ELECTRONET

USER MANUAL FOR
FULL BORE ELECTROMAGNETIC
FLOW METER
MODEL NO. :- ELMAG 200

Authorised Dealer

NK Instruments Pvt. Ltd.

B-501/504, 5th floor, Raunak Arcade, Near THC Hospital, Gokhale Road, Naupada,
Thane(W) 400602. Maharashtra INDIA
Telefax Nos.: 91-22-25301330 / 31 / 32
E-Mail: sales@nkinstruments.com
Web: http://www.nkinstruments.com
Skype: nitinkelkarskype
Gtalk: nkinstruments2006

ORDERING DTAILS

Instrument Name : Full Bore Type Electromagnetic Flow Meter
Model No. : ELMAG 200
Serial No. :

Code	Description	As Applicable
Line Size		
01	½ Inch (15NB)	
02	¾ Inch (20NB)	
03	1 Inch (25NB)	
04	1¼ Inch (32NB)	
05	1½ Inch (40NB)	
06	2 Inch (50NB)	
07	2½ Inch (65NB)	
08	3 Inch (80NB)	
09	4 Inch (100NB)	
10	5 Inch (125NB)	
11	6 Inch (150NB)	
12	8 Inch (200NB)	
13	10 Inch (250NB)	
14	12 Inch (300NB)	
15	14 Inch (350NB)	
16	16 Inch (400NB)	
17	18 Inch (450NB)	
18	20 Inch (500NB)	
19	24 Inch (600NB)	
20	28 Inch (700NB)	
21	32 Inch (800NB)	
22	36 Inch (900NB)	
23	40 Inch (1000NB)	
24	Other	
Calibration Range		
01		
Flow Direction		
01	Forward	
02	Reverse	
Lining Material		
01	PTFE	
02	Rubber	
03	Other	
Flange Material		
01	CS/MS	
02	SS304	
03	SS316	

Code	Description	As Applicable
Coil Housing Material		
01	MS	
02	SS304	
03	SS316	
Electrode Material		
01	SS316L	
02	Hastalloy C	
03	Platinum	
04	Other	
Electronic Enclosure		
01	Aluminum die cast	
02	SS304	
Output		
01	4-20mA DC	
02	4-20mA DC + Pulse Output	
03	4-20mA DC + HART Output	
04	All (4-20mA DC + Pulse Output +HART Output)	
Communication Output		
01	RS485	
02	Data Logger	
03	RS232	
04	GSM	
Alarm Output		
01	Low	
02	High	
03	Batch	
Power Supply		
01	90-260V AC,50Hz	
02	24V DC	
03	48V DC	
Cable Gland		
01	M20 x 1.5 double compression	
02	1/2" NPT(F)	
03	3/4 ET	
Accessories		
01	Power cable	
02	Cable gland	
03	Magnetic key chain	
04	‘U’ clamp	
05	Grounding Ring	
06	Other	

CONTENTS

1. INTRODUCTION

1.1 Item Supplied :

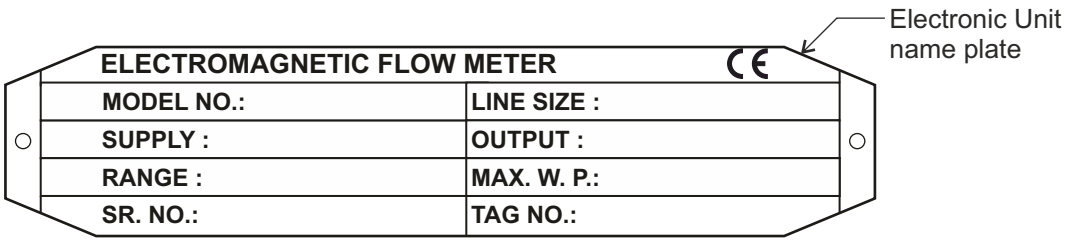
- ☐ ELMAG 200 flow meter
- ☐ User Manual
- ☐ Calibration Certificates
- ☐ User Manual CD

Inspection :

- Check for mechanical damage due to possible improper handling during shipment. All claims for damage are to be made promptly to the shipper.
- Make sure the scope of delivery and the information on the name plate corresponds to the ordering information.

1.2 Device Identification :

The Model no. and Specification are found on name plate, located on top of electronic housing. Check the Model no. & Specifications you have ordered.



1.3 Reading User Manual :

- This manual should be provided to the end user.
- Before use, read this manual carefully and compare the instrument specification.
- The contents of this manual may be changed without prior notice.

1.4 Warranty terms :

- The terms of this instrument that are guaranteed are described in the quotation. We will make any repairs that may become necessary during the guaranteed term free of charge.
- Please contact our sales office if this instrument requires repair.
- If the instrument is faulty, contact us with concrete details about the problem and the length of time it has been faulty, and state the model and serial number. We would appreciate the inclusion of images or additional information.
- The results of our examination will determine whether the meter will be repaired free of charge or on an at-cost basis.

2. SAFETY INSTRUCTIONS

2.1 General Instructions:

- This flow meter was carefully calibrated at the factory before shipment. When meter is delivered, visually check that no damage has occurred during transportation
- Read User manual carefully and understand instructions & directions provided in this manual.
- In general, devices from the manufacturer may only be installed, commissioned, operated and maintained by properly trained and authorized personnel.
- Look at the ordering detail to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.
- Before powering up the meter, consider the following:
  - Is the meter installed according to the direction of flow as marked on the meter.
  - Has the wiring been carried out correctly and have all safety procedures been adhered to. Is the supply voltage correct.
  - Has the flow meter been properly earth.
  - Lethal power supply voltages may be present, do not apply power with the signal converter cover or terminal box cover removed.
- The following principles should be considered during installation:
  - If there is a noisy power supply voltage (especially peaks generated, usually by motors), use an external power supply filter between the flow meter and power supply.
  - Protect the flow meter and the internal lining of the sensor pipe from mechanical damage, especially during installation or cleaning.
  - Do not expose the flow meter to intense vibration.

2.2 Storage Precautions:

- Store the device in a dry, dust-free location.
- Avoid continuous direct sunlight.
- Store the device in its original packing.
- Storage temperature: 0 to 55°C

2.3 Installation Location Precautions:

- Installation of the Electromagnetic flow meter must be performed by expert engineer or skilled personnel. No operator shall be permitted to perform procedures relating to installation.
- The Electromagnetic flow meter is a heavy instrument. Be careful that no damage is caused to personnel through accidentally dropping it, or by exerting excessive force on the electromagnetic flow meter. When moving the electromagnetic flow meter, always use a trolley .
- When the electromagnetic flow meter is processing hot fluids, the instrument itself may become extremely hot. Take sufficient care not to get burnt.

Note : IP68 Certification is valid if cable glanding is done as per mentioned cable glanding procedure (Point no. 9.2, page no.11&12) also safety precautions must be strictly maintained

3. APPLICATION

ELMAG 200 is microprocessor based full bore type electromagnetic flow meter specially used for various industrial applications. This flow meter accurately measures the flow rate of conductive liquids & slurries in closed pipes. Due to simple, rigid & obstruction less design the flow meter is a maintenance free instrument in place of conventional mechanical flow measuring device. ELMAG 200 standard configuration is a sensor with transmitter integrated in one unit. It's performance is independent of temperature, pressure, density and viscosity of the medium. ELMAG 200 is a flanged meter available in sizes from DN 10 to DN 1000. The rugged flow sensor is constructed from completely welded construction. In the instrument, the sensor and the electronics form one mechanical entity. A retransmission output of 4-20 mA is provided. The use of 'Pulsed DC ' excitation technology offers highest ability & better measuring accuracy in the form of electrical signal 4 - 20 mA DC linearly proportional to volumetric flow.

Sensor : The sensor consists of metering pipe; electrodes and coils. It is accommodated in welded and a fully encapsulated steel enclosure.

Electronics : The conditioning electronics circuitry is housed in a cast aluminum connection box. The termination of this electronics is given in the same housing through cable glands for the required connecting cables.

Applications:

- ☞Applications include measurement of flow on conducting liquids and slurries (even highly corrosive and abrasive) in chemical and petrochemicals, pharmaceutical, fertilizers, foodstuffs, dairy, sugar, breweries, paper, steel, mining industries etc.
- ☞Monitoring water flow in cooling systems in steel plants, power plants etc.
- ☞Measuring flow of clean water, effluent, sludge etc. In pollution and environmental control.
- ☞The isolated 4-20 mA output proportional to flow can be fed to PLCs, DCS or remote mounted indicator.

4. OPERATING PRINCIPLE

The flow meter is designed for electrically conductive fluids. Measurement is based on Faraday's law of induction, according to which a voltage is induced in an electrically conductive body, which passes through a magnetic field.

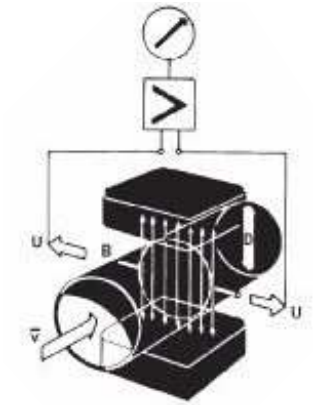


Fig.1

The following expression is applicable to the voltage:
U = K x B x v x D
Where:
U = induced voltage
K = an instrument constant
B = magnetic field strength
v = mean velocity
D = pipe diameter

Thus the induced voltage is proportional to the mean flow velocity, when the field strength is constant. Inside the electromagnetic flow meter, the fluid passes through a magnetic field applied perpendicular to the direction of flow. An electric voltage is induced by the movement of the fluid (which must have a minimum electrical conductivity). This is proportional to the mean flow velocity and thus to the volume of flow. The induced voltage signal is picked up by two electrodes, Which are in contact with conductive fluid and transmitted to the signal converter.This method of measurement offers the following advantages:

1) No pressure loss through pipe.
2) Since the magnetic field passes through the entire flow area, the signal represents a mean value over the pipe cross-section; therefore, only relatively short straight inlet pipes x DN from the electrode axis are required upstream of the primary head.
3) Only the tube liner and the electrodes are in contact with the fluid.
4) The signal produced is an electrical voltage, which is an exact linear function of the mean flow velocity.

5. TECHNICAL DETAILS

5.1 Specifications:

5.1.1 Electronics Unit Specifications:

Instrument Name	: Full Bore Type Electromagnetic Flow Meter
Model No.	: ELMAG 200
Media	: Conductive Liquids & slurries
Calibration Range	: As per customer requirement
Display	: 16X2 Alphanumeric LCD, 6 digit for flow rate & 8 digit for totaliser
Power Supply	: 1) 90-260V AC, 50Hz 2) 24V DC 3) 48V DC
Power Consumption	: Less than 10VA
Response Time	: 2Sec.
Accuracy	: +/-0.5% of full scale
Linearity	: +/-0.5% of full scale
Isolation	: 1.4KV Between input & Power supply
Output	: 1) 4-20mA DC 2) Pulse output (Open collector OR 12V DC Amplitude) 3) Relay O/P(1c/o,1Amp @ 230V AC for Low/High/Batch alarm)
Communication Output	: 1) 4-20mA DC with HART 2) RS485 supporting MODBUS RTU Protocol 3) RS232 4) GSM
Flow Direction	: 1) Forward 2) Reverse
Temperature	: 1) Ambient : 0 to 55 ^{0}C 2) Storage : 0 to 55 ^{0}C
Relative Humidity	: 10-95% RH, non condensing
Cable Entry	: M20 x1.5 Double Compression Cable Gland, ½" NPT
Mounting	: In Line - Horizontal / Vertical
Transmitter Enclosure	: Aluminum Die cast
Protection Class	: IP66

5.1.2 Flow Sensor Specifications:

Line Size	: 15NB to 1000NB
Material of Construction	: 1) Coil housing : MS / SS 2) Electrode : SS 316L / Hastalloy C / Platinum 3) Flange : CS / MS / SS 304 / SS 316 4) Lining : Rubber / PTFE
Mechanical Connections	: Flange / SMS union / Threaded / Tri clover
Media conductivity	: > 20 µs/cm
Limit flow velocities of measured liquid	: 6 m/s
Viscosity	: 200cp (max.)
Direction of Flow	: Direction of Arrow on Meter
Protection class	: IP68
Process Temperature	: 1) 0 to 85° C(For Rubber Lining) 2) 0 to 120° C(For PTFE Lining)
Operating Pressure	: 0 to10Kg/cm^{2}

6. ASSEMBLY OVERVIEW

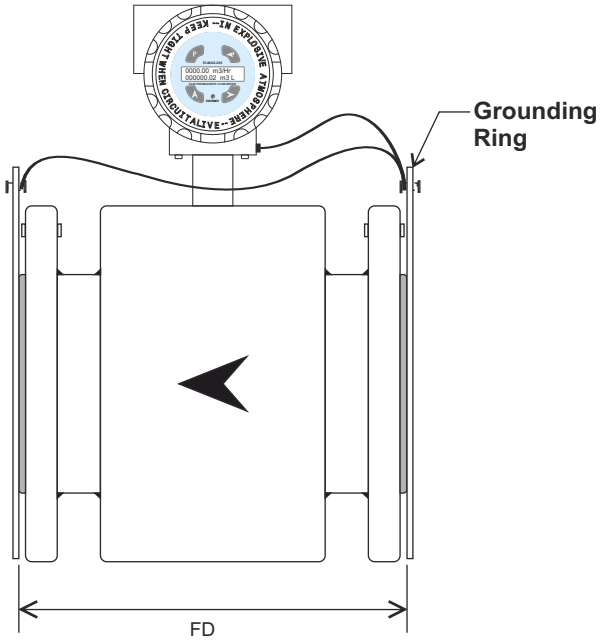


Fig.2 FRONT VIEW

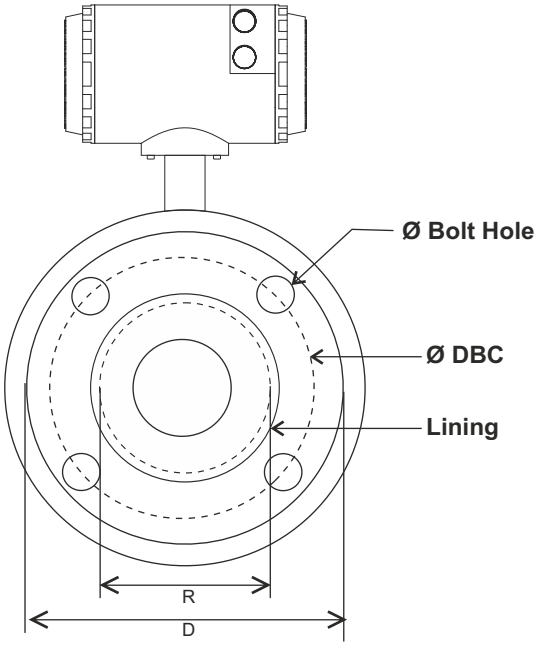


Fig.3 SIDE VIEW WITH FLANGE DETAILS

DIMENSIONAL DETAILS OF FLANGE(AS PER ASA150 # B-16.5):

Line Size		Flange Diameter D (mm)	Diameter of Raised Face R (mm)	Diameter of Bolt Hole Circle DBC (mm)	Diameter of Bolt Hole (mm)	No. of Holes	Thickness of Flange	Housing OD (mm)	Flange to Flange Distance (FD) (mm)
Inch	NB								
½"	15	88.9	34.9	60.3	15.9	4	11.1	125	200
3/4"	20	98.4	42.9	69.8	15.9	4	12.7	125	200
1 "	25	107.9	50.8	79.4	15.9	4	14.3	145	200
1 ¼ "	32	117.5	63.5	88.9	15.9	4	15.9	155	200
1 ½ "	40	127.0	73	98.4	15.9	4	17.5	155	200
2"	50	152.4	92.1	120.6	19.0	4	19.0	165	200
2 ½ "	65	177.8	104.8	139.7	19.0	4	22.2	185	200
3 "	80	190.5	127.0	152.4	19.0	4	23.8	205	200
4"	100	228.5	157.2	190.5	19.0	8	23.8	245	250
5 "	125	254.0	185.7	215.9	22.2	8	23.8	265	250
6"	150	279.4	215.9	241.3	22.2	8	25.4	285	300
8"	200	342.9	269.9	298.4	22.2	8	28.3	355	350
10"	250	406.4	323.8	361.9	25.4	12	30.2	405	450
12"	300	482.6	381.0	431.8	25.4	12	31.8	485	500
14"	350	533.4	469.9	476.2	28.6	12	34.9	555	500
16"	400	596.9	533.4	539.7	28.6	16	36.5	605	600
18"	450	635.0	584.2	577.8	31.7	16	39.7	605	600
20"	500	698.5	692.1	635.0	31.7	20	42.9	605	600
24"	600	812.8	692.1	749.3	34.9	20	47.6	605	600

*** Note : Flange to flange distance (FD) Tolerance : 1) 1/2"(15NB) to 6"(150NB) : +/-3mm**
2) 8"(200NB) to 24"(600NB) : +/-5mm

Note : All dimensions are in 'mm'

7. KEY BOARD DETAILS

P 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 start Batch operation

▶ Shift Key : This key is used to :-
1) Shift the cursor to the next digit.
2) To stop Batch operation

↵ Enter Key : This key is used to :-
1) Validate the function or value of parameter.
2) To toggle between totaliser & batch totaliser in batch mode.
3) Press this key for 5 to 6 sec. to reset totaliser

8. TERMINATION DETAILS

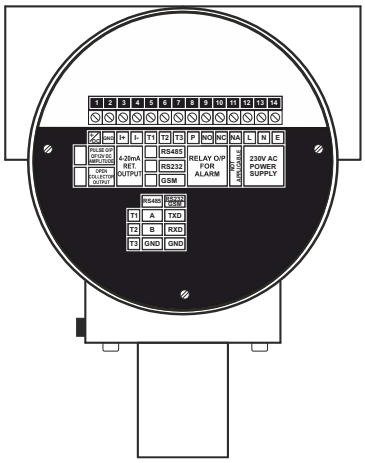


Fig 4 . 230V AC operated flowmeter Rear View

1	+ / OC	Open Collector Output	PULSE O/P OF 12V DC AMPLITUDE
2	GND		
3	I+	4-20 mA DC RET. OUTPUT	
4	I-		
5	T1	RS485	RS232 / GSM
6	T2		
7	T3		
8	P	Relay O/P For Alarm	
9	NO		
10	NC		
11	NA	Not Applicable	
12	L	230V AC Power Supply	
13	N		
14	E		

	RS 485	RS 232 / GSM
T1	A	TXD
T2	B	RXD
T3	GND	GND

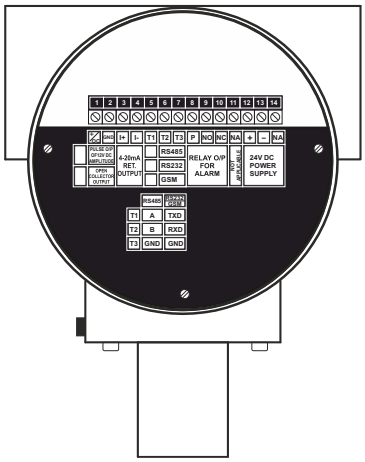


Fig 5 . 24V DC operated flowmeter Rear View

1	+ / OC	Open Collector Output	PULSE O/P OF 12V DC AMPLITUDE
2	GND		
3	I+	4-20 mA DC RET. OUTPUT	
4	I-		
5	T1	RS485	RS232 / GSM
6	T2		
7	T3		
8	P	Relay O/P For Alarm	
9	NO		
10	NC		
11	NA	Not Applicable	
12	+	24V DC Power Supply	
13	−		
14	NA		

	RS 485	RS 232 / GSM
T1	A	TXD
T2	B	RXD
T3	GND	GND

8.1 HART Communication Details :

a) Instructions:

1) Connect 250Ω resistor across I+ & I- terminal at flow meter termination.

2) Now connect the HART communicator probe across the 250Ω resistor.

3) For HART functionality checking refer communicator manual

b) Loop Diagram :

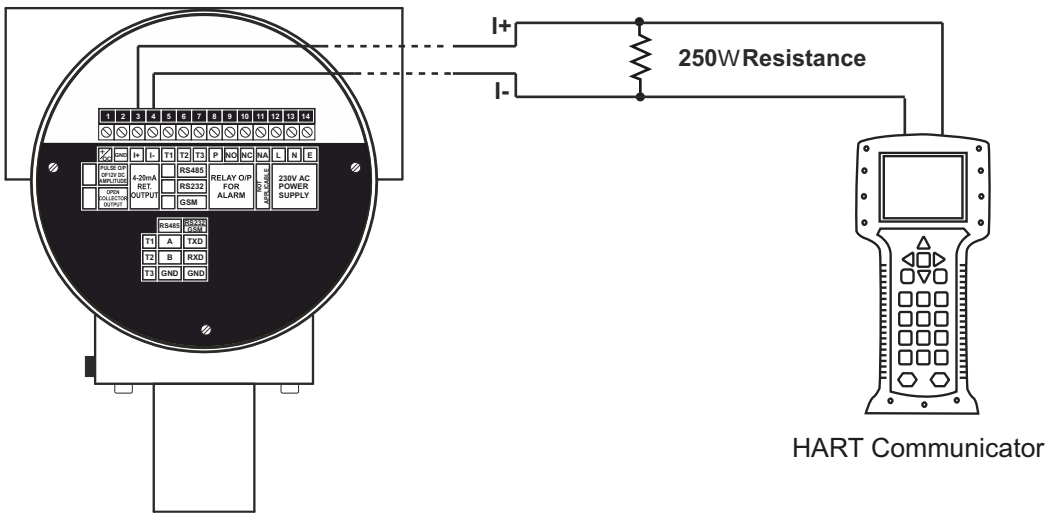
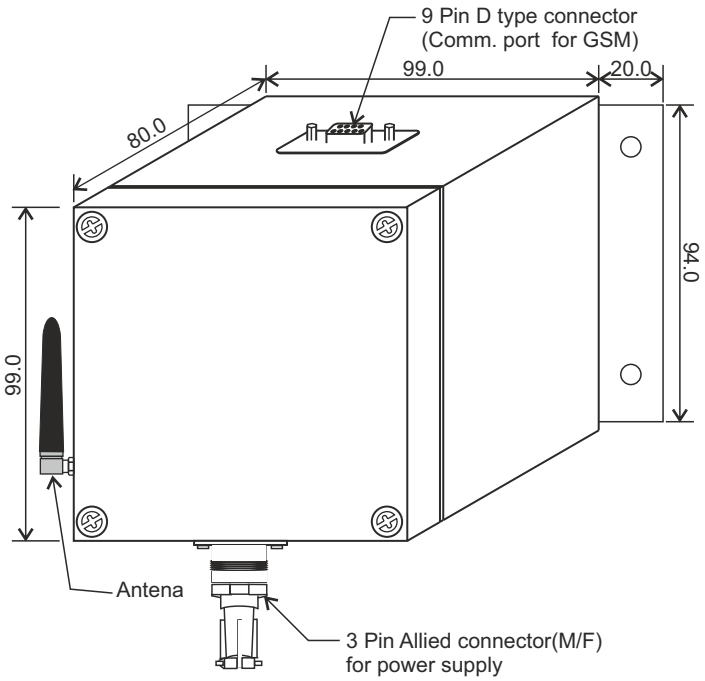


Fig 6 . Rear View

8.2 GSM Module Details :



9 Pin D Type Connector Details	
Pin No.	Description
1	No Connection
2	TXD
3	RXD
4	No Connection
5	GND
6	No Connection
7	No Connection
8	No Connection
9	No Connection

Fig.7 GSM Module

Loop Diagram Flow Meter with GSM Module :

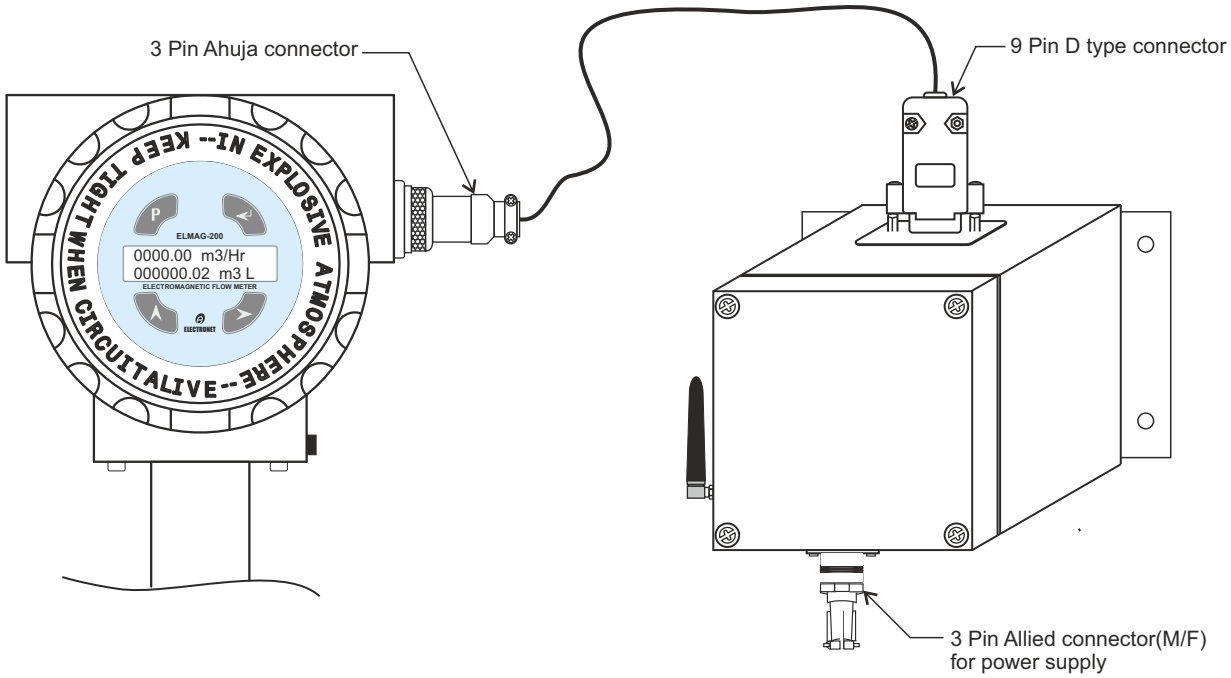


Fig 8 . Loop Diagram

Procedure for Insert or Remove SIM Card :

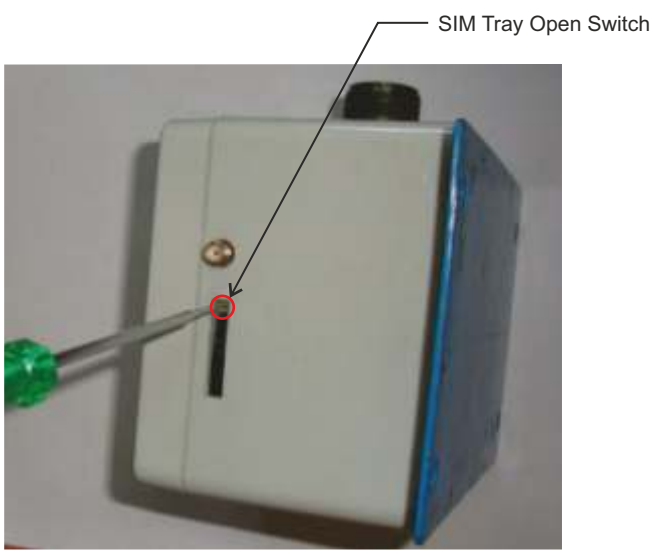


Fig.9 GSM Module SIM Try Open Switch position

Fig.10 GSM Module SIM Try position

1) Switch o ffpower supply.
2) Press SIM Tray open switch (As shown in fig 9).
3) By pressing open switch, Open the SIM tray insert SIM (As shown in fig 10).
4) Insert the tray & Power ON GSM Module.

9. INSTALLATION DETAILS

9.1 How to Install Flow Meter :-

1) Flowmeter can be installed in any position either vertical or horizontal.

2) The meter may be installed in horizontal or vertical pipelines. If a vertical pipeline installation is desired, the meter should be installed with the direction of flow being upwards, to ensure a full pipe under low flow conditions. If a horizontal installation is desired the measuring electrodes should be installed in the horizontal plane in order to prevent entrained air or gasses collecting at the electrodes. The effect of this would be that the meter would give inaccurate and unstable readings.

3) For horizontal installation, the electrode axis should always be in horizontal plane.

4) The flow meter should be installed away from electrical motors, transformers, inverter and other power sources in order to avoid interference with measurement. Install the flow meter in a location where it is not exposed to direct sunlight.

5) Be sure to choose a gasket with inner and outer diameters that does not protrude inside the piping If the inner diameter of the gasket is too large, or outer diameter of the gasket is too small, fluid leakage may result.

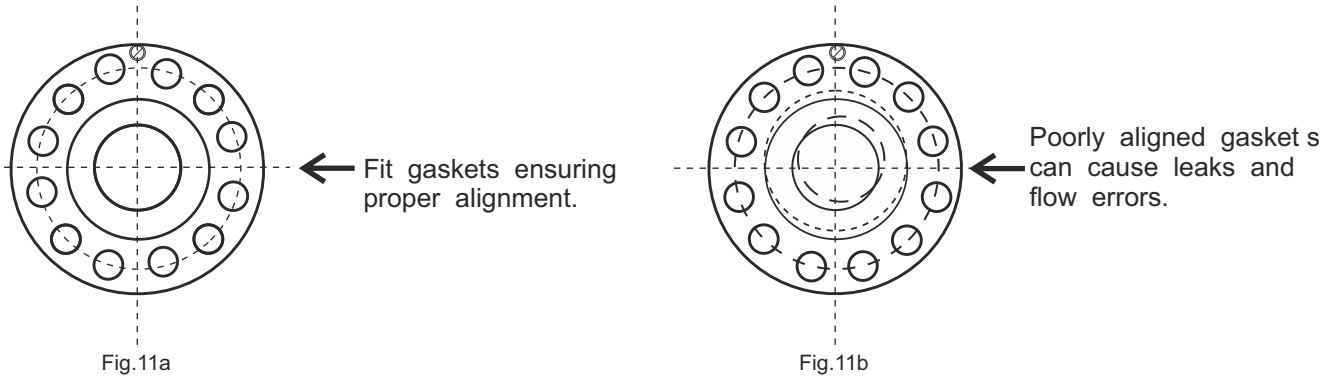


Fig.11a Fig.11b

Fig.11 Gasket Alignment

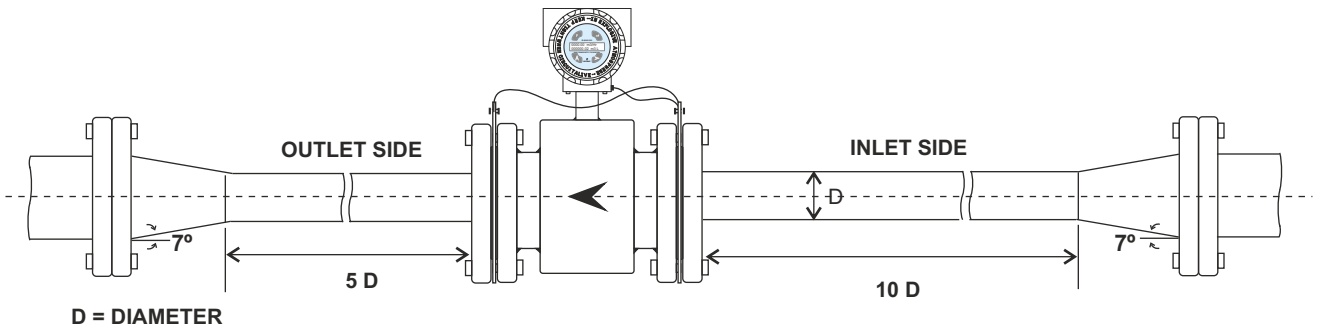


Fig.12 Flow Meter Installation With Reducer

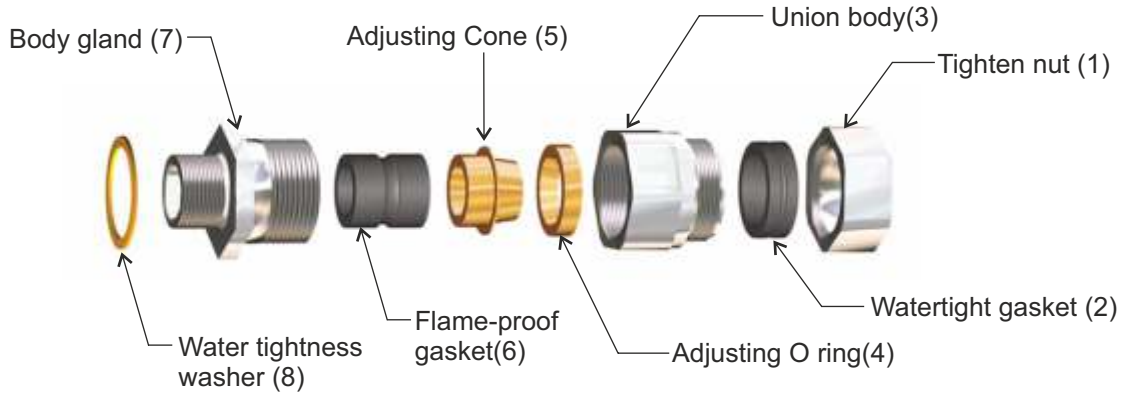
6) If pipeline is bigger than the size of flow meter, use Reducers as shown in Fig-10

7) At inlet side, straight run to be maintained 10 times of flow meter bore size ‘ D’and similarly 5 times of ‘D’at outlet side.

8) Flange size to be selected as per pipeline and flow meter size.

9.2 Cable Glanding procedure :

a) Cable Glanding For Armoured Cable :



Assembly Method :

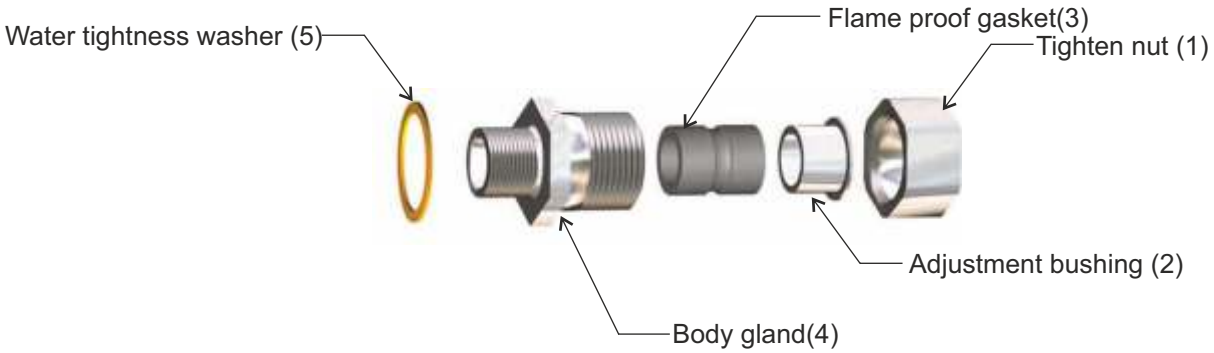
1) Grease all the threads.
2) Peel the end of the cable, considering that the length "X" until the wiring position must include the body length between threads.
3) Cut the metal mesh leaving an useful length as long as the conic zone of the clamping and earthing cone plus 1or 2 mm.
4) Thread the tighten nut with the weather proof gasket inside (1), the reduction body (3), the clamping and earthing ring so that the main side cone remains at the cut end of cable.

5) Open the metal mesh in such a way that it "copies" the adjustment cone. Thread it.

6) Thread the body gland, with water tightness washer to the other cable glands side.
7) Thread the body gland at the entry with the appropriate wrench until it has been adjusted definitively.
8) Then thread the union body (3) and the lock nut (1) with a considerable adjustment (with the appropriate wrench).

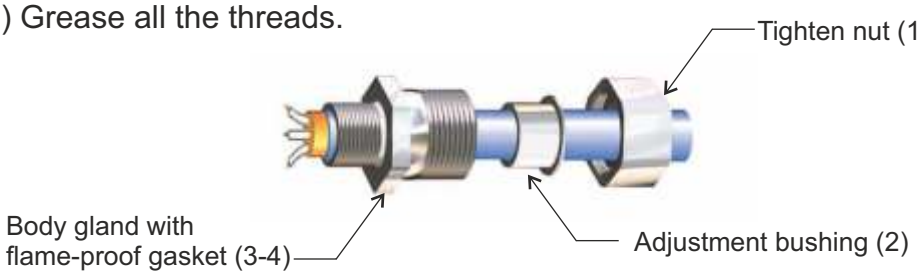
9) In case of cable glands for "e mode" protection or weather proof, add the water tightness washer (8).

b) Cable Glanding For Non Armoured Cable :

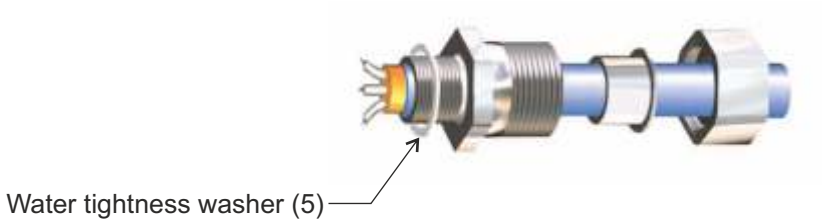


Assembly Method :

1) Grease all the threads.



2) Thread in the cable, the tighten nut (1), the adjustment bushing (2) and body gland (4) with the flameproof gasket (3) toward of the side of the other part of the cable gland.
3) Thread the body gland at the entry with the appropriate wrench until it has been adjusted definitively.
4) Thread all the parts with a considerable adjustment (with the appropriate wrench).
5) In cases of cable glands for “e” protection or weather proof, add the watertightness washer.



9.3 Safety Precautions :

a) Flow meter must be properly grounded or earth according to local electric codes.
b) Install signal wiring separate from the high voltage power cable.
c) After termination cabling , fit back cover properly to maintain IP certification.

9.4 Installation Position:

a) Horizontal Position:

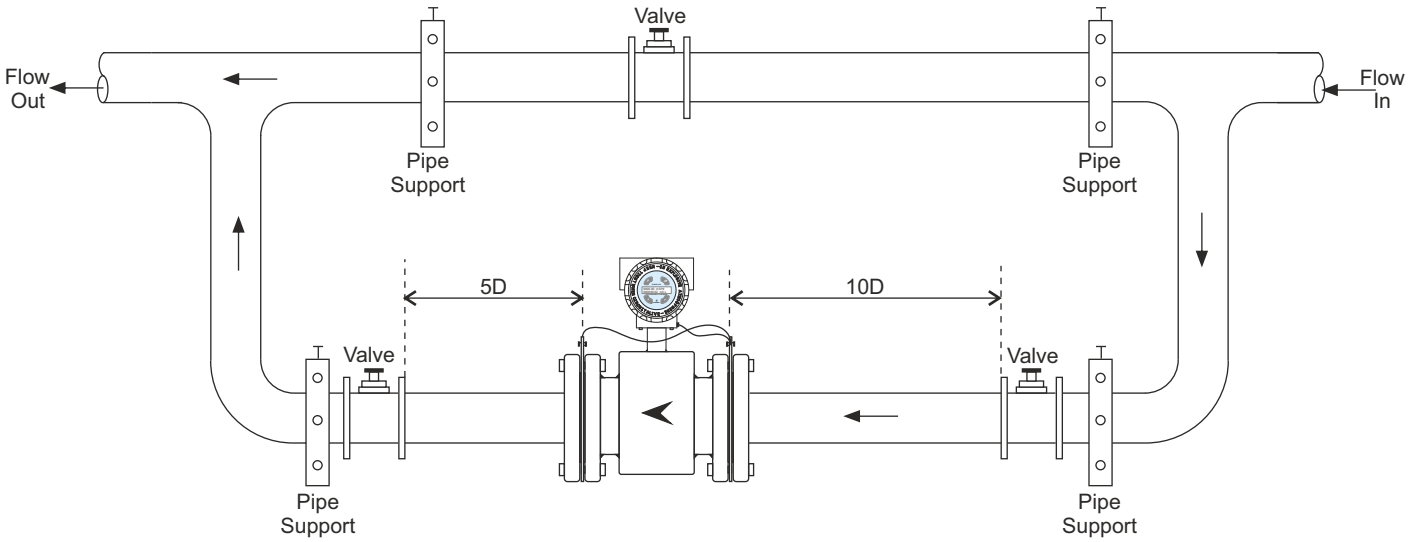


Fig.13 FLOW METER INSTALLATION IN HORIZONTAL POSITION

b) Vertical Position:

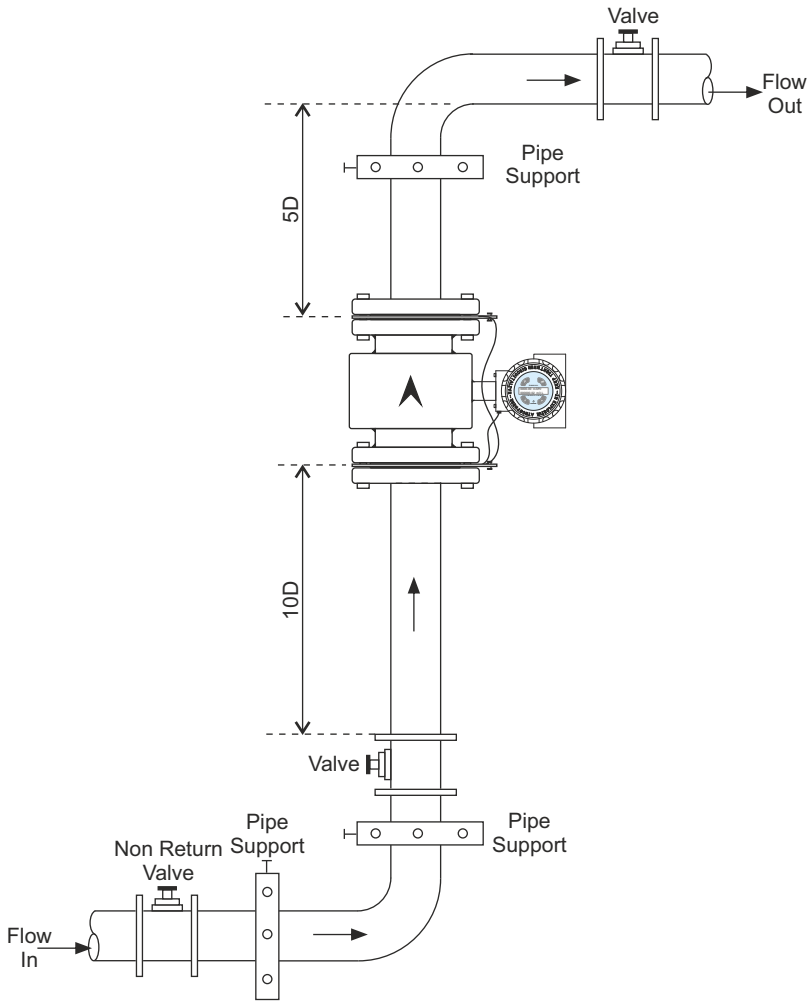
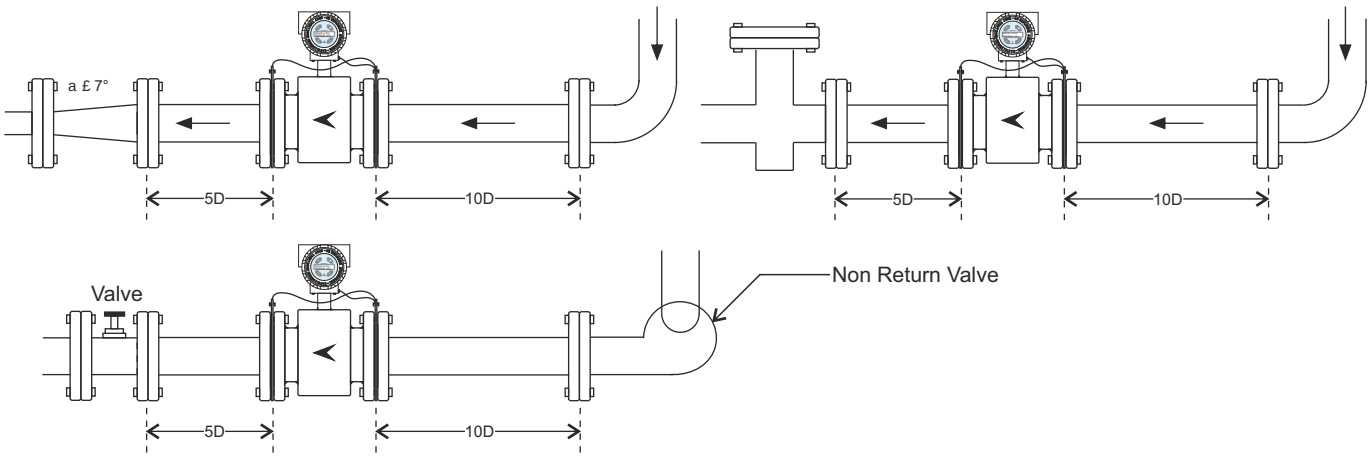


Fig.14 FLOW METER INSTALLATION IN VERTICAL POSITION

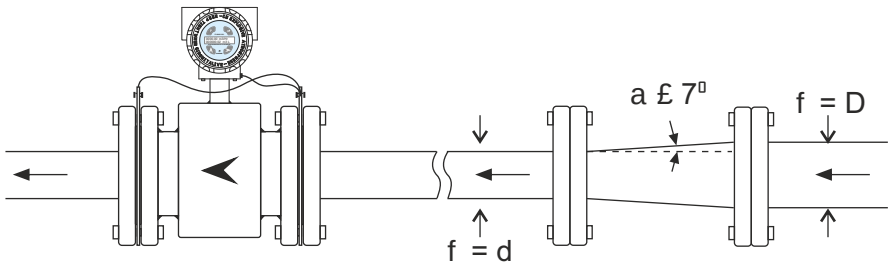
9.5 Pipe System :

1.The flow sensor must be mounted in a location which is free from interfering elements like valves, Ts, bends, pumps, etc. to ensure a laminar flow without turbulence upstream of the flow sensor. For that reason the flow sensor must be mounted in a straight pipe at a distance from interfering elements of minimum 10 x DN upstream and minimum 5 x DN downstream.



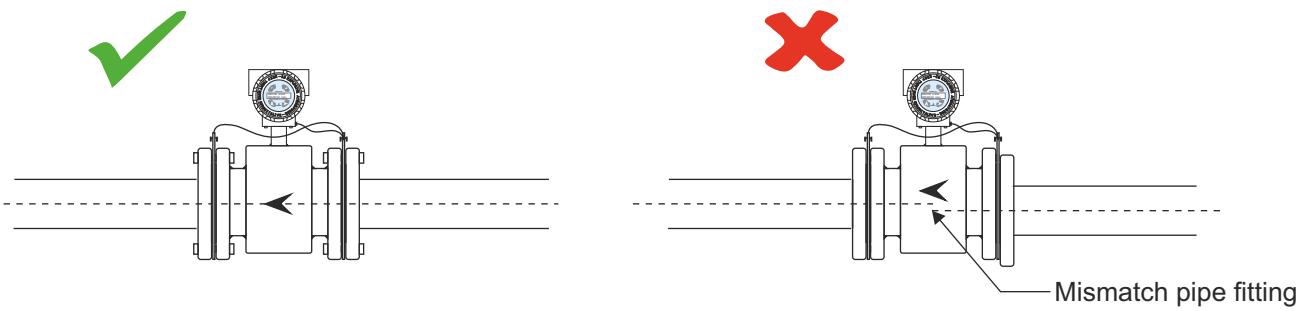
Important: Valves should always be mounted on the downstream side of the flow sensor!

2. If it becomes necessary to use reducers, the inner angle must not exceed 7°.

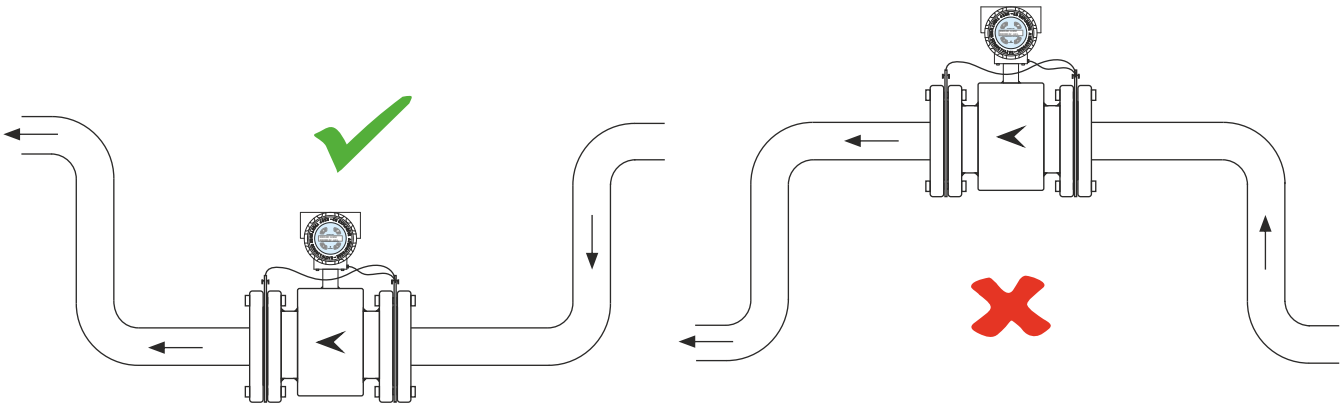


The minimum length to keep the angle below 7° can be checked by means of the formula below:
L= (D - d) / (2 x tana) where "D" is the large diameter and "d" the small diameter of the reducer.
Example: If a flow sensor in dimension DN 65 is mounted downstream of a 80 mm pipe,the reducer must then have a length of minimum 108.80 mm in order to keep the inner angle below 7°.

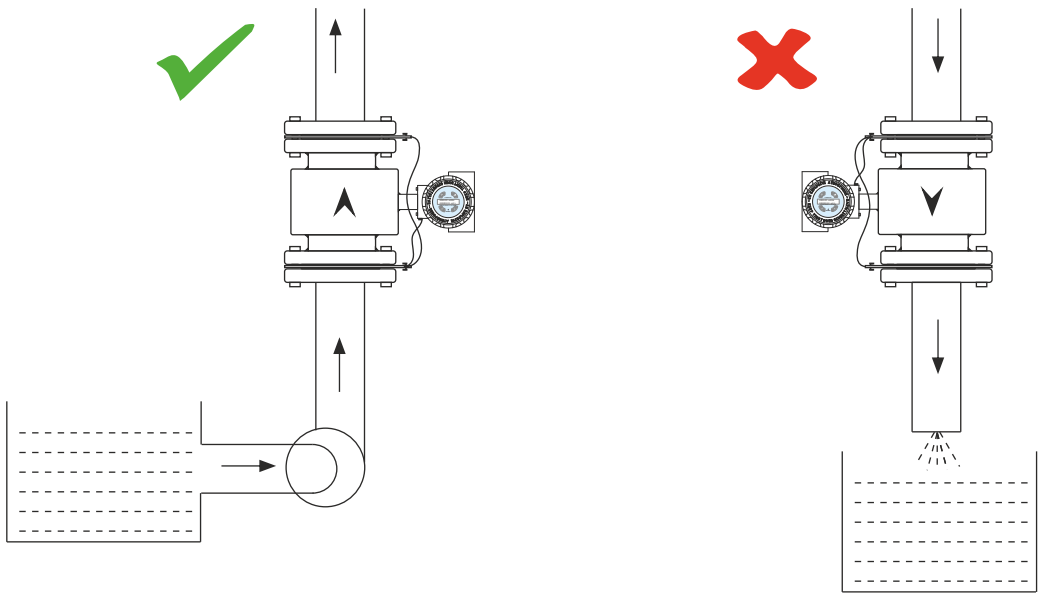
3. Flange connections must be assembled concentrically on both the upstream and the downstream side. Due to improper connection assuring accuracy of flow meter will be affected.
Note:- Gaskets and grounding rings must also be mounted concentrically!



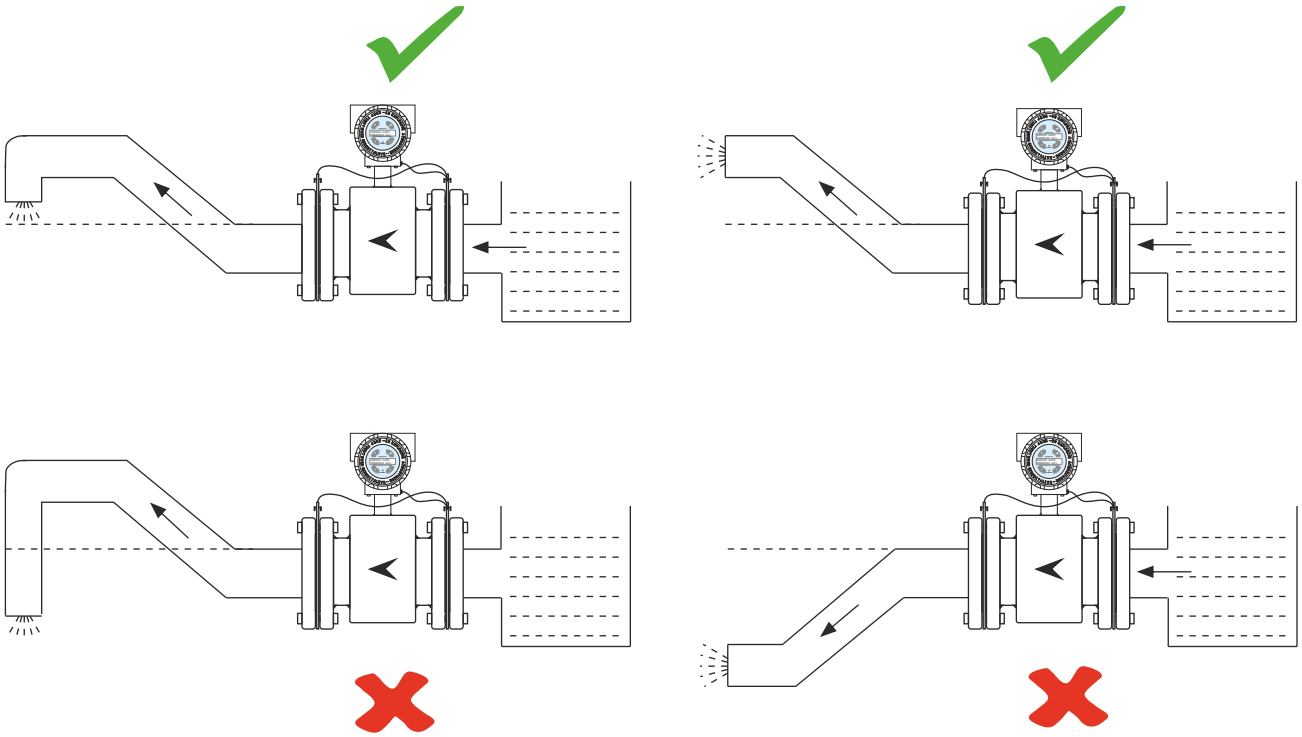
4. The flow sensor should always be filled with liquid. For that reason the flow sensor must not be mounted at the highest point of the pipe system or in free outlets, where gravity could empty or partially empty the pipe.



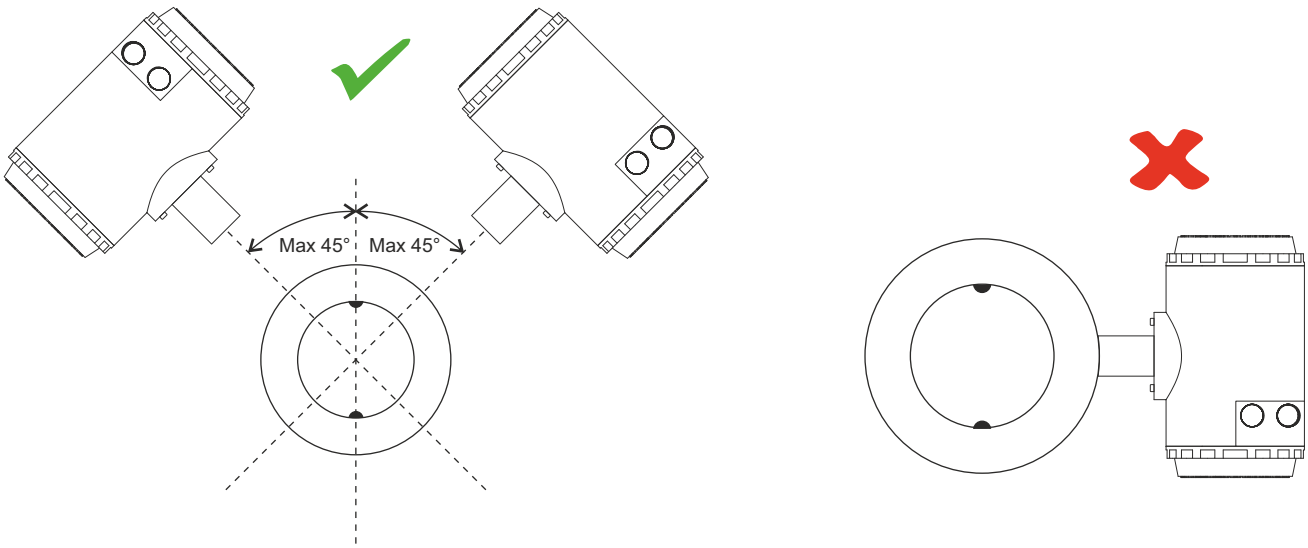
5. The flow sensor can be mounted vertically or horizontally . If the flow sensor is mounted vertically , the flow direction should always be upwards. In that way the effect from possible bubbles in the liquid will be significantly reduced, just as it will ensure that the flow sensor is always filled with liquid. In case the liquid is carrying particles, for example when measuring sludge, sewage, etc.,the flowsensor must be mounted vertically .



6. When mounting horizontally in pipes with free downstream outlet, the flow sensor should be mounted such that it will always be filled with liquid, for example in a bend situated lower than the height of the outlet. **In case the liquid is carrying particles, e.g. when measuring sludge, Sewage etc. the flow sensor must be mounted vertically .**

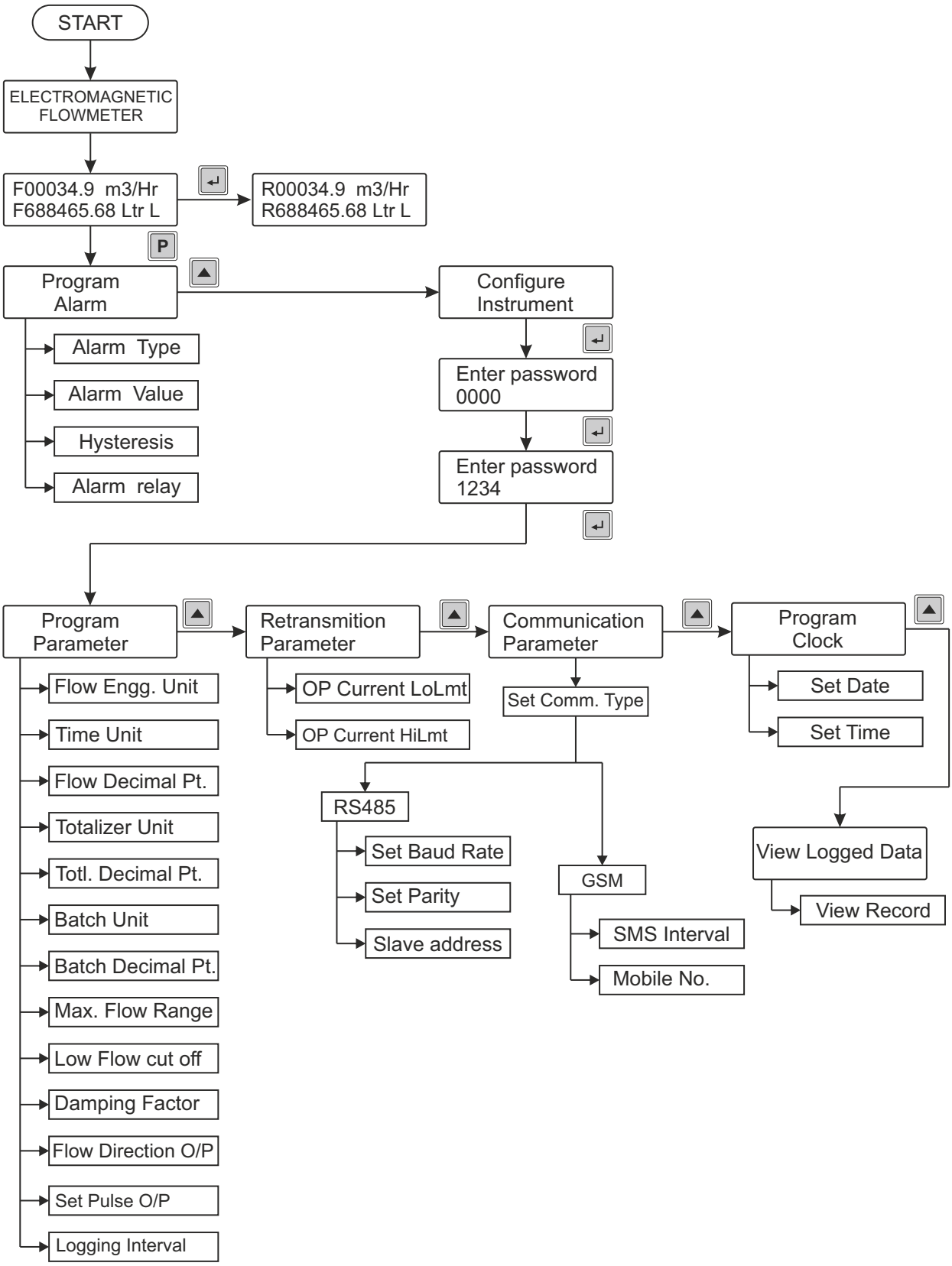


7. When mounting horizontally the flow sensor can be rotated max. +/- 45° seen from the connection end. If the flow sensor is rotated more than 45°, one of the electrodes may not be in full contact with the liquid.

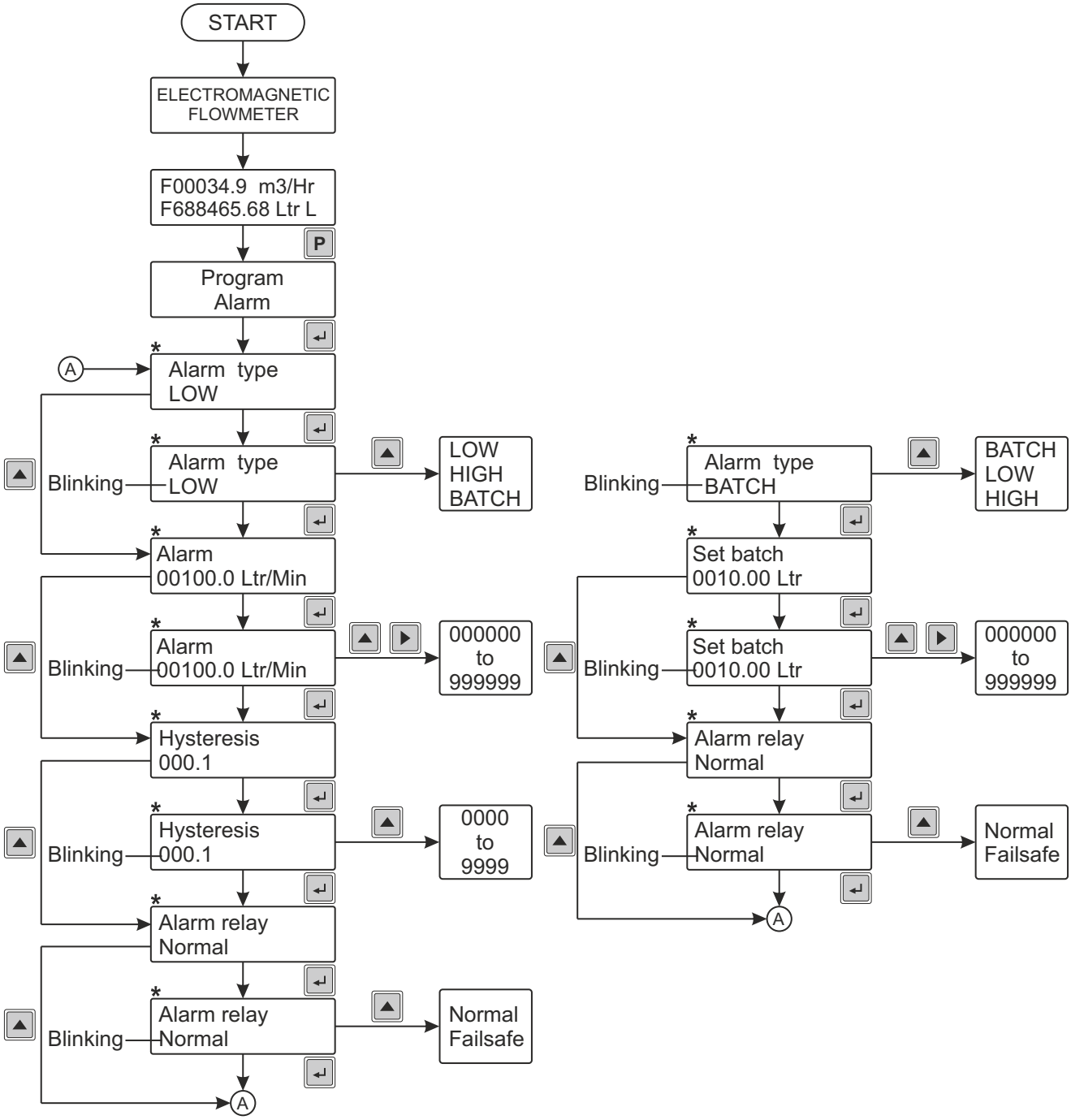


10. OPERATIONAL FLOW CHART

10.1 General Overview of Operations :

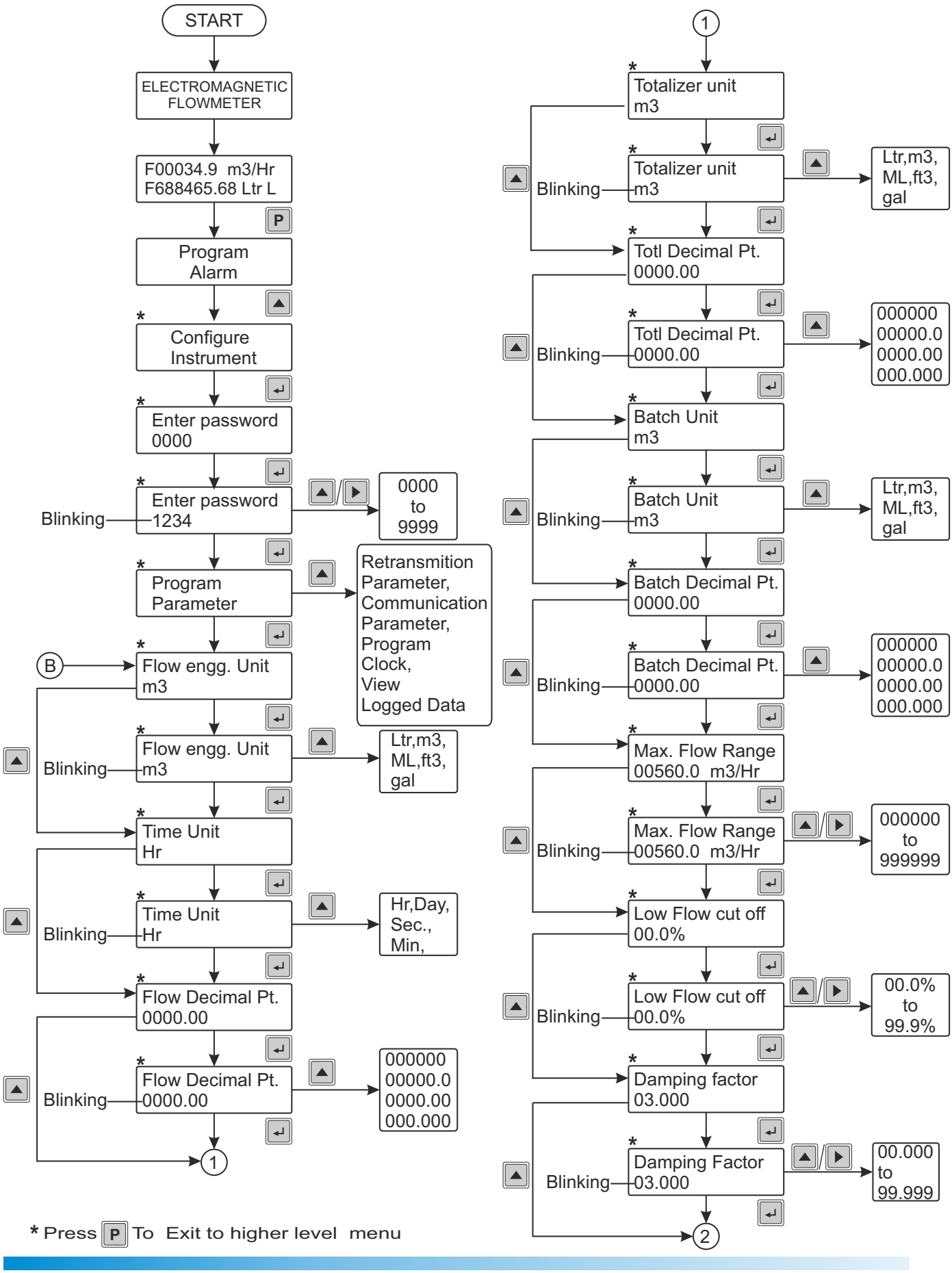


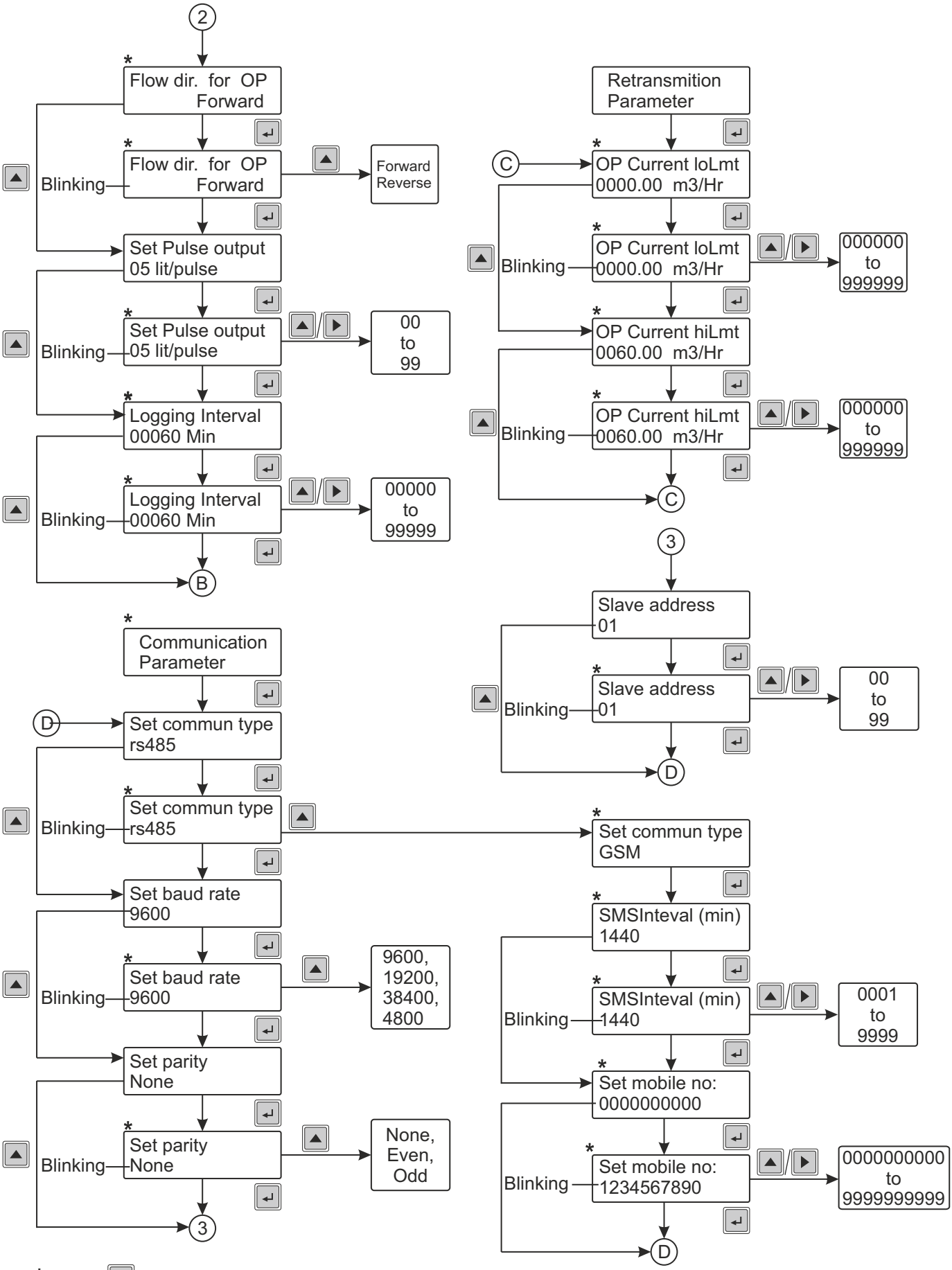
10.2 Alarm Setting Mode :



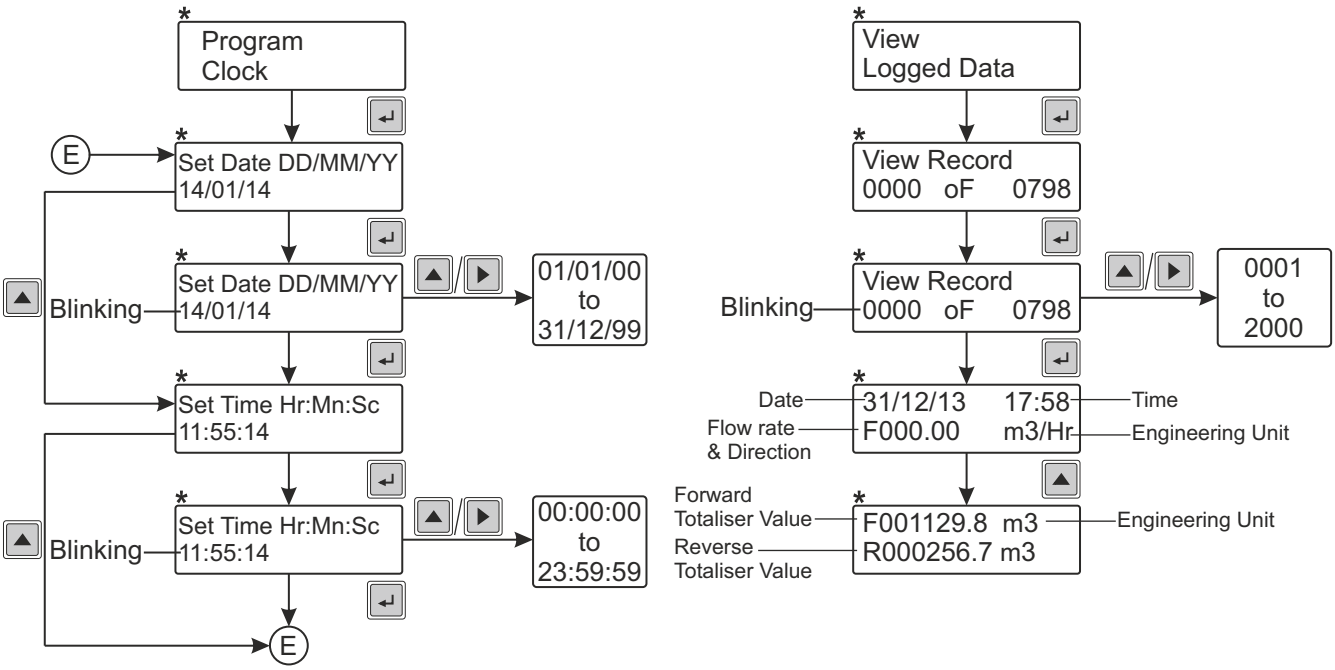
* Press P To Exit to higher level menu

10.3 Configure Mode :





* Press P To Exit to higher level menu



* Press P To Exit to higher level menu

10.4 Alarm Configuration :

Flow meter offers high alarm, low alarm or Batch mode operation. One potential free contact is provided as output. User is able to configure this potential contact in normal mode or in fail-safe mode.
High Alarm: When process flow is above 'High Alarm' flow value, alarm contact will be activated.
Low Alarm: When process flow is below 'Low Alarm' flow value, alarm contact will be activated.
Batch Mode: Batch mode is used for tank filling application, user is able to configure the amount of volume is to be filled. Potential free contact should be connected to contactor which will drive the control valve (On and Off).

10.4.1 Alarm Mode :

1] Power On the instrument. Display will show [F00034.9 m3/Hr / F688465.68 Ltr L]

2] Press [P] key. Display will show [Program / Alarm] .The [▲] key is used to configure instrument & calibrate input.

3] Press [↵] key. Display will show [Alarm Type / LOW]

Press [↵] key. Now the display will blink. Press [▲] key to change Alarm Type LOW, HIGH and BATCH. Press [↵] key to store alarm type.

4] Now, Display will show [Alarm / 001.000 m3/Hr]

Press [↵] key. Display will blink. Enter the desired value one by one using [▲] & [▶] key.

Press [↵] key to store the value.

5] Now, Display will show [Hysteresis / 0.001]

Press [↵] key. Display will blink. Enter the desired value one by one using [▲] & [▶] key.

Press [↵] key to store the value.

6] Display will show [Alarm relay / Failsafe]

Press [↵] key. Display will blink. The [▲] key is used to change Alarm type.

Press [↵] key to store alarm type condition.

7] Press twice [P] key. Go to RUN mode.

10.4.2 Batch Mode :

1] Power On the instrument. Display will show | F00034.9 m3/Hr
F688465.68 Ltr L |

2] Press [P] key. Display will show | Program
Alarm |

3] Press [↵] key. Display will show | Alarm Type
BATCH |

Press [↵] key. Now the display will blink. Press [▲] key to change Alarm Type LOW, HIGH and BATCH. Press [↵] key to store alarm type.

4] Now, Display will show | Set batch
0010.00 m3 |

Press [↵] key. Display will blink. Enter the desired value one by one using [▲] & [▶] key.

Press [↵] key to store the value.

5] Display will show | Alarm relay
Failsafe |

Press [↵] key. Display will blink. The [▲] key is used to change Alarm type.

Press [↵] key to store alarm type condition.

6] Press twice [P] key. Go to RUN mode.

10.5 Configure Instrument Method :

10.5.1 Program Parameter :

System offers user to set flow unit, Totaliser unit, Decimal point, max flow range, Low flow cut o fflimit, damping factor, etc.

1] Power On the instrument. Display will show | F00034.9 m3/Hr
F688465.68 Ltr L |

2] Press [P] key. Display will show | Program
Alarm |

Then press [▲] key display will show | Configure
Instrument |

3] Press [↵] key. Display will show | Enter Password
0000 |

Enter the password 1234 using [▲] & [▶] key.

4] Press [↵] key. Display will show | Program
Parameter |

Press [↵] key display will show | Flow Engg. Unit
m3 |

Press [↵] key. Display will blink. The [▲] key is used to change Engg. unit.

Press [↵] key to store Engg. unit.

5] Now, Display will show [Time Unit / Hr]

Press ↵ key. Now the display will blink. The ▲ key is used to change time unit.

Press ↵ key to store time unit.

6] Display will show [Flow Decimal Pt. / 000.000]

Press ↵ key. The numeric digit will start to blink. Press the ▲ key to change the position of decimal point. Press ↵ key to store position of decimal point.

7] Display will show [Totalizer unit / m3]

Press ↵ key. Display will blink. Press the ▲ key to change totaliser unit .

Press ↵ key to store totaliser unit.

8] Display will show [Totl Decimal Pt. / 000.000]

Press ↵ key. Now the display will blink. Press the ▲ key to change the position of decimal point. Press ↵ key to store position of decimal point.

9] Display will show [Batch Unit / m3]

Press ↵ key. Now the display will blink. Press the ▲ key to change batch unit .

Press ↵ key to store batch unit.

10]Press ↵ key. Display will show [Batch Decimal Pt. / 0000.00]

Press ↵ key. Now the display will blink. Press the ▲ key to change the position of decimal point. Press ↵ key to store position of decimal point.

11]Now, Display will show [Max. Flow Range / 056.000 m3/Hr]

Press ↵ key. The numeric digit will blink. Enter the desired value one by one using ▲ & ▶ key.

Press ↵ key to store max flow range value.

12]Display will show [Low Flow cut off / 00.0%]

Press ↵ key. The display will blink. Enter the desired value using ▲ & ▶ key.

It is the integer value below which the display & the Ret. Output shows the lower limit value.

Press ↵ key to store value

13]Now, Display will show [Damping Factor / 03.000]

Press ↵ key. The display will blink. Enter the desired value using ▲ & ▶ key.

It is Number of ADC count of which average is taken to stabilize the display.

14]Now, Display will show [Flow dir. for OP / Forward]

Press ↵ key. The display will blink. Enter the desired flow direction press ▲ key.

15] Now, Display will show [Set Pulse output / 05 lit/pulse]

Press ↵ key. The numeric digit will blink. Enter the desired value one by one using ▲ & ▶ key. Press ↵ key to store value.

16] Display will show [Logging Interval / 00060Min]

Press ↵ key. The numeric digit will blink. Enter the desired value one by one using ▲ & ▶ key. Press ↵ key to store value.

17] Press three times P key. Go to RUN mode.

10.5.2 Retransmission output configuration

Retransmission output can be configured to process flow range. 'OP Current LoLmt' and 'OP Current HiLmt' will be configured to 4mA and 20mA respectively.

1] Power On the instrument. Display will show [F00034.9 m3/Hr / F688465.68 Ltr L]

2] Press P key. Display will show [Program / Alarm]

Then press ▲ key display will show [Configure / Instrument]

3] Press ↵ key. Display will show [Enter Password / 0000] Enter the password 1234 using ▲ & ▶ key.

4] Press ↵ key. Display will show [Program / Parameter]

Then press ▲ key display will show [Retransmition / Parameter]

Press ↵ key display will show [OP Current LoLmt / 000.000 m3/Hr]

Press ↵ key. The numeric digit will blink. Enter the desired value one by one using ▲ & ▶ key. Press ↵ key to store value.

5] Press ↵ key display will show [OP Current HiLmt / 060.000 m3/Hr] Press ↵ key, numeric digit will start blink.

Enter the desired value one by one using ▲ & ▶ key.

Press ↵ key to store value.

6] Press three times P key. Go to RUN mode.

10.5.3 Communication Parameter Setting :

System is able to communicate with PLC or control system with MODBUS RTU protocol or SMS to a configured mobile number. RS485 or RS232 can be used for MODBUS RTU protocol. If GSM is required Rs232 enabled hardware is required. User has to connect external GSM modem to the RS232 termination.

1] Power On the instrument. Display will show [F00034.9 m3/Hr / F688465.68 Ltr L]

2] Press [P] key. Display will show [Program / Alarm]

Then press [▲] key display will show [Configure / Instrument]

3] Press [↵] key. Display will show [Enter Password / 0000]. Enter the password 1234 using [▲] & [▶] key.

4] Press [↵] key. Display will show [Program / Parameter]

Then press [▲] key display will show [Retransmition / Parameter]

Now again press [▲] key display will show [Communication / Parameter]

5] Press [↵] key. Display will show [Set commun type / rs485]

Press [↵] key. Now the display will blink. Press the [▲] key to change the communication type.

Press [↵] key to store communication type RS485 or GSM. Now select

communication type RS485

6] Display will show [Set baud Rate / 9600] Press [↵] key. Now the display will blink.

The [▲] key is used to change baud rate. Press [↵] key to enter & store baud rate value.

7] Display will show [Set Parity / None]

Press [↵] key. Now the display will blink. The [▲] key is used to change parity type.

Press [↵] key to store parity type.

8] Display will show [Slave Address / 01]

Press [↵] key. The numeric digit will blink. Enter the desired value one by one

using [▲] & [▶] key.

Press [↵] key to store slave address

9] Now select communication type **GSM**

Press [↵] key display will show [SMS Interval (min) / 1440]

Press [↵] key. The numeric digit will blink. Enter the desired value one by one

using ▲ & ▶ key.

Press ↵ key to store SMS interval time .

10] Display will show SMS mobile no. 1234567890

Press ↵ key. The numeric digit will blink. Enter the desired value one by one

using ▲ & ▶ key. Press ↵ key to store mobile number.

11] Press three times P key. Go to RUN mode

Note : Refer Part number for hardware configuration; only one hardware configuration can be used at a time (RS485 or RS232) For RS232 MODBUS configuration, set communication type as RS485 and use RS232 enabled hardware.

10.6 Real Time Clock Configuration :

Program instrument clock as per user setting for date & time.

1] Power On the instrument. Display will show F00034.9 m3/Hr F688465.68 Ltr L

2] Press P key. Display will show Program Alarm

Then press ▲ key display will show Configure Instrument

3] Press ↵ key. Display will show Enter Password 0000

Enter the password 1234 using ▲ & ▶ key.

4] Press ↵ key. Display will show Program Parameter.

Then press ▲ key display will show Retransmition Parameter

Now press ▲ key display will show Communication Parameter .

Press again ▲ key display will show Program clock

5] Press ↵ key. Display will show Set Date DD/MM/YY 14/01/14

Press ↵ key. Now the display will blink. The ▲ & ▶ key is used to change Date.

Press ↵ key to enter the actual Date.

6] Display will show Set time Hr:Mn:Sc 11:55:54

Press ↵ key. Now the display will blink. The ▲ & ▶ key is used to change Time.

Press ↵ key to enter the actual time.

7] Press twice P key. Go to RUN mode.

10.7 View Logged Data :

1] Power On the instrument. Display will show

F00034.9 m3/Hr
F688465.68 Ltr L

2] Press P key. Display will show

Program
Alarm

Then press ▲ key display will show

Configure
Instrument

3] Press ↵ key. Display will show

Enter Password
0000

Enter the password 1234 using ▲ & ▶ key.

4] Press ↵ key. Display will show

Program
Parameter

Then press ▲ key display will show

Retransmition
Parameter

Now press ▲ key display will show

Communication
Parameter

Press ▲ key display will show

Program
clock

5] Press ▲ key display will show

View
Logged Data

Press ↵ key. Display will show

View Record
0000 of 0789

Press ↵ key. Now the display will blink. The ▲ & ▶ key is used to change Record No.

Press ↵ key to Display will show

31/12/13 17:58
F000.000 m3/Hr

Press ▲ key to display will show

F00132.922 m3
R00025.232 m3

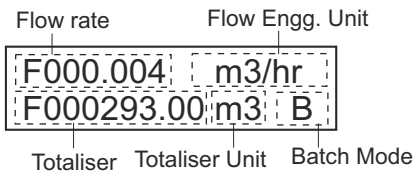
6] Press twice P key. Go to RUN mode.

10.8 Batch Mode Opration :

Configure instrument for batch alarm mode

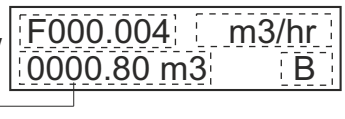
Display in RUN mode.

Now, Display will show



Press ↵ key to toggle display to batch mode

Now , display will show



Now press ▲ key to start batch mode.

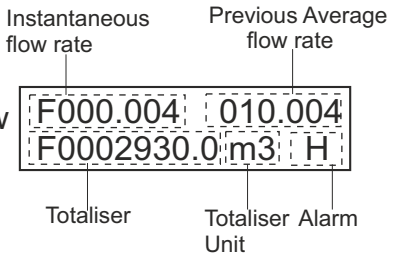
After reaching the batch value which is configured by user relay status will change over.

To intermediate stop of batch mode press ▶ key.

10.9 Procedure for Average Flow Rate :-

Display in RUN mode. Pres ▲ key 15 to 20 Sec

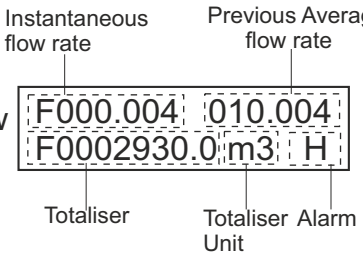
Now, Display will show



get the average flow rate. Press ▲ key to start averaging.

Now to get the average flow rate. Press ▶ key.

Display will show



Press P key. to go to RUN mode.

10.10 SMS format on Mobile :

Serial No. : 123456
Flow : 00000.0 ltr/min
Totaliser : 0000000.0 ltr

10.11 Online Diagnostic Features :

10.11.1 Empty Pipe Indication:- For proper functioning of electromagnetic flow meter, flow tube should always be completely filled, So it is important to detect whether flow tube is filled or empty.'Pipe Empty' message is displayed on display whenever flow tube is empty. Output current is 4.00 mA during empty pipe condition.

10.11.2 Flow Over Range :- 'Flow Over Range' message is displayed whenever flow rate exceeds 110% of calibration Range. For e.g. If Range is 0 -350.0 m³/hr, then flow meter will show reading up to 385.0 m³/hr i. e. 110 %. If flow exceeds 385.0 m³/hr display will show 'Flow Over Range ' message Ret. output will also be 21.60 mA (max.) at 385.0 m³/hr.

10.11.3 Average Flow Rate :- This feature is used to calculate average value of flow rate over a given period of time. It is extremely useful whenever flow rate is fluctuating and we are required to know what is the average flow rate over a given period of time.

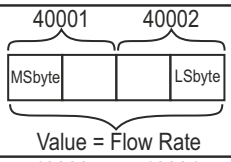
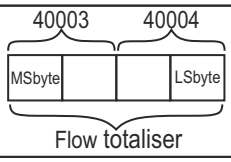
11. MODBUS (RS 485) COMMUNICATION DETAILS

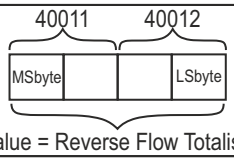
11. 1 To view parameters :

Note: Program below parameters before starting communication

1. Baud Rate :9600 / 19200 / 38400 / 4800
2. Parity : None/Odd/Even
3. Slave Address : Selectable 01 to 99
4. Length : 14
5. Communication Protocol: Modbus RTU

COMMUNICATION FORMAT

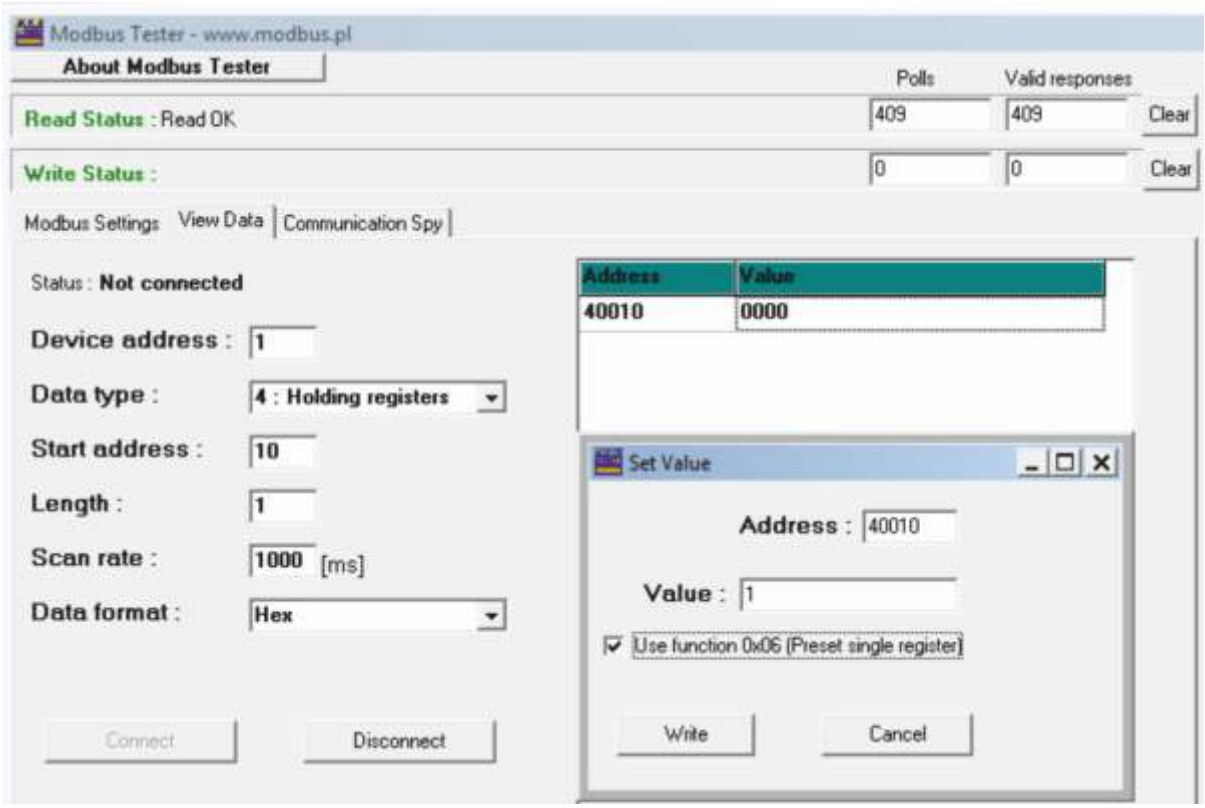
Sr. No.	Function Code	Command	Register Address	Data Format	Details
1	0x04	Read holding Register	40001	Swapped Float	
			40002		
			40003	Swapped Float	
			40004		
			40005	Integer (Hex)	Flow Decimal Value 0 = 0000 1 = 000.0 2 = 00.00 3 = 0.000
			40006	Integer (Hex)	Flow Volume Unit Value 0 = Ft3 1 = gal 2 = Ltr 3 = m3 4 = ML
			40007	Integer (Hex)	Flow Time Unit Value 0 = Sec 1 = Min 2 = Hr 3 = Day
			40008	Integer (Hex)	Totaliser Decimal Value 0 = 0000 1 = 000.0 2 = 00.00 3 = 0.000
			40009	Integer (Hex)	Totaliser Engg. Unit Value 0 = Ft3 1 = gal 2 = Ltr 3 = m3 4 = ML

Sr. No.	Function Code	Command	Register Address	Data Format	Details
1	0x04	Read holding Register	40010	Integer (Hex)	Downloading Status 0x0000 = No Downloading 0xFFFF = Downloading in process
			40011	Swapped Float	
			40012		
			40013	Integer (Hex)	Reverse Flow Enable / Disable 0 = Disable 1 = Enable
			40014	Integer (Hex)	Current Flow Direction 0 = Forward 1 = Reverse

11.2 To Set Data downloading Flag :

1. Baud Rate : 9600 / 19200 / 38400 / 4800
2. Parity : None/Odd/Even
3. Start Address : 10
4. Slave Address : Selectable 01 to 99
5. Function : 04
6. Display Data : Hex
7. Length : 01
8. Communication Protocol: Modbus RTU

Double click at address 10 and select function 0x06 & write download flag =1



11.3 To Downloading data logged :-

1. Baud Rate : 9600 / 19200 / 38400 / 4800
2. Parity : None/Odd/Even
3. Slave Address : 01 to 99 selectable
4. Function : 04
5. Display Data : Hex
6. Length : 64
7. Communication Protocol : Modbus RTU
8. Starting Address: 1024

Reg. Add.	Data	Data Type	Description	Record No.
41024	< X X X X> (Date Month)	Hex	Date & Month	1
41025	< X X X X> (Year Hour)	Hex	Year & Hour	
41026	< X X X X> (Min Sec.)	Hex	Min & Sec.	
41027	< X X X X >	Hex	Flow Rate value	
41028	< X X X X >	Hex		
41029	< X X X X >	Hex	Forward totaliser value	
41030	< X X X X >	Hex		
41027	< X X X X >	Hex	Reverse totaliser value	
41028	< X X X X >	Hex		
41031	< X X X X> (Flow unit Time unit)	Hex	Flow Engg. Unit & Time unit	
41032	< X X X X> (Totaliser unit Flow direction)	Hex	Totaliser Engg. Unit & Flow Direction	
41067	< X X X X> (Date Month)	Hex	Date & Month	5
41068	< X X X X> (Year Hour)	Hex	Year & Hour	
41069	< X X X X> (Min Sec.)	Hex	Min & Sec.	
41070	< X X X X >	Hex	Flow Rate value	
41071	< X X X X >	Hex		
41072	< X X X X >	Hex	Forward totaliser value	
41073	< X X X X >	Hex		
41074	< X X X X >	Hex	Reverse totaliser value	
41075	< X X X X >	Hex		
41077	< X X X X> (Flow unit Time unit)	Hex	Flow Engg. Unit & Time unit	
41078	< X X X X> (Totaliser unit Flow direction)	Hex	Totaliser Engg. Unit & Flow Direction	

12. DOS & DON'TS

General mishandling on site :

1. Application of power supply 230 V AC at incorrect terminals like input .
2. Loose connection on terminations.
3. Incorrect calibration.

Precautions to be taken on site :

1. Read the instruction manual carefully before installing the instrument.
2. Do the connections as per the termination details given in the manual.
3. Terminal connections should be tight.
4. Check for proper supply voltage. It should be between 90 to 260V AC.
5. During calibration, follow the steps mentioned in the manual.
6. Verify that earthing is proper.

13. TROUBLE SHOOTING PROCEDURE

SYMPTOMS	CAUSE OF FAILURE	ACTION TO BE TAKEN
No display indication	1. Absence of power supply at terminal block 2. Loose connection on termination.	1. Check power supply connections & rectify the fault. 2. Tight the termination connections.
Incorrect display indication.	1. Incorrect calibration.	1. Recalibrate the instrument. Refer calibration procedure.
Flow is not registered at all.	1. Reverse flow direction.	1.Check for correct flow measurement direction as indicated by arrow on the flowmeter.
Incorrect retransmission output.	1.Retransmission output calibration disturbed.	1.Recalibrate the instrument for retransmission output. Refer calibration procedure.

Periodical maintenance :

The flow meter does not require any special maintenance. Dependent on the media being measured it is recommended that approx. once a year, remove the sensor from the pipe and clean the liner. Method of cleaning consists of removing mechanical dirt and any non conductive coating (like oil film) from the liner. A very dirty liner could cause inaccuracy of the measurement. Check mechanical state of the liner

MATERIAL RETURN FORM

CUSTOMER INFORMATION :

Customer Name :_____

Address : _____

E-mail Address :_____

Telephone No. : _____

Contact Person : _____

Work Order No. _____ Purchase Order No. _____

Warranty : In Warranty / Out of Warranty

INSTRUMENT DETAILS :

Instrument Serial No.	Model No.	Reason For Return

Date : / / **Customer Signature**