

## Insertion Electromagnetic Flow meter

GT300-INT

### Features:

- *No Moving Parts, Virtually No Pressure Loss.*
- *Various measuring pipe from 80mm to 2400mm.*
- *Corrosion protection, abrasion resistant.*
- *High accuracy, Stable performance.*
- *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/CDMA*



*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 RS232/ 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  $U_E$  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  $U_E$  and the average flow velocity  $v$ .

The equation for the volume flow shows that the signal voltage  $U_E$  is linear and proportional to the volume flow rate.

The induced signal voltage is processed in the converter into scaled, analog and digital signals.

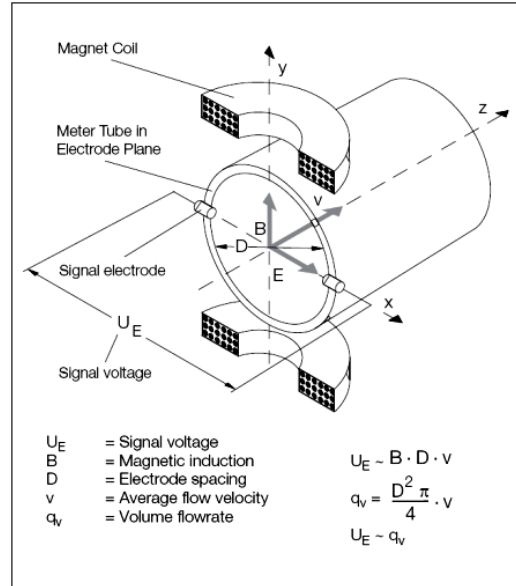


Fig. 2: Electromagnetic Flow meter Schematic

## Product Structure

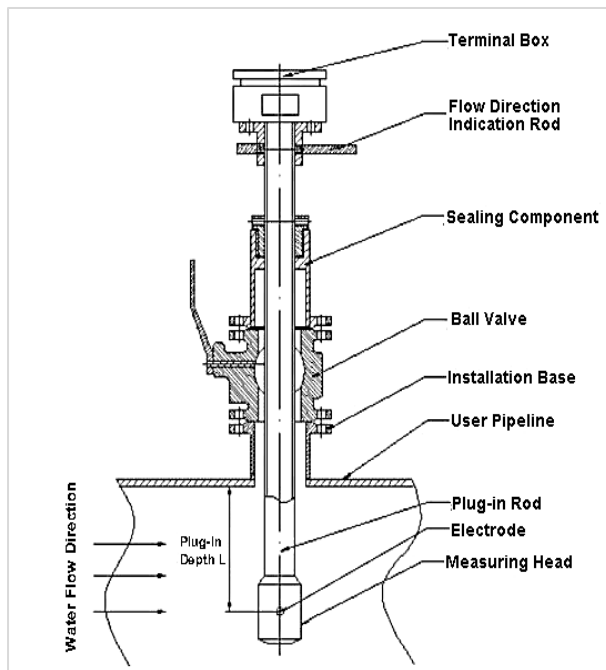
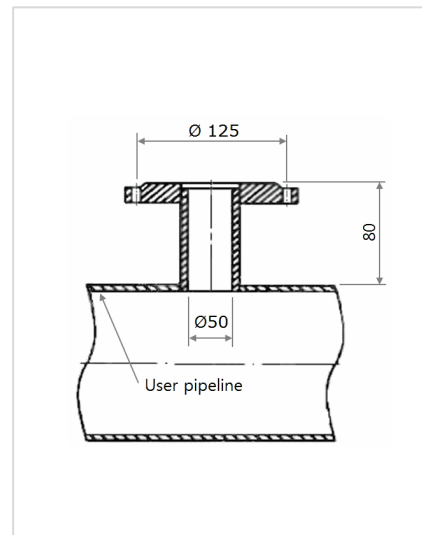


Fig. 2: External drawing Insertion type sensor



Installation size



- **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.

## Technical Parameters

- Nominal diameter: DN 80~2400mm
- Working pressure:  $\leq 1.6\text{MPa}$
- Flow rate measuring range: 0~1m/s to 0~10m/s, full scale within 1~10m/s range continuously adjustable.
- Measurement accuracy: when the full scale flow rate  $> 0.5\text{m/s}$ ,  $\pm 1.5\%$
- Measured medium conductivity:  $\geq 20\text{us/cm}$
- Measuring tube (head) material: ABS
- Measuring pipe material: Carbone steel, SUS304.
- Electrode material: SUS316L, Hastelloy C, Tantalum,
- Ambient temperature:  $-10 \sim +55^{\circ}\text{C}$
- Shell protection degree: IP65, IP68
- DC current:  $\sim 10\text{mA}$  load resistance is 0~1k $\Omega$
- 4~20mA load resistance is 0~500 $\Omega$
- Frequency: 1~5kHz load resistance is 250 $\Omega$ ~1.2k $\Omega$
- Communication interface: RS232/ RS485, HART
- Converter power supply type: 85~220VAC, 24VDC, 3.6V battery powered
- Connection method: Flanged, Threaded connection



## Technical Specification Table

GT300 Electromagnetic Flow meter			
		<b>Integral type</b>	<b>Remote separate type</b>
Accuracy		±1.5% of reading value (Standard version)	
Min. Conductivity		5 Micro Simens	
Measuring range		0.2~0.5m/sec (0.5% of full scale), 0.5~10m/sec (0.5% of reading value)	
Flow direction		Bi-direction	
Diameter (mm)		S: DN80~250mm, M: DN300~1200mm, L: DN1300~2400	
Medium Pressure		DN80~2400 : 1.0 1.6 2.5 4.0MPa Please consult with us if you order special pressure	
Medium Temperature		Economic version: 0~80°C	0~180°C (Choice of lining material)
Material	Sensor Housing	SUS304, Option: Others	
	Electrode	SUS316L, Titanium, Tantalum, Hastelloy, Monel, Platinum-Iridium	
	Electrode cap	Rubber, FEP, Polyurethane, Others.	
	Valve	SUS304, SUS316	
Meter Protection Level		IP65, IP68	
Ambient Temperature		-20~60°C	
Influence of Ambient Temperature		< ±0.1% / 10°C or < ±0.25% / 10°C	
Repetition		≤ ±0.15%	
Measurement Range of Velocity		≤12m/s	
Transmitting Signal Converter		Power: 85~240VAC, 50~60hz.(Option: DC 20~36V)	
		Output: Standard output (4~20mA and 0~10mA DC), Dual current output Option: RS232, RS485, HART, Profibus-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 20VA	
		Enclosure: weather proof IP65, 67(Integral mounting), IP67-68 (Remote mounting)	
		Electric Connections	

## Operation

Temperature	
Process temperature	Hard rubber liner: -5...+60°C
	Polyurethane liner: -5...+90°C
	FEP liner: -10-+150°C Operation
Ambient temperature (all versions)	<b>Standard</b> (with aluminum converter housing)
	-20...+60°C (Protect electronics against self- heating with ambient temperatures above 55°C)
Storage temperature	-20...+70°

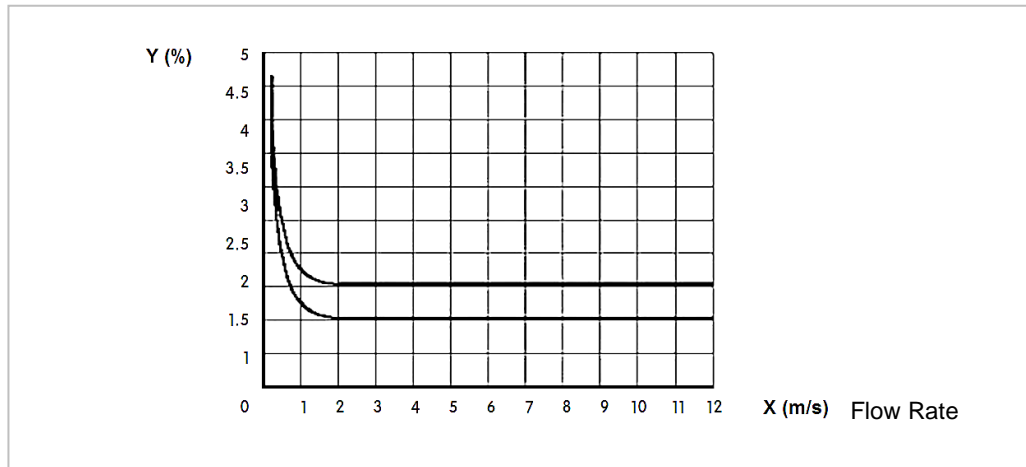
Pressure	
EN 1092-1	DN300...1200: PN 10
	DN80...250: PN 16
	Other pressures on request
ISO insertion length	Optional for DN80...1200
ASME B16.5	3...48": 150 Lb RF
	Other pressures on request
JIS	DN80...1200 / 2...48": 10K
	Other pressures on request
Pressure drop	Negligible

Fluid	
Physical condition	Conductive liquids
Electrical conductivity	≥ 20 μS/cm
Permissible gas content (volume)	≤ 50%
Permissible solid content (volume)	≤ 70%

## 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	

## Flow Rate Graph



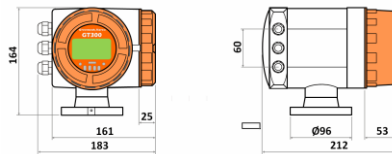


## Specifications of Transmitting Signal Converters

### 1. High performance version: **S200**



- Matched Size: **DN80~2400mm**
- 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: **125mA**
- 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: **RT100**

#### A) Surface Mounting: Code No.: **RS**



- Matched Size: **DN80~2400mm**
- 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.**

#### B) 2" Pipe Mounting: Code No.: **RP**



- Matched Size: **DN80~2400mm**
- 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.**

**3. Battery type Signal Converter:****A) Battery type: BT800**

- Matched Size: **DN80~2400mm**
- 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: **Pulse only for calibrating**

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

- Matched Size: **DN80~2400mm**
- 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: **Pulse only for calibrating**
- Communication: **No Communication**
- **GPRS/CDMA communication**

## Ordering Code

### 1. Selection codes of Flow meter

Code: GT300-INT - □ - □ - □ - □ - □ - □ - □		Description
Pipe size	<b>S</b>	DN80~250mm
	<b>M</b>	DN300~1200mm
	<b>L</b>	DN1300~2400mm
Electrodes Material	<b>L</b>	SUS316L
	<b>TI</b>	Titanium
	<b>TA</b>	Tantalum
	<b>H</b>	Hastelloy
	<b>M</b>	Monel
	<b>PT</b>	Platinum-Iridium
Electrode cap material	<b>C</b>	Chloroprene Rubber (DN80~1200mm)
	<b>F</b>	FEP
	<b>P</b>	Polyurethane
	<b>O</b>	Customization
Adapter material	<b>F</b>	Carbon steel Flange
	<b>S ( )</b>	Stainless steel Flange (04: SUS304. 06: SUS316)
Working pressure	<b>-D ( )</b>	DIN PN.1.0, 1.6, 2.5, 4.0MPa
	<b>-A ( )</b>	ANSI CL150, CL300
	<b>-J ( )</b>	JIS 10K, 20K, 30K
Sensor housing material	<b>S</b>	SUS304
	<b>9</b>	Customization
Liquid temperature	<b>L</b>	<60°C (Short time can up to 80°C)
	<b>T</b>	<120°C (Integral type with cooling pin)
	<b>S</b>	<120°C (Remote type)
	<b>E</b>	<180°C (Integral type with cooling pin)
	<b>H</b>	<180°C (Remote type)
Valve assembly	<b>V</b>	Assembly with ball valve: SUS304 Thread (standard), 2"X SUS304.
	<b>N</b>	Without ball valve

## 2. Selection codes of Transmitting Signal Converter

Signal converter type	<b>S200</b>	High performance version only
	<b>BT800</b>	Battery type (0.5% of reading value) : Direct mounting , High performance version only
	<b>BT803</b>	Battery type (0.5% of reading value) with GPRS/GSM/CDMA : Direct mounting , High performance version only
	<b>RT100</b>	Remote surface mounting (0.5% of reading value) - Code: RS High performance version only
Mounting Construction	<b>-I</b>	Integral direct mounting
	<b>-R ( )</b>	Remote mounting – (S): Surface mounting, (P): 2" Pipe mounting. (RT100: Surface mounting only) (S200, EX400-pipe and Surface mounting)
Enclosure	<b>A</b>	IP65
	<b>C</b>	IP68
Power supply	<b>A</b>	85~240VAC
	<b>B</b>	20~36VDC
	<b>C</b>	Lithium battery (Pulse output only for calibration)
Output signal 1	<b>-C</b>	4-20mA Current output & 0-10mA Dual current output
Output signal 2	<b>-P</b>	Pulse output
	<b>-F</b>	Frequency output
Communication	<b>-N</b>	No communication
	<b>-S</b>	RS485 (Modbus)
	<b>-R</b>	RS232 (Modbus)
	<b>-B</b>	RS485 (Modbus )-Battery supply type
	<b>-F</b>	Profibus; Only option for S200
	<b>-H</b>	HART: Only option for S200
	<b>-G</b>	GPRS: (Excluded in economic version)
<b>-A</b>	CDMA: (Excluded in economic version)	
Cables length	<b>-0</b>	No cable (Integral type)
	<b>-1</b>	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.