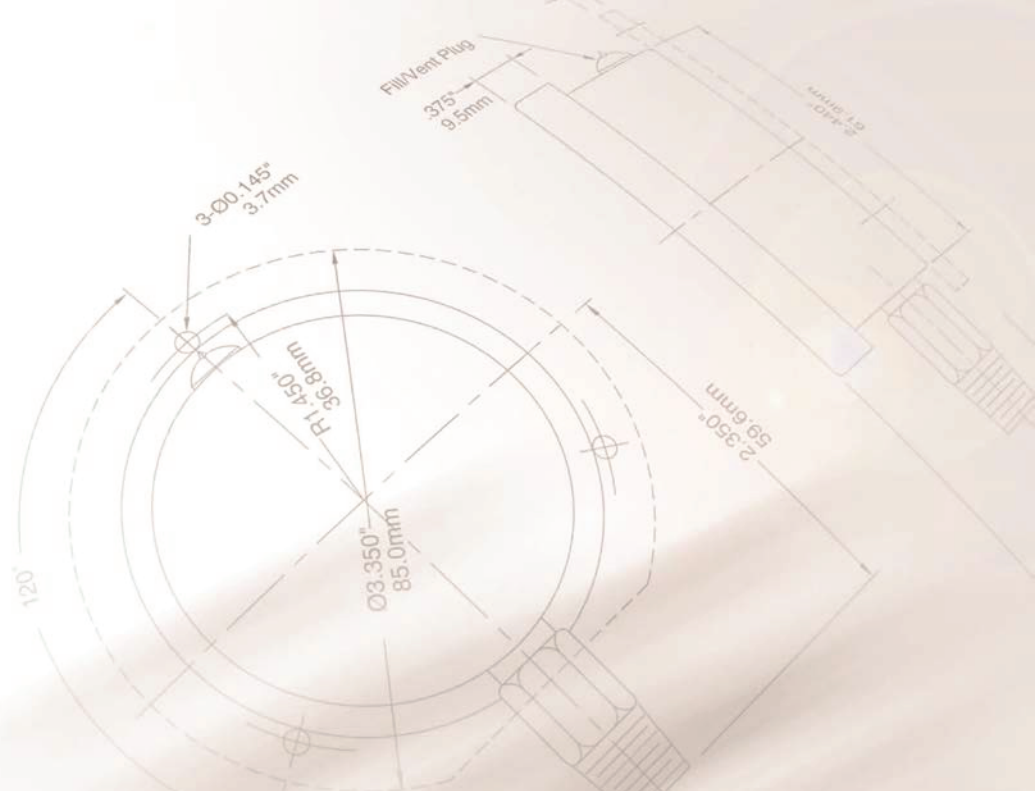


WINTERS



We're There.



ELECTROMAGNETIC FLOWMETER



www.winters.com
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WINTERS INSTRUMENTS
MANUFACTURER OF INDUSTRIAL INSTRUMENTATION



Why Winters?

We're There.

Global. Operating from 10 worldwide offices in Toronto, Calgary, Buffalo, Houston, Dubai, Shanghai, Montevideo and Buenos Aires, Winters works closely with a vast network of distribution partners in over 90 countries to ensure that customers receive the instrumentation they require. This also allows Winters to provide local support to ensure our customers are individually serviced in the markets they operate in.

Cover All Markets. We work with customers in industries such as fluid power, wastewater, pharmaceutical, petrochemical, oil and gas, process control, HVAC, power generation, plumbing, food and beverage, agriculture, pulp and paper, and many others. In addition, many of Winters' products are manufactured, tested and certified in accordance to globally recognized third party agency requirements (3A, CSA, CRN, CE, Ex, FM, UL, NACE, RoHS).

High Field Support. Winters maintains field located regional sales managers who provide on-site visits and product support to distributors, end users and OEMs. Our customer service team is well trained in order management and can also provide telephone support on technical challenges. In addition to our world class customer service, Winters conducts training programs every quarter to provide our distribution partners with comprehensive sales tools and keep them up-to-date on new developments in instrumentation.



LMF11
General Applications



LMF11B
Battery Operated



LMF12
Heat Meter (BTU)



LMF13
Sanitary Type



LMF14
Insertion Type



LMF14B
Insertion Type
Battery Operated

Products Performance & Features

- Modular functional design, practically for a variety of applications.
- No moving parts in the tube, No wear and tear.
- Easy to choose, easy to install, Maintenance-free and very low operating costs.
- High corrosive resistance; solid and reliable.
- Up to 400: 1 turndown ratio
- Easily achieve the positive cumulative flow, Reverse Cumulative and Difference Calculation.
- Built-in reference electrode, fully guarantee the stability of measurement.
- A variety of IP protection and installation methods, can be install for continuous immersion in water.
- Adopt EEPROM memory to measure operation data, safe and reliable protection of memory.

Applications

- Environmental protection and water treatment.
- Municipal water supply.
- Water distribution network monitoring, Utilities, Waterworks.
- Water supply, District heating/cooling water.
- Waste water & Sewage water applications.
- HVAC Industry
- Food & Beverage and Pharmaceutical.
- Oil & Gas/ Petrochemical
- Fine Chemical

Product Description

LMF series of electromagnetic flowmeter SMD devices and surface mount (SMT) technology, circuit reliability, low power consumption, and the use of 32-bit embedded microprocessor, fast computing, high precision, low frequency rectangular wave excitation, The stability of the measurement. All digital processing, anti-interference ability, reliable measurement, high precision.

Ultra-low power EMI switching power supply, the use of a wide range of power supply voltage changes, EMC performance. Built-in three integrators, respectively, for positive cumulative, inverse cumulative and the difference calculation. With the average flow of automatic computing function, easy to calibrate the instrument.

At the same time also has a small signal cut off the function, the user can set the lower limit of the display panel and the lower limit of the flow, thus removing the interference of small signal flow. In order to enhance the safety, the flow meter is also equipped with a password latch function. After power meter, if you need to set parameters, you must enter the advanced password to set the parameters to prevent unauthorized personnel to change the instrument parameters.

Even if incident suddenly power failure, the flow meter operation results and user settings will not disappear, EEPROM can protect the set parameters and cumulative value.

Classification of Products

LMF series smart electromagnetic flow meters consist of sensor and smart signal transducer. And it can be classified into two structures--- integral type and remote type according to the set-up form of the sensor and transducer. In terms of integral type electromagnetic flow meters, transducer and sensor directly assembles as a full ball type and can not be dissociated.

External power supply and Battery operated type is available as following model.

Working principle

The metering system of the electromagnetic flow meter primary is based on Faraday's laws of electromagnetic induction, on the channel border which is vertical each other with metering tube axis and line of magnetic field mount one pair detecting electrode, when the conductive liquid move along the metering tube axis the conductive liquid cutting the line of magnetic field induce the inductive E.M.F. This EMF detect out by two electrodes on the metering tube, numerical value size is:

$$E = KBVD$$

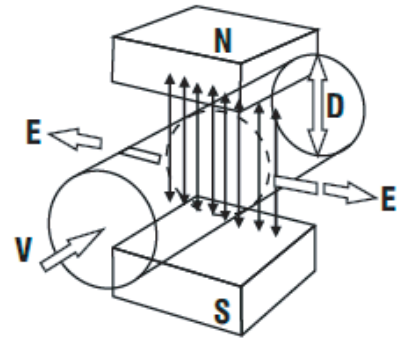
Here: E - inductive EMF;

K - instrument constant;

B - magnetic induction

V - average flow velocity in metering tube section;

D - metering tube inner diameter;



When measuring flow rate, the fluid flow through magnetic field vertical to flow direction, the conductive liquid movement induce one EMF in direct proportion to average flow velocity, so that require measured flow liquid conductivity higher than lowest limit. It's induction voltage signal is detected by two electrodes, and pass through a cable transmit to converter, after through signal treatment and correlative operation, take the integrating flow and the instantaneous delivery indicate on the display screen of the converter.

The sensed signal voltage is converted into the indexing, analogue, and digital output signals in the converter.

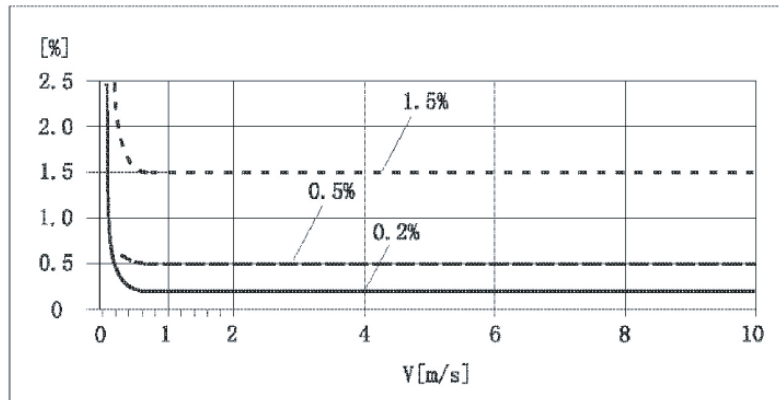
Technical Parameters

1. Normal working conditions

Ambient temperature	:	-25 - 60 ° C
Relative humidity	:	5% to 90%
Power supply	:	Single-phase AC power supply (85 ~ 250) V/ (45 ~ 63) Hz DC power supply 16VDC ~ 36VDC
Power consumption	:	less than 20W

2. Measurement accuracy

LMF11/LMF11B: $\pm 0.2\%, 0.5\%$; LMF12: $\pm 0.5\%$; LMF13: $\pm 0.5\%$; LMF14/LMF14B: $\pm 1.5\%$



3. Output variables

3.1 Analog current output

- Load resistance : (0-10) mA, (0 -1.5) k Ω ,
(4-20) mA, (0-750) Ω .
- Basic error : 0.1% $\pm 10\mu$ A,

3.2 Digital frequency output

- Frequency output range : (1 ~ 5000) Hz
- Output Electrical Isolation : Opto-isolated, isolated voltage > 1000V
- Frequency output drive : FET output, the maximum withstand voltage 36VDC, the maximum load current of 250mA

3.3 Digital pulse output

- Output pulse range: (0-100) pulse / sec <higher than the upper elbow, will lose pulse>
- Output pulse equivalent: (0.001-1.000) m³ / cp,
(0.001-1.000) LTR /cp,
(0.001-1.000) USG /cp,
(0.001-1.000) UKG /cp ;
- Output pulse width : User software settings;
- Output Electrical Isolation : Opto-isolated, isolated voltage > 1000V
- Pulse output drive : FET output, the maximum withstand voltage 36VDC, the maximum load current of 250mA

3.4 Alarm output

- Alarm output contact : ALMH - upper limit alarm: ALML - lower limit alarm
- Output Electrical Isolation : Opto-isolated, isolated voltage > 1000V
- Alarm output drive : transistor output, the maximum withstand voltage of 36V, the maximum load current of 250mA

3.5 Digital communication interface and communication protocol:

- MODBUS interface
- RTU format
- Physical interface RS-485
- Electrical isolation 1000V
- HART interface: support standard HART protocol, configure the HART Communicator, can display the measured value online, and modify the instrument parameters

SPECIFICATIONS			
	LMF11	LMF11B	LMF12
Type	General Type	General Type (Battery Operated)	Heat Meter (BTU)
Accuracy	±0.2% , ±0.5%		±0.5%
Repeatability	±0.06% , ±0.16%		
Medium temperature	-25 ~ 200°C		
Conductivity	≥ 5 μS / cm (softening water) ≥ 20 μS / cm)		
Calibration range	3-2000mm	25-1200mm	3-2000mm
Operating Pressure	0.6MPa / 1.0MPa / 1.6MPa / 2.5MPa / 4.0MPa / on request		
	Class 150 / Class 300		
Flowrate	0.5 ~ 1.0 m/s		
Flow direction	Forward / Reverse		
Lining material	Hard rubber		
	PTFE		
	F46/ PFA		
Electrode material	SS316L		
	Hastelloy B/ Hastelloy C/ Titanium/ Tantalum/ Platinum Iridium/ Tungsten carbide		
Number of electrodes	4	3	4
Flange material	Carbon steel		
	SS304/ SS316/ SS316L		
Installation method	Flange Type / Wafer type (without flange)		
Protection class	IP 65 IP 67 IP 68 (Remote type only)	IP 68	IP 65 IP 67 IP 68 (Remote type only)
Power supply	230 VAC / 24 VDC	Build-in lithium battery/ 12V ~ 24V DC	
Output	4-20mA + pulse	N/A	4-20mA
Communication	HART / Modbus / Profibus	RS485 / GPRS / CMDA	Modbus
Sensor type	Integrated / Remote		Remote
Ambient	Ambient Temperature -25 ~ 60°C, Humidity 5% to 90%		

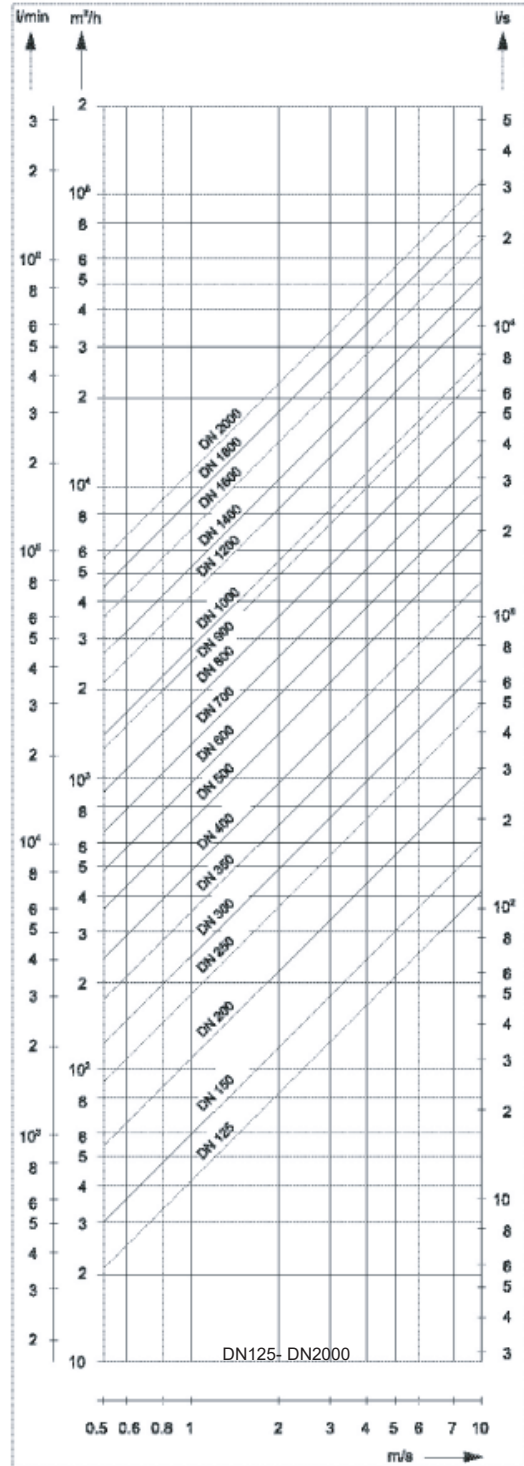
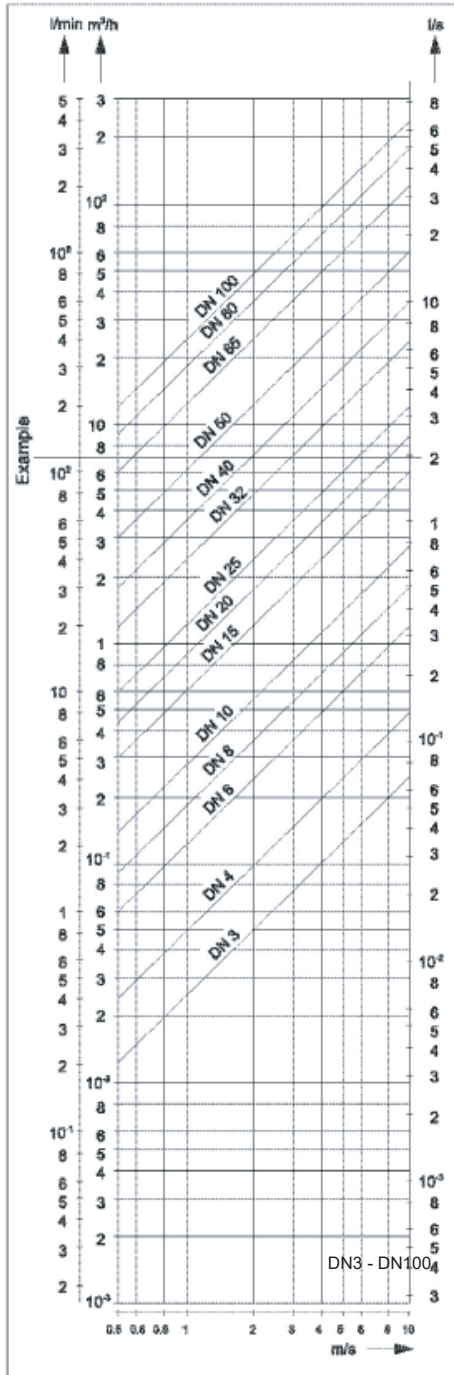
Flowmeter nominal size, pressure and flow range

The instantaneous volume flow is a function of the flow rate and the sensor aperture. The instantaneous flow bar graph shows the flow range that each flow meter can measure, and gives several sensor specifications suitable for measuring a given flow rate.

Size DN	Pressure MPa	Min. flowrate 0.5m/s	Max. flowrate 1.0m/s
3	4.0	0.2 l/min	4 l/min
4	4.0	0.4 l/min	8 l/min
6	4.0	1.0 l/min	20 l/min
8	4.0	1.5 l/min	30 l/min
10	4.0	2.25 l/min	45 l/min
15	4.0	5.0 l/min	100 l/min
20	4.0	7.5 l/min	150 l/min
25	4.0	10 l/min	200 l/min
32	4.0	20 l/min	400 l/min
40	4.0	30 l/min	600 l/min
50	4.0	3 m ³ /h	60 m ³ /h
65	4.0	6 m ³ /h	120 m ³ /h
80	4.0	9 m ³ /h	180 m ³ /h
100	1.6	12 m ³ /h	240 m ³ /h
125	1.6	21 m ³ /h	420 m ³ /h
150	1.6	30 m ³ /h	600 m ³ /h
200	1.6	54 m ³ /h	1080 m ³ /h
250	1.6	90 m ³ /h	1800 m ³ /h
300	1.6	120 m ³ /h	2400 m ³ /h
350	1.6	165 m ³ /h	3300 m ³ /h
400	1.6	225 m ³ /h	4500 m ³ /h
450	1.0	286 m ³ /h	5700 m ³ /h
500	1.0	330 m ³ /h	6600 m ³ /h
600	1.0	480 m ³ /h	9600 m ³ /h
700	1.0	660 m ³ /h	13200 m ³ /h
800	1.0	900 m ³ /h	18000 m ³ /h
900	1.0	1200 m ³ /h	24000 m ³ /h
1000	1.0	1350 m ³ /h	27000 m ³ /h
1200	0.6	2100 m ³ /h	42000 m ³ /h
1400	0.6	2700 m ³ /h	54000 m ³ /h
1600	0.6	3600 m ³ /h	72000 m ³ /h
1800	0.6	4500 m ³ /h	90000 m ³ /h
2000	0.6	5700 m ³ /h	114000 m ³ /h

The instantaneous flow of the electromagnetic flowmeter

example:
 Instantaneous flow rate + 7m³ / h (maximum value is the upper limit of the range). When the flow rate is between 0.5 and 10 m / s, the applicable sensor diameter [DN20-DN65].



Selection of Electrode Material(s)

The material of the electrode is selected according to the corrosiveness of the fluid to be measured.

Material	Corrosion resistance
SS 316L	<ol style="list-style-type: none"> Domestic water, industrial water, raw water, urban water Dilute acid, dilute alkali and other weak corrosive, alkaline salt solution
Hastelloy B	<ol style="list-style-type: none"> Hydrochloric acid <(less than 10% concentration) and other non - oxidizing acid Uranium hydroxide (concentration less than 50%) of all concentrations of ammonium hydroxide alkaline solution. Phosphoric acid, organic acids <p>*Not applicable: nitric acid</p>
Hastelloy C	<ol style="list-style-type: none"> A mixed solution of a mixed acid such as chromic acid and sulfuric acid Oxidizing salts such as Fe ⁺⁺⁺, Cu ⁺⁺, seawater <p>*Not applicable: hydrochloric acid</p>
Titanium	<ol style="list-style-type: none"> Salt, such as <ol style="list-style-type: none"> chloride (oxide / magnesium / aluminum / calcium / plating / iron, etc.) Sodium salt, ammonium salt, hypochlorite, sea water Concentration of less than 50% potassium hydroxide, ammonium hydroxide, barium hydroxide alkaline solution <p>*Not applicable: hydrochloric acid, sulfuric acid, phosphoric acid, hydrofluoric acid and other reducing acids</p>
Tantalum	<ol style="list-style-type: none"> Hydrochloric acid (concentration less than 40%), dilute sulfuric acid and concentrated sulfuric acid (not including fuming sulfuric acid) Chlorine dioxide, ferric chloride, hypochlorous acid, sodium cyanide, lead acetate, etc. Nitric acid (including fuming nitric acid) and other oxidizing acid, the temperature below 80 °C of aqua regia <p>*Not applicable: Alkaline, hydrofluoric acid</p>
Platinum (Pt)	<ol style="list-style-type: none"> Applicable: almost all acid, alkali, salt solution <(including fuming sulfuric acid, fuming nitric acid) <p>*Not applicable: aqua regia, ammonium salt</p>
Tungsten carbide	<ol style="list-style-type: none"> Applicable: pulp, sewage, can interfere with solid particles <p>*Not applicable: inorganic acid, organic acid, chloride</p>

Selection of Lining Material(s)

Should be based on the corrosion of the measured medium, wear and temperature to choose. Hard / soft rubber can be resistant to the general weak acid, alkali corrosion, temperature 65 °C, soft rubber wear resistance, PTFE (PTFE) almost resistant to heat acid other than strong acid, alkali corrosion, medium temperature up to 130 °C, but not wear and tear. Polyurethane rubber has good wear resistance, but not acid, alkali corrosion, temperature resistance is also poor, the medium temperature is less than 65 °C.

Lining material	The main function	Applicable scope
Hard rubber	<ul style="list-style-type: none"> Can be resistant to hydrochloric acid at room temperature, acetic acid, oxalic acid, ammonia, phosphoric acid and 50% sulfuric acid, sodium hydroxide, potassium hydroxide Avoid strong oxidants 	<ul style="list-style-type: none"> Below 65°C General acid, alkali, salt solution
Soft rubber	<ul style="list-style-type: none"> Have better flexibility, better wear resistance Resistance to the general low concentration of acid, alkali, salt medium corrosion 	<ul style="list-style-type: none"> Below 65 ° C Measure the general water, sewage, mud, pulp Weak acid, weak base, salt medium
Polypropylene (PP)	<ul style="list-style-type: none"> Have good insulation, physical and chemical properties, viscosity Weak vinegar, weak base, salt, oxidizer 	<ul style="list-style-type: none"> Below 90 ° C Common water, hot water, sewage and industrial wastewater
Polytetrafluoroethylene (PTFE) High temperature insulation (F46) Solubility poly tetrafluoroethylene (PFA)	<ul style="list-style-type: none"> The most stable chemical properties of plastic in a material, the ability to boil hydrochloric acid, sulfuric acid, nitric acid and aqua regia, but also resistant to alkali and a variety of organic solvents Poor wear resistance and poor adhesion 	<ul style="list-style-type: none"> -40°C to 130°C (PTFE) -40°C to 180°C (F46) -40°C to 200°C (PFA) Acid, alkali and other strong corrosive media Sanitary media

Protection Level

According to EN60529 standard, the enclosure protection class can be divided into:

- IP65** for the spray type, you can allow the faucet from any direction of the instrument water, spray pressure of 30kPa, the water is 12.5 liters / min, spray from the instrument from the distance of 3 meters.
- IP67** for the anti-flooding type, that is, the instrument can be immersed in water for a short time, the highest point should be underwater at least 150cm, duration of at least 30 minutes.
- IP68** for the diving type, should be able to work long hours in the water, the maximum depth of its penetration by the manufacturer and the user consultation.

Protection principle selection principle should be based on the above requirements and the actual conditions of the instrument selected. If the instrument below the ground, often flooded, should use IP68: If the instrument on the ground, you can use IP65.



LMF11
(General Application)



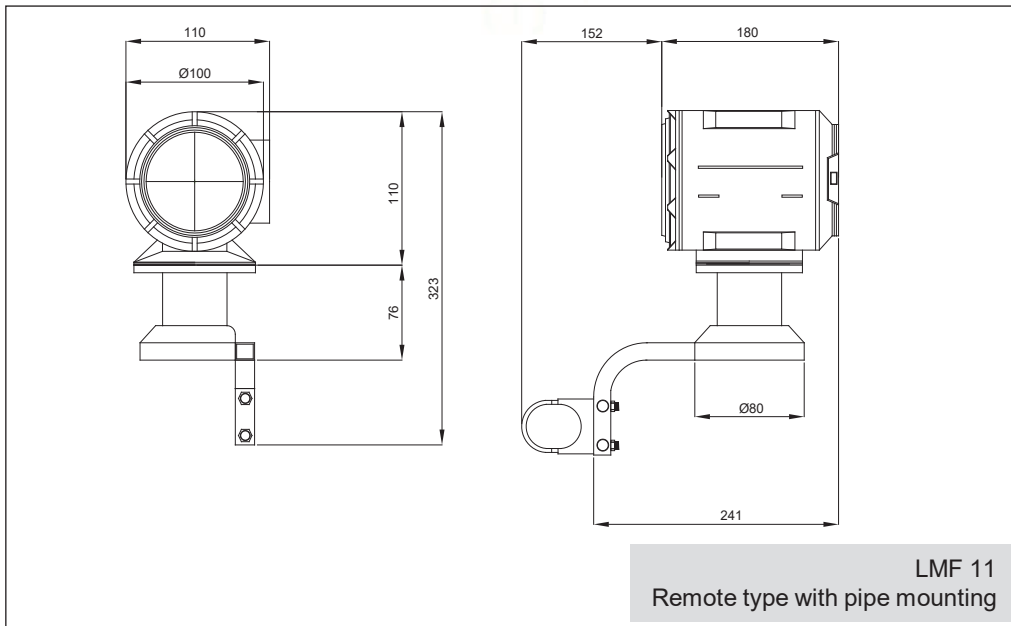
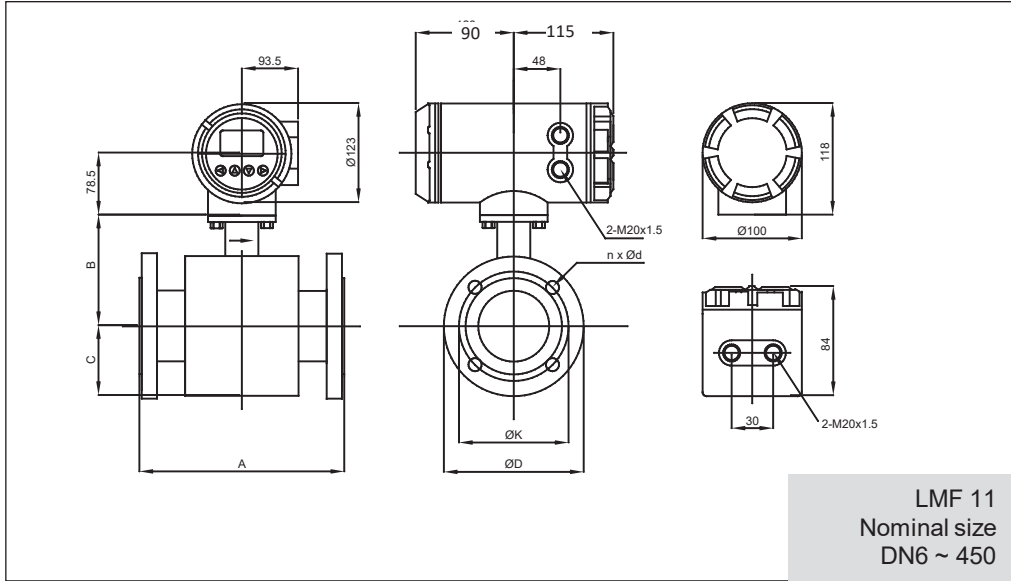
LMF11B
(Battery-operated)



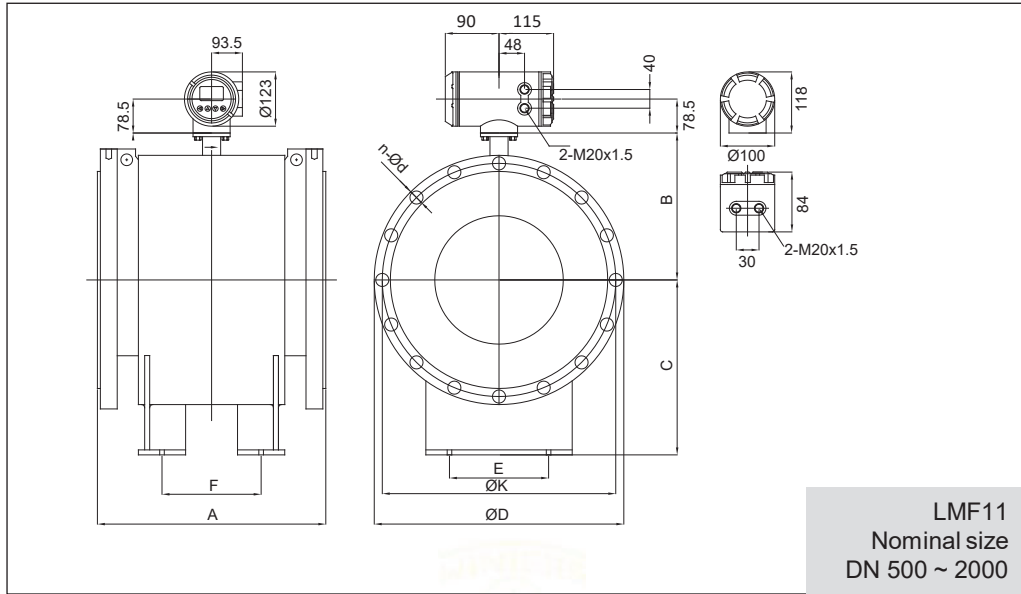
LMF12
Heat Meter (BTU)

Specification		
Model	LMF11	LMF11B
Type	General Applications	General Type (Battery Operated)
Accuracy	±0.2%, ±0.5%	
Repeatability	±0.06% , ±0.16%	
Medium temperature	-25 ~ 200°C	
Conductivity	≥ 5 μS / cm (softening water ≥ 20 μS / cm)	
Nominal size	DN6 – DN2000	DN10 – DN1200
Operating Pressure	0.6MPa / 1.0MPa / 1.6MPa / 2.5MPa / 4.0MPa / on request	
Flowrate	0.5 ~ 1.0 m/s	
Flow direction	Forward / Reverse	
Electrode material	SS316L/ Hastelloy B/ Hastelloy C/ Titanium/ Tantalum/ Platinum Iridium/ Tungsten carbide	
Lining material	Hard rubber/ PTFE/ F46/ PFA	
Number of electrodes	4	3
Measuring tube material	SS304	
Flange material	Carbon steel/ SS304/ SS316/ SS316L	
Installation method	Flange Type / Wafer type (without flange)	
Power supply	230 VAC/ 24VDC	Build-in Lithium battery (≥ 6 yrs) External lithium battery pack (≥10 yrs) 12-24 VDC external power
Battery Life (LMF11B)	Low power consumption, standard conventional lithium battery pack (3.6V) for 5 to 6 years of continuous work and optional external battery pack to achieve the maximum battery life more than 10 years, reducing flow meter after installation maintenance costs.	
Protection class	IP65 IP67 IP68 (remote type only)	IP68
Output	4-20mA /Pulse/ Frequency	N/A
Electrical connection	M20 x 1.5; 1 /2" – 14NPT	M16 x 1.5
Communication	HART / Modbus (RS485)	RS485 / GPRS / CDMA
Sensor Type	Integrated / Remote	
Language	Selectable English/ Chinese	

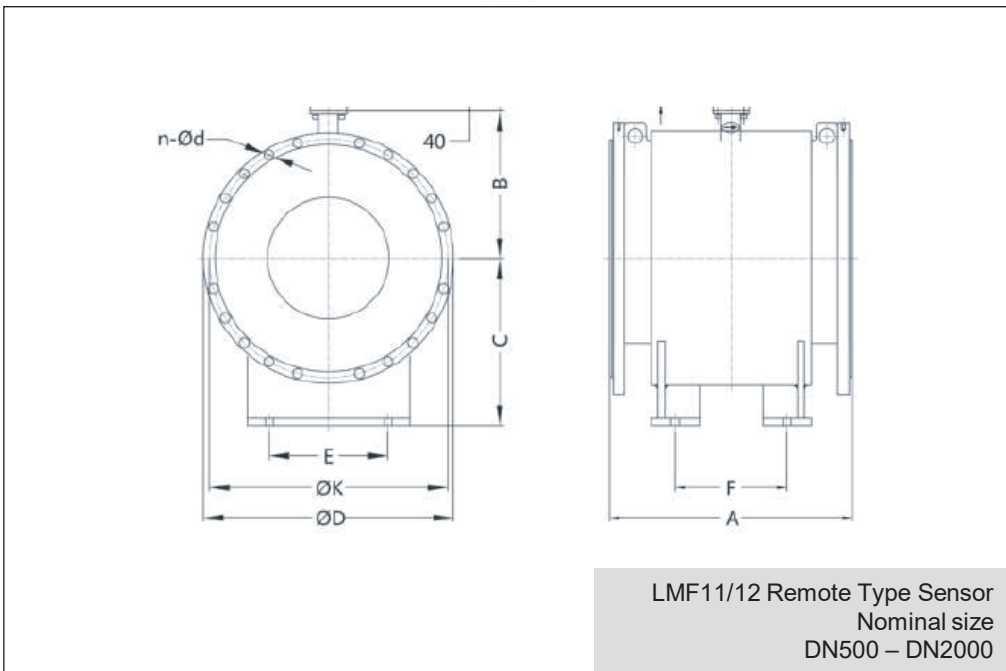
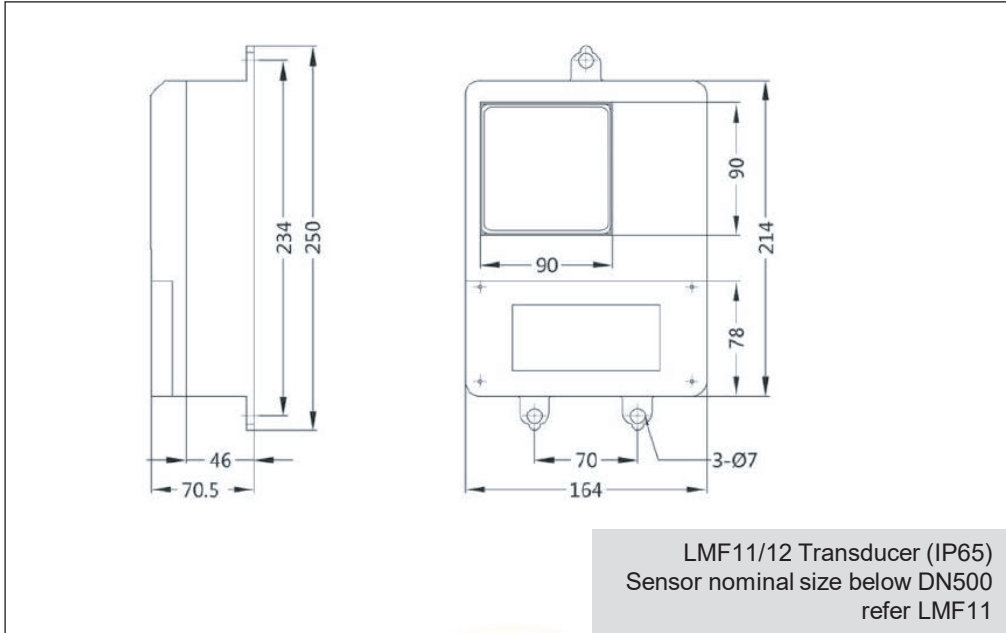
LMF11 - Dimension (mm)



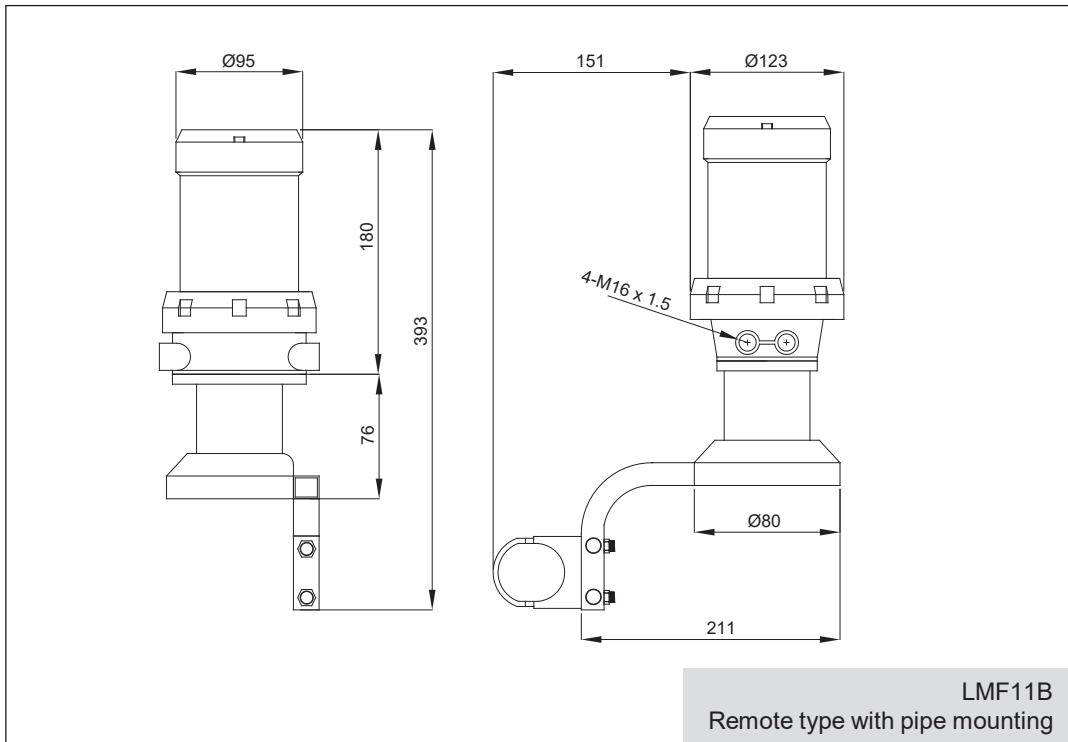
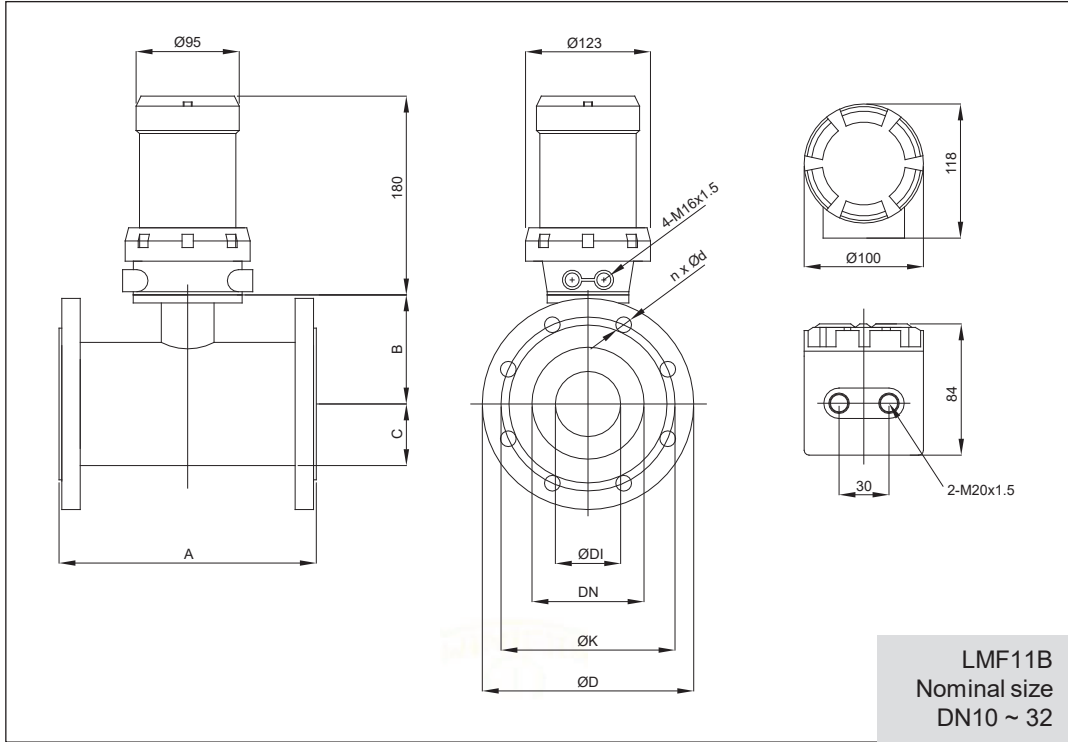
LMF11 - Dimension (mm)



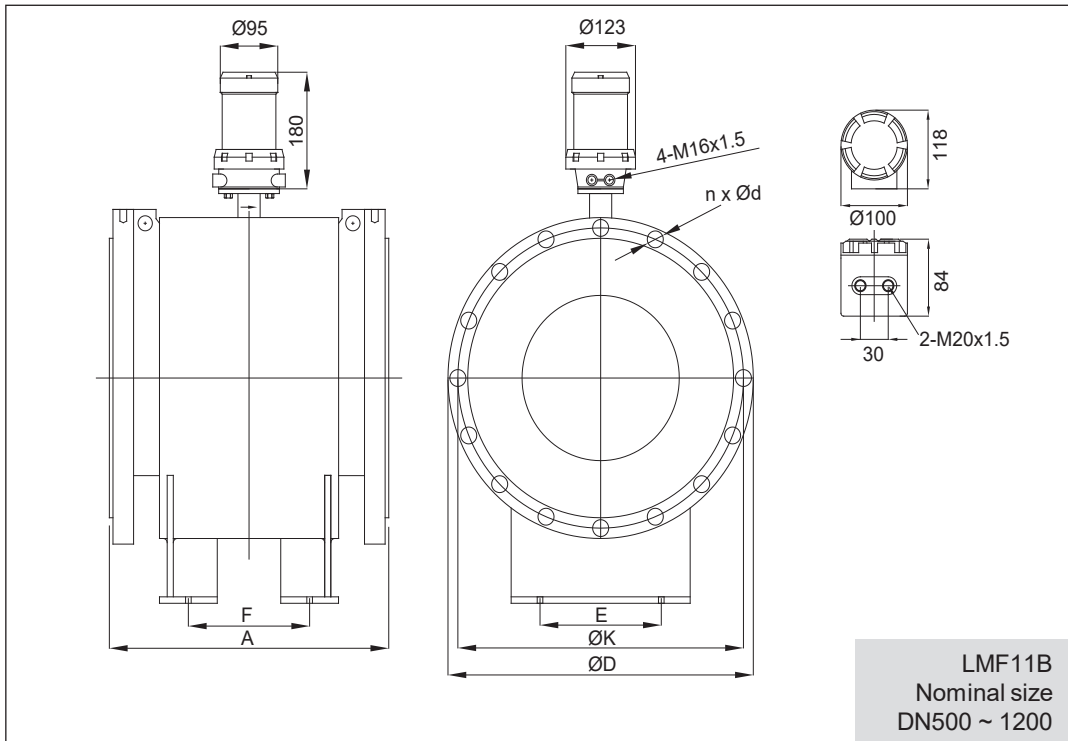
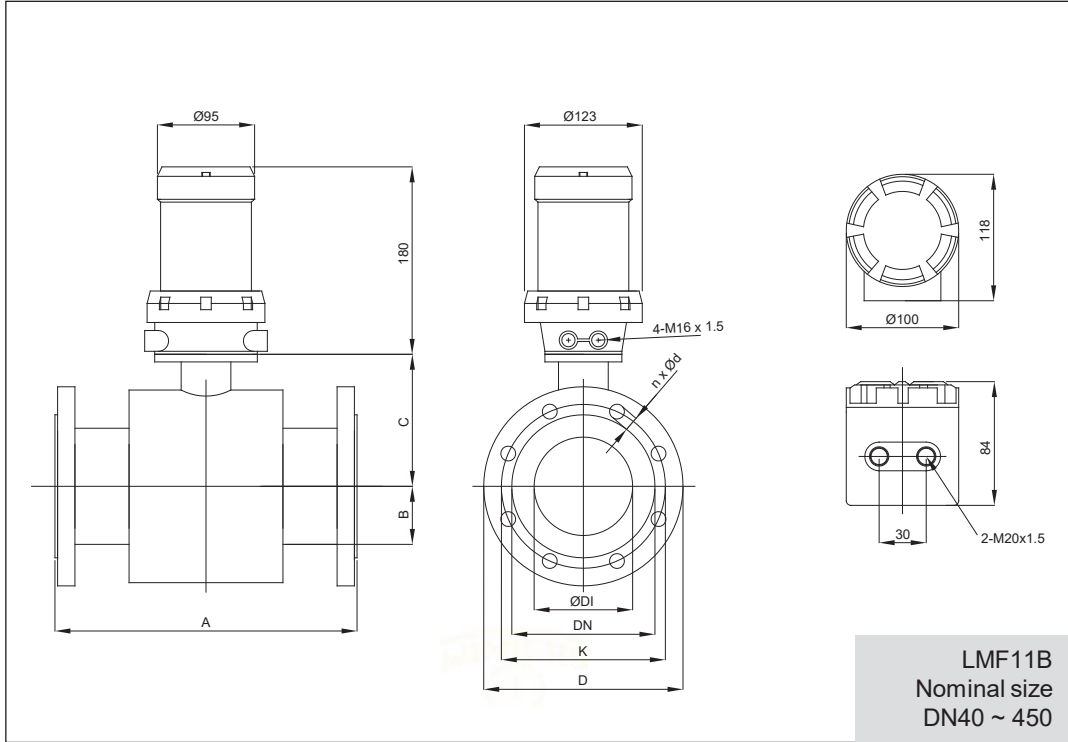
LMF11/12 - Dimension (mm)



LMF11B - Dimension (mm)



LMF11B - Dimension (mm)



LMF11 / LMF11B / LMF12 Nominal Dimension (mm)

DN	Pressure		A	B	C	E	F	Φ D	Φ K	n x Φd					
	MPa														
10	4.0	150		95	50			90	60	4 x Φ14					
15								95	65						
20								105	75						
25								100	55						
32								105	60						
40				110	65			4 x Φ18							
50				121	76										
65				197/202	130			85	8 x Φ18						
80					135			90							
100				1.6	247/252					145	100			220	180
125	161	116	245			210									
150	171	126	280			240	8 x Φ22								
200	199	154	335			295	12 x Φ26								
250	224	179	405			355	12 x Φ22								
300	249	204	440			400									
350	498/502	274	229			500	460		16 x Φ22						
400		305	260			565	515		16 x Φ26						
450	1.0	598/602				330	285				615			565	20 x Φ26
500						/600	360				403			300	
600		410	453	270	780		725	20 x Φ30							
700		/700	467	560	400	350	895	840			24 x Φ30				
800		/800	517	610		400	1010	950			24 x Φ33				
900		/900	567	660		470	1110	1050			28 x Φ33				
1000		/1000	617	712		570	1225	1160			28 x Φ36				
1200		0.6	/1200		719	814	600	710			1400	1340	32 x Φ33		
1400													/1400	819	914
1600			/1600	919	1036	800	1040	1825			1760	40 x Φ36			
1800	/1800		1021	1138	1180		2045	1970	44 x Φ39						
2000	/2000		1121	1238	1350		2265	2180	48 x Φ42						

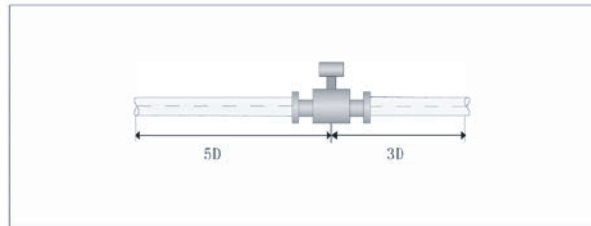
Correct Installation of Electromagnetic Flowmeter

1. Choice of Installation Place

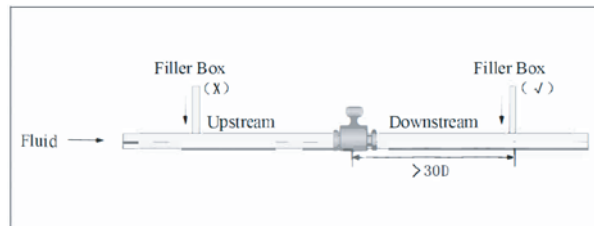
- Choosing no negative pressure in measuring tube;
- Avoiding being installed near motor, transformer, and other strong current equipment, to avoid jammer;
- Avoiding being installed near strong corrosion gas;
- Avoiding being installed in separated place, when measuring mixed fluid;
- Avoiding being under direct sunlight, ambient temperature should be $-25-60\text{ }^{\circ}\text{C}$;
- Choosing place without or less vibration, if too much vibration, fixed support should be installed before and behind the pipe;
- Choosing relative humidity is 5%-90%;
- Avoiding being installed in place which can be exposed to rain or immersed.

2. Demands of straight length: (D is the diameter of flowmeter)

Electromagnetic flowmeter has less demands for straight length forward and backward, usually as for 90° bend, T pattern three way, reducer, widely open valve, it must have 5D straight length near axis of spindle, not headface of sensor; as for different aperture valve, such as adjustable aperture valve, it must have 1 OD straight length. As for backward, it only needs 3D straight length.

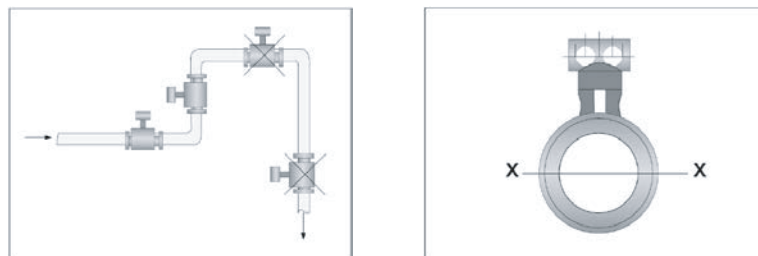


When measuring different medium of mixed fluid, distance between mixing point and flowmeter should be $>30D$, as following picture shows:



3. Installation and Direction of Flow

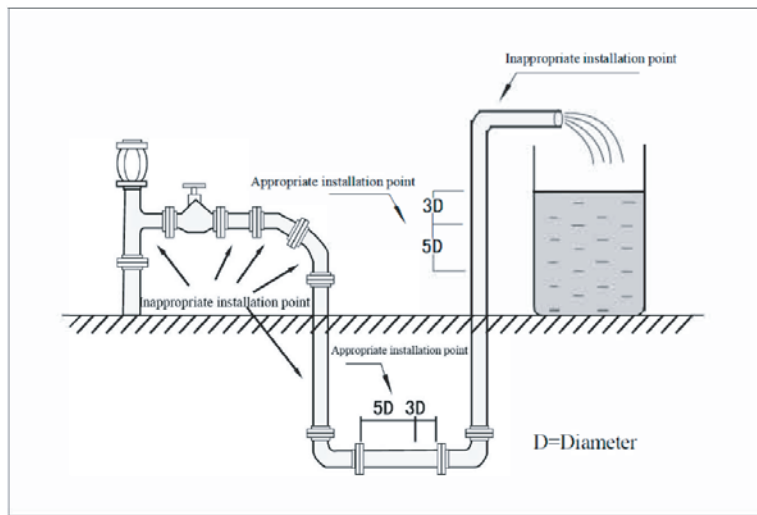
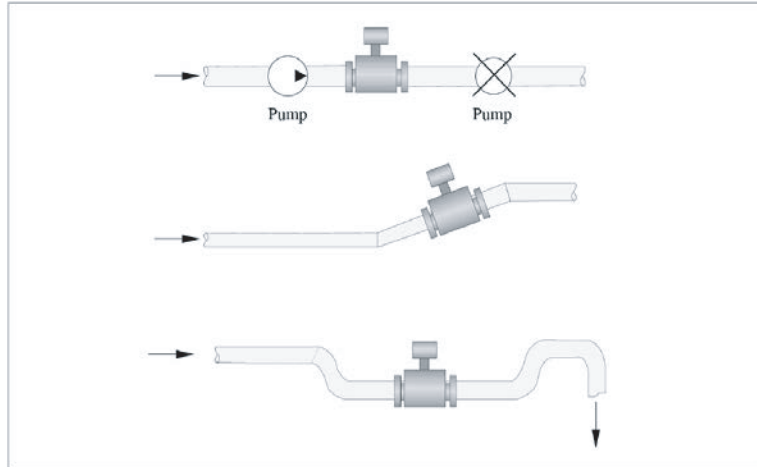
Electromagnetic flowmeter can be installed horizontal, vertical, bias to the pipe: When horizontal installation, axis of electrode should be horizontal, which prevents short insulation of electrodes due to bubble within fluid, and prevents electrodes being covered by sediment in fluid. Sensor shouldn't be installed in the highest point, to avoid gas accumulation.



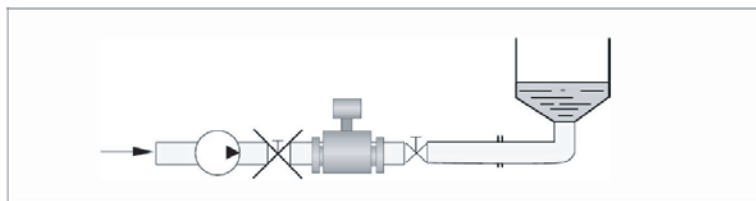
When vertical installation, direction of flow should be upward, so that when no flow or small flow, heavier solid particle in fluid will sink, and lighter material will rise to leave electrode district, when measuring solid and liquid medium, it can avoid rubbing between sediment of solid and uneven lining. As following picture shows.

Measuring pipe of sensor should be full of fluid, and have some backpressure. In order to prevent negative pressure (damaging lining), electromagnetic flowmeter can't be installed behind the pump, but before the pump; when bias installation, it must be installed in rising pipe; when installed in discharged pipe, it must be installed in lower point of pipe.

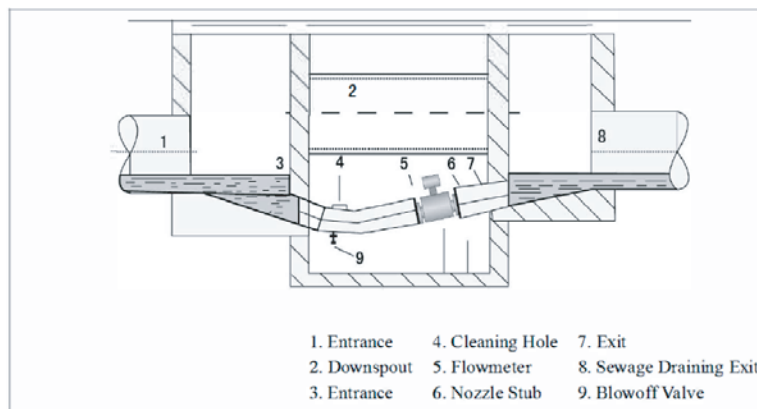
Correct Installation of Electromagnetic Flowmeter



Controlling valve and stopping valve should be installed in downstream sensor, not upstream.



Methods of installing flowmeter in measuring well





S/N: 001686

Verification of Conformity

No.: **ICR Polska/VC/HE210603**

Name and address of Applicant

WINTERS INSTRUMENTS
Suite 203, Building 8, No.471 Guiping Road, Xuhui Dist., Shanghai, China

Name and address of manufacturer:

WINTERS INSTRUMENTS
Suite 203, Building 8, No.471 Guiping Road, Xuhui Dist., Shanghai, China

Product name: Electromagnetic Flowmeter

Product types: LMF series

Product trademark: n/a

This document confirms that the product sample meets the requirements of the following standards:

- Related with Directive 2014/32/EU:
EN 1434-1:2015+A1:2018

The assessment process has been carried out in accordance with individual rules and conditions agreed with the applicant. Evaluation has been carried out in accordance with:

Test report: CE-HR20210610-WI-1
Tests conducted by: WINTERS INSTRUMENTS

Issue date: 11.06.2021
Expiration date: 10.06.2026

Remarks

This Verification of conformity refers to the above mentioned product and its conformity in regards of above mentioned standard(s) was proven on test sample.

This Verification of conformity was issued on voluntary basis and does not imply meeting all essential requirements, assessment of the series-production or any other restricted Notified Bodies conformity assessment procedure appropriate for the product.



marking remarks:
mark is not sanctioned by the following verification of conformity mark given here as reference, can be only use by the manufacturer after applying all essential requirements from relevant directives

document status can be checked: <https://cert.icrpolska.com/>



Director: Rafał Kalinowski
Warsaw, 11.06.2021

ICR Polska Co. Ltd.
www.icrpolska.com
icrpolska@icrqa.com



WINTERS INSTRUMENTS

MANUFACTURER OF INDUSTRIAL INSTRUMENTATION



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Corporate – Canada

Winters Instruments
121 Railside Road
Toronto, Ontario
M3A 1B2
Tel: 416-444-2345
1-800-WINTERS
Fax: 416-444-8979
sales@winters.com

Canada - Calgary

Winters Instruments
4116 8th Street SE
Calgary, Alberta
T2G 3A7
Tel: 403-723-6645
1-800-WINTERS
Fax: 403-723-6647
calgary@winters.com

USA - Buffalo

Winters Instruments
600 Ensminger Road
Buffalo, New York
14150
Tel: 716-874-8700
1-800-WINTERS
Fax: 716-874-8800
usasales@winters.com

USA - Houston

Winters Instruments
10757 Cutten Road, Building 7
Houston, Texas
77066
Tel: 281-880-8607
1-800-WINTERS
Fax: 281-880-8614
usasales@winters.com

Asia

Winters Instruments
Shanghai WitHub Hi-Tech
Business Center, Suite 308
No. 333, Hongqiao Road
Shanghai 200030 China
Tel: 86-21-6104-2610
Fax: 86-21-6104-2615
asiasales@winters.com
www.wintersasia.com

Latin America

Winters Instruments
Alberellos 1916 1° Piso E1
B1640BIN, Martinez
Buenos Aires, Argentina
Tel: 54-11-4733 3003
Fax: 54-11-4733-0572
latinsales@winters.com
www.winters.com.ar

Middle East – North Africa - Europe

Winters Instruments
P.O. Box 371722
Dubai Airport Free Zone Dubai,
United Arab Emirates
Tel: 971-4295-9177
Fax: 971-4295-9177
menasales@winters.com



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Head Office


Infiniti Office, Permata Regency D/37, Kembangan, Jakarta Barat 11630


Warehouse

Kawasan Bizpoint Multiguna 1

Jln. Frankfurt No. 02, Kel. Cikupa, Kec. Cikupa, Kab. Tangerang, Banten

 www.berkah-tirtasolusindo.com

 sales@berkah-tirtasolusindo.com

 +62 818-135-558

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