

# Electromagnetic Flow meter

## GT300

### Features:

- *No Moving Parts, Virtually No Pressure Loss.*
- *Various measuring pipe from 10mm 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.*

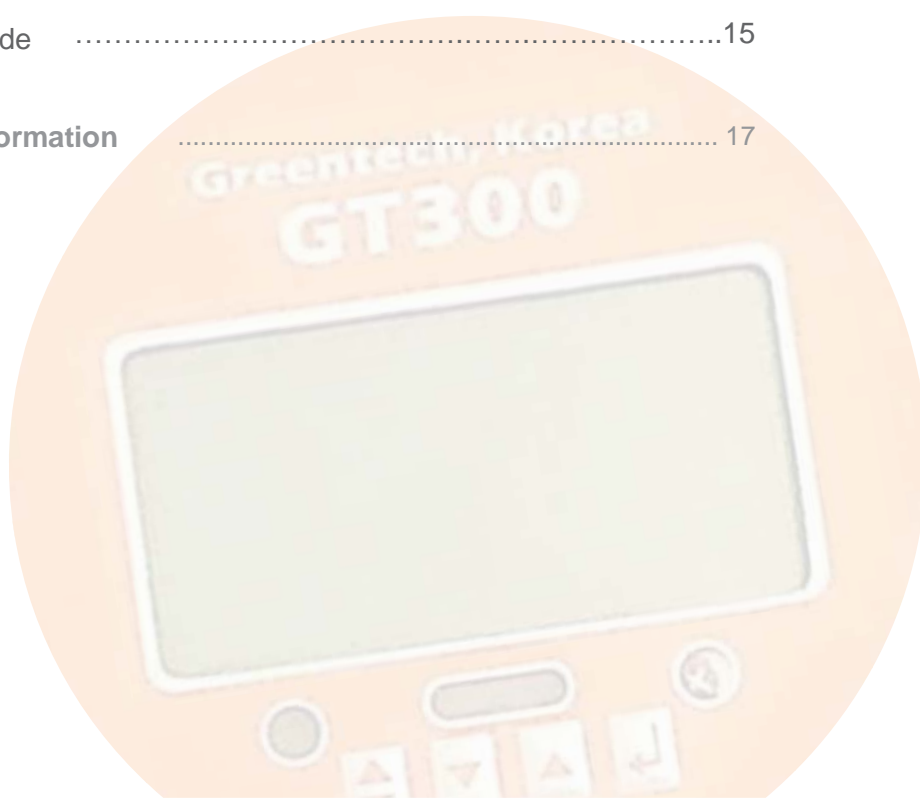


**Greentech Innovation Co., Ltd.**

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# Index

1. Introduction .....	1
2. Structure and Operation Principle .....	1
3. Technical Specification Table .....	2
4. Reference Condition .....	3
4. Flow Ranges and Meter Sizes .....	4
5. Meters Styles .....	5
6. Dimensions of Meter and Connection .....	6
1. Economic Version	
2. High Performance Version	
3. Thread Connection Version	
4. Sanitary, Tri-clamp Connection Version	
5. High pressure Version	
6. Wafer Version	
7. Remote Version	
7. Basic Specifications and Dimension of Transmitting Signal Converters ...	12
1. Economic Version	
2. General Version	
3. Explosion Proof Version	
4. Remote Version	
A) Surface Mounting	
B) 2" Pipe Mounting	
5. Battery type Signal Converter:	
A) Battery type	
B) Battery type with GPRS/CDMA communication faction	
8. Ordering Suffix Code .....	15
■ Technical information .....	17



# Introduction

These electromagnetic flow meters follow the Faraday law of electromagnetic induction.

They can be used to accurately measure the flow rate of liquids which are electrical conducting, caustic, and mixed with liquids and solids.

They are widely used throughout industries of petroleum, chemical engineering, pharmacology, papermaking, electric power, environmental protection and so forth.



Fig. 1: Product actual photos

## Structure and Operation Principle

### 1. 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.

### 2. 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.

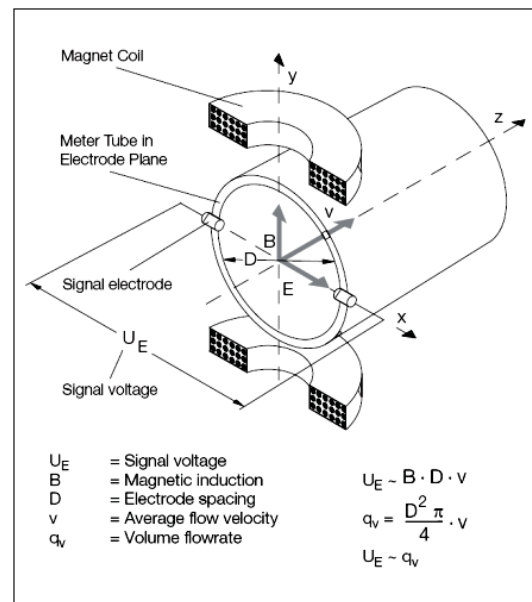




Fig. 2: Electromagnetic Flow meter Schematic

## Technical Specification Table

GT300 Electromagnetic Flow meter			
		Integrated type	Remote separate type
Accuracy		±0.5% of reading value (Standard version)	
Repeatability		±0.1% or Better	
Electrode Q'ty		2pcs (Standard), 3pcs or others (Option)	
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)		DN10~2400 (High performance version), DN10~500 (Economic version),	
Medium Pressure		DN10~2400 : 1.0 1.6 2.5 4.0MPa	
		Please consult with us if you order special pressure	
Medium Temperature		Economic version: 0~60°C (High performance version: 0~80°C)	0~150°C (0~180°C at cooling pin) (Choice of lining material)
Material	Body	Aluminum (10~100mm), Steel painted, Stainless steel	
	Electrode	SS316L, Titanium, Tantalum, Hastelloy, Tungsten Carbide, Platinum-Iridium	
	Measuring Tube	SS304	
	Lining	Chloroprene Rubber, Polyurethane, FEP	
	Flange	Standard material: Steel Standard norm.: JIS      Option: SS304, SS316, Others. Option: DIN, ANSI, 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		≤ ±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		M20×1.5 ,1/2" NPT(With Adapter)	

**Remarks:** Meter body and Converter housing color may be changed without any prior notice.  
The signal converter design and construction may be changed by order specification

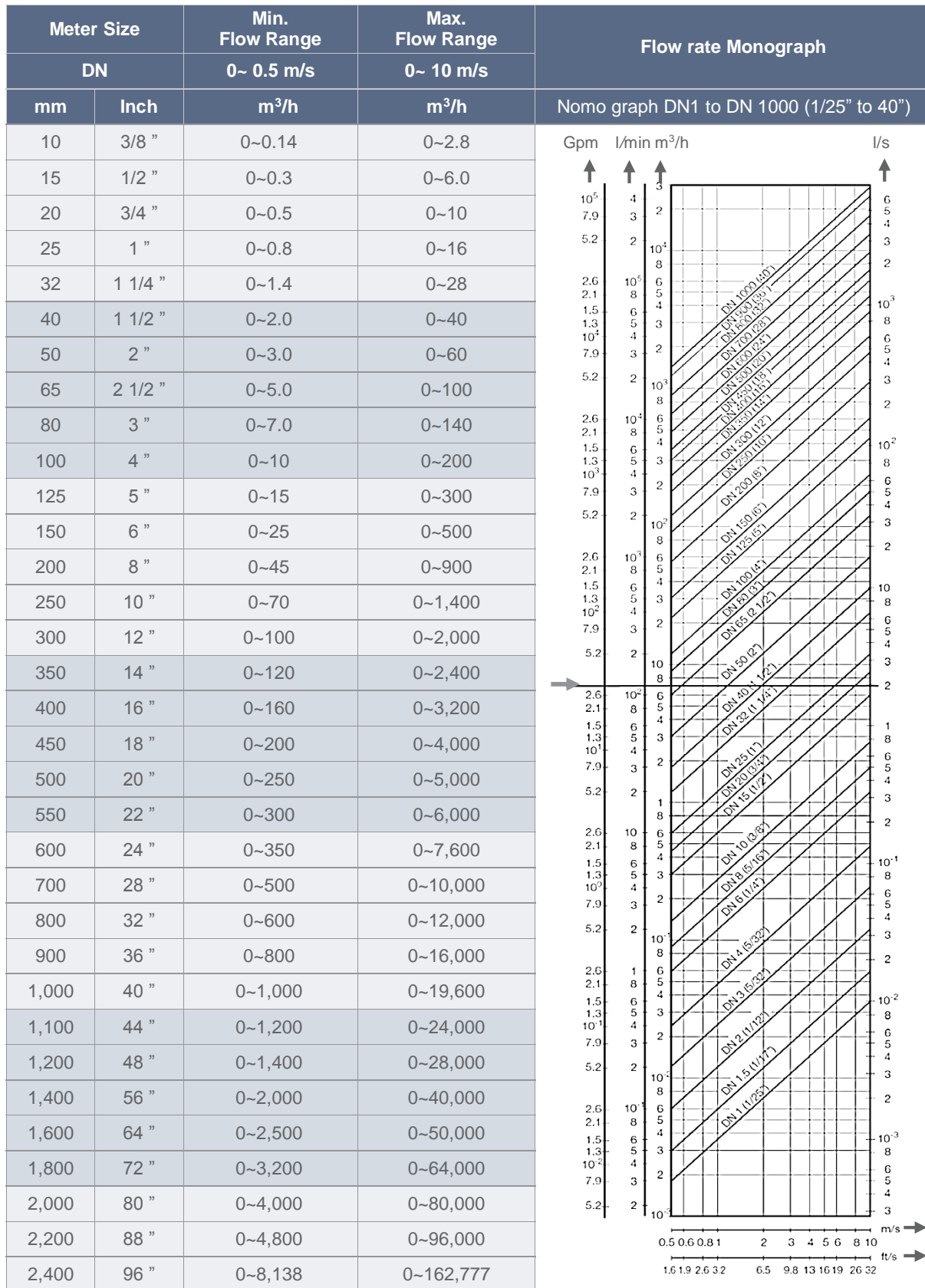
## Reference Condition

Temperature	
Process temperature	Chloroprene Rubber: -10~+80°C
	FEP: -40~+150°C
	PTFE liner: -10~+120°C
	Polyurethane: -10~+80°C
Ambient temperature (all versions)	-20~+60°C
Storage temperature	-20~+70°

Pressure	
EN 1092-1	DN2200~3000mm: PN 2.5
	DN1200~2000mm: PN 6
	DN200~1000mm: PN 10
	DN65~150mm: PN 16
	DN10~50mm: PN 40
	Other pressures on request
ISO insertion length	Optional for DN15~600mm
ASME B16.5	1"~24": 150 LB RF
	Other pressures on request
JIS	DN10~1000mm / DN 2"~40": 10 K
	Other pressures on request



Fluid	
Physical condition	Conductive liquids
Electrical conductivity	$\geq 5 \mu\text{S/cm}$
Permissible gas content (volume)	$\leq 50\%$
Permissible solid content (volume)	$\leq 70\%$



## Flow Ranges and Flow rate Monograph








➔ **Example:** Flow rate = 7 m<sup>3</sup>/h [30.82 gpm] (Maximum value = range end value). Suitable are flow meter sizes DN 20 to DN 65 [3/4" to 2 1/2"] for a flow velocity between 0.5 and 10 m/s [1.64 and 32.81 ft/s].

## Meters Styles

Economic Version    Code No.: <b>E</b>	
 DN10~100mm  DN125~500mm	<ul style="list-style-type: none"> <li>• <b>Diameter:</b> DN10~500mm</li> <li>• <b>Accuracy:</b> 0.5% of rate (Span: 0.5-10m/s), 0.5%FS (Span: 0-0.5m/s)</li> <li>• <b>Electrodes:</b> SS316L, Titanium, Tantalum, Hastelloy C, Tungsten Carbide</li> <li>• <b>Lining:</b> FEP (DN10~500mm), Rubber (DN125~500mm)</li> <li>• <b>Working Pressure:</b> DIN PN6~40bar</li> <li>• <b>Temperature:</b> Max 120 Deg C with remote converter</li> <li>• <b>Sensor Housing Material:</b> Aluminum (DN10~100mm), Carbon Steel (DN125~500mm)</li> <li>• <b>Main application:</b> Water processing, Waste water processing</li> <li>• <b>IP65</b></li> </ul>

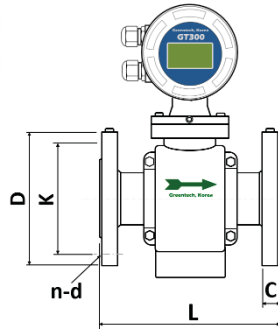
High Performance Version    Code No.: <b>H</b>	
 DN10~100mm  DN125~2400mm	<ul style="list-style-type: none"> <li>• <b>Diameter:</b> DN10~2400mm</li> <li>• <b>Accuracy:</b> 0.5% of rate (Span: 0.5-10m/s), 0.5% FS (Span: 0-0.5m/s)</li> <li>• <b>Electrodes:</b> SS316L, Titanium, Tantalum, Hastelloy C, Tungsten Carbide</li> <li>• <b>Lining:</b> FEP (DN10~500mm), Rubber (DN65~2400mm)</li> <li>• <b>Working Pressure:</b> DIN PN10~40bar</li> <li>• <b>Temperature:</b> Max 180 Deg C with remote converter</li> <li>• <b>Sensor Housing Material:</b> Aluminum (DN10~100mm), Carbon Steel (DN150~2400mm)</li> <li>• <b>Main application:</b> Power plant, Petrochemical plant, etc.</li> <li>• <b>Option:</b> IP65, IP67, IP68</li> </ul>

Selection	Thread Connection Code: <b>T</b>	Thread Connection Code: <b>TR</b>	High Pressure Version Code: <b>HP</b>	Wafer Version Code: <b>W</b>	All Stainless Version
Photo					
Diameter	DN25~100mm	DN25~100mm	DN10~200mm	DN25~200mm	DN10~200mm
Lining	FEP	FEP	FEP	FEP	FEP
Sensor Housing Material	SS304	SS304	Polished SS304, Full Welding	Carbon Steel, SS304	Polished SS304, Full Welding
Accuracy	0.5% of rate (Span: 0.5-10m/s), 0.5%FS (Span: 0-0.5m/s)				
Electrodes	SS316L, Titanium, Tantalum, Hastelloy C, Tungsten Carbide				

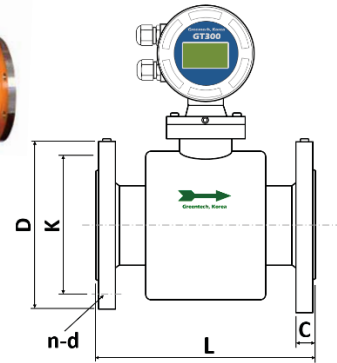


# Dimensions of Meter and Connection

## 1. Economic Version (DN10~500mm) - Code No.: E



Aluminum meter body (DN10~100mm)



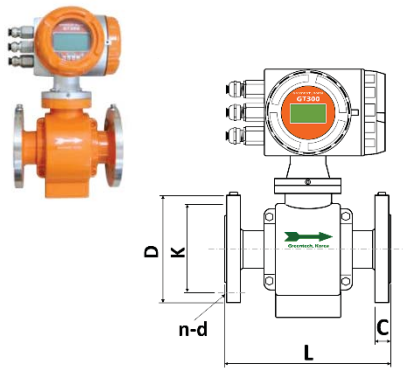
Carbon steel meter body (DN125~500mm)

Meter Size (DN)		Length	Dimensions (mm)											
			ANSI CL150				DIN PN6, 10, 16				JIS 10K			
Inch	mm	L	D	K	C	n-d	D	K	C	n-d	D	K	C	n-d
3/8	10	200	89	60.5	11.5	4-15.7	90	60	14	4-14	90	65	12	4-15
1/2	15	200	89	60.5	11.5	4-15.7	95	65	14	4-14	95	70	12	4-15
3/4	20	200	98	70	13	4-15.7	105	75	16	4-14	100	75	14	4-15
1	25	200	108	79.5	14.5	4-15.7	115	85	16	4-14	125	90	14	4-19
1 1/4	32	200	117	89	16	4-15.7	140	100	18	4-18	135	100	16	4-19
1 1/2	40	200	127	98.5	17.5	4-15.7	150	110	18	4-18	140	105	16	4-19
2	50	200	152	120.5	19.5	4-19	165	125	20	4-18	155	120	16	4-19
2 1/2	65	200	178	139.5	22.5	4-19	185	145	20	4-18	175	140	18	4-19
3	80	250	190	152.5	24	4-19	200	160	20	8-18	185	150	18	8-19
4	100	250	228	190.5	24	8-19	220	180	22	8-18	210	175	18	8-19

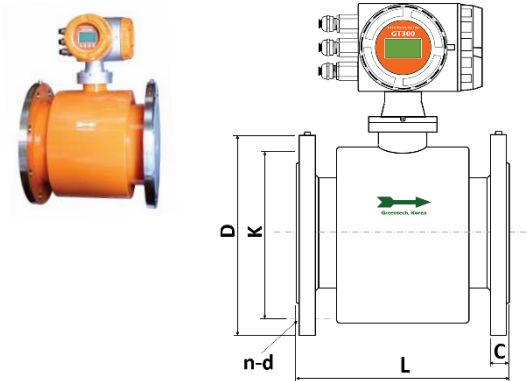
5	125	250	254	216	24	8-22.4	250	210	22	8-18	250	210	20	8-23
6	150	300	279	241.5	25.5	8-22.4	285	240	24	8-22	280	240	22	8-23
8	200	350	343	298.5	28.5	8-22.4	340	295	24	8-22	330	290	22	12-23
10	250	400	406	362	30.5	12-25.4	395	350	26	12-22	400	355	24	12-25
12	300	400	482	432	32	12-25.4	445	400	26	12-22	445	400	24	16-25
14	350	400	533	476	35.5	12-28.4	505	460	26	16-22	490	445	26	16-25
16	400	450	597	540	37	16-28.4	565	515	26	16-26	560	510	28	16-27
20	500	450	698	635	43	20-31.8	670	620	28	20-26	675	620	30	20-27



## 2. High Performance Version (DN10~2400mm) - Code No.: **H**



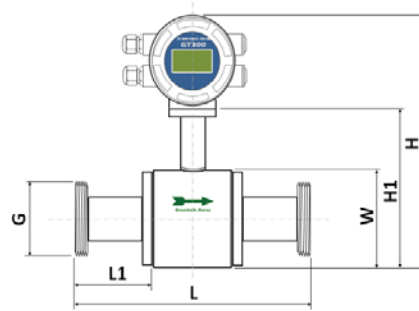
Aluminum meter body (DN10~100mm)



Carbon steel meter body (DN125~2400mm)

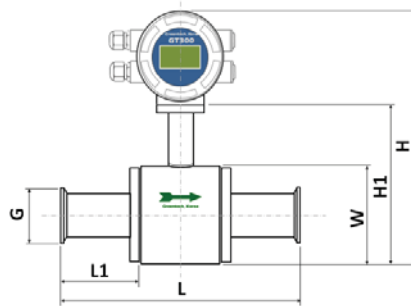
DN		PN	Dimension (mm) DIN Flange					Weight (Kg)
Inch	mm	MPa	L	D	K	C	n-d	
3/8	10	4.0	160	95	65	14	4-Ø 14	8
1/2	15	4.0	160	95	65	14	4- Ø 14	8.5
3/4	20	4.0	200	115	85	14	4- Ø 16	9
1	25	4.0	200	115	85	26	4- Ø 16	10
1 1/4	32	4.0	200	140	100	18	4- Ø 18	11
1 1/2	40	4.0	200	150	110	18	4- Ø 18	13
2	50	4.0	200	165	125	18	4- Ø 20	14
2 1/2	65	1.6	200	185	145	18	4- Ø 20	16
3	80	1.6	250	200	160	18	8- Ø 20	18
4	100	1.6	250	220	180	18	8- Ø 22	22
5	125	1.6	250	250	210		8- Ø 18	29
6	150	1.6	300	285	240	22	8- Ø 24	35
8	200	1.0	350	340	295	22	8- Ø 24	48
10	250	1.0	400	395	350	22	12- Ø 26	68
12	300	1.0	400	445	400	22	12- Ø 26	77
14	350	1.0	400	505	460	22	16- Ø 26	115
16	400	1.0	450	565	515	26	16- Ø 26	165
18	450	1.0	450	615	565	26	20- Ø 28	175
20	500	1.0	450	670	620	26	20- Ø 28	187
24	600	0.6	600	780	725	30	20- Ø 28	303
28	700	0.6	700	895	840	30	24- Ø 30	470
30	800	0.6	800	1010	95	30	24- Ø 32	500
36	900	0.6	900	1110	1050	34	28- Ø 34	700
40	1000	0.6	1000	1230	1100	36	28- Ø 34	921
48	1200	0.6	1200	1405	1340	33	28- Ø 34	1100
56	1400	0.6	1400	1630	1560	34	32- Ø 28	1285
60	1600	0.6	1600	1830	1760	36	36- Ø 34	1675
72	1800	0.6	1800	2045	1970	36	40- Ø 36	2050
80	2000	0.6	2000	2265	2180	39	44- Ø 38	2670
88	2200	0.6	2200	2475	2390	42	48- Ø 52	3250

### 3. Thread Connection - Code No.: **T**



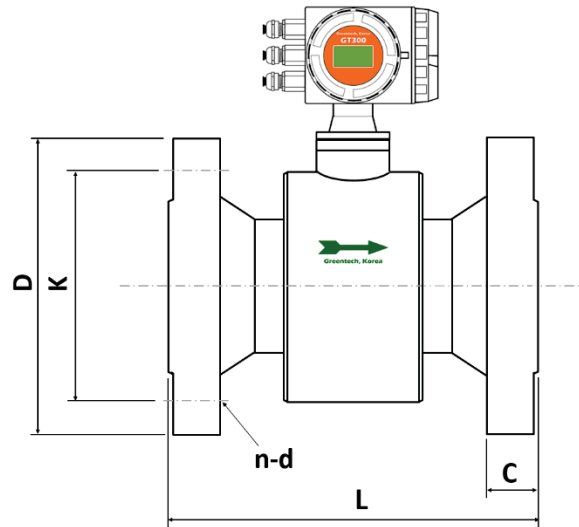
DN		PN	Dimension (mm) DIN Flange					
Inch	mm	MPa	G (DIN 11851)	L1	L	W	H1	H
3/8	10	4	RD 28 x 1/8"	73	214	88	158	268
1/2	15	4	RD 34 x 1/8"	73	214	88	158	268
3/4	20	4	RD 44 x 1/6"	73	214	88	158	268
1	25	4	RD 52 x 1/6"	61	190	88	158	268
1 1/2	40	4	RD 65 x 1/6"	90	280	113	183	293
2	50	4	RD 78 x 1/6"	92	284	113	183	293
2 1/2	65	2.5	RD 95 x 1/6"	96	292	139	209	319
3	80	2.5	RD 110 x 1/4"	121	362	151	221	331
4	100	1.6	RD 130 x 1/4"	125	380	202	272	382

### 4. Sanitary, Tri-clamp Connection - Code No.: **TR**

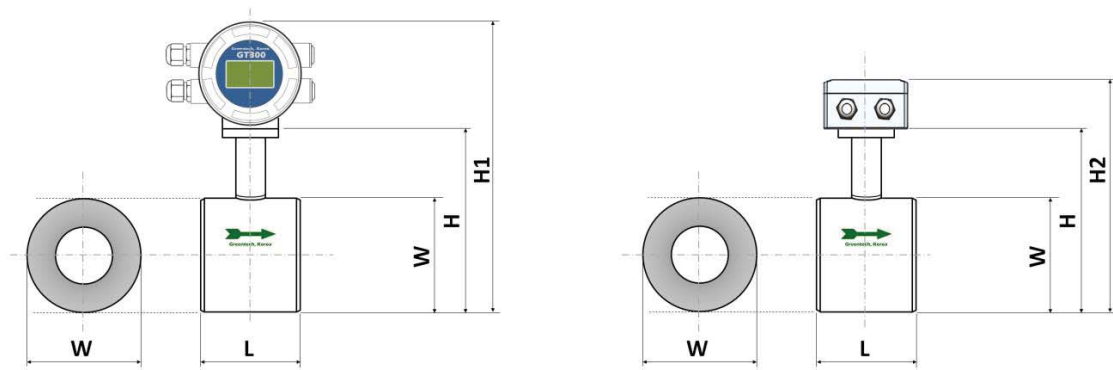


DN		PN	Dimension (mm) DIN Flange					
Inch	mm	MPa	G (BSP Male Thread)	L1	L	W	H1	H
3/8	10	4	R 1/2"	73	214	88	158	268
1/2	15	4	R 3/4"	73	214	88	158	268
3/4	20	4	R 1"	73	214	88	158	268
1	25	4	R 1 1/4"	61	190	88	158	268
1 1/2	40	4	R 1 1/2"	90	280	113	183	293
2	50	4	R 2"	92	284	113	183	293
2 1/2	65	2.5	R 2 1/2"	96	292	139	209	319
3	80	2.5	R 3"	121	362	151	221	331
4	100	1.6	R 4"	125	380	202	272	382

## 5. High Pressure Version - Code No.: **HP**

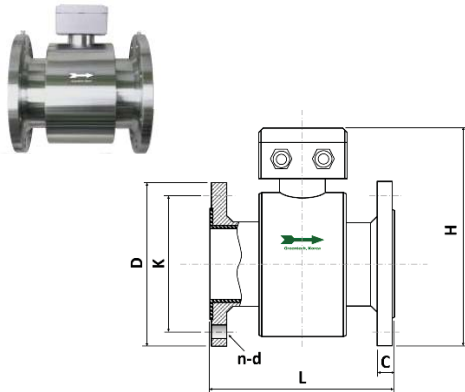


Meter Size		PN	Dimensions (mm) DIN Flange			
Inch	mm	(MPa)	L	D	K	n-d
3/8~1/2	10~15	16~25	200	120	82.5	4- Ø 22
3/4~1	20~25	16~25	225	150	101.5	4- Ø 26
1 1/4	32	16~25	225	160	111	4- Ø 26
1 1/2	40	16	225	170	125	4- Ø 22
		20~25	225	180	124	4- Ø 29.5
2	50	16	225	195	145	4- Ø 26
		20~25	225	215	165	8- Ø 26
2 1/2	65	2.5~4	200	185	145	8- Ø 26
		16	250	220	170	8- Ø 26
		20~25	250	245	190.5	8- Ø 29.5
3	80	2.5~4	250	200	160	8- Ø 18
		16	250	230	180	8- Ø 26
		25	250	265	203	8- Ø 32.5
4	100	2.5~4	250	235	190	8- Ø 22
		16	250	265	210	8- Ø 30
		25	250	310	241.5	8- Ø 35.5
6	150	2.5~4	300	300	250	8- Ø 26
8	200	1.6	350	340	295	12- Ø 22
		2.5	350	360	310	12- Ø 26
		4	350	375	320	12- Ø 30

**6. Wafer Connection - Code No.: W**

Meter Size		PN	Dimension (mm) DIN Flange					Weight (Kg)
Inch	mm	MPa	L	W	H	H1	H2	
1	25	4.0	68	64	134	244	199	1.8
1 1/4	32	4.0	68	64	134	244	199	2.2
1 1/2	40	4.0	78	82	152	262	217	2.6
2	50	4.0	100	100	170	280	235	4.2
2 1/2	65	4.0	100	113	183	293	248	5
3	80	4.0	120	130	200	310	265	6
4	100	1.6	130	156	226	336	291	9.5
5	125	1.6	150	180	250	360	315	12
6	150	1.6	170	210	280	396	345	15
8	200	1.6	200	266	336	446	401	20

## 7. Remote Version:



A) Surface Mounting: **RS** (RT100)



B) 2" Pipe Mounting: **RP**

Meter Size		ANSI	Dimension (mm)					
Inch	mm	Class	L	H	D	K	C	n-d
1/2	15	CL150	200	188	89	60.5	11.5	4-Ø 15.7
3/4	20	CL150	200	193.5	98	70	13	4-Ø 15.7
1	25	CL150	200	198.5	108	79.5	14.5	4-Ø 15.7
1 1/2	40	CL150	200	207.5	117	89	16	4-Ø 15.7
2	50	CL150	200	212.5	127	98.5	17.5	4-Ø 15.7
2 1/2	65	CL150	200	225.5	152	120.5	19.5	4-Ø 19
3	80	CL150	200	246.5	178	139.5	22.5	4-Ø 19
4	100	CL150	250	262	190	152.5	24	4-Ø 19
5	125	CL150	250	319	254	216	24	8-Ø 22.4
6	150	CL150	300	345	279	241.5	25.5	8-Ø 22.4
8	200	CL150	350	406.5	343	298.5	28.5	8-Ø 22.4
10	250	CL150	400	450.5	406	362	30.5	12-Ø 25.4
12	300	CL150	400	535.5	482	432	32	12-Ø 25.4
14	350	CL150	400	591	533	476	35.5	12-Ø 28.4
16	400	CL150	450	643	597	540	37	16-Ø 28.4
18	450	CL150	450	693	635	578	40	16-Ø 31.8
20	500	CL150	450	759	698	635	43	20-Ø 31.8

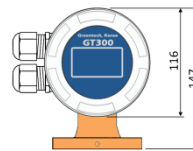
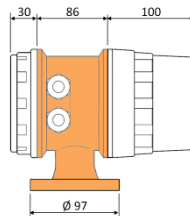
# Basic Specifications and Dimension of Transmitting Signal Converters

*(We sell signal converter only without being mounted any meters)*

## 1. Economic Version: **S400**



- Matched Size: **DN10~500mm**
- 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: **RS-485 (Modbus)**



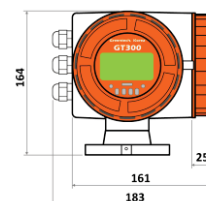
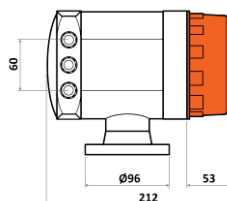
## 2. High performance version: **S200**



- Matched Size: **DN10~2400mm**
- 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: **RS-485 (Modbus), Infrared remote control.**
- Option: **HART, Profibus.**
- Power consumption: **Less than 20W**
- Option: **Data logger, Total flow: Daily, Monthly, Yearly.**



Cooling pin



### 3. Explosion Proof Version: **EX400**



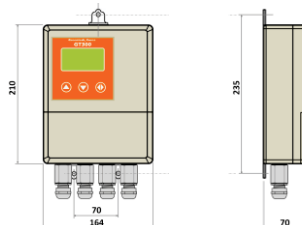
- Matched Size: **DN10~2400mm**
- Power Supply: **85~240VAC, 20~36VDC**
- Accuracy: **0.5% of rate (Span: 0.5~10m/s), 0.5%FS (Span: 0~0.5m/s)**
- Exciting current: **187mA**
- Menu Language: **English**
- Display: **Forward and Reverse Flow rate, Total flow, Velocity**
- Alarm Function: **Empty Pipe Alarm, System, Alarm, Contact alarm**
- Signal Output: **Pulse, Frequency, 4-20mA (4 wire or 2 wire)**
- Communication: **RS-485 (Modbus), HART, Profibus**
- Option: **Data logger, Total flow: Daily, Monthly, Yearly.**

### 4. Remote Version:

#### A) Surface Mounting: Code No.: **RS (Model: RT100)**



- Matched Size: **DN10~2400mm**
- 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: **RS-485 (Modbus), HART, Profibus**
- Option: **Data logger, Total flow: Daily, Monthly, Yearly.**



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



- Matched Size: **DN10~2400mm**
- 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: **RS-485 (Modbus), HART, Profibus**
- Option: **Data logger, Total flow: Daily, Monthly, Yearly.**



## 5. Battery type Signal Converter:

### A) Battery type: **BT800**



- Matched Size: **DN10~2400mm**
- 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: **DN10~2400mm**
- 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**
- **GPRS/CDMA communication**



## Ordering Code

Please select ordering codes of meter and converter, separately.

### 1. Selection codes of Flow meter

Code: GT300 - □ - □ - □ - □ - □ - □ - □ - □		Description
Meter Style	E	Economic version (DN10~500mm only)
	H	High performance flange version (DN10~2400mm)
	T	High performance thread connection version (DN25~100mm),
	TR	High performance sanitary, Tri-clamp connection (DN25~100mm)
	HP	High performance, High pressure version (DN10~200mm)
	W	High performance wafer version (DN25~200mm)
Meter size	-XXX	Nominal size DN10~2400 mm
Flow sensor Housing material	A	Aluminum (DN10~100mm)
	CS	Carbon steel (More than 125mm)
	S	SS304 (DN10~200mm)
Electrodes Material	L	SS316L
	TI	Titanium
	TA	Tantalum
	H	Hastelloy
	TU	Tungsten Carbide
	PT	Platinum-Iridium
Lining Material	C	Chloroprene Rubber (DN125~2400mm)
	F	FEP (DN10~500mm)
	P	Polyurethane
	O	Customization
Process Connection	C	Carbon steel Flange
	S ( )	Stainless steel Flange (04: SS304. 06: SS316)
	T	Thread connection (DN10~100mm)
	W	Wafer connection (DN10~200mm)
	TC	Tri-clamp connection (DN10~100mm)
Flange Norm. & Working pressure	W	Wafer connection: No flange.
	-D ( )	DIN PN. 0.6, 1.0, 1.6, 2.0, 2.5, 4.0, 16, 25, 35, 42MPa
	-A ( )	ANSI CL150, CL300, CL600, CL900, CL1500, CL2500
	-J ( )	JIS 10K, 20K, 30K
	-X ( )	Please mark the connection type and size
Liquid temperature	L	E: <60°C (Short time can up to 80°C), H: <80°C
	T	<120°C (Integral type with cooling pin: High performance only)
	S	<120°C (Only remote type): Economic version: <80~100°C
	E	<180°C (Integral type with cooling pin: High performance only)
	H	<180°C (Only remote type: High performance only)
Flow sensor protection Class	A	IP65
	B	IP67 ( H code only)
	C	IP68 ( H code only)

## 2. Selection codes of Transmitting Signal Converter

Signal converter type	<b>S400</b>	Economic version only
	<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>EX400</b>	Explosion proof version (0.5% of reading value) : High performance version only
	<b>RT100</b>	Remote surface mounting (0.5% of reading value) - Code: <b>RS</b> , High performance version only
Mounting Construction	<b>-I</b>	Integral direct mounting
	<b>-R ( )</b>	Remote mounting – ( <b>S</b> ): Surface mounting, ( <b>P</b> ): 2" Pipe mounting. (RT100: Surface mounting only) (S200, S400, EX400-pipe and Surface mounting)
Enclosure	<b>A</b>	IP65
	<b>C</b>	IP67 ( H code only)
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 or 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, RT-100, EX400
	<b>-H</b>	HART: Only option for S200, EX400
	<b>-I</b>	Infrared remote controller.(S200 only)
	<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>-5</b>	XX meters. (Remote type). Standard: 5 meter. Please mark your cable meters here.

**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.

## Technical information

*The model selection of the electromagnetic flowmeter is preferably performed by a technician who is familiar with on-site technological conditions. The technician shall select proper aperture, lining material and electrode and so on according to the measurable range table in the type selection material, and the selection is preferably confirmed by an end user who is familiar with the on-site technological conditions*

### Selecting flow meter type:

#### Integral type and the Remote split type

Both integral type and remote split type have their own advantages, and basic principles for selection are as follows: the split type is usually used in situations inconvenient for one-site maintenance and numerical reading when debugging is difficult or the flow meter is often immersed in water and with other functions. It is also used in poor application situations, such as high temperature fluid, a position with vibration source and explosive environment. In most cases, both the integral type and the remote split type can meet use requirements.

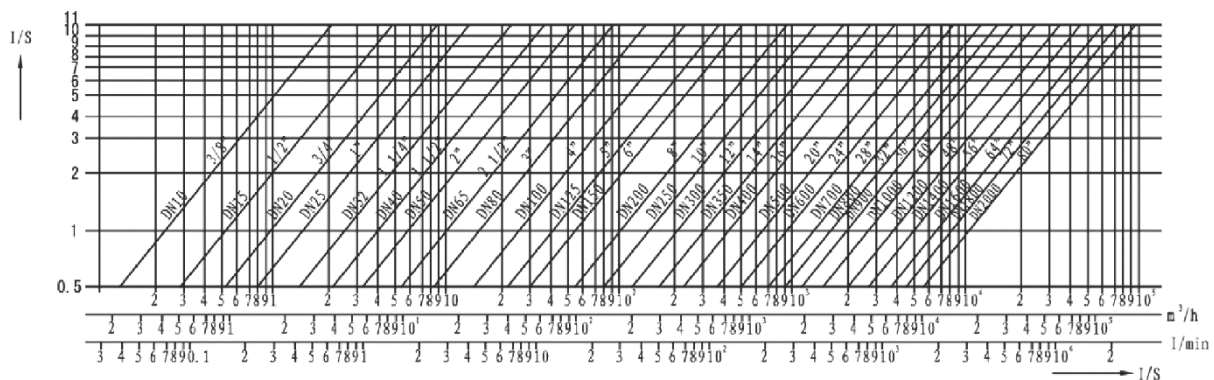
#### General type and explosion-proof type

Users shall confirm to select a general type or an explosion-proof type according to application environment of the flow meter.

### The diameter of the sensor and that of technological pipeline:

Generally, it's suggested not to select reducing pipe for the sake of convenient installation, provided that the use flow in the flow meter pipe shall be within the range of 0.3m/s~10m/s. This kind of selection is usually applicable to a newly-designed project for which current work situation is not only considered when choosing a flow speed, but also a situation of running at full load of the device in the future shall also be considered. For the relationships among the flux, velocity and diameter, see curve graph. However, sometimes we also choose a sensor with a different diameter with the connected technological pipeline diameter, for example:

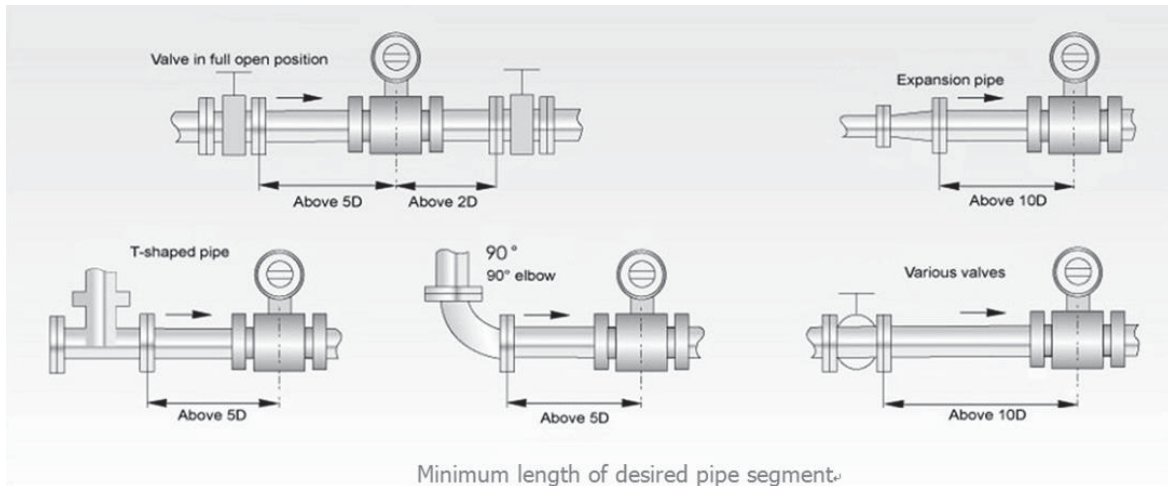
1. The velocity in the pipeline is low and the process flux is stable. In order to meet the demand of instrument for flux range and improve local velocity of the flow meter, select a sensor with smaller diameter than the technological pipeline and additionally connect a reducing pipe at front and rear part of the sensor.
2. In terms of large diameter electromagnetic flow meter, the larger the diameter is, the higher the price will be.. As for the situations with low velocity in the pipeline and stable technological parameter, small diameter flow meter may be chosen. This not only runs the flow meter under good working state, but also reduces investment cost.



Curve Chart of the Relationships among the Diameter Velocity and Flux of Flowmeter

### Length of straight pipe segment:

To guarantee the upstream pipeline condition required for achieving high measurement precision of electromagnetic flow meter, pipeline condition as shown in following figure are recommended according to standards above and measured data of pipeline condition.



### Notes for additionally installing a reducing pipe:

#### Selection of a reducing pipe cone angle

For not mapping distribution of flow field after installing the reducing pipe, and not influencing precision of the electromagnetic flow meter, the reducing pipe can be regarded as one part of the straight pipe segment. The central cone angle  $\alpha$  of the reducing angle shall be no more than 15 degrees, and the smaller the better.

#### Installing a reducing pipe will cause pressure loss

Total pressure loss composes pressure loss in the gradual contraction pipe by three parts:

Pressure loss of a gradual contraction pipe  $\Delta P_1 = \rho/2 \xi_1 V_1^2$

Pressure loss of a gradual enlargement pipe  $\Delta P_3 = \rho/2 \xi_3 V_2^2$

Pressure loss in the sensor measurement pipe  $\Delta P_2 = \rho/2 \xi_2 V_2^2$

The total pressure loss is:

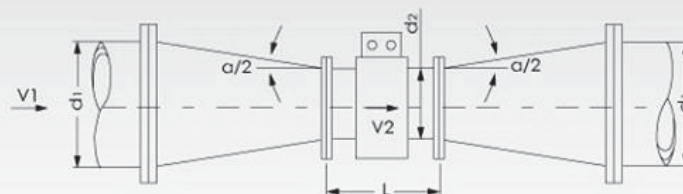
$$\Delta P = 0.01 (\Delta P_1 + \Delta P_2 + \Delta P_3) \text{ (mbar)}$$

Where,  $\rho$  is a medium density, whose unit is  $\text{kg/m}^3$

$\xi_1$   $\xi_3$  are respectively coefficients related with the Reynolds number of reducing pipe and increasing pipe.

$\xi_2 = 0.02$  is coefficient of sensor measuring pipe.

$V_1$  and  $V_2$  are respectively velocities in the technological pipeline and sensor measurement pipe, whose unit is m/s.

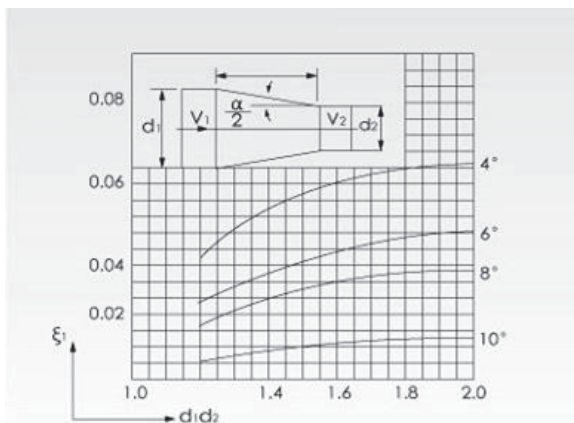
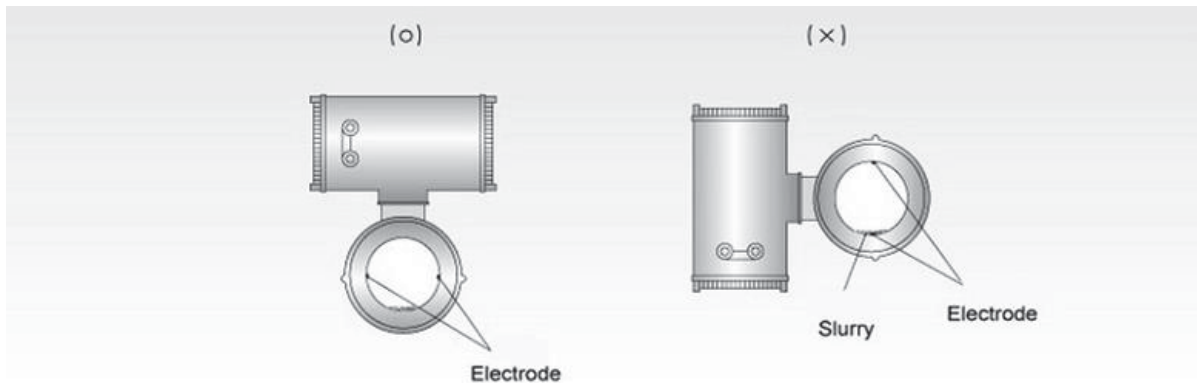


E.g. the value of  $\zeta$  when  $\alpha=80$

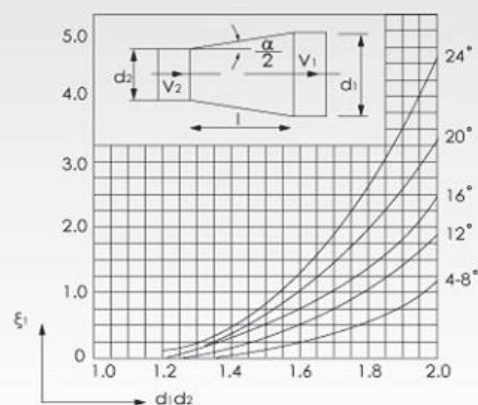
$d_1/d_2$	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
$\zeta_1$	0.018	0.023	0.0255	0.028	0.03	0.0308	0.0315	0.0323	0.0332
$\zeta_3$	0.01	0.02	0.07	0.15	0.26	0.43	0.64	0.9	1.25

## Installation direction:

When installing an electromagnetic flow meter, generally speaking, the axis line of the electrode shall be approximate level in horizontal installation; if the axis line of the electrode is perpendicular to the ground, bubbles will be easily collected near the electrode located on the upper side, the electrode located at lower side and stopping the liquid contacting with the same is covered by slurry. The converter shall be installed above the pipeline to prevent water from entering the converter.



Gradual contraction pipe



Gradual enlargement pipe

The positive direction in which fluid flows is generally in the same direction as the arrows in the sensor. There must be an enough installation and maintenance space close to the flow meter to prevent the flow meter from being vibrated. During installation of the flow meter, supports for supporting pipelines should be provided on the two sides of the flow meter. Stress is prevented from being affected because of pipeline vibration, impact and shrinkage. For heavy polluted fluid, a consideration that a flow meter is installed on the pipeline should be given.

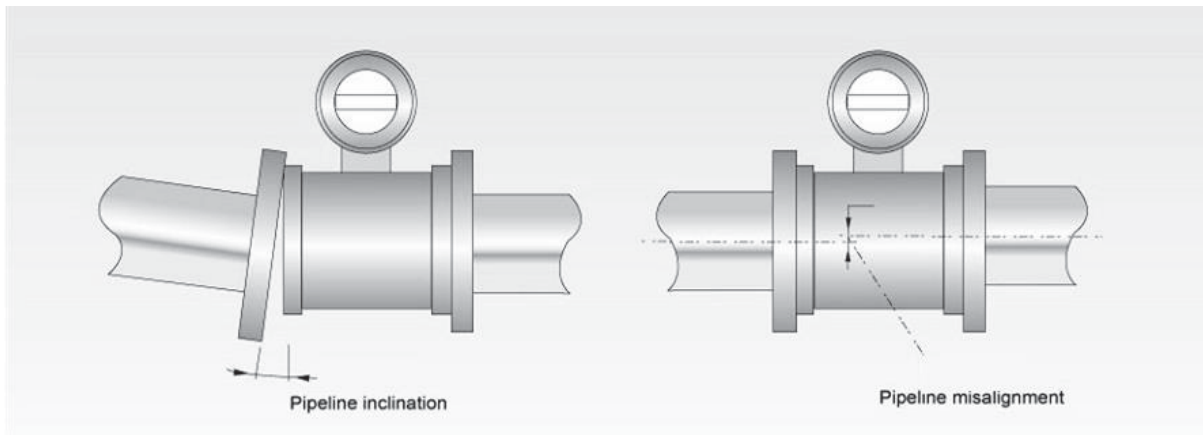
*Electromagnetic flowmeter must work in full pipe conditions; that is to say, the flowmeter cannot normally work in part-filled pipe or empty pipe conditions.*

## Flow meter piping:

Misalignment or inclination of pipeline is a reason why the pipeline flange bounces and breaks.

- (1) During installation of flow meter, misalignment or inclination of pipeline, and installation distance deviation between two flanges should be corrected first.
- (2) During installation of flow meter, generally there are some foreign matters (e. g. welding slag and scraps) within pipeline road. Prior to installing the flow meter, these impurities should be washed away.





### ■ Conductivity of fluids:

Electromagnetic flow meter cannot be installed where the conductivity of fluids is very uneven. In particular when chemicals are injected from the upstream of the instrument, it is very easy to cause unevenness of conductivity, thereby seriously interfering the measurement of flowmeter. In this case, we recommend that chemicals should be injected from the downstream of the instrument. If chemicals must be injected from the upstream of the instrument, a straight pipe section which is long enough must be installed to ensure that fluids are mixed well.

### ■ Liquid sealant:

The following points should be mentioned during using fluid sealant;

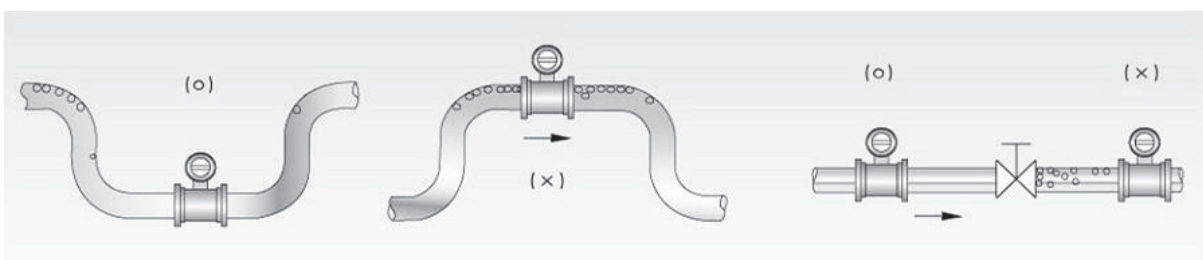
Don't let it cover the surfaces of electrode and grounding ring because this will influence the measurement of fluid flow.

### ■ Adopting throttle valves and bypass valves:

For convenient maintenance and zero setting, throttle valves and bypass valves are suggested to adopt.

*Ensuring no bubble in flowmeter*

Pipeline design should ensure that no bubble can be separated from fluid. Generally, the flow meter should be installed in the upstream of the valve, because the pressure in the pipeline is reduced under the action of the valve, thereby producing bubble.





### Selection of electrode materials:

Electrode materials should be selected according to corrosiveness of measured medium, and selected by users familiar with site conditions. In general, the corrosion resistance of electrode material is higher than that of pipeline material by one grade. For ordinary media, please consult related anti-corrosion manuals. For media having complex components such as mined acid, coupon tests should be done.

### Properties of electrode material (for reference only):

Electrode material	Properties of measured material (for reference only)	Corrosion reference
316 TI	Domestic water, industrial water, raw well water, urban sewage, weak corrosive acid, alkali, salt solutions.	
Hastelloy alloy B (HB)	Hydrochloric acid (concentration less than 10%), and other non-oxidizing acids Sodium hydroxide (concentration less than 50%), all concentrations of alkali-ammonium hydroxide solution Phosphoric acid, organic acids	Not apply to nitric acid
Hastelloy alloy C (HC)	Mixed acids such as chromic acid and sulfuric acid solution Oxidizing salts such as Fe <sup>+++</sup> , Cu <sup>++</sup> , water	Not apply to hydrochloric acid
Titanium	Salts, such as (1)chloride (ammonium oxide/calcium/magnesium/ Aluminum/iron/etc) (2) the sodium salt, potassium salt and ammonium salt and sodium hypochlorite salts, as well as potassium hydroxide, ammonium hydroxide, barium hydroxide caustic soda solution with sea water concentrations less than 50%	Not apply to hydrochloric acid, sulfuric acid, phosphoric acid, hydrofluoric acid and other reducing acid
Tantalum	Hydrochloric acid (concentration less than 40%). dilute sulfuric acid and concentrated sulfuric acid (not including oleum) Chlorine dioxide, ferric chloride, hypochlorite, sodium hydroxide, lead acetate Nitric acid (including fuming nitric acid) and other oxidizing acid, aqua regia with temperature below 80 degrees centigrade	Not apply to alkali and hydrofluoric acid
Platinum	Almost all of the acid, alkali, salt solutions (including fuming sulfuric acid, fuming nitric acid)	Not apply to aqua regia, ammonium salt
Tungsten Carbide	Pulp, sewage, solid particles with anti-interference property	Not apply to inorganic acids, organic acids, chlorides

### Selection of grounding ring material:

Grounding ring material can be the same as the electrode material; generally material with the same corrosion resistance as the pipeline material is selectable.

### Selection of lining material:

Lining material should be selected according to the type and working temperature of measured fluid. PFA is a fluorinated plastic, has good corrosion resistance to strong acid, strong alkali, at the same time has good high temperature resistance, does not deform at high temperature. Insulation resistance is not reduced. 99.9% high purity alumina is used for making ceramic lining so that the instrument can measure the flow with high precision.

In comparison with traditional high polymer material, ceramics cannot create high temperature, high pressure deformation, and have good wear resistance.

## Selection of protection grade:

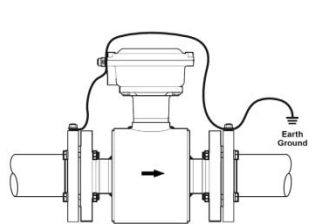
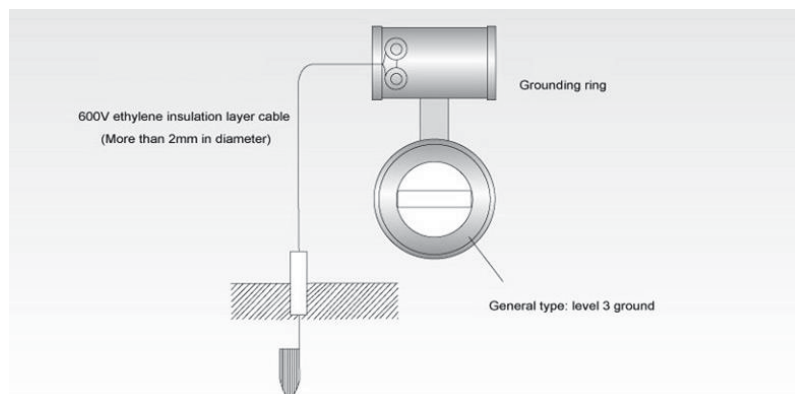
Degrees of protection provided by enclosure are as follows according to GB4208-84, International Electro-technical Commission (IEC) standards (IEC529-76):

IP65 is an anti-spray type, i.e. a water faucet is allowed to spray water to the instrument in any direction. The pressure of spray water is 30KPa (0.3bar). Water yield is 12.5 liters/minute. The distance between spray water and the instrument is 3m. IP67 is an anti-immersing type, i.e. the instrument can be totally immersed in the water in a short time. The highest point is 150cm below the water during test. The duration time is 30min. IP68 is a submerged type, which can work in the water for a long period. The maximum depth immersed is negotiated by manufacturers and users.

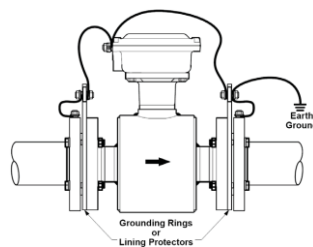
The selection principles of protection grade are determined by the abovementioned requirements and actual working conditions of the instrument. If the instrument is installed underground and often immersed under water, it's suggested to select IP68. If the instrument is installed above the ground and the environment is not wet, choose IP65.

## Sensor ground:

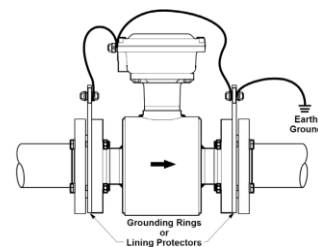
Because the voltage of sensing signals of the electromagnetic flow meter is small, it is easily affected by the noise. The reference potential must be the same as the measured fluid. So the reference potential (terminal potential) of the sensor, the reference potentials of converter and amplifier are the same as the measured fluid. And the fluid potential should be the same as the ground potential. The electromagnetic flow meter is equipped with a grounding ring, which plays a role in establishment of fluid ground by contacting the fluid, at the same time, protecting the lining. The instrument ground is as shown below:



No Grounding Options or  
Grounding Electrode in Lined Pipe



Grounding with Grounding Rings  
or Lining Protectors



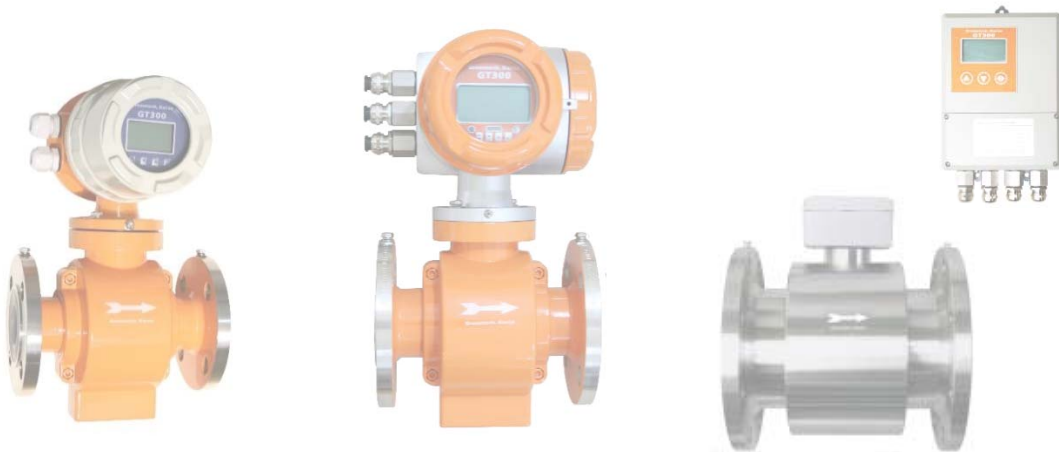
Grounding with Grounding Rings  
or Lining Protectors

## Noise suppression:

The electromagnetic flow meter cannot be installed near the motor, transformer or other power supplies easy to cause inductive interference.

## Main properties and application range of electromagnetic flow meter lining:

Lining	Material	Main Properties	Application Range of Lining	Examples of Measurable Media	Notes
Teflon	PTFE	<ol style="list-style-type: none"> <li>1. Chemical stability is good, but chlorine element and metal sodium in the melting state have a certain corrosion resistance to the product.</li> <li>2. It is hydrochloric acid, sulfuric acid and aqua regia-resistant and organic solvent has no effect on it.</li> <li>3. Bad wear resistance and adhesive properties, excellent electrical insulating property, but bad corona resistance.</li> </ol>	<ol style="list-style-type: none"> <li>1. Long term usage temperature of the flowmeter is -10 ~+120°C</li> <li>2. For use in measurement of most of strong corrosive media such as strong acid, alkali, oxidant, but not suitable for KOH, nitric acid, hydrofluoric acid, etc.</li> <li>3. Health media</li> </ol>	<ol style="list-style-type: none"> <li>1. Hydrochloric acid, sulfuric acid, aqua regia.</li> <li>2. Other most strong acids, alkalis and</li> </ol>	<ol style="list-style-type: none"> <li>1. Not suitable for KOH, nitric acid, hydrofluoric acid.</li> <li>2. Generally not for use in measurement of electrolyte, e. g. NaCl solution from electrolytic tank.</li> <li>3. Not suitable for media with solid particles.</li> </ol>
	FEP	<ol style="list-style-type: none"> <li>1. Its chemical stability, electrical insulation property, lubricating property, non-stick property and incombustibility are similar with PTFE (F4), but the strength, aging resistance, temperature resistance and low temperature flexibility of FEP material are superior to PTFE.</li> <li>2. Adhesion with metal is good; wear resistance is better than PTFE.</li> <li>3. High tearing resistance</li> </ol>	<ol style="list-style-type: none"> <li>1. Long term usage temperature of the flowmeter is -40~+150°C</li> <li>2. For use in measurement of most of strong corrosive media such as strong acid, alkali, oxidant, but not suitable for KOH, nitric acid, hydrofluoric acid, etc.</li> <li>3. Health media</li> </ol>	<ol style="list-style-type: none"> <li>1. Hydrochloric acid, sulfuric acid, aqua regia.</li> <li>2. Other most strong acids, alkalis and oxidants.</li> <li>3. Media with less fine particles.</li> </ol>	<ol style="list-style-type: none"> <li>1. Not suitable for KOH, nitric acid, hydrofluoric acid.</li> <li>2. Generally not for use in measurement of electrolyte, e. g. NaCl solution from electrolytic tank.</li> </ol>
	PFA	<ol style="list-style-type: none"> <li>1. Its chemical stability, electrical insulation property, lubricating property, non-stick property and incombustibility are similar with FEP(F46), but the strength, aging resistance and temperature resistance of PFA material are superior to PTFE, FEP.</li> <li>2. Adhesion with metal is good; wear resistance is better than PTFE, FEP</li> <li>3. Low smoke, fire resistance, high temperature resistance. High temperature mechanical strength is two times higher than PTFE.</li> </ol>	<ol style="list-style-type: none"> <li>1. Long term usage temperature of the flowmeter is -40~+160°C</li> <li>2. For use in measurement of most of strong corrosive media such as strong acid, alkali, oxidant, but not suitable for KOH, nitric acid, hydrofluoric acid, etc.</li> <li>3. Health media</li> </ol>	<ol style="list-style-type: none"> <li>1. Hydrochloric acid, sulfuric acid, aqua regia.</li> <li>2. Other most strong acids, alkalis and oxidants.</li> <li>3. Media with less fine particles.</li> <li>4. Beer, saponified liquefied gas, etc.</li> </ol>	<ol style="list-style-type: none"> <li>1. Not suitable for KOH, nitric acid, hydrofluoric acid.</li> <li>2. Generally not for use in measurement of slurry, coal pulp and core pulp.</li> </ol>
Polyurethane Rubber		<ol style="list-style-type: none"> <li>1. Excellent wear resistance, good oil resistance.</li> <li>2. High strength good tearing resistance, bad acid and alkali resistance.</li> <li>3. Bad heat resistance, generally 60°C</li> </ol>	<ol style="list-style-type: none"> <li>1. Long term usage temperature is generally -10~+80°C</li> <li>2. Good wear resistance, suitable for fluid containing solid particles.</li> <li>3. Not for use in measurement of water containing organic solvent.</li> </ol>	<ol style="list-style-type: none"> <li>1. Neutral and strong wearing ore pulp, coal pulp and mud.</li> <li>2. Domestic water, industrial water, sewage and sea water.</li> </ol>	<ol style="list-style-type: none"> <li>1. The temperature of fluid ranges between 0 and 40°C</li> <li>2. Generally not for use in measurement of media of organic solvent.</li> </ol>
Chloroprene Rubber		<ol style="list-style-type: none"> <li>1. Good elasticity and tearing resistance, oil resistance.</li> <li>2. Bad aging resistance, its brittleness temperature is -28°C</li> <li>3. Wear resistance is inferior to polyurethane rubber.</li> <li>4. Corrosion resistance to ordinary low concentration acid, alkali and salt media, non-corrosion resistance to oxidizing media.</li> </ol>	<ol style="list-style-type: none"> <li>1. Long term usage temperature is -10~+80°C</li> <li>2. Slight pollution because anti-aging agent is contained therein.</li> <li>3. Suitable for measurement of low concentration acid, alkali, salt media and sewage.</li> </ol>	<ol style="list-style-type: none"> <li>1. Normal water, sewage</li> <li>2. Slurry, ore pulp</li> </ol>	<ol style="list-style-type: none"> <li>1. Not for use in measurement of food.</li> <li>2. Not suitable for measurement of strong acid, alkali, oxidizing media.</li> </ol>
Ceramics		<ol style="list-style-type: none"> <li>1. Non-deformation at high strength, high temperature and high pressure.</li> <li>2. Unique platinum-alumina metal ceramic electrode.</li> <li>3. Good anti-slurry and anti-noise ability, suitable for permeable fluid.</li> <li>4. Good wear resistance, which is ten times the polyurethane.</li> </ol>	<ol style="list-style-type: none"> <li>1. Suitable for high-temperature high-pressure fluid, viscous fluid, corrosive fluid.</li> <li>2. Permeable fluid, slurry containing solid particles.</li> </ol>	<ol style="list-style-type: none"> <li>1. Slurry containing hard solid, corrosive fluid, viscous fluid, high-temperature high-pressure fluid.</li> <li>2. Chromium sulfate, 25% of sodium, hypochlorite, nitric acid, etc.</li> </ol>	<ol style="list-style-type: none"> <li>1. Not suitable for hydrofluoric acid, nitric acid, aqua acid, NaOH, 70% concentration of sulfuric acid.</li> <li>2. Not for use in partial salt substances such as copper sulfate, sodium bicarbonate.</li> </ol>



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