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Gear flowmeter selection guide

Gear Flowmeter Technical Manual

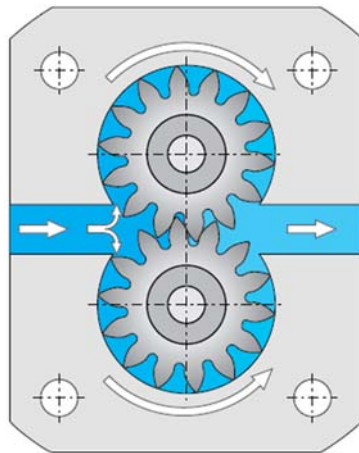


Higher precision
comes from our repetitive insistance

Description of principle

Gear Flowmeter, also known as positive displacement flowmeter (PD Flowmeter for short), is featured by relatively high precision among flow instruments.

The gear flowmeter applies the pressure difference, generated by the liquid while it flows through the flowmeter chamber, to push a pair of gears to be engaged, and such two gears are exactly matching with each other and are enclosed in a precision machined chamber. Chambers of the same volume will be formed between each gear root and measuring chamber. The gear rotates to cut the liquid into the liquid of single and known volume. The total volume of liquid is measured by the number of times of repetitive charge of the liquid into and discharge from the chamber. In a word, it is similar to “bailing out water with a water ladle”.



Set the circulating volume of flowmeter as v , the number of revolution of the gear in a certain period of time as N , and the volume of liquid flowing through the flowmeter in unit time as V , then:

$$V = Nv$$

Non-contacting sensor generates a pulse (P) by inducing a gear. The extracted signal will be displayed in form of square wave output signal via digitalization of signal amplifier. The square wave output signal can be processed by any external electronic products (e.g. PLC and IC), for display of instantaneous flow rate and accumulative volume via a local display instrument or wireless remote transmission or other forms of presentation by means of GPRS and so on.

Product characteristics

High measuring precision and repeatability(read value: $\pm 0.5\%$, repeatability: 0.1%);

High and low temperature resistant(-196°C - 200°C) (Please contact our customer service staff for High and low temperature customization);

Wide range ratio of 1: 150;

High resolution (10-16P/rpm);

Multiple signal output types (pulse, analog quantity, 485 and Hart);

Available for highly corrosive liquid (sulfuric acid, hydrofluoric acid, etc.);

Available for high viscosity medium (e.g. syrup, pitch and honey).

Application area

Available for any liquid having lubricating property and processed by usable pumps (centrifugal pump, peristaltic pump and diaphragm pump, etc.), for example, diesel, lubricating oil, hydraulic oil and other lubricating oils.

Automobile industry:

Brake system test bench, engine fuel consumption measurement and polyurethane foam for filling;

Monitoring on coolant of new energy engine system;

Paint spraying system;

Steering system (dosing and filling of engine oil, brake liquid, antifreeze and preservative liquid);

Adhesive coating for windshield and engine hood and so forth.

Hydraulic:

Volume and flow rate measurement;

Leakage monitoring.

Dosing and filling:

Monitoring on two-component A and B and mixing ratio.

Chemical industry:

Mixing and filling;

Hydrofluoric acid and highly corrosive chemical material filling;

Dropping into reaction kettle.

Measurement and control of high viscosity product:

Asphalt, ink, honey and syrup.

Air conditioning industry:

Refrigerant R143a.

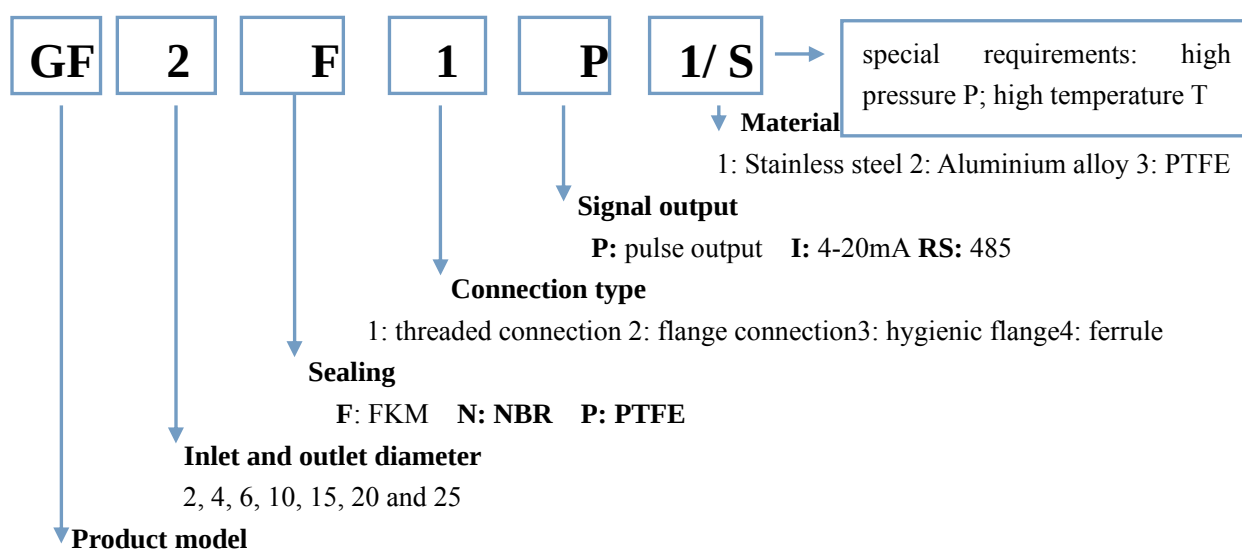
Technical Specification Sheet

Measuring medium	Liquid
Executive standard	JB/T9242-2015 Positive Displacement Flowmeters for Liquids-General Technical Requirements
Medium viscosity	5...500mm ² /s
Environment temperature	-40...85°C
Medium temperature	-40...80°C, 200°C for high-temperature type (custom-made)
Pressure	50bar for aluminum/100bar for stainless steel (custom-made 400bar for high pressure)
Precision	Read value: +/-0.5%, read value: (within measuring range of 1: 20), read value: +/- 1% (full measuring range), (the data above is based on liquid having the viscosity of 20cst)
Repeatability	Read value: +/-0.1%
Working voltage	9-26VDC
Explosive-proof grade	ExdIIct6Gb
Protection grade	IP65
Output signal	Analog quantity(4-20mA, 1-5V and 2-10V), impulse frequency 5Khz (Max)
Communication mode	RS485, supported standard: Modbus-RTU protocol, Hart GPRS Bluetooth
Electrical interface	M20*1.5(equipped with metal explosion-proof joint)
Material	
Body	1.4305(304SS), 1.4144(316L) and AL
Gear	304SS, 316L and high hardness alloy steel
Bearing	Rolling bearing or sliding bearing
Sealing	FKM, NBR and PTFE
Flange	Chinese standard(GB/T9112 and HG/T20592-2010), American standard and Japanese standard are optional.
Accessory	Internal and external thread adapter, Hermeto connector and hygienic chuck connector

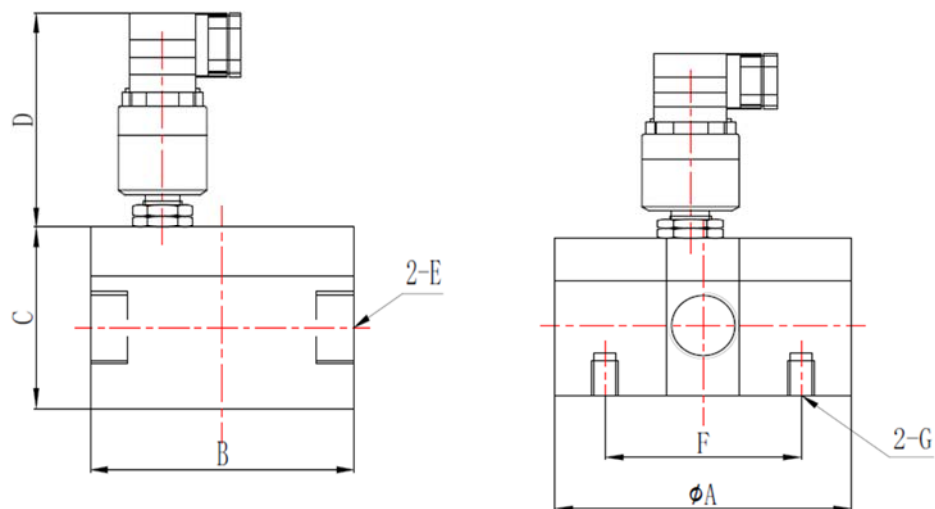
Performance parameter table

Model	Measuring range(l/h)	K coefficient(P/L)	Pressure (bar)		Connector	Screen hole diameter (μm)	
			SS304	AL		Rolling bearing	Sliding bearing
GF02	0.6-50	11200	50	16	G1/4	20	40
GF04	5-250	4780	50	16	G3/8	20	40
GF06	10-500	3468	50	16	G1/2	20	40
GF10	20-1200	2780	50	16	G1/2	20	40
GF15	200-3000	334	50	16	G3/4	20	150
GF25	1000-12000	110	50	16	G1	100	150
GF32/40	2000-20000	40	50	16	G1-1/4	100	150

Product code



Product size



(Unit: mm)

Model \ Size	A	B	C	D	E	F	G	H
GF02A	Φ83	80	55	70	G1/4	40	M6	16
GF02	Φ83	80	55	70	G1/4	40	M6	16
GF04	Φ83	80	55	70	G3/8	55	M6	16
GF06	Φ83	80	62	70	G1/2	55	M6	14
GF10	Φ83	80	62	70	G1/2	55	M6	14
GF15	Φ113	110	65	70	G3/4	90	M6	28
GF25	Φ158	140	85	70	G1	110	M8	40
GF32	Φ218	160	100	70	G1-1/4	180	M8	45

The sizes above are standard. In case special circumstances, it can be custom-made according to customer's on-site demands.

Signal sensor

24V/5V impulser



Output type	Square wave pulse(NPN and PNP push-pull output)
Environment temperature	-40 to 80℃
Electrical interface	M12*1 connector
	Hirschmann connector
	M20*1.5 metal explosion-proof connector
Reverse polarity protection	Have
No-load current	3mA
Protection grade	IP65

PSH pulse&high temperature sensor



Output type	Square wave pulse(NPN and PNP push-pull output)
Probe working temperature	-40-200℃
Environment temperature	-40 to 80℃
Other parameters are the same as that in the table above.	

Current(4-20mA)/voltage(1-5V&2-10V)signal sensor

Voltage signal sensor



Supply voltage	9-26VDC
Output type	4-20mA
	1-5V&2-10V
Probe working temperature	-40℃-140℃
Environment temperature	-40℃-80℃
Electrical interface	M12*1 connector
	Hirschmann connector
	M20*1.5 metal explosion-proof connector
Reverse polarity protection	Have
No-load current	Voltage output type: 8mA
	Current output type: 10mA
Protection grade	IP65

ASH/VSH current&high temperature sensor



Output type	4-20mA
	1-5V&2-10V
Probe working temperature	-40℃-200℃
Environment temperature	-40℃-80℃
Other parameters are the same as that in the table above.	

Intelligent digital display sensor

Digital display sensor(one analog quantity+two switch quantity output)



Supply voltage	9-26VDC
Output type	4-20mA(three-wire system)
	Two-way switch quantity
	Pulse(push-pull type, three-wire system)
Probe working temperature	-40℃-140℃
Environment temperature	-40℃-80℃
Electrical interface	M12*1 connector (with 2m cable)
Display	LCD display
Unit resolution	0.001
Reverse polarity protection	Have
No-load current	Current output type: 20mA
Precision	Read value: $\pm 0.5\%$
Repeatability	0.1%
Shell material	SS304
Protection grade	IP65

LDH-45 current&high temperature sensor



Output type	4-20mA(three-wire system)
	Pulse(three-wire system)
Probe working temperature	-40℃-200℃
Environment temperature	-40℃-80℃
Other parameters are the same as that in the table above.	

Four-button digital display sensor



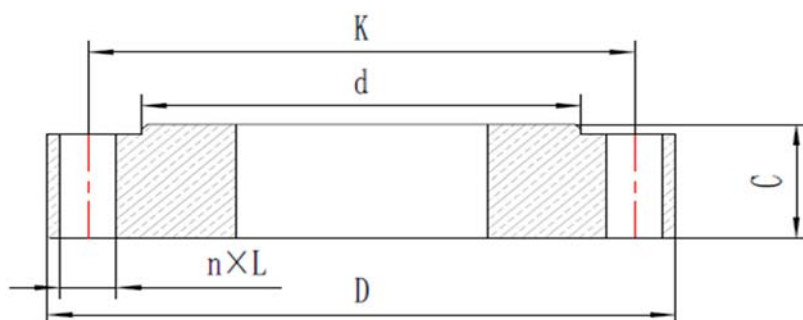
Supply voltage	9-26VDC
Output type	4-20mA(two, three and four wire
	Two-way switch quantity (high and low
	Pulse(push-pull type, three-wire
	RS485, supported Modbus-RTU protocol
Display	LCD display
Probe working	-40 to 140℃
Environment	-40 to 80℃
Electrical interface	M12*1 connector (with 2m cable)
Unit resolution	0.001
Reverse polarity	Have
No-load current	Current output type: 20mA
Precision	Read value: $\pm 0.5\%$
Repeatability	0.1%
Shell material	SS304
Protection grade	IP65

Four-button high temperature sensor



Output type	4-20mA(two, three and four wire system)
	Pulse(three-wire system)
	RS485, supported Modbus-RTU protocol
Probe working temperature	-40 to 200℃
Environment temperature	-40 to 80℃
Other parameters are the same as that in the table above.	

Appendix : GB/T9124.1-2019(RF) 1.6Mpa, 2.5Mpa and 4.0Mpa plate steel pipe flange dimensions



Unit: mm

Nominal diameter	Nominal pressure	D flange outer diameter			Bolt parameter									C Flange thickness		
					K Bolt hole center distance			L Diameter of bolt hole			n Number of bolt					
GB	Mpa	1.6	2.5	4.0	1.6	2.5	4.0	1.6	2.5	4.0	1.6	2.5	4.0	1.6	2.5	4.0
15	1.6	95	95	95	65	65	65	14	14	14	4	4	4	14	14	14
20		105	105	105	75	75	75	14	14	14	4	4	4	16	16	16
25		115	115	115	85	85	85	14	14	14	4	4	4	16	16	16
32	2.5	140	140	140	100	100	100	18	18	18	4	4	4	18	18	18
40	4.0	150	150	150	110	110	110	18	18	18	4	4	4	18	18	18
50		165	165	165	125	125	125	18	18	18	4	4	4	20	20	20
65		185	185	185	145	145	145	18	18	18	8	8	8	20	22	22
80		200	200	200	160	160	160	18	18	18	8	8	8	20	24	24
100		220	220	220	180	190	190	18	22	22	8	8	8	22	26	26
125		250	250	250	210	220	220	18	26	26	8	8	8	22	28	28
150		285	285	285	240	250	250	22	26	26	8	8	8	24	30	30