DTI-E82 ELECTROMAGNETIC FLOW METER

Contents

1.1 Preface.....- 2 -
1.2 Features.....- 2 -
1.3 Operating Principle.....- 2 -
1.4 Applications.....- 3 -
1.5 Safety Instructions.....- 3 -
1.6 Specifications.....- 3 -
1.7 Material Selection.....- 5 -
1.8 Dimensions.....- 5 -

2 Transmitter Unit.....- 7 -

2.1 Transmitter wiring terminal.....- 7 -
2.2 Power wiring diagram.....- 8 -
2.3 4-20mACurrent output wiring diagram (no external power supply).....- 8 -
2.4 Pulse output wiring diagram (requires external power supply).....- 8 -
2.5 RS485 output wiring diagram.....- 9 -
2.6 High alarm output wiring diagram (requires external power supply).....- 9 -
2.7 Low alarm output wiring diagram (requires external power supply).....- 9 -
2.8 Operation of converter.....- 9 -
2.8.1 Main screen.....- 9 -
2.8.2 Menu Windows.....- 10 -

3 Menu Window Details.....- 11 -

3.1 Basic Setup.....- 11 -
3.2 Signal Setup.....- 12 -
3.3 Pulse Output.....- 13 -
3.4 RS485 Output.....- 14 -
3.5 Total Set.....- 14 -
3. 6 Calibration.....- 15 -
3.7 Factory Set.....- 15 -

4. Install.....- 20 -

4.1. Upstream and Downstream Piping.....- 20 -
4.2 Flowtube Orientation.....- 20 -
4.3 Flow Direction.....- 21 -
4.4 Grounding.....- 22 -

5. Troubleshooting.....- 24 -

DTI-E82 ELECTROMAGNETIC FLOW METER

Introduction

1.1 Preface

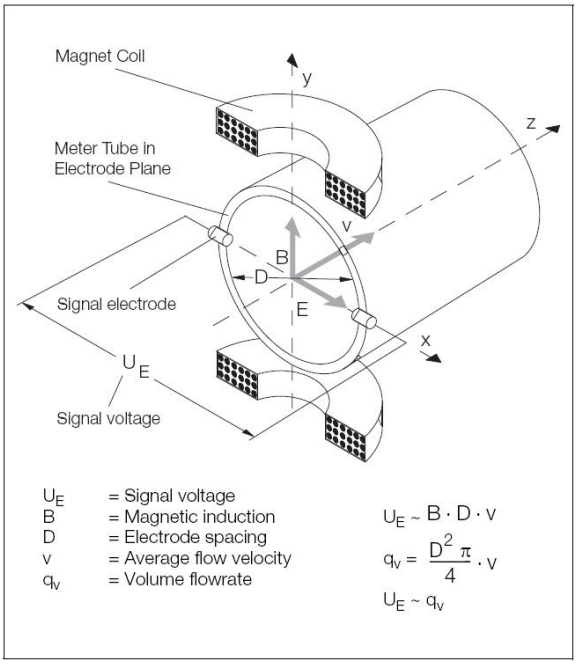
Electromagnetic flowmeters follow the Faraday law of electromagnetic induction. They can be used to accurately measure the flow rate of liquids which are electrical conducting, caustic, and mixed with liquids and solids. They are widely used throughout industries of petroleum, chemical engineering, pharmacology, papermaking, electric power, environmental protection and so forth.

1.2 Features

- No Moving Parts, Virtually No Pressure Loss;
- Corrosion protection, abrasion resistant;
- High accuracy, Stable performance;
- High level of anti-vibration and anti-jamming, wide measuring dimensions.
- Multi-Output Interface：4~20mA, Pulse, HART or RS-485

1.3 Operating Principle

Faraday's Laws of Induction form the basis for the electromagnetic flowmeters. It states that a voltage is induced in a conductor as it moves through a magnetic field.
This principle is applied to a conductive fluid which flows through a magnetic field generated perpendicular to the flow direction (see Schematic).
The voltage induced in the fluid is measured at two electrodes, installed diametrically opposed. This signal voltage UE is proportional to the magnetic induction B, the electrode spacing D and the average flow velocity v. Noting that the magnetic induction B and the electrode spacing D are constants, a proportionality exists between the signal voltage UE and the average flow velocity v. The equation for the volume flow shows that the signal voltage UE is linear and proportional to the volume flowrate. The induced signal voltage is processed in the converter into scaled, analog and digital signals.



1.4 Applications

- Water / waste water
- Chemical industry
- Food industry
- Power engineering
- Agriculture
- Effluent industry

1.5 Safety Instructions

! Please read this manual carefully before using the product.

! Keep this manual for future reference. we will not be liable for any damage caused by improper use of the product or its accessories.

! The flowmeter converter - flow-meter MUST NOT be mounted in explosive hazardous areas.

1.6 Specifications

- Nominal Meter Size
  6 to 2800mm (0.2to 110 inch)
- Liquid Pressure (MPa)
  0.6 1.0, 1.6, 2.5, 4.0, 6.4,10,16,25
- Accuracy
  ±0.25%, ±0.5% (upon req.)
- Minimum Conductivity
  ＞5μs/cm
- Electrode Material
  316L, Hastelloy(HB,HC), Tantalun, Titanium, Platinum, Tungsten Carbide
- Fluid Temperature
  Ne 0~70℃ FEP -20~180℃
  PTFE -40~180℃
- Liner
  Rubber, PTFE, FEP,PU
- Relative Humidity
  ≤90% r.h
- Ambient Temperature
  -30 to 60℃ (-22 to 140℉)
- Current Output
  4 to 20mA
- Frequency Output
  0 to 10KHz
- Pulse Output
  from 0.001 to 1000 Ltr/Pulse
- Protocal
  RS-485
  HART
- Supply Power
  85 to 265VAC
  18 to 36VDC
- Power
  S＜10W/AC, S＜7.5W/DC

Flow Ranges and Meter Sizes

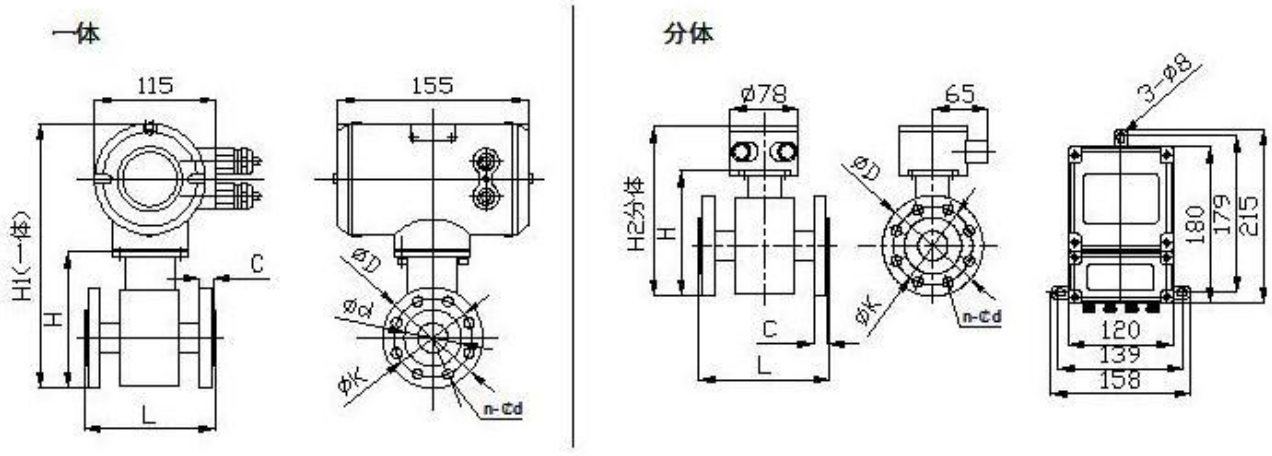
Sizes mm (in.)	Flow Range	
	Minimum	Maximum*
	m 3/h	m 3/h
10(0.4)	0.014	3.39
15 (0.6)	0.03	3.39
20 (0.8)	0.06	13.56
25 (1)	0.09	21.19
40 (1.6)	0.23	54.25
50 (2)	0.35	84.78
65 (2.5)	0.6	143
80 (3)	0.90	217
100 (4)	1.41	339
125（4.9）	2.21	529
150(6)	3.18	763
200 (8)	5.65	1356
250 (10)	8.83	2119
300 (12)	12.7	3052
350 (14)	17.3	4154
400 (16)	22.6	5425
450 (18)	28.6	6867
500 (20)	35.3	8478
600 (24)	51	12208
700 (28)	69	16616)
800 (31)	90	21703
900 (35)	114	27468
1000 (39)	141	33912
1200 (47)	203	48833
1400 (55)	277	66467
1600 (63)	361	86814
1800 (71)	457	109874

1.7 Material Selection

Lining Material	General Characteristics
PFA	Highly chemical-resistant Excellent high temperature capabilities
PTFE	Highly chemical-resistant Excellent high temperature Capabilities
Rubber	Abrasive resistance Wide applications

Electrode Material	General Characteristics
316L Stainless Steel	Good corrosion resistance Good abrasion resistance Not recommended for sulfuric or hydrochloric acids
Hastelloy	Better corrosion resistance High strength Good in slurry applications Effective in oxidizing fluids
Tantalum	Better chemical resistance Not recommended for fluosilic acid, hydrofluoric acid, or sodium hydroxide
Titanium	Better chemical resistance Better abrasion resistance Good for sea water applications Not recommended for hydrofluoric or sulfuric acid

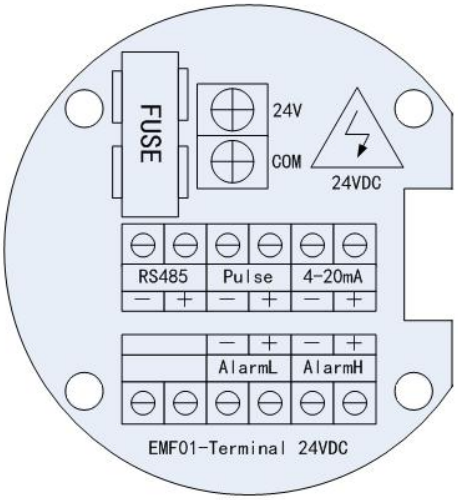
1.8 Dimensions

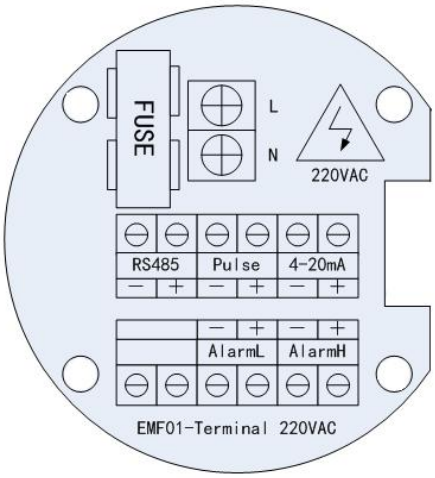


DN	L (mm)	H	H1	H2	D	K	n-Ød	C	Pressure
10	160(F46)	130	247	180	95	65	4-Ø14	14	PN4.0
15		135	252	185	95	65	4-Ø14	14	
20		143	260	193	105	75	4-Ø14	16	
25	160 (PTFE) 165 (F46)	123	240	173	115	85	4-Ø14	16	
32		150	267	200	140	100	4-Ø18	18	
40	195 (PTFE) 200 (F46)	160	277	210	150	110	4-Ø18	18	
50		173	290	223	165	125	4-Ø18	20	
65	195 (PTFE) 200 (Rubber)	183	300	233	185	145	4-Ø18	20	PN1.6
80		206	323	256	200	160	8-Ø18	20	
100	245（PTFE） 250 (Rubber)	225	342	275	235	180	8-Ø18	22	
125		255	372	305	250	210	8-Ø18	22	
150	295 / 300	287	405	337	285	240	8-Ø22	24	
200	345 / 350	344	461	395	340	295	12-Ø22	26	
250	395 / 400	396	512	446	395	350	12-Ø22	26	PN1.0
300	495 / 500	450	565	500	445	400	12-Ø22	28	
350		510	625	560	500	460	16-Ø22	30	
400	595 / 600	560	675	610	565	515	16-Ø26	32	
450		610	725	660	615	565	20-Ø26	35	
500		660	775	710	670	620	20-Ø26	38	
600		770	885	820	780	725	20-Ø30	42	
700	700	910	1025	960	895	840	24-Ø30	30	
800	800	1020	1135	1070	1010	950	24-Ø34	32	
900	900	1120	1235	1170	1110	1050	28-Ø34	34	
1000	1000	1220	1335	1270	1220	1160	28-Ø36	34	
1200	1200	1410	1525	1460	1400	1340	32-Ø33	60	PN0.6
1400	1400	1620	1735	1670	1620	1560	36-Ø36	68	
1600	1600	1850	1965	1900	1880	1760	40-Ø36	76	
1800	1800	2040	2155	2100	2045	1970	44-Ø39	84	
2000	2000	2250	2365	2300	2265	2180	48-Ø42	92	

2 Transmitter Unit

2.1 Transmitter wiring terminal

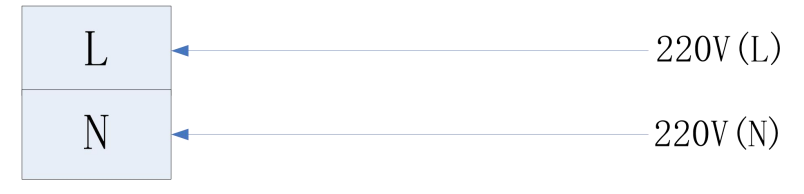




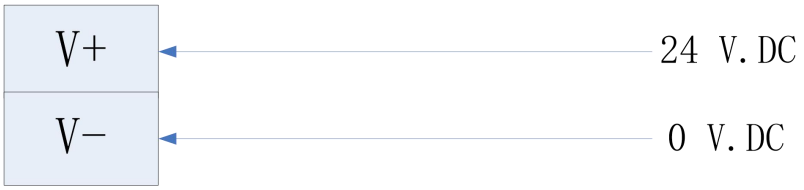
Marked		Function	Remark
L		AC 85~265v power	L is Ac220v power supply
N		AC 85~265v power	N is Ac220v power supply
24V		DC 18~36v power +	Power 24v+
COM		DC 18~36v power -	Power 24v-
4-20mA	+	4~20mA output+	Current output is active, does not require nor external 24V power supply to the current output terminals, the load resistance ≤ 500Ω
	-	4~20mA output-	
Pulse	+	Frequency or pulse output +	Frequency or pulse output is passive, the load current ≤ 20mA
	-	Frequency or pulse output -	
RS485	+	RS485 output+	RS485 output
	-	RS485output-	
Alarm H	+	High alarm output+	High alarm output is passive, the load current ≤ 20mA
	-	High Alarm Output -	
Alarm L	+	Low alarm output +	Low alarm output is passive, the load current ≤ 20mA
	-	Low alarm output -	

Note: Passive output requires external supply 24VDC or 12VDC power (+ pull-up resistor) to the output terminals!

2.2 Power wiring diagram



220V AC power supply

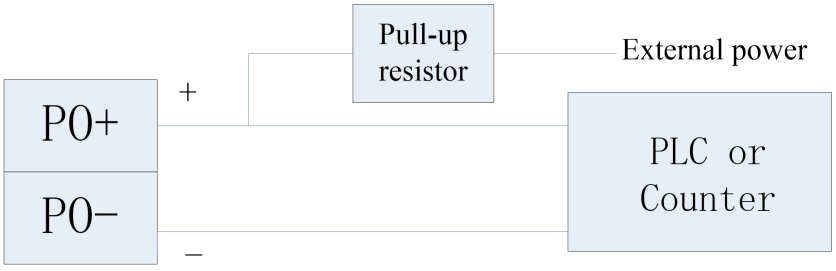


24V DC power supply

2.3 4-20mACurrent output wiring diagram (no external power supply)



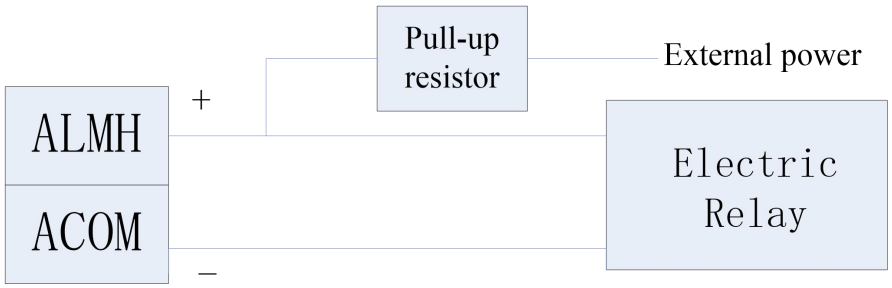
2.4 Pulse output wiring diagram (requires external power supply)



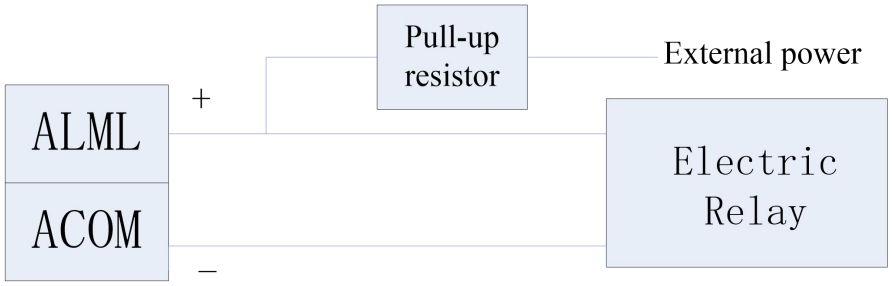
2.5 RS485 output wiring diagram



2.6 High alarm output wiring diagram (requires external power supply)

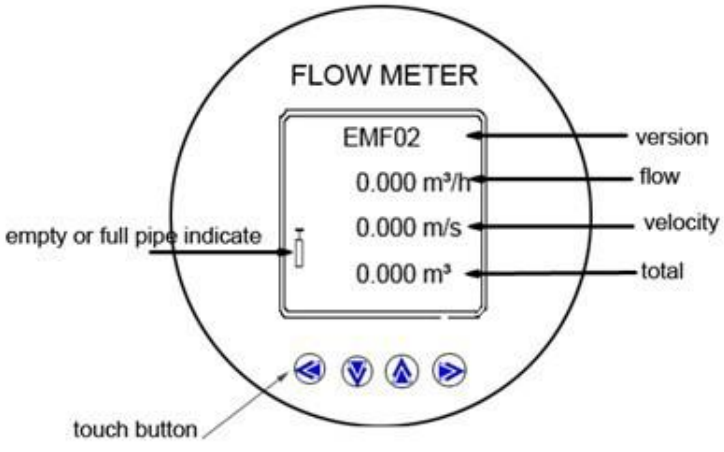


2.7 Low alarm output wiring diagram (requires external power supply)



2.8 Operation of converter

2.8.1 Main screen



The transmitter enters the automatic flow measurement mode after power on. All of measurement functions are ready and measurement data are displayed. The parameters can be setup and displayed by pressing four keys:

 Set parameters to confirm and exit the sub-menu to set key

 Down key

 Up key

 Enter the menu and cancel key

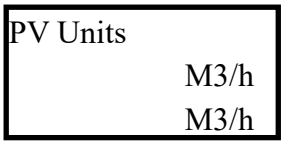
2.8.2 Menu Windows

Basic Setup	1. PV Units
	2. PV Decimal
	3. Total Units
	4. Total Decimal
	5. Damping(s)
Signal Setup	1. Qmax(m3/h)
	2. Low Cutoff %
	3. Direction
	4. Indication
Pulse Output	1. Freq Max(Hz)
	2. Liter/pulse
	3. Pulsewidth
	4. Pulse Level
	5. F/P Switch
RS485 Output	1. Protocol
	2. Baudrate
	3. Data Bit
	4. Check Mode
	5. Device ID
Total Set	1. Clear Total
	2. Set Total
Calibration	1. 4mA Trim
	2. 20mA Trim
	3. Zero Trim
Factory Set	1. Enter Password

3 Menu Window Details

3.1 Basic Setup

(1)Flow Unit



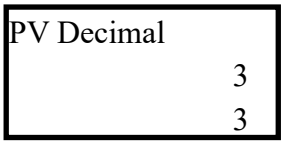
Parameter Type: Select

Default value: m3/h

Range： L/s L/m L/h m3/s m3/m
m3/h G/s G /m G/h

With "→" key to select the setting item, use the "↓ or ↑" key to select the flow units, and then press"←" key to confirm and exit.

(2)PV Decimal (Flow display resolution)



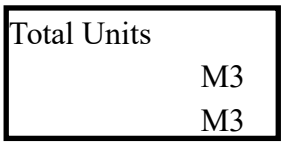
Parameter Type:： Select

Default value： 3

Range： 1 2 3

With "→" key to select the setting item, use the "↓ or ↑" key to select, and then press"←" key to confirm and exit.

(3)Total Units



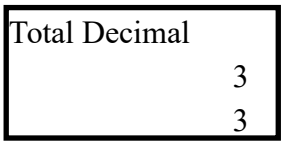
Parameter Type： Select

Default value： m3

Range： L m3 G

With "→" key to select the setting item, use the "↓ or ↑" key to select, and then press"←" key to confirm and exit.

(4) Total Decimal



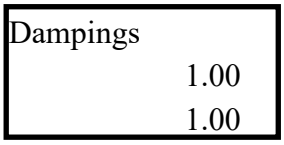
Parameter Type： Select

Default value： 3

Range： 1 2 3

With "→" key to select the setting item, use the "↓ or ↑" key to select, and then press"←" key to confirm and exit.

(5)Damping(s)



Parameter types：fixed-point decimal

Default value： 1.0

Range： 30.0 – 0.1

With "→" key to select the setting item, use the "→" to move the cursor, use the "↓ or ↑" key to enter the desired damping time, and then press"←" key to confirm and exit.

3.2 Signal Setup

(1) Qmax（m3/h）

Parameter types：floating point

Default value： 100.0 m3/h

Range： m – n

Floating point:

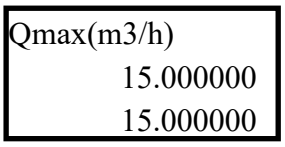
Max =This caliber under 15m/s velocity corresponding flow

Min = Under the current diameter 0.2m / s flow velocity corresponding

Q=(Velocity of flow*D*D)/353.67765

Such as the current caliber=100mm，then:

max = 424.115 m3/h min = 5.655m3/h Default= 100.0 m3/h



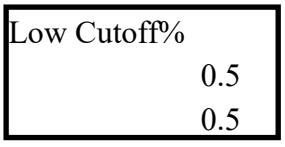
Qmax refers to the flow reach the set value, the current output is 20mA, frequency output is "output frequency" settings; change Qmax will affect this parameter: current output and frequency output.

(2) Low Cutoff %

Parameter types：fixed-point decimal

Default value： 0.0

Range： 9.9 – 0.0



For example: Qmax = 100m3 / h

Low cutoff= 1.0%

Then: When the instantaneous flow rate <1m3/h,the flow will be cutoff .

(3) Direction

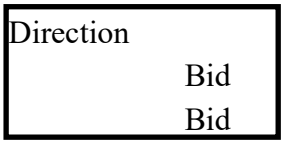
Parameter Type: Select

Default: forward

Range: forward reverse two-way

When set to positive, the reverse flow will not be measured and displayed,

Set to two-way, then positive and reverse's flow are measured and displayed



(4) Indication

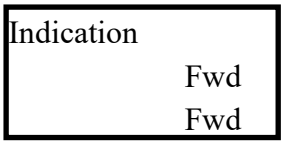
Parameter Type: Select

Default: forward

Range: forward reverse

When set to positive, the reverse flow will be measured and displayed as positive,

If set to reverse, then forward reverse flow are measured and displayed.



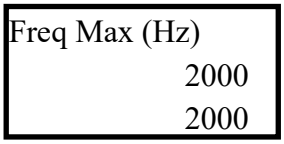
3.3 Pulse Output

(1)Freq Max（Hz）

Parameter types：fixed-point decimal

Default value： 2000.0

Range： 5000.0 – 100.0



Current flow corresponding to the current output frequency

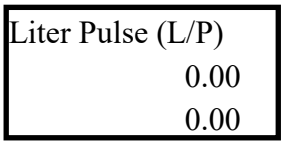
Output frequency (Hz) = (Current flow (m3 / h) / Max flow (m3 / h)) * frequency limit (Hz)

(2)Liter/Pulse

Parameter types: floating point decimal

Default: 0.0

Range: m - 0.00555



$$\text{Output frequency ()} = \frac{\text{Current flow (m3 / h) / 3.6}}{\text{Current pulse(L/P)}} = \frac{\text{Current flow (L / s)}}{\text{Current pulse(L/P)}}$$

When the current pulse = 0.0, the "Max freq(Hz)" setting determines the frequency output

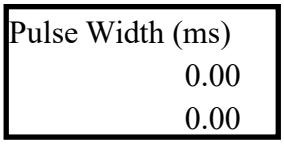
When the current pulse > 0.0, the "Liter/Pulse"setting determines the frequency output

(3)PulseWidth（ms）

Parameter types： floating point decimal

Default value： 0.0000

Range： 0.1000 – 0.0000



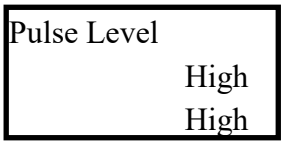
When this is the default value, the output of pulse’s duty ratio is 1:1

(4)Pulse Level

Parameter Type: Select

Default value: Active L(low)

Range: Low and High effective



When set to low, the pulse output is active low

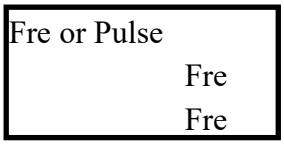
When set to active high, the pulse output is active high

(5) F/P Switch

Parameter Type: Select

Default value: Frequency Output

Range: Pulse output Frequency output

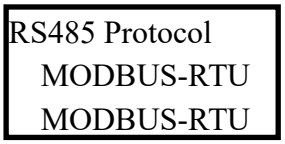


When set to the frequency output from the "upper frequency limit Hz" setting determines the output, the output duty ratio of 1:1When set to pulse output from the "pulse equivalent L / P" setting determines the output, the output duty cycle from

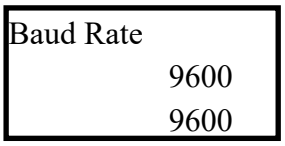
the "pulse width" setting determines

3.4 RS485 Output

(1) Protocol
Optional：MODBUS-RTU　MODBUS-ASCII
Default value：MODBUS-RTU



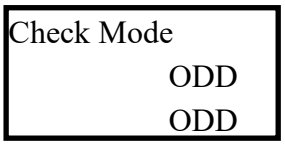
(2)Baud Rate
Optional：1200 2400 4800 9600 19200 38400
Default value：　9600



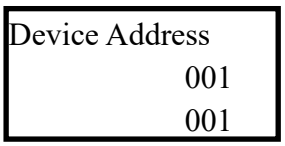
(3)Data Bit
Optional: 7　8
Default vealue：　8
In RTU protocol, you can not select 7 data bits



(4)Check Mode
Optional: no parity / odd parity /even parity
Default value：　No parity

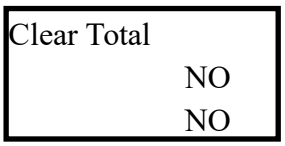


(5)Device ID
Rang：　247 – 1
Default value：　1

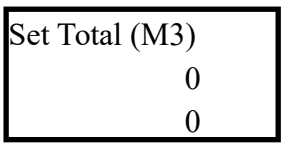


3.5 Total Set

(1)Clear Total
Optional：　No　Yes
Default value：　No
Clear the cumulative amount



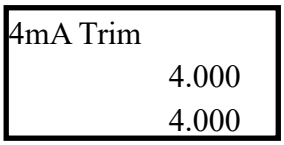
(2)Set Total
floating-point ：　9999999999 – 0
Default value：　0000000000
Set this value, the cumulative amount of the current value of this setting will be overwritten.



Note: If the total amount display "Over Flow!", Please timely processing (cleared or preset), so as not to affect the normal measurements.

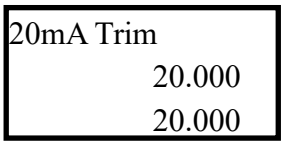
3. 6 Calibration

(1)4mA Trim
Floating-point： 5.0 – 3.0
Default value = 0.0



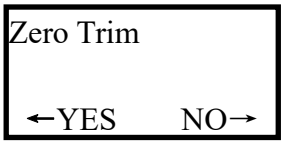
Perform this function, with an ammeter to measure the 4-20mA current output, the input meter readings, the meter automatically calibrate the internal operations

(2) 20mA Trim
floating-point ： 21.0 – 19.0
Default = 0.0



Perform this function, with an ammeter to measure the 4-20mA current output, the input meter readings, the meter automatically calibrate the internal operations

(3) Zero Trim
Parameter Type： Choose
Default value： No
Range： No Yes



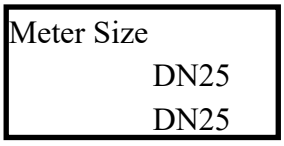
Confirm the measurement tube is filled tube and fluid at rest, after a full warm-up, perform this function, the instrument automatically zero calibration.

3.7 Factory Set

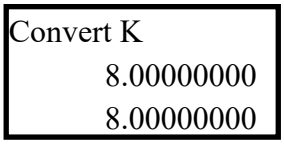
Into the “Factory Set” to enter the correct password
Factory password is 0525



(1) Meter Size
Parameter Type: Select
Default value: DN100
Range：1 1.5 2 3 4 5 6 8 10 15 20 25 32 40
50 65 80 100 125 150 200 250 300 350 400
450 500 600 700 750 800 900 1000 1100 1200
1300 1350 1400 1500 1600 1700 1800 2000 2100
2200 2300 2400 2500 2600 2700 2800 2900 3000



(2) Convert K
Parameter Type: floating decimal
Default value: 8.0000
Range： 00.01000-99999.9



This parameter is only related with the converter, which means that the eigenvalues of the converter, signal simulator

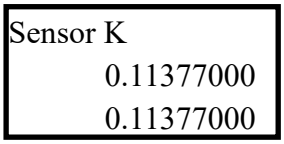
calibration required New Convert K values are recognized: New Convert K = original Convert K / (display value / theoretical value)

(3) Sensor K

Parameter Type: floating decimal

floating-point： 00.16000

Range： 00.01000-9.9000



This parameter is determined during the actual flow calibration

This parameter is only associated with the sensor, which means that the sensor characteristic value

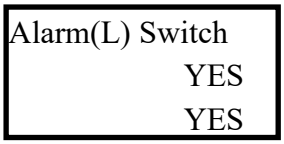
New Sensor K value are recognized: New Sensor K = original Sensor K / (was seized represents the value / standard represents the value)

(4)AlarmL Switch

Optional: No Yes

default = No

This is set to Yes, the alarm signal can be output normally low

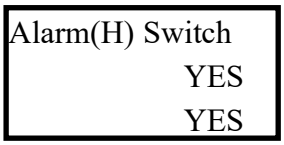


(5)AlarmH Switch

Optional: No Yes

default = No

This is set to Yes, the alarm signal to the normal output high

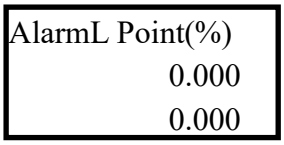


(6)AlarmL Point

Parameter Type: floating decimal

Default value： 5.000%

Range： 0.000 – High Alarm(%)



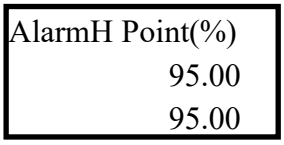
When the absolute value of the instantaneous flow rate is less than the percentage scale flow × this setting, the output low alarm signal

(7)AlarmH Point

Parameter Type: floating decimal

Default value： 95.00%

Range： Low Alarm(%) – 150.0%



When the instantaneous flow rate is greater than the absolute value of the percentage scale flow × this setting, the output signal is high alarm

(8)TubeCheck ON

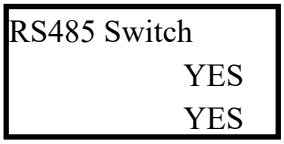
Optional: No Yes

default = No



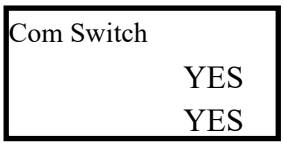
Sensor well grounded, will this set to Yes, then the normal measurement

(9)RS485 Switch
Options: No Yes
Default value = No
Need to use RS485 function, select Yes on RS485 function is disabled by default.

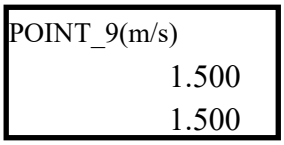


(10)Compensation

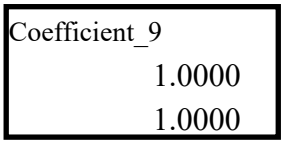
(10.1) Com Switch
Options: No Yes
Default value = No
Need to use non-linear correction, select Yes to open the function.



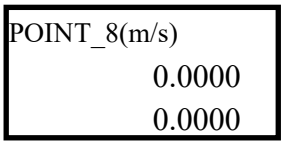
(10.2) POINT_9(m/s)
floating-point number： 20.0 –0.0
default = 0.0
This setting must be> compensation point _8 setting value.



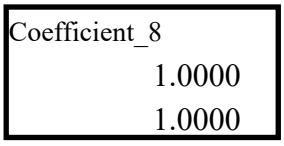
(10.3) Coefficient_9
floating-point number: 0.05 –3.00
default = 1.0



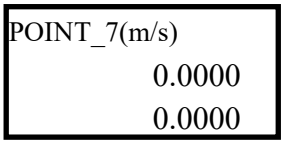
(10.4) POINT_8(m/s)
floating-point number: 20.0 –0.0
default = 0.0
This setting must be> _7 compensation point value set!



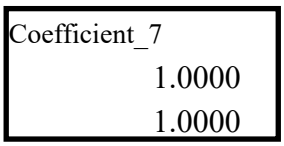
(10.5) Coefficient_8
floating-point number： 0.05 –3.00
default = 1.0



(10.6) POINT_7(m/s)
floating-point number： 20.0 –0.0
default = 0.0
This setting must be > compensation point _6 Settings!

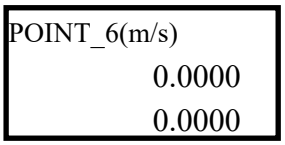


(10.7) Coefficient_7
floating-point number： 0.05 –3.00

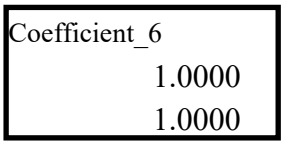


default = 1.0

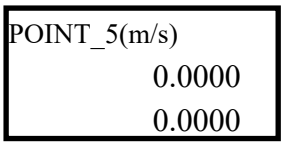
(10.8) POINT_6(m/s)
floating-point number： 20.0 –0.0
default = 0.0
This setting must be> _5 compensation point value set!



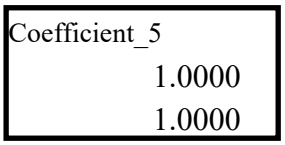
(10.9) Coefficient_6
floating-point number： 0.05 –3.00
default = 1.0



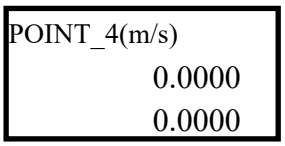
(10.10) POINT_5(m/s)
floating-point number： 20.0 –0.0
default = 0.0
This setting must be> compensation point _4 settings!



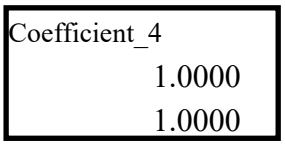
(10.11) Coefficient_5
floating-point number： 0.05 –3.00
default = 1.0



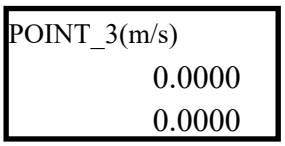
(10.12) POINT_4(m/s)
floating-point number： 20.0 –0.0
default = 0.0
This setting must be> compensation point _3 settings!



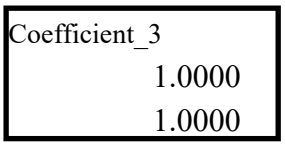
(10.13)Coefficient_4
floating-point number： 0.05 –3.00
default = 1.0



(10.14) POINT_3(m/s)
floating-point number： 20.0 –0.0
default = 0.0
This setting must be> compensation point _2 settings!



(10.15) Coefficient_3
floating-point number： 0.05 –3.00
default = 1.0



(10.16) POINT_2(m/s)

floating-point number： 20.0 –0.0
default = 0.0
This setting must be> compensation point _1 settings!

POINT_2(m/s)
0.0000
0.0000

(10.17) Coefficient_2
floating-point number： 0.05 –3.00
default = 1.0

Coefficient_2
1.0000
1.0000

(10.18) POINT_1(m/s)
floating-point number： 20.0 –0.0
default = 0.0
This setting value must be ≥ 0m / s!

POINT_1(m/s)
0.0000
0.0000

(10.19)Coefficient_1
floating-point number： 0.05 –3.00
default = 1.0

Coefficient_1
1.0000
1.0000

(11) Actual Zero
Parameter Type： Decimal point
Default value： The initial value of zero adjustment of the voltage
Rang： 99.999 – -99.999

Actual Zero (mV)
0.6539
0.6539

Note :

Correction method： Turn off the correction switch, with a calibrated flow device before correction electromagnetic flowmeter, flow from the large to the small flow calibration, calibration points as much as possible, according to the calibration of the results, and the corresponding flow rate range planning segment compensation factor. Set as follows: 1, open correction switch; 2, the large flow point (as close to scale flow), the average coefficient as a sensor coefficient K, is set to the sensor coefficient setting items; 3, according to the planned scope and calculated velocity compensation coefficient, all parameters can be set for 7.10.2-7.10.19, please note that if the number of segments to be compensated reach nine segments, you can divide the flow rate range, will not need to use the flow velocity correction point unified segment is set to 0 .

The calculation of compensation coefficient is：

New compensation coefficient = current compensation coefficient * The frequency range of the average actual calibration of the sensor coefficient K '/ sensor coefficient K (theory), if used to calculate the flow rate, the compensation factor should be set equal to the current compensation coefficient * Theoretical flow / current measure the flow.

routine：0-8m / s measurement range,3-8m / s without correction for the segment, the sensor coefficient of 0.1,1-3m / s for the need to amend the first paragraph (correction factor 1.002) ,0-1m / s in need of correction the second paragraph (correction factor 1.005), in this case, did not make full use of Kudan for routines, set the parameters as follows: 1, 7.3 sensor factor is set to 0.1; 2 compensation point settings from small to large, respectively 1-7 is 0 to set the compensation

point, compensation point 8 is 1m / s, compensation point 9 of 3m / s. Set compensation coefficient 8 1.005, 1.002 to compensation coefficient 9 (compensation coefficient 1-7 to keep the default value).

4. Installation

4.1. Upstream and Downstream Piping

To ensure specification accuracy over widely varying process conditions, install the flowtube a minimum of five straight pipe diameters upstream and two pipe diameters downstream from the electrode plane (see Fig. 1).

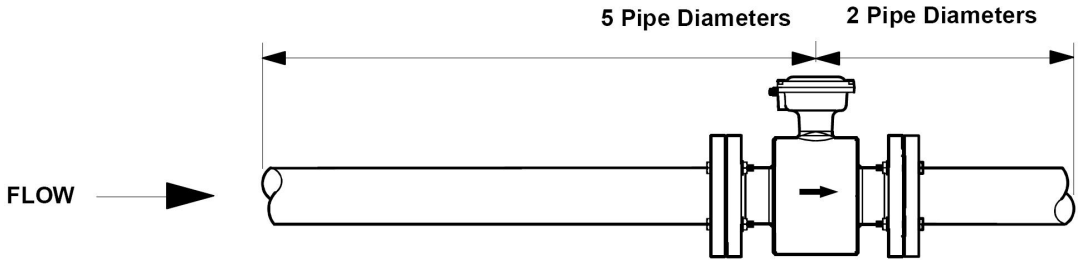


Fig.1: Upstream and Downstream Straight Pipe Diameters

4.2 Flowtube Orientation

The flowtube should be installed in a position that ensures the flowtube remains full during operation. Horizontal or inclined positions are preferred. Fig. 2, Fig 3, and Fig. 4 show the proper flowtube orientation for the most common installations. The following orientations ensure that the electrodes are in the optimum plane to minimize the effects of entrapped gas. As illustrated in Fig. 3B and Fig. 4B, avoid downward flows where back pressure does not ensure that the flowtube remains full at all times.

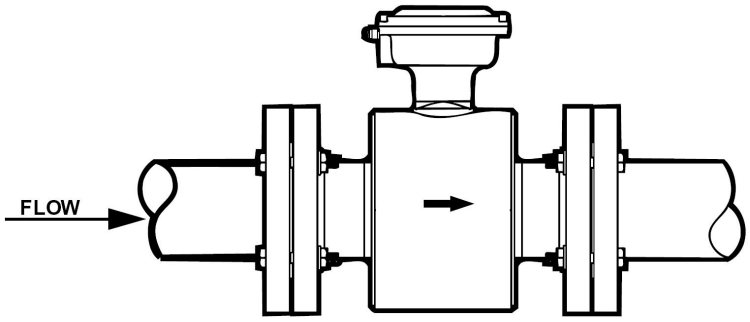


Fig. 2: Horizontal Flowtube Orientation

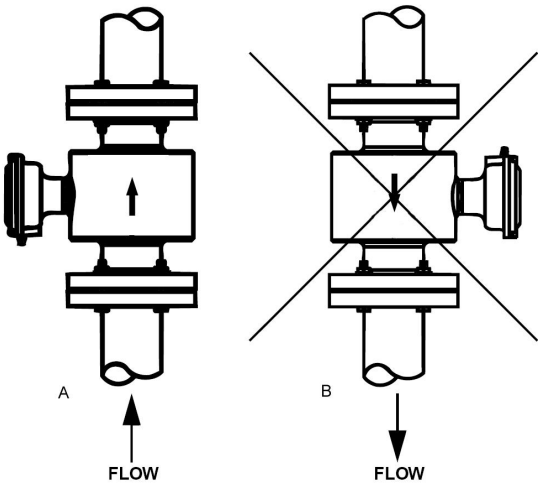


Fig.3: Vertical Flowtube Orientation

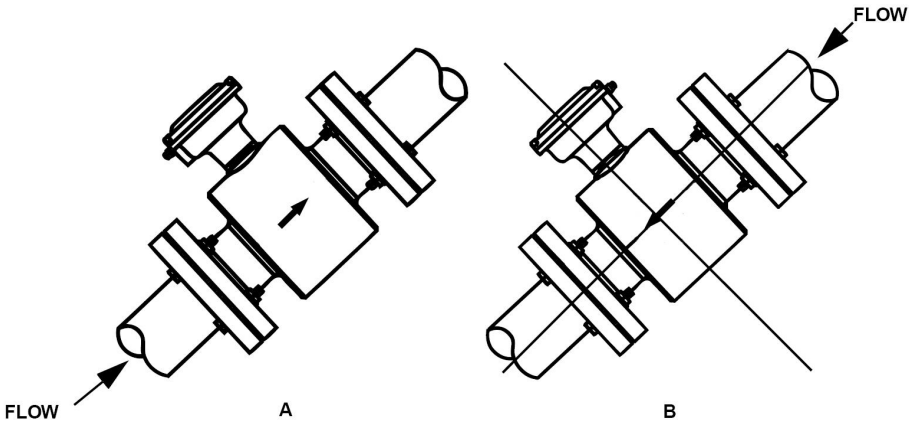


Fig. 4: Incline or Decline Orientation

4.3 Flow Direction

The flowtube should be mounted so that the FORWARD end of the flow arrow, shown on the flowtube identification tag, points in the direction of flow through the tube. In this mounting configuration, the conduit ports point upstream.

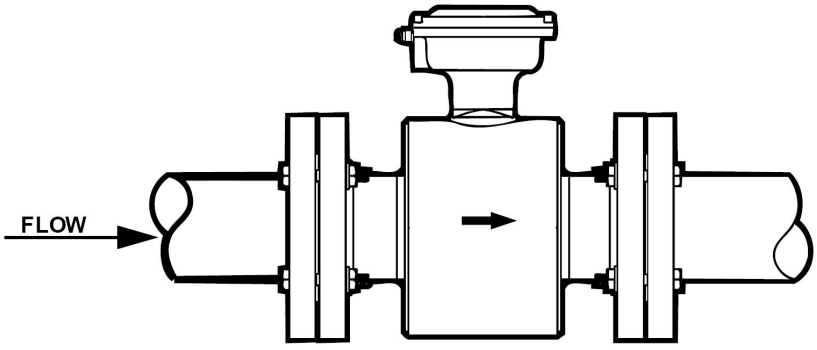


Fig.5: Flow Direction

4.4 Grounding

Grounding the flowtube is one of the most important details of flowtube installation. Proper grounding ensures that only the voltage induced in the magnetic field of the flowtube is measured. Use Table 2-4 to determine which grounding option to follow for proper installation. Attached grounding rings should be grounded equivalently to non-attached grounding rings.
The flowtube case should always be grounded in accordance with national and local electrical codes. Failure to do so may impair the protection provided by the equipment. The most effective grounding method is direct connection to earth ground with minimal impedance.

Type of Pipe	Grounding of Options		
	No Grounding Options	Grounding Rings	Lining Protectors
Conductive Unlined Pipe	See Fig. 6	Not Required	See Fig. 7
Conductive Lined Pipe	Insufficient Grounding	See Fig. 7	See Fig. 7
Non-Conductive Pipe	Insufficient Grounding	See Fig. 8	See Fig. 8

Table: Grounding Installation

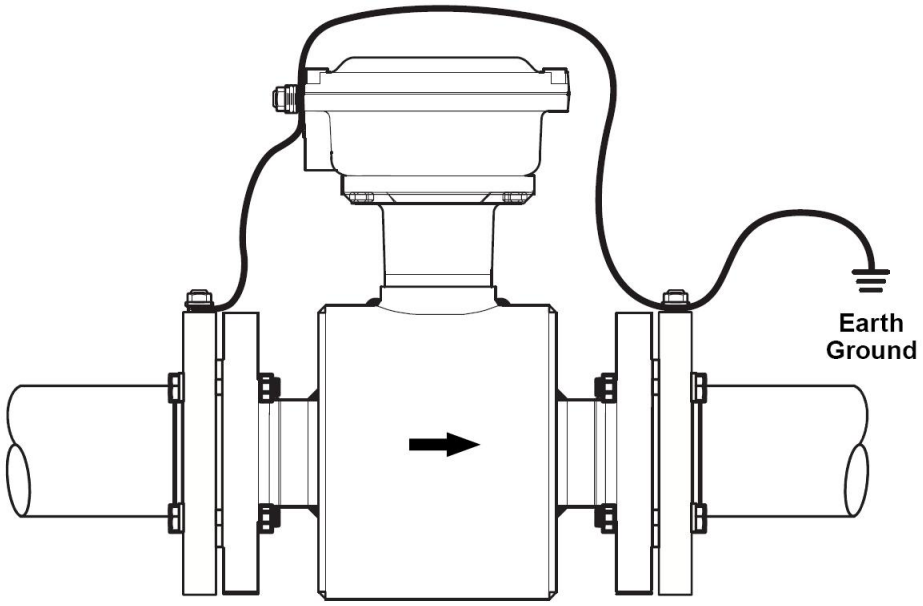


Fig. 6: No Grounding Options or Grounding Electrode in Lined Pipe

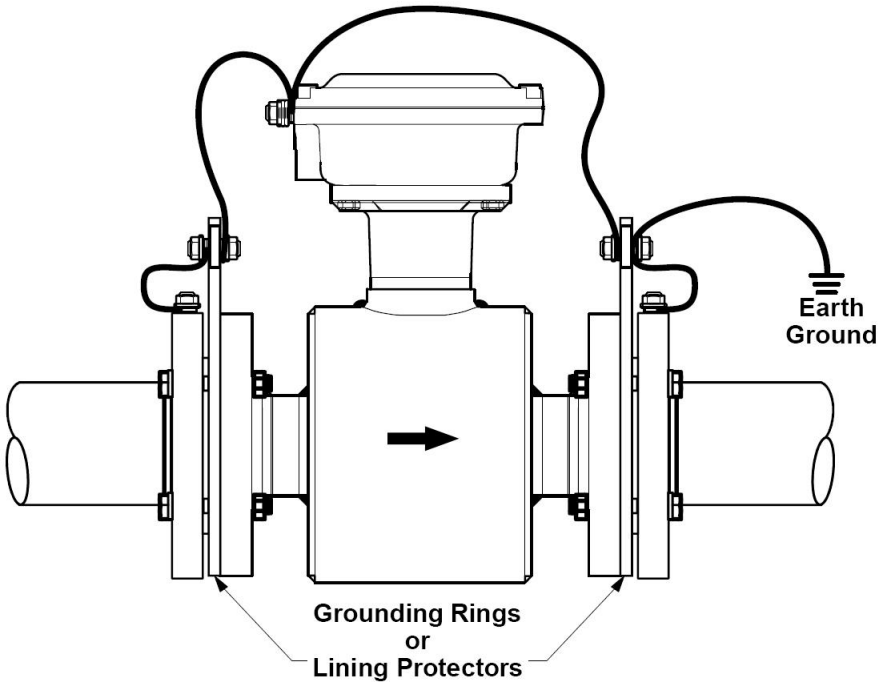


Fig. 7: Grounding with Grounding Rings or Lining Protectors

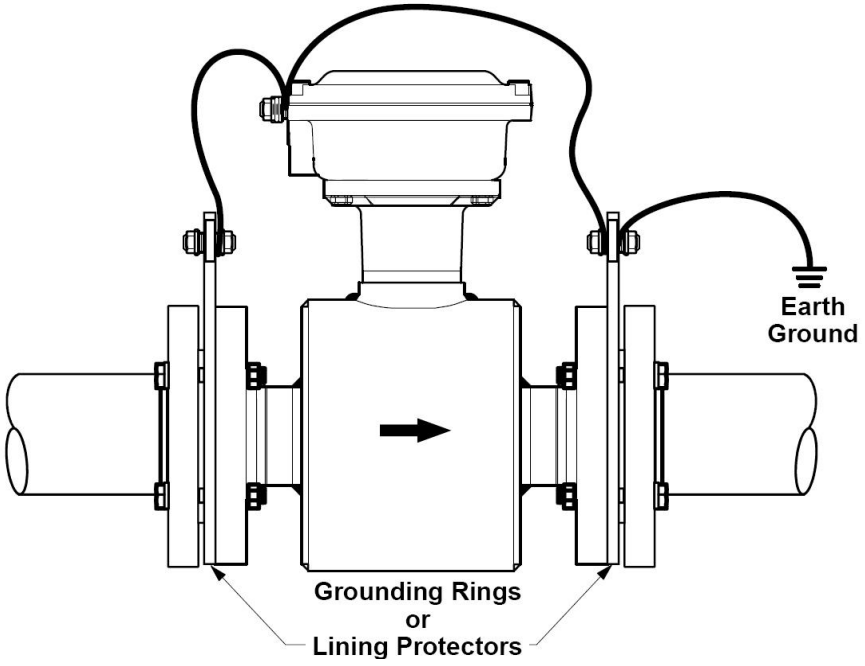


Fig. 8: Grounding with Grounding Rings or Lining Protectors

5. Troubleshooting

1) No Display:

a) Check the power supply connection;
b) Check the power fuse to see for OK;
c) Check the contrast of LCD and regulate it to working state;

2) Exciting Alarm

a) Check if the exciting cables EX1 and EX2 did not connected;
b) Check if the total resistance of sensor's exciting coil resistances less than 150Ω;
c) If a) and b) are OK, the converter is failed.

3) Empty Pipe Alarm

a) If measured fluid full of testing pipe of sensor;
b) When shorting circuit three connectors SIG 1, SIG 2, SIGGND of converter, and no "Empty Alarm" displayed then the converter works OK. In this case, it is possible that conductivity of measured fluid may be small or empty threshold of empty pipe and range of empty pipe are set wrongly.
c) Check if the signal cable is OK;
d) Check if the electro-poles are OK or not.
- Let the flow is zero, then the displayed conductivity should be less than 100%.
- Resistances of SIG1 to SIGGND and SIG2 to SIGGND are all less than 50kΩ (conductivity of water) during measurement operation. (It is better to test the resistances by means of multimeter with pointer to see the charging process well.)

e) The DC voltage should be less than 1V between DS1 and DS2 testing the voltage by means of multimeter. If DC voltage is larger than 1V, the electro poles of sensor were polluted that have to be cleaned.

4) Incorrect Measurement Of Flow

a) Check if the fluid full of testing pipe;
b) Check if the signal cable connection is right;
c) Check if the sensor coefficient and zero settings are no deferent from the data on the labels of product that are calibrated by manufacturer.