Goldcard TANCY

TEF Electromagnetic Flowmeter

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1. Measurement principle

1.1. Product features and application areas

The TEF electromagnetic flowmeter consists of two main components: a flow sensor and a flow transmitter. According to the installation structure, It is available in two types:integrated and remote. TEF Electromagnetic flowmeters utilize advanced microprocessor technology, have powerful functions, compact structure and easy of operation, and is suitable for flow measurement of conductive liquid media in closed pipelines. It is widely used in chemical, petroleum, municipal engineering, metallurgy, textile, papermaking, pharmaceutical, food, environmental protection, water conservancy construction and other industries.

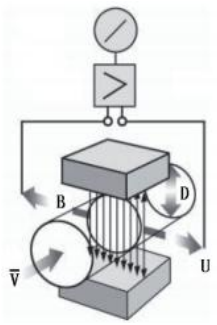
TEF flowmeters‘ features:

- No mechanical moving parts, no pressure loss.
- Uses low frequency square wave excitation signal, With configurable frequency, improving flow measurement stability while maintaining low power consumption.
- Features a new 32-bit ultra-low power microprocessor with FLASH memory, offering high integration, fast processing speed, and high calculation precision.
- Full digital processing, strong anti-interference ability and reliable measurement.
- Incorporates an Ultra-low EMI switching power supply, suitable for applications with a wide range of power supply voltage variations,Offering high efficiency, low temperature rise and excellent EMC performance.
- High-definition backlit LCD display that switches to red backlight when alarms are triggered, facilitating easy maintenance.
- Supports multiple digital output, analog output, HART, and RS485 bus communication protocols.
- Features fault self-diagnosis functions including empty pipe detection, excitation monitoring, and upper/lower flow limit alarms. It has fault self-diagnosis function and can realize empty pipe, excitation, upper and lower limit flow alarm.

1.2. Measurement principle

The electromagnetic flowmeter operates based on Faraday's law of electromagnetic induction. When a conductive fluid passes through a magnetic field, induces a voltage as it cuts across the magnetic field lines. The induced voltage is proportional to the volumetric flow rate.

During flow measurement, the fluid passes through a magnetic field positioned perpendicular to the flow direction. The movement of the conductive fluid induces a voltage proportional to the volumetric flow rate.



This voltage is given by: $U = K \bullet \overline{B} \bullet V \bullet D$

LEGEND:

U — induced voltage;

K — instrument constant;

B —magnetic induction intensity;

$\overline{V}$ — average flow velocity in the measuring pipe section;

D —Inner diameter of the measuring pipe.

The induced voltage signal is detected by at least a pair of electrodes in direct contact with the fluid and transmitted to the converter for intelligent processing , enabling measurement of both instantaneous and cumulative flow rates.

2. Performance specifications

2.1. Performance parameter table

Performance	Parameter
Nominal diameter DN (mm)	DN15~DN600
Dielectric conductivity	≥ 5 uS/cm, soft water ≥ 20 uS/cm
Maximum working pressure	4.0 MPa
Medium temperature	-20 ~ 150℃ : PFA lining, diameter range DN25 ~ 200 (1 ~ 8") -20 ~ 180℃ : High temperature PFA lining, diameter range DN25 ~ 200 (1 ~ 8") -40 ~ 130℃ : PTFE lining, diameter range DN1 5 ~ 600 (1/2 ~ 24") -20 ~ 80℃ : Neoprene lining, diameter range DN15 ~ 600 (1/2" ~ 24")
Accuracy level	Level 0.5
Repeatability	0.16%
Range Ratio	≥ 20:1
Electrode Materials	316L, HC, titanium, tantalum, platinum-iridium
Lining material	Neoprene, PTFE , PFA
Table material	Carbon steel/ Stainless steel
Supply voltage	220 V AC /24V DC
Output method	4mA~20mA Current output, HART, frequency/pulse output , RS-485
Self-diagnosis alarm	Empty pipe alarm, excitation alarm, flow upper and lower limit alarm
Installation type	Integrated/remote
Straight pipe section requirements	Upstream straight pipe length ≥ 5 DN Downstream straight pipe length ≥ 3 DN
Protection level	IP66, IP67, IP68 (remote sensor)
Explosion-proof grade	Ex db eb ib IIC T1...T6 Gb
Ambient temperature	-40℃ ~ 60℃ (above -20℃ to ensure normal LCD display)
Relative humidity	5% ~ 95%

2.2. Measurement range

Electromagnetic flowmeter measurement range (flow rate range is 0.5 m/s to 10 m/s)

DN (mm)	15	20	25	32	40	50	65
Q_{max} (m^3/h)	6	11	18	29	45	71	119
Q_{min} (m^3/h)	0.3	0.6	0.9	1.5	2.3	3.5	6

DN(mm)	80	100	125	150	200	250	300
Q_{max} (m3/h)	181	283	442	636	1131	1767	2545
Q_{min} (m3/h)	9	14	22	32	57	88	127

DN(mm)	350	400	450	500	600
Q_{max} (m3/h)	3464	4524	5726	7069	10200
Q (m3/h)	173	226	286	353	509

3. Environmental conditions

3.1. Ambient temperature and humidity

Transmitter	-40℃~ 60℃
LCD display	-20℃~ 60℃; the LCD display unit may not work properly outside the temperature range
sensor	Process connection material (carbon steel): –20℃~ 60℃ Process connection material (stainless steel):–40℃~ 60℃
lining	Do not exceed the permissible temperature range of the lining

When using outdoors:

- Install the measuring device in a shaded area.
- In direct sunlight conditions, it is recommended to install a sunshade.

Allowable relative humidity: 5% ~ 95%

3.2. Storage environment

- The instrument should be stored in a ventilated room with a temperature of -40℃ ~60℃ and a relative humidity of no more than 80%. ■ Indoor air must be free of contain harmful gases with corrosive effects

3.3. Protection level

Transmitter: IP66, IP67
Integrated sensor: IP66, IP67
remote sensor: IP66, IP67, IP68 (glue filling)

3.4. Vibration resistance

- Comply with JJG 1033-2007 Electromagnetic Flowmeter Verification Procedure and JB/T 9248-2015 Electromagnetic Flowmeter Standard

3.5. Electromagnetic compatibility

- Comply with JJG 1033-2007 Electromagnetic Flowmeter Verification Procedure and JB/T 9248-2015 Electromagnetic Flowmeter Standard

4. Process conditions

4.1. Medium temperature range

Medium temperature range:

- -20℃~ 150℃ : PFA lining, diameter range DN25 ~ DN200
- -20℃~ 180℃: High temperature PFA lining, Caliber range DN25 ~ DN200
- -40℃~ 130℃: PTFE lining, diameter range DN15 ~ DN600
- -20℃~80℃: Neoprene lining, diameter range DN15 ~ DN600

4.2. Conductivity

Medium conductivity ≥ 5μS/ cm , soft water ≥ 20μS/ cm

5. Output

5.1. Output signal

Typical output options include:
- 4mA~20mA Current output
- HART
- Frequency/Pulse Output (10kHz)
- RS485
- Digital outputs (2 digital outputs with configurable functions)

5.2. Alarm signal

Two transistor open collector alarm outputs with photoelectric isolation, passive output interface.

Alarm status: flow upper limit alarm, lower limit alarm.

5.3. Communication specification parameters

HART

HART protocol version number	7
Manufacturer ID	0x6195
Device Type ID	0xE628
HART Load	250Ω~700Ω

Modbus RS485

protocol	MODBUS Communication (V1.8)
Device Type	From the device
Instrument communication address	1 ~ 99
Function Code	0x03: Read a single register 0x04: Read input register 0x06: Write a single register 0x10: Write multiple registers
Baud rate	1200 2400 4800 9600 14400 19200 38400

5.4. Low flow cut-off

The low flow cut-off point is set as a percentage of the full-scale flow range. When low flow cut-off is enabled, the display and output of flow, flow rate, and percentage will be cut off below the threshold; when disabled, no cut-off will be applied.

6. Power supply

6.1. Supply voltage

Selection code	Voltage Type	Voltage range	Frequency range
A	220V AC	-15% ~ 10%	50Hz±4Hz
D	24V DC	-15% ~ 20%	none

6.2. Power consumption

Transmitter: Maximum 10W (active power)

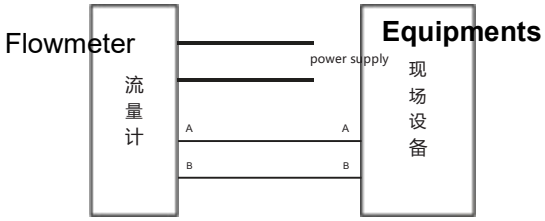
6.3. Current consumption

Transmitter:

- 220V AC power supply: maximum 200mA
- 24V DC power supply: maximum 400mA

6.4. Electrical Connections

RS-485 communication connection method:



picture 1 RS-485 communication

RS-485 communication: standard Modbus communication protocol, R TU format, capable of remotely transmitting display data.

Frequency/Pulse Output:

① Frequency signal: The maximum full-scale frequency can be set to 10000Hz, and the set frequency corresponds to the full-scale flow rate.

② Calibration pulse signal: pulse unit equivalent $^{0.001m3}$ ~ 1m ^{3}, 0.001L ~ 1L can be set appropriately according to needs.

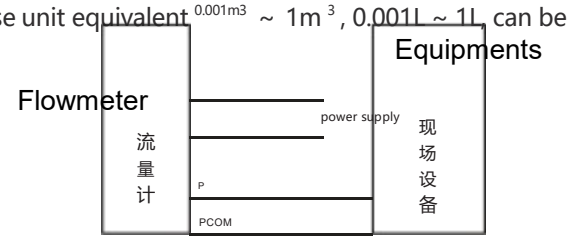


Figure 2 Frequency/Pulse Output

Current + HART output connection method:

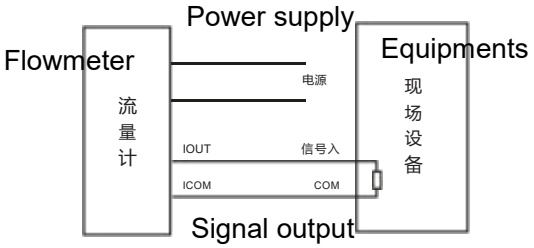


Figure 3 Current output

4mA~20mA： Full-scale current corresponds to full-scale flow, the full-scale flow can be set by the user, load resistance ≤ 700Ω .

6.5. Terminal blocks

Transmitter interface identification, pin definition

Interface ID	Pin Definition	Remark
485-A	RS485 Output+	RS485
485-B	RS485 output -	
P	Frequency (pulse) output+	Frequency/ Pulse Output
PCOM	Frequency (pulse) output ground	
ALM+	1# Output +	Digital Output
ALM-	2# Output +	
ALCOM	Digital output ground	
IW+	Passive analog current output+	Current+HART output
IOUT	Active analog current output +/ Passive analog current output -	
ICOM	Active analog current output -	
L	AC power phase line; DC power +	Power Input
PE	AC power ground wire	
N	AC power neutral line; DC power -	

6.6. Cable specifications

- remote installation wiring

The cable between the remote sensor and the converter uses STT -3200 The cable is a special four-core cable, two of which have two layers of inner shielding, forming a triple shield with the outer overall shielding wire . Except for the mesh braided shielding close to the core wires C and D, the other two layers of shielding are foil shielding with leakage wires. Factory default length is 5 meters. Please indicate, if a longer cable length is required.

The wiring diagram of the sensor or converter junction box cable is as follows:

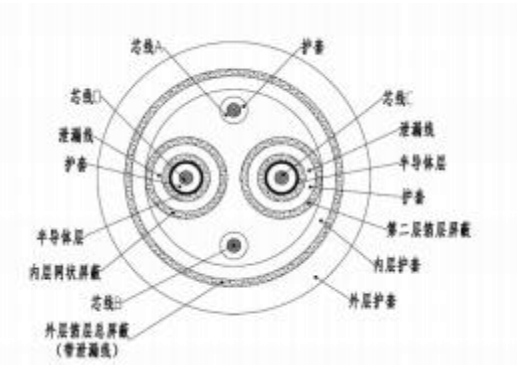
Red core wire A — EXT+

Yellow core wire B — EXT-

Black core wire C — SIG 1

White core wire D — SIG 2

The inner two shielded wires are twisted together - SIGGND



Signal Cable

- Power cord

The power cord can be a two-core insulated rubber soft cable, and the recommended model is YHZ-2× ^{1mm2}.

For DC powered transmitters, it should be noted that the wire resistance is related to the power supply voltage. Generally, the resistance of the 24V power supply cable should not be greater than 10Ω. Determined by the length and cross-section of the line.

7. Self-diagnosis function

TEF transmitter has a self-diagnosis function. Except for power supply and hardware circuit failures, all faults in general applications can correctly give alarm information. The upper right corner of the display shows an exclamation mark "!". In the measurement state, press the down key ▼ Turn the page and view the self-diagnosis information in the display window. The information contents are as follows: excitation alarm, upper limit alarm, lower limit alarm , empty pipe alarm.

8. Install

8.1. Installation Notes

1) The sensor can be installed horizontally, vertically or tilted without restriction. To ensure that the measuring pipe is filled with the measured medium, vertical installation with upward flow is recommended.
Especially for liquid-solid two-phase flow, vertical installation is required. If horizontal installation is necessary, ensure both electrodes are on the same horizontal plane with their axis approximately horizontal.

2) The measuring pipe must be completely filled with liquid (empty or partially filled pipes are not allowed.).

3)Ensure the flow direction matches the direction indicated by the flow direction arrow on the flowmeter 's body.

4) Provide a minimum straight pipe section of 5D upstream and 3D downstream of the flowmeter (where D is the inner diameter of the flowmeter's pipe).

5) If there is negative pressure in the pipeline , the lining of the flow meter will be damaged. A negative pressure prevention valve should be installed near the sensor.

6) The flow meter should be kept away from pumps, valves and other equipment to avoid interference with the measurement.

7) The flow meter should be kept away from interference sources such as radio frequency, strong magnetic field, and strong vibration .

8) If the measuring pipeline vibrates, fixed supports should be installed on both sides of the flow meter.

9) When measuring mixed liquids of different media, the distance between the mixing point and the flowmeter must be at least 30D of straight pipe length.

10) To facilitate the cleaning and maintenance of the flow meter in the future, it is recommended to install a bypass pipe.

11) When installing the electromagnetic flowmeter, the bolts connecting the two flanges should be tightened evenly, Otherwise, the lining may be easily damaged. It is recommended to use a torque wrench.

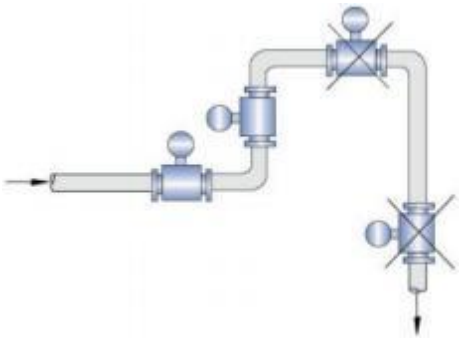
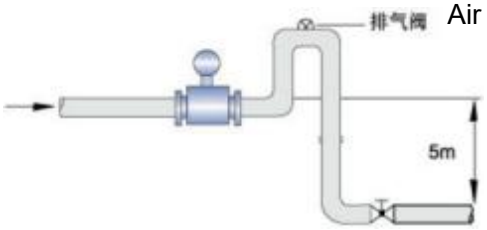
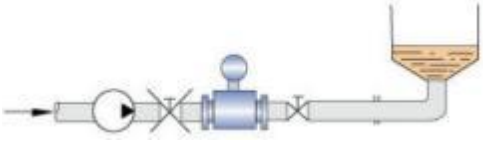
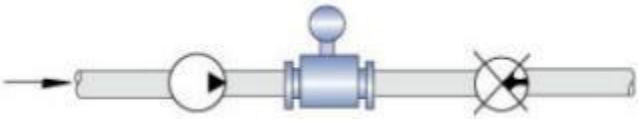
12) To improve measurement accuracy, the instrument should be reliably grounded.

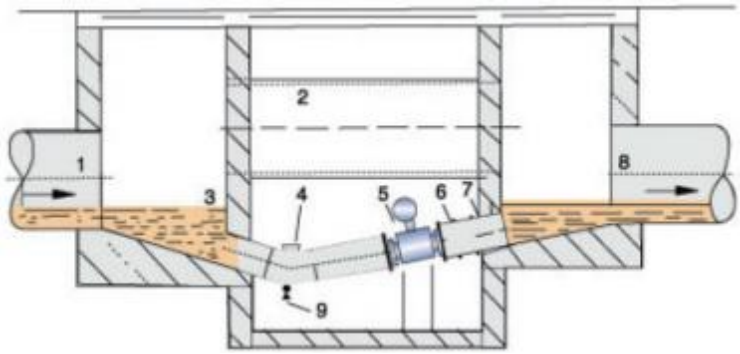
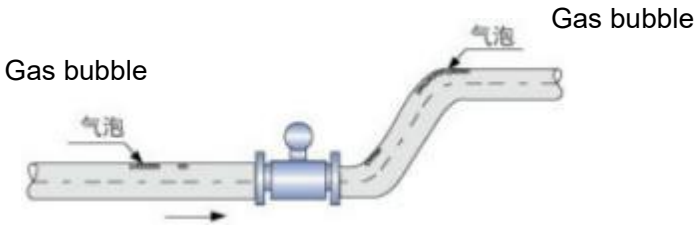
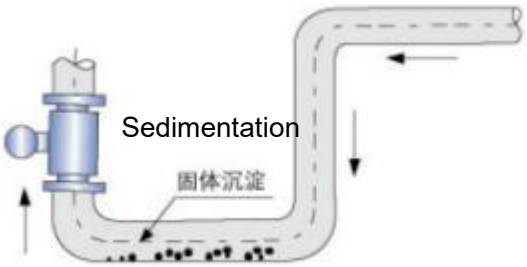
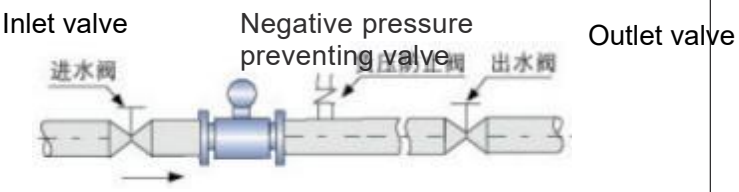
13) For the convenience of installation, maintenance and servicing, Ensure sufficient space for operation and maintenance near the pipeline flange.

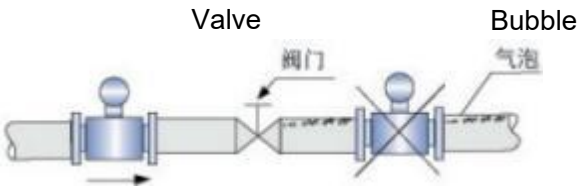
14) If the selected diameter specification does not match the inner diameter of the process pipeline, the corresponding diameter reduction or expansion treatment should be carried out to prevent the distribution of the flow velocity field from being affected after the installation of the reducer. This causes pressure loss, which in turn reduces the measurement accuracy of the electromagnetic flowmeter. The central cone angle of the reducer is required to be no greater than 15°, the smaller the better.

15) The electromagnetic flowmeter transmitter, in the remote type should be installed in a ventilated and dry place . It is recommended to avoid rain and water accumulation to prevent the electrical components of the instrument from getting damp. This will cause insulation performance degradation and damage.

8.2. Installation Location

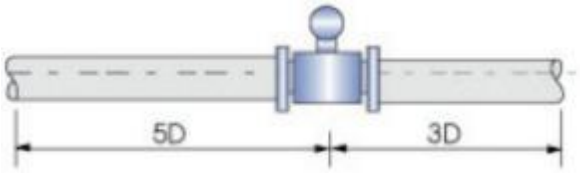
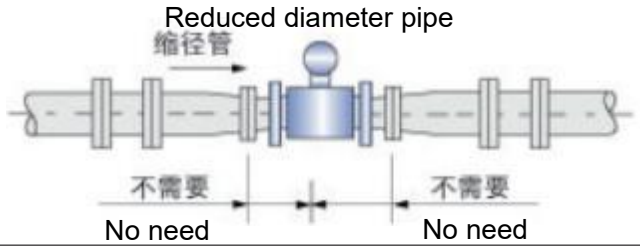
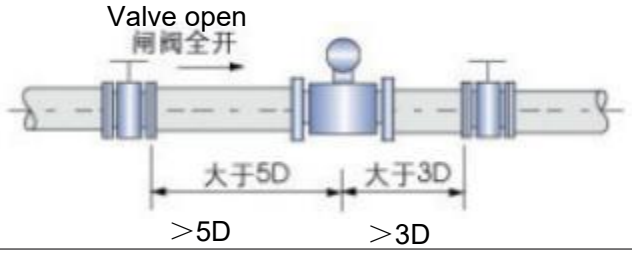
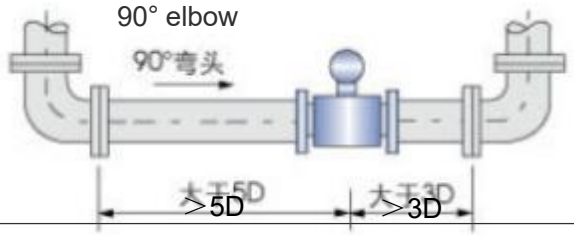
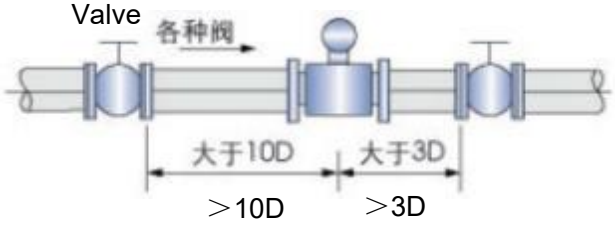
Installation	Graphics
It should be installed at the lower part of the horizontal pipeline or at the vertical upward part. Avoid installing at the highest point of the pipeline or vertically downward.	
Should be installed at the rising part of the pipeline	
When installing in an open discharge pipe, it should be installed At the lower part of the horizontal pipeline.	
If the pipe drop exceeds 5m, an automatic exhaust valve at the downstream of the sensor should be installed on the position to prevent damage caused by negative pressure difference lining; This installation method can prevent the liquid in the pipeline from stopping the flow, and avoid cavitation	 Air evacuation valve
A control valve and a shut-off valve should be installed downstream of the flow meter. It should not be installed at the upstream.	
It must not be installed at the pump upstream, but should be installed at the pump downstream.	

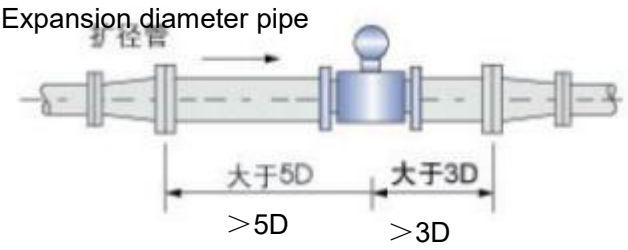
Installation	Graphics
How to install flow meter in measuring well 1. Inlet 2. Overflow pipe 3. Entrance gate 4. Cleaning holes 5. Flow meter 6. Short pipe 7. Outlet 8. Discharge port 9. Drain valve	
With a horizontally mounted flowmeter, gases mixed into the liquid may separate and collect above the measuring pipe. If there is an elbow downstream, the gas at the low level has to gather at the high level, therefore, the flow meter should be installed at the low level	
Liquid containing solids (silt, small stone particles, etc.) are prone to precipitation, the flowmeter should be installed vertically, and the fluid flows from the bottom up to meet the solid-liquid two-phase is in a mixed state	
Improper operation may cause negative pressure to build up in the high temperature fluid flowing through the meter. Negative pressure can cause the liner to peel away from the metal conduit and cause the electrode to leak. In this case, a negative pressure prevention valve should be added near the meter. If necessary, open the valve to connect to atmospheric pressure to prevent negative pressure inside the flowmeter	

There is a negative pressure area behind the valve, and the fluid contains Gas may enter the measuring pipe and affect the measurement, therefore, the valve should be installed downstream of the flowmeter.	

8.3. Straight upstream and downstream sections

The flow meter has certain requirements for the upstream and downstream straight pipe sections At the installation point, otherwise it will affect the measurement accuracy, see following details.

Installation	Graphics
Typically a minimum of 5D straight sections upstream and 3D straight sections downstream	
No straight pipe section is required after the reduction pipe	
Minimum 5D straight section upstream, minimum 3D straight section downstream after fully open gate valve	
Minimum 5D straight section upstream, minimum 3D straight section downstream after 90° elbow	
Minimum 10D straight section upstream, minimum 3D straight section downstream after the valve with different openings	

Minimum 5D straight section upstream, minimum 3D straight section downstream after the expansion pipe	

8.4. Grounding method

In order to ensure reliable grounding of the instrument, improve measurement accuracy, without interference from external parasitic potential, the sensor must have a good separate grounding with a grounding resistance less than 10Ω, the cross-sectional area of the grounding wire should be greater than 4mm2，the grounding wire must not conduct any other interfering voltage, and do not connect the grounding wire to other powered electrical equipment.

9. Mechanical structure

9.1. Structural materials

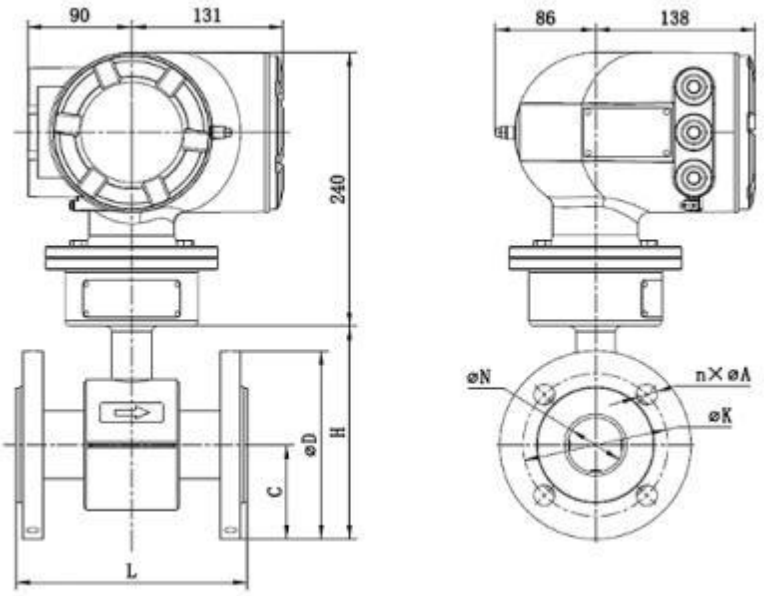
part	Material
lining	▪ Neoprene CR ▪ Polytetrafluoroethylene PTFE ▪ Fluorinated Ethylene Propylene (PFA)
Sensor housing	▪ Carbon Steel ▪ 304 Stainless Steel ▪ 316 Stainless Steel
Measuring tube	▪ 304 Stainless Steel ▪ 316 Stainless Steel
Flange	▪ Carbon Steel ▪ 304 Stainless Steel ▪ 316 Stainless Steel
Measuring electrode material	▪ 316L ▪ Tantalum (Ta) ▪ Titanium (Ti) ▪ Hastelloy C (HC) ▪ Platinum-iridium alloy

9.2. Process connection

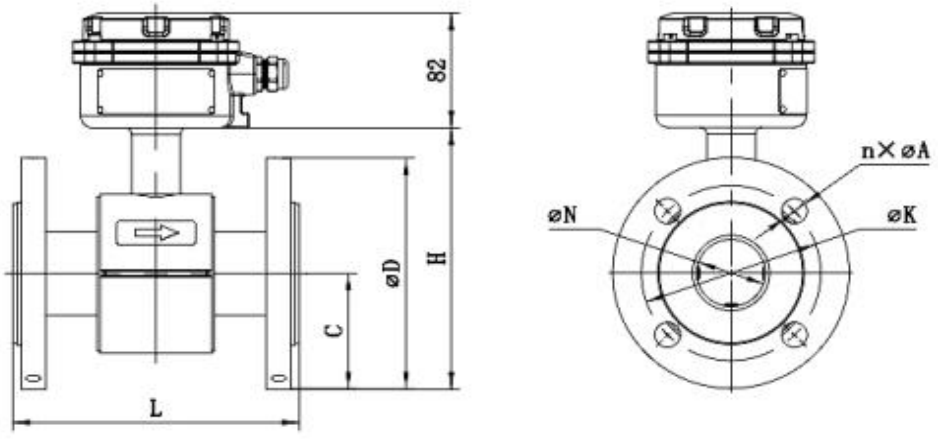
Sensor Type	Flange Type	standard
R0	PN10 RF Face flange	GB/T 9124.1-2019
R1	PN16 RF Face flange	
R2	PN25 RF Face flange	
R3	PN40 RF Face flange	
RA	ANSI Class 150 RF Flange	GB/T 9124.2-2019

9.3. Dimensions

All-in-one type:



remote type:



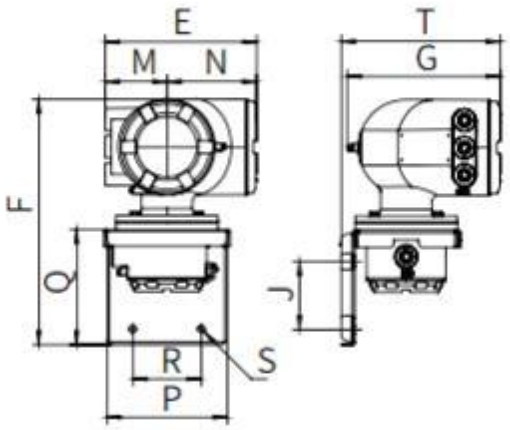
Standard type/ Installation dimension table

Nomial caliber (mm)	pressure grade	Dimensions (mm)			Inner diameter (mm)	Flange connection size (mm)			
		L	C	H	N	Flange Outer diameter D	Screw center Circle diameter K	Screw hole diameter A	Bolt quantity
15	PN10	200	47.5	140	15	95	65	14	4
	PN16	200	47.5	140	15	95	65	14	4
	PN25	200	47.5	140	15	95	65	14	4
	PN40	200	47.5	140	15	95	65	14	4
	Class150	200	45	137	15	90	60.3	16	4
20	PN10	200	52.5	145	20	105	75	14	4
	PN16	200	52.5	145	20	105	75	14	4
	PN25	200	52.5	145	20	105	75	14	4
	PN40	200	52.5	145	20	105	75	14	4
	Class150	200	50	142	20	100	69.9	16	4
25	PN10	200	57.5	150	23	115	85	14	4
	PN16	200	57.5	150	23	115	85	14	4
	PN25	200	57.5	150	23	115	85	14	4
	PN40	200	57.5	150	23	115	85	14	4
	Class150	200	55	147	23	110	79.4	16	4
32	PN16	200	70	162	30	140	100	18	4
	PN25	200	70	162	30	140	100	18	4
	PN40	200	70	162	30	140	100	18	4
	Class150	200	57.5	149.5	30	115	88.9	16	4
40	PN10	200	75	180	39	150	110	18	4
	PN16	200	75	180	39	150	110	18	4
	PN25	200	75	180	39	150	110	18	4
	PN40	200	75	180	39	150	110	18	4
	Class150	200	62.5	167	39	125	98.4	16	4
50	PN10	200	82.5	187	48	165	125	18	4
	PN16	200	82.5	187	48	165	125	18	4
	PN25	200	82.5	187	48	165	125	18	4
	PN40	200	82.5	187	48	165	125	18	4
	Class150	200	75	179	48	150	120.7	18	4
	PN10	200	92.5	210	64	185	145	18	8
	PN16	200	92.5	210	64	185	145	18	8

65	PN25	200	92.5	210	64	185	145	18	8
	PN40	200	92.5	210	64	185	145	18	8
	Class150	200	90	207.5	64	180	139.7	18	4
80	PN10	200	100	223	77	200	160	18	8
	PN16	200	100	223	77	200	160	18	8
	PN25	200	100	223	77	200	160	18	8
	PN40	200	100	223	77	200	160	18	8
	Class150	200	95	218	77	190	152.4	18	4

100	PN10	250	110	240	100	220	180	18	8
	PN16	250	110	240	100	220	180	18	8
	Class150	250	115	245	100	230	190.5	18	8
125	PN10	250	125	270	126	250	210	18	8
	PN16	250	125	270	126	250	210	18	8
	Class150	250	127.5	272	126	255	215.9	22	8
150	PN10	300	142.5	303	156	285	240	22	8
	PN16	300	142.5	303	156	285	240	22	8
	Class150	300	140	300	156	280	241.3	22	8
200	PN10	350	170	365	207	340	295	22	8
	PN16	350	170	365	207	340	295	22	12
	Class150	350	172.5	367.5	207	345	298.5	22	8
250	PN10	450	202.5	425	260	395	350	22	12
	PN16	450	202.5	425	260	405	355	26	12
	Class150	450	202.5	425	260	405	362	26	12
300	PN10	500	230	480	314	445	400	22	12
	PN16	500	230	480	314	460	410	26	12
	Class150	500	242.5	493	314	485	431.8	26	12
350	PN10	550	252.5	525	350	505	460	22	16
	PN16	550	260	533	350	520	470	26	16
	Class150	550	267.5	540	350	580	510	36	16
400	PN10	600	282.5	587	400	565	515	26	16
	PN16	600	290	594	400	580	525	30	16
	Class150	600	297.5	601.5	400	595	539.8	30	16
450	PN10	600	307.5	639	455	615	565	26	20
	PN16	600	320	651	455	640	585	30	20
	Class150	600	317.5	648.5	455	635	577.9	33	16
500	PN10	600	335	691	500	670	620	26	20
	PN16	600	357.5	714	500	715	650	33	20
	Class150	600	350	706	500	700	635	33	20
600	PN10	600	390	796	601	780	725	30	20
	PN16	600	420	826	601	840	770	33	20
	Class150	600	407.5	814	601	815	749.3	36	20

Remote transmitter mounting dimensions:



Remote transmitter size information:

Remote transmitter dimensions										
E	M	N	F	G	R	J	S	P	Q	T
221	90	131	359	225	100	100	10.5	176	169	233

9.4. Weight

Flange type electromagnetic flowmeter. With the following weights:

Nominal diameter (mm)	Pressure level	weight (kg)
15	PN10	8.9
	PN16	8.9
	PN25	8.9
	PN40	8.9
	Class150	8.6
20	PN10	9.6
	PN16	9.6
	PN25	9.6
	PN40	9.6
	Class150	9.1
25	PN10	10
	PN16	10
	PN25	10
	PN40	10
	Class150	9.6

25	PN10	10
	PN16	10
	PN25	10
	PN40	10
	Class150	9.6
32	PN16	11.5
	PN25	11.5
	PN40	11.5
	Class150	10
40	PN10	12.5
	PN16	12.5
	PN25	12.5
	PN40	12.5
	Class150	11.1
50	PN10	14
	PN16	14
	PN25	14.3
	PN40	14.3
	Class150	13.1
65	PN10	15.5
	PN16	15.5
	PN25	16.1
	PN40	16.1
	Class150	16.1
80	PN10	16.7
	PN16	16.7
	PN25	18.2
	PN40	18.2
	Class150	17.5
100	PN10	20
	PN16	20
	Class150	22.2
125	PN10	23.3
	PN16	23.3
	Class150	24.8
150	PN10	29.2
	PN16	29.2
	Class150	29.6
200	PN10	38.4
	PN16	39.4
	Class150	43.6
250	PN10	52
	PN16	56
	Class150	58

300	PN10	70
	PN16	80
	Class150	90
350	PN10	100
	PN16	114
	Class150	121
400	PN10	127
	PN16	143
	Class150	149
450	PN10	145
	PN16	168
	Class150	161
500	PN10	170
	PN16	217
	Class150	198
600	PN10	211
	PN16	295
	Class150	254

10. Ordering Information

10.1. Selection of electrode material

Electrode material should be selected according to the corrosiveness of the fluid, as shown in the following table.

Material	Corrosion resistance
316L	Applicable: 1. Domestic water, industrial water, raw well water, urban sewage; 2. Weakly corrosive acid, alkali and salt solutions.
Hastelloy C (HC)	Applicable: 1. Mixed acids such as mixed solution of chromic acid and sulfuric acid; 2. Oxidizing salts such as Fe 3+ , Cu 2+ , and seawater; Not applicable: Hydrochloric acid
Titanium (Ti)	Applicable: 1. Salts, such as chlorides (chloride/magnesium/aluminum/calcium/ammonium/iron, etc.), sodium salts, potassium salts, hypochlorites, seawater; 2. Potassium hydroxide, ammonium hydroxide, and barium hydroxide solutions with a concentration less than 50%; Not applicable: reducing acids such as hydrochloric acid, sulfuric acid, phosphoric acid, and hydrofluoric acid.
Tantalum (Ta)	Applicable: 1. Hydrochloric acid (concentration less than 40%), dilute sulfuric acid and concentrated sulfuric acid (excluding fuming sulfuric acid); 2. Chlorine dioxide, ferric chloride, hypochlorous acid, sodium cyanide, lead acetate, etc.; 3. Oxidizing acids such as nitric acid (including fuming nitric acid), aqua regia at a temperature

	below 80℃. Does not apply: alkali, hydrofluoric acid.
Platinum-iridium alloy	Can cover almost all chemical liquids, not suitable for aqua regia and ammonium salts

10.2. Selection of lining material

The selection should be made based on the corrosiveness, abrasiveness, hygiene requirements. As well asoperating temperature of the measured medium, as shown in the following table.

Lining material	Capability	Operating temperature	Applicable medium
Neoprene	1. Excellent elasticity, high tearing force and good impact resistance; 2. Resistant to corrosion from general low-concentration acid, alkali, salt and other media, but not resistant to corrosion from oxidizing media.	-25℃~ 60℃	Water, sewage, mud, mineral Slurry and other media
PTFE	1. Chemically stable, resistant to boiling hydrochloric acid, sulfuric acid, nitric acid, aqua regia, strong alkali and a variety of organic solvents. Not resistant to molten alkali metals (or its ammonia solution) and High temperature fluorine or chlorine trifluoride; 2. Poor abrasion resistance and adhesion.	-40℃~ 130℃	Strongly corrosive media such as acid, alkali and salt solutions ~~Sexual medium~~
PFA	1.1. PFA material strength, aging resistance and temperature resistance are better than PTFE; 2. Good adhesion with metal and better abrasion resistance than PTFE.	-20℃~ 180℃	Hydrochloric acid, sulfuric acid, aqua regia; Most other strong acids and bases and strong oxidizers

10.3. Precautions for use

Necessary conditions to ensure the normal operation and measurement accuracy of electromagnetic flowmeter:

1) The measured fluid medium must be electrically conductive With measurable minimum conductivity ≥ 5μs/cm;

2) The measured fluid medium must fill the measuring pipe to ensure measurement accuracy;

3) The flowmeter measurement system must be well grounded to ensure normal and reliable operation;

4) The flow meter should meet the requirements of the straight pipe length upstream and downstream to ensure the accuracy and stability of the measurement;

5) Avoid strong electromagnetic field interference near the flow meter.

10.4. Recommended flow rates

Recommended flow rates for electromagnetic flowmeters:

1) Considering the accuracy, affordability and durability, the recommended flow rate range is 1 ~ 5m/s Within this range, the flow meter has high measurement accuracy and good linearity. The power loss is small, and the fluid medium causes less wear on the flow meter lining and electrodes.

2) Recommended flow rate range for fluids containing solid particles is between 1 ~ 3m/s. This selection helps to avoid excessive wear and tear of the flowmeter's liner and electrodes by suspended solids caused by high flow velocities.

3) For fluids in pipes likely of causing deposits, the recommended flow rate range is between 2 ~ 5m/s. Higher flow rates make it easier to remove excess sediments. Mounting the meter (or flowmeter) vertically makes it easier to remove excessive sediments.

10.5. Selection table

model	Code	illustrate
TEF		Electromagnetic flowmeter
caliber	015	DN15
	020	DN20
	025	DN25
	032	DN32
	040	DN40
	050	DN50
	065	DN65
	080	DN80
	100	DN100
	125	DN125
	150	DN150
	200	DN200
	250	DN250
	300	DN300
	350	DN350
	400	DN400
	450	DN450
	500	DN500
	600	DN600
Accuracy level	1	Level 0.5
Process connection	R0	PN10 RF Flange
	R1	PN16 RF Flange
	R2	PN25 RF Flange
	R3	PN40 RF flange
	RA	ANSI Class 150 RF Flange
Flange material	1	Carbon Steel
	2	304 Stainless Steel
	3	316 Stainless Steel
Sensor housing material	1	Carbon Steel
	2	304 Stainless Steel
	3	316 Stainless Steel
Guide tube material	1	304 Stainless Steel
	2	316 Stainless Steel
Lining material	A	Neoprene
	B	PTFE (medium temperature -40~130℃)
	C	PFA (medium temperature -20~150℃)
	D	High temperature type PFA (medium temperature -20~180℃)
Electrode material	1	Stainless steel 316L
	2	Hastelloy HC
	3	titanium
	4	Tantalum
	5	Platinum Iridium
Grounding Type	1	Grounding Ring
	2	Ground electrode
enter	0	none

Output	1	4mA~20mA +HART+ frequency +RS485
power supply	A	AC220V
	D	DC24V
Transmitter	1	Integrated, aluminum alloy
	2	remote type, made of aluminum alloy
Explosion-proof and protection level	d1	EX db eb ib IIC T1...T 6 Gb IP66/IP67
	d2	Ex db eb ib IIC T1...T6 Gb IP68 (remote type only)
Electrical interface	N	ANSI 1/2NPT
	M	ISO M20*1.5
Nameplate	0	According to factory standard nameplate
	1	Custom Tag
	2	Stainless steel number plate
SIL2	Null Value	none
	S	have
Stress Testing	Null Value	none
	P	have
Material certificate	Null Value	none
	M	have
Cable length	L	remote cable length (unit: meter) 05/10/15/20

Version number: V01-20250401

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