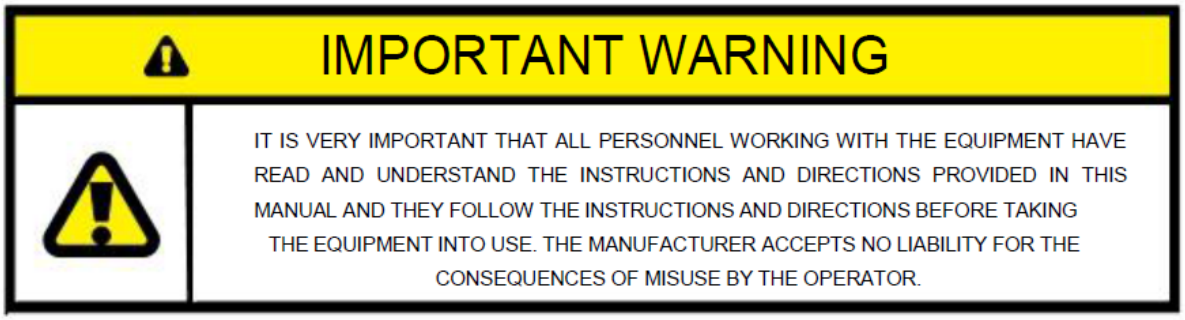
ACCUMAX
INSTRUMENTS PVT. LTD.

ELECTROMAGNETIC FLOW METER

Instruction Manual

Accumax Instruments Pvt. Ltd.
B-95, Electronic Estate, G.I.D.C., Sector-25,
Gandhinagar, Gujarat, India. 382024
Call us: +(91)-9909919095,
Mail: info@accumaxinstruments.com
Web: accumaxinstruments.com



The operator shall bear responsibility for the suitability of the device for the specific purpose:

1. Improper installation and operation of the devices (systems) will cause warranty to be void
2. The manufacturer will not be liable for any damage of any kind by using its product, including, but not limited direct, indirect, incidental, punitive and consequential damages.

Installation, connection, commissioning and service must be carried out by personnel who are qualified and authorized to do so.

Installation personnel must ensure that the measuring system is correctly connected in accordance with the connection diagram.

For applications involving high working pressures or media that can be dangerous to people, surroundings, equipment or other in the event of pipe fracture, ACCUMAX INSTRUMENTS PVT. LTD. recommends taking precautions such as special placement, shielding or installation of a safety guard or safety valve prior to installation of the sensor.

This device contains electrical components with an electrical current therefore installation, services and maintenance must be carried out by expert and qualified personnel, aware of all necessary precautions. Before opening any internal parts, please shut off the power supply.

The flow-meter is composed of metal and plastic parts, all of which must be in compliance with local norms and requirements concerning their trash disposal.

Manufacturer's design and safety statement

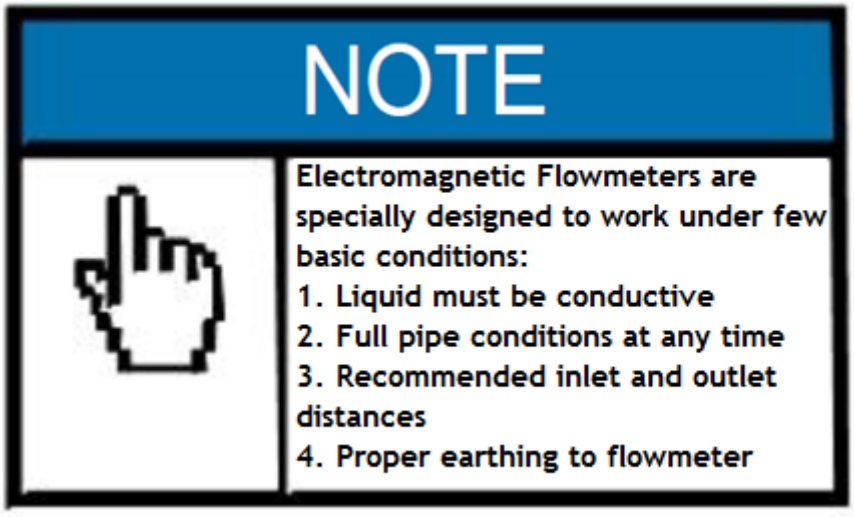
- Responsibility for the choice of lining and electrode materials as regards abrasion and corrosion resistance lies with the purchaser; the effect of any change in process medium during the operating of the meter should be taken into account. Incorrect selection of lining and/or electrode could lead to a failure of the meter.
- Stresses and loading caused by earthquakes, traffic, high winds and fire damage are not taken into account during meter design.
- Do not install the meter such that it acts as a focus for pipeline stresses. External loading is not taken into account during meter design.
- During operation do not exceed the pressure and/or temperature ratings indicated on the data label or in this Operating Manual.

1. PRELIMINARY NOTES

The main parts composing the electromagnetic flow-meter are:

A. The sensor - is installed in the pipes using flanges or threaded attachments or clamp attachments
B. The converter - may be installed on the sensor (in compact version), or nearby (in remote version) connected by two cables.

Electromagnetic flow meters have many important advantages over their mechanical counterparts: outstanding long-term stability, maximum process reliability, no maintenance - to name just a few. As a result, these meters can deliver precise and reliable measurements for many years.



2. GENERAL PRECAUTIONS

The correct lifting method is shown in the figure on the right, while the one shown in the figure on the left should be avoided; more importantly DO NOT lift the flow-meter by its converter but by holding it on its sides.

3. INSTALLATION OF THE FLOW-METER

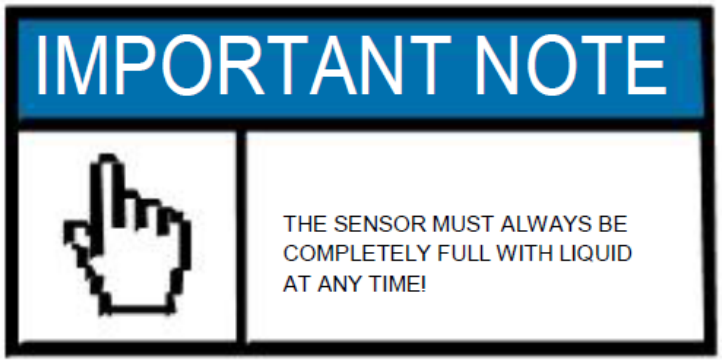
3.1 IDENTIFYING DATA PLATE

Model Selection: EFM-A-B-C-D-E-F-G-H-I-J-K

- A: Line Size (NB)
- B: Lining Material (PTFE, PFA, Rubber)
- C: Electrode Material (SS316L, Hastelloy 'C')
- D: Flange & Coil Housing (MS, SS)
- E: Class of Flange (Class 150, 300, 600)
- F: Special Paint (NO [Siemens Gray], Mention Colour)
- G: Output 4 -20mA (No: 0, Yes: 1)
- H: Output RS485 (Modbus) (No: 0, Yes: 1)
- I: Display (Integrated: I, Remote: R)
- J: Pulse Output (No: 0, Yes: 1)
- K: Supply Voltage (220V AC, 110V AC, 24V DC)

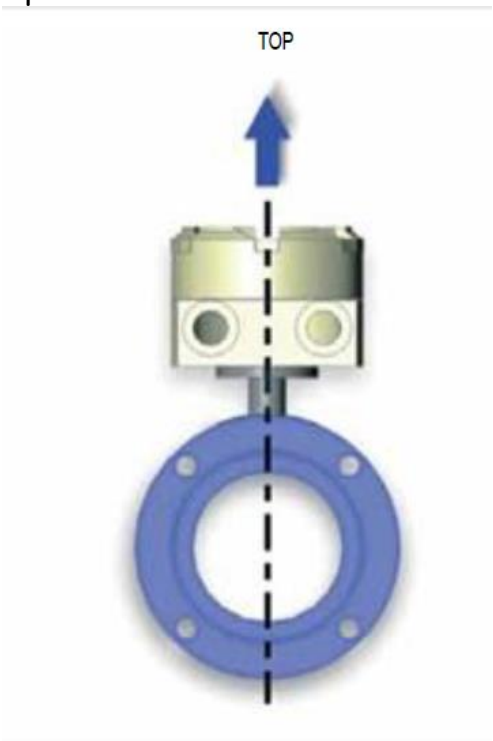
E.g.: EMF-50-PTFE-SS316L-MS-150-NO-1-1-I-0-220V

3.2 INSTALLATION INSTRUCTIONS

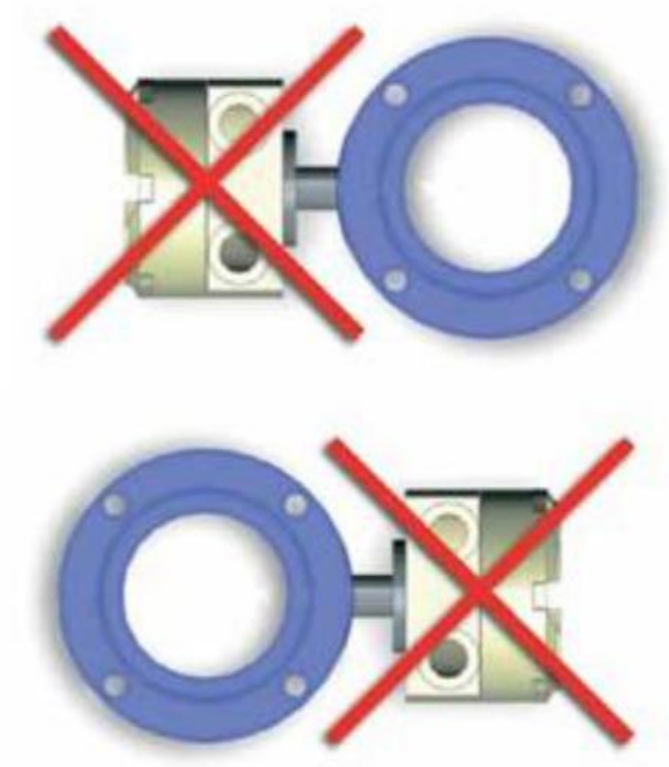


3.2.1 POSITIONING IN RELATION TO THE FLOW

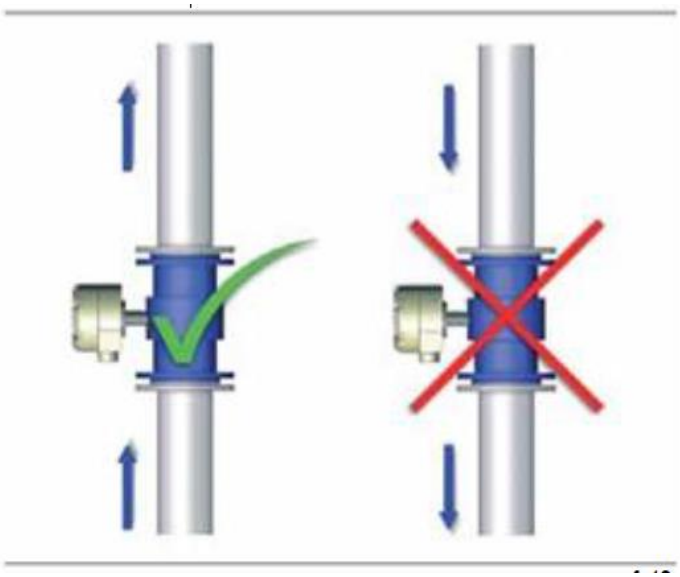
With installations in horizontal pipes, the converter (or the junction box in the separate version) must be placed on the upper part.



Avoid following positions:



Recommended installation is in vertical/inclined pipe with upward flow direction, to minimize the wear and L max deposits in the sensor. Avoid installation in vertical pipes with free outlet.

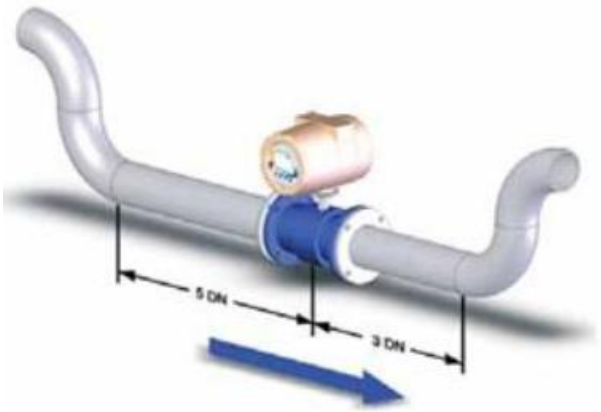


3.2.2 IMPORTANT GUIDELINES FOR CORRECT INSTALLATION

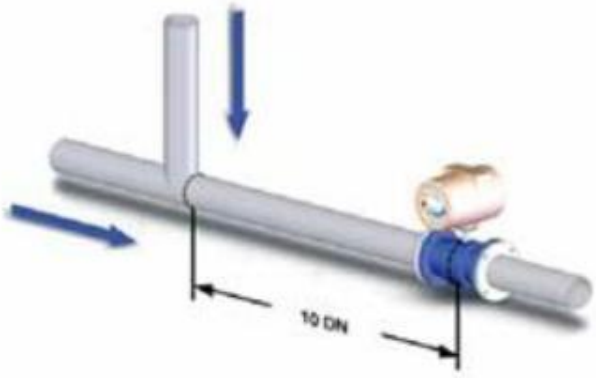
For a correct working condition please follow the important guidelines shown in the following figures. A wrong installation cannot guarantee a good measurement.

To achieve most accurate flow measurement, it is essential to have minimum straight lengths of the inlet and outlet pipes as shown (DN: sensor nominal diameter)

- For partially filled pipes or pipes with downward flow and free outlet, the flow-meter should be located in a U-tube, respecting the upward and downward lengths between the bends.



- In case of a "T" connection between two different pipes, please respect 10DN distance upstream the flow-meter.

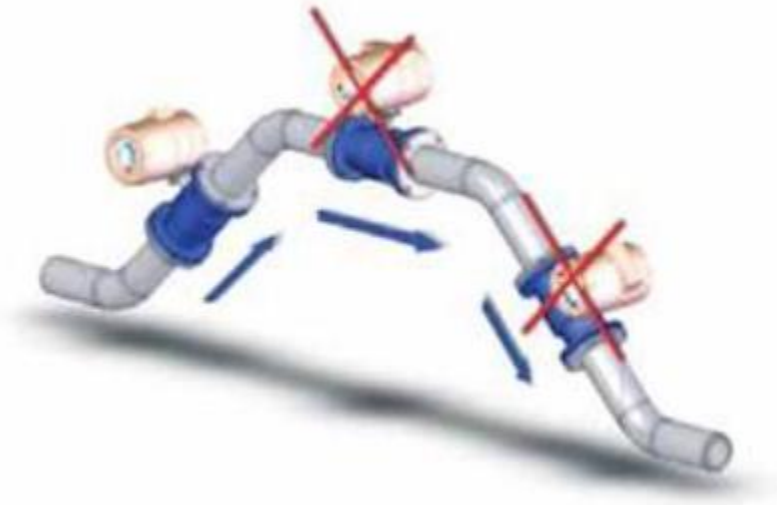


- Keep 5 meters between the axis of the flow-meter and the axis of the gate valve located downstream.

- This installation keeps the sensor full with liquid.

- This installation DOES NOT guarantee a full pipe.

- The position on the left is correct, the other two ARE NOT.

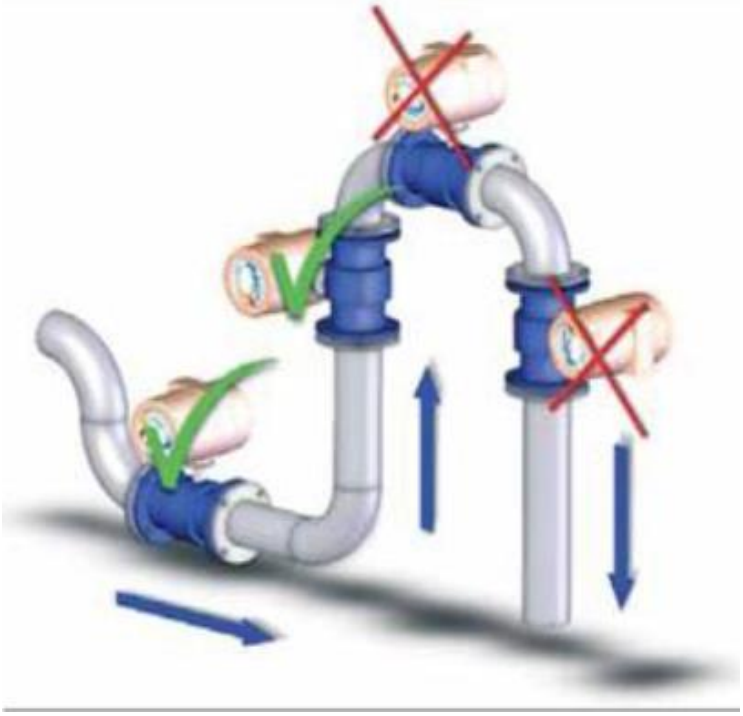


- DO NOT place the sensor close to any variation in the route of the flow.

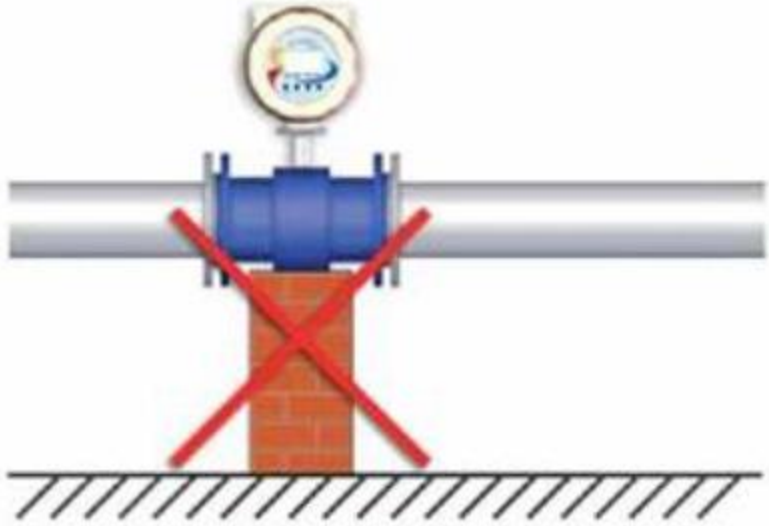
- DO NOT place any gate valve directly connected condition.

- Always install the sensor downstream the pump and NEVER upstream to avoid vacuum.

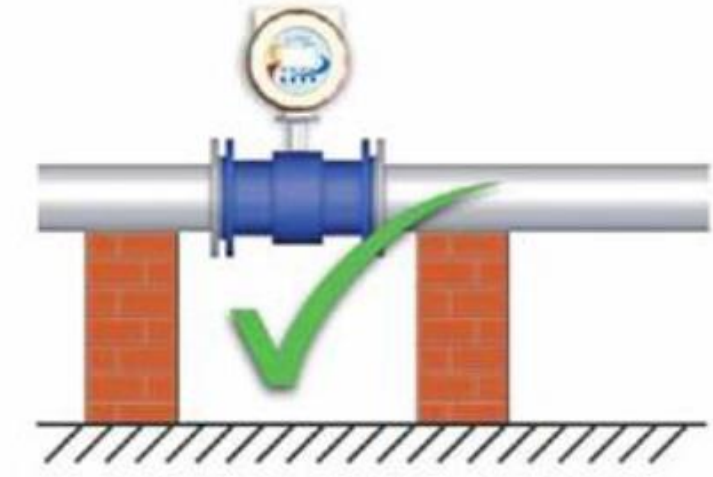
- DO NOT install the sensor in vertical pipes with free outlet or at the highest point in the pipe system



- DO NOT USE the sensor as a support to the pipe.

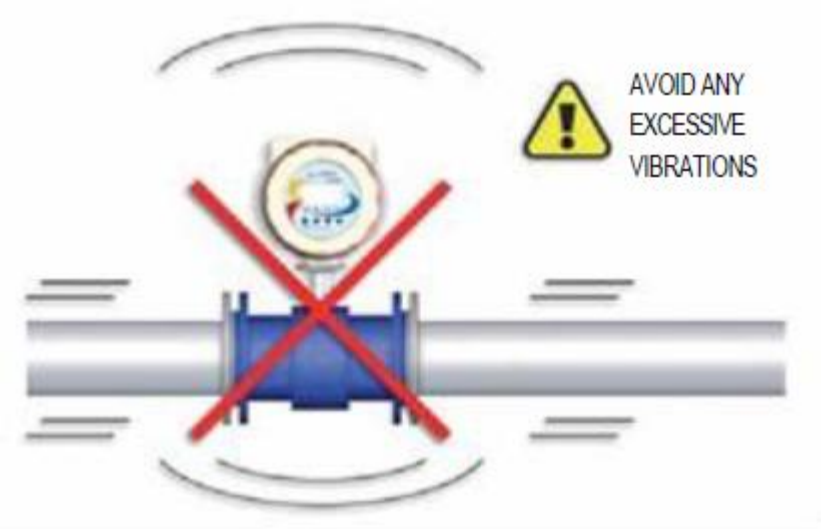


- Pipe should give the support to the flow-meter

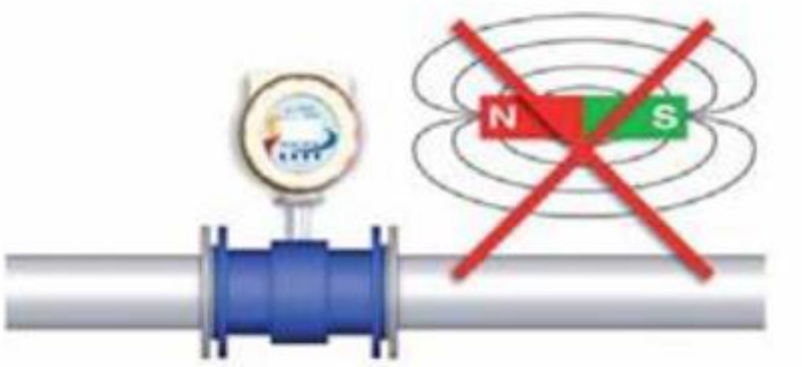


- Install suitable anti-vibration protection if any vibration arise.

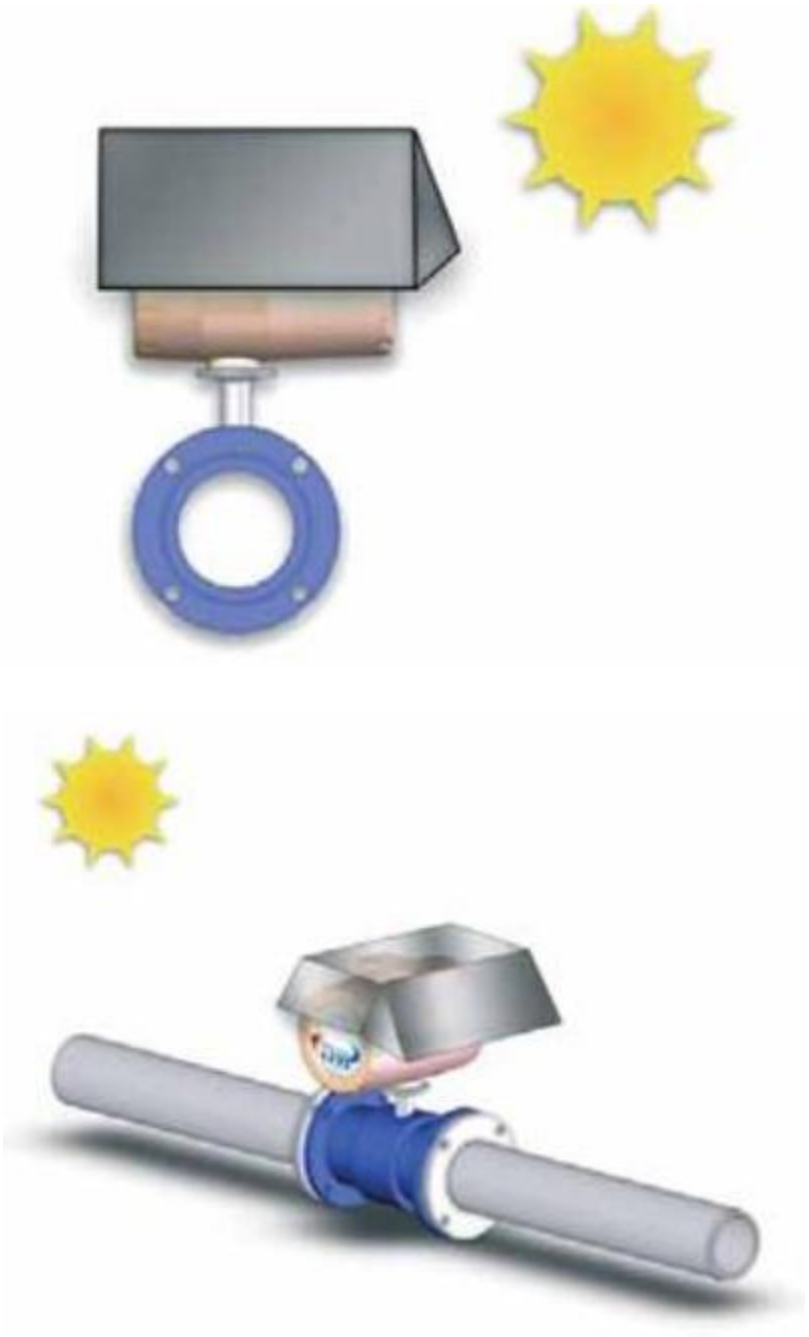
- DO NOT expose the flow-meter to vibrations and/ or movement, which may affect its performance and duration.



- AVOID exposure of the flow-meter to strong or nearby magnetic fields.



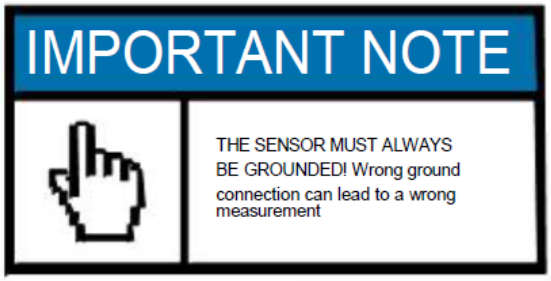
- Protect the flow-meter if exposed to direct sun radiations.

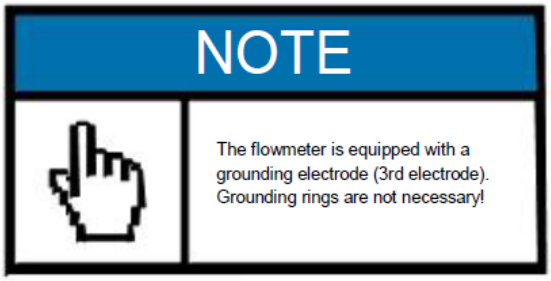


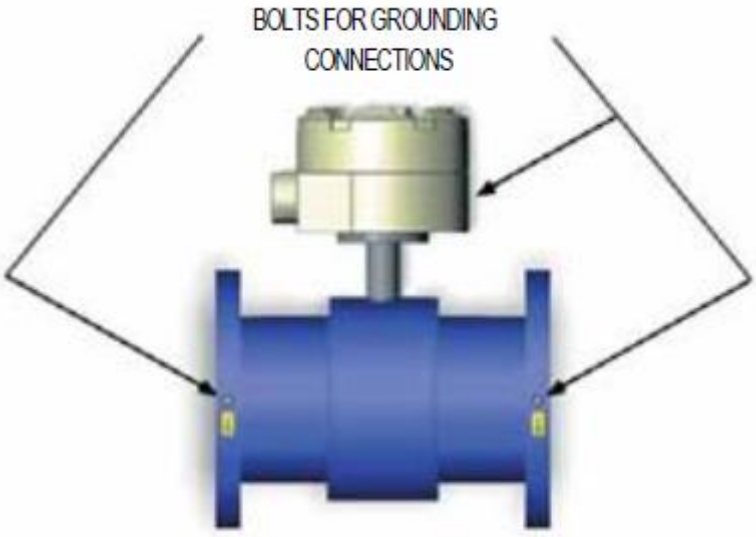
- NRV (Non-returnable Valve) is recommended to avoid reverse flow from pipe, which cause wrong reading in metering or batching purpose.

4. POTENTIAL EQUALIZATION

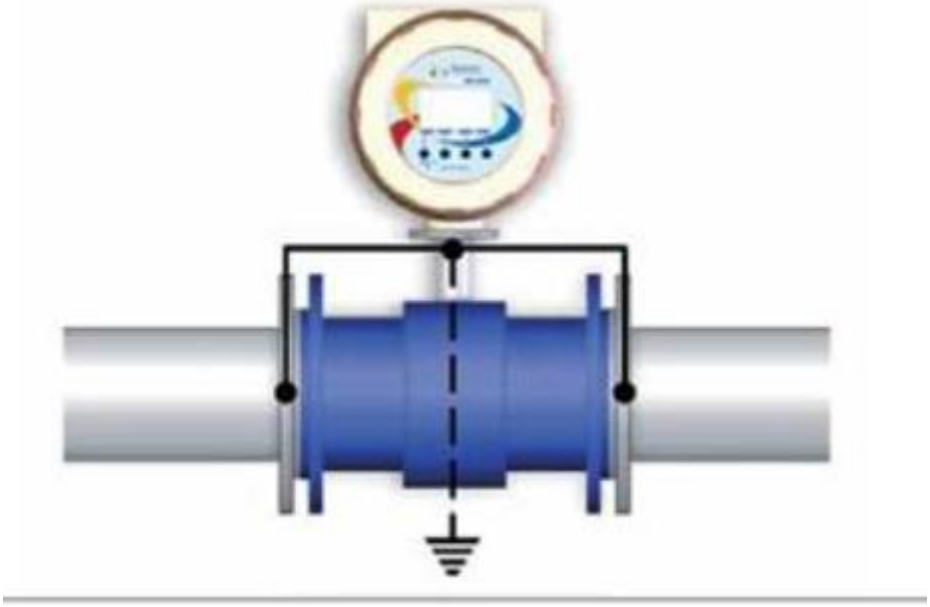
Liquid potential equalization or grounding is accomplished with the built-in grounding electrode (so called 3rd electrode). The 3rd electrode electrically bonds the liquid to the meter to provide a stable and accurate measurement.







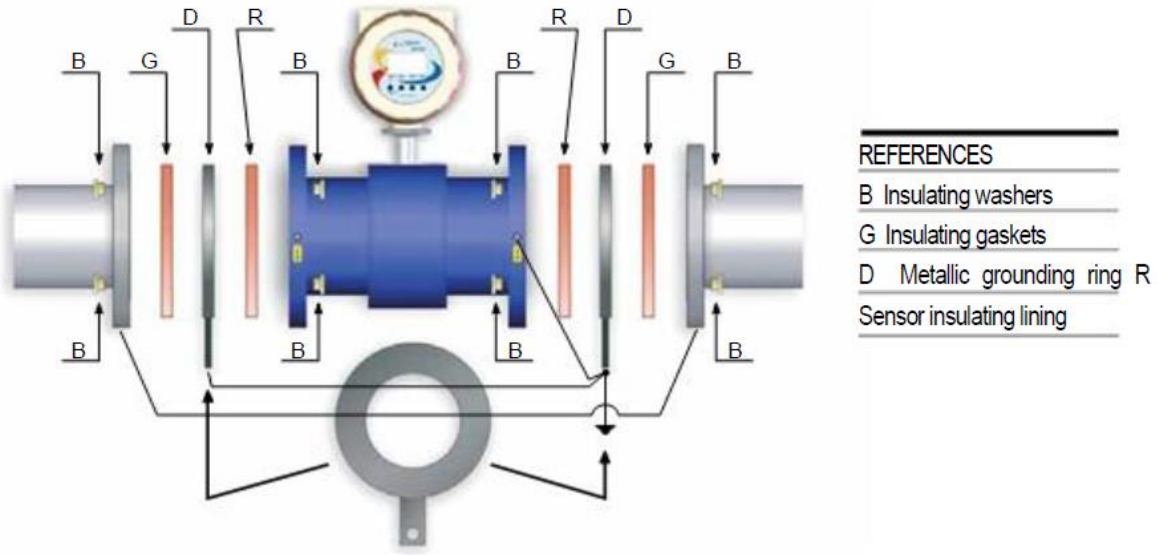
The sensor body must be grounded using grounding/bonding straps and/or rounding rings to protect the flow signal against stray electrical noise and/or lightning. This ensures that the noise is carried through the sensor body and noise-free measuring area within the sensor body



On plastic pipelines and lined metal pipes, OPTIONAL grounding rings can be used at both ends to ensure a good potential equalization. Grounding rings are not included in the delivery.

Special attention for meter installation in cathode protected pipeline.

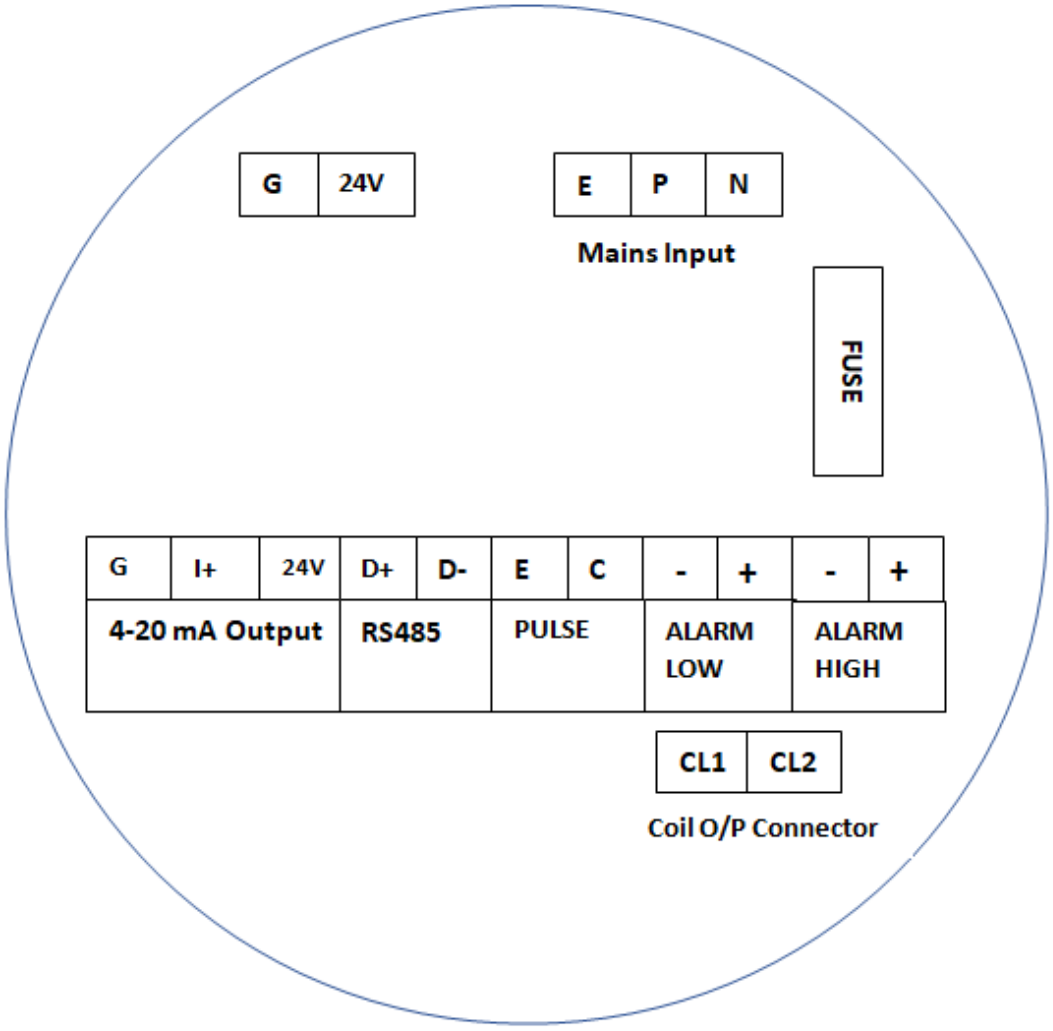
Isolate the meter from the pipeline by mounting isolation Sleeves and Washers on the flange bolts and connect a wire between the pipelines, dimensioned to manage the cathode current and environmental influence. Use grounding rings on both ends.



5. NEGATIVE PRESSURE IN THE PIPE

Avoid high vacuum conditions in the pipe, these can damage the lining of the flow-meter and move the electrodes from the correct position.

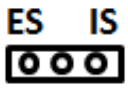
6. HARDWARE CONNECTIONS



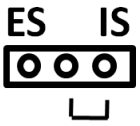
- Connector Coil wires to coil output connector.
- Any loose connection will give error in output.
- Connect Mains (220V AC) to P & N in Mains Input Connector.
- Earthing must be connected proper for safety purpose and best output
- During 24V dc give positive terminal to +24VDC and Negative to GND terminal
- While providing power to circuit LCD will display text.

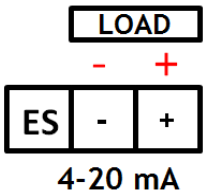
7. HARDWARE Connections

- 4-20 mA Connection:
  - Hardware has two source option. (Internal & External)

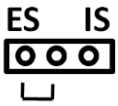


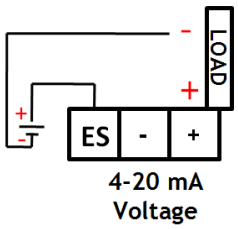
  - Default connection is internal Source (IS), which uses supply current from hardware itself.
  -





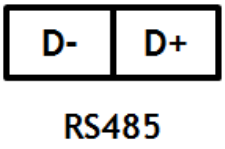
  - To change supply from PLC/External source place jumper ES side. Apply supply of +24V at block of 4-20mA in connector card.





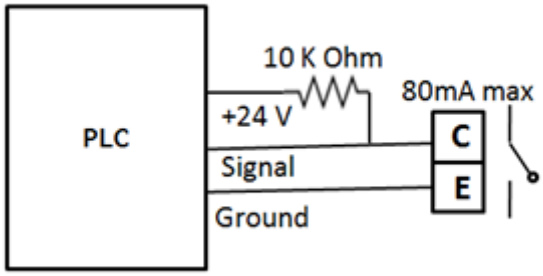
  - In case of external source voltage should not above 24V DC.

- RS485 Connection:
  - Connect D+ & D- Wire from Master device to flow-meter.



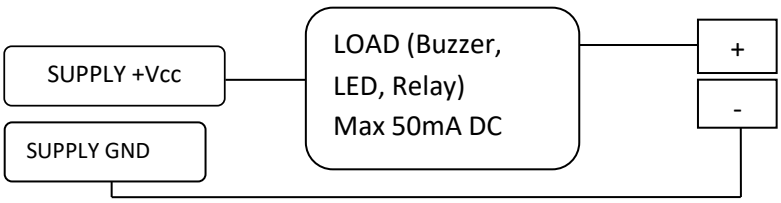
- Pulse Output Connection:

Connecting Flow-meter with a PLC Controller As following



Note: Maximum load is 80mA, pulse width is 10mS.

- Alarm High/Low Output Connection:



8. SOFTWARE SETTINGS

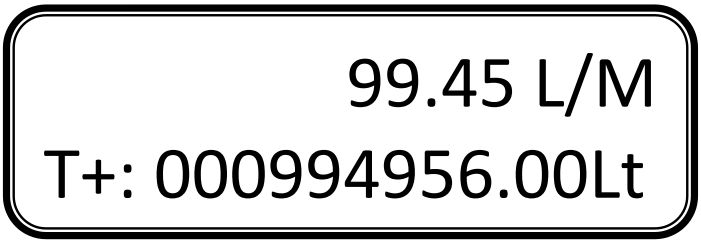
- Switch1 -- Enter
- Switch2 -- Menu
- Switch3 -- Shift

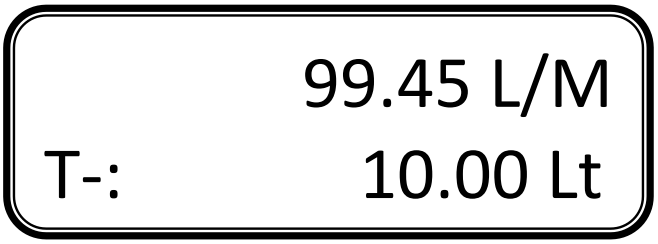
- Password Settings:
  - Press "Menu" (Switch(M)) for 2 seconds for setting mode
  - Press Switch(M) to enter number and Switch(S) to shift cursor (Set password XXXX)
  - Press Switch(E) to enter

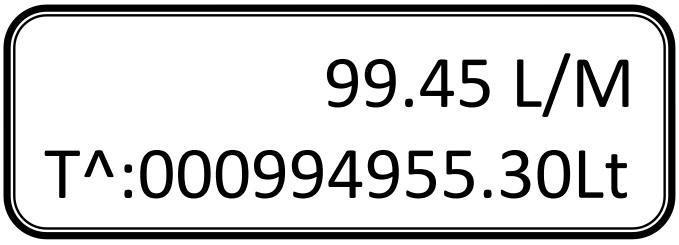
- Password Table

Password (XXXX)	**Function**
1111	Basic configuration
2222	Calibration setting
3333	Modbus setting
5555	Pulse Output Setting
6666	Set Zero Flow

- **LCD Display:**



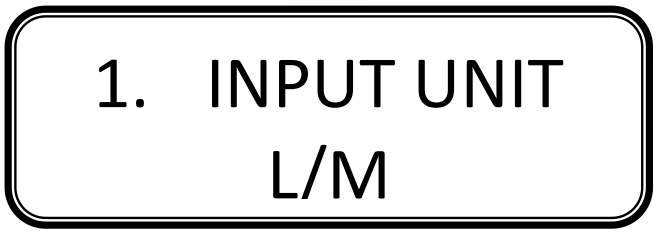




8.1 Basic Configuration

- Press "Menu" (Switch(M)) for 2 seconds for setting mode
- Press Switch(M) to enter number and Switch(S) to shift cursor (Set password 1111)
- Press Switch(E) to enter

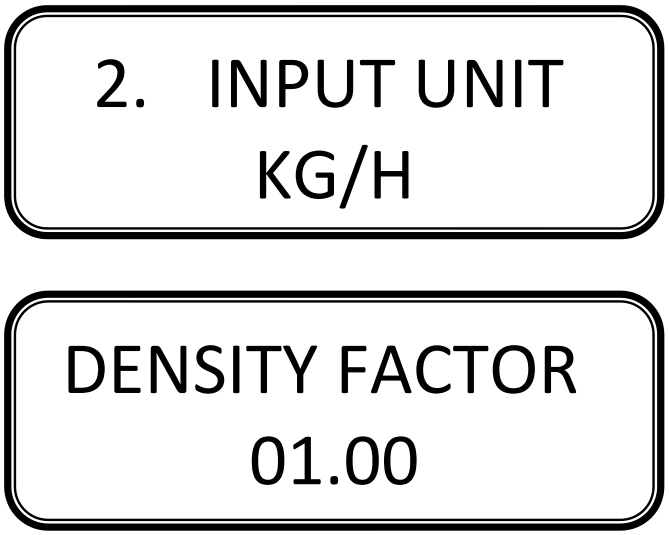
- **Unit Select:**
  - Press switch(M) to select Unit
  - Press Switch(E) to enter



List of units for selection

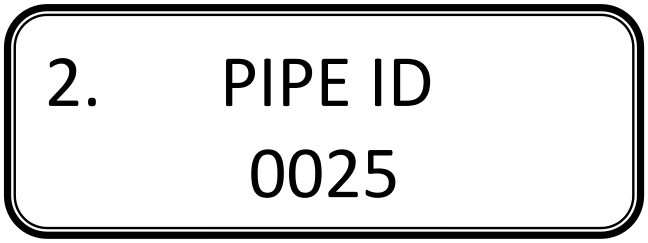
✓ L/S	✓ L/M	✓ L/H
✓ M^3/S	✓ M^3/M	✓ M^3/H
✓ KL/S	✓ KL/M	✓ KL/H
✓ KG/S	✓ KG/M	✓ KG/H

- **Density Factor Setting:**
  - Press switch(M) to select input unit.
  - Press Switch(E) to enter into density factor.
  - Press Switch(S) to shift cursor
  - Press Switch(E) to enter
  - Note: Only applicable if selected Kg Unit.



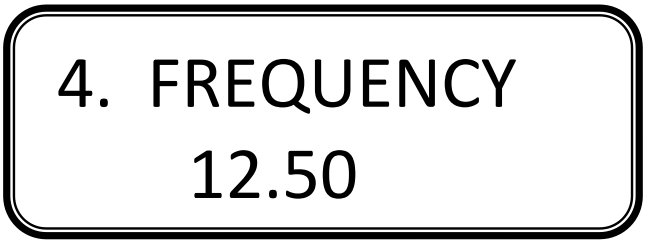
- **PIPE ID Select:**
  - Press switch(M) to select PIPE ID
  - Press Switch(E) to enter

PIPE SIZE	PIPE ID	Max Flow
½"	15	5 m^3/H
1 "	25	9 m^3/H
1 ½ "	40	22 m^3/H
2"	50	36 m^3/H
2 ½"	65	60 m^3/H
3"	80	90 m^3/H
4"	100	121 m^3/H
5"	125	200 m^3/H
6"	150	318 m^3/H
8"	200	450 m^3/H
10"	250	600 m^3/H
12"	300	850 m^3/H



- **FLOW RANGE**
  - Press switch(M) to change Flow range
  - Press Switch(E) to enter

- **FREQUENCY**
  - Press switch(M) to select frequency
  - Press Switch(E) to enter



Available option: 6.25, 3.125

- **INDICATION**
  - Press switch(M) to select.
  - Press Switch(E) to enter.

    This option is used to reverse flow direction.

- **DIRECTION**
  - Press switch(M) to select direction.
  - Press Switch(E) to enter

    This option used to allow Forward, Reverse or Bidirection

- **Totalizer Setting:**
  - Press Switch(E) to reset Totalizer
  - Press Switch(S) to enter without resetting Totalizer

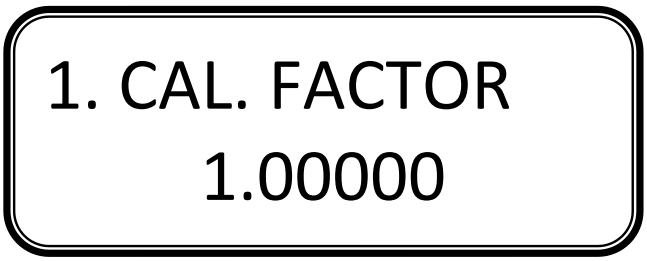
(Note: All 3 totalizer, totalizer(positive), totalizer(negative) totalizer (^delta) will reset)

(Note: delta totalizer (^) = (positive totalizer- negative totalizer))

8.2 Calibration Setting

- Press "Menu" (Switch(M)) for 2 seconds for setting mode
- Press Switch(M) to enter number and Switch(S) to shift cursor (Set password 2222)
- Press Switch(E) to enter

- **CALIBRATION FACTOR:**
  - Press switch(M) to enter Cal. Factor
  - Press Switch(S) to shift cursor
  - Press Switch(E) to enter



- **Count for 4mA:**
  - Press switch(M) to increase count
  - Press switch(S) to decrease count
  - Press Switch(E) to enter

2. COUNT @ 4mA
06740

(At this instance check 4 mA at output port of hardware. And increase/decrease accordingly.)

- **Count for 20mA:**
  - Press switch(M) to increase count
  - Press switch(S) to decrease count
  - Press Switch(E) to enter

3. COUNT @ 20mA
33410

(At this instance check 4 mA at output port of hardware. And increase/decrease accordingly.)

Empty Pipe Status:

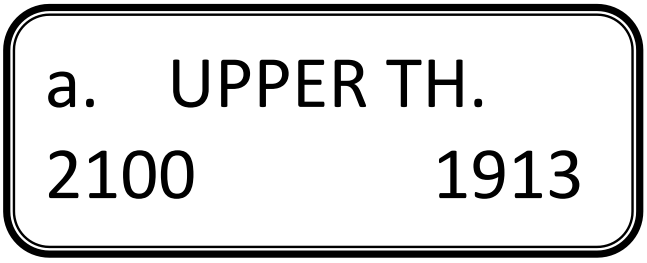
- Press switch(M) to select Empty status
- Press Switch(E) to enter

This setting will indicate error on main display when flow-meter connected pipe becomes empty.

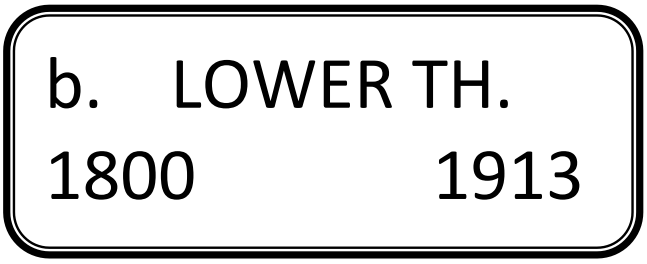
4. EMPTY STATUS
ENABLE

(Option available: disable, Enable)

The count will change when pipe become empty. The right-side count is editable. Upper threshold should be higher than current count (Left side), And Lower threshold should set lower than current count.



Empty pipe upper threshold



Empty pipe lower threshold

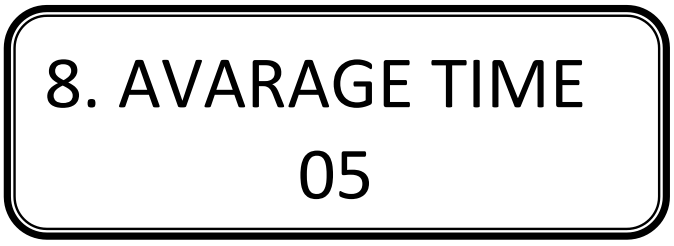
- **Cut OFF Span setting:**
  - Press switch(M) to enter Cut off span.
  - Press Switch(S) to shift cursor
  - Press Switch(E) to enter

    This flow below cut-off will show as zero flow.

- **High Alarm Setting:**
  - Press switch(M) to enter high alarm
  - Press Switch(S) to shift cursor
  - Press Switch(E) to enter

- **Low Alarm Setting:**
  - Press switch(M) to enter low alarm
  - Press Switch(S) to shift cursor
  - Press Switch(E) to enter

- **Average Time Setting:**
  - Press switch(M) to enter into average time setting.
  - Press Switch(S) to shift cursor
  - Press Switch(E) to enter

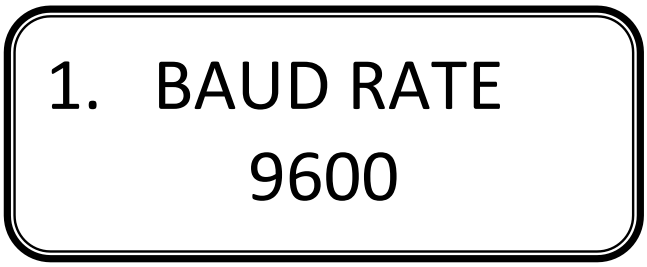


- **Complete Setting Mode:**
  - Press Switch(E) to complete setting
  - Press Switch(S) to enter in setting mode again

8.3 Modbus Setting

- Press "Menu" (Switch(M)) for 2 seconds for setting mode
- Press Switch(M) to enter number and Switch(S) to shift cursor (Set password 3333)
- Press Switch(E) to enter

- **BAUD RATE Select:**
  - Press switch(M) to select Baud rate
  - Press Switch(E) to enter



Available option (2400, 4800, 9600, 19200, 38400)

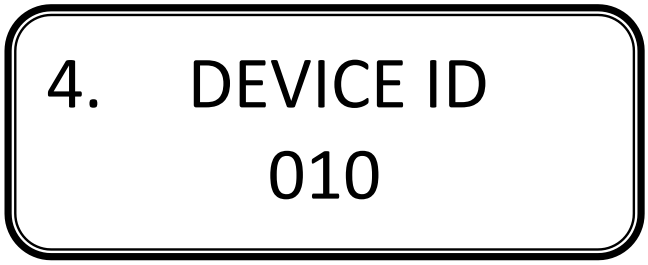
- **PARITY Select:**
  - Press switch(M) to select parity
  - Press Switch(E) to enter

Available option (NONE, ODD, EVEN)

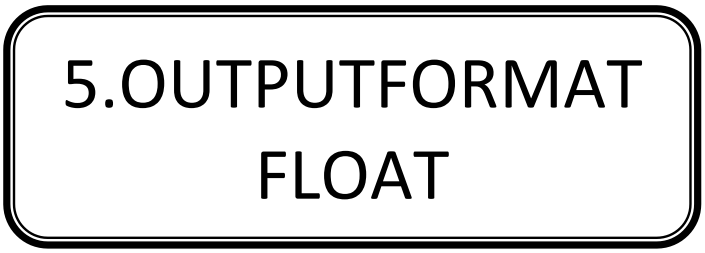
- **STOP BIT Select:**
  - Press switch(M) to select stop bit.
  - Press Switch(E) to enter

Available option (ONE, TWO)

- **DEVICE ID Select:**
  - Press switch(M) to select Device ID
  - Press Switch(E) to enter



- **Modbus Format Select:**
  - Press switch(M) to select Modbus output format (Float, Long Integer, Decimal, Integer)
  - Press Switch(E) to enter



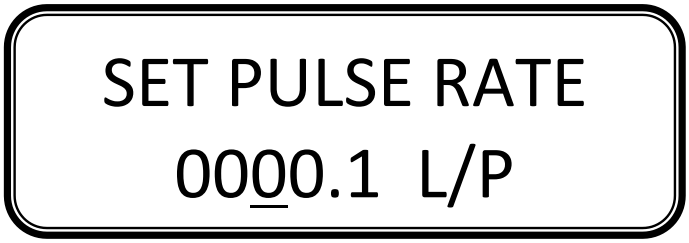
- **Write configuration setting:**
  - Press switch(M) to select write configuration.
  - Press Switch(E) to enter

- **Complete Setting Mode:**
  - Press Switch(E) to complete setting

8.4 Pulse Output Setting

- Press "Menu" (Switch(M)) for 2 seconds for setting mode
- Press Switch(M) to enter number and Switch(S) to shift cursor (Set password 5555)
- Press Switch(E) to enter

- **Pulse Output Select:**
  - Press switch(M) to select litre per Pulse (L/P, m3/P, Kl/P)
  - Press Switch(S) to shift cursor
  - Press Switch(E) to enter



- **Complete Setting Mode:**
  - Press Switch(E) to complete setting

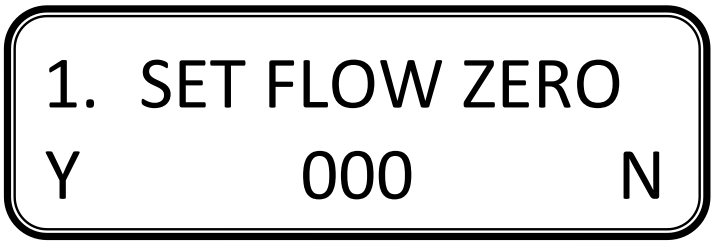
8.5 Set Zero Flow.

Note: Ensure that Water or conductive liquid is fully filled in flow-meter (No air& No "Empty pipe" error on display) & Zero flow (No Flow) condition before applying this setting.

- Press "Menu" (Switch(M)) for 2 seconds for setting mode
- Press Switch(M) to enter number and Switch(S) to shift cursor (Set password 6666)
- Press Switch(E) to enter

- **Set Flow Zero Setting:**
  - Press switch(M) to select Auto or manual mode.
  - Press Switch(E) to enter into respective mode.

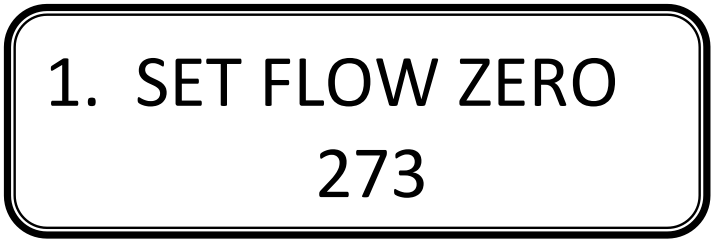
(NOTE: digit represnts previous count)



(AUTO MODE DISPLAY)

- Press switch(M) to select Auto or manual mode.
- Press Switch(E) to enter into respective mode.
- Press switch(M) to increase count
- Press switch(S) to decrease count
- Press Switch(E) to enter.

(NOTE: digit represnts previous count)



(MANUAL MODE DISPLAY)

9. TROUBLESHOOTING

- No Power: Check Fuse, Mains supply across P&N
- No Flow Indication: Check voltage across CL1 & CL2
  a. Without coil connected: 22-24 Volt pulsating DC
  b. With coil connected: 10-12 Volt pulsating DC
  c. Check Sensor Connection S1, S2 & G

- No RS485 Data: Check D+ & D- connection, Device ID & Output Format
- No 4-20 mA: Check I+ & I- connection, count setting for 4mA& 20mA.
- Minor flow indication at No flow: Set Cut off Span Proper

(For More Information,
Please Contact **ACCUMAX INSTRUMENTS PVT. LTD.**)

10. STANDARD TESTS

- Each finished product is thoroughly checked to establish the product completeness and compliance with the manufacturer's quality assurance standards.
- Subsequently the product functions are tested according to specifications of the approved test directions and subject to at least 24-hour burn-in operation cycle.

11. CALIBRATION AND VERIFICATION TESTS

- The ACCUMAX INSTRUMENTS PVT. LTD. flow meters are supplied from the manufacturing plant calibrated.