



# FlowMaster

## ELECTROMAGNETIC FLOWMETER

### Instruction Manual

**Sichuan Instrument ComplexCo., LTD.  
Flowmeter Branch**

October, 2005

**Dear users,**

Thanks you for your kindly selecting our FlowMaster series flowmeters. Before using please read in detail our instruction manual to have a good understanding of the proper installation and operation, which will help you to successfully install them and have best using effect and improve their use-of-life.

We SIC have been conforming to the philosophy that "SIC by customer's side, customer in SIC's heart", if you have any questions in the course of installation and application, or any suggestions ( which we will be very much appreciated ), please dial our technical support number: 86-23-62807086, we'll be at your service.



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## I . How to choose FlowMasters

Selecting appropriate electromagnetic flowmeter as a tool of measuring the flow should satisfy 2 conditions as following:

1. The subject being electric liquid or liquid and solid medium, and the conductance not lower than  $5 \mu\text{s}/\text{cm}$  which equal to the soften water (electricity of the general tap water and the natural water is about  $100\text{-}500 \mu\text{s}/\text{cm}$ . Therefore, the acid, soda and salt liquid, the paper slurry, the slop, the mineral slurry, etc can all adapt pure alcohol, the pure acetone, the petroleum and any other fatty substances.
2. The subject can't contain too many Fe-magnetic substances and too many bubbles( full pipe measurement).

Having mediums meeting 2 conditions above , users then can select the Electromagnetic flowmeters for measuring purposes according to their parameters and specifications. Please confirm that the specifications and types of the provided products are consistent with the ones that you choose, and check product qualifications(Inspection certificates), instruction manual and matched accessories.

### A. Package sheet

Confirm the following content in the package:

1. Sensor (1 set)
2. Transmitter (1 set)
3. Instruction manual (1 piece)
4. Calibration sheet (1 piece)
5. Qualified sheet (1 piece)
6. Cable (only for separate type flowmeter)
7. Matching flanges (if ordered)
8. Matching flanges bolts and nuts (if ordered)
9. Sealing glue (1 set, only for separate type)

### B. Notice for store

The issues as shown below must be taken into consideration if the flowmeter will be stored for a long time after receiving it:

1. Pack instrument with its original package box, and let it as the state of leaving factory.
2. Refer to the storing position as shown below:

Do not dispose instrument under the rain.

Do not put instrument in the place with continual vibration.

Do not open the connect terminal box to avoid moisture.

Ambient temperature, humidity and atmospheric pressure must be as follows:

Ambient temperature:  $-20^\circ\text{C}\sim60^\circ\text{C}$

Relative humidity: 5%~90%

Atmospheric pressure: 86~106kPa

### C. Notice for installation position

For keeping the instrument work steadily and chronically, please notice the following issues:

1. Ambient temperature: avoid large change of temperature and the direct sunshine.
2. Atmospheric environment: avoid corrosive atmospheric environment and the position filled with volatile gas.(non explode-proof type instrument)

#### D. Change the display direction of transmitter

Changing the display direction of transmitter must be carried out by suitably trained personnel.

## II.Cautions

Please give special intentions below before using the electromagnetic flowmeters:

- |                      |   |
|----------------------|---|
| 1. Power Supply      | 220V a.c.   |
| 2. Safety            | Whether used for explosive-proof situations? Confirm the working areas the instruments can operate. |
| 3. Pressure          | Whether the pressure rating consistent with the working conditions                                  |
| 4. Temperature       | Whether the temperature resistance level consistent with the working conditions                     |
| 5. Protection        | Whether the protection rating consistent with the working conditions                                |
| 6. Connection        | Whether the electrical connection correct and reliable  |
| 7. Flow direction    | Whether the flow direction sign consistent with the working conditions                              |
| 8. Straight pipeline | Whether installation of sensor straight pipeline consistent with the instruction manual             |
| 9. Grounding         | Whether has a reliable grounding connection   |

Only after each above item meets the use requirements of the instrument can you switch the power supply on and put the instrument into operation.

## III.Installation Connections

### ● Mechanical Installation

A. Installing the sensor upon the process pipeline should satisfy following conditions:

1. The flowmeter can self-check forward/reverse flow, and the flow arrow on the sensor is stipulated by the producer as forward flow direction. Users should make the flow arrow consistent with the process flow when installing the instrument.
2. To ensure measurement accuracy of the flowmeter, the straight pipe of the flowmeter must assure 5D of the upstream part and 2D of the downstream part ( D prefers to inner pipe diameter);
3. Selecting proper sensor installation position and direction, the sensor can be installed by linear, vertical and lean installation, but the axial electrode must be nearly horizontal (the sharp angle between the axial electrode and the horizontal not more than 45°) to reduce effects on the measurement resulting from the bubbles mixed in the liquids.
4. The measuring pipe must be fully filled with process medium, assuring that the electrode completely immerge into the measured flow liquid to make the measurement reliable.

B. Installing the sensor upon the process pipeline should also notice following circumstances:

1. For the abrasion medium measurement, vertical installation is the most preferable;
2. High electromagnetic field should be avoided nearby the flowmeter;
3. The sensor can not be installed on free-vibrating pipes;
4. The marked flow direction is the appointed forward flow direction indicated by manufacturer on sensor. The forward flow direction should be in accordance with the actual flow direction of pipe.
5. Sensor could be linear or vertical installing , see Fig.(1)

6. Avoiding measure deviation resulted from the additional gases and the damages against the lining resulted from the vacuum, see Fig. (2);
7. For the opening emission pipe, the flowmeter should be installed at the low pipeline part, see Fig. (3);
8. For pipe fall exceeding 5m, air valve (vacuum) should be installed at downstream flowmeter, see Fig. (4);
9. For the long pipeline, control valve is usually installed at downstream flowmeter, see Fig. (5);
10. The flowmeter could not be installed at the pumping side, see Fig. (6)
11. Underground installation should add supporters in two ends of the pipeline, see Fig. (7)
12. None air bubble in pipes, see Fig.(8)

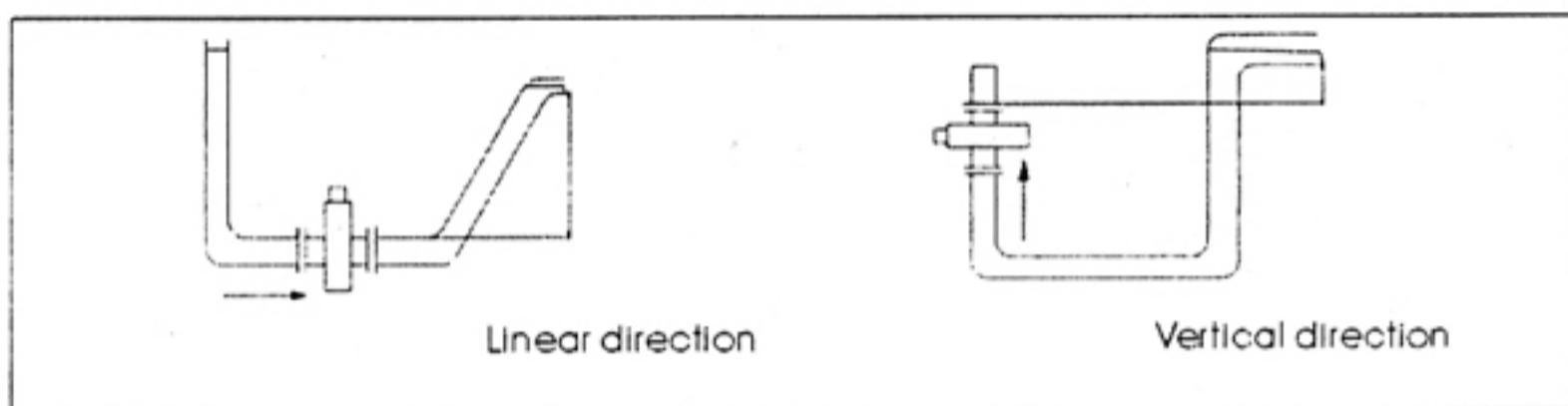


Fig. (1) Install direction

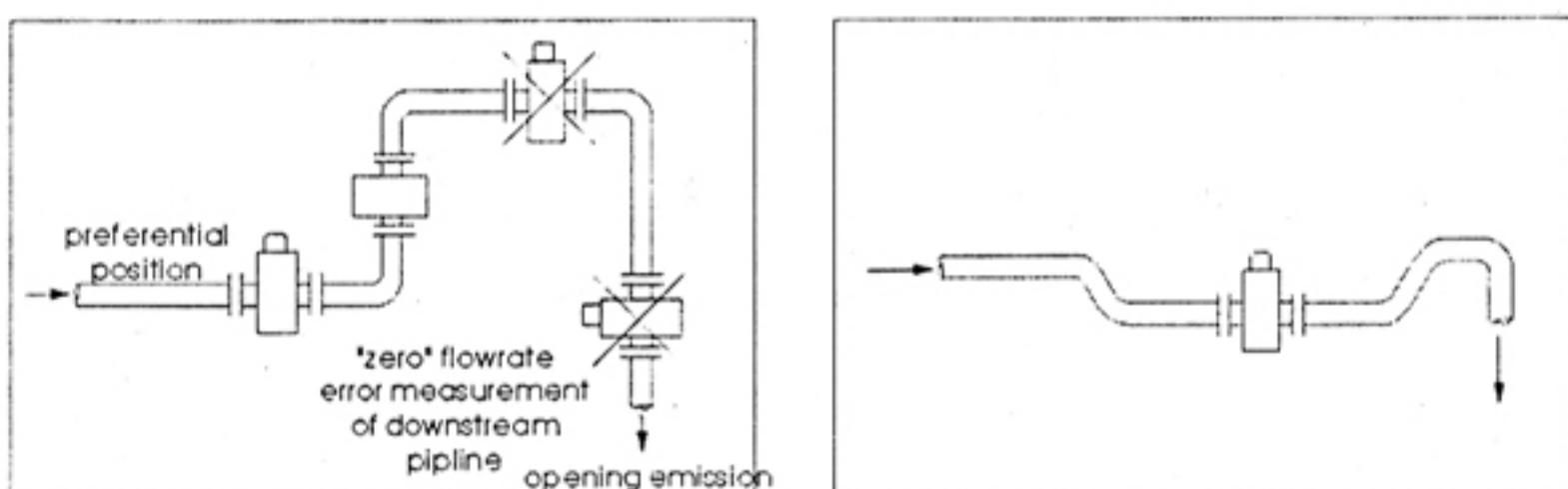


Fig. (2) pipe zenith  
(Bubbles in the measurement pipe error measurement)

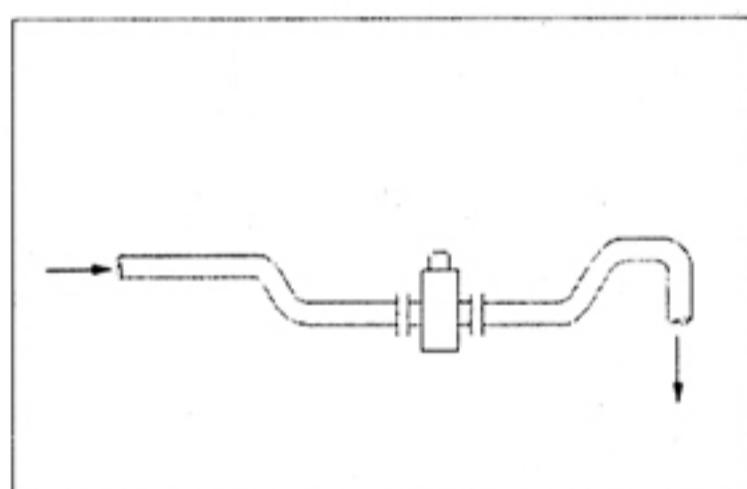


Fig. (3) Install instruments at the open feed-in or at low pipe part of emission

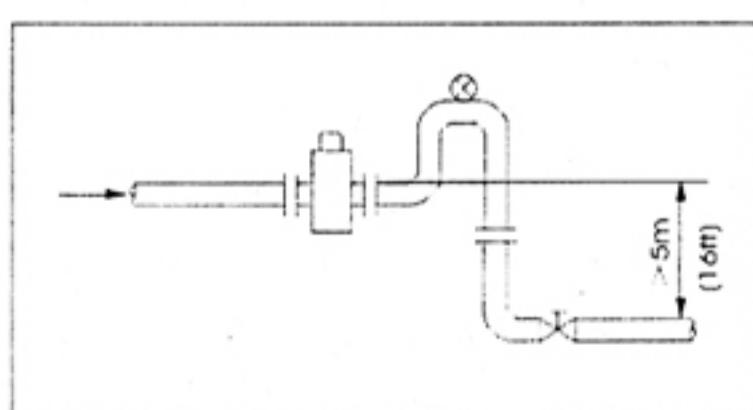


Fig.(4) For pipe fall exceeding 5m(16ft), install air valve(vacuum) at downstream flowmeter

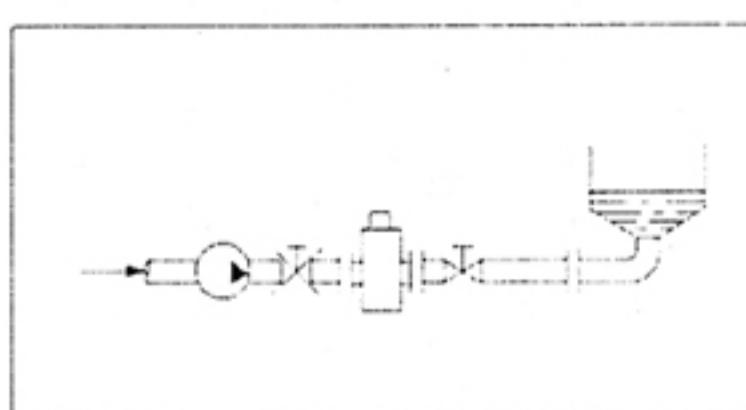


Fig. (5) For the long pipeline, install control valve at downstream flowmeter

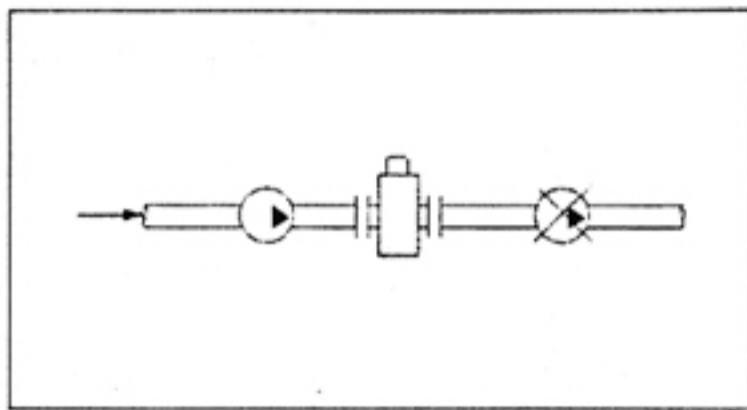


Fig. (6) Flowmeter (vacuum) should never be installed on the pumping side

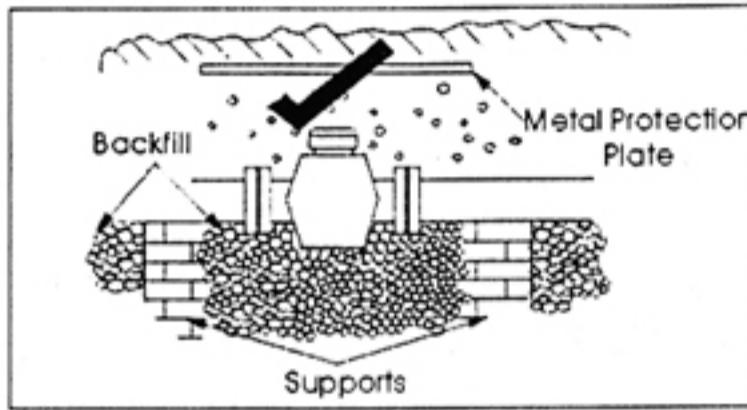


Fig.(7) Underground

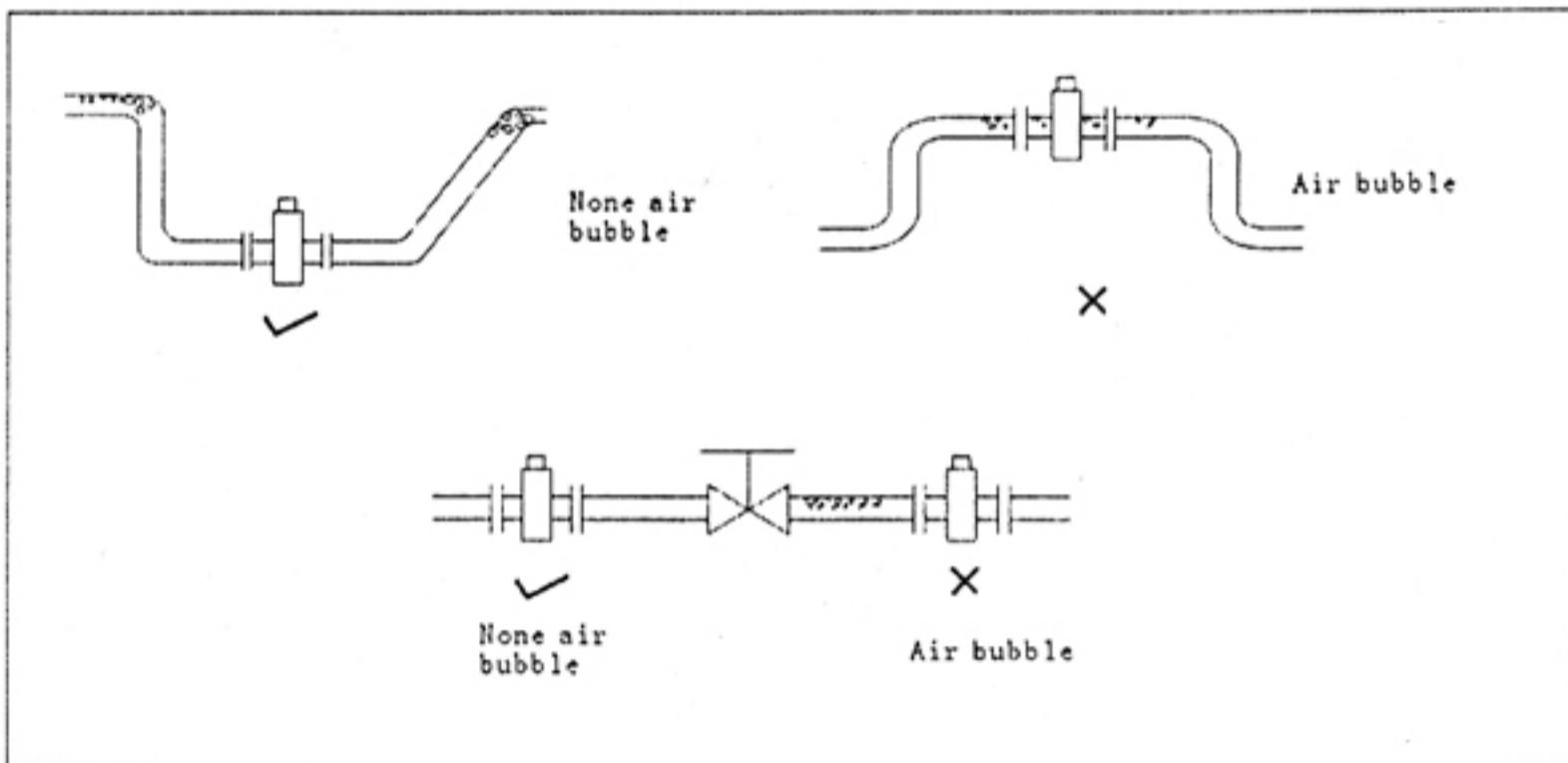


Fig. (8) None air bubble in pipes

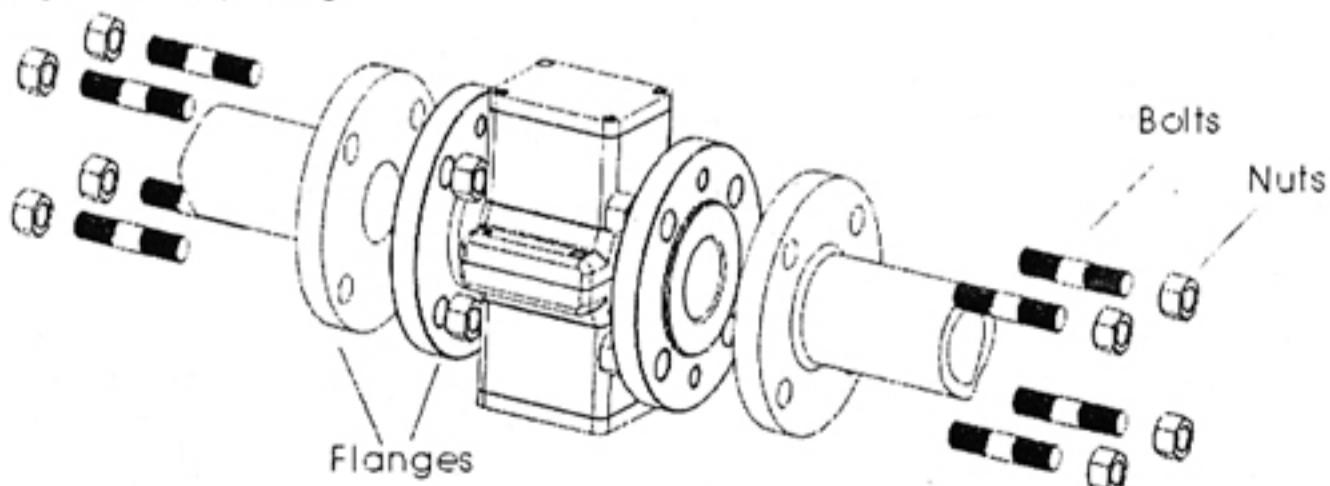
### C. Installing sensor to the pipe:

#### 1. Flow direction

The direction of measured liquid must be in accordance with the direction marked on the sensor.

#### 2. Connection method

Connect flanges of sensor and pipe with bolts and nuts at jobsite. And firmly screw the bolts down during the daily using.

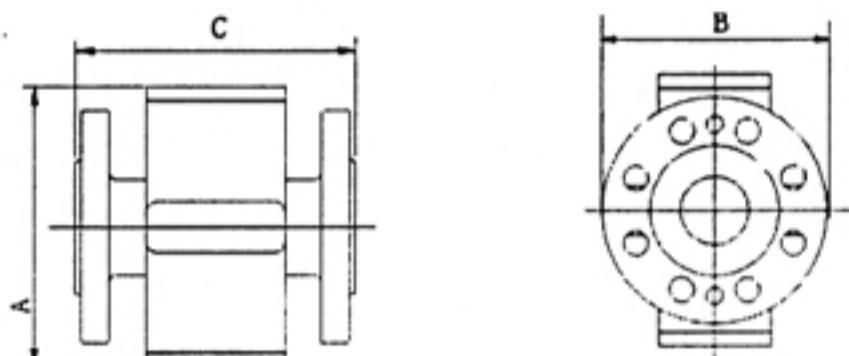


### ● Instrument surface dimensions

#### FlowMaster Sensor

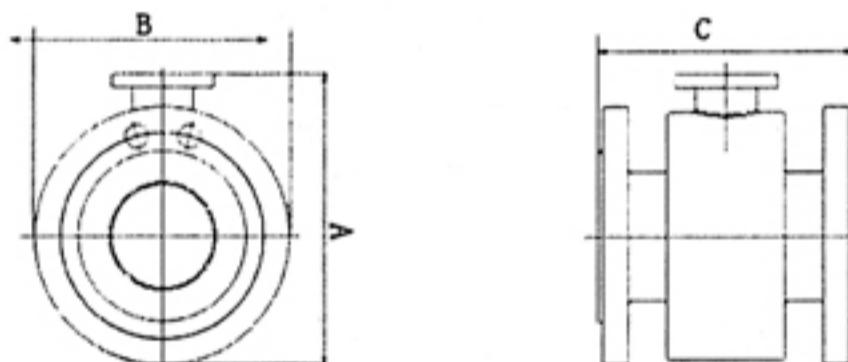
Note: The dimensions of flange drawn below area all based on Gb9119-2000 flange standard.

(1)



Size (Mm)	Dimension (Mm)			Approx Weight (Kg)	
	A	B	C	1.0~1.6MPa	2.5~4.0MPa
15	191	128	200	8.5	8.5
20	191	128	200	9.2	9.2
25	191	128	200	10.5	10.5
32	191	128	200	11	11
40	191	128	200	12.3	12.3
50	203	140	200	13.6	13.6
65	218	155	200	15.6	16
80	235	172	200	17	17.7

(2)



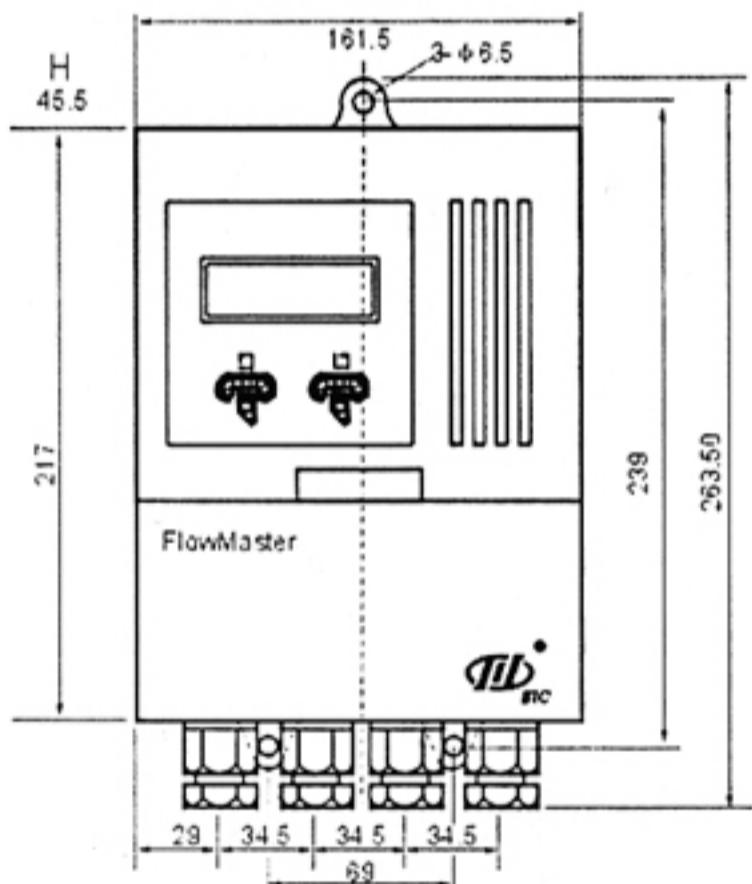
Size (Mm)	Dimension (Mm)			Approx Weight (Kg)			
	A	B	C	1.0MPa	1.6MPa	2.5MPa	4.0MPa
50	187	165	200	11	11	11	11
65	202	185	200	13	13	13	13
80	223	200	200	15	15	15	15
100	249	220	250	21	21	23	23
125	278	250	250	26	26	29	29
150	303	285	300	35	35	38	38
200	358	340	350	52	53	57	63
250	418	405	450	58	60	67	77
300	468	460	500	96	100	79	92
350	560	562	550	134	134	—	—
400	614	596	600	172	172	—	—
450	656	640	600	207	207	—	—
500	710	706	600	241	241	—	—
600	810	810	600	309	309	—	—

(3)

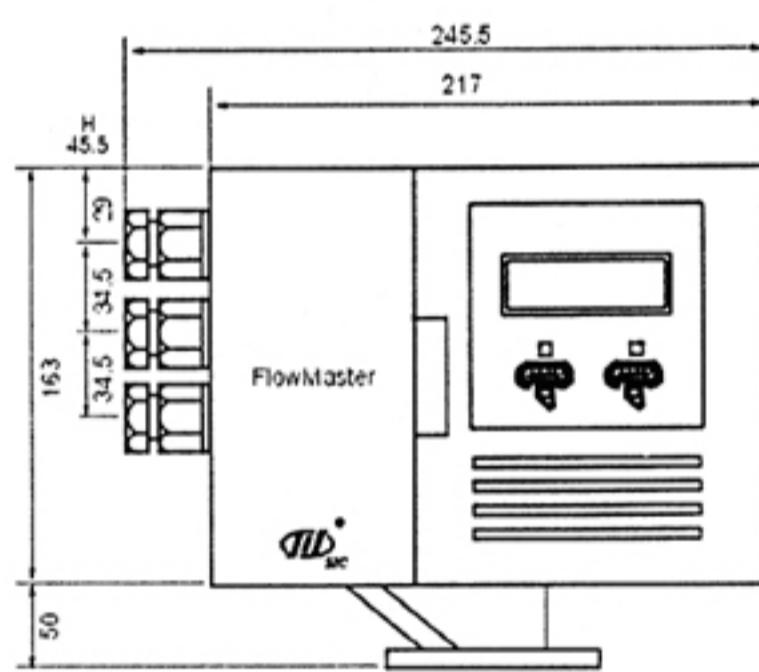


Size (mm)	Dimension (mm)	Approx Weight (kg) 0.6MPa
700	700	420
800	800	541
900	900	668
1000	1000	858
1200	1200	990
1400	1400	1362
1600	1600	1754
1800	1800	1890
2000	2000	2105

### ● Transmitter surface dimensions



Separation version  
transmitter



Integral version transmitter  
(mounted on sensor)

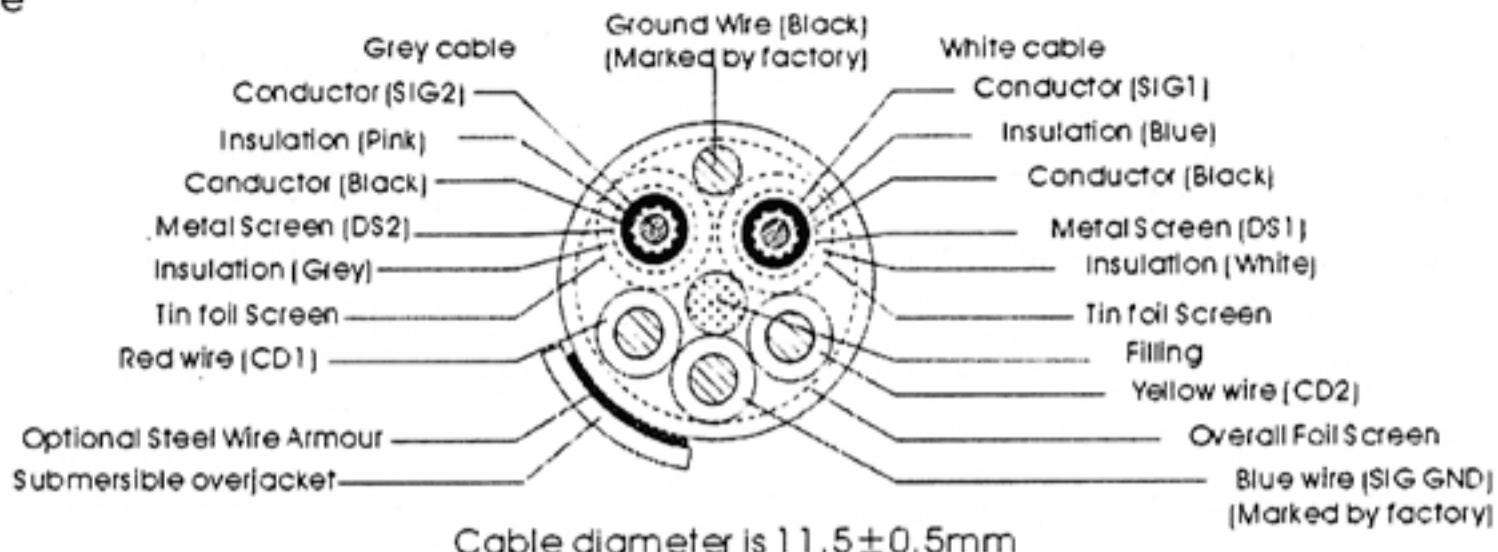
### ● Electrical connections

#### A. Connections between sensor and transmitter

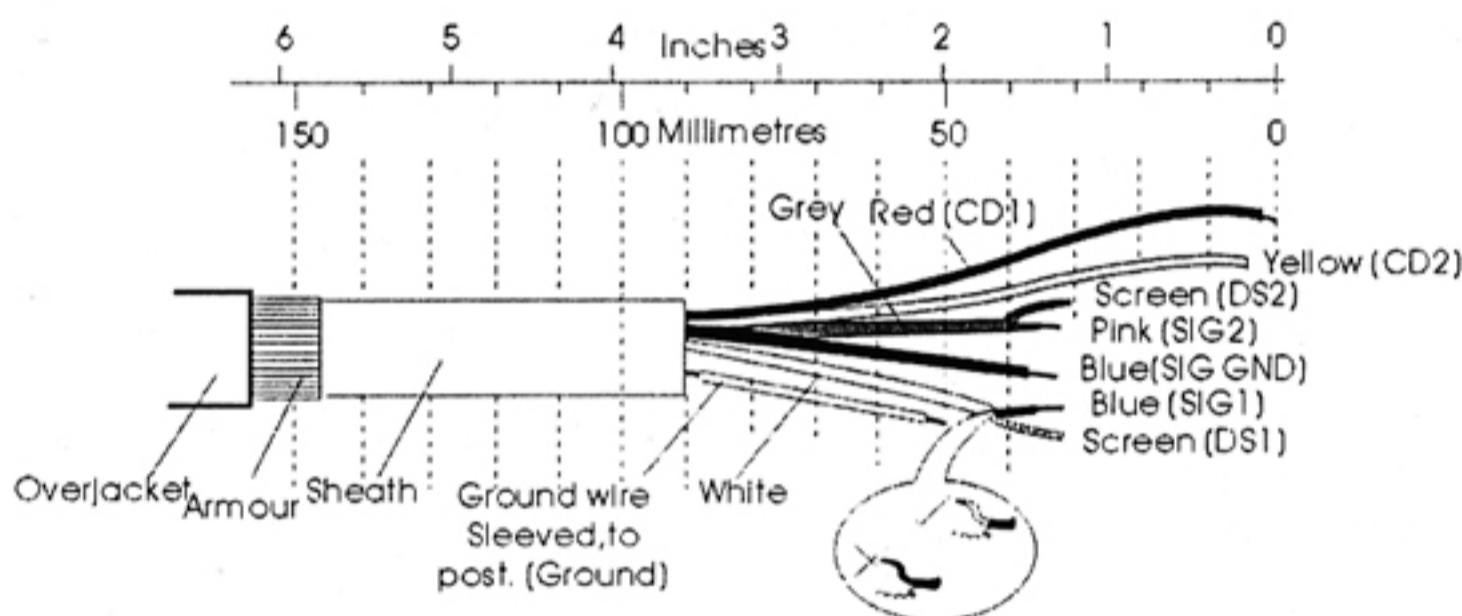
Connections between sensor and transmitter should be correct, and contact well, free from short circuit and open circuit.

For the integral version, connections between sensor and transmitter are completed by the manufacturer; For the separation version, this connections but be done by using special SIC supplied cables.

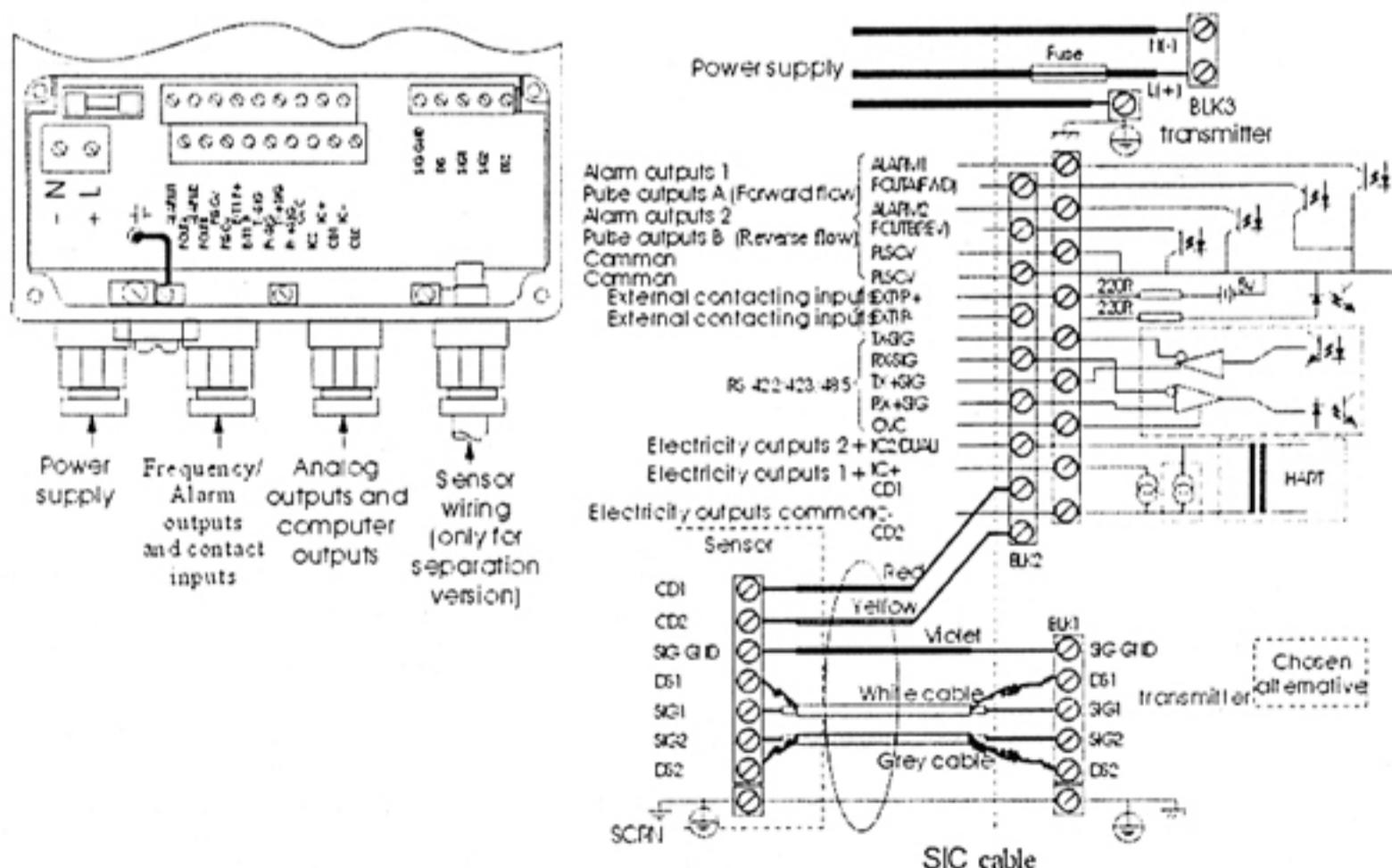
## 1. Cable



## 2. Cable operation

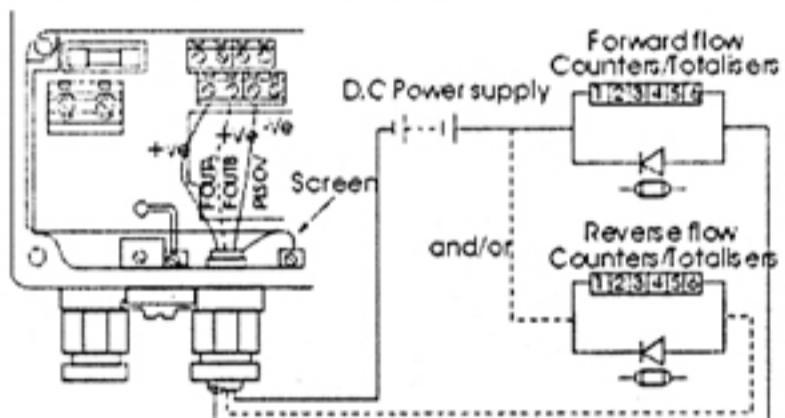


## 3. Transmitter cable/wire guide

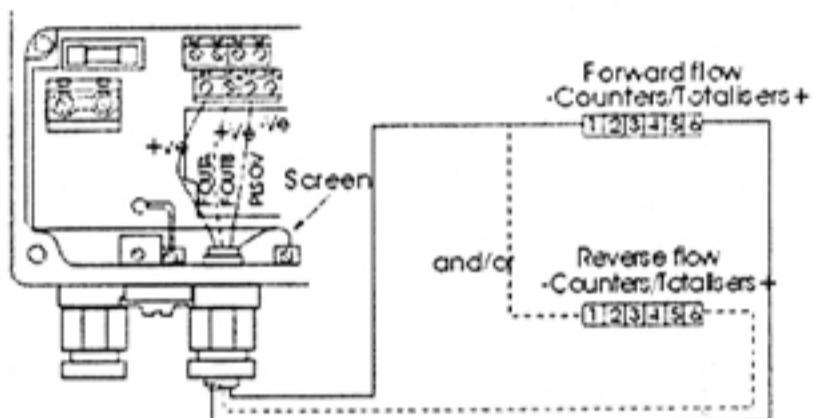


**Notice:**

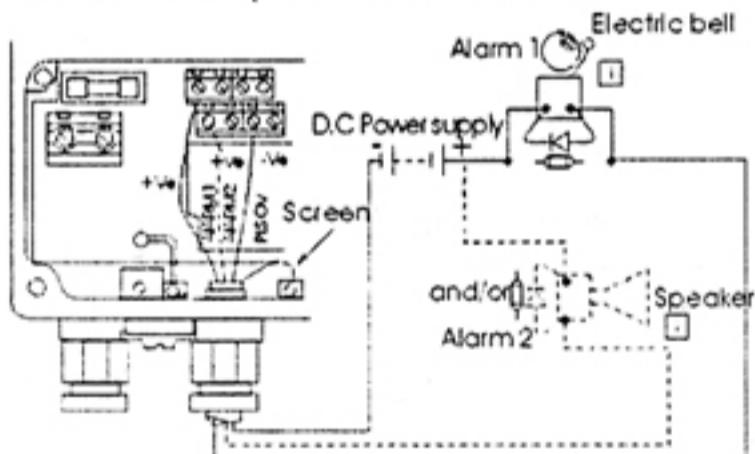
- (1) The connection between sensor and transmitter must be correct, fixed without short circuit or open circuit.
- (2) Do not connect wires outdoor in the rain day for avoiding moisture.
- (3) Fix the cable linker to the connect terminal box after finishing connecting wires for separator type flowmeter.
- (4) Do not add other power supply to the 4~20mA output.

**B. Transmitter connections**
**1. Frequency outputs**


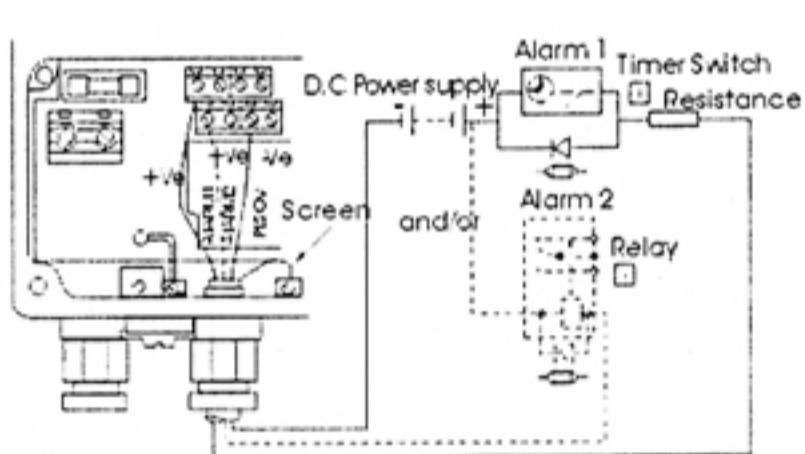
(a) Electromagneticcounter connection



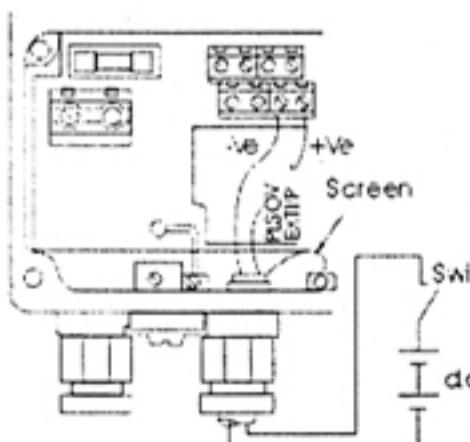
(b) Telemetry, electronic counters etc.

**2. Alarm output connections**


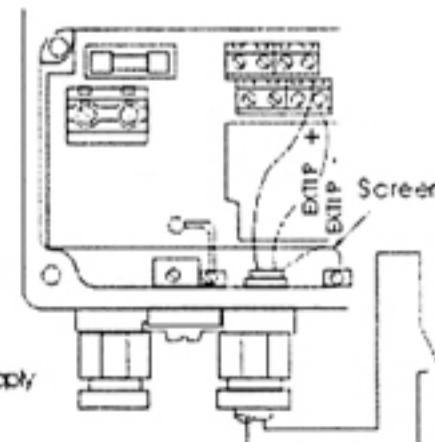
(A) Alarms (1)



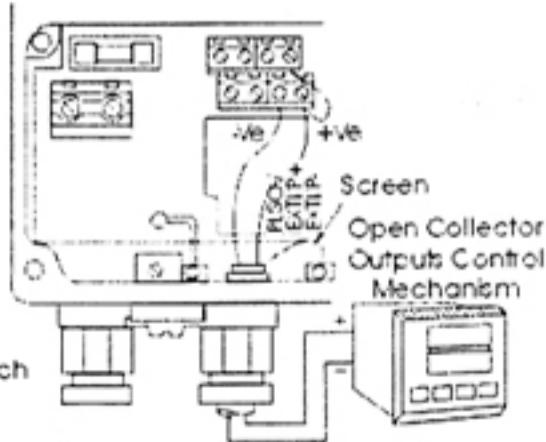
(B) Alarms (2)

**3. Contact input connections**


(a) Volt-free contact

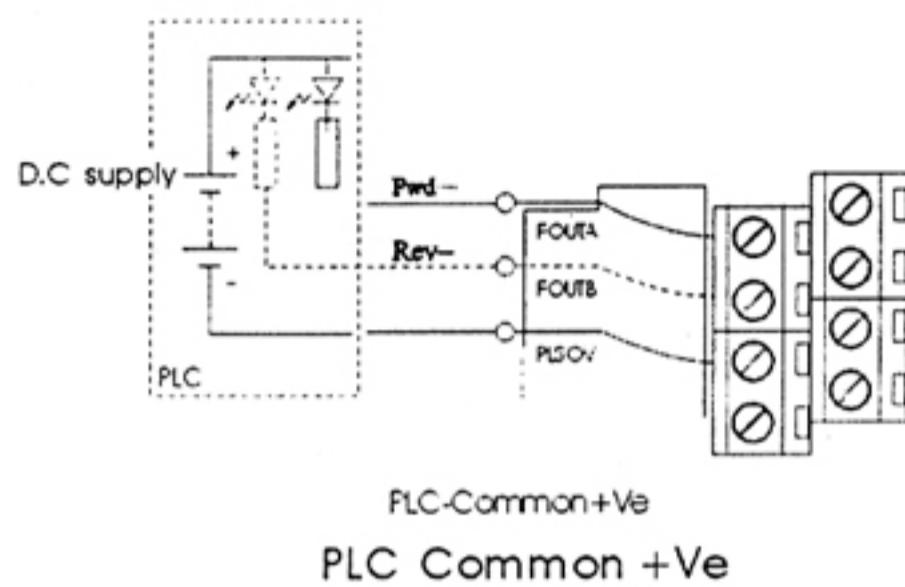
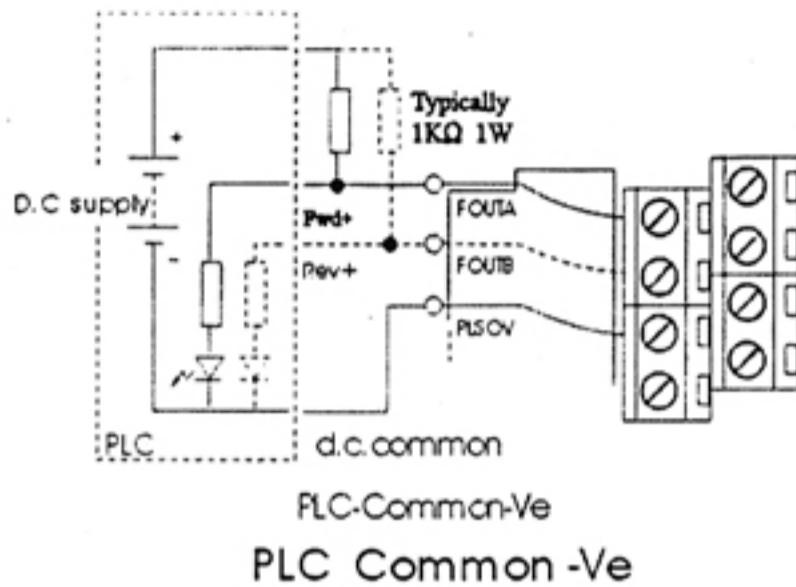


(b) Voltage Signal or  
Logic Signal

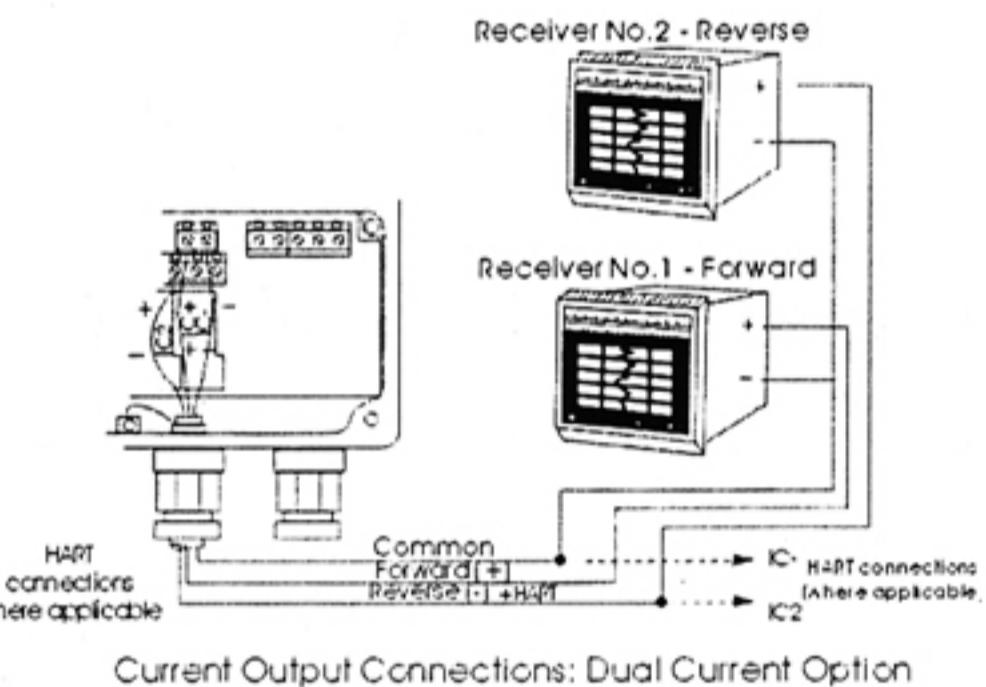
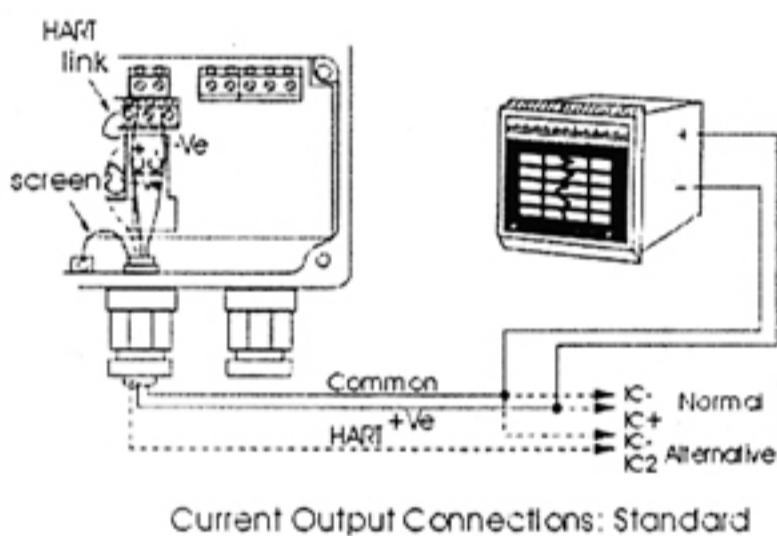


(c) Open Collector  
(or Grounded Contact)

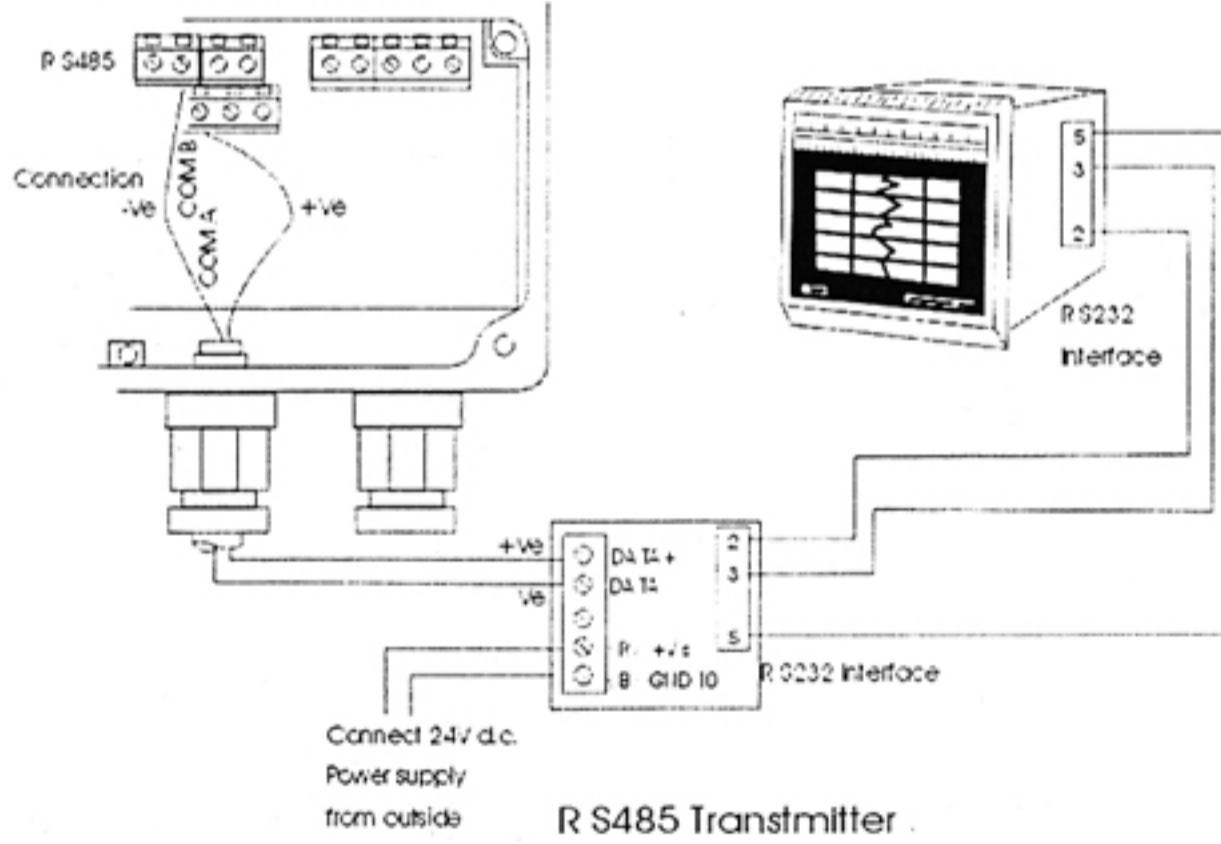
#### 4. PLC Interface



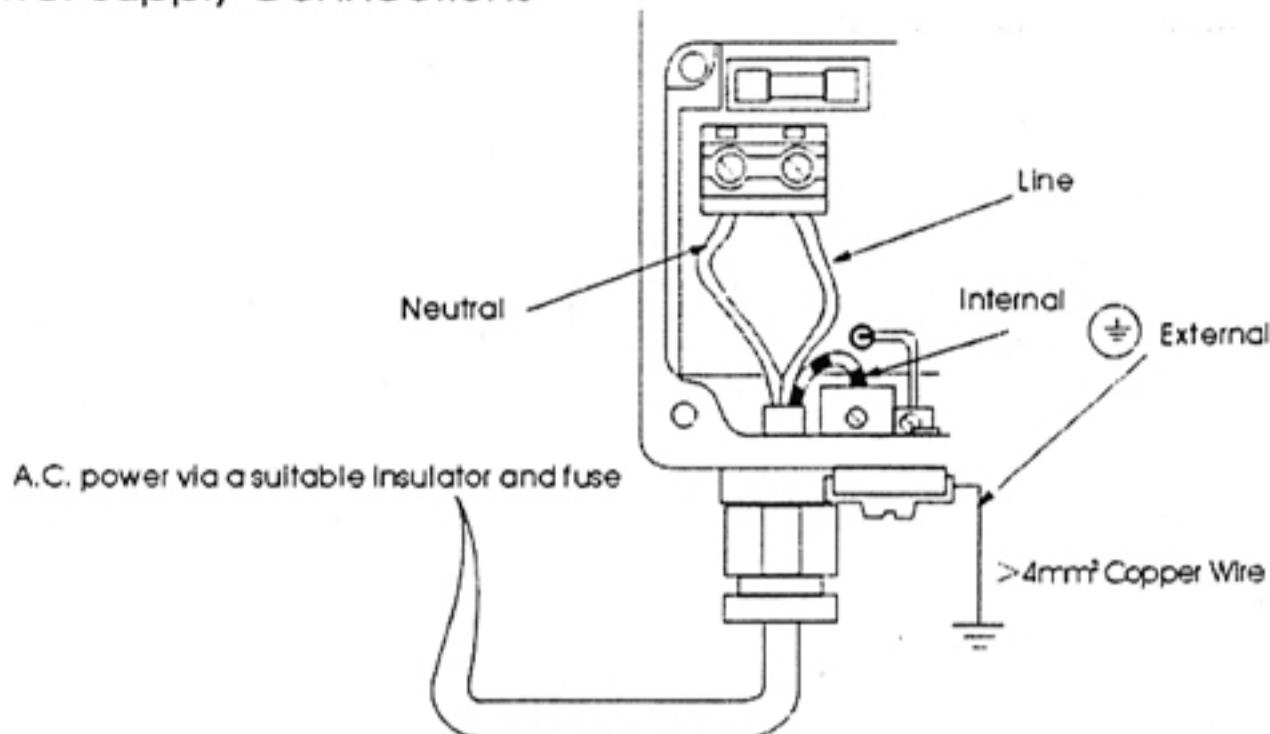
#### 5. Current Output Connections



#### 6. R S485 Connections



## 7. Power Supply Connections



**A.C. Power Supply Connections (AC220V)**

## C.Flowmeter Grounded Connection

As the inductive signal related to medium flow is very faint in the sensor of electromagnetic flowmeter, avoiding disturbing signal is of great importance, of which the most important is to have a good grounded connection, and this requires that not only the instrument connects to ground, the medium inside the pipe needs to have a good grounded connection as well.

Nominal size≤DN15

Matching grounding ring

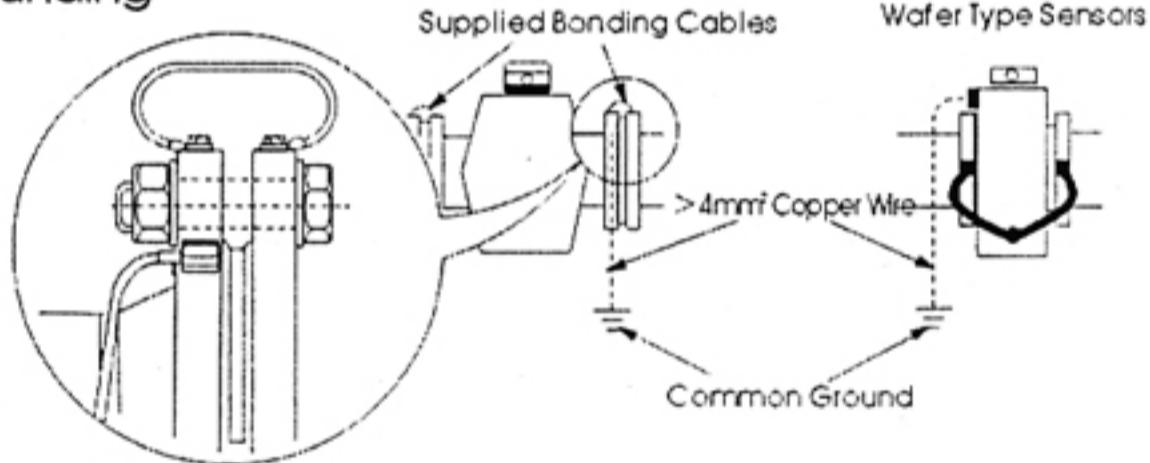
Nominal size:DN20~DN150

Matching grounding electrode

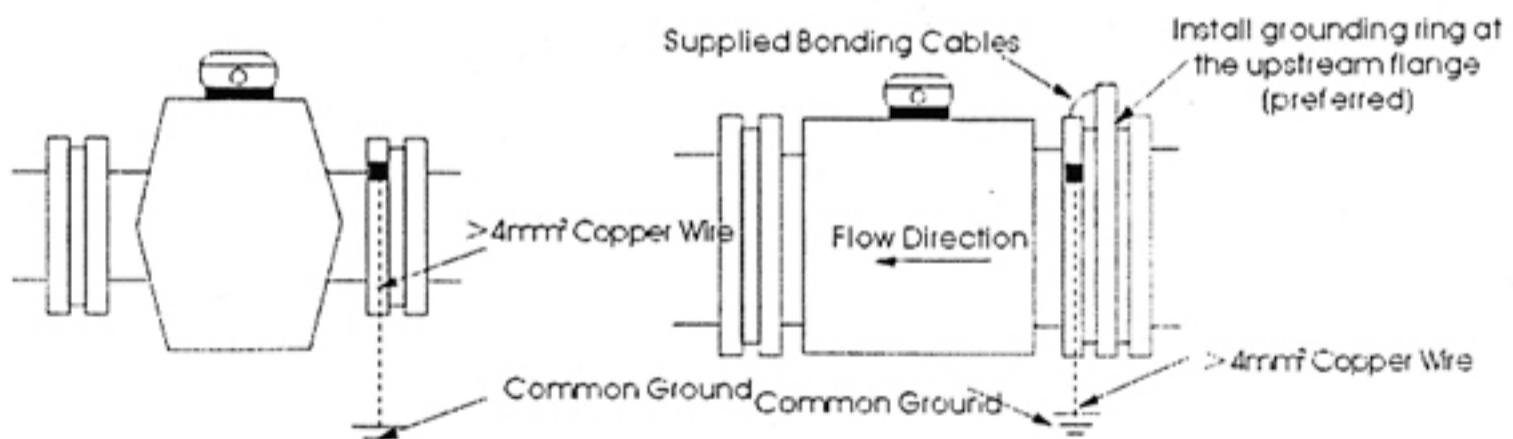
Nominal size≥DN200

Neither grounding ring nor grounding electrode

### 1. Metal Pipe Grounding



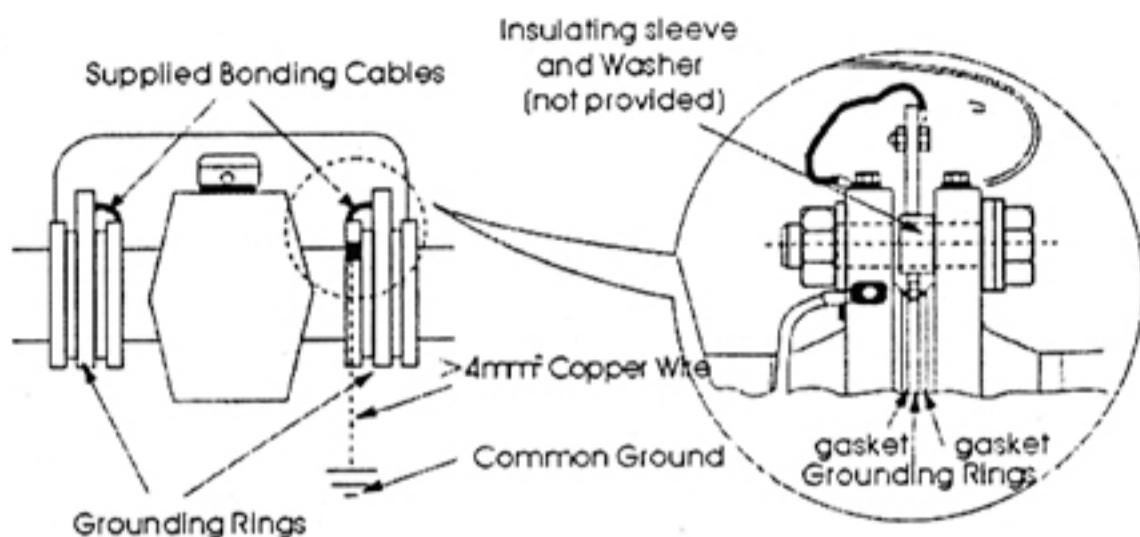
### 2. Plastic Pipe Grounding



Sensors with grounding electrode

Sensors without grounding electrode

### 3. Pipelines with Cathodic Protection

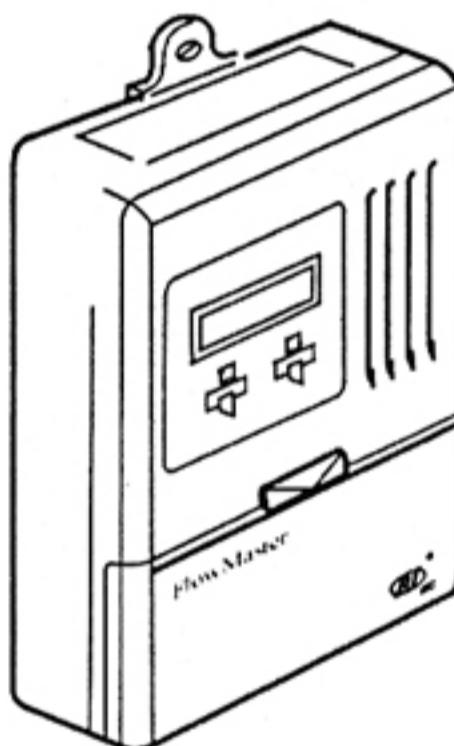


## IV. How to use a FlowMaster

When each electrical connection is correctly completed, the power supply then can be switched on, and the following operations can be finished through the transmitter.

### ● Transmitter Structure

Electromagnetic flowmeter uses two line LCDs and two magnetic operating switches, through which users can watch measuring parameters of the flowmeter, while working parameters cannot be modified and regulated by this way. Users can use SIC hand-held configurators or PCs and through RS232 on the keypad to watch, modify and regulate working parameters of the flowmeter.



Display Transmitter

### ● Working Parameter Structure of Transmitter

For users using SIC hand-held configurators and PC operating menu structures, this FlowMaster sets the first level password as 'user', permitting users to enter this level to regulate the parameters; sets the second password as 'engineer', permitting technical engineers to enter this level to regulate the parameters. Please not to modify user password in case of forgetting them and resulting in impossibility to operate the parameters.

- (1) The parameters of transmitter connected to SIC hand-held configurator or a PC is shown in the next page:

Main Menu	Sub-Menu	Third Menu	Parameters Description	Default
Read				
Read (1)>	Read flow (1)>	-----	Flowrate	-----
	Read %(2)>	-----	Flowrate as the percentage of range	-----
	Read Fwd(3)>	-----	Accumulated total in forward totaliser	-----
	Read Rev(4)>	-----	Accumulated total in reverse totaliser	-----
	Read Net(5)>	-----	Net Total	-----
	Read Alm(6)>	-----	Alarm	-----
	Read Vel(7)>	-----	True flow velocity	-----
	Read quit(q)>	-----	Quit and return to Main Menu	-----
Display options				
Disp (2)>	Disp Mode(1)>	-----	Set display method of PC (0:single line display; 1:two line display; 2:New line for each display update)	2
	Disp Res(2)>	-----	Set number of decimal places required	3
	Disp quit(q)>	-----	Quit and return to Main Menu	-----
Passwords				
Login(3)>	Login Login(1)>	-----	If password is right, level 2 could be available	engineer
	Login SetKey(2)>	-----	Change password	-----
	Login LogOut(3)>	-----	Quit login	-----
	Login quit(q)>	-----	Quit and return to Main Menu	-----
FLOW MEASUREMENT				
Flow (4)>	Flow Rng(1)>	-----	Flow range	100
	Flow Unit(2)>	Flow Unit Ltr(1)	Litres	0
		Flow Unit m^3(2)>	Cubic metres	1
		Flow Unit quit(q)>	Quit and return to Sub-Menu	-----
	Flow Mult(3)>	Flow Mult m(1)	0.001	0
		Flow Mult c(2)>	0.01	0
		Flow Mult (3)>	1	1
		Flow Mult h(4)>	100	0
		Flow Mult k(5)>	1000	0
		Flow Mult M(6)>	1000000	0
		Flow Mult quit(q)>	Quit and return to Sub-Menu	-----

Main Menu	Sub-Menu	Third Menu	Parameters Description	Default
	Flow Time(4)>	Flow Time s(1)>	Seconds	0
		Flow Time Min(2)>	Minutes	0
		Flow Time Hr(3)>	Hours	1
		Flow Time Dy(4)>	Days	0
		Flow Time Wk(5)>	Weeks	0
		Flow Time quit(q)>	Quit and return to Sub-Menu	-----
	Flow rspns(5)>	-----	Nominal time constant (only for edition 2.4)	3
		Flow Rspns Rspns1 (1)	Nominal time constant (only for edition 2.5/2.8)	Edition2.5: 4 Edition2.8: 3
		Flow Rspns Rspns2(2)>	Response coefficient (only for edition 2.5/2.8)	Edition2.5: 7 Edition2.8: 3
		Flow Rspns Threes(3)>	Response valve value (only for edition 2.5/2.8)	Edition2.5: 30 Edition2.8: 0
		Flow Rspns Value(4)>	Display response value (only for edition 2.5/2.8)	-----
		Flow Rspns quit(q)>	Quit and return to Sub-Menu	-----
	Flow Probe(6)>	Flow Probe Ins(1)>	(Unavailable)	-----
		Flow Probe Prof(2)>	(Unavailable)	-----
		Flow Probe quit(q)>	Quit and return to Sub-Menu	-----
	Flow %(7)>	-----	Display current flowrate as the percentage of range	-----
	Flow Cutoff(8)>	-----	Flow velocity in mm/s below which all outputs are set to zero	5
	Flow quit(q)>	-----	Quit and return to Main Menu	-----
<b>ANALOG OUTPUT</b>				
	Anlg(5)>	Anlg Fsd(1)>	According to output current in mA for 100% flow range	20
		Anlg Zero(2)>	According to output current in mA for 0% flow range	4
	Anlg Dir(3)>	Anlg Dir Fwd(1)>	Analogue output responds to forward flow	1
		Anlg Dir Rev(2)>	Analogue output responds to reverse flow	0
		Anlg Dir quit(q)>	Quit and return to Sub-Menu	-----
	Anlg No2(4)>	-----	Full scale flow range for second analogue range as percentage of main flow range (Unavailable)	100

Main Menu	Sub-Menu	Third Menu	Parameters Description	Default
Anlg mA(5)>	Anlg mA(5)>	-----	Present electric current output	-----
	Anlg mANo1(6)>	Anlg mANo1 Dir(1)>	Direction of No.1 electric current output	0
		Anlg mANo1 Fsd(2)>	Revised value of No.1 electric current output at full scale	0
		Anlg mANo1 Zero(3)>	Revised value of No.1 electric current output at zero	0
		Anlg mANo1 quit(q)>	Quit and return to Sub-Menu	-----
	Anlg mANo2(7)>	Anlg mANo2 Dir(1)>	Direction of No.2 electric current output	1
		Anlg mANo2 Fsd(2)>	Revised value of No.2 electric current output at full scale	0
		Anlg mANo2 Zero(3)>	Revised value of No.2 electric current output at zero	0
		Anlg mANo2 quit(q)>	Quit and return to Sub-Menu	-----
	Anlg quit(q)>	-----	Quit and return to Main Menu	-----

### PULSE OUTPUT

Pls(6)>	Pls Fact(1)>	-----	Output pulses per flow volume unit	Edition2.4/2.5:0 Edition2.8:1
	Pls Cutoff(2)>	-----	Flow velocity in mm/s below which all outputs are set to zero	5
	Pls Max(3)>	-----	Max. output of frequency in Hz	800
	Pls Hz(4)>	-----	Present value output of frequency in Hz	-----
	Pls Idle(5)>	-----	Idle state for Pulse Output with no output pulse	0
	Pls Size(6)>	-----	Output pulse width in ms.(Set to 0 for square wave output)	0
	Pls quit(q)>	-----	Quit and return to Main Menu	-----

### TOTALIZER

Tot(7)>	Tot Unit(1)>	Tot Unit Ltr(1)>	Litres	0
		Tot Unit $m^3$ (2)>	Cubic metres	1
		Tot Unit quit(q)>	Quit and return to Sub-Menu	-----
		Tot Mult m(1)>	0.001	0
		Tot Mult c(2)>	0.01	0
	Tot Mult(2)>	Tot Mult (3)>	1	1
		Tot Mult h(4)>	100	0
		Tot Mult k(5)>	1000	0
		Tot Mult M(6)>	1000000	0
		Tot Mult quit(q)>	Quit and return to Sub-Menu	-----

Main Menu	Sub-Menu	Third Menu	Parameters Description	Default
	Tot ClrEn(3)>	-----	Enter "1" to enable totaliser reset function to be used from keyboard terminal	0
	Tot quit(a)>	-----	Quit and return to Main Menu	-----
<b>ALARMS</b>				
Alm(8)>	Alm No1(1)>	Alm No1 Idle(1)>	Idle state for alarm output	1
		Alm No1 En(2)>	0=Alarm output disabled; 1=Alarm output enabled	1
		Alm No1 Coil(3)>	Alarm occurs for excitation coil	1
		Alm No1 Fwd(4)>	Alarm occurs for forward flow	0
		Alm No1 Rev(5)>	Alarm occurs for reverse flow	0
		Alm No1 Cutoff(6)>	Alarm occurs for Cutoff	0
		Alm No1 Mtsnsr(7)>	Alarm occurs for empty sensor	1
		Alm No1 Hi(8)>	Alarm occurs for Flow $\geq$ "Alm Trip Hi"	0
		Alm No1 Lo(9)>	Alarm occurs for Flow $\leq$ "Alm Trip Lo"	0
		Alm No1 Anlg(A)>	Alarm occurs for Analogue Output Overrange	0
Alm(8)>	Alm No2(2)>	Alm No2 Idle(1)>	Idle state for alarm output	1
		Alm No2 En(2)>	0=Alarm output disabled; 1=Alarm output enabled	1
		Alm No2 Coil(3)>	Alarm occurs for excitation coil	1
		Alm No2 Fwd(4)>	Alarm occurs for forward flow	0
		Alm No2 Rev(5)>	Alarm occurs for reverse flow	0
		Alm No2 Cutoff(6)>	Alarm occurs for Cutoff	0
		Alm No2 Mtsnsr(7)>	Alarm occurs for empty sensor	1
		Alm No2 Hi(8)>	Alarm occurs for Flow $\geq$ "Alm Trip Hi"	0
		Alm No2 Lo(9)>	Alarm occurs for Flow $\leq$ "Alm Trip Lo"	0

Main Menu	Sub-Menu	Third Menu	Parameters Description	Default
		Alm No2 Anlg(A)>	Alarm occurs for Analogue Outout Overange	0
		Alm No2 Pls(B)>	Alarm occurs for Pulse	0
		Alm No2 quit(q)>	Quit and return to Sub-Menu	-----
Alm(8)>	Alm Trip(3)>	Alm Trip Hi(1)>	High flow alarm trip point as % of range	110
		Alm Trip Lo(2)>	Low flow alarm trip point as % of range	0
		Alm Trip Hyst(3)>	(Disavailable)	-----
		Alm Trip quit(q)>	Quit and return to Sub-Menu	-----
		Alm Scr(4)>	-----	Alarm
		Alm quit(q)>	-----	Quit and return to Main Menu
<b>INPUT CONTACT</b>				
Inpt(9)>	Inpt Anlg(1)>	-----	No effect	1
	Inpt Clr(2)>	-----	Reset totaliser	0
	Inpt Hld(3)>	-----	Hold flowmeter output value	0
	Inpt Zero(4)>	-----	Set flowrate output to zero	0
	Inpt Idle(5)>	-----	Enter inactive state of input contact	0
	Inpt quit(q)>	-----	Quit and return to Main Menu	-----
<b>EMPTY PIPE DETECTION</b>				
Mtsnsr(A)>	Mtsnsr Trip(1)>	-----	(Disavailable)	50
	Mtsnsr mv(2)>	-----	(Disavailable)	-----
	Mtsnsr Empty(3)>	-----	Set value of Empty sensor	300
	Mtsnsr EmVal(4)>	-----	Displayed Empty sensor value	-----
	Mtsnsr Intvl(5)>	-----	Inspected time of Empty sensor in min	5
	Mtsnsr quit(q)>	-----	Quit and return to Main Menu	-----
<b>SENSOR DATA AND CALIBRATION</b>				
Snsr(B)>	Snsr No(1)	-----	Serial No.	Requirement from customer
	Snsr Tag(2)>	-----	Tag No.	Requirement from customer
	Snsr Size(3)>	-----	Nominal Diameter in mm	Requirement from customer
	Snsr Vel(4)>	-----	Current velocity in the sensor	-----
	Snsr Fact(5)>	Snsr Fact LOut(1)>	slope	Fact 1
		Snsr Fact Offset(2)>	Offsett in mm/s at zero	Fact 2

Main Menu	Sub-Menu	Third Menu	Parameters Description	Default
		Snsr Fact Wave(3)>	Type of excitation wave	0
		Snsr Fact Pro(4)>	(Unavailable)	1
		Snsr Fact quit(q)>	Quit and return to Sub-Menu	-----
	Snsr quit(q)>	-----	Quit and return to Main Menu	-----
<b>SYSTEM TEST</b>				
Test(C)>	Test Mode(1)>	-----	If setting 1 , transmitter is in Tset Mode	0
	Test DataOut(2)>	-----	Data output	0
	Test Flow(3)>	-----	Simulate input flow	100
	Test %(4)>	-----	Show Flowrate as a percentage	-----
	Test Hz(5)>	-----	Show Pulse Output frequency	-----
	Test mA(6)>	-----	Show Output Current	-----
	Test Vel(7)>	-----	Show flow velocity in sensor	-----
	Test Alm(8)>	-----	Show currently active alarms	-----
	Test Txv(9)>	-----	(Unavailable)	-----
	Test quit(q)>	-----	Quit and return to Main Menu	-----

Note:

1. '-----' = 'None' .
2. Default value '1' means that this option is selected;  
Default value '0' means that this option is not selected.

(2) The parameters of 3 line keypad version FlowMaster is shown below:

Press Moves ----->

Return to "Flow Ring" page <-----

First Page	Second Page	Third Page	Fourth Page	Fifth Page	Sixth Page	Seventh Page	Eighth Page	Ninth Page	Tenth Page	Eleventh Page	Twelfth Page	Thirteenth Page	Fourteenth Page
Flow Freq	Anlg Fsd	Pls Fact	Int Unit	Alm Not Idle	Alm No2 Idle	Alm Trip Hi	Int Audig	Mtana Top	Snsr Size	Test Mode	Disp Res		
Flow Unit	Anlg Zero	Pls Cutoff	Int Mult	Alm Not En	Alm No2 En	Alm Trip Lo	Int Cls	Mtana mv	Snsr Ing	Test DataOut			
Flow Mult	Anlg Dir	Pls Max	Int ClrEn	Alm Not Coil	Alm No2 Coil	Alm Scr	Int Hld	Mtana Empty	Snsr No	Test Flow			
Flow Time	Anlg No2	Pls Hz		Alm Not Fwd	Alm No2 Fwd		Int Zero	Mtana EmVd	Snsr Vel	Test %			
Flow Rspns Rsl	Anlg mA	Pls Idle		Alm Not Rev	Alm No2 Rev		Int Idle	Mtana Invd	Snsr Fact1	Test Hz			
Flow Rspns Rs2	Anlg mANo2 Dir	Pls Size		Alm Not Cutoff	Alm No2 Cutoff				Snsr Fact2	Test mA			
Flow Rspns Rs3	Anlg mANo2 Fsd			Alm Not Mtansr	Alm No2 Mtansr				Snsr Fact3	Test Vel			
Flow Rspns Value	Anlg mANo2 Zero			Alm Not Hi	Alm No2 Hi					Test Alm			
Flow %	Anlg mANo2 Dir			Alm Not Lo	Alm No2 Lo					Test Txv			
Flow Cutoff	Anlg mANo2 Fsd			Alm Not Anle	Alm No2 Anle								
	Anlg mANo2 Zero			Alm Not Pls	Alm No2 Pls								

Security Level 1  
 Security Level 2

#### Security setting:

Note: the password of level 1 and level 2 is all a 5-digit security code. Only inputting password is right, can you enter the parameter setting interface.

Keypad version FlowMaster sets the first level password as '02041', permitting users to enter this level to regulate the parameters; Sets the second password as '04121', permitting engineers to enter this level to regulate the parameters.

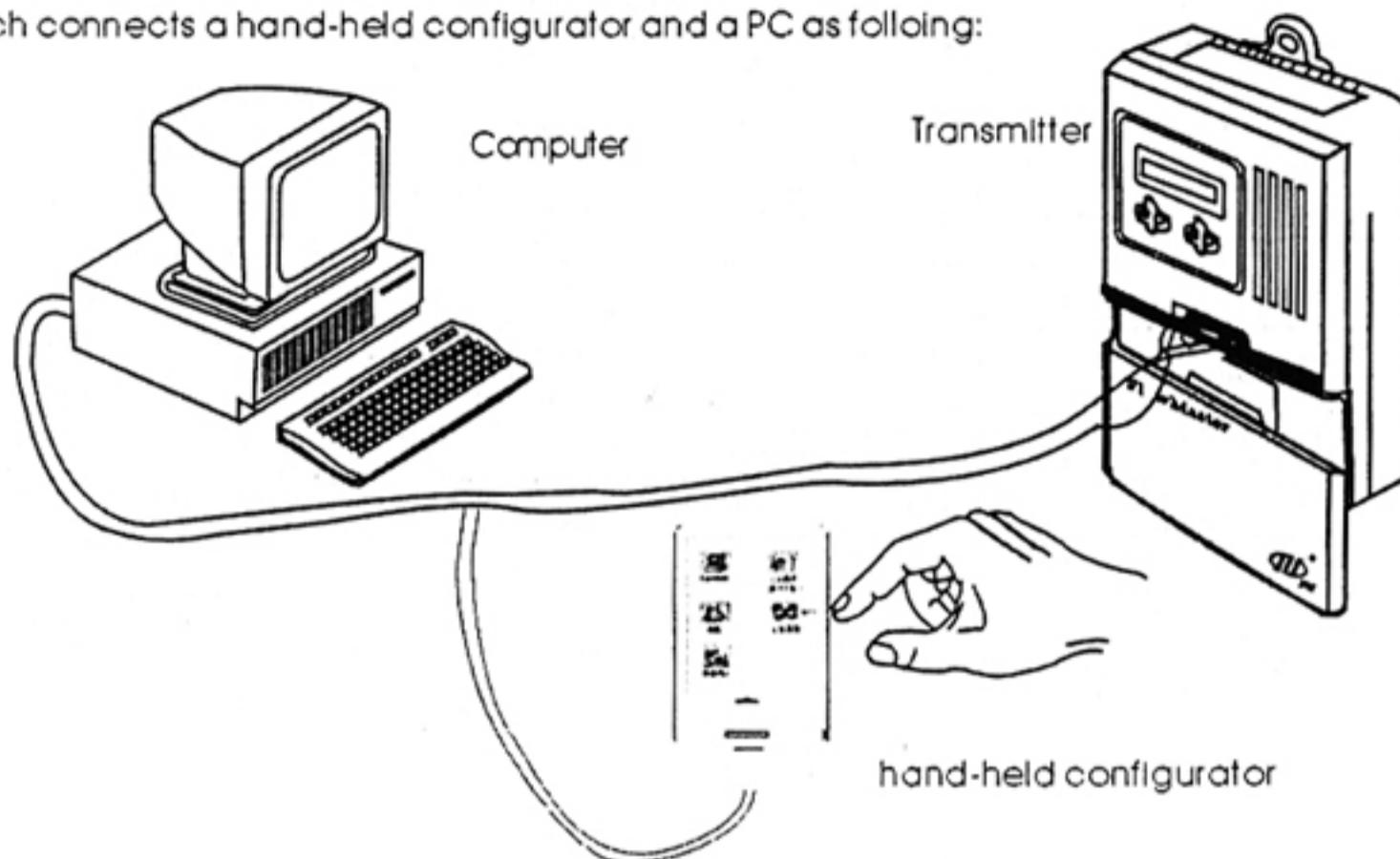
#### Enter password:

After entering the login interface, press membrane switch to the digit needed to be revised, and then press either or switches to reach the required digit. Continue until all digits have been set, and press switch to enter the complete code.

If an correct value is entered, display login success Information, and then access to Parameter change interface. If an incorrect value is entered, display login fault Information, and return to primal interface.

## ● Communication connections between transmitter and hand-held configurator transmitter

1. On the transmitter keypad there is a standard RS232 communication preface (9-pin D type plug), which connects a hand-held configurator and a PC as following:



2. Communication connections between transmitter and hand-held configurator

Our corporation can supply users with SIC hand-held configurators, which are small type hand-held PCs and equipped with RS232 communication prefaces and cables. Users can make connections according to above, switch on hand-held configurator power supply and operate the flowmeter applications.

3. Communication connections between transmitter and PC

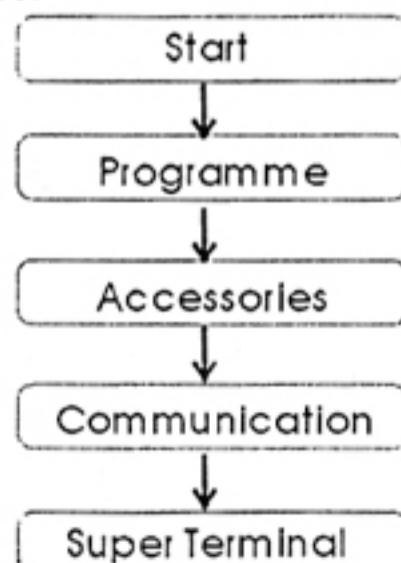
Transmitter connects to PC as below:

FlowMaster transmitter 9-pin D type preface	PC	
	9-pin D type preface	25-pin D type preface
1(not connected)		
2	3	2
3	2	3
4	6	6
5	5	7
6	4	20
7	8	5
8	7	4
9(not connected)		

Note: make sure the power supply is cut off,

when connecting transmitter to PCs serial-port.

Routes:



Parameter settings of computer communication port (Hyper Terminal) are as following:

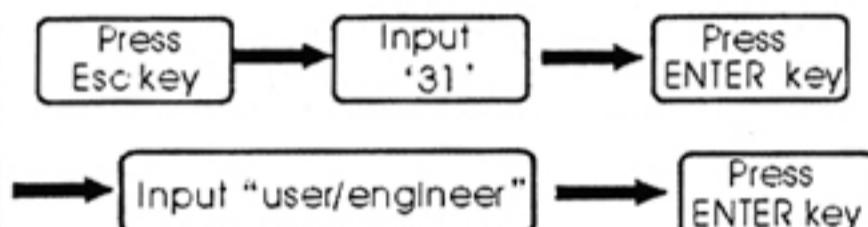
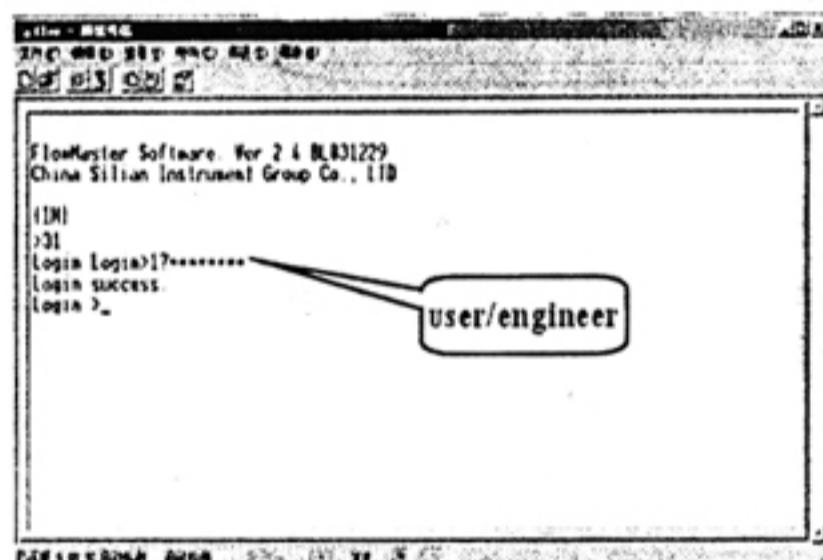
Baud rate	4800
Data bits	8
Stop bits	1
Parity	NONE
Handshaking	NONE
COMMS PORT	COM1 or COM2

Computer communication software packages: Microsoft Windows super terminal

## ● Instrument configuration

- Login for Personal Computer or SIC hand-held configurator

1. Login on super terminal

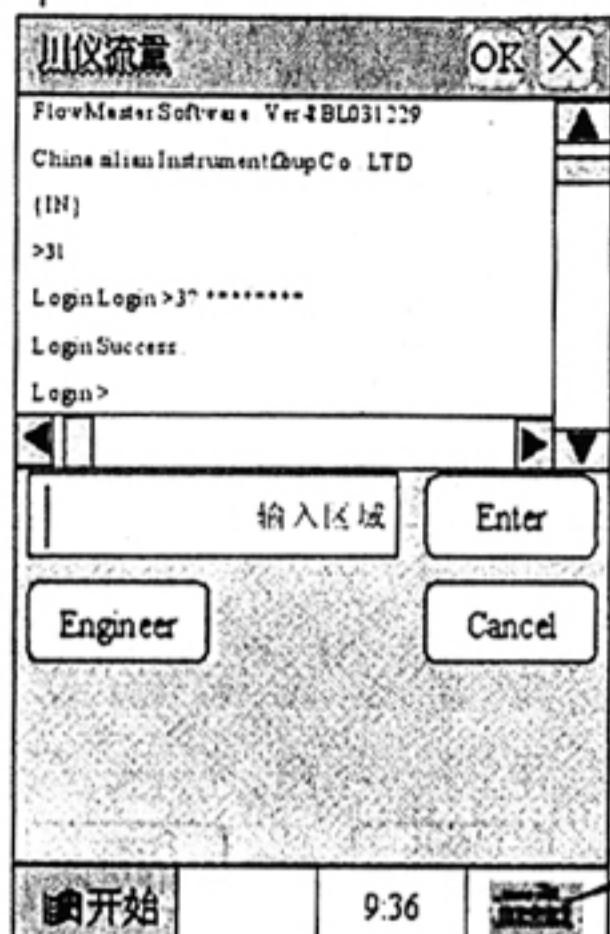


Press ESCAPE key, when a '>' is showing.  
After login success, press ESCAPE key resets to root directory.

2. Login on SIC hand-held configurator



Switch on the power supply of SIC hand-held configurator.  
The drawing on the left is shown.  
Select the icon of 'SIC Flow' on the LCD screen with matched pen.

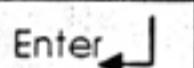


After entering the program, hand-held configurator auto-search the port. When hand-held configurator find the instrument, 'FlowMaster' show in the window interface. After a short delay, the prompt is shown after {IN}. And then input 'user/engineer' as password for login.

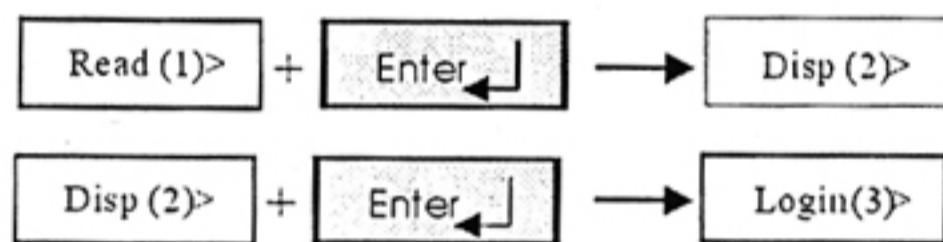
Select this icon, show the keyboard.  
Then, prompt is shown after {IN}.

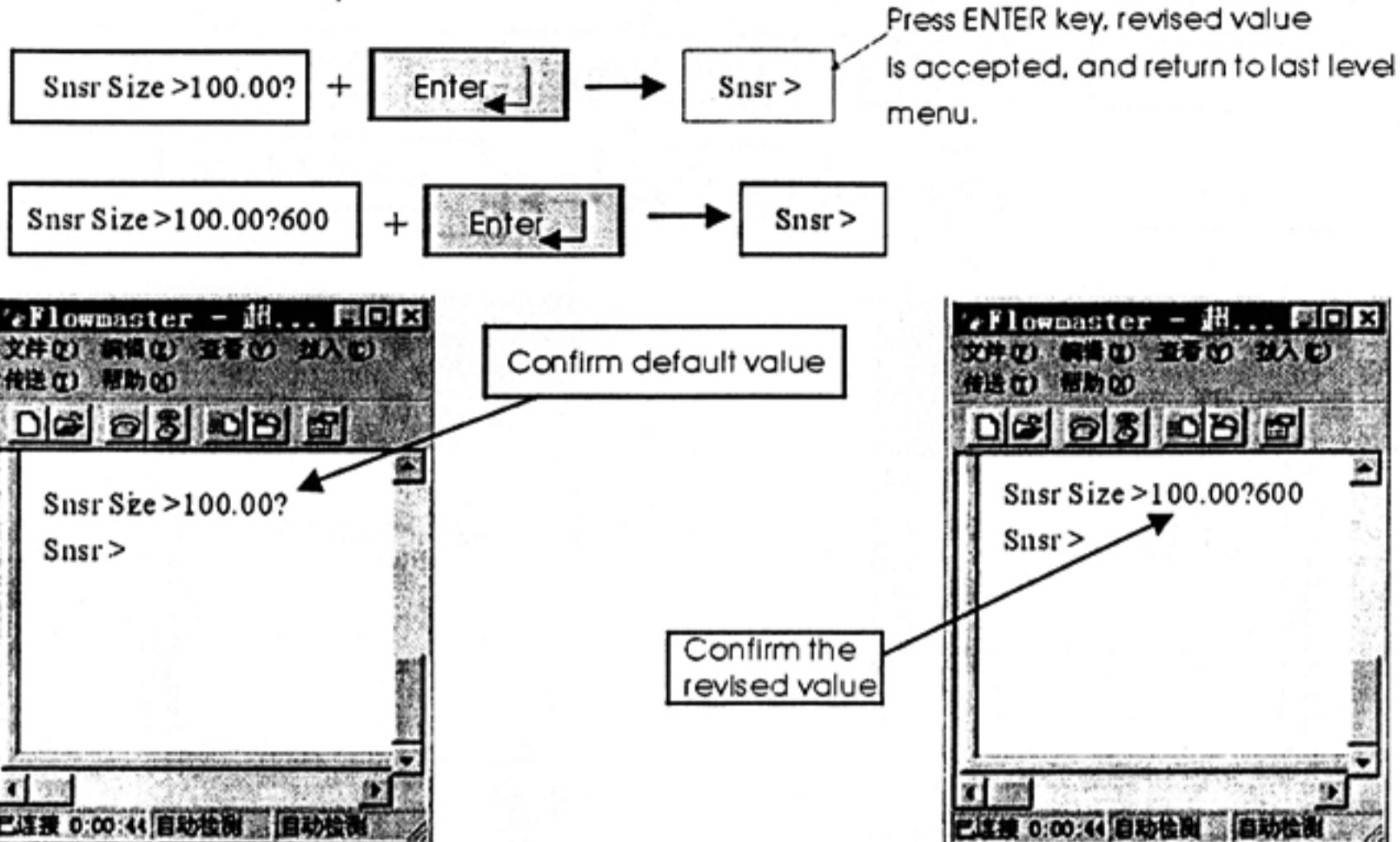
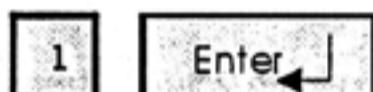
- The function of the key on Personal Computer or SIC hand-held configurator is as follows:

- The function of ENTER key (enter or action etc.)

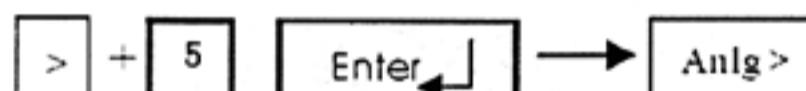
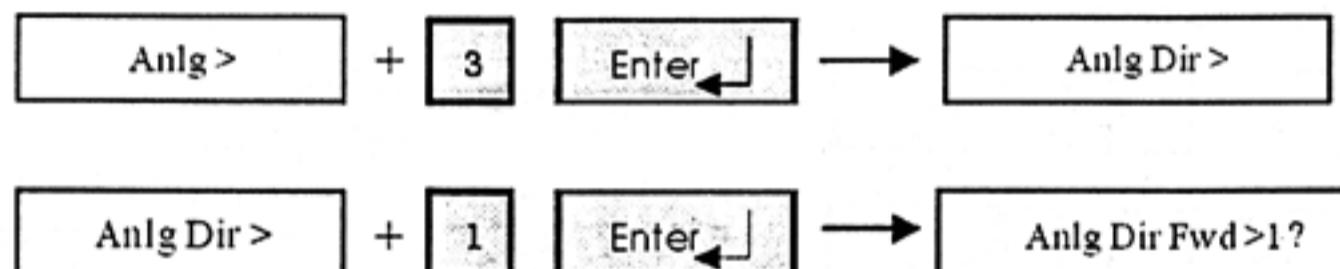


- Display main menu or sub-menu in the super terminal interface.

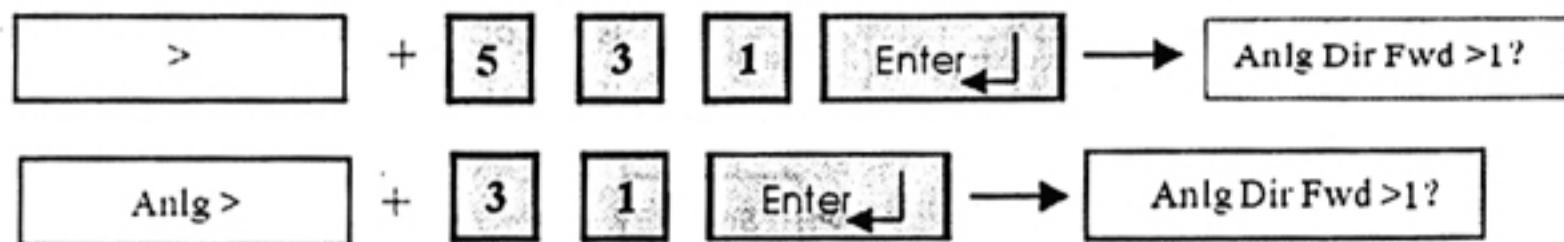


**B. Confirm the revised parameter**

**2. Number key or letter key + ENTER key**


A. Refer to the next level menu, enter the number key or letter key to advance to the next level menu.

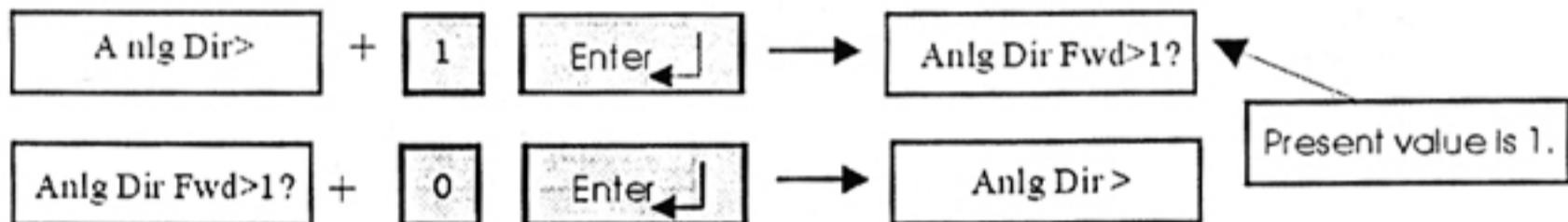


B. Refer to the parameter table, enter combined code as fast selection method.

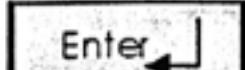


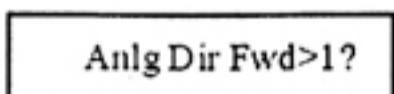
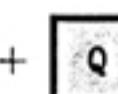
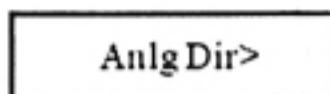
C. Act the order item and show return value. When a ‘?’ prompt is showing, that means present value can be changed.

Enter required value after ‘?’ , Press ENTER key to confirm the required value. Press ENTER key to leave current value unaltered.



Note:  
1 = yes  
0 = no

3. Q key + ENTER key            (Return to last level menu from present menu)

 +            →    



Press Q key

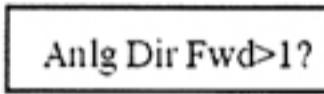
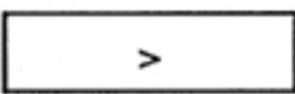
(1) Return to sub-menu of 'Anlg Dir' from the third menu of 'Anlg Dir Fwd' .

(2) Return to main menu of 'Anlg' from the sub-menu of 'Anlg Dir' .

(3) Return to root directory from the main menu of 'Anlg' .

#### 4. ESCAPE key

A. Directly return to root directory

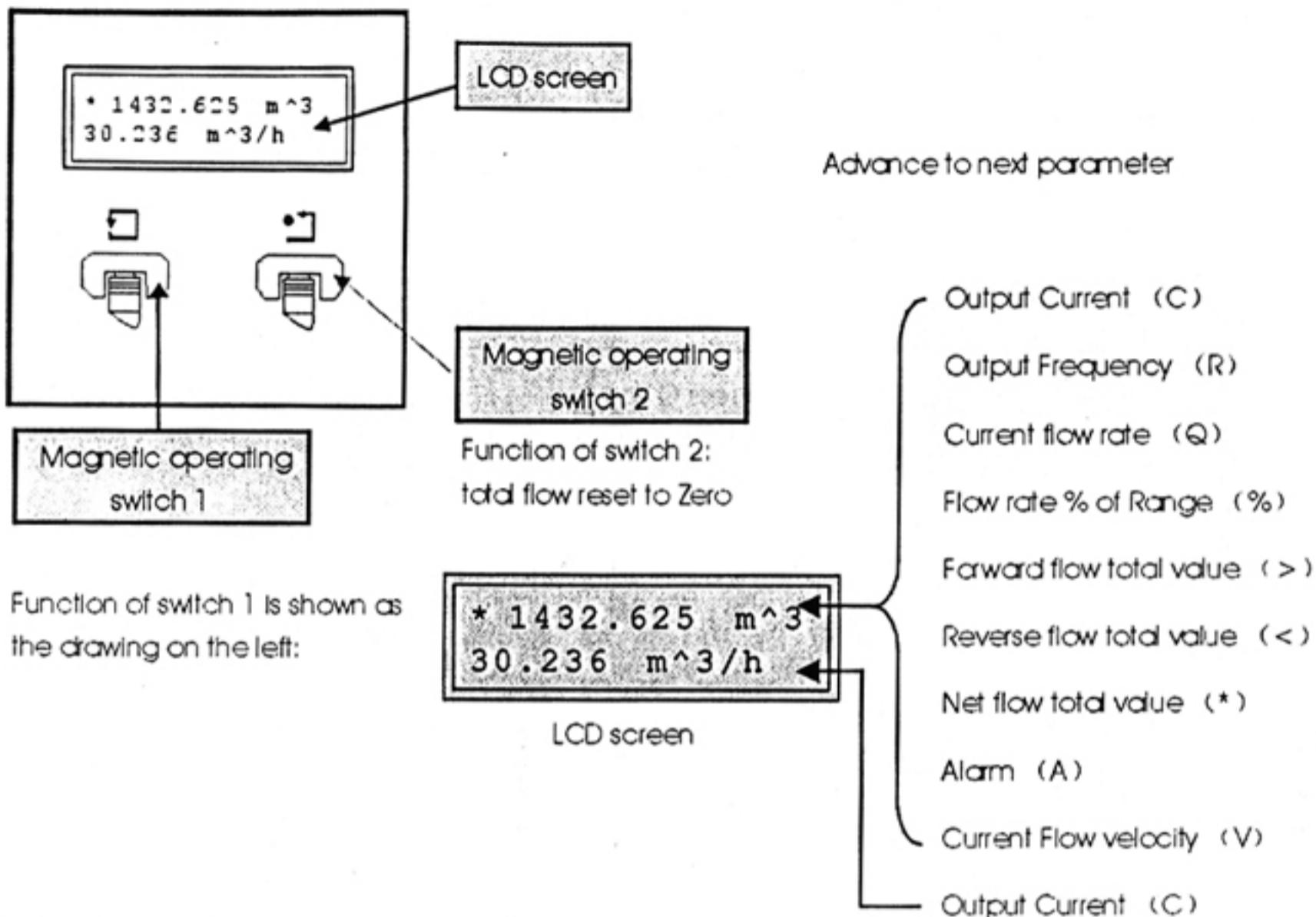
 +        →    



Press Esc key

Return to root directory from the third menu of 'Anlg Dir Fwd' .

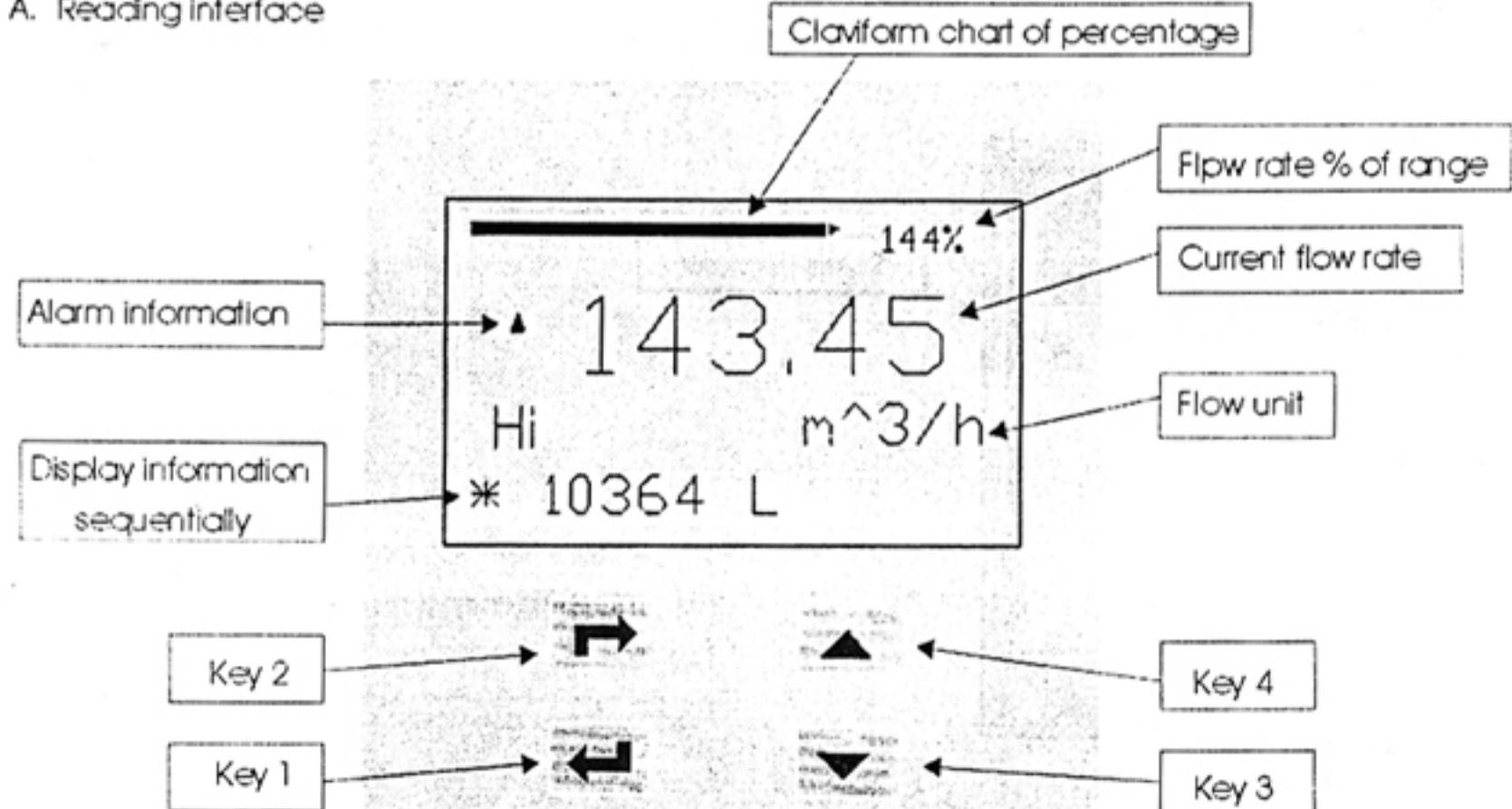
- The magnetic operating switch on LCD screen for 2 line display



- Instruction for 3 line keypad version FlowMaster

Three line keypad version FlowMaster can be connected to PC or SIC hand-held configurator and be operated as the instruction indicated before. It can be also operated though the keypad on the transmitter.

#### A. Reading interface



Press  switch, following items are displayed sequentially:

> Forward flow total value

< Reverse flow total value

\* Net flow total value

A Active alarms If more than one alarm is present, all alarms are displayed sequentially. Display 'None' when there is not any alarm.

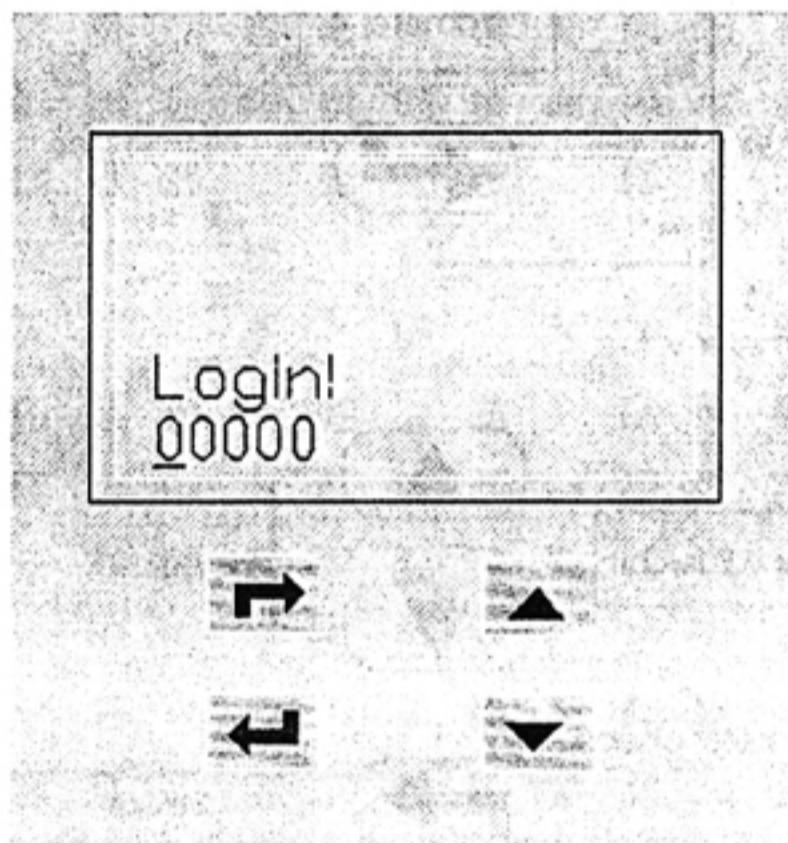
V Current flow velocity

% Flow rate % of range

Press  switch and hold on 3~5 seconds, reset the Flow total value.

Note: Only parameter of "Tot Clr En" be set to "1", can the Flow total value be reset.

Press  switch to enter login interface as shown below:



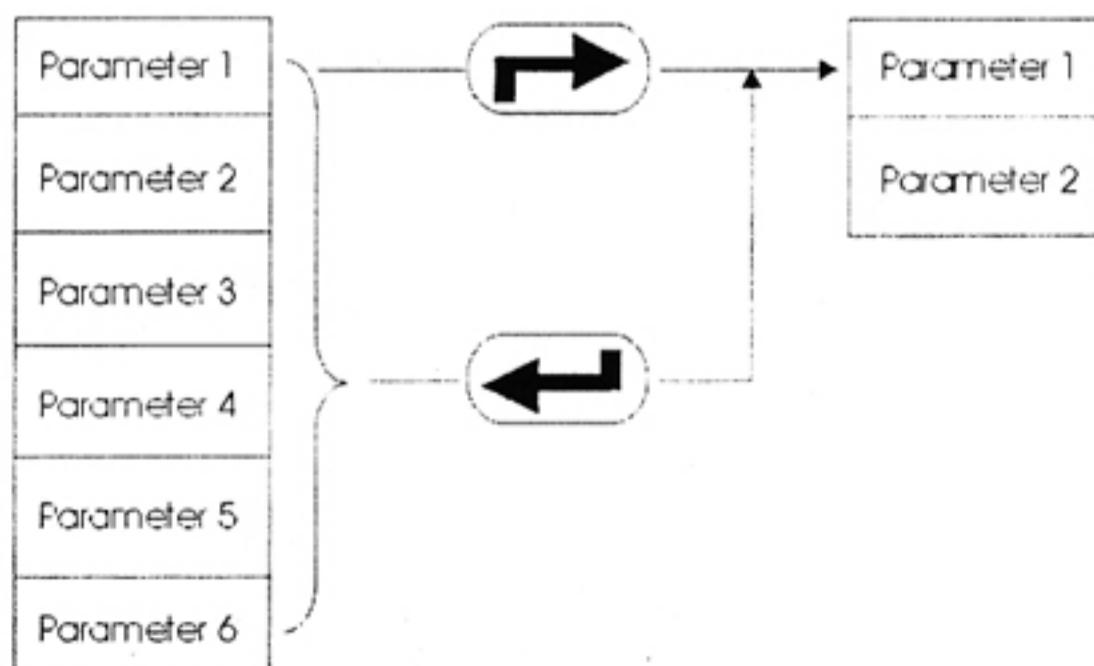
A 5-digit security code must be entered. It is used to prevent tampering with the secure parameters.

B. The using method of switch on transmitter

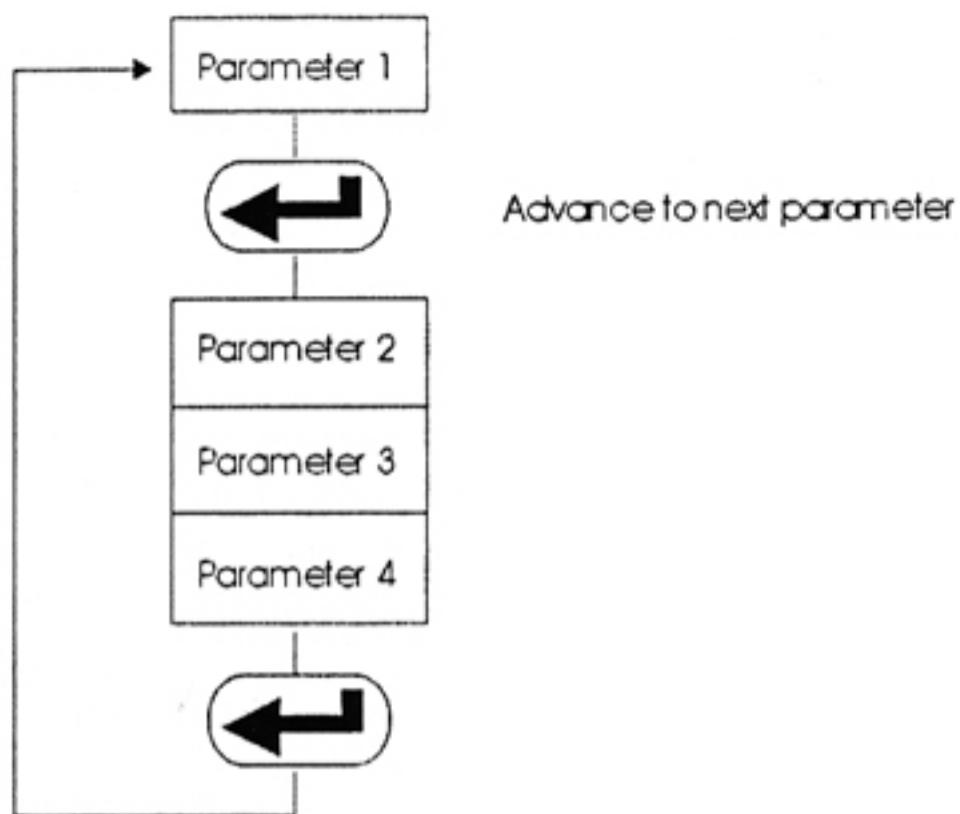
1. Advancing to next page:

Page 1

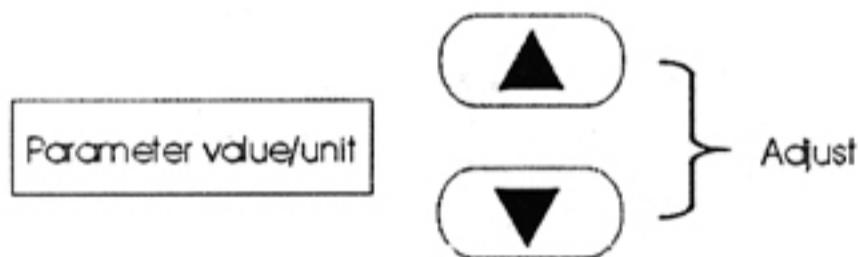
Page 2



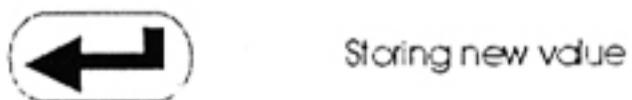
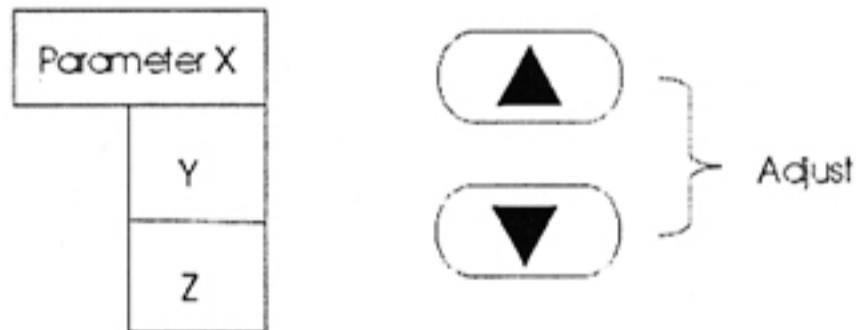
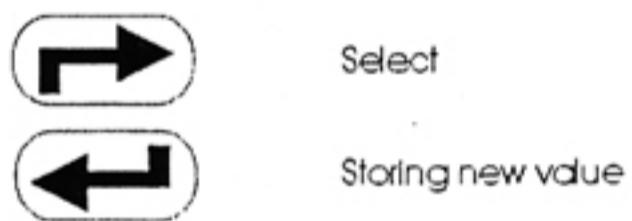
## 2. Moving between parameters



### 3. Adjusting and Storing a parameter value

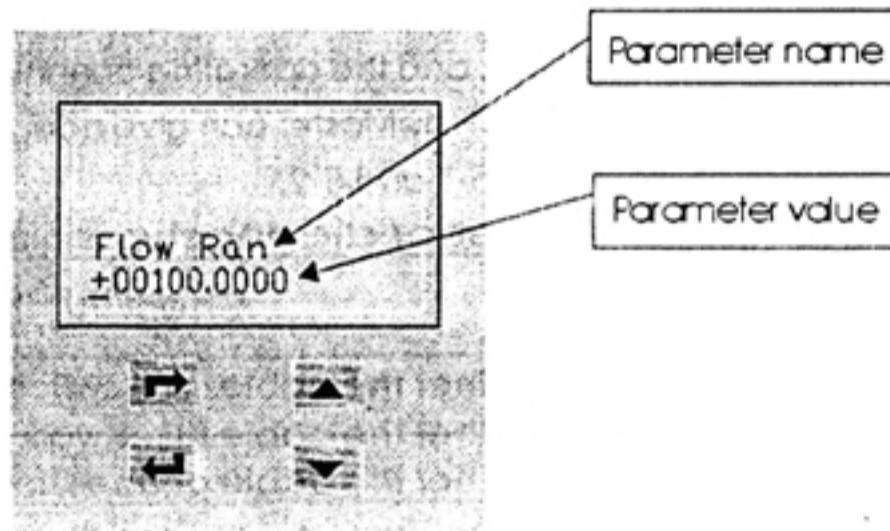


#### 4. Selecting and storing a parameter choice

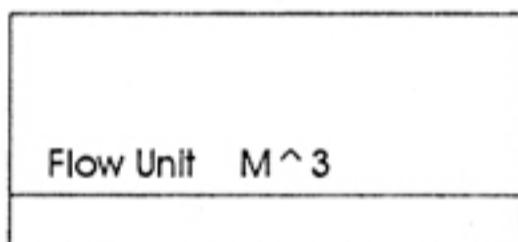


Pressing this switch and hold on 5 seconds, and then releasing it will exit the menu system and return to normal operating mode.

## C. Parameter configuration



- When a parameter is selected, which holds one or more optional items, e.g. 'Flow Unit' parameter which can be litres, cubic metres etc., Proceed as follows to change the units:



'Flow Unit' , M ^ 3 parameter selected

Press or switches to select the units.

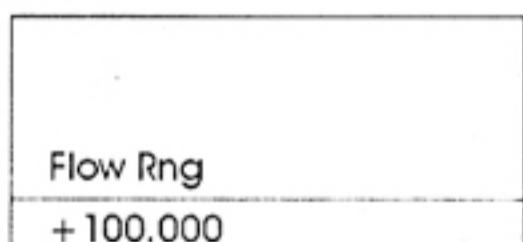
Note: the existing units will flash when pressing or switches.

Pressing switch will enter the newly selected units.

This type of action is similar for parameter units..

- Changing parameter values

e.g. The value of 'Flow Rng' parameter.



Firstly, move prompt to the behind of 'Flow Rng' . The cursor under the first digit or letter will flash, that means this digit/letter can be changed when pressing or switches at the first time. And then change the value with the or switches. Press switch to move cursor to the next digit/letter and press or switches to change the value of it. Lastly, pressing switch will enter the final selection.

## V. Maintenance and error diagnostics

FlowMaster needs very few maintenance tasks, usual daily maintenances are to visually check the reliability of the electrical connections, and the operating conditions of the FlowMaster. For errors appear in the normal applications, the FlowMaster can give adequate alarm information through its self-diagnostics function, see table 5-1 and 5-2:

**Normal error diagnostics table**

**Table 5-1**

Errors	Checking Items
No display	<ul style="list-style-type: none"> <li>① Check whether the cables are switched on</li> <li>② Check whether the cable fuses work well</li> <li>③ Check whether the cable connections are correct</li> </ul>
Flow measurement incorrect	<ul style="list-style-type: none"> <li>① Check whether the pipeline is full of mediums</li> <li>② Check whether signal wire is correctly connected and reliable</li> <li>③ Check whether following parameters accord with those on the sensor nameplate            [B3]=Sensor Diameter            [B51]=Instrument quotient 1            [B52]=Instrument quotient 2</li> <li>④ Readings vibrating, check whether signal wire and ground connection is OK</li> </ul>
Electromagnetism-driven malfunction	<ul style="list-style-type: none"> <li>① Check whether electromagnetism-driven connections (CD1 and CD2) are switched off</li> <li>② Check whether resistance of sensor magnetic wire less than <math>20\Omega</math></li> </ul>
Empty pipe error	<ul style="list-style-type: none"> <li>① Check whether the measuring pipeline is full of mediums</li> <li>② Connect SIG1 and SIG2 to SIG GND to see if errors can be excluded</li> <li>③ Check whether signal wires are correctly connected</li> <li>④ Check whether electrodes contaminated</li> <li>⑤ When the flow volume is zero, check whether the value of parameter MtSnsr mv is more than 50</li> <li>⑥ When water is the medium and the flow exists, check whether the resistances of SIG1 and SIG2 are less than 50</li> </ul>
Analog output error	<ul style="list-style-type: none"> <li>① If analog outputs above range, please regulate the value of parameter Flow Rng</li> <li>② Switch off current output cable, check the value of parameter Anlg mA and test current value between output terminals IC+ and IC- to see whether they are equal</li> <li>③ If the flow is full of range and the current output come up to full scale, check whether the current output circuit resistance is less than <math>750\Omega</math></li> </ul>
PLS frequency error	<ul style="list-style-type: none"> <li>① If frequency output is out of range, regulate the value of parameter Pls Fact</li> <li>② If PLS frequency output Incorrect, use the test function to test output frequency to exclude output connection errors</li> </ul>
19 20 21 error	Input '0' in the parameter Read Alm to return to originating conditions to recover related parameters before leaving the factory

If errors not excluded after executing above actions, please contact our local subdivision nearby or directly get in touch with our head office.

Self-diagnostics alarm information table

Table 5-2

Alarm information	Alarm Explanation
Mtsnsr	Empty sensor
HI	Flow higher than upper limits of setting
Lo	Flow below lower limits of setting
Anlg	Analog outputs higher than limits
PLS	Pulse output frequency higher than limits of setting
Coll	Sensor magnet-driven error
19	Total value error
20	Register error
21	Parameter configuration error
A*	Check contact of the signal wire
V	Power cut alarm
N	Hardware alarm 1
E	Hardware alarm 2
D	Hardware alarm 3
1	Alarm appear in alarm 1
2	Alarm appear in alarm 2
C	Sensor open circuit
S	Sensor short circuit
A	Regulating the state

As the FlowMaster transmitter applies surface mount technology (SMT), it can't be maintained by the user. Therefore the user is advised not to open the transmitter. If the FlowMaster doesn't give alarm information and the user is quite sure of the existence of errors, please check it according to table 5-1 to see whether the reasons are found before requesting maintenance services from our corporation.

## VI. Appendix

### ● How to use two mixed backfills

When the FlowMaster needs to be used underground, after the connections are completed, please use the special sealing glues supplied by our corporation to backfill connection terminal of the junction box. For more details please see instruction of the special glue attached with the FlowMaster.

## ● FlowMaster Electromagnetic flowmeter model code

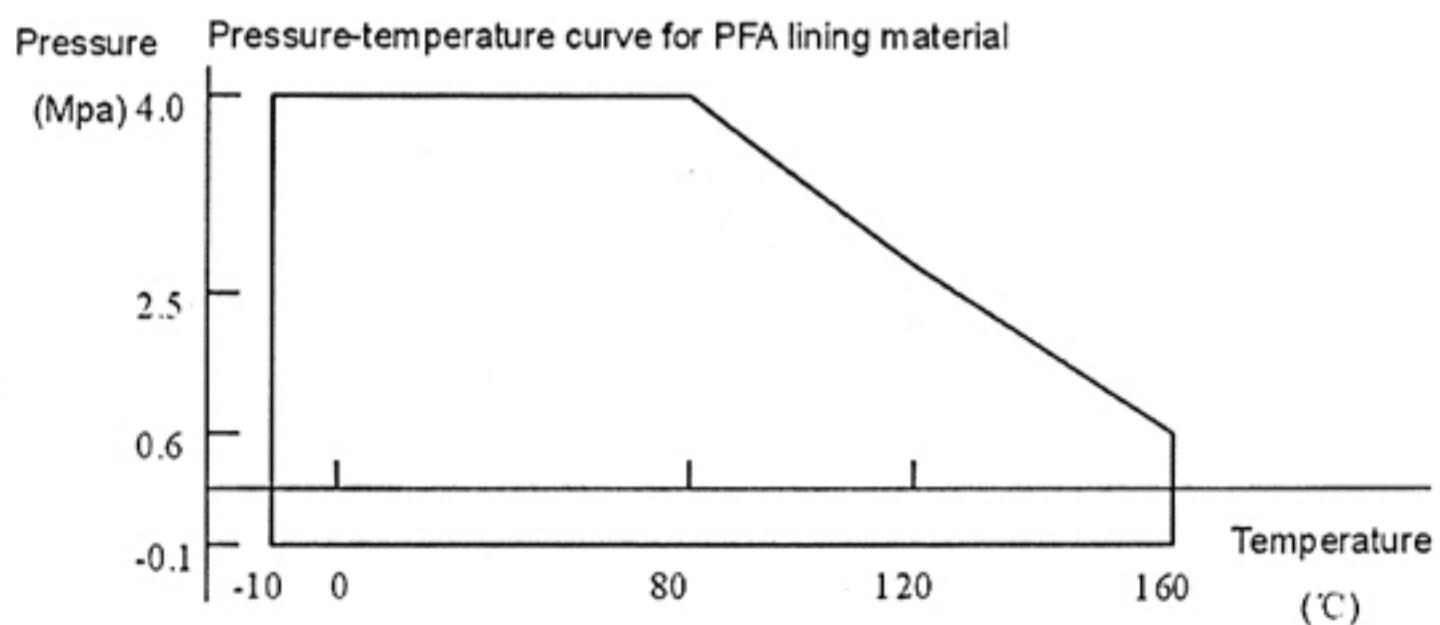
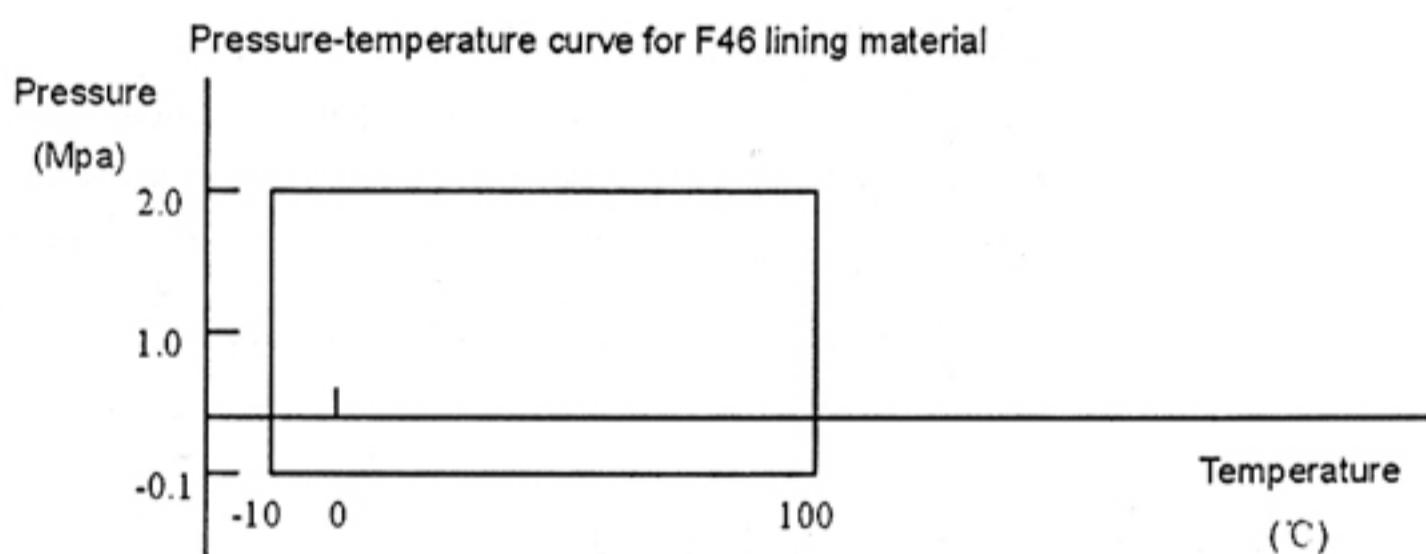
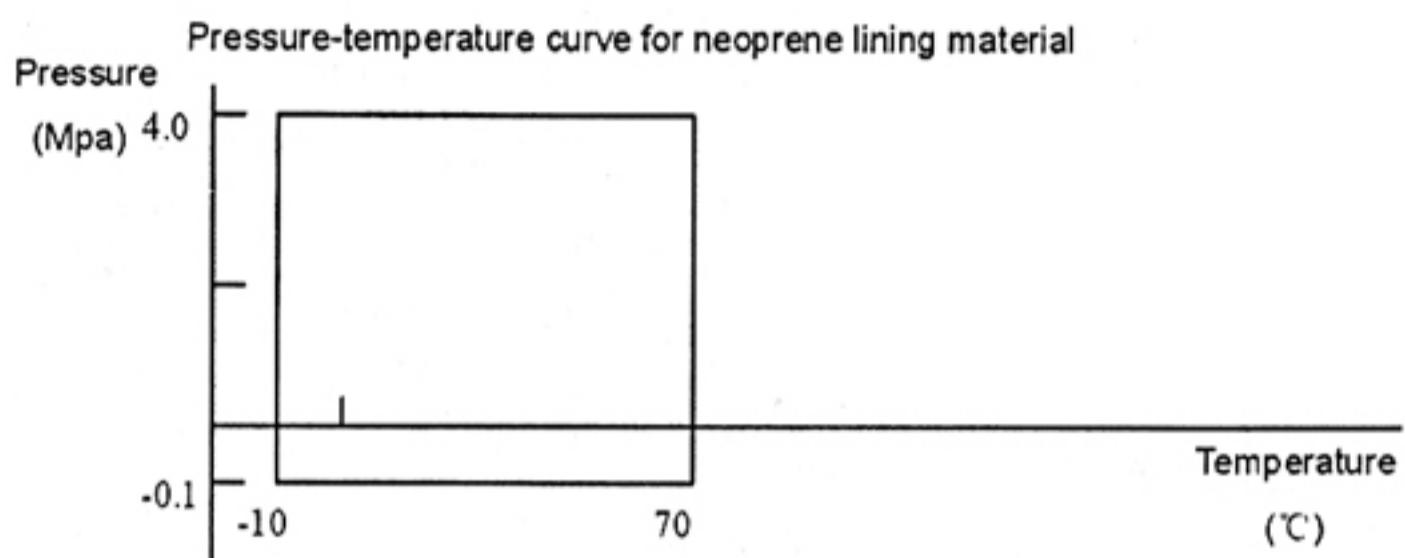
	FlowMaster sensor										FlowMaster transmitter											
Main Title	<input checked="" type="checkbox"/> MFC	<input type="checkbox"/> XXX	<input checked="" type="checkbox"/> XX	<input checked="" type="checkbox"/>																		
Size DN3~DN1600																						
Represented with 3-digit figure, the former 2 represents 1st and 2nd figure of the Diameter, the 3rd digit figure.																						
Unit: mm																						
Standard Pressure (flanges)																						
1 : 1.6MPa	DN15~DN600																					
2 : 4.0MPa	DN15~DN600																					
4 : 2.5MPa	DN15~DN600																					
5 : 1.0MPa	DN15~DN600																					
6 : 0.6MPa	DN700~DN1600																					
S : Special																						
Lining Material																						
4 : Elastomer																						
6 : Polyurethane																						
7 : PTFE																						
8 : Neoprene																						
9 : FEP	DN≤300																					
A : PFA	Dn≤300																					
Electrode Material																						
1 : 316L																						
2 : Hastelloy C																						
3 : Ti																						
4 : Ta																						
5 : Pt-Ir alloy																						
Working environment																						
1 : Normal area: Environment temperature≤60°C Medium temperature≤80°C																						
4 : Normal area: Environment temperature≤60°C Medium temperature≤140°C (Separation type)																						
Calibration																						
A : Standard 3 point test without pressure ± 0.5%																						
B : Standard 3 point test without pressure ±0.2% (DN≤300)																						
Cable length																						
Separation type≤100m, Integral is 00.																						
Special demand remarked when ordering																						
Gland sealing																						
1 : M20*1.5 plastic sealing (cable fitted) 2: GB G1/2, JIS G1/2																						
5 : M20*1.5 plastic sealing (user to fit cable or integral type) 3: ANSI 1/2 NPT																						
Type																						
EH: Integral ER: Separation																						
Power supply																						
1:220V AC 50Hz																						
Display																						
3: High protected two line display 4: Three line keypad display																						
Drive Connection																						
0: Standard output 1: Dual current output 2: RS485																						
Working environment																						
1: Normal working area (not used on slurry medium) 2: Normal working area (used on slurry medium)																						
Display direction																						
1: Standard direction 2: +90° 3: +180° 4: +270°																						
Language																						
1: English																						
Label																						
1: Factory matched																						

**● FlowMaster Electromagnetic flowmeter  
dimension and flow range**

Code	Size (mm)	Flow range(m <sup>3</sup> /h)		Code	Size (mm)	Flow range(m <sup>3</sup> /h)	
		Minimum	Maximum			Minimum	Maximum
150	15	0.318	12.723	351	350	173.180	6927.212
200	20	0.565	22.619	401	400	226.195	9047.787
250	25	0.884	35.343	451	450	286.278	11451.105
320	32	1.448	57.906	501	500	353.429	14137.167
400	40	2.262	90.478	601	600	508.938	20357.520
500	50	3.534	141.372	701	700	692.721	27708.847
650	65	5.973	238.918	751	750	795.216	31808.625
800	80	9.048	361.911	801	800	904.779	36191.147
101	100	14.137	565.487	901	900	1145.111	45804.420
121	125	22.089	883.573	102	1000	1413.717	56548.667
151	150	31.809	1272.345	112	1050	1558.623	62344.905
201	200	56.549	2261.947	122	1200	2035.752	81430.080
251	250	88.357	3534.292	142	1400	2770.885	110835.387
301	300	127.235	5089.380	162	1600	3619.115	144764.587

● Lining introduction for FlowMaster Electromagnetic flowmeter

1. The temperature and pressure range for lining material



## 2. Lining material

Lining materials	Main capabilities	Application range
PTFE	1. The best stable chemical plastic material, resistance to boiled hydrochloric acid, vitriol, nitric acid, aqua regia, thick alkali, various organic solvents, not resistant to C1F3, high temperature Of3, high flow velocity liquid state fluorin, lox, ozone, etc. 2. Weak in abrasion resistance capability and negative voltage resistance.	1. -25°C~140°C Mediums such as thick acid, thick alkali, etc. 2. Hygienetype mediums
FEP	1. Have good hydrophobia and inviscidity capability 2. After PFA as referred to erosion resistance 3. Strong in negative voltage resistance, if negative voltage is high, wire netting would be added to improve the negative voltage resistance. 4. Have low abrasion resistance capability.	1. -25°C~120°C non-high abrasion mediums 2. Hygienetype mediums
PFA	1. Have good hydrophobia and inviscidity capability, resistant to high temperature 2. Resistant to thick acid, thick alkali, organic solvents and various salt erosion. 3. Strong in negative voltage resistance, if negative voltage is high, wire netting would be added to improve the negative voltage resistance. 4. Have low abrasion resistance capability	1. -25°C~140°C available for non-high abrasion medium 2. Hygienetype medium
Neoprene	1. Have good elasticity, high pull-breaking force and good abrasion capability. Weak in enduring cold resistance. 2. Resistant to normal acid, alkali and salt erosion, resistant to oil, solvents and oxidative medium erosion	1. 0°C~80°C, normal acid, alkali and salt medium 2. Usual water, wastewater, mineral slurry
Polyurethane	1. Have good abrasion resistance capability (about 10 times of the natural rubber) and elasticity. 2. Weak in acid and alkali resistance	1. -25°C~60°C 2. Neutral high abrasion mineral slurry, coal slurry and slop
Elastomer	1. Resistant to heat, normal acid, alkali and salt erosion. Perfect oil resistance capability.. 2. Weak in ozone, cold resistance. Have not good elasticity.	1. 0°C~80°C 2. Normal acid, alkali and salt medium. Perfect for oil medium. 3. Do not used on cold medium.



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