Virtec Instruments Inc.

User Manual

Insertion Electromagnetic Flow Meter

The documentation is only complete when used in combination with the relevant documentation for the signal converter.

Version Number: 20220421 REV.E

1. Brief introduction

1.1. Storage precautions

After the shipment arrival, if the instrument is planed to store for a certain time, the followings should be paid attention to:

A. It should be packed by its original package and kept same as the shipment package.

B. The storage place should take the following reference:

C. Avoid rain and wind.

D. Avoid impact

E. Don't open the wire box for sensors connection to keep it dry in order not to affect future normal operation

F. Atmosphere temperature, humidity and air pressure: Atmosphere temperature：-20 ~+60 Relative humidity：5%~90%. Air pressure：86-106KPa

1.2 Installation location precautions

The installation location is chosen according to the following requirements, ensuring the stable and continuous operation of instruments.

Atmosphere temperature: avoid large temperature change and sunshine, if some thermal radiation in the installation location, the thermal insulation and ventilation should be applied.

Air condition: avoid strongly corrosion and explosive gas in the installation location (non-explode- resistant instrument).

1.3 Change adapter direction

It is not recommended to change the adapter direction by users, if it is necessary to change, please contact service center.

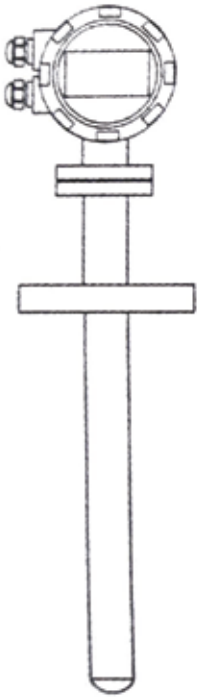
1.4 Product application scope

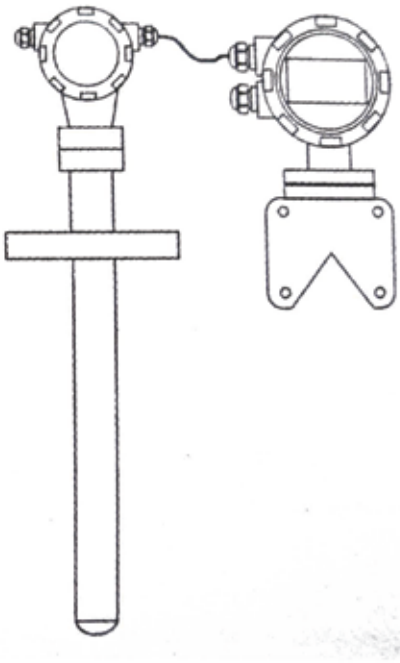
The insert-type electromagnetic flow-meter is composed of sensors and adapter, using for measuring conductive liquid. During measurement, conductivity is required to be more than 5μs/cm, and water, sewage, acid and alkali and so on could be measured.

1.5 Product component

One set of PMF insert-type electromagnetic flow-meter is composed of sensors and adapter. Two different types are designed, according to safety class and parameter configuration, which are sensor and adapter in one unit type and sensor and adapter separate type.

The sensor and adapter connection by shield cable is adopted in the separate type installation, to make one set of electromagnetic flow-meter, illustrated as follow. The parameters could be fixed according to user requirement and production value after manufacturing, which is suitable to inner water occasion.





1.6 The main technical parameter of magnetic flow-meter

Sensor Adopter

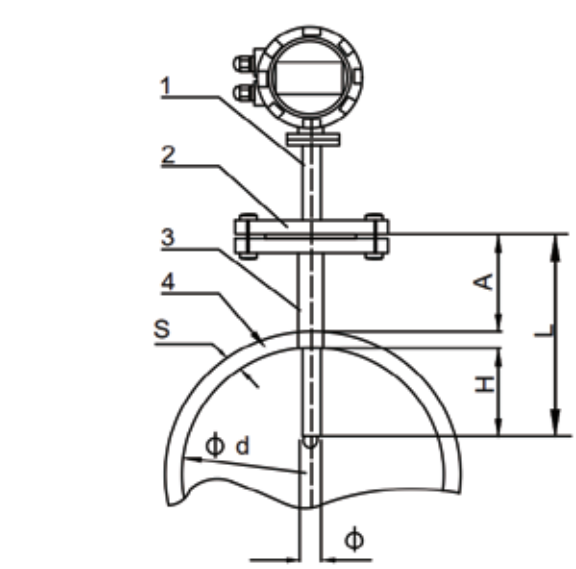
Type		
	Appearance	Details
Accuracy	±0.5%~±1.5%(according to different situation)	
Diameter（mm）	DN200-DN3000	DN200-DN3000
Flange	Meet GB9119 standard, stainless steel	
Pressure class	1.6MPa	
Adapter cover material	Die-casting aluminum alloy	
Sensor cover material	Stainless steel	
Sensor frame material	Stainless steel/PVDF	
Weight	6Kg	
Conductivity	≥5μs/cm(if less than5μs/cm, please contact us for special order)	
Electrode	316L, Hastelloy alloy, titanium, tantalum, platinum	
Safety class	IP65	IP65/IP67（sensor could be IP68）
Medium temperature	-25℃~80℃	-25℃~120℃
Atmosphere temperature	25℃~60℃	
Atmosphere temperature influence	＜±0.1%/10℃ or ＜±0.25%/10℃	
Repeatability	≤±0.01% or ≤±0.25%	
Analog output error	≤±0.02mA	
Measurement flowing speed range	≤10ms	
Maximum embedded length	-	≤5m（Only for IP68）
Cable connection	M20*1.5sealing sleeve、G1/2、NPT1/2	
Sensor cable		＜30m

2. Installation

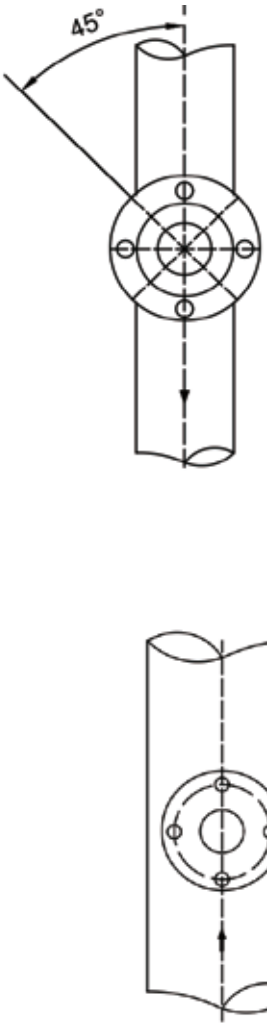
2.1 Dimension

2.1.1 Sensor dimension

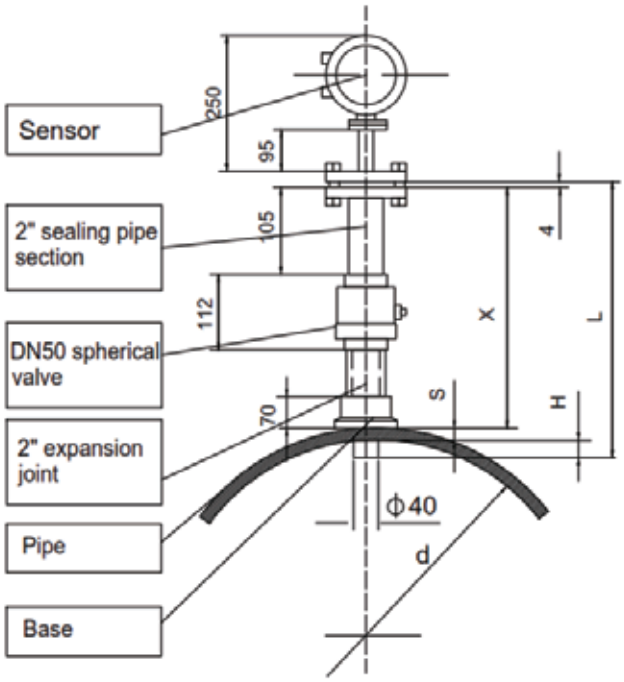
The flange connection is adopted as the sensor's fixation. First, the connection pipes length of base could be calculated according to pipe diameter, and then holes could be opened in the pipe, after that the base will be welded on holes in the pipes; during welding the correct direction of base flange screw hole and insert depth should be paid attention to make the sensor pole vertical to flow direction. The base connection pipe is not allowed to be exceeding the inner surface of measurement pipe to keep its inner surface of the pipe smooth. The exact size and material specification are illustrated as the following drawing.



Holes opening illustration



Installation direction illustration



Installation illustration

Installation principle: The insert pipe of sensor should be exceeding the inner surface 10%, that means the depth H= (d-2s) X10%, adjust expansion joint to make X=L-4-S-H (mm).

Here L: sensor length, 4: the washer and convex thickness, S: pipe thickness, d: pipe outer diameter Example: DN500 pipe Φ530X8, PMF-ST-450 flow-meter

H= (530-2X8)x10%=51.4mm X=450-4-8-5.1-4=386.6mm

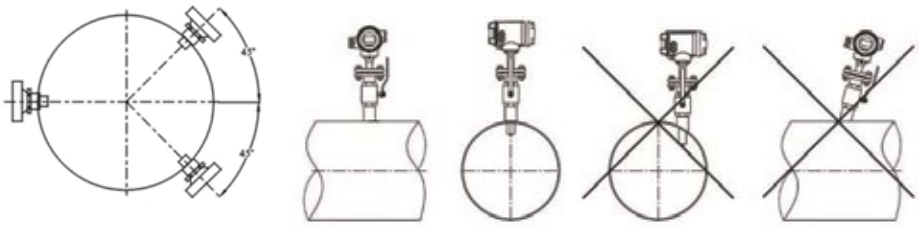
The insert-type electromagnetic flow-meter installation illustration

DN500mm~DN1200

Name\ DN	DN500mm	DN600mm	DN700mm	DN800mm	DN900mm	DN1000mm	DN1200mm
Sensor (LXΦ)	450XΦ38						
Sealant (included into product)	Φ45X3						
Connection flange	DN40 1.6Mpa						
Spherical valve	DN50						
Connection pipe	Φ50						
Pipe	ΦdXS						

2.2 Structure and installation

1. Find the installation point and weld the short pipe (45° is recommended for installation under pressure, and the installation point can be installed on the top to save effort when the installation point is at the low position and absolutely full pipe)



3. Special hole-opening tool for installation

4. Install the upper ratchet adjustable wrench, press the upper screw rod down and screw it to the proper position

7. Install upper threaded to flange fittings and gaskets

8. Install the movable flange (Note: Do not overtighten the bolts, otherwise it will cause the gasket to deform and make it difficult to install the sensor)

9. Install the insertion flowmeter sensor

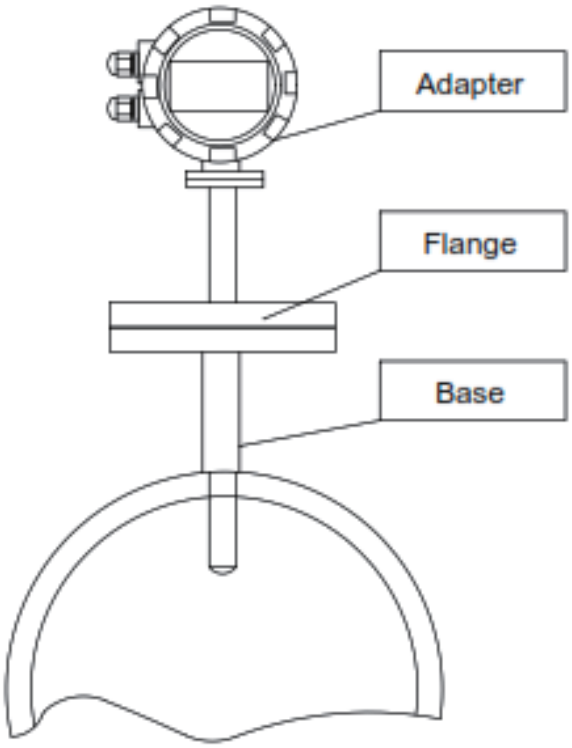
10. Install the threaded connecting rod for protection to prevent the sensor from being pushed out under pressure when the valve is opened (Note: Do not use excessive force when the valve is not opened to avoid damage to the sensor probe)

11. Fully open the valve, and when the sensor is pressed down, the nut on the long rod is screwed down, and the screw is removed after the screw is completely installed in place.

12. After aligning the direction of the water flow, tighten the screws, and the pressure opening is installed.

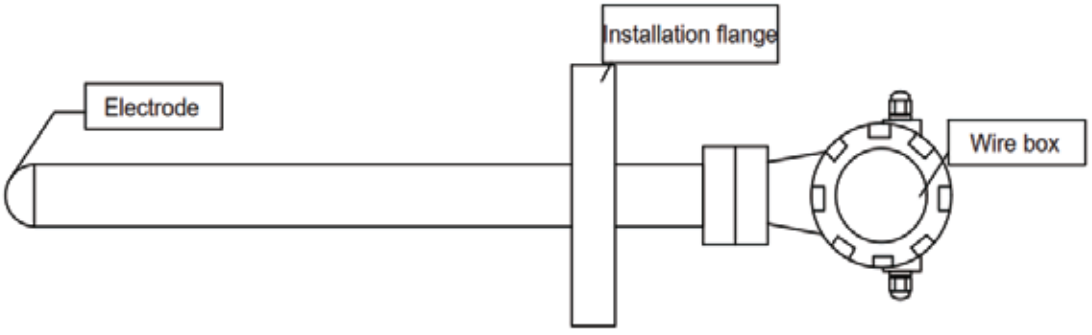
2.2.1 Adapter structure

The instrument is a kind of intelligent system. The flow signal is magnified before the calculation by signal-chip computer, and then the flow and accumulation value are indicated as well the output of impulse and analog item, which is used for liquid flow calculation and control. The small-type one-unit optimization design is adopted in the adapter, which is installed inside aluminum cover with safety class Ip65.



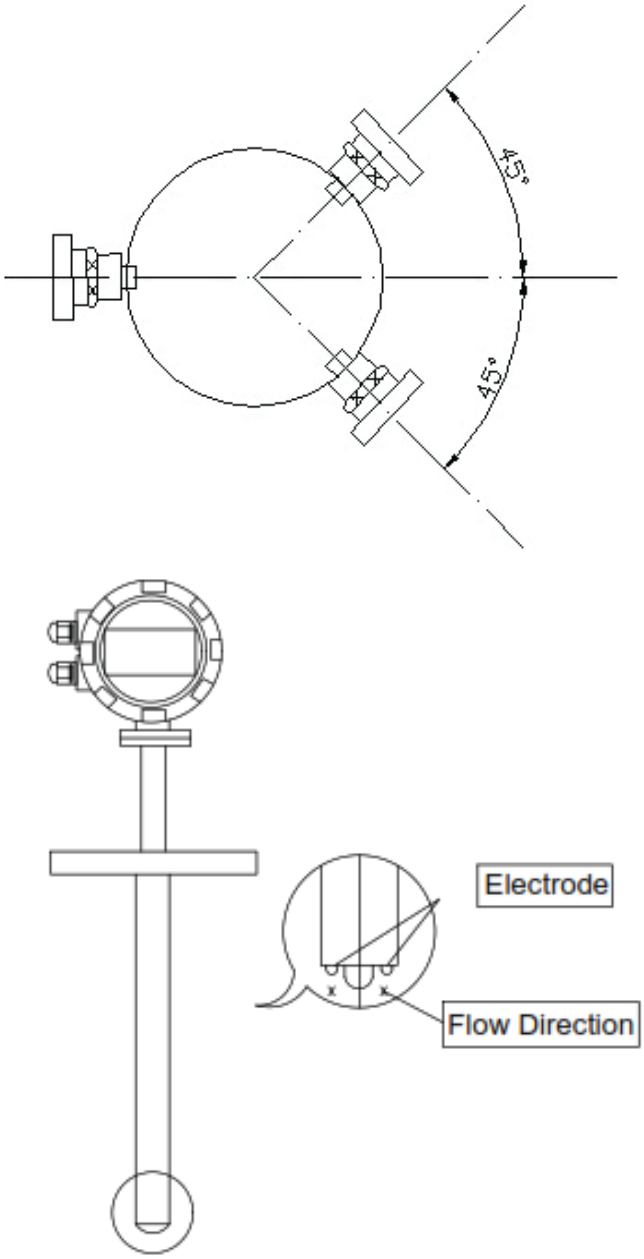
2.2.2 Sensor structure

The sensor is composed of measurement detector, installation flange and wire box (separate type) and so on. The sensor outline is in cylinder shape with installation flange, inside which the excitation winding used for exciting, magnet-conductive winding and two electrodes of magnet-conductive core, contacting liquid, are installed.



2.2.1 Adapter structure

The sensors could be erected at any position, however, the method illustrated as the drawing below is recommended to make sure that the electrode could be in the liquid all the times.



The sensors should be installed on the pipes inside which there are liquid all along, and it is always risky to bear whirlpool if the pipe is half-full, as well as to be installed behind valve, elbow, tee-joint as they are also the stem of whirlpool. In this case, the length of straight pipe before sensors should be at least >10D and straight pipe >5D after sensor, by which the whirlpool could be avoided and measurement accuracy improved. If the accuracy is required at ±0.5%, the length of straight pipe before sensors should be at least >30D and straight pipe >10D after sensor.

2.3 Installation requirements

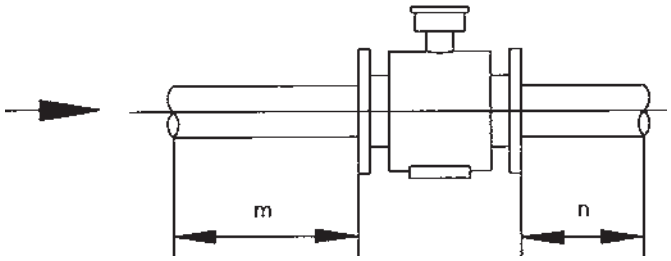
2.3.1 The requirements of straight pipes

The requirements of straight pipes are listed as follows:

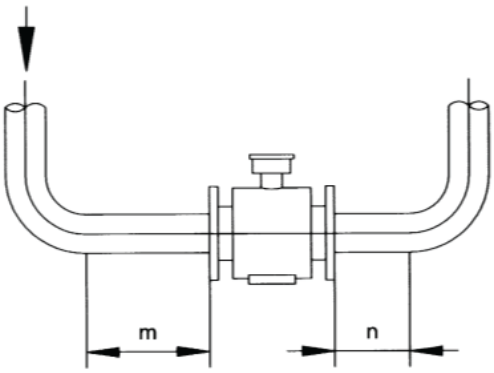
The pipes installation type	Illustration No.	Forward straight pipe	Backward straight pipe
Straight pipe	1	10D	5D
Elbow pipe	2	20D	5D
Increasing pipe	3	20D	10D
Downstream of valve	4	20D	5D
Decreasing pipe	5	10D	10D
Downstream of pump	6	30D	10D
Mixture liquid	7	30D	5D

The forward and backward straight pipe of flow-meter illustration

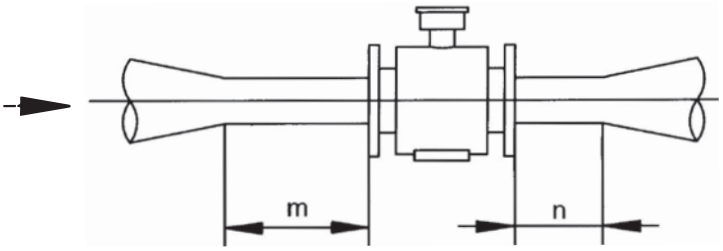
1. Straight pipe installation



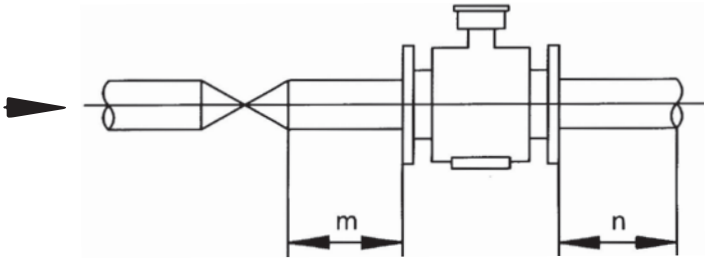
2. Elbow pipe installation



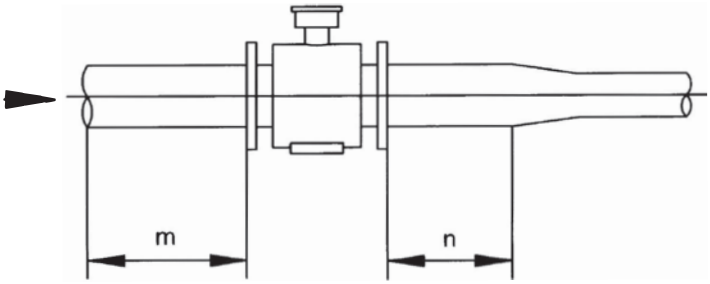
3. Increasing pipe installation



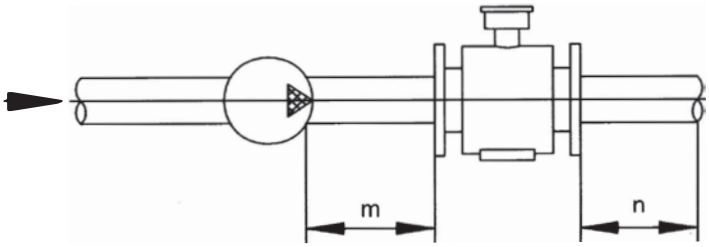
4. Downstream of valve installation



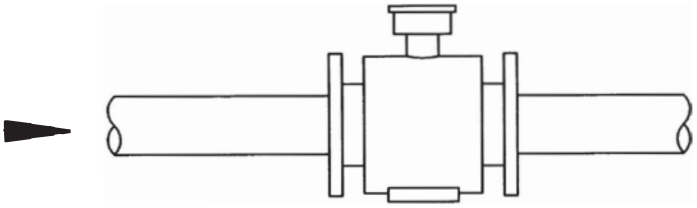
5. Decreasing pipe installation



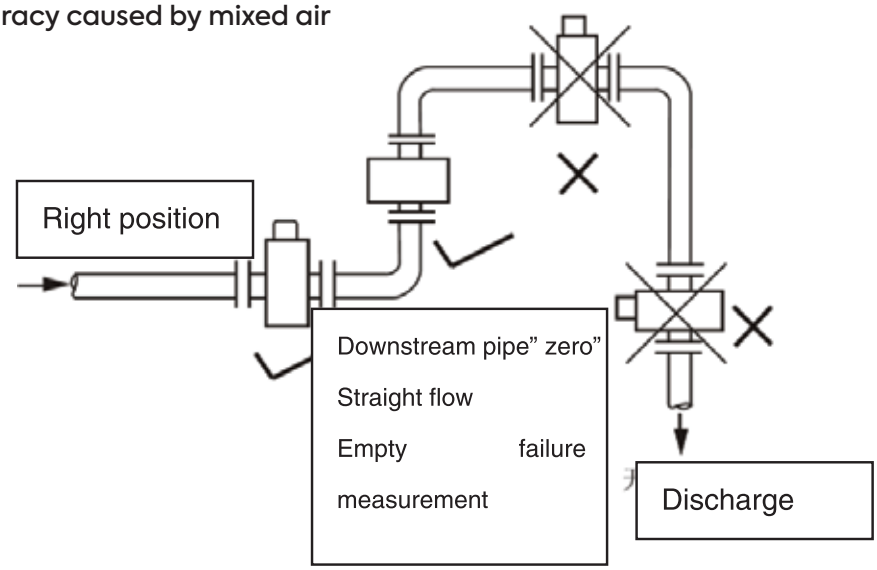
6. Downstream of pump installation



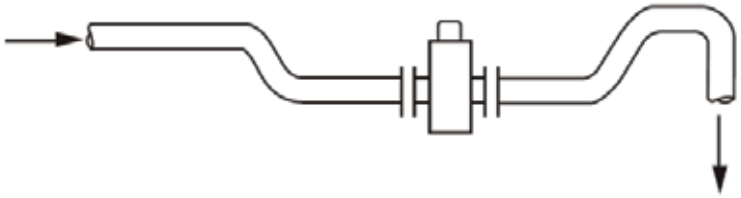
7. Mixture installation



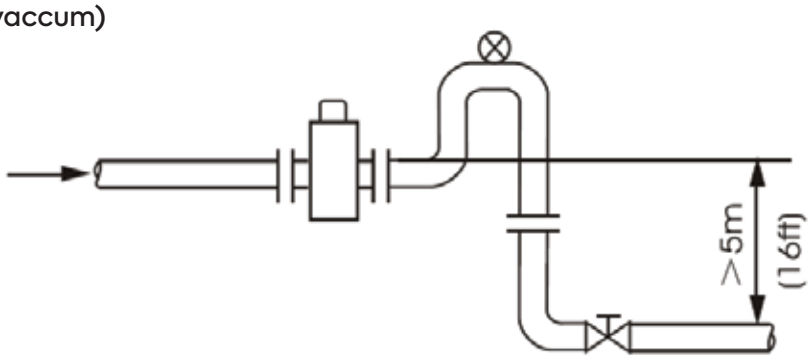
a. To avoid the measurement accuracy caused by mixed air



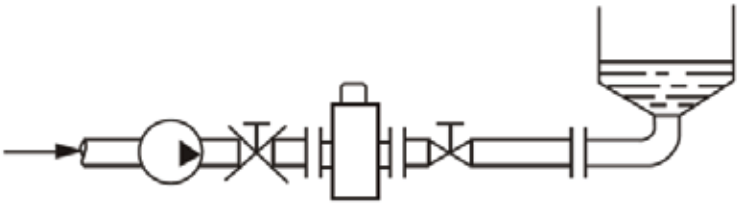
b. The flow-meter should be installed in the lower section of discharge pipe



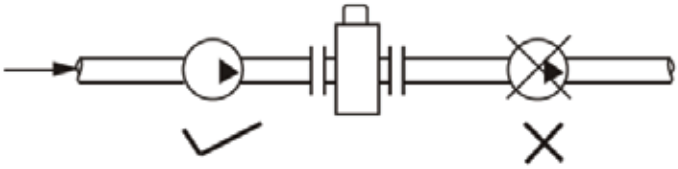
c. When it comes to the pipe with water head over 5mm, the air valve should be installed in the downstream side of flow-meter (vaccum)



d. When it comes to long straight pipe, the control valve should be installed in the downstream side of flow-meter.

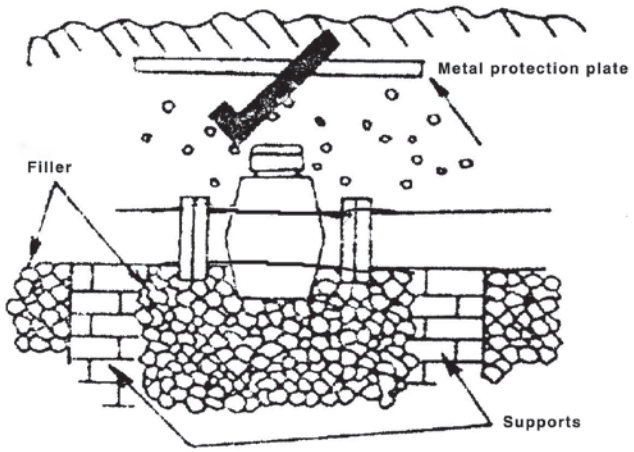


e. The flow-meter is forbidden to install in sucking side of pump side.



f. The sensor should be installed underground

2.3.3 Operation environment requirement



The outer environment requirements of flow-meter

A. It is forbidden to install in the environment with great temperature change and high-temperature thermal radiation. If it has to be, the thermal insulation and ventilation solution should be applied.

B. It had better install the flowmeter inner house, if it has to be outside house, the rain, flood and sun radiation should be avoided.

C. In order for avoiding corrosion air in the environment, the ventilation solution should be applied.

D. In order for erection, reparation or maintenance, enough space should be prepared.

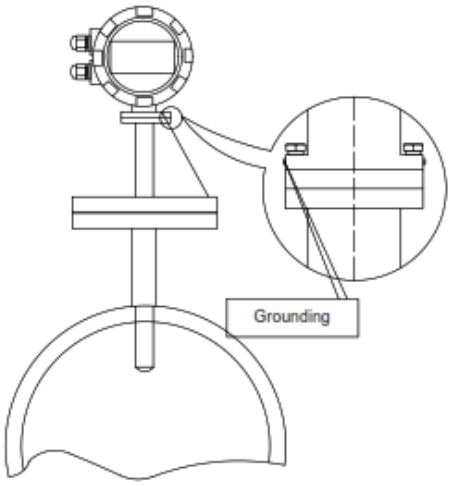
E. The magnetic field and strong vibration should be avoided in the installation location, if strong vibration occurs, the support for fixing pipes should be installed at both sides of flowmeter.

2.4 The distance between sensor and adapter

The shorter distance between sensor and adapter is, the better it is, which makes the adapter more close to sensor. The distance between sensor and adapter depends on measured liquid conductivity and signal capacitance, and the measured medium must be conductive liquid with minimum conductivity 5μs/cm , equaling to conductivity of delonized water. Generally speaking, the conductivity of common purified water and natural water is between 15 and 500μs/cm

2.5 System grounding

Since the flow signal received by the detecting electrode of magnetic flowmeter is at MV class, so the outer interference influences it greatly. In this case, the measurement accuracy repetition depends on good grounding greatly. The measured medium is a kind of electrolytic conductor, so the extra electromagnetic interference must be excluded. Usually the flowmeter is erected on the metal pipes grounded with connecting sensor.



2.3 Installation requirements

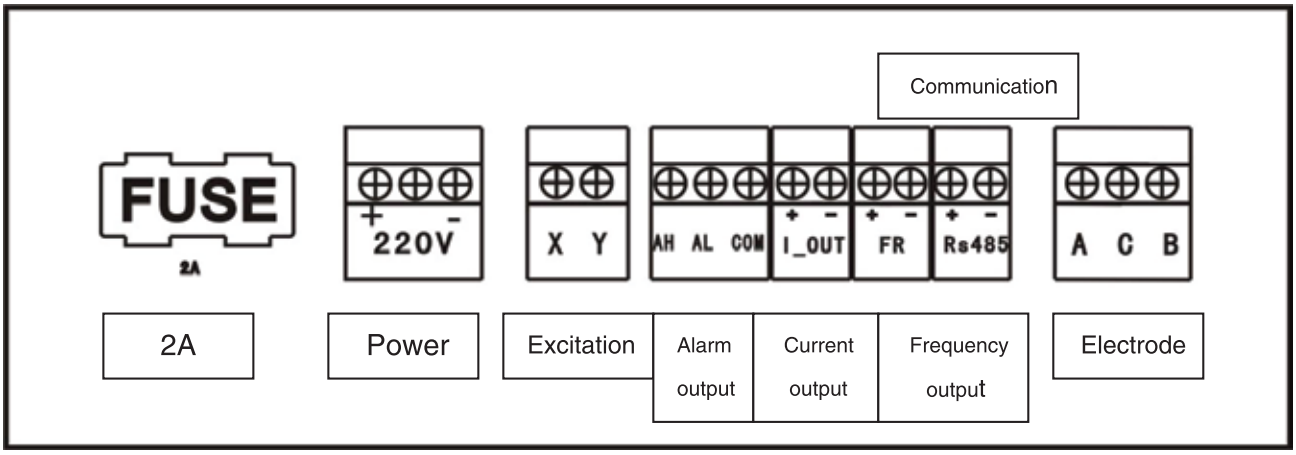
2.6.1 Wire connection

All the wires, meeting the load current requirements, are prepared by the users. The sealing structure should be applied on the outlet holes for wires. In order for its reliability, the round- section cable should be adopted. After the wire connection achieved, the sealing cushion should be pressed tightly as well as screw connector to prevent the eroding by wet air and corrosion gas. The wire for anti-explosive type adapter should be packed by anti-explosive conduit.

All the wire connection should be after the power off

A. After the cable specification is confirmed, the connection could be conducted and the correct and reliable wiring should be done.
B. When the coating of wire is cut off, the insulation layer should be kept without any damage. When it comes to the flow signal cable, no shielding layer should be cut if the wiring could be conducted.
C. The cable length between sensor and adapter is related to liquid conductivity and outer electro-magnetic interference and so on, and its length could be calculated according to the following formula approximately:
   L=δX4
   Here L stands for cable length δstands for liquid conductivity(μs/cm)
   However, the cable length commonly is not more than 60m to ensure the measurement accuracy and little interference, and to make adapter more close to sensor is recommended.
D. The excitation and flow signal cables are supplied by instrument supplier.

2.6.2 The separate type adapter wiring terminal



2.6.3 The wiring between sensor and adapter

The cable between flowmeter sensor and adapter is included into instrument scope. If the sensor is installed in the water or in the location inclined to suffer from water, the silica gel should be filled inside wire box following the silica gel operation instruction. If the sensor installation is in vertical method, the wire connection in wire box and silica gel filling should be before installation.

3. Instrument check and maintenance

4. Instrument failure diagnose

The electromagnetic flowmeter is a kind of highly-accurate instrument, so maintenance on some parts at a regular time by user is recommended, such as checking wire connection and conduit, electrode cleaning and so on. The unknown technical requirements of flowmeter or related to performance, please take reference from this manual; and the usual maintenance could be conducted on the base of understanding those information. If further maintenance or parts replacement required, please contact with our customer service center, good service and support will be supplied.

If failure occurs in the usual operation, the following information in the list could be adopted as the diagnose reference.

Failure	Possible reasons	Diagnose
Liquid flowing but without indication or signal output	1.Power cable is not connected or power circuit failure	Check power or power c ircuit by multimeter
	2.Singnal or excitation cable wrongly connected	Change signal cable connection(A and B terminal) and excitation cable connection (X and Y terminal)
	3. The sensor is damp-wet or signal cable damaged, causing to grounding short-circuited	Check the insulation of signal cable by multimeter
	4.Output signal cable not well connected or inner wiring connection loosen	Check signal circuit closed by multimeter
	5.Excitation circuit open	Check sensor circuit closed by multimeter
	6. Grounding sound or not	Keep flowmeter, measurement pipe and medium connected and reliable grounding
	7.Medium is not connected or not full of pipe	Medium connected and liquid full of pipes
	8. The electrode is oxidated or dirt on	Dismantle flowmeter and clean electrodes
	9.Failure in adapter	Fuse failure or other reasons
Flow signal indication but beyond limit	1. One signal cable to grounding short circuit or open circuit	Check resistance from cable to grounding (while full liquid, the resistance from electrode to ground is between 1-10 thousand ohm)
	2.Liquid not full of sensor measurement pipes	Check signal cable circuit closed or not, or improve installation
	3. Not sound grounding	Check signal shielding layer or grounding point resistance, to reinstall grounding device
Instrument indication not conformity with actual flow value	1.Measurement errors caused by zero point change	Not sound grounding or electrode dirt on, and reset zero point after improvement
	2. Calibration factor of adapter not correct	Reset calibration factor following correct calibration value
	3. Sensor installation position not good, or measurement medium not full of pipe or bubbles in the measurement medium	Improve installation following instruction
	4. Dirt on the electrode or inner wall	Clear dirt
	5. The forward or backward sensor straight pipe length is not enough or valve not fully opened.	

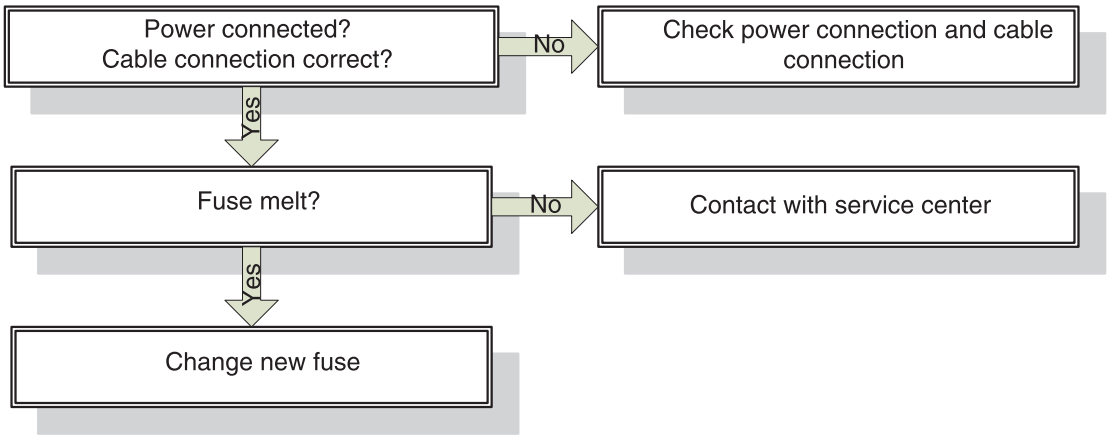
Other possible failure diagnose

Failure	Failure diagnose
Output shaking	The measured medium flow is in shaking or pulse, in this case, this is not flowmeter failure but exact flow reflection. If straight pipe is not long enough, the short distance from flow meter to pump may also cause shaking
	Liquid not full of pipe or bubbles in the liquid
	Electrical or magnetic interference included such as electrical current
	Conductivity of liquid not equal or too low, maybe many grain of fiber included
	The electrode material doesn 't fit to liquid, causing electrode polluted or rusted
	Grounding not sound, the flowmeter, measurement pipe and measured medium are connected with good grounding, zero point not stable.
Zero point not stable	Liquid not full of pipes or bubbles in the liquid
	Grounding nor reliable or electrical or magnetic interference included such as electrical current.
	Small flow inside pipes but thought without fl owing, so it is actual indication not flowmeter failure
	Conductivity of liquid not equal or too low, or the electrode material doesn 't fit to liquid, causing electrode polluted or rusted
	Insulation in the signal circuit descends

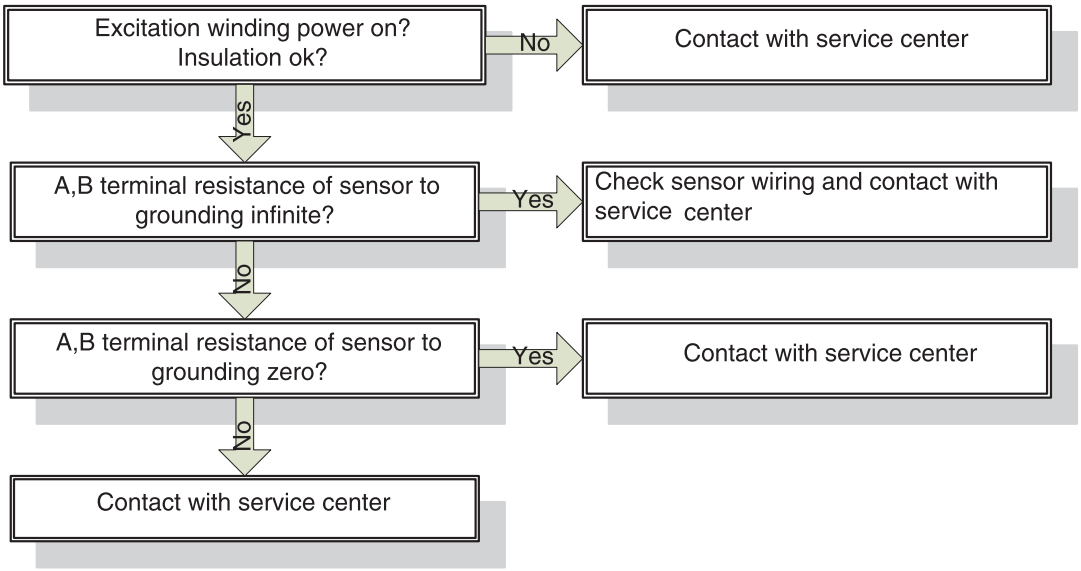
4.2 FAQ solution flow

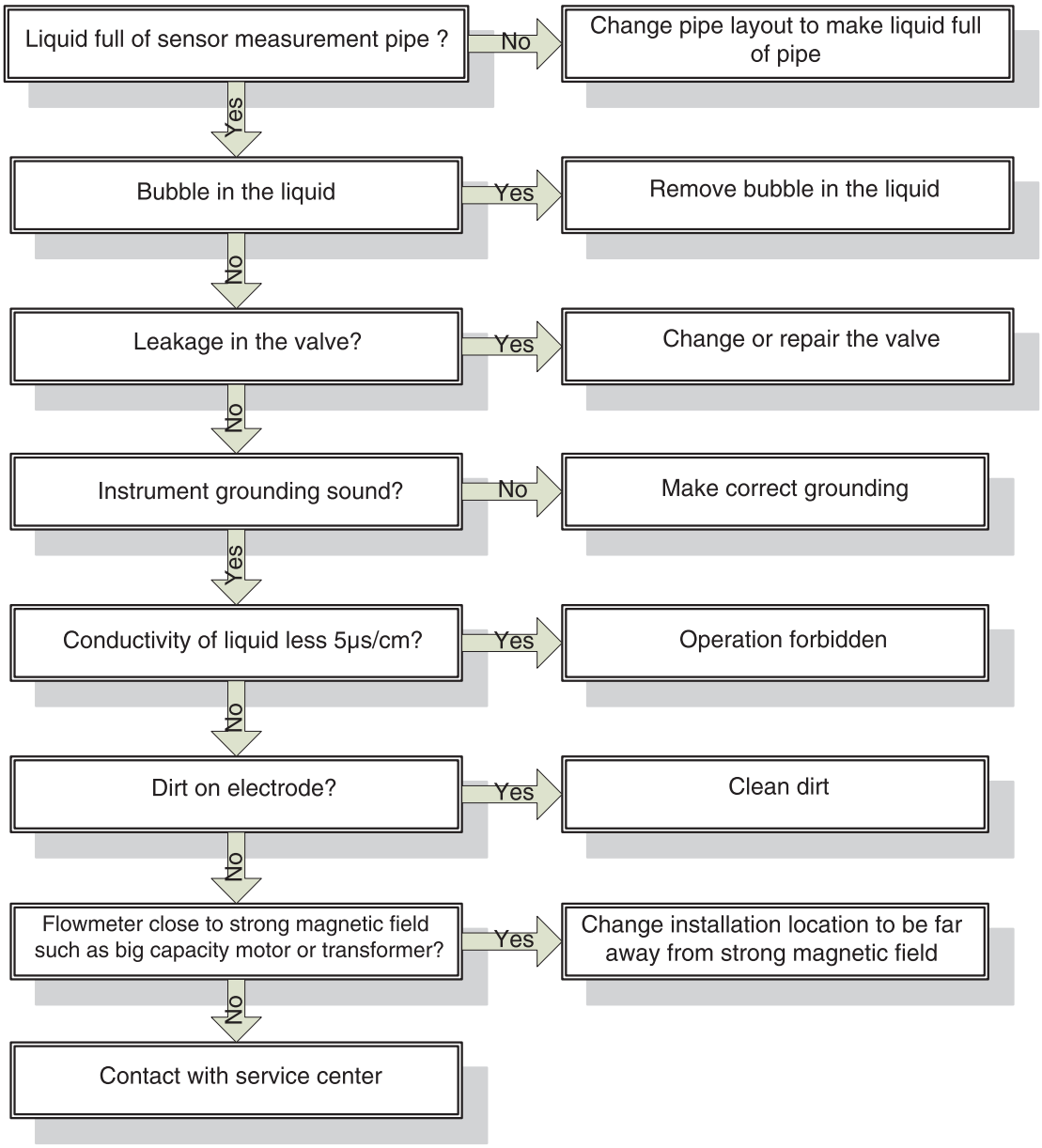
2.6.2 The separate type adapter wiring terminal

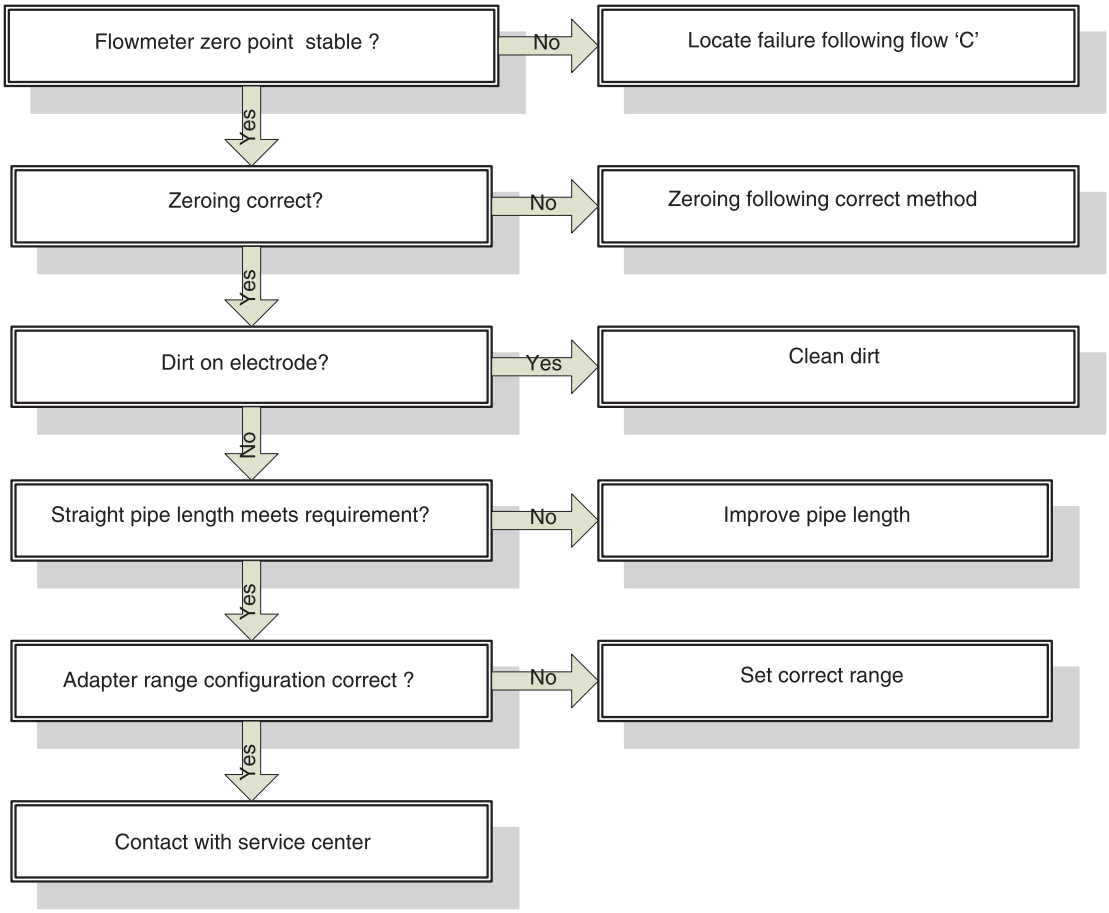
A. No Indication



B. Transient flow indicating zero




Liquid full of sensor measurement pipe ?
No
Change pipe layout to make liquid full of pipe
Yes
Bubble in the liquid
Yes
Remove bubble in the liquid
No
Leakage in the valve?
Yes
Change or repair the valve
No
Instrument grounding sound?
No
Make correct grounding
Yes
Conductivity of liquid less 5μs/cm?
Yes
Operation forbidden
No
Dirt on electrode?
Yes
Clean dirt
No
Flowmeter close to strong magnetic field such as big capacity motor or transformer?
Yes
Change installation location to be far away from strong magnetic field
No
Contact with service center


Flowmeter zero point stable ?
No
Locate failure following flow 'C'
Yes
Zeroing correct?
No
Zeroing following correct method
Yes
Dirt on electrode?
Yes
Clean dirt
No
Straight pipe length meets requirement?
No
Improve pipe length
Yes
Adapter range configuration correct ?
No
Set correct range
Yes
Contact with service center

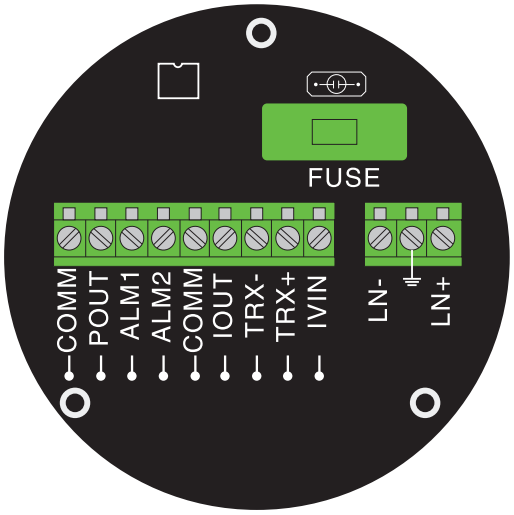
5. &-&$53*$"- 8*3*/(

8BSOJOH: &MFDUSJDBM)B[BSE

%JTDPOOFDU QPXFS CFGPSF CFHJOOJOH FMFDUSJDBM XJSJOH.

5.1 5FSNJOBM $POGJHVSBUJPO %JBHSBN

5.1.1 $PNQBDU $POWFSUFS (110-2407 "$; 18-247 %$)



Terminal Configuration

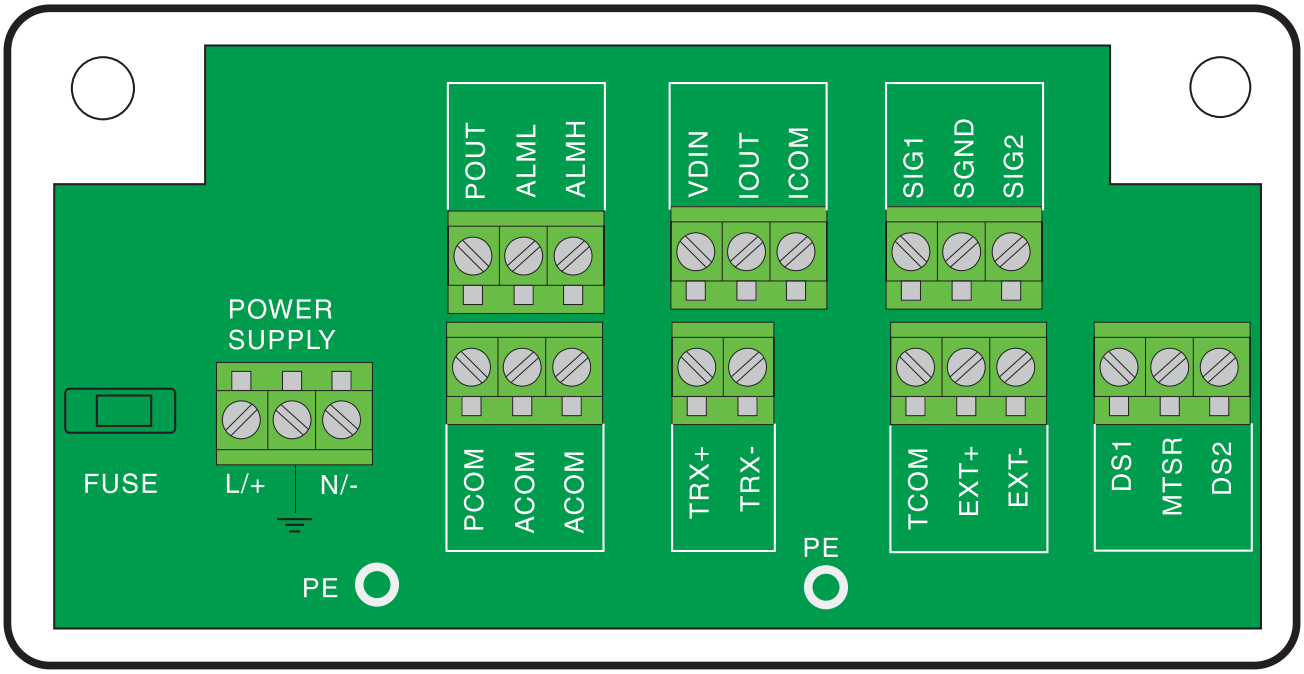
Terminal Wiring For Compact Converter

POUT	Frequency(Pulse) Output for Bi-directional Flow
ALM1	Alarm Output for Upper Limit
ALM2	Alarm Output for Low Limit
COMM	Frequency, Pulse and Current Common (GND)
COMM	Frequency, Pulse and Current Common (GND)
IOUT	Current Output of Flow Rate
IVIN	24V DC Power Supply for 2-wire 4-20mA Output
TRX+	+Communication RS485(+)
TRX-	-Communication RS485(-)
LN+	L: Live Wire of 110-240V AC; +24V DC power supply
LN-	N: Naught Wire of 110-240V AC; -24V DC power supply

/PUF: %POhU DPOOFDU 110-2407 "$ 1PXFS PO 521# DPOWFSUFS XIJDI JT %$ 1PXFS 4VQQMZ 5ZQF.

5.1.2 3FNPUF $POWFSUFS (110-2407 "$; 18-247 %$)

5FSNJOBM $POàHVSBUJPO



5FSNJOBM 8JSJOH GPS 3FNPUF $POWFSUFS

Pulse Output	POUT	Frequency(Pulse) Output for Bi-directional Flow
	PCOM	Pulse Output Ground
Alarm Output	ALMH	Alarm Output for Upper Limit
	ACOM	Alarm Output Ground
Alarm Output	ALML	Alarm Output for Low Limit
	ACOM	Alarm Output Ground
RS485(Function Optional)	TRX+	Communication RS485+
	TRX-	Communication RS485-
Analog Current Output	VDIN	24VDC Power Supply for 2-wire 4-20mA Output
	IOUT	Analog Current Output
	ICOM	Analog Current Output Ground
Power Supply	L / +	L: Live Wire of 110-240Vac; +: 24V DC +
	N / -	N: Naught Wire of 110-240VAC; - : 24V DC -
Signal from Sensor	SIG1	Signal 1
	SGND	Signal Ground
	SIG2	Signal 2
	TCOM	Reserved
	EXT+	Exciting Current+
	EXT-	Exciting Current-
	DS1	Shielded Exciting1
	MTSR	Reserved
	DS2	Shielded Exciting2

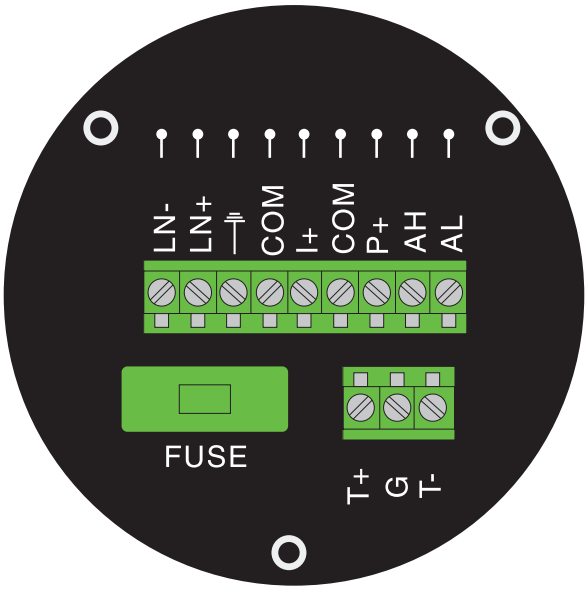
/PUF: %POhU DPOOFDU 110-2407 "$ 1PXFS PO 221# DPOWFSUFS XIJDI JT %$ 1PXFS 4VQQMZ 5ZQF.

8BSOJOH: &MFDUSJDBM)B[BSE

%JTDPOOFDU QPXFS CFGPSF CFHJOOJOH FMFDUSJDBM XJSJOH.

5.2 5FSNJOBM $POGJHVSBUJPO %JBHSBN

5.2.1 $PNQBDU $POWFSUFS (110-2407 "$; 18-247 %$)



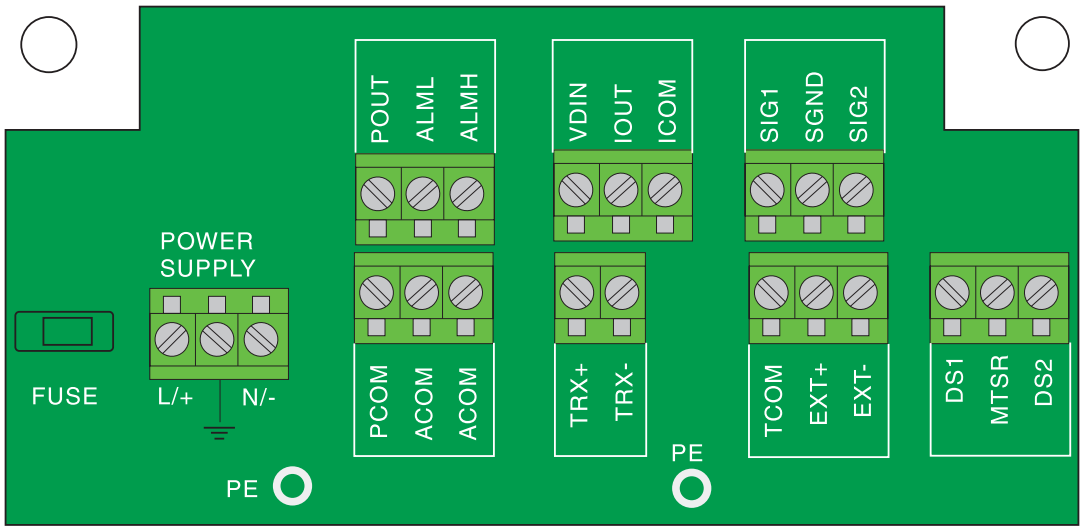
5FSNJOBM $POGJHVSBUJPO

5FSNJOBM 8JSJOH 'PS $PNQBDU $POWFSUFS

I+	Frequency(Pulse) Output for Bi-directional Flow
COM	Alarm Output for Upper Limit
P+	Alarm Output for Low Limit
COM	Frequency, Pulse and Current Common (GND)
AL	Frequency, Pulse and Current Common (GND)
COM	Current Output of Flow Rate
FUSE	24V DC Power Supply for 2-wire 4-20mA Output
T+	+Communication RS485(+)
T-	-Communication RS485(-)
LN+	L: Live Wire of 110-240V AC; +: 24V DC +
LN-	N: Naught Wire of 110-240V AC; -: 24V DC -

/PUF: %POhU DPOOFDU 110-2407 "$ 1PXFS PO 521# DPOWFSUFS XIJDI JT %$ 1PXFS 4VQQMZ 5ZQF.

5.2.2 &MFDUSJDBM 8JSJOH GPS 3FNPUF)PVTJOH 5FSNJOBM $POàHVSBUJPO



5FSNJOBM 8JSJOH GPS 3FNPUF $POWFSUFS

Pulse Output	POUT	Frequency(Pulse) Output for Bi-directional Flow
	PCOM	Pulse Output Ground
Alarm Output	ALMH	Alarm Output for Upper Limit
	ACOM	Alarm Output Ground
Alarm Output	ALML	Alarm Output for Low Limit
	ACOM	Alarm Output Ground
RS485(Function Optional)	TRX+	Communication RS485+
	TRX-	Communication RS485-
Analog Current Output	VDIN	24VDC Power Supply for 2-wire 4-20mA Output
	IOUT	Analog Current Output
	ICOM	Analog Current Output Ground
Power Supply	L / +	L: Live Wire of 110-240Vac; +: 24V DC +
	N / -	N: Naught Wire of 110-240VAC; - : 24V DC -
Signal from Sensor	SIG1	Signal 1
	SGND	Signal Ground
	SIG2	Signal 2
	TCOM	Reserved
	EXT+	Exciting Current+
	EXT-	Exciting Current-
	DS1	Shielded Exciting1
	MTSR	Reserved
	DS2	Shielded Exciting2

/PUF: %POhU DPOOFDU 110-2407 "$ 1PXFS PO 221# DPOWFSUFS XIJDI JT %$ 1PXFS 4VQQMZ 5ZQF.

6. %FTDSJQUJPO PG 0VUQVUT

6.1 %JHJUBM 'SFRVFODZ 0VUQVU

Frequency Output Range	1 to 5000 Hz
Output Electric isolate	Photoelectric Isolate > 1000V
Frequency Output Capacity	Field-effect transistors Output Maximum Voltage: 36V DC Maximum Current: 250 mA

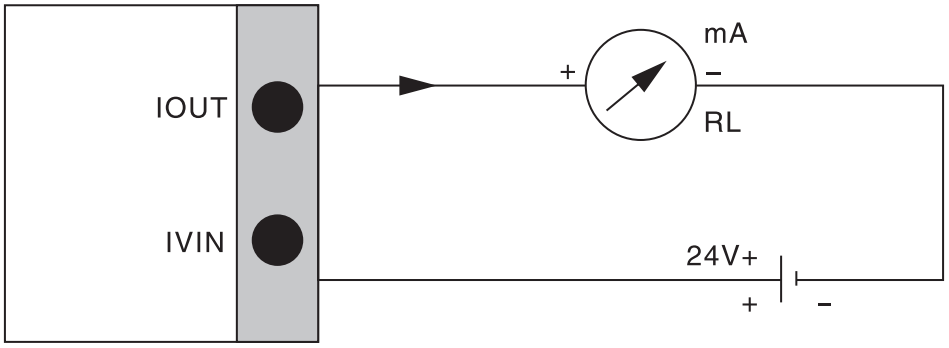
6.2 %JHJUBM 1VMTF 0VUQVU

Pulse Output Range	1 to 100 Pulse/s
Pulse Output Value	0.001- 1.000m3/cp; 0.001-1.000 Liter/cp
Pulse Output Capacity	Field-effect transistors Output Maximum Voltage: 36V DC Maximum Current: 250mA

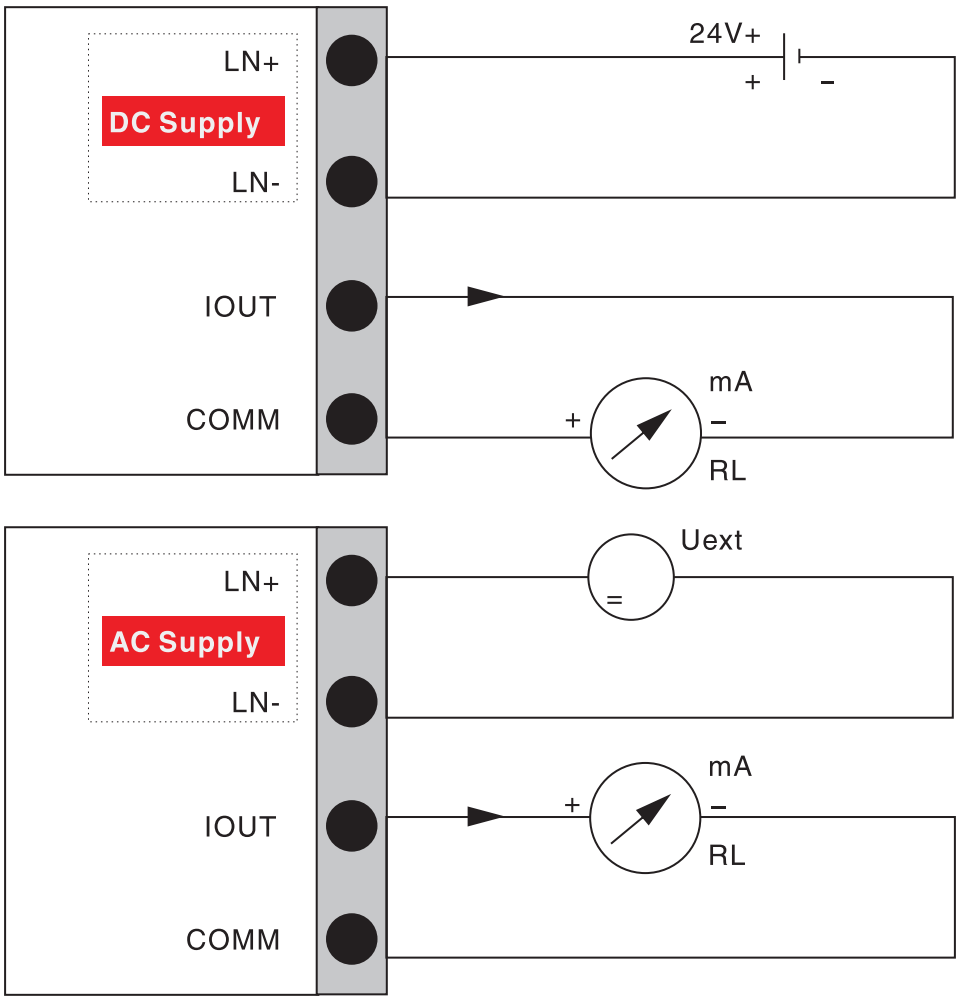
6. "MBSN 0VUQVU

Alarm Output Junction	ALMH: Upper Limit; ALML: Lower Limit
Alarm Output Capacity	Field-effect transistors Output Maximum Voltage: 36V DC Maximum Current: 250 mA

6.4 $POOFDUJPO %JBHSBNT 0G 0VUQVUT

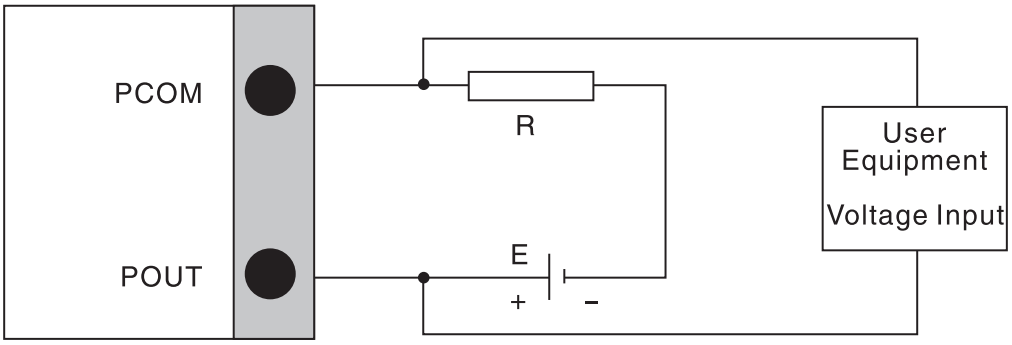


Current Output -Two Wire Connection

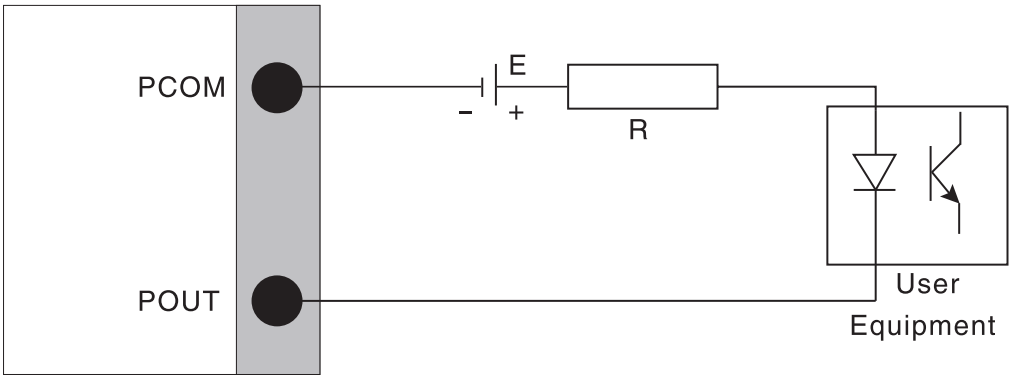


Current Output -Four Wire Connection(Isolated)

6.4.2 %JHJUBM 7PMUBHF 0VUQVU

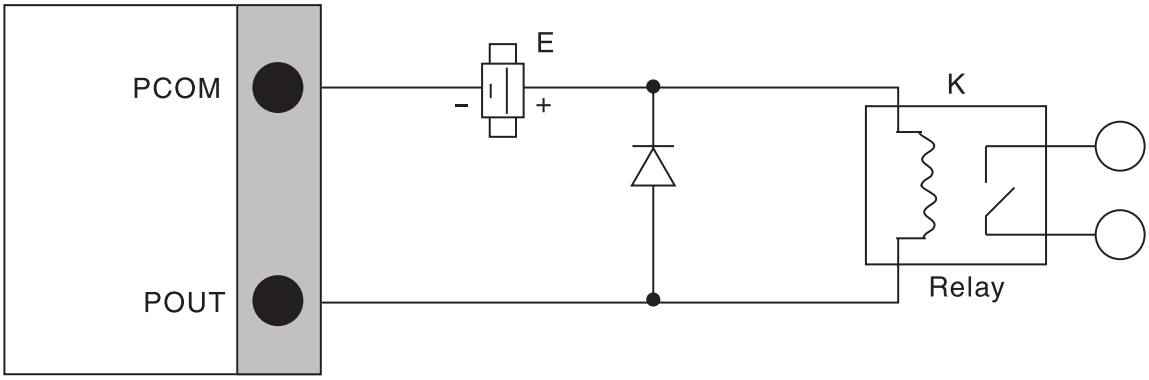


6.4.3 %JHJUBM 0VUQVU 5P 1IPUPFMFDUSJDJUZ $PVQMJOH



Generally, photoelectricity coupling current is about 10mA. When E/R=10mA, E=5~24V.

6.4.4 %JHJUBM 0VUQVU 5P 3FMBZ



Digital Output To Relay

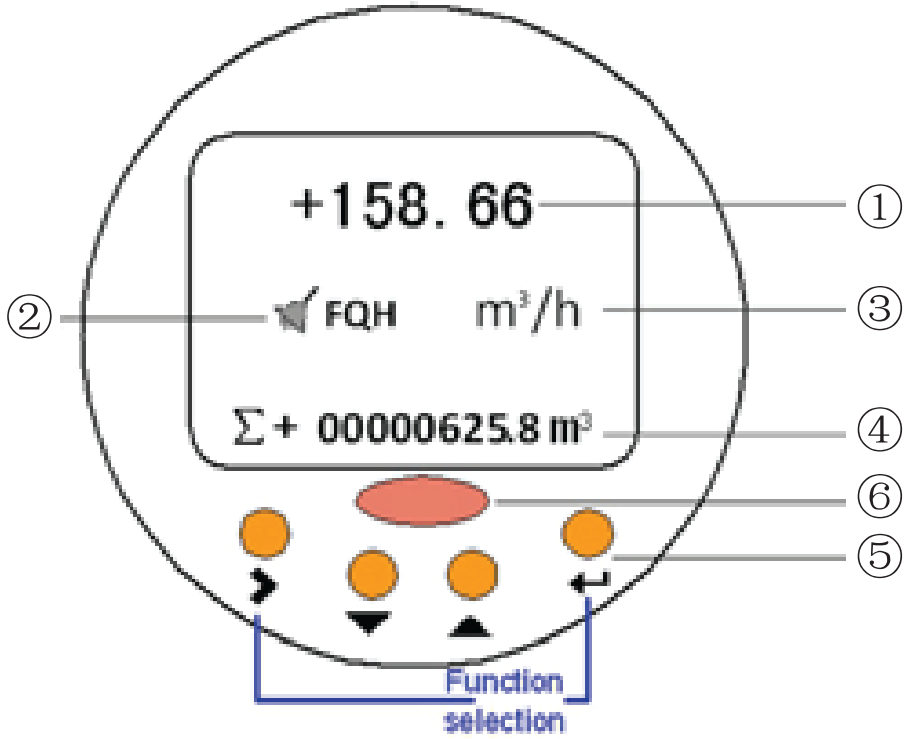
*(FOFSBMMZ, & (7PMUBHF) PG UIF SFMBZ JT 127 PS 247; % JT FYUFOEFE EJPEF, NPTU NJEEMF SFMBZT IBWF UIJT EJPEF JOTJEF. *G OPU, VTFS TIPVME DPOOFDU POF PVUTJEF.*

5BCMF PG EJHJUBM PVUQVU QBSBNFUFS: 1065

Parameter	Test Condition	Mini	Typical	Max	Unit
Voltage	IC=100 mA	3	24	36	V
Current	Vol=1.4V	0	300	350	mA
Frequency	IC=100 mA Vcc=24V	0	5000	7500	Hz
High Voltage	IC=100 mA	Vcc	Vcc	Vcc	V
Low Voltage	IC=100 mA	0.9	1.0	1.4	V

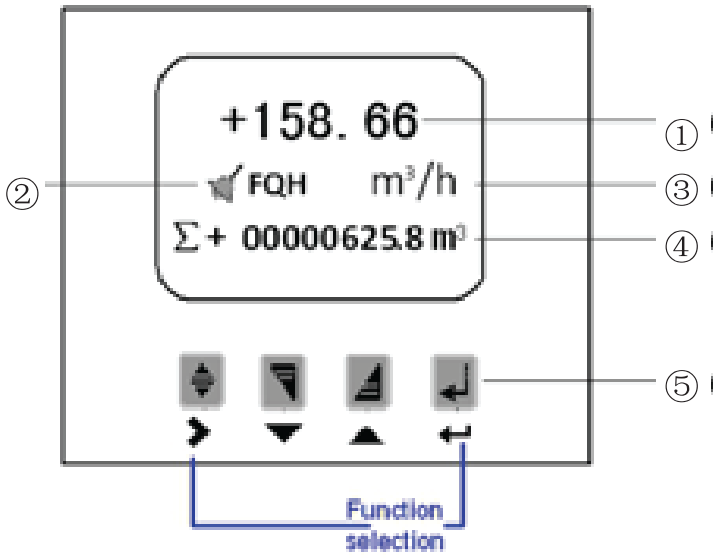
7. 01&3"5*0/ "/% 4&561

7.1 %JTQMBZ BOE ,FZT 7.1.1 $PNQBDU 5ZQF



①	Flow Rate
②	Alarm Symbol and Message: FQH; FQL; FGP; SYS
③	Flow Rate Unit
④	Flow Velocity; Percentage; Positive, Negative or Net Total (Switchable)
⑤	Keys (See table below for function and representation in text)
⑥	Infrared Sensor (not present in all signal converter versions)

7.1.2 3FNPUF 5ZQF



①	Flow Rate
②	Alarm Symbol and Message: FQH; FQL; FGP; SYS
③	Flow Rate Unit
④	Flow Velocity; Percentage; Positive, Negative or Net Total (Switchable)
⑤	Keys (See table below for function and representation in text)

Key	Measuring Mode	Menu Mode	Sub-menu or Function Mode	Parameter and Data Mode
→ + ↵	Function Selection (1)Parameters Set (2)Clr Total Rec: Reset Totaliser (3)Fact Modif Rec: check the modification recorel			
↵ (Enter Key)	Enter the function selection	Return to the measuring mode but prompt whether the data should be saved	Press 1 time, returnto menu mode, data saved	Return to sub-menu or function, data saved
	At any modes, Press and hold “Enter” for 3 seconds to return to measuring mode			
▼ or ▲	Switch between display pages: Flow velocity, Percentage, Positive Total, Negative Total, NetTotal	Select menu	Select sub-menu or function	Use cursor highlighted to change number, unit,setting and to move the decimal point
→ + ▲ or → + ▼	Adjust LCD Contrast			For numerical values, move cursor one position to the right or left
It returns to the measuring mode automatically after 3 minutes without any action under parameter setting mode.				

7.2 'VODUJPO 4FMFDUJPO .FOV

At measuring mode, press + can lead to function selection menu including three sub-menu.

Key (Measuring mode)	Function Selection	Description
+	(1) Parameters Set	Choose this menu and one page with password protect can be displayed.Input the correct password and press + to enter the parameters set.
	(2) Clr Total Rec	Choose this menu and one page with password protect can be displayed.Input the correct password and press + to perform the total flow reset. ***Note: factory default password is"10000"; change this password when get the flowmeter to avoid unintended reset on total flow.***
	(3) Fact Modif Rec	Track the modification record on factor

7. 1BSBNFUFST 4FU

Press + , it leads to function selection menu and the first menu is "Parameters Set", press to confirm the enter "Parameters Set". Input the pssword, and press + There are total 54 menus in "Parameters Set" and users can access and modify these menus depending on the input password grade. See table in next page for more information on password grade.

Table. Description of Password Grade

Password Grade	Password	Login Privileges	Menu Access
Grade 1	00521	Read Only	Menu 1 to 54
Grade2	03210	Read and Edit	Read: Menu 1 to 54 Edit: Menu 1 to 24
Grade3	06108	Read and Edit	Read: Menu 1 to 54 Edit: Menu 1 to 25
Grade4	07206	Read and Edit	Read: Menu 1 to 54 Edit: Menu 1 to 38
Grade5	Please consult your local representative	Read and Edit	Read: Menu 1 to 54 Edit: Menu 1 to 52

4QFDJàD .FOV- 1BSBNFUFST 4FU

Menu	Parameter Name	Setting Method	Grades	Range
M1	Language	Select Parameter	2	English
M2	Comm Addres	Input Value	2	0~99
M3	Baud Rate	Select Parameter	2	600~14400
M4	Snsr Size	Select Parameter	2	3~3000
M5	Flow Unit	Select Parameter	2	L/h, L/m, L/s, m^3/h, m^3/m, m^3/s
M6	Flow Range	Input Value	2	0~99999
M7	Flow Rspns	Select Parameter	2	1~50
M8	Flow Direct	Select Parameter	2	Rlus/Reverse
M9	Flow Zero	Input Value	2	0~±9999
M10	Flow Cutoff	Input Value	2	0~599.99%
M11	Cutoff Ena	Select Parameter	2	Enable/Disable
M12	Total Unit	Select Parameter	2	0.001m^3~1m^3, 0.001L~1L
M13	SegmaN Ena	Select Parameter	2	Enable/Disable
M14	Analog Type	Select Parameter	2	0~10mA/4~20mA
M15	Pulse type	Select Parameter	2	Freque / Pulse
M16	Pulse Fact	Select Parameter	2	0.001m^3~1m^3, 0. 001L~1L
M17	Freque Max	Select Parameter	2	1~5999HZ
M18	Mtsnsr Ena	Select Parameter	2	Enable/Disable
M19	Mtsnsr Trip	Input Value	2	59999%
M20	Alm Hi Ena	Slect Parameter	2	Enable/Disable
M21	Alm Hi Val	Input Value	2	000. 0~599. 99%
M22	Alm Lo Ena	Select Parameter	2	Enable/Disable
M23	Alm Lo Val	Input Value	2	000. 0-599. 99%
M24	Sys Alm Ena	Select Parameter	2	Enable/Disable
M25	Clr Sum Key	Input Value	3	0-99999
M26	Snsr Code 1	User set	4	Finished Y M
M27	Snsr Code 2	User set	4	Product Number

Menu	Parameter Name	Setting Method	Grades	Range
M28	Field Type	Select Parameter	4	Type1,2,3
M29	Sensor Fact	Input Value	4	0.0000-5.9999
M30	Line Crc Ena	Select Parameter	4	Enable/Disable
M31	Lineary CRC 1	User Set	4	Set Velocity
M32	Lineary Fact 1	User Set	4	0.0000-1.9999
M33	Lineary CRC 2	User Set	4	Set Velocity
M34	Lineary Fact 2	User Set	4	0.0000-1.9999
M35	Lineary CRC 3	User Set	4	Set Velocity
M36	Lineary Fact 3	User Set	4	0.0000-1.9999
M37	Lineary CRC 4	User Set	4	Set Velocity
M38	Lineary Fact 4	User Set	4	0.0000-1.9999
M39	FwdTotal Lo	Correctable	5	00000-99999
M40	FwdTotal Hi	Correctable	5	00000~9999
M41	RevTotal Lo	Correctable	5	00000~99999
M42	RevTotal Hi	Correctable	5	00000~9999
M43	PlsntLmtEna	Select Parameter	5	Enable/Disable
M44	PlsntLmtVal	Select Parameter	5	0.010-0.800m/s
M45	Plsnt Delay	Select Parameter	5	400-2500ms
M46	PassWord 1	User Correct	5	00000-99999
M47	PassWord 2	User Correct	5	00000-99999
M48	PassWord 3	User Correct	5	00000-99999
M49	PassWord 4	User Correct	5	00000-99999
M50	Analog Zero	Input Value	5	0.0000-1.9999
M51	Anlg Range	Input Value	5	0.0000-3.9999
M52	Meter Fact	Input Value	5	0.0000-5.9999
M53	MeterCode 1	Factory Set	6	Production Date:Y/M
M54	MeterCode 2	Factory Set	6	Product Serial No

7.4 1BSBNFUFS 'VODUJPO 5BCMF

No.	Function	Settings/Descriptions
language		
M1	Language	English / Chinese Language selection depends on the device version.
RS485 Communication		
M2	Comm Addres	Value: Integer 01 to 99 Device Address for RS485 (Not Present in all converter)
M3	Baud Rate	Selectable: 600,1200, 2400, 4800, 9600, 19200
Sensor Diameter		
M4	Sensor Size	Select the sensor size (See the nameplate)
Flow Parameter:Unit,Range,Response Time,Direction,Zero Calibration,Small Flow Cutoff		
M5	Flow Unit	Selectable: L/h(liter/hour), L/m(liter/minute), L/s(liter/second)m^3/h (cubic meter/hour), m^3/m(cubic meter/min), m^3/s(cubic meter/second)
M6	Flow Range	Value: 0-99999 (This parameter represents the Max,Flow Rate of flowmeter)
		Change this value will affect other parameter (M10) and current output value.
M7	Flow Rspns	Damping time / Time constant, default value: 3 second
		Set large value can enhance the stability of flow display and output digital, which is suitable for accumulative total from pulse output; the small value means fast respond rate, which is suitable for production control.
M8	Flow Direct	Selectable:Plus/Reverse
		Define polarity of flow direction. Plus/Forwards(according to the arrow on the measuring sensor) or Reverse/Backwards(in the opposite direction to the arrow)
M9	Flow Zero	Zero Calibration
		First row - small words: FS-new zero calibration value Second row - large words: zero point correction value To ensure the flowmeter's accuracy, FS should be 0. Change the value at second row to make sure FS is 0. Note: ONLY perform “Flow Zero” when the pipe is full filled static fluid.
M10	Flow Cutoff	Sets output value of all outputs to “0”: (Low flow cutoff)
		For example: Flow Cutoff value = 20% Then the Min. Flow rate = 20% of Max. Flow rate (the value in M6) Note: this function is ONLY effective if M11 (SegmaN Ena) is Enable.
M11	Cutoff Ena	Selectable: Enable / Disable The switch on M10(Flow Cutoff)
M12	Total Unit	Selectable: 0.001m^3, 0.01m^3, 0.1m^3, 1m^3, 0.001L, 0.01L, 0.1L, 1L 9Digitals, this parameter can control the resolution for accumulative flow.

No.	Function	Settings/Descriptions
Outputs:		
M13	SegmaN Ena	The switch to control outputs of reverse Flow: current or pulse output.
		The output function is ONLY effective for reverse flow if M13 is Enable.For example, M13 = “Disable” , then there is still no output even though there is reverse flow rate in pipe.Note: this switch can't control output of Plus Flow Rate.
M14	Analog Type	Selectable: 4-20mA / 0-10mA
		Select the correct current output mode base on user's application.
M15	Pulse Type	Selectable: Freque (Frequency) / Pulse Freque: Frequency Output Pulse: Scaled Pulse Output
M16	Pulse Fact	Selectable: 0.001L, 0.01L, 0.1L, 1L; 0.001 m^3, 0.01 m^3, 0.1 m^3, 1 m^3
		The scaled pulse output value for each pulse, ONLY effective if M15 is selected as “Pulse”. For example, M16=“0.1L”, it means each pulse is 0.1L Max. Pulse Output: 100 Pulses/Second.
M17	Freque Max	Value: 1-5000Hz Max. Frequency is corresponding to M6 (Flow range).
Alarms:		
M18	Mtsnsr Ena	Selectable: Enable / Disable Empty Pipe Detect is ONLY valid if M18 (Mtsnsr Ena) = Enable.
M19	Mtsnsr Trip	First row: measured conductivity value (V1) Second row: the value (V2) which can trigger the Empty Pipe Alarm. Generally, set V2 as three to five times of V1. Flow indication, pulse output and current output “=0” when pipe empty Note: perform this parameter set when the pipe is full filled with fluid.
M20	Alm Hi Ena	Selectable: Enable / Disable Upper Flow Limit Alarm is ONLY valid if M20 (Alm Hi ENa) = Enable
M21	Alm Hi Val	Value: 0% - 199.9% (The value to trigger the Upper Flow Limit Alarm)
		Upper Flow Limit Alarm is ONLY triggered when M20= Enable and Flow rate > M21*M6
M22	Alm Lo Ena	Selectable: Enable / Disable Low Flow Limit Alarm is ONLY valid if M22 (Alm Lo Ena) = Enable
M23	Alm Lo Val	Value: 0% - 199.9% (The value to trigger the Low Flow Limit Alarm)
		Low Flow Limit Alarm is ONLY triggered
M24	Sys Alm Ena	When M22= Enable and Flow rate < M10*M6
		Selectable: Enable / Disable System Exciting Alarm is ONLY valid if M24 = Enable

No.	Function	Settings/Descriptions
Reset Totaliser Password:		
M25	Clr Sum Key	The password is used to reset the totalizer. Note: please set M25 “Clr Sum Key” first, and use this password to perform reset according to Section 3.29 (Page 51)
Sensor:		
M26	Snsr Code1	User can set sensor production date in M26 to track whether the Sensor Factor is correct
M27	Snsr Code2	Sensor Serial Number
M28	Field Type	Selectable: 1/16; 1/20; 1/25
		Three types of Exciting frequency. Usually use 1/16 for small size sensor, and others two for large size sensor.
M29	Sensor Fact	Input Measuring Sensor Constant: GK User can get this factor from the calibration certificate.
Linearity Correction:		
M30	Line Crc Ena	Selectable: Enable / Disable
		This parameter is used to control the linearity correction function. Enable: use the linearity correction; Disable: linearity correction is not used even M31 to M38 are set.
M31	Lineary CRC 1	Correction Point 1: the velocity of point 1
M32	Lineary Fact 1	Linearity Fact 1: the correction factor for point 1
M33	Lineary CRC2	Correction Point 2: the velocity of point 2
M34	Lineary Fact 2	Linearity Fact 2: the correction factor for point 2
M35	Lineary CRC3	Correction Point 3: the velocity of point 3
M36	Lineary Fact 3	Linearity Fact 3: the correction factor for point 3
M37	Lineary CRC4	Correction Point 4: the velocity of point 4
M38	Lineary Fact4	Linearity Fact 4: the correction factor for point 4
Set Value for Total Flow: For flowmeter maintenance or replacement, maybe the previous total flow should be set. And change M39 to M42 can accomplish this function.		
M39	FwdTotal Lo	Set Value: 00000 - 99999
		Low Bbyte of Positive Total Flow

No.	Function	Settings/Descriptions
M40	FwdTotal Hi	Set Value: 0000 - 9999
		High Byte of Positive Total Flow
M41	RevTotal Lo	Set Value: 00000 - 99999
		Low Byte of Negative Total Flow
M42	RevTotal Hi	Set Value: 0000 - 9999
		High Byte of Negative Total Flow
Peak Suppression Function:		
M43	PIsntLmtEna	The switch for Peak Suppression Enable: Peak Suppression ON; Disable: Peak Suppression OFF. For paper pulp, slurry and other serosity, “Peak Interference” can occur when the solid grain scrubs or strikes the electrodes. Peak suppression arithmetic can restrain this interference via the setting of M43, M44 and M45.
M44	PIsntLmtVal	This parameter determines the change rate of Peak Interference, based on the percent of flow velocity; ten grades: 0.010m/s (Grade 1), 0.020m/s, 0030m/s, 0.050m/s, 0.080m/s, 0.100m/s, 0.200m/s, 0.300m/s, 0.500m/s, 0.800m/s (Grade 10) The sensitivity of Peak Suppression is highest for Grade 1.
M45	PIsnt Delay	This parameter can determine the width of time to restrain Peak Interference and the unit is ms.
		If the duration of one signal is less than the value in M45, this signal can be determined as Peak Interference and will be suppressed; otherwise it will be determined as normal signal.
Password Management:		
M46	PassWord 1	M46 to M49 can be changed using Grade 5 Password to enter parameter setting.
M47	PassWord 2	
M48	PassWord 3	
M49	PassWord 4	
Factory Use ONLY: Zero point calibration or Full scale calibration		
M50	Analog Zero	Zero Point Calibration for current output to make sure the Zero point is 0 mA/ 4 mA.
M51	Anlg Range	Full scale calibration for current output to make sure the Full Scale is 10mA or 20mA.
M52	Meter Fact	Factory Use ONLY.
M53	MeterCode 1	Converter Production Date
M54	MeterCode 2	Converter Serial Number

Virtec

Setting Trends

Virtec is one of the global leaders providing Heat & Flow management solutions in HVAC & Water applications. The solutions are based on two measuring technologies, Ultrasonic & Electromagnetic principle. Our high-end services and cutting-edge product solutions in this field have made us the leading providers of technologically advanced Heat and Fow measuring instruments.

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