

Your vision, automated



MCOM-MFT-03

ELECTROMAGNETIC FLOWMETER



The MCOM-MFT-03 is a flanged or insertion-type electromagnetic flow meter designed for accurate measurement of conductive liquids in industrial, wastewater, chemical, and municipal applications with no moving parts and self-cleaning electrodes, it delivers stable performance, low maintenance, and long service life. The meter operates on Faraday's Law, supports bi-directional flow, offers clear digital indication of flow rate and total, and requires only minimal straight-pipe lengths. Each unit is factory-calibrated and built with durable materials to ensure reliable measurement across a wide range of pipe sizes and process conditions.

➤ MEASURING PRINCIPLE

The measurement is based on Faraday's law of Electromagnetic Induction according to which, when a conductor is moved in a magnetic field, a voltage is induced in the conductor. The voltage induced, in the case of an electromagnetic flow meter is:

$$U=K. B. V. D.$$

K=Instrument constant

B=Strength of magnetic field

V=Average Velocity

D=Pipe diameter.

➤ SPECIFICATION

Pipe size	DN10 to DN2000 (for higher sizes consult factory)	
Flanges	Carbon Steel / SS 316 / SS 316L / SS 304 / ANSI / PN/DIN / BS / SMS / Tri-clamp.	
Pressure	Up to DN 80: PN 40, DN 100 to DN 200: PN 16, DN 250 to DN 350: PN 10	
Temperature	PFA Liner	0-200°C max,
	PTFE Liner	0-150°C max,
	Rubber Liner	0-90°C max,
	(Ambient temperature range 0-85°C).	
Accuracy	±0.5% of reading [at ref. conditions] between 100% to 10% of calibrated range	
	±0.7% of reading for flow rate between 10% to 5%[refer accuracy graph]	
Body materials	Stainless steel / M.S.	
Liner	Soft and Hard Rubber / PTFE / PFA/ Neoprene/Without Lining	
Electrode	Hastelloy 'C' /S.S.316	
Electronics housing	IP67 Die cast aluminium/ flame proof/IP 67/ IP 68	

Power	230VAC/110VAC, 50Hz/24VDC.	
Signal output	4-20 mA dc isolated in max. 600 ohms.	
Frequency output	0-10KHz prop. To 100% Flow rate (open collector with 10 mA/24Vdc max)	
Flow range	0.3mtr/sec to 12 m/sec	
Display digits	for flow rate	for total
	04 Digits	09 Digits
Units	M ³ /Hr	M ³
	Litres/Minute	Litres
	Litres/Second	Litres
	Gallons/Minute	Gallons x 1000
Flow	Bi-directional flow with separate totalizers for forward and reverse flow	

➤ INSTALLATION & GROUNDING

- **POSITIONING THE METER**

These meters can be installed horizontally, vertically and radial position.

- **STRAIGHT PIPE RECOMMENDATION**

As with most flow meters, the MICROMAG requires some straight pipe before and/or after the meter for best accuracy. However, the ability of electromagnetic meters to average the flow across the entire pipe allows for shorter straight pipe recommendations than most mechanical meters.

- **FULL PIPE RECOMMENDATION**

MCOM MFT-03 require a method for determining that the pipe is empty, to prevent false reading. This meter is designed to go to zero reading if one or more electrodes are exposed. For highest accuracy, install the meter so that the pipe will be full when there is flow or in idle condition. If air bubbles may be present in the pipe or sludge accumulation is an issue, rotate the meter by one flange hole to position the control housing at 45° angle.

- **FITTING**

The MICROMAG flanges have standard class ANSI 150 and mate with any other flanges.

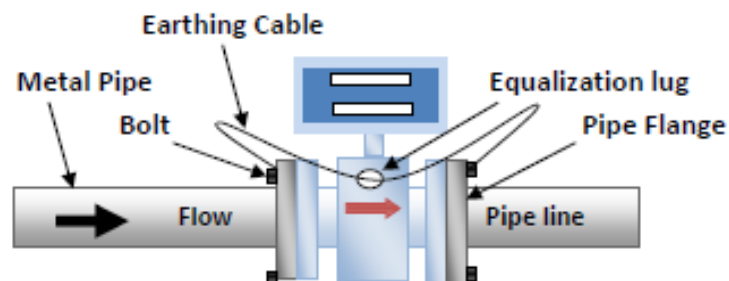
- **CALIBRATION**

The MCOMMFT-03 flow meters are factory calibrated on water velocity of 5-6 m/s and will not require any form of field calibration.

➤ EQUALIZATION & GROUNDING

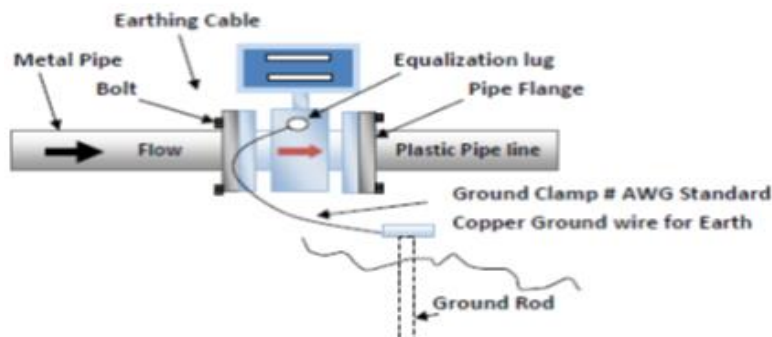
- **METAL PIPE INSTALLATION**

To equalize the electrical potential of the fluid, the MICROMAG meter, and the surrounding pipe secure the flange plates (factory installed on the equalization lug) to both pipe flange at one of the bolt holes, as shown below. Be sure the lock washer fits between the pipe flange and the flange plate.



- **PLASTIC PIPE INSTALLATION**

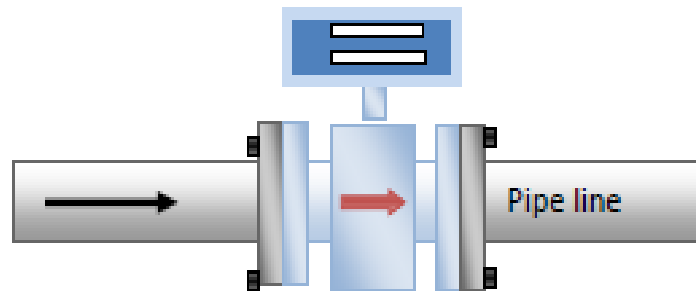
When the flow meter is installed in the plastic piping system, it is not necessary to use the equalization straps, but very important to ground the meter to avoid electrical shock hazard and electrostatic interference with meter function.



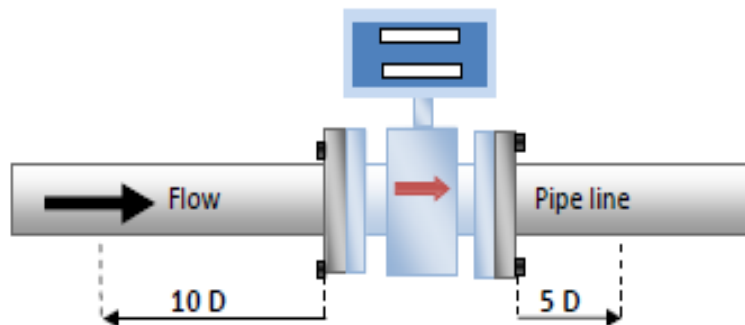
- **COMMISSIONING OF PRIMARY FLOW METER**

The Primary Flow meter can be installed at any point in the pipe run either horizontal or vertical provided the following conditions are met:

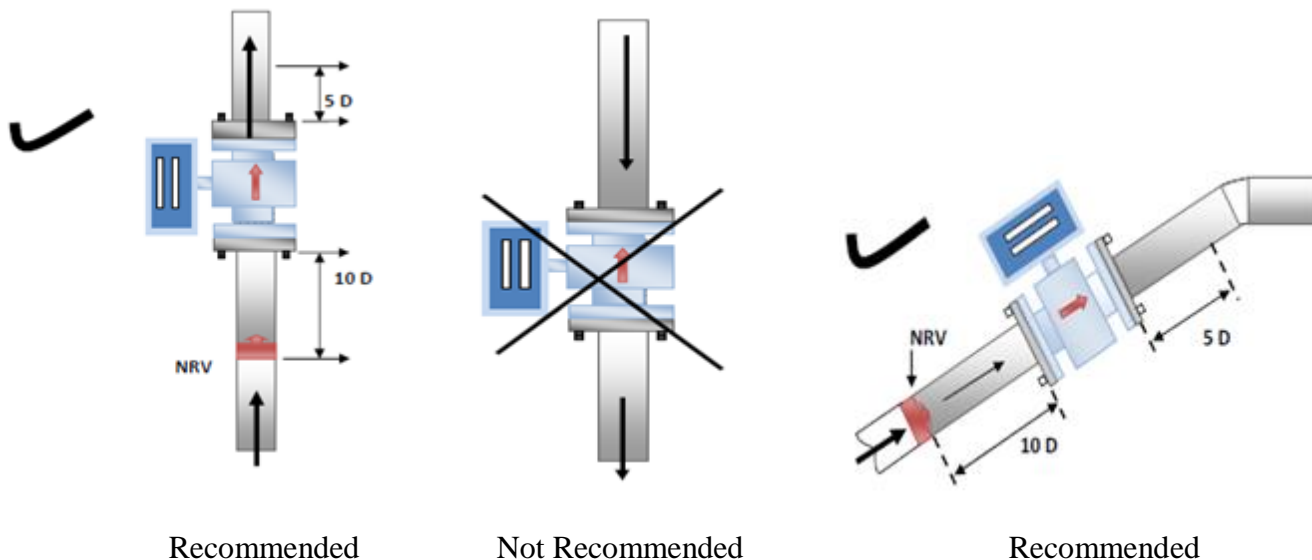
1. The direction of flow through the pipe is same as indicated on the primary flow tube by a red arrow.



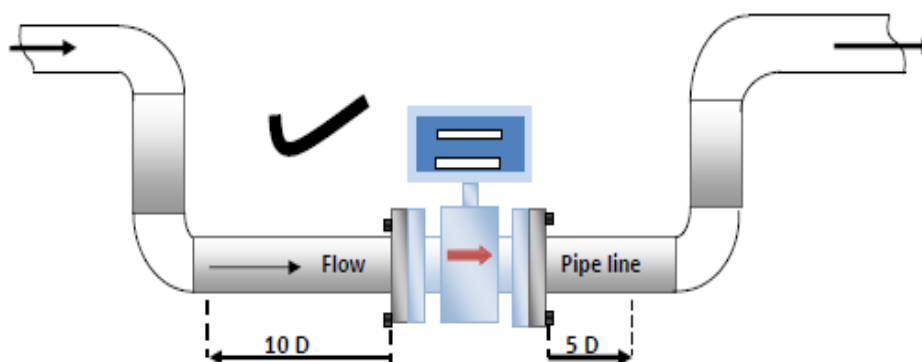
2. Straight lengths of maximum 5D on upstream and minimum 2.5D on down-stream as shown. If disturbances like cork screwing or vortex flow conditions are present straight lengths should be increased or flow straighteners should be used. Flaps, slide gates, valves etc. should be arranged at a distance of at least 5D downstream of primary flow tube.



3. Ensure that primary flow tube remains completely filled by the fluid under measurement even under no flow condition. This ensures trouble free and reliable operation of the Flow Meter. Select a location on the pipe, which will always run full of liquid. For vertical installations the direction of flow against gravity ensures full pipe. Some of the recommended installations are as under -

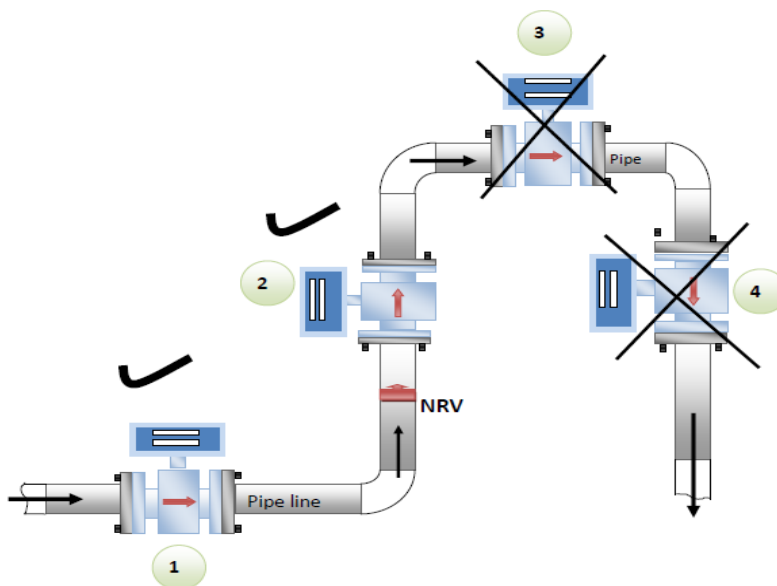


4. open feed or open discharge provide sluice underpass if full pipe cannot be assured, this ensures full pipe under no flow condition.

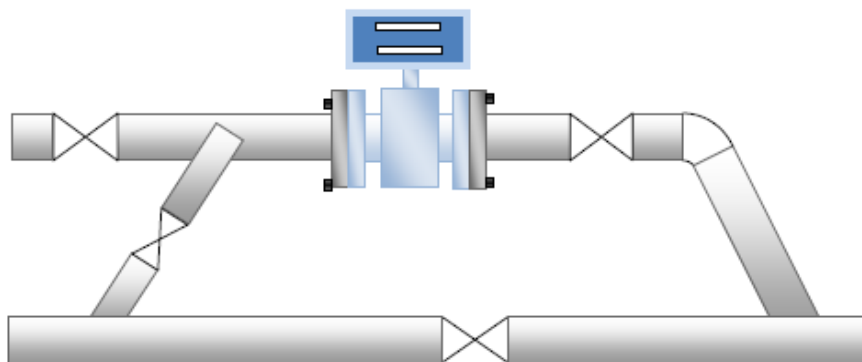


5. Preferred locations:

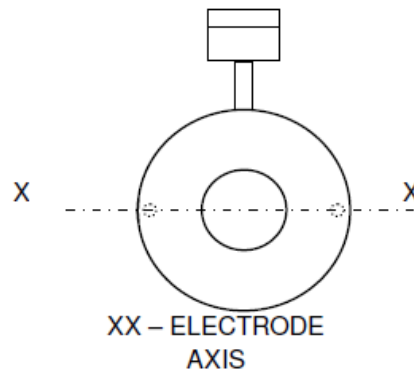
- Location 1 and 2 are recommended locations.
- Location 3 is the highest point in pipe run. This location is not recommended since air bubbles collect in the metering tube which will lead to faulty measurements.
- Location 4 is also not recommended since at zero flow the line will get drained and hence it will give false measurements.



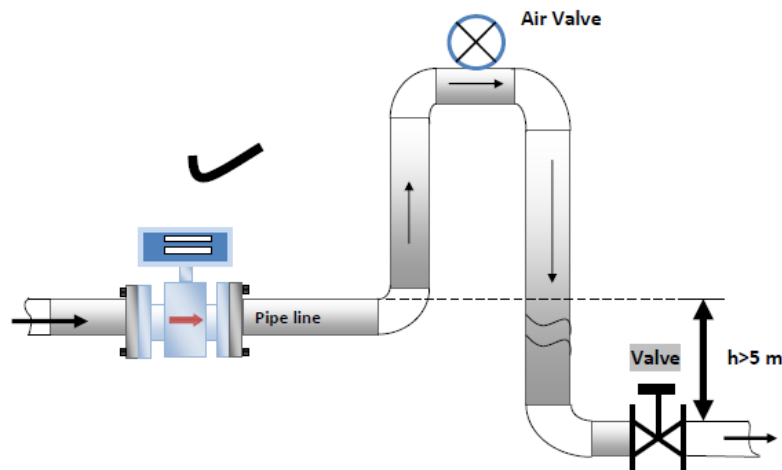
6. In case of heavily contaminated fluids, the primary flow tube should be installed with a bypass pipeline and isolation valves so that it can be removed for cleaning without interrupting operation.



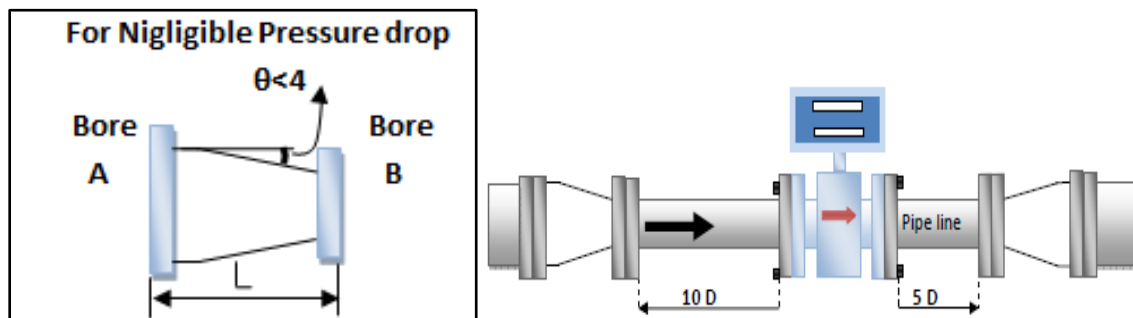
7. For horizontal installations the measuring electrode axis should always lie in horizontal plane to prevent contamination on electrodes and avoid loss of contact of electrodes with fluid because of gas bubbles, if present.



8. It is important to fit air valve as shown if the down pipe is at a height greater than 5 meters to remove:



- Strong Electromagnetic fields** should not be located in the immediate vicinity of the flow tube since these could affect the field generated by the coils in flow tube and hence disturb the reading stability and accuracy. Ensure that no magnetic material other than the pipe and connecting flanges should come in contact with the flow tube.
- Ensure that the minimum conductivity of the fluid** under measurement is greater than $5 \mu\text{s}/\text{cm}$ is maintained. Ensure that the fluid under measurement does not contain magnetic particles in it otherwise it will lead to measurement errors.
- Reducers** should be flanged and generally shall reduce by one size nominal bore otherwise the pressure loss will be high.



The table given below is a general guideline dimensions for reducers.

Nominal Bore A (in mm)	Nominal Bore B (in mm)	Length L (in mm)
40	25	150
50	40	200
65	50	200
80	65	200
100	80	250
150	100	300
200	150	300

❖ Range changes by a factor of 2

Range changes by a factor of specification or a multiple there of are performed simply by means of changing the link configuration.

The following configurations are available for the range adjustment:

Configuration	1	2	3	4	5
Link	BE	AB/BE	AB/BD	AB/BC	AB

Each increase by a positive step in the configurations number represents changes in the full scale range by a factor specification.

Each reduction in the configuration number by a negative step represents changes in the full scale range by a factor commissioning.

Example:

Full scale range 4.5m/s. Existing link configuration 4. The desired new full scale range is 9 m/s. An increase by a factor specification is therefore necessary. For this the link configuration AB/BC must be changes to AB. i.e. link BC must be removed.

After removal, reset the zero and change the name plate to indicate the new full scale range. Link may either directly be connected from pin B to target pin e.g. E or short circuiting all pins between B and target pin.

➤ REPLACEMENT OF CIRCUIT BOARDS

The PCB is replaceable without sensitivity readjustment.

1. Check whether the new circuit board is suitable for the mains voltage.
2. Disconnect the mains voltage.
3. Remove cover plate.
4. Detach the connections to terminal blocks 1-L, 2-N, 3-E and the solder pin.
5. Transfer the range link A...E position the old circuit board to the new one.
6. Fit cover plate.
7. Switch on mains voltage.
8. Adjust zero point at zero flow, check polarity.

➤ REPLACEMENT OF CIRCUIT BOARD POWER SUPPLY (PS)

The PS is replaceable without sensitivity readjustment. The replacement procedure is as follows:

1. Switch off mains voltage.
2. Unscrew cover plate of power supply and disconnect flat cables.
3. Fit new power supply.
4. Plug in flat cable, avoiding twisting into terminal block on power supply.
5. Switch on mains voltage.
6. At zero flow, check zero point of signal output (0-4mA) and if required, readjust zero point, check properly.

➤ RANGE CHANGES

The MCOM-MFT-03 is supplied for a fixed full scale range. The name plate contains the following information:

Full scale range in m³/hr, Ltr/min or Ltr/sec, Serial No., Input.

Note the following when using options.

❖ Conversion of range changes

In order to affect a range changes. The full scale range (m³/hr) for a given meter size (DN in mm or inches) must be converted into the exact flow velocity (v) in m/s or ft/sec. in accordance with the details given in the following table.

- **Flow Table**

DN	V=0.3m/s (min)	V=1m/s	V=12m/s(max)
15	0.1909	0.636	7.634
20	0.3393	1.131	21.20
25	0.5301	1.767	21.20
32	0.8686	2.895	34.74
40	1.358	4.524	54.28
50	2.121	7.068	84.83
65	3.584	11.95	143.2
80	5.429	18.90	217.1
100	8.483	28.2	339.2
125	13.26	44.18	530.1
150	19.09	63.62	763.1
200	33.93	113.1	1357
250	53.02	176.7	2120
300	76.35	254.5	3053
350	103.9	364.4	4156
400	135.8	452.4	5428
500	212.1	706.9	8482
600	305.4	1018	12215

The Optimum flow velocity should be 2-3 m/s or 6-9 ft/s. for products with solid contents it should be between 3 and 5 m/s or 9-15 ft/s. The exact flow velocity can be determined from the columns in the tables. For V= 12m/s as shown in the following example.

Example for m³/h:

Meter size: DN80

Desired measuring range: 55M³/hr

From the table 1 obtain for V = 12m/s the flow rate of 217.1 M³/h at DN80.

$$V = \frac{55m^3/hr}{217.5m^3/hr} \times 12 m/s ; \quad V = 3.04 m/s .$$

➤ TROUBLESHOOTING

Trouble Shooting of Flow Meter MFM			
Problem	Possible fault		Remedy
Instrument is completely dead	1	Fuse blown on power supply board	Replace the fuse a] 500 mA for 230 V ac
	2	Mains supply is not available or is not proper	Apply proper mains supply (Refer label pasted on meter.)
The flow meter shows negative readings.	1	Installation of flow meter is reversed.	Install the flow meter with the direction of flow as indicated by the red arrow on flow meter body.
Flow meter reading is fluctuating.	1	Loose connection	Tighten the connections.
	2	Line is empty or partially filled with the liquid.	Ensure line is full with liquid without bubbles
	3	Air bubbles are present in line or leakage on inlet side	
The flow meter permanently shows zero reading.	1	Terminals 8, 9 & 10 are short circuited externally	Check the connections and remove the short circuit.
Flow meter shows wrong readings.	1	Trim pots are disturbed.	Contact to factory.
	2	Flow tube is partially filled	Ensure Full pipe Flow.
Display shows correct readings but current output (4–20mA) is zero.	1	Terminals 4 & 5 connector may be short circuited externally.	Check / repair the short circuit.
	2	Connections made to terminals 4 & 5 connector may be open.	Check / connect properly.
Current output (4–20mA) is less than the desired output.	1	Trim pots disturbed	Contact to factory.
	2	The current output (4–20mA) is getting loaded.	Verify the load connected across the output terminals 4 & 5. It should be less than 600Ω.

If the above given steps fail to correct the problem call factory or send Flow Meter back to factory. Please have the following information available when you call:

- a. Meter Serial Number
- b. Detailed description of the problem.
- c. When does the problem occur or repeat?
- d. What is the meter size, Full scale flow rate, meter constant, service liquid of the flow meter?
- e. What is the output load on the meter, grounding technique used?

➤ DISPLAY

Flow rate indicator cum totalizer manual

❖ Specification

1. Microcontroller based.
2. Supply: 5V DC
3. Input: 4 to 20 mA

❖ Display

- Line 1: 9 digit display indicating current reading of TOTAL FLOW.
- Line 2: 4 digit display will show FLOW RATE.

❖ Front keys



*Above mentioned keys are used to set the parameters and enter password.

❖ Operation

a) Set unit

- Press SW1 key to change LPS, LPM, LPH, and M³/Hrs.
- Use SW3 key to select the parameter
- Total flow line will indicate LPS or LPM or LPH or M³/ hour.

b) Set flow decimal

- Press SW1 again press to Set Flow Decimal.
- Use SW2 key to select Flow Decimal.

c) Set low range

- Press SW1 again.
- Display will indicate Set Low Range.
- Press SW2 key to shift editing digit and SW3 key to change editing digits value.
- Maximum value of low range selection will be < higher range.

d) Set High Range

- Press SW1 again.
 - Display will indicate Set High Range.
 - Press SW2 key to key to shift editing digit and SW3 key to change editing digits value.
 - Display will indicate High range up to 9999.
 - Maximum value of Flow range selection will be 9999 M³/Hrs.
 - And total count digit shows “**PASS 4mA**”.
 - If user presses SW1 the calibration mode is discarded and totalizer continues its working, if user needs to calibrate then pass 4 mA and press SW4.
 - Now total count digit shows “**PASS 20mA**”.
- Now pass 20 mA and press SW4 to calibrate **Enter Password**.

There are two modes in which you have Password which are mentioned below:

1) Reset Total Count

When you want to reset the total flow count on the display follow procedure given below.

- Press SW4 for 3 Sec then release SW4 flow rate digits will show “**PASS**” and right most digit of total count will show “**0**”
- Now Press SW3 for 5 times now the right most digit of total count will show “**5**”.
- Now flow rate digits will show “**TF**”.
- If user press SW1 the reset mode is discarded and totalizer continue its working, but if user presses SW4 then total count will reset to 0.

2) Calibration Mode

When you want to calibrate the LED FIT module follow procedure given below.

- Press SW3 for 3 Sec then release SW3 flow rate digits will show “PASS” and right most digit of total count will show “0”
- Now press SW2 for 3 times now the right most digit of total count will show “3”.

Now flow rate digits will show “CALB

MODERN COMMUNICATION TECHNOLOGY

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