

Engelmann

PRODUCT MANUAL

 SMARTEST METERING TECHNOLOGY

**ELECTROMAGNETIC
FLOWMETER**

Engelmann

GERMANY (HEADQUARTERS)

Engelmann Sensor GmbH
Rudolf-Diesel-Str.24-28,D-69168 Wiesloch-Baiertal
TEL: +49 (0) 6222-9800-0
FAX: +49 (0) 6222-9800-50
WEB: www.engelmann.de

China

Engelmann Metering (Xuzhou) Co., Ltd.
No. 6, Zone A, Suicheng Industrial Concentration Zone, Qingnian East Road,
Suining County, Xuzhou City, Jiangsu Province, 221200
TEL: +86-516-8821 1122
FAX: +86-516-8821 1122
WEB: www.engelmann.com.cn

BEIJING OFFICE

Room 2021, Floor 2, Strait International Building, Building 1, Yard 30,
Sanlihe East Road, Xicheng District, Beijing
TEL: +86-010-5338 5705

The specifications, technical parameters, indicators, and dimensions of the products introduced in this sample are subject to update without prior notice, and the actual product shall prevail.



Since
1976

UNSERE DEVISE

IMMER NAH AM KUNDEN – ZUVERLÄSSIG
UND SERVICESTARK

COMPANY PROFILE



Engelmann Sensor GmbH, founded in 1976 and headquartered in Westloch, Germany, is a well-known manufacturer of energy and flow instruments worldwide and a leader in the field of measurement. Since its establishment, Enleman has always been committed to the research and production of measuring instruments. In order to meet the needs of customers and the market, the company invests 5% of its annual revenue in the research and development and improvement of products. Enleman has over 40 years of experience in measuring instruments, and is renowned for designing and producing high-precision and highly reliable

measuring instruments with high-quality standards. Having an absolute market share in Europe, it is a leading company in the field of measurement instruments in the European region, with energy instruments accounting for 25% of the market share.

In 2005, Enleman entered China and began serving the Chinese market. With the growth of user demand, in order to provide more professional services, Germany's Enlehmenn Sensor Co., Ltd. established its first wholly-owned subsidiary in Beijing in 2006, tailoring solutions based on different customer measurement needs, providing customers with

various product related services and technical support. After years of effort, our products cover China and assist the government and users in continuously optimizing energy consumption.

In order to promote the process of product localization, Germany's ENLEMAN Sensors Co., Ltd. established an advanced instrument manufacturing factory -

ENLEMAN Instruments (Xuzhou) Co., Ltd. in early 2013, with independent production and testing capabilities for a full range of measuring products. It is a production and sales center in China. Enleman is serving new and old customers with a brand new look, providing high-quality products and solutions, and contributing to China's metrology, energy conservation and environmental protection industry.



UNSERE DEVISE

IMMER NAH AM KUNDEN – ZUVERLÄSSIG UND SERVICESTARK

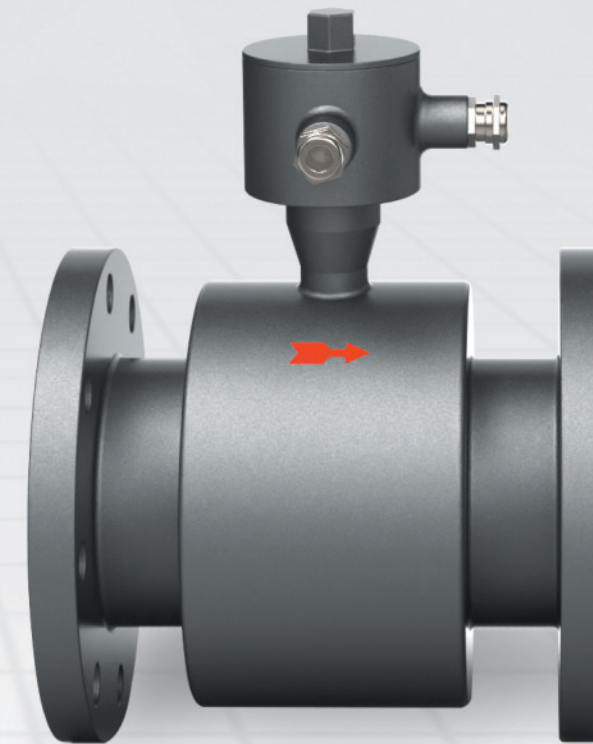


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SensoStar[®]
EM9300 *ELECTROMAGNETIC
FLOWMETER*

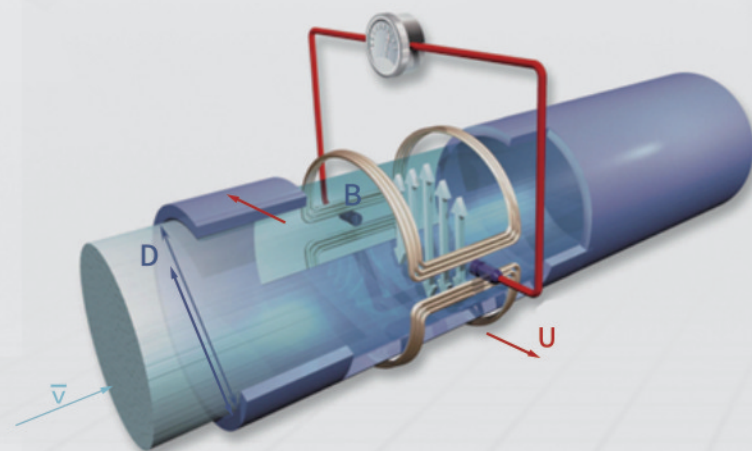


INTEGRATED

COMBINED

ELECTROMAGNETIC FLOWMETER INTRODUCTION

According to Faraday's law of electromagnetic induction, the electromagnetic flowmeter is equipped with a pair of detection electrodes on the pipe wall perpendicular to the axis of the measurement pipe and the magnetic line of force. The conductive fluid ($\geq 5\mu\text{S/cm}$) When passing through the measuring tube and moving along the axis of the measuring tube, the cutting magnetic line of force generates an induced potential, which is detected by two detection electrodes and converted into a value proportional to the size and flow through the converter.



Faraday's law of induction

$$E = K \times B \times D \times V$$

E: Induced Electromotive Force
K: Instrument Constant
B: Magnetic flux density

D: Measuring tube diameter
V: Average Velocity

The electromagnetic flowmeter is applicable to the flow measurement of any highly corrosive conductive liquid such as acid, alkali, sea water, or conductive liquid containing impurities.

It is widely used in water industry, chemical industry, heat supply, petroleum, metallurgy, light textile, paper making, environmental protection, food and other industrial fields.

SensoStar[®] EM9300 | ELECTROMAGNETIC FLOWMETER



PROFESSIONAL



CONVENIENT



EFFICIENT



SensoStar[®] EM9300 ADVANTAGE & FEATURE

- || Multi electrode design ensures measurement accuracy
- || The bidirectional measurement system can measure forward flow, reverse flow, and forward and backward flow.
- || It can measure instantaneous flow rate and cumulative flow rate, with small flow rate cutoff Functions such as air traffic control alarm and self diagnostic error system
- || High definition back light LCD display with fullChinese menu operation switchable easy to use and operate.
- || There are no movable or flow blocking components in the pipeline, and there is zero pressure loss during measurement.
- || Zero self calibration, eliminating zero drift
- || EEPROM memory, no backup battery required, internal clock without power down,can record power down time, and measurement data storage is safe and reliable
- || Enter the password to set parameters and prevent misoperation
- || Low frequency rectangular wave excitation not only overcomes the interference effect of AC excitation, but also eliminates polarization phenomenon, enhancing the anti-interference performance of the flow meter and improving the stability of flow measurement
- || The split type can be customized to meet the protection level of IP68, and on-site use does not require secondary gluing



TECHNICAL SPECIFICATION

Nominal diameter	DN3-DN3200
The flow rate range	0.5~15m/s;Special customization:0.3~15m/s
Measurement accuracy	0.5 level; Optional 0.2/0.3 grade (DN15-DN300)
Conventional caliber and pressure	≤10MPa(DN5-DN50); ≤4.0 MPa (DN65-DN400); ≤2.5 MPa (DN400-DN600); ≤1.6 MPa (DN600-DN3200);
Flow direction	Bidirectional, net flow (if bidirectional measurement is required, please confirm with Engelmann before placing an order)
Repeatability error	Less than or equal to ± 0.1% of the measured value
Lining material	Neoprene,polyurethane,polytetrafluoroethylene, PFA, etc
Flange material	Standard configuration: carbon steel; Optional: stainless steel 304, stainless steel 316
Protection grade	Diving type: IP68 (only available for split type) Other types: IP65, IP67
Power supply	AC220V 50Hz; DC24V; Optional battery powered
Electrode material	316 stainless steel, titanium, tantalum, Hastelloy, platinum iridium and other electrode materials
Ambient temperature	Sensor: -40~+80 °C; Converter: -25~+60 °C
Ambient humidity	5-95%RH
Output signal	4-20mA current output, load resistance<7502; Pulse: 0-5KHz (load resistance ≥ 30002); Optoelectronic isolation OCT external power supply ≤ 35V;
Communication	Equipped with standard HART to meet the needs of general industrial sites;Optional PRO-FIBUS to meet more customer needs
Electrical interface	ISO M20 × 1.5 internal threads; ANSI1/2NPT internal thread; JIS G1/2 internal thread, etc

TECHNICAL PARAMETER

Flow Calculation Formula

$$Q = V \cdot n \cdot (D/2)^2 = 0.002826VD^2$$

In the formula: Q-m³/h, V-m/s, D-mm

Flow Rate Range: 0.5-15m/s; Special option: 0.3-15m/s

The maximum and minimum flow rates refer to the data in the table below:

Caliber	3 (0.12inch)	5 (0.2inch)	8 (0.32inch)	10 (0.4inch)	15 (0.5inch)
Qmin(m³/h)	0.01	0.04	0.09	0.14	0.32
Qmax(m³/h)	0.38	1.06	2.71	4.24	9.54
Caliber	20(0.8inch)	25(1inch)	32(1.25inch)	40(1.5inch)	50(2inch)
Qmin(m³/h)	0.57	0.88	1.45	2.26	3.53
Qmax(m³/h)	16.96	26.49	43.41	67.82	105.98
Caliber	65(2.5inch)	80(3inch)	100(4inch)	125(5inch)	150(6inch)
Qmin(m³/h)	5.97	9.04	14.13	22.08	31.79
Qmax(m³/h)	179.10	271.30	423.90	662.34	953.78
Caliber	200(8inch)	250(10inch)	300(12inch)	350(14inch)	400(16inch)
Qmin(m³/h)	56.52	88.31	127.17	173.09	226.08
Qmax(m³/h)	1695.60	2649.38	3815.10	5192.78	6782.40
Caliber	450(18inch)	500(20inch)	600(24inch)	700(28inch)	800(32inch)
Qmin(m³/h)	286.13	353.25	508.68	692.37	904.32
Qmax(m³/h)	8583.98	10597.50	15260.40	20771.10	27129.60
Caliber	900(36inch)	1000(40inch)	1100(44inch)	1200(48inch)	...
Qmin(m³/h)	1144.53	1413.00	1709.73	2034.72	...
Qmax(m³/h)	34335.90	42390.00	51291.90	61041.60	...

MEASURABLE FLOW RANGE

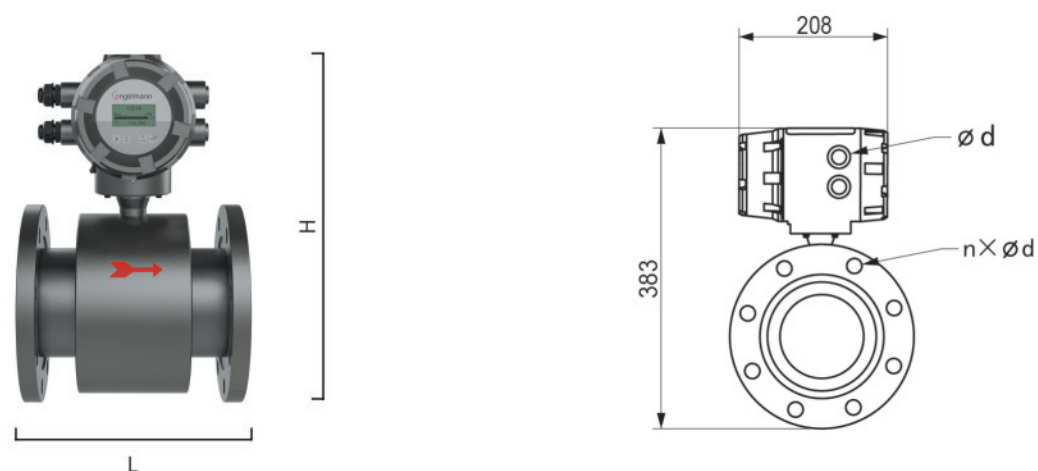
Caliber (mm)	0~min. flow rate (0.3m/s)	0~max. flow rate (12m/s)	Caliber (mm)	0~min. flow rate (0.3m/s)	0~max. flow rate (12m/s)
3	0-0.01	0-0.38	450	0-286.13	0-8583.98
5	0-0.04	0-1.06	500	0-353.25	0-10597.50
8	0-0.09	0-2.71	600	0-508.68	0-15260.40
10	0-0.14	0-4.24	700	0-692.37	0-20771.10
15	0-0.32	0-9.54	800	0-904.32	0-27129.60
20	0-0.57	0-16.96	900	0-1144.53	0-34335.90
25	0-0.88	0-26.49	1000	0-1413.00	0-42390.00
32	0-1.45	0-43.41	1100	0-1709.73	0-51291.90
40	0-2.26	0-67.82	1200	0-2034.72	0-61041.60
50	0-3.53	0-105.98	1400	0-2769.48	0-83084.40
65	0-5.97	0-179.10	1600	0-3617.28	0-108518.40
80	0-9.04	0-271.30	1800	0-4578.12	0-137343.6
100	0-14.13	0-423.90	2000	0-5652.00	0-169560.00
125	0-22.08	0-662.34	2200	0-6838.92	0-205167.60
150	0-31.79	0-953.78	2400	0-8138.88	0-244166.40
200	0-56.52	0-1695.60	2600	0-9551.88	0-286556.40
250	0-88.31	0-2649.38	2800	0-11077.92	0-332337.60
300	0-127.17	0-3815.10	3000	0-12717.00	0-381510.00
350	0-173.09	0-5192.78	3200	0-14469.12	0-434073.60
400	0-226.08	0-6782.40			

Note: When the measurement range exceeds the measurable flow range in the table, please confirm with the ENGELMANN instrument.

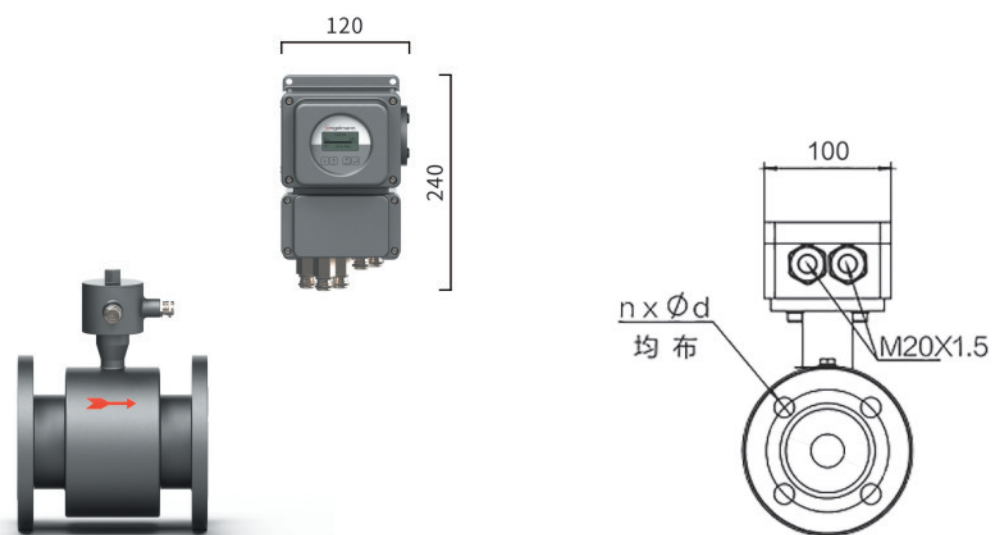
PRODUCT SIZE AND PROFILE

Overall dimensions (standard type)

INTEGRATED OUTLINE DRAWING



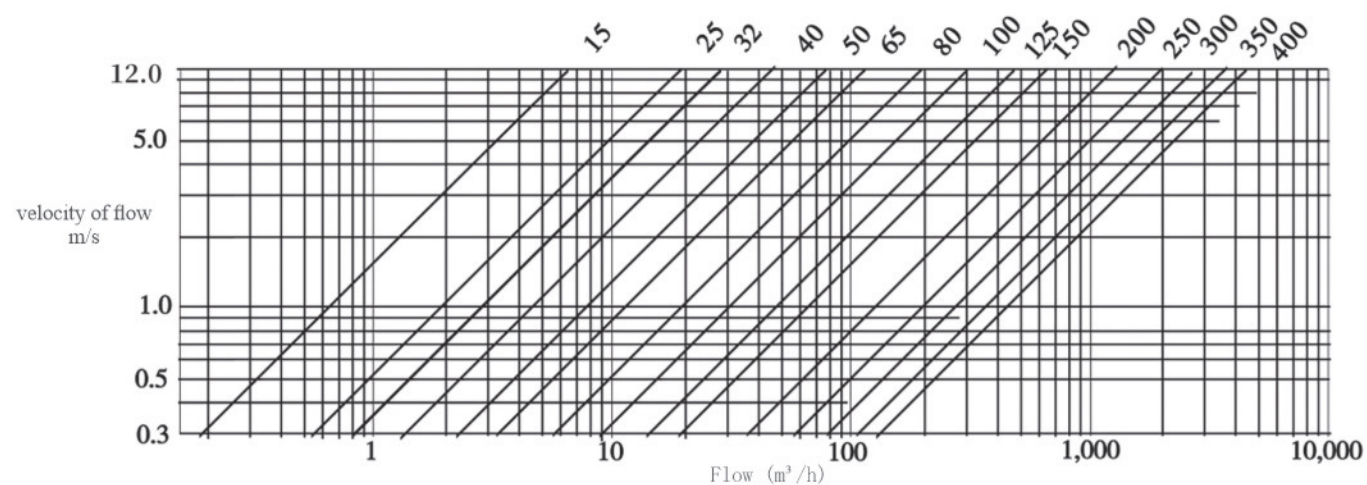
COMBINED OUTLINE DRAWING



Caliber DN(mm)	L (mm)	H(Integrated) (mm)	Reference net weight (integrated) KG	H (split type) (mm)	Reference net weight (split type)KG	n×d (mm)	Nominal pressure PN	Special Nominal pressure
3	150	210	6.5	190	7	4×14	4MPa	16MPa以下
5	150	210	6.5	190	7	4×14		
6	150	210	6.5	190	7	4×14		
8	150	210	6.5	190	7	4×14		
10	200	250	6.6	230	6.9	4×14		
15	200	250	7.2	230	8	4×14		
20	200	250	8.2	230	9	4×14		
25	200	260	8.6	240	9.4	4×14		
32	200	265	9.8	245	10.6	4×18		
40	200	275	10.2	255	11	4×18		
50	200	280	12.4	260	13.2	4×18	1.6MPa	4.0MPa
65	200	300	14.4	280	15.2	4×18		
80	200	315	15	295	15.8	8×18		
100	250	330	17.9	310	18.7	8×18		
125	250	360	20.6	340	21.4	8×18		
150	300	390	28.8	370	29.6	8×22		
200	350	450	37	430	37.8	12×22		
250	450	510	57.5	490	58.3	12×22		
300	500	560	70.8	540	71.6	12×22		
350	550	580	90.2	560	91	16×22		
400	600	670	114.2	650	115	16×26	1.0MPa	2.5MPa
450	600	730	117.2	710	118	20×26		
500	600	790	138.2	770	139	20×26		
600	600	870	240	850		20×30		
700	700	950	435	930		24×30		
800	800	1155	545	1135		24×34	0.6MPa	1.0MPa
900	900	1255	655	1235		28×34		
1000	1000	1355	810	1335		28×36		

RELATION CURVE OF FLOWMETER INNER DIAMETER, FLOW RATE AND FLOW

Path data Unit: mm



When measuring clean water, the economic flow rate is 1.5-3.0 M/s; When measuring easy crystallization solution, 3.0-4.0 m/S is appropriate, which plays a role of self sweeping and preventing adhesion and deposition; measure. When slurry and other abrasive fluids are used, 1.0-2.0 M/S is appropriate to reduce the wear of lining and electrode.

The diameter of the electromagnetic flowmeter

corresponding to the measured flow range shall be selected according to the inner diameter of the flowmeter, the relationship curve between flow rate and flow, and the measurable flow range of each diameter. If the inner diameter of the selected electromagnetic flowmeter does not match the inner diameter of the current process pipeline, the pipe shall be shrunk or expanded.

ELECTRODE MATERIAL SELECTION TABLE

Material	Code	Corrosion Resistance
		Applicable
316L	BL	1. domestic water, industrial water, raw water well water, urban sewage 2. corrosive acid, alkali and salt solutions
Hastelloy B	HB	1. domestic water, industrial water, raw water well water, urban sewage 2. corrosive acid, alkali and salt solutions 3. phosphoric acid, organic acid
Hastelloy C	HC	1. mixed acid such as mixed solution of chromic acid and sulfuric acid fe++, cu++, seawater
Ti	TI	1. salt, such as: (1) chloride (magnesium/aluminum/calcium/ammonium/iron, etc.) (2) sodium salt, potassium salt, ammonium salt, hypochlorite, sea water 2. concentration less than 50% potassium hydroxide, ammonium hydroxide, alkali solution
Ta	TA	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 chloride, lead acetate, etc 3. oxidizing acids such as nitric acid (including fuming nitric acid), aqua regia with temperature lower than 80 °C
Pt	PT	Almost all acid, alkali and salt solutions (including fuming sulfuric acid and fuming nitric acid)
tungsten carbide	WC	Pulp, sewage, anti solid particle interference

LINING MATERIAL SELECTION TABLE

Lining material	Code	performance	Maximum operating temperature	Applicable liquid	Applicable caliber
Neoprene rubber	RL	Medium wear resistance, Resistance to general low concentration acid, alkali and salt	<60°C	Tap water, sea water and industrial water	DN50~3200
Polyurethane	PU	Excellent wear resistance, Poor acid and alkali resistance	<60°C	Pulp, mineral pulp and other slurry	DN25~1200
Polytetrafluoroethylene F4 (PTFE)	RP	Stable chemical properties and boiling resistance Corrosion of hydrochloric acid, sulfuric acid, aqua regia and concentrated alkali	<120°C	Highly corrosive acid-base salt liquid	DN25~1600
Fluorinated ethylene propylene Teflon F46 (FEP)	46	The chemical properties are equal to F4 compressive strength, and the tensile strength is better than F4	<150°C	Corrosive acid Alkali salt liquid	DN3~200
Copolymer of tetrafluoroethylene and ethylene (PFA)	PA	The chemical properties are equivalent to F46 compression resistance, and the tensile strength is better than F46	<180°C	Corrosive acid Alkali salt liquid	DN5~500

MODEL SELECTION COMPARISON TABLE

Integrated / combined

SensoStar[®]
EM9300

CALIBER >>>

Product Name	Suffix Code	illustrate
EM9300		ENGELMANN EM9300 series electromagnetic flowmeter
Type	N	Integrated
	C	Combined

Suffix Code	illustrate	Notes
-3	DN3	0.12inch
-5	DN5	0.2inch
-10	DN10	0.4inch
-15	DN15	0.5inch
-20	DN20	0.8inch
-25	DN25	1inch
-32	DN32	1.25inch
-40	DN40	1.5inch
-50	DN50	2inch
-65	DN65	2.5inch
-80	DN80	3inch
-100	DN100	4inch
-125	DN125	5inch
-150	DN150	6inch
-200	DN200	8inch
-250	DN250	10inch
-300	DN300	12inch
-350	DN350	14inch
-400	DN400	16inch
-450	DN450	18inch
-500	DN500	20inch
-600	DN600	24inch
-700	DN700	28inch
-800	DN800	32inch
-900	DN900	36inch
-10K	DN1000	40inch

(over DN1000, please contact ENGELMANN)

CONNECTION MODE >>>



Suffix Code	Illustrate	Notes
A1W	ANSI 150 Clamping type	DN15-DN150
A3W	ANSI 300 Clamping type	DN15-DN150
G1W	GB 1.6MPa Clamping type	DN15-DN150
G2W	GB 4.0MPa Clamping type	DN15-DN150
A1S	ANSI 150 Flange connection	DN15-DN400
A2S	ANSI 300 Flange connection	DN15-DN400
A3S	ANSI 600 Flange connection	DN15-DN400
A4S	ANSI 900 Flange connection	DN15-DN400
G1S	GB 1.6MPa Flange connection	DN15-DN400
G2S	GB 2.5MPa Flange connection	DN15-DN400
G3S	GB 4.0MPa Flange connection	DN15-DN400
G4S	GB 6.3MPa Flange connection	DN15-DN400
G5S	GB 10.0MPa Flange connection	DN15-DN400
H1S	Sanitary interface clamp connection	DN15-DN50

ELECTRODE MATERIAL >>>

LINING MATERIAL >>>

ELECTRICAL INTERFACE >>>

ACCURACY >>>

POWER SUPPLY >>>

Suffix Code	Illustrate
BL	316L
PT	Platinum PT
HB	Hastelloy B
TA	Tantalum
TI	Titanium
HC	Hastelloy C
WC	Tungsten Carbide

Suffix Code	Illustrate
RL	Neoprene rubber
PU	Polyurethane rubber
RP	F4
46	F46
PA	PFA

Suffix Code	Illustrate
-1	ASME 1/2 NPT Female
-2	ISO M20 x 1.5 Female

Suffix Code	Illustrate	Notes
N	Standard accuracy 0.5	
P	High precision 0.2	Optional diameter (DN10-DN300)

Suffix Code	Illustrate
1	220V
2	24V
3	On Battery

COMMUNICATION MODE >>>

DISPLAY MODE >>>

OPTIONAL SPECIFICATIONS >>>

Suffix Code	Illustrate
A	4-20mA DC, Pulse, HART
B	4-20mA DC, Pulse, MODBUS
C	4-20mA DC, Pulse, PROFIBUS

Suffix Code	Illustrate
C	Chinese operation interface
E	English operation interface

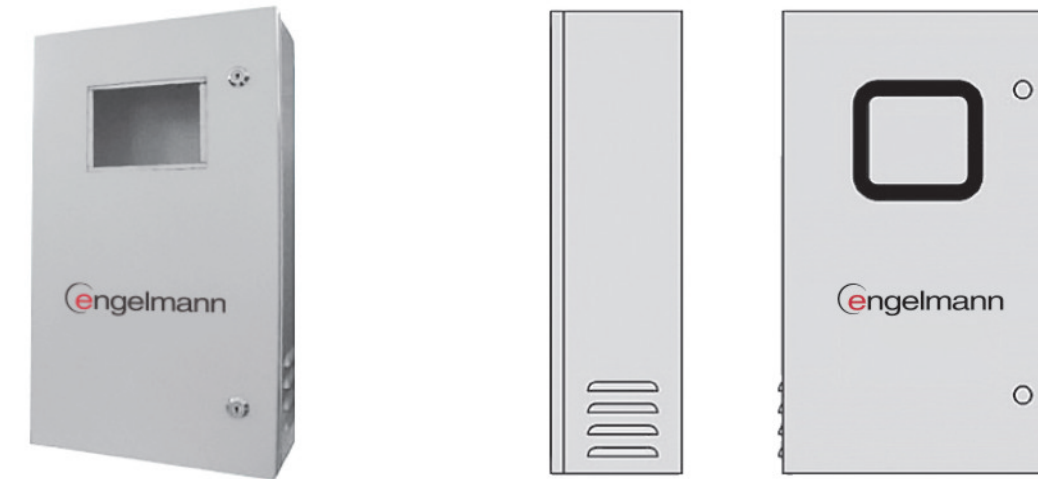
Suffix Code	Illustrate
/NF1	China (nepsi) flameproof
/GP	Remove grease attached to the instrument
/D	Normal warranty:1 year, 2years(optional)
/T	Normal warranty:1 year, 3years(optional)
/04	The default body material of Engelmann electromagnetic flowmeter is carbon steel, and 304 is optional
/16	The default body material of engelmann electromagnetic flowmeter is carbon steel, optional 316
/M	For viscous fluid, Internal surface Bull polishing (DN15-400)
/B	The standard instrument box is made of stainless steel with visible glass windows
/S	Outdoor installation with lightning arrester

CABLE LENGTH >>>

Product Name	Suffix Code	Description	Notes
		EM9300 series electromagnetic flowmeter cable length	
Cable length	-005		
	-010		
	-015		
	-020		
	-025		
	-030		
	-040		
	-050		
	-060		
	-070		
	-080		
-090			
-100			

Remarks:
 We suggest using shorter cables. The cable is too long. Due to the influence of its distributed capacitance, it is easy to cause signal interference, If it is more than 100 meters, please contact enleman instruments.

APPENDIX ENGELMANN CUSTOMIZED INSTRUMENT BOX



Requirement specification

Installation tag number					
Piping requirements	Pipe outside diameter		Pipe inside diameter		
Media properties	Media name				
	Medium status and liquid temperature				
Process parameters	Parameter requirements	Flow range	Fluid Pressure	Fluid temperature	Note
	Maximum				
	Common values				
	Minimum value				
Installation environment	High temperature environment <input type="checkbox"/>	Explosive environment <input type="checkbox"/>	Wet environment <input type="checkbox"/>	Water immersion environment <input type="checkbox"/>	
Structural type	Integrated <input type="checkbox"/>	Combine <input type="checkbox"/>	Cable length:		
Power supply mode	Battery <input type="checkbox"/>	DC24V <input type="checkbox"/>	AC220V <input type="checkbox"/>		
Electrical interface					
Special specification requirements					

SensoStar®

EM9910 PLUG-IN ELECTROMAGNETIC FLOWMETER

PRODUCT FEATURES



Multiple power supply modes
(installation without water cut off under pressure)

AC220V
3.6V lithium battery
DC24V, dual power supply, etc



IP68
protection level
Stable and reliable



Low start flow rate

≤ 2mm/s



sampling

Short sampling period



Communication type

NB-IoT
4G
RS-485



Measuring

Accurate measurement
High precision level 0.5, Level 1



SensoStar® EM9910

TECHNICAL PARAMETERS

Nominal diameter	DN200-DN3000
Accuracy class	Level 0.5, Level 1
Repeatability	0.15%
Measuring medium	Conductive fluid
Conductivity	5µs/cm
Measuring flow rate range	0.002~10m/s
Output signal	The standard output signal is pulse frequency output. The optional output includes 4-20mA, isolated or non isolated rs485/rs232c digital communication interface, and supports modbus, PROFIBUS-DP, Hart and other field bus communication modes
Power supply	AC220v/DC24V/3.6V lithium battery/lithium battery +solar energy/lithium battery+AC220V
Working pressure	Optional 1.0Mpa/1.6MPa
Ambient temperature	25°C~60°C
Ambient humidity	5%~90%
Working medium temperature	≤120°C
Protection grade	1P67/IP68
Electrode structure	2 electrodes
Electrode material	According to the measured medium, 316L stainless steel, Hastelloy B, Hastelloy C, tantalum, titanium, platinum, ceramics, etc
Insulating material	FEP
Housing	Stainless steel housing
Installation form	Separate installation of split sensor and transmitter (with 5m standard cable)



APPIY

- online intelligent comparison of level 1, level 2 and level 3 zonal metering of pipe network · flow metering of urban water supply pipe network
- flow measurement of water resource pipe network
- measurement of large pipe runoff in water supply network
- flow measurement in metallurgical, papermaking, chemical and sewage treatment industries