Insertion Electromagnetic Flow meter GT300-INT

Features:

- *No moving parts,*
  Virtually no pressure loss.
- *Various measuring pipe*
  from 100mm to 6000mm.
- *Corrosion protection,*
  abrasion resistant.
- *High level of anti-vibration*
  and anti-jamming, wide
  measuring dimensions.
- *Multi-output interface: 4~20mA,*
  Pulse, Alarm outputs,
- *RS-485 and Modbus communication.*
  GPRS

It can measure the flow at every position at high precision.

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Introduction

The product consists of insertion electromagnetic flow sensor (referred to as sensors) and insertion electromagnetic flow converter (referred to as converter) supporting components, used to measure the volume flow of various conductive liquids in the pipe.

Features

- Internal rotation sensors have no moving parts, compact size, simple structure, reliable work.
- The inserted installation configuration, it can be easily installed and removed under low pressure or under-pressure without water supply, it is ideal instrument for users to upgrade the existing pipeline, which is easy and convenient for flow meter installation and maintenance.
- Measurement accuracy is not influenced by measured medium temperature, pressure, density, viscosity, conductivity influence (as long as the conductivity is bigger than 20us/cm) and other physical parameters change.
- Sensors almost have no pressure loss, low energy consumption
- Manufacturing costs and installation costs lower than the average pipe flow meter.
- Particularly suitable for large and medium pipeline measuring and enjoy high-cost performance.
- Zero stability, strong anti-interference ability, reliable work.
- Flow measurement big range. Full scale flow is measured within the pipe can set from 1m/s to 10m/s, the output signal is linear with flow.
- Flow meter not only has 0~0mA / 4~20mA standard current output, as well as frequency output and various of communication interfaces, such as RS485/ HART so on.

Due to the above advantages of insertion electromagnetic flow meter, which has been widely used in chemical, iron and steel, metallurgy, fertilizer, paper, industry, irrigation, water supply and drainage, sewage and other industrial sectors.

Structure and Operation Principle

Structure

The electromagnetic flow meters are made up of sensor and transducer, together with LCD screen, current and pulse output, alarm signal and RS-485 communication.

Operating Principle

Faraday's Laws of Induction form the basis for the electromagnetic flow meters. It states that a voltage is induced in a conductor as it moves through a magnetic field.
This principle is applied to a conductive fluid which flows through a magnetic field generated perpendicular to the flow direction (see Schematic).

The voltage induced in the fluid is measured at two electrodes, installed diametrically opposed.
This signal voltage UE is proportional to the magnetic induction B, the electrode spacing D and the average flow velocity v. Noting that the magnetic induction B and the electrode spacing D are constants, proportionality exists between the signal voltage UE and the average flow velocity v.
The equation for the volume flow shows that the signal voltage UE is linear and proportional to the volume flow rate.
The induced signal voltage is processed in the converter into scaled, analog and digital signals.

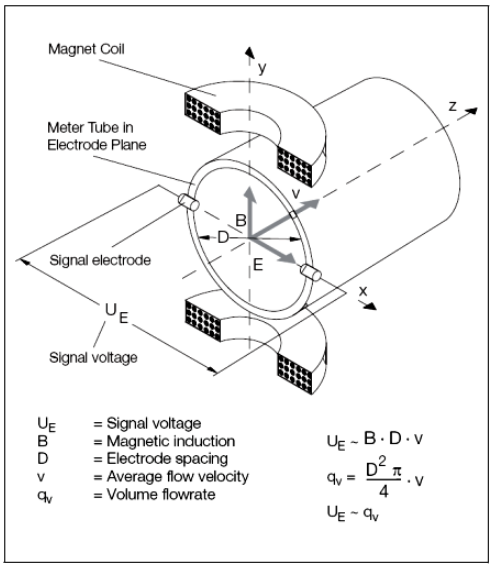

Fig. 1: Electromagnetic Flow meter Schematic

Product Structure

- **The measuring head:** Probe (measuring tube) use to test the measuring point flow rate.
  The probe (or the measuring tube) is made of an insulating material or conduit ends, with a pair of electrodes. Apart from the electrode terminal and the inner wall of the measuring tube, the other part is insulation condition with the measuring liquid.

- **Excitation system:** the role of the excitation system is to produce a operating magnetic field, which is consists of an excitation coil and a iron core, which is insulated sealed within the probe.

- **Plug-in rod:** It was made of stainless steel, the measuring head is fixed on the plug-in rod.

- **Terminal box:** It is located on the upper part of flow sensor, the wiring terminal inside the terminal box plays the role of connection of flow sensor and converter.

- **Installation base:** It is welded on the measuring pipeline, it is used for connecting the installation ball valve and the plug-in flow sensor part.

- **Sealing component:** It consist of compression screw seat, glad nut, rubber washer and positioning screw made of stainless less, which used for sealing while plug-in, and help it resist certain working pressure.

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Technical Specification Table

GT300-INT Electromagnetic Flow meter		 **Integral type**	 **Remote separate type**
Accuracy		±1.5~2% of reading value (Standard version)	
Min. Conductivity		20 Micro Simens	
Measuring range		0.5~10m/sec	
Flow direction		Bi-direction	
Diameter (mm)		**M**: DN100~900mm, **L**: DN1000-6000mm.	
Medium Pressure		DN100~250mm: 1.6 MPa DN300~1000mm: 1.0 MPa DN1200~2000mm: 0.6 MPa	
Medium Temperature		0~80°C	0~120°C（Option）
Process connection		Thread ball valve: DN50, Flange ball valve: DN50	
Material	Sensor pipe	SUS304, SUS316L, Option: Others	
	Electrode	SUS316L, Titanium, Tantalum, Hastelloy B, Hastelloy C, Stainless steel covered with tungsten carbide, Platinum-Iridium	
	Electrode cap	ABS, PTFE.	
	Valve	SUS304, SUS316, Others.	
Meter Protection Level		IP65, IP67, IP68	
Ambient Temperature		-20~60°C	
Influence of Ambient Temperature		< ±0.1% / 10°C or < ±0.25% / 10°C	
Repetition		≤ ±1.5%	
Measurement Range of Velocity		≤12m/s	
Transmitting Signal Converter		Power: 85~240VAC, 50~60hz.(Option: DC 20~36V)	
		Output: Standard output (4~20mA) Dual current output, Option: RS485, HART, Proflbus-PA	
		Analog output error: ≤ ±0.02mA	
		Display: LCD-Flow rate (4-digits), Totalizer (9-digits), Velocity, Alarm status Rate: selectable of m3/h, L/sec, US Gal/min, user's) Volume: m3, liter, US Gal, user's Positive, Total, Negative and Auxiliary (clearable, daily) volume	
		Control: Key board.	
		Time constant: programmable from 1 to 20sec.	
		Mounting: integral or separate	
		Power consumption: below 150VA	
		Enclosure: weather proof IP65	
Electric Connections		M20×1.5 , 1/2" NPT (With Adapter)	

Technical Parameters

- Nominal diameter: DN 100~2000mm
- Working pressure: ≦1.6MPa
- Flow rate measuring range: 0~1m/s to 0~10m/s, full scale within 1~10m/s range continuously adjustable.
- Measurement accuracy: flow rate > 0.5m/s, ±1.5~2% of rate.
- Measured medium conductivity: ≧ 20us/cm
- Measuring tube (head) material: ABS
- Measuring pipe material: SUS304. SUS316
- Electrode material: SUS316L, Hastelloy C, Tantalum,
- Ambient temperature: -10 ~ +55°C
- Shell protection degree: IP65, IP67, IP68
- DC current: ~10mA load resistance is 0~1kΩ
- 4~20mA load resistance is 0~500Ω
- Frequency: 1~5kHz load resistance is 250Ω~1.2kΩ
- Communication interface: RS232/ RS485, HART
- Converter power supply type: 85~220VAC, 24VDC, 3.6V battery powered
- Connection method: Flanged, Threaded connection

Flow Ranges

DN (mm) (Inch)		Velocity (m/sec)					
		0.5	1.0	**1.5**	**2.0**	**2.5**	**3.0**
300	12 ”	127.2	254.4	381.6	508.8	636.0	763.2
350	14 ”	173.1	346.2	519.3	692.4	865.5	1,038.6
400	16 ”	226.1	452.2	678.3	904.4	1,130.5	1,356.6
450	18 ”	286.2	572.3	858.3	1,144.6	1,430.8	2,574.9
500	20 ”	353.3	706.5	1,059.8	1,413.2	1,766.5	2,119.8
600	24 ”	508.7	1,017.0	1,526.0	2,034.0	2,544.0	3,052.0
700	28 ”	682.4	1,385.0	2,047.0	2,730.0	3,412.0	4,094.0
800	32 ”	904.3	1,808.0	2,713.0	3,617.0	4,522.0	5,126.0
900	36 ”	1,145.0	2,290.0	3,435.0	4,580.0	5,725.0	6,870.0
1000	40 ”	1,413.0	2,826.0	4,239.0	5,652.0	7,065.0	8,478.0
1200	48 ”	2,034.0	4,068.0	6,102.0	8,136.0	10,170.0	
1400	56 ”	2,770.0	5,540.0	8,310.0	11,080.0	13,850.0	

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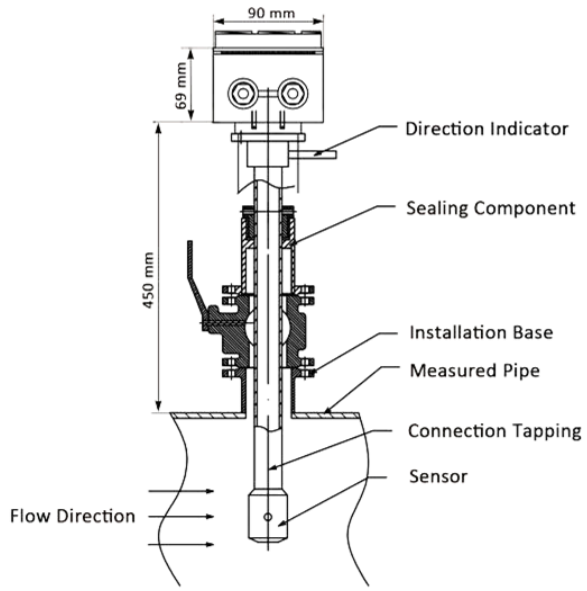
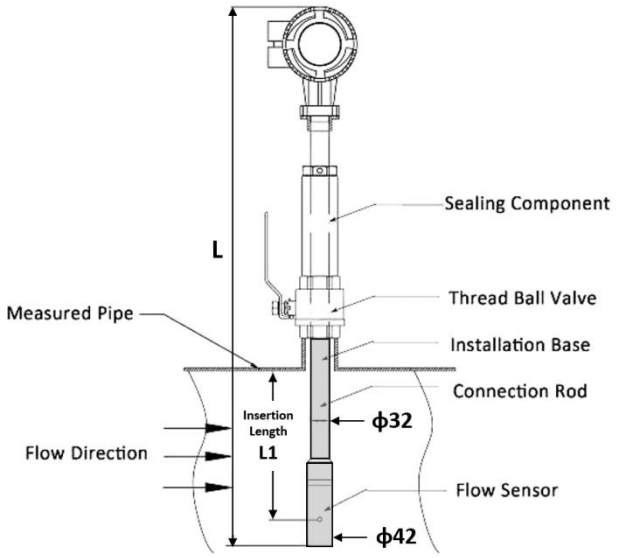
Drawing Insertion Magnetic Flow



Flange Ball Valve Separated Insertion Type



Thread Ball Valve Integrated Insertion Type

Remarks:

Measuring Tube/Sensor: It's used to measure the velocity of medium, two electrodes are installed in it.

Exciting System: It can produce magnetic field, it is composed by exciting coils and iron core, it is sealed in the measuring tube.

Connection Rod: Measuring tube is fixed in it.

Installation Base: It will be welded in the measuring pipe.

Seal Component: Consists of screw seat, nut, rubber washer and dog screw.

Specification		
Pipe size	**Length (L)**	**Insertion Length L1**
100≦DN ≦250	758mm	1/2 DN
600≧ DN ≧300	958mm	
1000≧ DN ≧700	1158mm	1/3~1/2DN
2000≧ DN >1200	1458mm	1/4~1/2DN

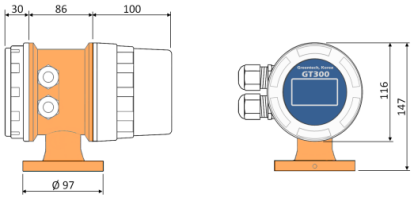
Specifications of Transmitting Signal Converters

1. High performance version: S400

(S) Single housing

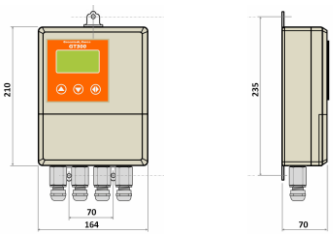
(D) Double housing

- Matched Size: **DN100~6000mm**
- Power Supply: **85~240VAC, 20~36VDC**
- Accuracy: **0.5% of rate (Span: 0.5~10m/s), 0.5%FS (Span: 0~0.5m/s)**
- Exciting current: **200mA and 100mA optional**
- Menu Language: **English**
- Display: **Forward and Reverse Flow rate, Total flow, Velocity**
- Alarm Function: **Empty Pipe Alarm, System Alarm**
- Signal Output: **Pulse, Frequency, 4-20mA (4 wire or 2 wire)**
- Communication: **Modbus**
- Option: **HART, Profibus.**
- Power consumption: **Less than 20W**
- Option: **Data logger, Total flow: Daily, Monthly, Yearly.**



2. Remote version: RT400

- Matched Size: **DN100~6000mm**
- Power Supply: **85~240VAC, 20~36VDC**
- Accuracy: **0.5% of rate (Span: 0.5~10m/s), 0.5%FS (Span: 0~0.5m/s)**
- Exciting current: **187mA**
- Menu Language: **English**
- Display: **Forward and Reverse Flow rate, Total flow, Velocity**
- Alarm Function: **Empty Pipe Alarm, System Alarm**
- Signal Output: **Pulse, Frequency, 4-20mA (4 wire or 2 wire)**
- Communication: **Modbus, HART, Profibus**
- Option: **Data logger, Total flow: Daily, Monthly, Yearly.**



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3. Battery type Signal Converter:

A) Battery type: BT800

- Matched Size: **DN100~6000mm**
- Power Supply: **Battery Supply**
- Accuracy: **0.5% of rate (Span: 0.5~10m/s), 0.5%FS (Span: 0~0.5m/s)**
- Battery Life time: **5 years**
- Display: **Forward and Reverse Flow rate, Total flow, Velocity**
- Alarm Function: **Empty Pipe Alarm, Battery Volume Alarm**
- Signal Output: **RS485 only for calibrating**

B) Battery type with GPRS/CDMA communication faction: BT803

- Matched Size: **DN100~6000mm**
- Power Supply: **Battery Supply**
- Accuracy: **0.5% of rate (Span: 0.5~10m/s), 0.5%FS (Span: 0~0.5m/s)**
- Battery Life time: **5 years**
- Display: **Forward and Reverse Flow rate, Total flow, Velocity**
- Alarm Function: **Empty Pipe Alarm, Battery Volume Alarm**
- Signal Output: **RS485 only for calibrating**
- Communication: **No Communication**
- **GPRS communication or others optionally.**

Ordering Code

1. Selection codes of Flow meter

Code: GT300-INT - □ - □ - □ - □ - □ - □ - □- □				Description
Pipe size	**M**			DN100~900mm
	L			DN1000~6000mm
Calibrated meter size	**XX**			( ) mm
Electrode material	**L**			SUS316L
	TI			Titanium
	TA			Tantalum
	HB			Hastelloy B
	HC			Hastelloy C
	TG			Stainless steel covered with tungsten carbide
	PT			Platinum-Iridium
Electrode cap material	**S**			ABS, Standard
	O			Others
Pipe material	**C**			Carbon steel
	S ( )			Stainless steel Flange (**04**): SUS304, (**16**): SUS316
Valve material	**S ( )**			(**04**): SUS304, (**16**): SUS316, (**16L**): SUS316L, O: Others.
Process connection	**T**			Thread connection: 2” NPT
	Flange	**S**		DN50 PN16
		O		OTHERS
Liquid temperature	**L**			<80°C
	H			<120°C (Remote type)
Flow sensor protection Class	**A**			IP65
	B			IP67
	C			IP68

2. Selection codes of Transmitting Signal Converter

Signal converter type	**S400**	**S**	Single head type-General application
		D	Double head type-General application
	R400		Remote surface mounting (0.5% of reading value)
	BT800		Battery type (0.5% of reading value) Direct mounting, RS485
	BT803		Battery type (0.5% of reading value) Direct mounting, RS485 & GPRS. CDMA
Mounting Construction	**-I**		Integral direct mounting

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	-R		Remote mounting: Surface mounting
Enclosure	A		IP65
	C		IP68 (BT803, BT803 converter)
Power supply	A		85~240VAC
	B		20~36VDC
	C		Lithium battery (RS485 output only for calibration)
Standard output signal		-S	4-20mA Current output Pulse output, Frequency output, RS485 MODBUS
Communication		-N	No communication
		-B	RS485 (Modbus)-Battery supply type
		-F	Profibus; Only option for S400 Signal Converter
		-H	HART: Only option for S400 Signal Converter
		-G	GPRS
Cables length		-0	No cable (Integral type)
		-1	XX meters.(Remote type)

Note 1: Users must consider the characteristics of selected wetted parts material and the influence of process fluids. The use of inappropriate materials can result in the leakage of corrosive process fluids and cause injury to personnel and/or damage to plant facilities. It is also possible that the instrument itself can be damaged and that fragments from the instrument can contaminate the user's process fluids. Be very careful with highly corrosive process fluids such as hydrochloric acid, sulfuric acid, hydrogen sulfide, sodium hypochlorite, and high-temperature steam (150°C [302°F] or above). Contact GT300 for detailed information of the wetted parts material.

Note 2: Our technical specification may be updated or changed without any prior notice.

Note 3: The color may be changed by our condition.

The our technical specifications may be revised for update without prior notice