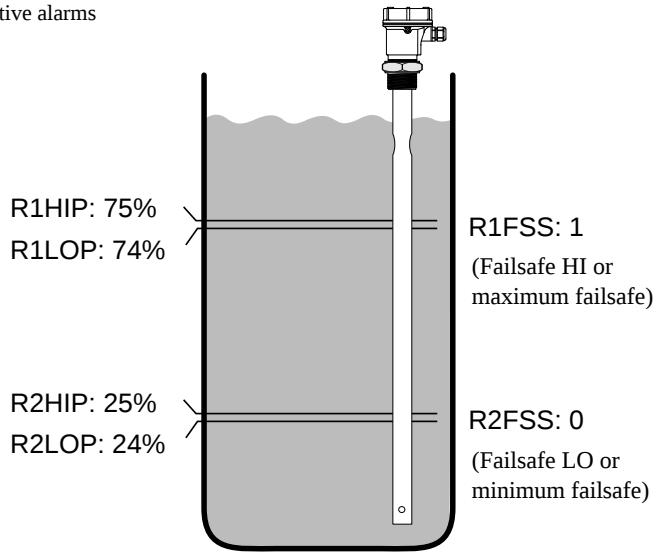
In illustration on the right, let in a given application it is required to provide two distinctive alarms when tank is

1. Over Filled
2. Over Emptied.

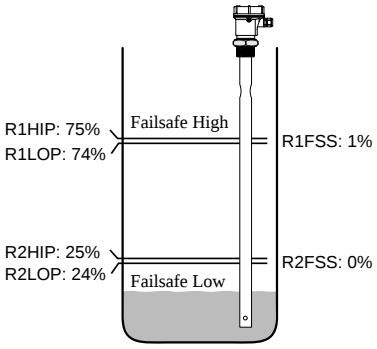
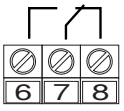
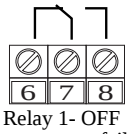
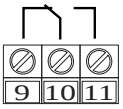
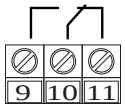
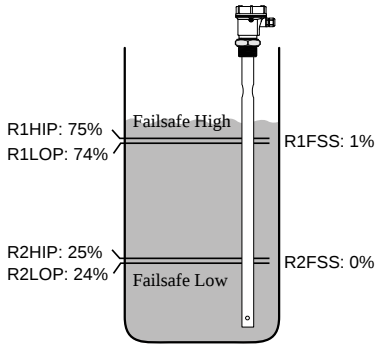
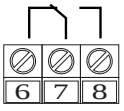
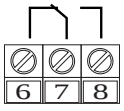
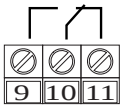
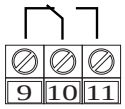
Then in first case, let Relay 1 is used. This relay will have the two parameters R1HIP and R1LOP placed at 1% difference (this difference can be adjusted at any %). When Level go to more than or equal to 75%, Relay 1 must give the alarm and when Level is less than or equal to 74%, Relay 1 must go out of the alarm.

Then in second case, let Relay 2 is used. This relay will have the two parameters R2HIP and R2LOP placed at 1% difference (this difference can be adjusted at any %). When Level go to less than or equal to 25%. Relay 2 must give the alarm and when Level is more than or equal to 24%, Relay 2 must go out of the alarm.

The Failsafe Select Parameter R1FSS should be selected 1 (Failsafe High or Maximum Failsafe) and the R2FSS for Relay 2 should be selected 0 (Failsafe Low or Minimum Failsafe)

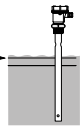
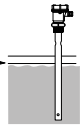


Operation Matrix

Material Status	Relay 1			Relay 2		
	Power ON		Power OFF	Power ON		Power OFF
	Alarm LED & Level Status	Relay Contacts	Relay Contacts	Alarm LED & Level Status	Relay Contacts	Relay Contacts
	● LED: OFF Normal	 Relay 1- ON	 Relay 1- OFF (due to power failure)			
				 LED: ON Alarm	 Relay 2 OFF	 Relay 2 - ON (as it is)
	 LED: ON Alarm	 Relay 1- OFF	 Relay 1- OFF (as it is)			
				● LED: OFF Normal	 Relay 2 - ON	 Relay 2 - OFF (due to power failure)

It should be noted that, the Relay contacts during alarm are same as that during power fail / device turned off.

Relay Operation Delay Timings

	Liquid Level	Failsafe Setting	Delay Applicable	Status Before Delay	Status After Delay
Cover delay is time from: normal to alarm (failsafe high) alarm to normal (failsafe low) -when material is more than or equal to High set point		Failsafe High (1)	r1Cdl : for Relay 1	● LED: OFF Normal	 LED: OFF Alarm
		Failsafe Low (0)	r2Cdl : for Relay 2	 LED: ON Alarm	● LED: OFF Normal
Uncover delay is time from: alarm to normal (failsafe high) normal to alarm (failsafe low) -when material is less than or equal to Low set point		Failsafe High (1)	r1Edl : for Relay 1	 LED: ON Alarm	● LED: OFF Normal
		Failsafe Low (0)	r2Edl : for Relay 2	● LED: OFF Normal	 LED: ON Alarm