

**INSTRUCTION MANUAL
FOR
ULTRASONIC LEVEL
TRANSMITTER
MODEL NO.: ULT 200H**

Authorised Dealer



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1.INTRODUCTION

APPLICATION :

The 2-wire ultrasonic level transmitters are excellent tool for level measurement. Level measurement principle is based on the non contacting type technology. Non contacting type technology offers low maintainance. It is mainly suitable for application, where no physical contact can be established between level transmitter and surface of liquid which is to be measured.

PRINCIPAL OF OPERATION :

- 1) Ultrasonic level metering technology is based on principle of measuring the time required for ultrasonic pulse to travel from sensor to surface of liquid and return back.
- 2) The ultrasonic sensor emits an ultrasonic pulse train & receive the echoes reflected from liquid surface.
- 3) By calculating the time of flight the distance from transmitter base to the liquid surface is measured.

1) Minimum Measuring Distance: Minimum measuring distance is determined by the design of the unit within which the measurement is not possible (Dead band)

2) Maximum Measuring Distance : Maximum distance is the greatest distance which can be measured by the unit under ideal condition.

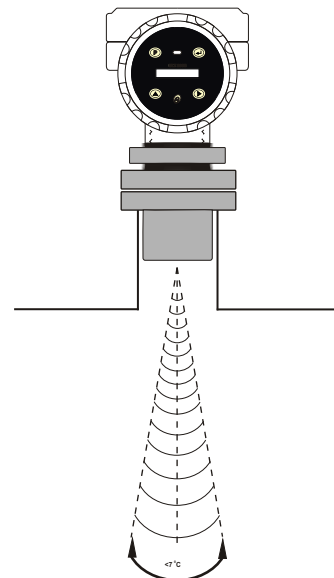
A) It measures level in cm (xxxx.x) from bottom of tank to sensor surface..

B) If transducer doesn't get reflected echo then display will show " No Echo". Also in dead band area display will show same message.

C) ULT-200H has programmable current output proportional to measured level.

BEAM ANGLE :

A total beam angle is $<7^{\circ}$.Further more, as a result of narrow beam angle the emitted ultrasonic signal have an outstanding focusing.



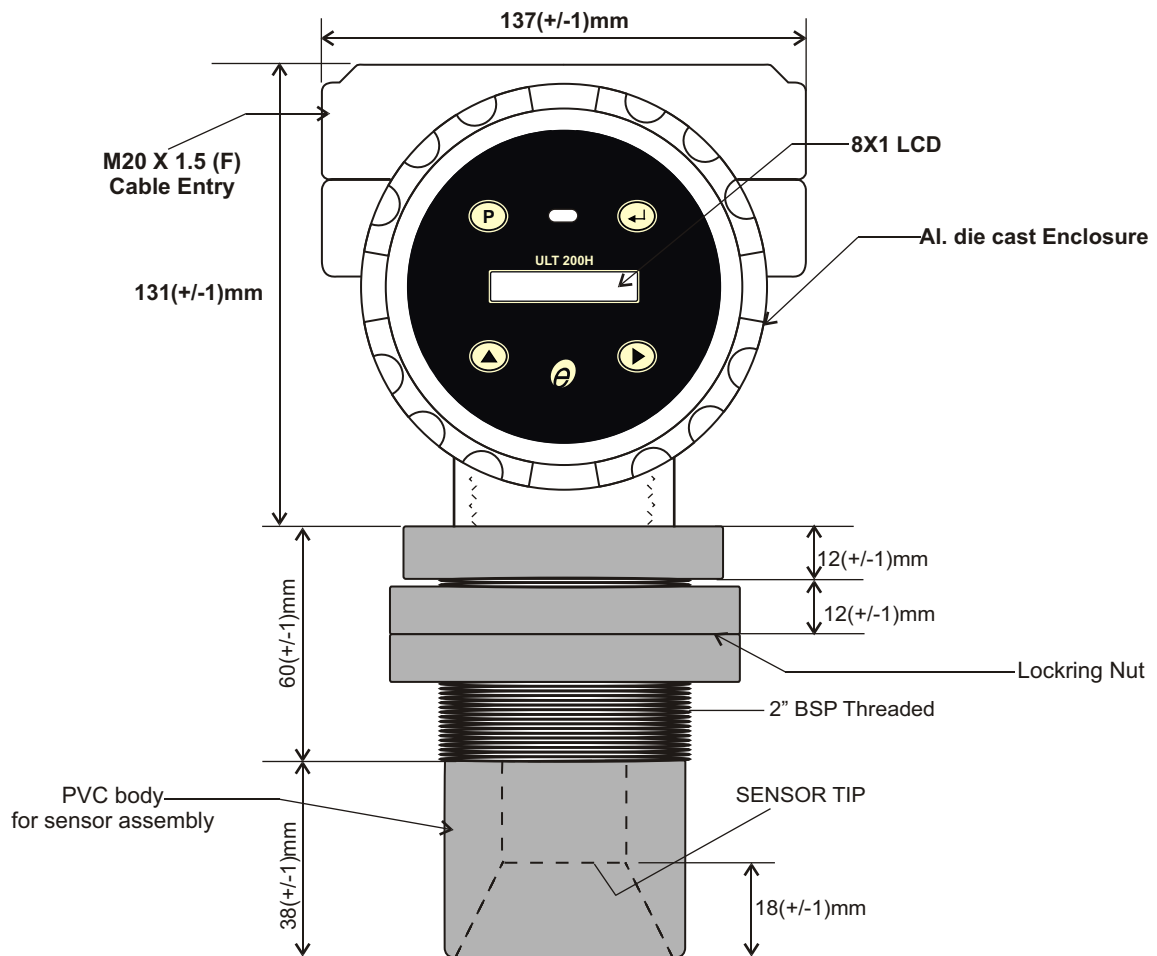
DEAD BAND :

This feature is common to all ultrasonic level transmitters. It is specified as a "Minimum measuring distance". Within this range distance can not be interpreted.





2. TECHNICAL SPECIFICATIONS

Instrument Name	: Ultrasonic Level Transmitter
Model No.	: ULT 200H
Serial No.	: -----
Sensor Type	: Piezoelectric
Measuring Range	: 0.6 to 1mtr.
Dead Band	: 60cm
Beam Angle	: <8 deg
Display	: 8 X 1 LCD
Accuracy	: +/- 0.25% of full scale
Power Supply	: 24V DC +/-1%
Output	: 4-20mA DC
Load Resistance	: 500W @ 24V DC
Measuring Frequency	: 25Khz
Enclosure Class	: Weatherproof IP65
Process connection	: 2" BSP (M) Threaded
Electrical connection	: M20 X 1.5 pitch (F)
Mounting	: Top of the Tank
Response Time	: < 500mSec
Operating Temperature	: -30 to 80 °C
Operating Pressure	: Atmospheric
Relative Humidity	: 5-95% Rh at 25°C
Enclosure Material	: Al. die cast

3. ASSEMBLY OVERVIEW



2.1. Keyboard key details:

- 
PROGRAM KEY : This key is used to toggle between Run mode and Program mode.
- 
INCREMENT KEY : This key is used to
 - 1) Increment the numerical value of any digit, from 0 to 9, by one at each time.
 - 2) Go to the next parameter in Program mode.
 - 3) To view liquid level, empty distance, Temperature in scrolling format.
- 
SHIFT KEY : This key is used to shift the cursor to the next digit.
- 
ENTER KEY : This key is used to validate the function or value of parameter.

3.2 Internal View :-

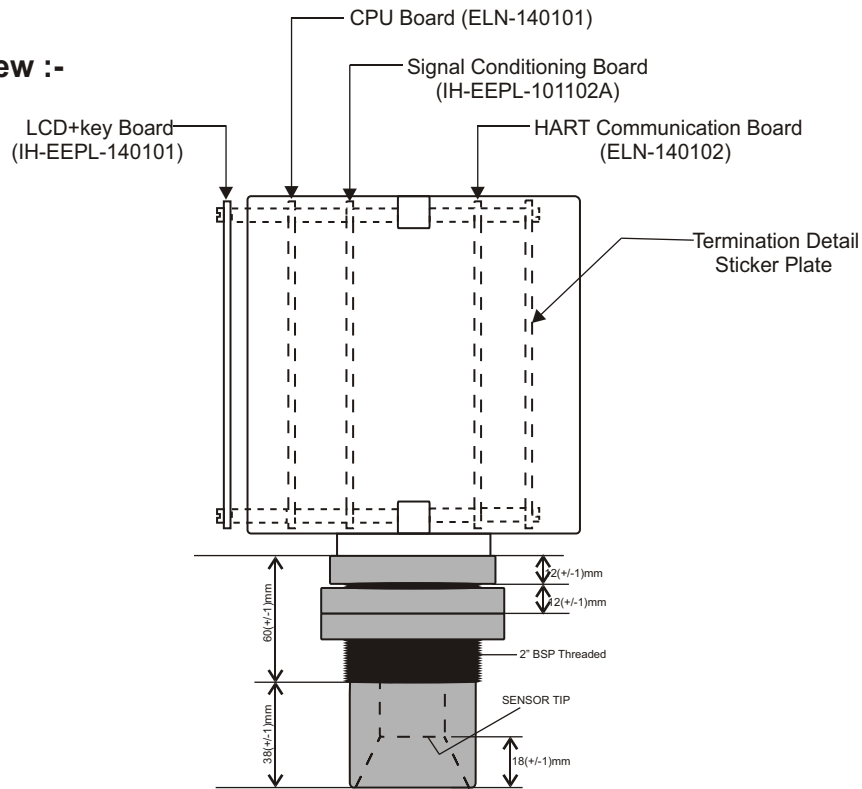
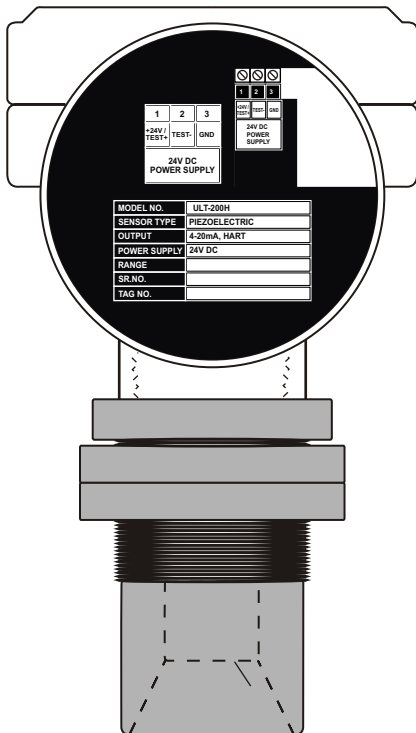


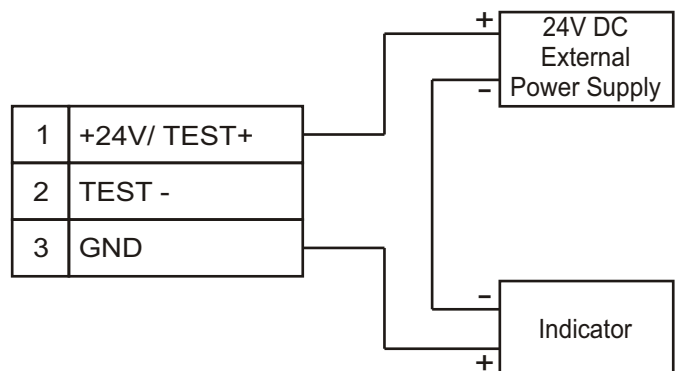
FIG.5. INTERNAL ASSEMBLY LAYOUT

3.3 Termination Details :-



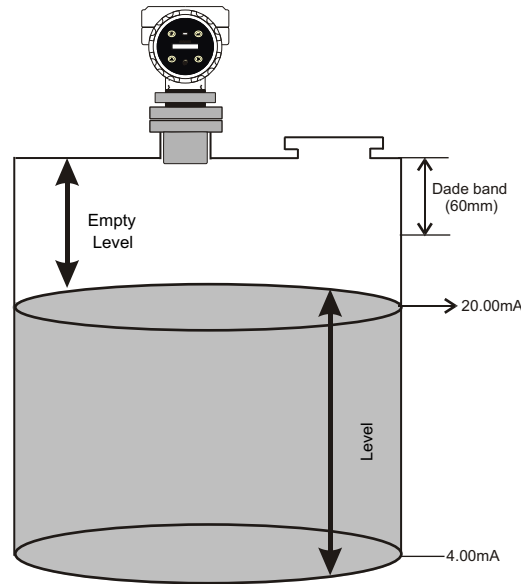
No.	Terminal Detail	Description
1	+24V/ TEST+	
2	TEST -	
3	GND	

3.3.1 Loop Diagram with Indicator :-



4. INSTALLATION

4.1 Typical Installation :



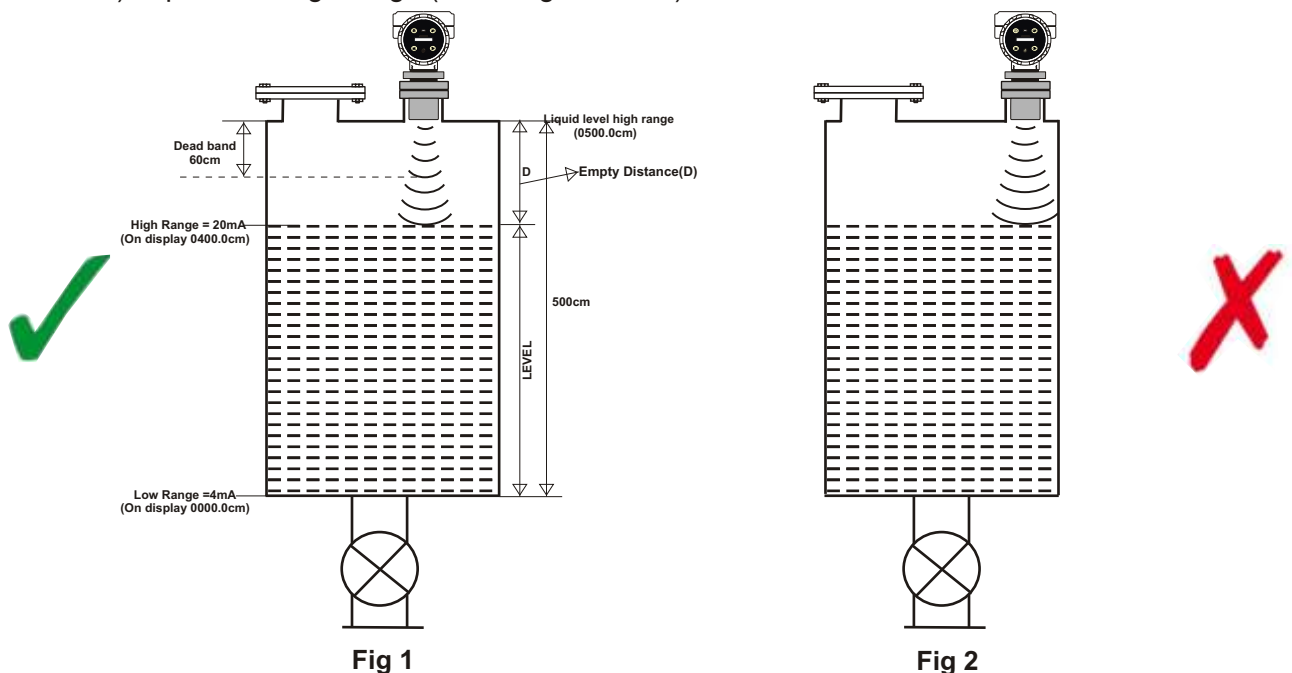
Operations :

The ultrasonic pulse is transmitted from the sensor. The pulse travels to the surface being monitored and is reflected from this surface back to the sensor. The ULT-200H calculates from the time of flight, the actual distance between the sensor & the surface.

4.2 Installation Positions:

Case-I :- Suppose tank height =500cm then for getting current of 20 mA at level 0400cm and for getting current of 4mA at level 0.0cm, configure low range & High range in following way.

- low range = 0000.0cm, High range = 0400.0cm.
- Low range (0000.0cm on display) corresponds to 4mA
- High range (0400.0cm on display) corresponds to 20mA
- D stands for distance from sensor tip to surface of liquid.(Empty Distance)
- Liquid level high range (lvlHRange=500cm)



- NOTE :**
- 1) Low & High Range related to current output .
 - 2) Total tank height is always equal to distance from sensor tip to bottom of tank.
 - 3) The Ultrasonic Beam should not touch the tank wall.
 - 4) Program Liquid Level High Range (lvlH Range) as total tank height i.e distance from sensor tip to bottom of tank.

Case-II :- Suppose tank height = 0500cm then for getting current of 4 mA at level 0400cm and for getting current of 20mA at level 0.0cm, configure low range & High range in following way.

- a) low range = 0400.0cm, High range= 000.0cm.
- b) High range (0000.0cm on display) corresponds to 20mA
- c) Low range (0400.0cm on display) corresponds to 4 mA
- d) D stands for distance from sensor tip to surface of liquid.(Empty Distance)
- e) Liquid level high range (lvlHRange=500cm)

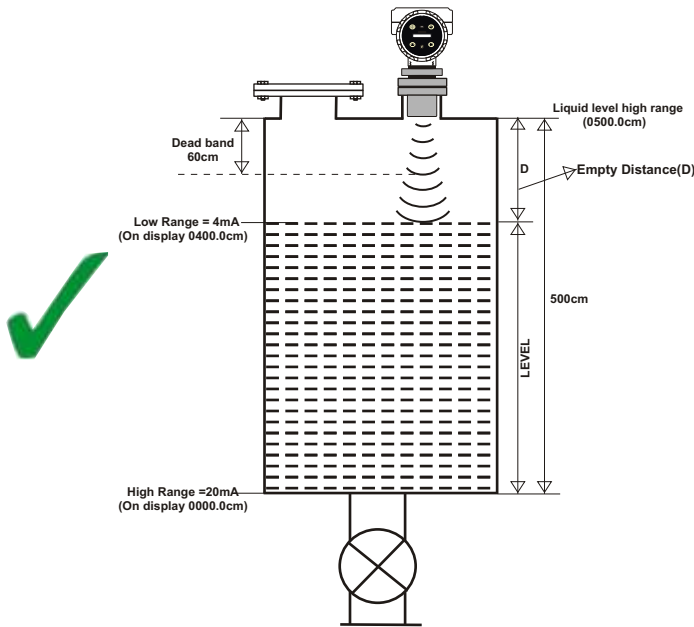


Fig 1

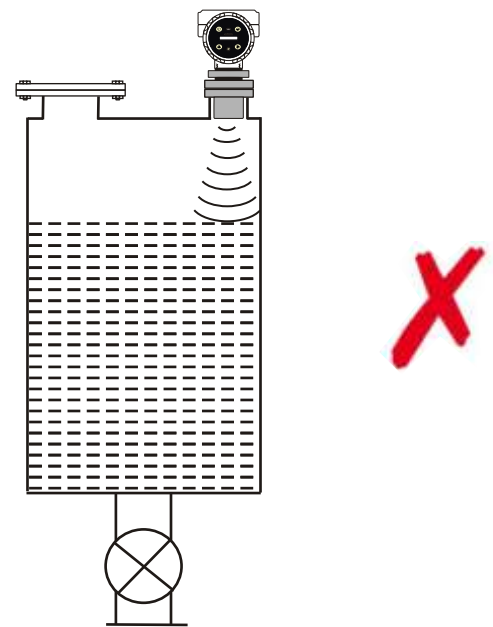


Fig 2

- NOTE :**
- 1) Low & High Range related to current output .
 - 2) Total tank height is always equal to distance from sensor tip to bottom of tank.
 - 3) The Ultrasonic Beam should not touch the tank wall.
 - 4) Program Liquid Level High Range (lvlH Range) as total tank height is distance from sensor tip to bottom of tank.

4.3 Sensor Alignment :

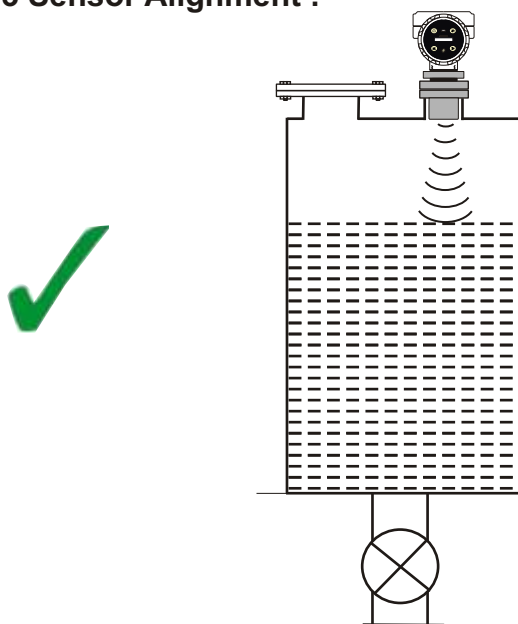


Fig 1

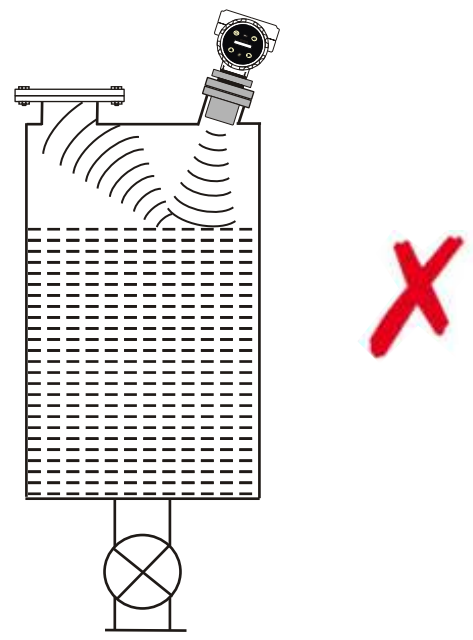
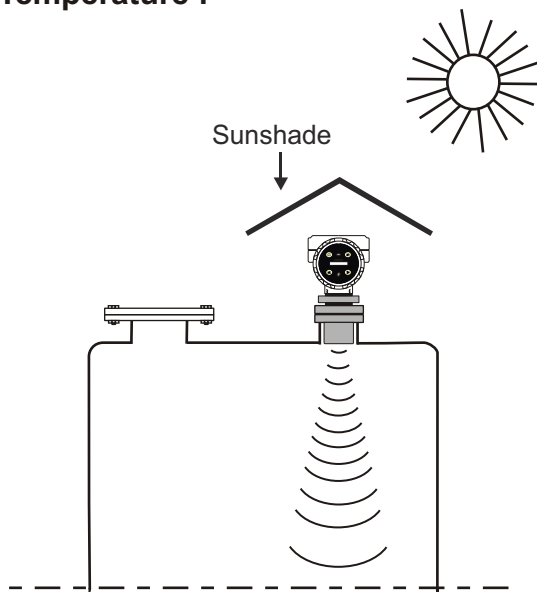


Fig 2

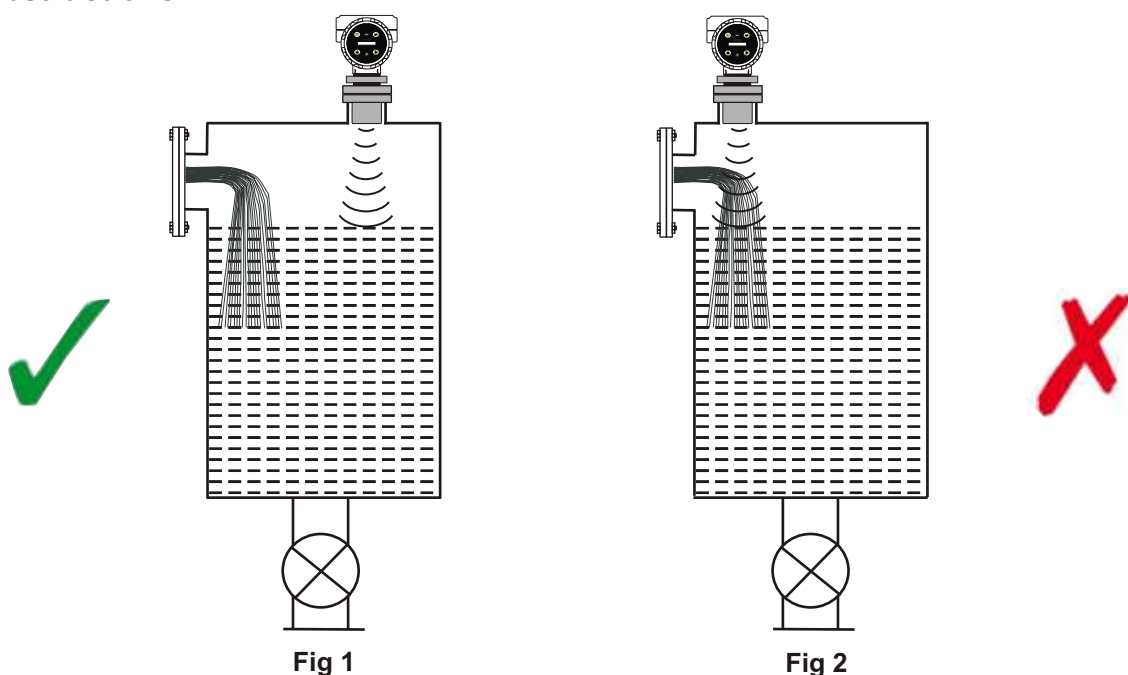
NOTE : Sensor should be aligned in such a way that it's face must be parallel to the surface of liquid as shown in fig. 1

4.4 Protection Against Temperature :



NOTE : Make sure that the transmitter is protected against overheating by direct sunshine.

4.5 Obstructions :



NOTE : Inflow path, objects or uneven tank wall surfaces should not protrude into sensing cone of ultrasonic beam as shown in fig. 2.

Obstacle Details :

Make sure that in flow path or object (e.g Cooling pipes ladder, Thermometer etc) should not come into sensing cone of ultrasonic beam.

Foam : Foaming of the liquid surface may render ultrasonic level metering impossible. If possible a location should be found, where foaming is least.

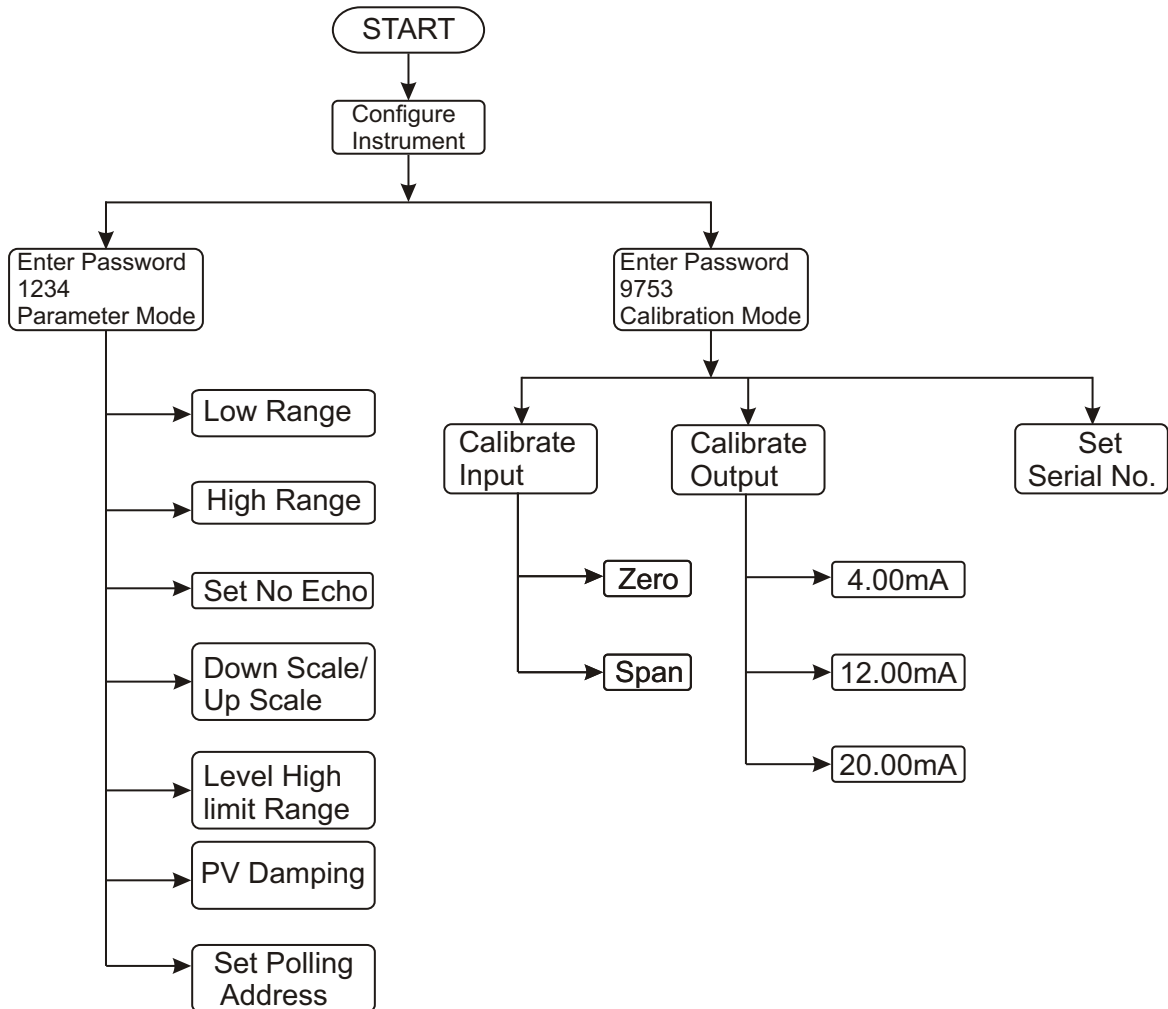
Wind : Intensive air (gas) movement in the vicinity of ultrasonic cone is to be avoided.

5. LEGEND DESCRIPTION

- 1) D : Empty Tank level including dead band
- 2) L : Filled Tank level
- 3) Prg Para : Program Parameter
- 4) Lo Range : Current output low range
- 5) Hi Range : Current output High range
- 6) Set NoEc : Set No Echo
- 7) Dn Scale : Down Scale (For No echo current will be 3.85mA)
- 8) Up Scale : Up Scale (For No echo current will be 20.80mA)
- 9) Cal Inpt : Calibrate Input (RTD)
- 10) Cal Out : Calibrate Output (Current)
- 11) cm : Centimeter
- 12) mA : Milliampere
- 13) °C : Degree celsius
- 14) T : Temperature
- 15) LvlH Range : Liquid Level High Range
- 16) Poll Add : Polling address
- 17) PV Damp : Damping adjustment incase this value
it observed fluctuations in the display reading

6. FLOW CHART

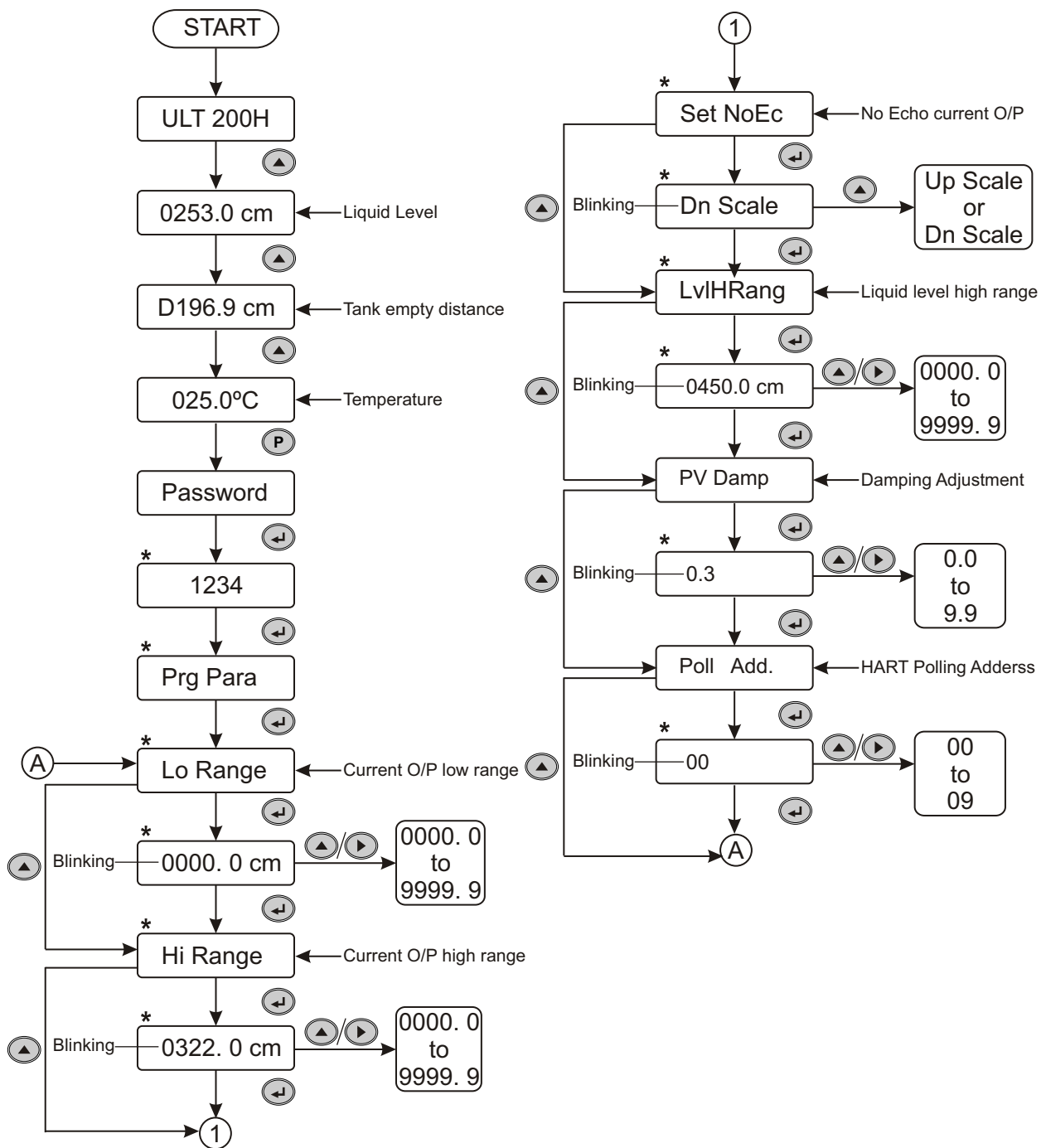
6.1 General Overview of Operation :



6.2 Message & Indications :

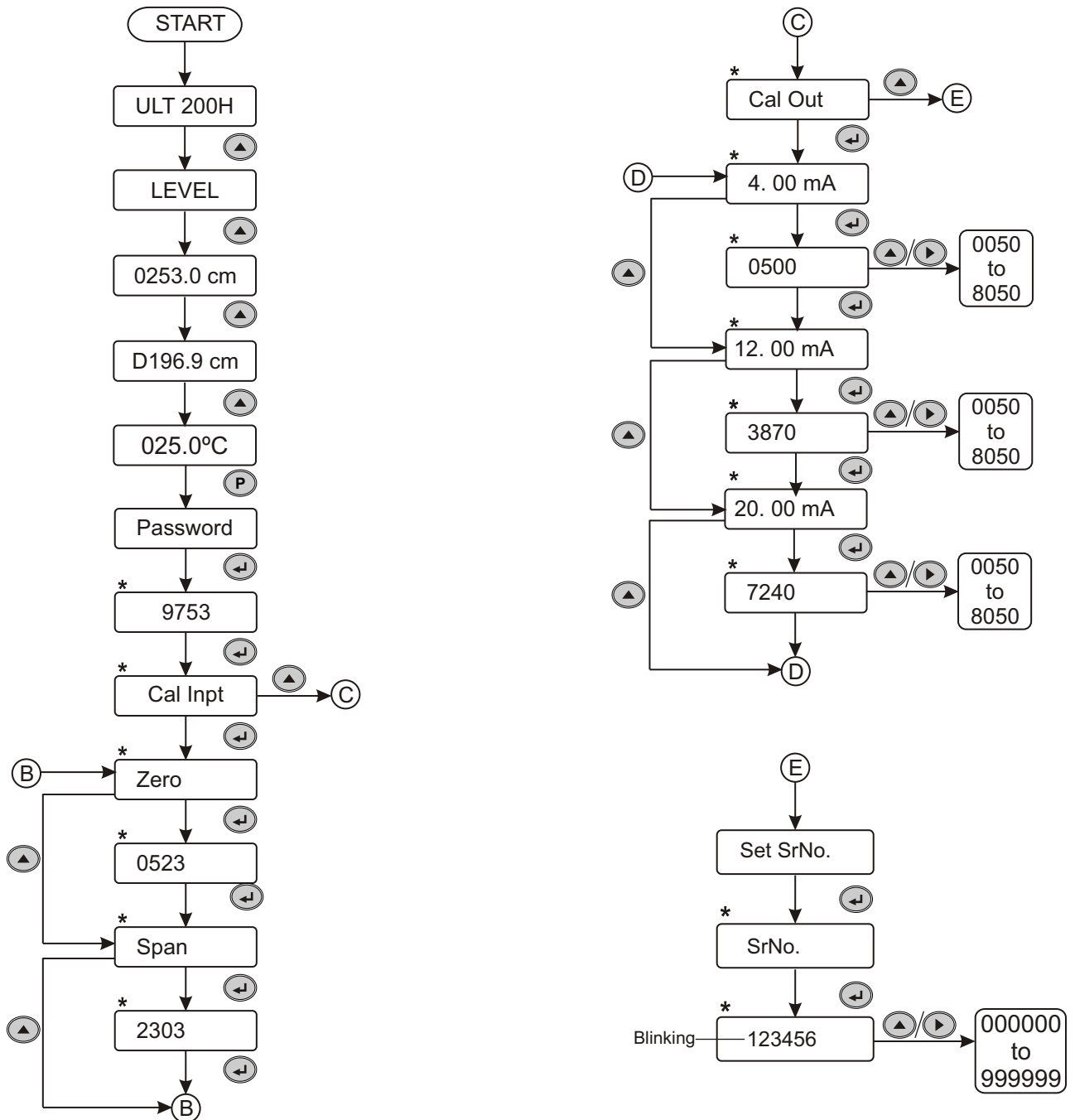
- No Echo : Message appears on display when sensor is not getting proper signal from reflected surface.
- RED LED : Indication on keyboard when sensor is not getting proper signal from reflected surface. Also it indicate Red LED in dead band area for No Echo condition.
- GREEN LED : Indication on keyboard when sensor is getting proper signal from reflected surface.

6.3 Parameter Mode :



* Press **P** To Exit to higher level menu

6.4 Calibration Mode :









* Press **(P)** To Exit to higher level menu

7. CALIBRATION PROCEDURE











7.1 Input Calibration:

For 0-100°C (Input Pt-100 Source)

- 1) Do the connections as per termination details.
- 2) Power ON the instrument.
- 3) Go to calibration mode by entering password **9753** . Display will show Cal Inpt
 Press  key display will show Zero
 Apply 0°C I/P from Pt-100 source
 Press  key Display will show 0600 — Approx. ADC Counts(+/-100)
- 4) Press  key to store this value & display will show Span
- 5) Now, Apply 100°C I/P from Pt-100 source
 Now, when  key Display will show 2250 — Approx. ADC Counts(+/-200)
 Press  key to store this value.
- 6) Press  key to exit from this mode.

7.2 Output Calibration:

For 4-20mA DC Output

- 1) Connect Multimeter at the Output terminals.
- 2) Go to calibration mode by entering password **9753** . Display will show Cal Out
 Press  key display will show 4. 00 mA
 Press  key Display will show 0750 — Approx. DAC Counts
 Adjust the count with / key. Till it show exact 4.00mA on current meter (Loop Current)..
- 4) Press  key display will show 12.00 mA
 Press  key Display will show 31225 — Approx. DAC Counts
 Adjust the count with / key. Till it show exact 12.00mA on current meter (Loop Current).
- 5) Now, Press  key store that respective count.
- 6) Similarly adjust the respective loop current as display shows 20mA.
- 7) Press  key to exit from this mode.

PARAMETER MODE PROCEDURE

- 1) Power ON the instrument. Press **P** key
 Display will show **Password**. Press **↵** key, display will show **1234**
- 2) Press **↵** key, display will show **Prg Para**
- 3) Press **↵** key, display will show **Lo Limit**
 Press **↵** key display will show **0100 cm** .Use **▲/▶** key to change the limit.(You will get 4.00mA output value for low limit).
- 4) Press **↵** key to store the value & display will show **Hi Limit**
 Press **↵** key Display will show **0300 cm** .Use **▲/▶** key to change the limit.(You will get 20.00mA output value for High limit).
- 4) Press **↵** key to store this value & display will show **Set no Echo**
- 5) Press **↵** key, display will show **Dn Scale** . Press **▲** key to toggle between **Dn Scale** (3.84mA) and **Up Scale** (21.6mA).
- 6) Press **↵** key to store this setting & display will show **Low Rang**
- 7) Press **↵** key display will show **0000.0 cm** use **▲/▶** key to change the limit .
- 8) Press **↵** key to store this setting & display will show **Hi Rang**
- 9) Press **↵** key display will show **0450.0 cm** use **▲/▶** key to change the limit .
- 10) Press **↵** key to store this value. Display will again show **Lo Limit**

Important Note:- Low & High limit related to filled tank level (L).

8. SAFETY WARNING & GENERAL INSTRUCTIONS

1. Read User manual carefully and understand instructions & directions provided in this manual.
2. Installation, connections, commissioning and service shall carry out by only qualified and authorized person.
3. To protect instrument from any external hazards, customer should take necessary care while preparing site ready before installation.
4. Ensure proper supply voltage (24V DC) with proper polarity to the instrument, before Powering ON instrument.

9. TROUBLE SHOOTING PROCEDURE

SYMPTOMS	CAUSE OF FAILURE	ACTION TO BE TAKEN
No display indication	<ol style="list-style-type: none"> 1. Absence of 24 V DC at terminal block. 2. Loose connection on termination. 	<ol style="list-style-type: none"> 1. Check 24 V DC power supply & rectify the fault. 2. Tight the terminal connections.
Constant indication of no echo on display .	<ol style="list-style-type: none"> 1. Sensor misalignment 2. Instrument is in dead band condition & measuring distance is greater than specified range. 	<ol style="list-style-type: none"> 1. Check sensor alignment. 2. Check always measuring range is greater than dead band.
Incorrect current output	<ol style="list-style-type: none"> 1. In correct setting of Lo & Hi limit for output. 2. Incorrect calibration. 	<ol style="list-style-type: none"> 1. Do the correct setting for Lo & Hi limit for output as per requirement. 2. Do proper calibration (Refer Calibration procedure).

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