HPAC201 series electromagnetic flow meter

Description

HPAC201 series electromagnetic flow meter are suitable for measuring the flow of almost all electrically conducting liquids, as well as sledges, 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 flow sensors are combined with the intelligent converters Integrated/separate to produce a complete unit.

Application

The main applications of the HPAC201 series flow meter can be found in the following fields:

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

Featuring

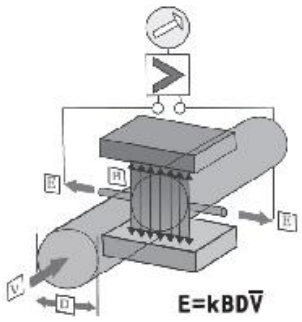
The measurement of flow is in a close circuit with water using an electromagnetic principle with higher accuracy compared to ultrasonic series. Important properties are:

- **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 forward / reverse 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**
- **Wide working voltage range**
- **Self-diagnostics**

Measuring principle

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

When the conductive liquid passes the 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.



Flow meter 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 8 digits, directly display various flow data, **m³** or **L** display unit optional.
Product structure	In-line type design, Integrated or separate type
Measured media	Liquid and solid-liquid two-phase fluid with conductivity>0.5μs/cm²
Measuring accuracy	The accuracy is ±0.5% in 0.2m/s～10m/s scale range The accuracy is ±0.25% in 0.4m/s～10m/s scale range is optional
Diameter (mm)	15~1200mm, maximum 2000mm on request
Nominal pressure	PN10, 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 or PTFE optional, others on request (e.g. PU, PFA)
Media temperature	0~70℃, maximum 180℃ on request (note: it is limited by the thermal resistance features of the lining materials)
Output signal	4~20mA or frequency
Communication	Optional, support MODBUS / BACnet communication protocol
Connection	Flange type connection for size from DN15~DN2000
Connection standard	Adapt to pipeline flange of various standards (e.g. BS EN1092-2 , ISO 7005-2, BS4504, HG20593-199, GB9119)
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) EN61000-3-2:2006 Limits for Harmonic Current Emissions Comply with the EN61010-1 and IEC61010-1 standard
Protection class	IP65 for integrated type, IP67 or IP68 optional for separate type
Power supply	AC220V or DC24V optional
Working ambient	Temperature 5~55℃, Humidity <90 % r.h. (non-condensing)
Storage ambient	Temperature -20~70℃,Humidity <85 % r.h. (non-condensing)

Electromagnetic flow sensor

HPAC201 separate type flow meter

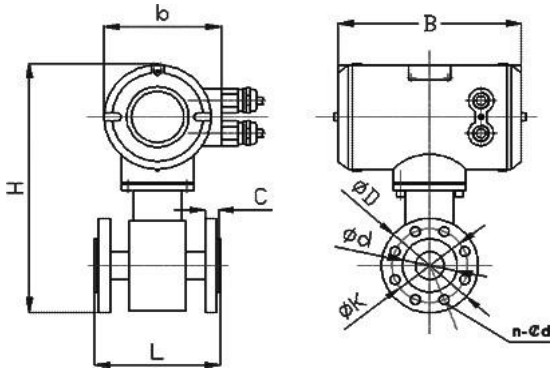
The shell of the flow sensor is welded from carbon steel. Only the electrode and lining is contacted with the media.

Flange type flow sensor is matched with the converter to form one set of integrated type electromagnetic flow meter or separate type electromagnetic flow meter.

Technical data of flow sensor

Application range	Including all conductive liquid such as HVAC cold and hot water, fresh water, various corrosive media.
Diameter (mm)	15~1200mm, maximum 2000mm on request
Nominal pressure	PN10, PN16, PN25 or PN40 optional
Electrode material	Stainless steel 316L or Ti, others on request (e.g. Hc, Hb, Ta, W)
Lining material	Ne , FEP or PTFE optional, others on request (e.g. PU, PFA)
Media temperature	0~70℃, maximum 180℃ 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 for flow sensor, others on request (e.g. stainless steel 304)
Protection class	IP67 or IP68 optional for flow sensor
Connection standard	Flange type connection adapt to pipeline flange of various standards (e.g. BS EN1092-2 , ISO 7005-2, BS4504, HG20593-199, GB9119)

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	FEP	PTFE	Norm. flow	Min. flow	Max. flow	L	H	B	b	¢K	n-¢d	¢D	¢d
15	4.0		•	•	1.5	0.03	3	160	304	152	102	65	4-¢14	95	46
20			•	•	2.5	0.05	5	160	304			75	4-¢14	105	56
25			•	•	3.5	0.07	7	160	304			85	4-¢14	115	65
32			•	•	6	0.12	12		320			100	4-¢18	140	76
40			•	•	10	0.2	20	200	330			110	4-¢18	150	84
50			•	•	15	0.3	30		344			125	4-¢18	165	99
65	1.6	•	•	•	25	0.5	50		363			145	8-¢18	185	118
80		•	•	•	40	0.8	80		376			160	8-¢18	200	132
100		•	•	•	60	1.2	120	250	394			180	8-¢18	220	156
125		•	•	•	100	2	200		422			210	8-¢18	245	184
150		•	•	•	150	3	300	300	453			240	8-¢22	285	211
200		•	•	•	250	5	500	350	510			295	12-¢22	340	265
250		•	•	•	400	8	800	400	561			355	12-¢26	405	319
300		•	•	•	600	12	1200	500	615			410	12-¢26	460	370
350		•		•	750	15	1500		670			470	16-¢26	520	429
400		•		•	900	18	1800	600	725			525	16-¢30	580	480
450		•		•	1200	24	2400		777			585	20-¢30	640	548
500		•		•	1500	30	3000		832			650	20-¢32	715	609
600		•		•	2500	50	5000		832			770	20-¢36	840	720
700	1.0	•			4000	80	8000	700	1118			840	24-¢36	910	794
800		•			5000	100	10000	800	1207			950	24-¢39	1025	901
900		•			6000	120	12000	900	1280			1050	28-¢39	1125	1001
1000		•			8000	160	16000	1000	1382			1170	28-¢42	1255	1112
1200		•			10000	200	20000	1200	1642			1390	32-¢48	1485	1328

Remark

1) "●" in the a.m. table means optional lining various diameter's flow sensor, Ne lining materials can be chose for DN65~DN2000, FEP lining materials only for DN15~300, PTFE lining materials can be chose for DN15~DN600.

2) When the normal diameter of the flow meter is below DN50, the pressure grade of the flow sensor standard chosen as PN40.

When the normal diameter is DN65~600, the pressure standard chosen as PN16 or PN25 is optional.

When the normal diameter is above DN700, the pressure standard chosen as PN10 or PN16 is optional.

3) Please place special order, if the pressure in the measured pipeline is higher than the nominal pressure of the sensor.

Converters

HPAC201 series 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.

HPAC201 series 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

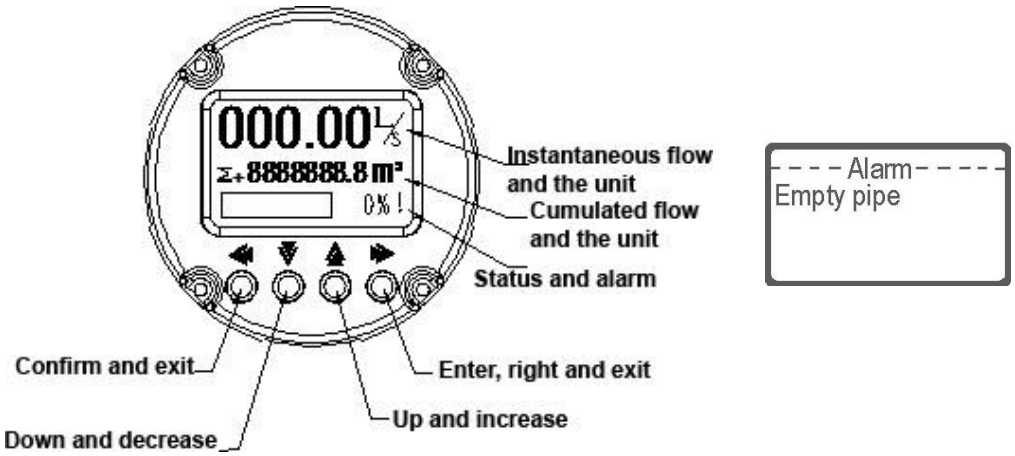
The LOG of the calculator records the following values:

Cumulated forward/reverse flow record the totally cumulated value till now.

Display description

The calculator has an easily-read at most 8 digits LCD display with associated pictograms for the various functions and display the following data:

Instantaneous flow, forward / reverse cumulative values and many kinds of alarm information. All the permanent memory data can be displayed too.



Communication

RS485 communication mode, baud rate optional for 1200, 2400, 4800, 9600, 19200, 38400.

Protocol: Optional,MODBUS or BACnet communication protocol

- **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.

Note: RS485 network only support Max. 128 pcs device.

Technical data of converter

Current output	4~20mA
Frequency output	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. Note1: When configured as pulse output, the pulse output frequency can be 0~5Hz. Note2: The level output for forwarding / backwarding flow rate.
Display	LCD display at most 8 digit with backlight
Display unit	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.
Communication	Support MODBUS / BACnet protocol optional
Power supply	220Vac ±10% 50Hz or 24Vdc, max.15VA
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 61000-3-2:2006
LVD 2006/95/EC	Comply with the EN61010-1 and IEC61010-1 standard
Protection class	IP65
Ambient temperature	5~55℃
Ambient humidity	<90 % r.h. (non-condensing)

te: 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 HPAC201 series integrated type electromagnetic flow meter, or connect with flow sensor through signal cable to form HPAC201 series separate type electromagnetic flow meter. Separate type converter is fixed on the wall or on the support.

Note: When choose the separate 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 flow meter 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.
Tantalum	Ta	Can resist almost all the chemical medium except hydrofluoric acid. Because the price is expensive, only for sulfuric acid, hydrochloric acid.
Tungsten carbide	W	Excellent wear resistance, dedicated to wear type medium such as mud, pulp.

Lining materials selection

Lining materials	Corrosive resistance	Working temp.	Range of application
Ne	Neoprene It can resist low concentration acid alkali salt.	0~70℃	It can be used in Industrial water, sewage, low concentration acid alkali salt solution. Maximum 95℃ on request Ne lining materials can only be chose for DN65~DN2000.
FEP	Fluorinated ethylene propylene It has heat resistance and corrosive resistance. It has high mechanical strength, abrasiveness resistance and when cleaning the surface the lining is seldom broken.	-40~180℃	All fluid except high abrasive medium like mortar. It can be used where has sanitary requirement like drink. Maximum 180℃ on request FEP lining materials can only be chose for DN15~DN300
PTFE	Polytetrafluoro ethylene It can resist almost all chemical medium's corrosion. It has low wear resistance.	-20~120℃	Can't be applied for pipe at negative pressure or high abrasive medium. It can be used where has high temperature requirement like domestic hot water. PTFE lining materials can be chose for DN15~DN600

Temperature grade selection

Four type of working temperature grades of flange type flow sensor are 70℃,95℃ (be the same with high temperature liquid) and 120℃, maximum 180℃ on request.

Select the temperature grade that mostly near the actual working temperature of the medium to make the flow meter working under ideal condition. For example, if the highest working temperature of the medium is 50℃, select the sensor with temperature grade 70℃.

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

HPAC201 series converter support MODBUS RTU or BACnet MS/TP protocol optional.

RS485 network only support Max. 128 pcs device.

Structure selection

Consider from the aspect of convenient installation and use, selection priority is given to integrated electromagnetic flow meter

When the flow meter is installed underground or places that is easily to be flooded by water, select IP 67 or IP 68 separate flow meter, when the flow meter is installed in the high temperature pipeline or high corrosive environment, select separate flow meter

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.

The level output for forwarding / backwarding flow rate.

Power supply selection

Can use AC220V or DC24V power supply. Consider from the aspect of convenient installation and use, selection priority is given to AC220V.

Examples of model code:

e.g. HPAC201-100 -11000C11

Description: HPAC201 series electromagnetic flow meter consists of intelligent model converter and DN100 flange type sensor. Stainless 316L is used as its electrode materials and Ne is used as lining materials. Its temperature grade is 0~70℃, no need grounding ring, no need communication, integrated install,output signal is 4~20mA, power supply is AC220V.

Ordering code

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Operation power supply

0 DC24V
1 AC220V

Output signal (Note 3)

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 (Note 2)

C Integrated type
S Separate type

Communication protocol

0 no need
1 MODBUS RTU
2 BACnet MS/TP

Grounding ring

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

Temperature grade of flow sensor

0 0℃~70℃
1 0℃~95℃
2 -20℃~120℃
3 -40℃~180℃

Lining materials (Note 1)
1 Ne
2 FEP
3 PTFE
4 Others(e.g. PU, PFA)

Electrode material

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

Flow meter diameter

e.g. 15…1200,2000

Note1 : Ne lining materials can be chose for DN65~DN2000,FEP lining materials only for DN15~DN300,PTFE lining materials can be chose for DN15~DN600.

Note2: When selecting the separate flowmeter give out details about the length(m) of the signal cable of the converter and sensor. The default value is 10m.

Note3: 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.