

Gear flowmeter

Klinger type GF Manual



1. Overview

Gear flow transmitter belongs to a kind of volumetric flow transmitter and can be used for measuring volume and flow precisely. The flowing medium makes the gear engage and rotate. Under the flowing effect of fluid, pressure difference is formed between the inlet and outlet of instrument. One pair of gears can rotate freely without the need of power supply. The empty cavity between gears is filled with liquid, which is discharged through rotation. The liquid flowing through instrument and liquid flow can be known through measuring the number of revolutions of gear.

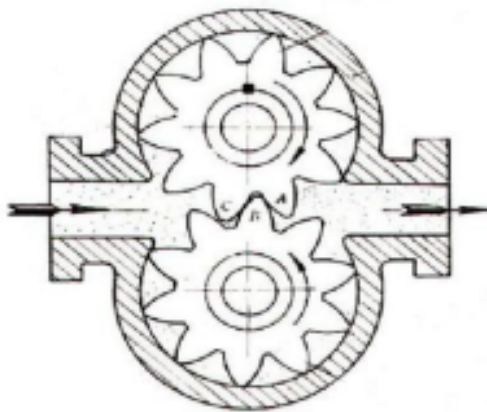


Fig. 1 Schematic Diagram of Fluid Flowing

The rotation speed of the transmitter is detected by the sensing coil inside the signal amplifier on the case. The signal amplifier cannot contact the measured medium. The magnetic line of force generated inside the permanent magnet inside the case due to transmitter gear cutting will lead to flux change inside the sensing coil. The sensing coil sends the signal of flux change cycle detected to the pre-amplifier so as to amplify and shape the signal. The impulse signal which is in direct ratio with flow velocity will be sent to the unit conversion and flow integration circuit to obtain and display the accumulative flow value. At the same time, it will also send the impulse signal to frequency current conversion circuit to convert the impulse signal to simulation amperage so as to display the instantaneous flow value.

The transmitter has high processing precision and can be installed precisely. The gear rotation undergoes non-contact scanning. One impulse is generated by one gear with very high resolution. The column gear transmission can measure the liquid with very small flow and small quantitative volume.

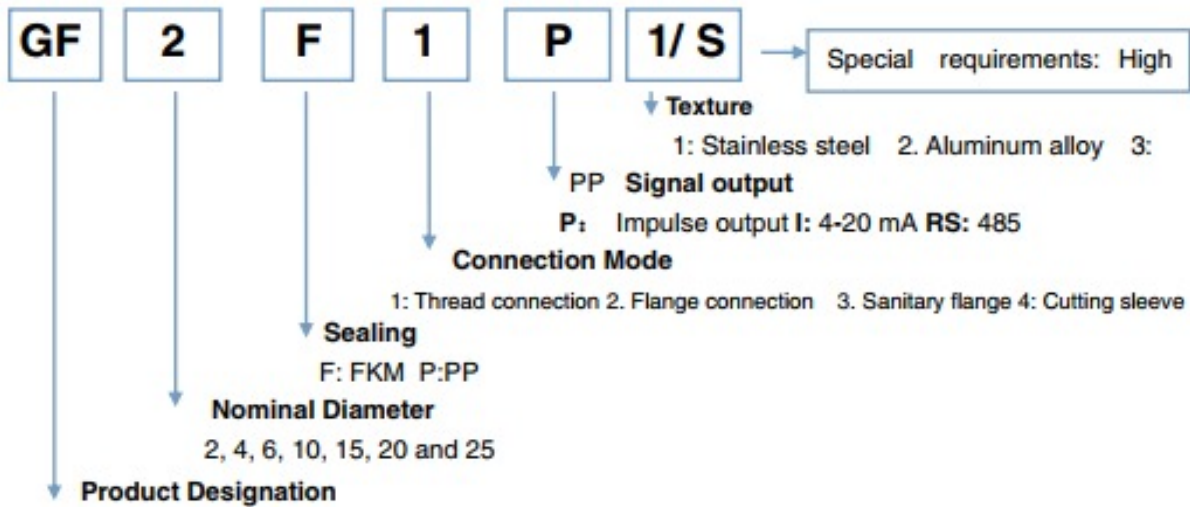
2. Product Characteristics

- High voltage resistance (1.0-45MPa)
- High and low temperature resistance (-196 °C-200 °C)
- Able to measure different kinds of viscous media.
- High precision and repeatability
- Impulse output/Analog output available
- Range ratio width (1: 100)
- Broad range of measurement
- Strong corrosion and pollutant resistance (acid and alkaline)

3. Scope of Application

- Measurement of resin and glue
- Measurement of hydraulic oil, lubricating oil and grease
- Measurement of fuel oil
- Measurement of printing ink and asphalt
- Measurement of liquid nitrogen, refrigerant and solvent
- Measurement of edible oil, fish oil and food canning
- Fluid quantitative control system

3. Product Code



4. Product Diagram:



Fig. 1 Thread Connection



Fig. 2 Quick Hoop Connection



Fig. 3 Cutting Sleeve Connection

5. Calculation Formula

K coefficient of gear flow transmitter (flow coefficient) defines the number of impulses per L within the unit flow precisely.

The following formula is used:

$$Q = f \times 60 / K$$

Q= Instantaneous flow L/min

F= Frequency of output impulse (HZ)

K= Coefficient of gear flow meter
(impulse/min)

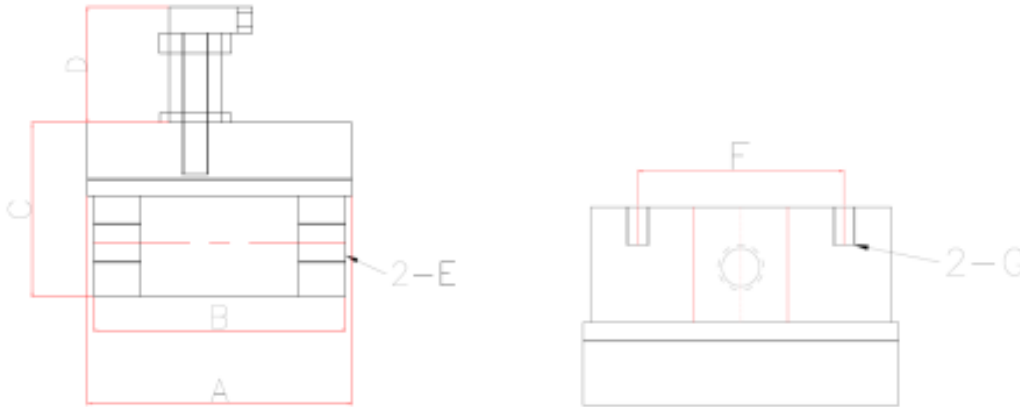
6. Features

As a kind of new volumetric flow transmitter, the round gear flow transmitter is used for measuring the flow or instantaneous flow of the liquid inside pipeline precisely, either in a continuous or discontinuous manner.

It is particularly suitable for the measurement of heavy oil. Flow measurement of media with high viscosity such as vinol and resin. (It can be used for measuring the fluid the viscosity of which is as high as 10,000 Pa.s) with the characteristics of small volume, light weight, small operation noise and stable operation. It can also be used for measuring the micro flow of small pipe diameter. With small startup flow and broad range ratio, it is applicable to the measurement of liquid flow with significant change and its measurement precision is not affected by either pressure or flow change. It is stable in performance, long in service life and large in circulation capacity.

7. Performance Parameters

Fig. 5 Outline Drawing



In mm

Model \ Size	A	B	C	D	E	F	G
GF02	Φ83	80	50	70	G1/4	40	M6
GF04/04A	Φ83	80	50	70	G1/4	55	M6
GF06	Φ83	80	62	70	G1/2	55	M6
GF10	Φ83	80	62	70	G1/2	55	M6
GF15	Φ113	110	62	70	G3/4	90	M6
GF25	Φ158	140	85	70	G1	110	M8
GF32	Φ218	160	100	70	M35*1.5	180	M8

The sizes are above are for the standard products. We also accept customization based on the customers' site demand.

7.1 Table 1 List of Basic Parameters

Flow unit: L/h

Model	Scope of Measurement l/h	K Coefficient P/L	Max. Pressure (Bar)		Temperature	Accuracy	Interface
			Aluminum Alloy	Stainless Steel			
GF04	0.6-50	4780	150	400	-15-80°C	+/- 0.5% (Range: 1: 10)+/- 1.0% (Range: 1:100)	G1/4
GF04A	5-200	4780	150	400	-15-80°C		G1/4
GF06	10-500	2468	150	400	-15-80°C		G1/2
GF10	50-1200	1280	150	400	-15-80°C		G1/2
GF15	200-3000	126.75	150	400	-15-80°C		G3/4
GF25	1000-12000	61.1	150	400	-15-80°C		G1
GF32	2000-20000	59.9	150	400	-15-80°C		M35*1.5

II. Electrical Apparatus Installation and Wiring Diagram

1) Hirschmann pulse wiring mode: (Impulse output): 3-wire wiring mode: Brown: +11V-26V, blue: GND, black IN;

2) Descriptions and connection method of electrical output terminal block:

8. Installation Requirements

- The transmitter should be installed in a position that facilitates maintenance and repairing instead of an environment with high temperature, strong mechanical vibration and strong magnetic field interference and corrosion.
- The transmitter should be generally installed on the assembly horizontally and firmly with screw. The liquid direction must be upward once it is installed vertically. The liquid should be filled in the pipeline and bubbles must be avoided.
- A straight pipe section which is 20 times of the nominal diameter should be set or rectifier should be installed at the upstream of transmitter while a straight pipe section which is 5 times of the nominal diameter should be set at the downstream.
- When the transmitter accessories are installed, the base central line should point to the pipe central line and the gasket at the connected part cannot be inside the liquid.
- Flow regulating valve must be installed at the downstream of the transmitter, if any.
- When transmitter is installed on a new pipe, a filter is suggested to be installed in the upstream of the transmitter to prevent the sundries inside the pipe from entering the transmitter.
- Bypass pipe should be installed near the installation site of the transmitter in order to avoid normal liquid transmission in course of overhaul.
- The magnetic field near gear flow transmitter and similar interference source may affect the transmitter from collecting signal. The transmitter and display instrument should be connected via the shield cable with metal. The shielding layer of transmission cable should be earthed at the display instrument site.

9. Use and Maintenance

9.1 Use Attentions

- Keep the liquid at vent side clean and contain no fiber and particle sundries in course of use.
- Valve opening/closing sequence when the transmitter is used
- For the transmitter with no bypass pipe, the upstream valve of the transmitter should be started with a medium openness; then the downstream valve should be opened slowly and operated for 10 min with a small flow. After the above, the upstream valve can be fully opened to reach the normal flow.
- For the transmitter with bypass pipe, the bypass pipe valve should be opened fully first and then the upstream valve of the transmitter should be started with a medium openness; then the downstream valve should be opened slowly; reduce the openness of bypass valve and make the transmitter operate for 10 min with a small flow. After the above, the upstream valve can be fully opened and the bypass valve (ensure no leakage) can be closed fully; finally, adjust the openness of downstream valve to the normal flow required.
- Open and close valve slowly. If valve is opened/closed automatically, "two-section opening and closing" mode is recommended for the transmitter with medium and large caliber so as to prevent the water hammer effect generated by sudden liquid impact from damaging gear.
- To ensure the long-term normal operation of the transmitter, strengthen inspection in usual days and take measures once any abnormality is discovered. Pay special attention to the monitoring of gear rotation. Check the transmitter if any abnormal sound is heard.
- The transmitter should be maintained generally for every three months. When checking and cleaning it, avoid damaging the internal parts and reassemble it according to the original position.
- If the transmitter is not used, the liquid inside should be cleaned and both ends should be set with protective cover to avoid dusts. Then keep it in a dry place.
- The filter should be cleaned regularly and set with protective cover when it is not used to avoid dusts. Then keep it in a dry place.
- The transmission cable of the transmitter can be designed in both overhead and underground manner (it should run through a plastic or iron pipe when it is designed underground).

9.2 Troubleshooting

Fault	Cause Analysis	Solution
<p>The fluid flows normally but the display instrument does not display</p>	<ol style="list-style-type: none"> 1. The power is not connected or the wiring between the transmitter and sensor is wrong or faults such as open circuit, short circuit or poor contact happens. 2. Faults happen to the pre-amplifier. 3. Gear is stuck. 	<ol style="list-style-type: none"> 1. Power on or check if the wiring is correct. Remove troubles with multimeter. 2. Check the pre-amplifier. 3. Remove sundries, do cleaning or change gear. Change gear and calibrate it again so as to acquire the new instrument parameters.
<p>Flow display value reduces even if no flow is reduced.</p>	<ol style="list-style-type: none"> 1. Check if filter is blocked. The valve element of valve on the sensor pipe becomes loose and the valve openness is reduced automatically. 2. Transmitter gear is hindered by sundries so the resistance becomes higher, finally leading to slow rotation speed. 	<ol style="list-style-type: none"> 1. Clean filter 2. Repair or change valve 3. Dismantle and clean the sensor
<p>Fluid does not flow but flow display is not zero or the value displayed is not stable.</p>	<ol style="list-style-type: none"> 1. The shielding earthing of transmission wire is poor or the external interference signal enters the input end of display instrument 2. Pipe vibrates and then gear generates error signals. 3. Faults inside the display instrument lead to interference 	<ol style="list-style-type: none"> 1. Check the display instrument of shielding layer is well earthed 2. Reinforce pipe or sensor screw. 3. Repair display instrument

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