



HPAC series intelligent type electromagnetic flowmeter

Description

HPAC series intelligent type electromagnetic flowmeter are suitable for measuring the flow of almost all electrically conducting liquids, as well as sludges, pastes and slurries. A prerequisite is that the medium must have a certain minimum conductivity. The temperature, pressure, viscosity and density have no influence on the result.

Even corrosive media can be measured providing suitable materials are selected for the tube liner and the electrodes. Solids present in the medium do not usually influence the result.

The high accuracy electromagnetic flow sensor is combined with the intelligent type converters integrated / separated to produce a complete unit.

Application

The main applications of the HPAC intelligent type flowmeter can be found in the following fields:

- Water or waste water
- Power generation and distribution
- Chemical and pharmaceutical industries
- Food industry

Featuring

The measurement of flow is in a close circuit with water using an electromagnetic principle with higher accuracy compared to ultrasonic series. Important properties are:

- **Non-wearing due to non-moving parts**
- **Measuring range of flow 1:1500 total range**
- **No settling sections or flow strengtheners.**
- **Applicable for measuring the flow-rate of various conducting liquid**
- **Measured result is not influenced by physical characteristics**
- **Strong corrosive resistant and strong abrasive ability**
- **Can measure the forwarding / back warding flow rate**
- **Large liquid-crystal screen, humanization interface operation, easy to use**
- **Permanent EEPROM to keep configured parameters and measured data**
- **Support Modbus / BACnet communication protocol**
- **Support Bluetooth communication tools for easy inspection and maintenance**
- **Demand measurements with maximum values**
- **Self-diagnostics**

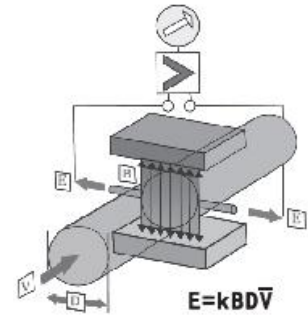
Measuring principle

The working principle of the electromagnetic flowmeter is law of Faraday's electromagnetic induction:

When the conductive liquid passes through measuring pipe surrounded in the magnetic field, induction electromotive force will be produced in the direction vertical to the flow direction and the magnetic field, which is in proportion to the average flow rate.

flowmeter consists of sensor and converter. The converter transfers the exciting current to the loop inside the sensor through exciting cable. Thus, magnetic field is produced inside the measuring pipe of the sensor. The conducted liquid passes the measuring pipe and

induction electromotive force is produced because of cutting magnetic force line. The electrodes fixed on both sides of the measuring pipe will receive this induction electromotive force and transfer it to the converter through signal cable. After filtering, amplifying, calculation and converting by the converter, flow rate of the measured media is obtained. Finally, a standard current signal or frequency signal in direct proportion to the measured flow rate is outputted.



Technical data

Display	LCD display with at most 9 digits, directly display real time clock various flow data, m³ or L display unit optional.
Product structure	In-line type design, Integrated type or split type optional
Measured media	Liquid and solid-liquid two-phase fluid with conductivity > 1 $\mu\text{s}/\text{cm}^2$
Measuring range	0.12 m/s ~ 12 m/s optional
Measuring accuracy	The accuracy is $\pm 0.5\%$ for any measured velocity in full scale range The accuracy is $\pm 0.25\%$ in 0.5m/s ~ 10m/s scale range is optional
Diameter (mm)	15 ~ 2000 mm
Nominal pressure	PN16, PN25 or PN40 optional
Tube material	Stainless steel 304 tube
Electrode material	Stainless steel 316L or Ti, others on request (e.g. Hc, Hb, Ta, W)
Lining material	Ne , FEP , PTFE or PU optional
Media temperature	0 ~ 120°C optional, maximum 180°C on request
Output signal	4 ~ 20mA or frequency
Communication	Support Modbus RTU or BACnet MS/TP protocol optional
Communication tools	Support Bluetooth communication in Android mobile tools
Connection	Flange type connection for size from DN15 ~ DN2000 Screw type connection for size from DN15 ~ DN40 is optional
Certificate	According to CE and EMC 2004/108/EC and LVD 2006/95/EC EN 61326-1:2013, Immunity (Conformity to EN61000-6-1 and 6-2) EN 61326-1:2013, Emission (Conformity to EN61000-6-3 and 6-4) EN61000-3-2:2014 Limits for Harmonic Current Emissions Comply with the EN61010-1 and IEC61010-1 standard
Protection class	IP67 Standard
Power supply	AC (100 ~ 242Vac) 50Hz or DC (18V ~ 36Vdc) max.10VA
Working ambient	Temperature 5 ~ 55°C
Storage ambient	Temperature -20 ~ 70°C

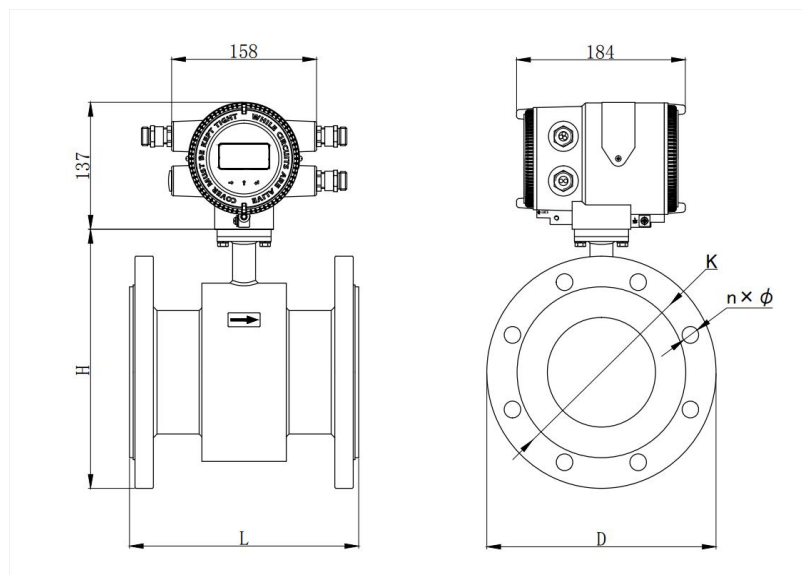
Electromagnetic flow sensor

The shell of the flow sensor is welded from carbon steel. Only the electrode and lining is contacted with the media. The flow sensor is matched with the converter to form one set of integrated type electromagnetic flowmeter or split type electromagnetic flowmeter.

Technical data of flow sensor

Application range	Including all conductive liquid such as HVAC cold and hot water, fresh water, sea water, various corrosive media.
Diameter (mm)	15~2000 mm
Nominal pressure	PN16 or PN25 or PN40 optional
Electrode material	Stainless steel 316L electrode for fresh water of HVAC application Ti electrode for sea water, others on request (e.g. Hc, Hb, Ta, W)
Lining material	Ne, FEP, PTFE or PU optional
Media temperature	0~70°C for Ne lining, 0~85 °C for PU lining, -20~120°C for PTFE lining, maximum 180°C for FEP lining on request Note: it is limited by the thermal resistance features of the lining materials
Tube material	Stainless steel 304 tube
Shell material	Carbon steel shell for DN15~DN2000 flange type flow sensor Carbon steel shell for DN15~DN40 screw type flow sensor others on request (e.g. Stainless steel 304 shell)
Protection class	IP67 for Integrated type, IP68 is optional for Split type
Connection standard	Flange type connection adapt to pipeline flange of various standards (e.g. BS EN1092-2 , ISO 7005-2, BS4504, HG20593-199, GB9119) The screw connection is complied with BS21 or ISO7-1 standard
Pressure loss	Inline type without obstructing the flow, So the head friction lost is little.

Dimensions





Technical data of flange type meter

DN mm	PN MPa	Lining materials			Flow range selection Flow volume (m ³ /h)			Overall dimensions(mm)			Connection dimensions (mm)		
		Ne	PU	PTFE	Norm. flow	Min. flow	Max. flow	L	D	H	K	n	MA
15	4.0		•	•	1.5	0.03	3	150	95	145	65	4	M12
20			•	•	2.5	0.05	5		105	150	75	4	M12
25			•	•	3.5	0.07	7		115	155	85	4	M12
32			•	•	6	0.12	12		140	165	100	4	M16
40			•	•	10	0.2	20		150	180	110	4	M16
50			•	•	15	0.3	30	200	165	190	125	4	M16
65			•	•	25	0.5	50		185	200	145	8	M16
80	1.6		•	•	40	0.8	80		200	235	160	8	M16
100			•	•	60	1.2	120	220	250	180	8	M16	
125			•	•	100	2	200	250	250	280	210	8	M16
150			•	•	150	3	300		285	310	240	8	M20
200			•	•	250	5	500	300	340	373	295	12	M20
250			•	•	400	8	800	350	405	430	355	12	M24
300			•	•	600	12	1200		460	495	410	12	M24
350			•	•	750	15	1500	400	520	550	470	16	M24
400			•	•	900	18	1800		580	606	525	16	M27
450			•	•	1200	24	2400	450	640	660	585	20	M27
500			•		1500	30	3000	500	715	725	650	20	M30
600			•		2500	50	5000	600	840	843	770	20	M33
700			•		4000	80	8000	700	910	915	840	24	M33
800		•		5000	100	10000	800	1025	1025	950	24	M36	
900		•		6000	120	12000	900	1125	1135	1050	28	M36	
1000		•		8000	160	16000	1000	1255	1250	1170	28	M39	
1200		•		10000	200	20000	1200	1485	1465	1390	32	M45	
1400		•		13500	270	27000	1400	1685	1665	1590	36	M45	
1600		•		18000	360	36000	1500	1930	1885	1820	40	M52	
1800		•		22500	450	45000	1800	2130	2085	2020	44	M52	
2000		•		28000	560	56000	2000	2345	2295	2230	48	M56	

K = Bolt circle diameter, n = Number of holes, MA = Size of bolt

Remark

“•” in the a.m. table means optional lining various diameter’s flow sensor

Ne lining materials can be chose for DN500~DN2000 flange type pipe

PU lining materials can be chose for DN15~DN450 flange type or DN15~DN40 screw type pipe

PTFE lining materials can be chose for DN15~DN1200 flange type

PU or Ne lining materials for HVAC system cooling or heating application

PTFE lining materials for PD system or hot water application

FEP lining materials can be chose for DN15~DN150 drinking water pipe on request

Converters

HPAC series intelligent type converter designed on the basis of microprocessor technology has all kinds of performance and advantages of intelligent instrument, such as simple structure, stable and reliable.

HPAC series intelligent type converter adopts lightning protection circuit so it can be made to survive rough conditions. The converter can detect many kinds of fault automatically and if detected any one then display the alarm on the LCD screen.

Permanent memory

The LOG of the converter records the following values: current instantaneous flow, power on/power off information, cumulated forward/reverse flow and max value.

Cumulated forward/reverse flow record the totally cumulated value till now. Max. instantaneous flow is stored for a further 36 months (monthly), and 15 years (yearly), power on/off information is stored for 50 items in a record for possible subsequent study of operating conditions in the system.

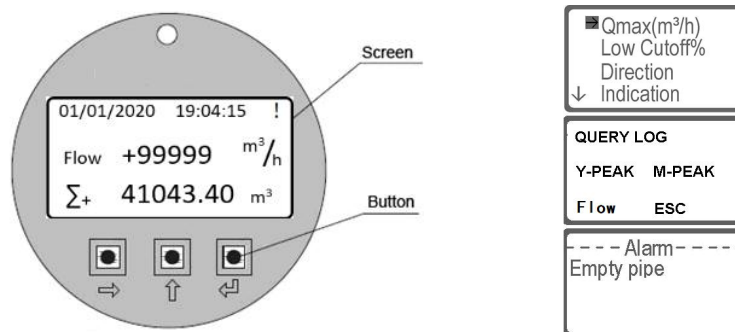
Note: Max. instantaneous flow is optional function, only for RS485 communication mode

Display description

The calculator has an easily-read at most 9 digits LCD display with associated pictograms for the various functions.

Can display the following data: instantaneous flow, forward/reverse cumulated values and many kinds of alarm information. All the permanent memory data can be displayed too.

The structure of converter panel



Communication

RS485 communication mode, support Modbus or BACnet protocol optional.

Communication baud rate optional for 1200, 2400, 4800, 9600, 19200, 38400.

- **Modbus communication mode**

Open Modbus RTU communication protocol

- **BACnet communication mode**

Also support BACnet MS/TP communication protocol

You can read all the permanent memory data and other information in this mode such as instantaneous flow, accumulated flow.

Note1: RS485 network only support Max. 32 pcs device

Note2: Basic communication settings is 8N1/9600



Technical data of converter

Current output	4~20mA
Frequency output	<p>Passive pulse: high level = external power source-1V, external power source voltage should be ≤ 30 V low level ≤ 0.5V load current ≤ 50 mA The maximum frequency output is 5KHz.</p> <p>Note1: When configured as pulse output, the pulse output frequency can be 0~5Hz. Note2: The level output for forwarding/backwarding flow rate, The high or low flow rate alarm is optional.</p>
Display	128*64 LCD display at most 9 digits with backlight
Display unit	<p>m^3/h, m^3/m, m^3/s, L/h, L/m, L/s, G/h, G/m, G/s display unit optional for instantaneous flow. m^3, L, G display unit optional for cumulated flow.</p>
Communication	Support Modbus RTU or BACnet MS/TP protocol optional
Communication tools	Support Bluetooth communication for Android mobile tools
Power supply	AC (100~242Vac) 50Hz or DC (18~36Vdc) max.10VA
lithium battery	3V lithium battery of 10 years or above lifetime
EMC immunity	EN 61326-1:2013, Immunity (Conformity to EN61000-6-1 and EN61000-6-2)
EMC emission	EN 61326-1:2013, Emission (Conformity to EN 61000-6-3 and EN61000-6-4)
Limits for Harmonic Current Emissions	Compliance to EN 61000-3-2:2014
LVD 2006/95/EC	Comply with the EN61010-1 and IEC61010-1 standard
Protection class	IP67
Ambient temperature	5~55°C

Note: frequency output can be configured to show the flow direction is inverse (always output low level voltage) or not (always output high level voltage).

Installation structure

Directly assembled with flow sensor to form HPAC series integrated type electromagnetic flowmeter, or connect with flow sensor through signal cable to form HPAC series split type electromagnetic flowmeter. Split type converter is fixed on the wall or on the support.

Note: When choose the split type, the distance between the converter and the flow sensor should no more than 10 meters to ensure the measurement accuracy.

Product selection

Diameter selection

When the normal velocity of flow of the measured pipeline is more than 0.5 m/s, select the meter with diameter same to that of the process pipeline.

Select the meter with diameter smaller than that of the process pipeline in following conditions:

The velocity of flow in the pipeline is somewhat slow, which can not meet the requirement of velocity limit of the flowmeter or the measurement precision is not satisfying under this velocity (the velocity limit to obtain relatively high precision is more than 1m/s).

Electrode materials selection

Materials	Code	Corrosive resistance
Stainless 316L	V	It is used in low corrosiveness medium such as industrial water, domestic water, sewage etc. , neutral solution and weak acid such as carbonic acid, acetic acid etc.
Titanium	Ti	It can resist seawater, various kinds of chloride, hypochlorite and many kinds of hydroxide.
Hastelloy c	Hc	Resistance to oxidation acid, like nitric acid, mixing acid, a mixture of sulfuric acid and chromium, and oxidation salt or other antioxidants environment. Has good corrosion resistance for seawater, alkali solution, peroxide-based solution.
Hastelloy b	Hb	Has good corrosion resistance for oxidizing acid, alkali, salt. Sulfuric acid, phosphoric acid, hydrofluoric acid etc.

Lining materials selection

Lining materials	Corrosive resistance	Working temp.	Range of application
Ne	Neoprene It can resist low concentration acid alkali salt.	0~70℃	Can be used in Industrial water, sewage, and low concentration acid alkali salt solution. Ne lining materials can be chose for DN500 or above pipe.
FEP	Fluorinated ethylene propylene It has heat resistance and corrosive resistance. It has high mechanical strength, abrasiveness resistance and when cleaning surface the lining is seldom broken.	-40~120℃	Can be used where has sanitary requirement like drinking water. All fluid except high abrasive medium like mortar. Maximum 180℃ on request FEP lining materials can be chose for DN15~DN150 pipe or DN15~DN40 screw type pipe.
PTFE	Polytetrafluoroethylene It can resist almost all chemical medium's corrosion. It has low wear resistance.	-20~120℃	Can be used in high temperature liquid, suitable to apply on domestic hot water and drinking water. Not suitable for pipe with egative pressure or high abrasive medium. PTFE lining material can be chose for DN15~DN1200 pipe.
PU	Polyurethane It can resist alkali, salty and organic solvents corrosion resistant It has high mechanical strength, abrasiveness resistance and when cleaning surface the lining is seldom broken.	0~85℃	Can be used in HVAC cooling or heating application. Can use in harsh environments instead of Neoprene. Maximum 90℃ on request PU lining materials can be chose for DN15~DN450 flange type or DN15~DN40 screw type pipe.



Connection type selection

Flange type connection for size from DN15~DN2000.

When the normal diameter of the flange type flow sensor is DN15~DN65, the pressure standard chosen as PN40. When the normal diameter of the flange type flow sensor is DN80~DN1200, the pressure standard chosen as PN16, PN25 or PN40 is optional. When the normal diameter of the flange type flow sensor is DN1400 or above, the pressure standard chosen as PN16.

Screw type connection for size from DN15~DN40 is optional, the pressure standard is PN16.

Grounding ring selection

When the grounding condition of the pipeline is not good (including insulated pipeline), grounding ring should be provided at both sides of the sensor. If the medium is of high abrasiveness, select the grounding ring with neck which has protective function for the lining end.

Communication selection

Intelligent type converter support Modbus RTU or BACnet MS/TP protocol optional.

RS485 network only support Max. 32 pcs device. Basic communication settings is 8N1/9600.

Structure selection

Consider from the aspect of convenient installation and use, selection priority is given to integrated type flowmeter.

When the flowmeter is installed underground or places that is easily to be flooded by water, select Split type flowmeter.

Note: when the flowmeter is installed in the high temperature pipeline or high corrosive environment, to suggest select Split type flowmeter for those whose medium is frozen water to avoid frosting or moisture condensation inside the sensor.

Output signal selection

4-20mA can used to output the instantaneous flow value signal.

Active frequency output means need no external power supply to accomplish the output function, and non-active frequency output means need some external power supply to accomplish the output function.

The frequency output port can be configured as alarm output to indicate the direction of the flow is inverse (always output low level voltage) or not (always output high level voltage), or frequency output to indicate the value of the instantaneous flow or the cumulated flow.

Note: The level output for forwarding / backwarding flow rate.

Power supply selection

Can use AC220V or DC24V power supply, Maximum power dissipation under 10W.

Consider from the aspect of convenient installation and use, selection priority is given to AC220V.

Examples of model code: e.g. HPAC201-100-14001C11

Description: HPAC series electromagnetic flowmeter consists of intelligent type converter and DN100 flange type flow sensor. Stainless 316L is used as its electrode materials and PU is used as lining materials. ,PN16 flange type connection, no need grounding ring, support Modbus RTU protocol, Integrated install, output signal is 4~20mA, operation power supply is AC220V.



Ordering code

HPAC201- { } - [] [] [] [] [] [] [] []

Power supply
 0 DC24V
 1 AC220V

Output signal (Note 4)
 0 No need
 1 4~20mA
 2 active frequency
 3 non-active frequency
 4 4~20mA + active frequency
 5 4~20mA + non-active frequency

Structure
 C Integrated type
 S Split type

Communication
 0 no need
 1 Modbus RTU protocol
 2 BACnet MS/TP protocol

Grounding ring
 0 No need
 1 Standard grounding ring
 2 Grounding ring with neck

Connection type (Note 3)
 0 Flange type / PN16
 1 Flange type / PN25
 2 Flange type / PN40
 3 Screw type / PN16 for DN15~40

Lining materials (Note 2)
 1 Ne (0~70℃)
 2 FEP (-40~120℃)
 3 PTFE (-20~120℃)
 4 PU (0~85℃)

Electrode material (Note 1)
 1 Stainless steel 316L
 2 Titanium
 3 Others(e.g. Hc, Hb, Ta, W)

flowmeter diameter
 e.g. 15,20...600,1200,2000

Note1: Stainless steel 316L electrode for fresh water
 Titanium electrode for sea water

Note2: Ne lining materials only for chilled water
 FEP lining materials only for drinking water
 PTFE lining materials for PD system
 PU lining materials for HVAC system

Note3: DN15~65 flange type only for PN40
 DN15~40 screw type only for PN16

Note4: The frequency output to indicate the value of the instantaneous flow or the cumulated flow.
 Can be configured as alarm output to indicate the direction of the flow.

Information in this publication is based on current specifications. Our company reserves the right to make changes in specifications and models as design improvements are introduced.