

Gear Flowmeter

Instruction manual



Tianjin U-ideal Instrument Co., Ltd

Positive displacement meters

Feature:

- High pressure up to 450 bar
- High and low temperature resistance (- 196°C-200°C)
- All kinds of viscous media can be measured
- High accuracy and high repeatability
- Pulse output/analog output (Optional)
- Strong anti-corrosion and anti-pollution ability (acid and alkali)

Applications

- Waterborne paints, clear coatings,
 - 2-component paints, highly-filled metal
 - paints and softfeel paints
- Coating wax, glues, PVC, epoxy resin,
- highly-filled and abrasive fluids
- Polyol- and isocyanate
- Oil, fat (also food and cosmetics)
- Hydraulic oil
- Off-shore-applications, special meters with

Principle and Design

Gear Flow Meters are positive displacement meters, similar in design to a gear pump. The measuring medium rotates two gears, which are engaged with minimum play.

The medium is forced along through closed measuring chambers between gears and housing. The gears, which run idle, lose no power.

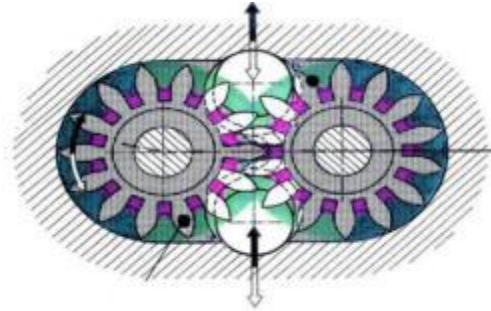
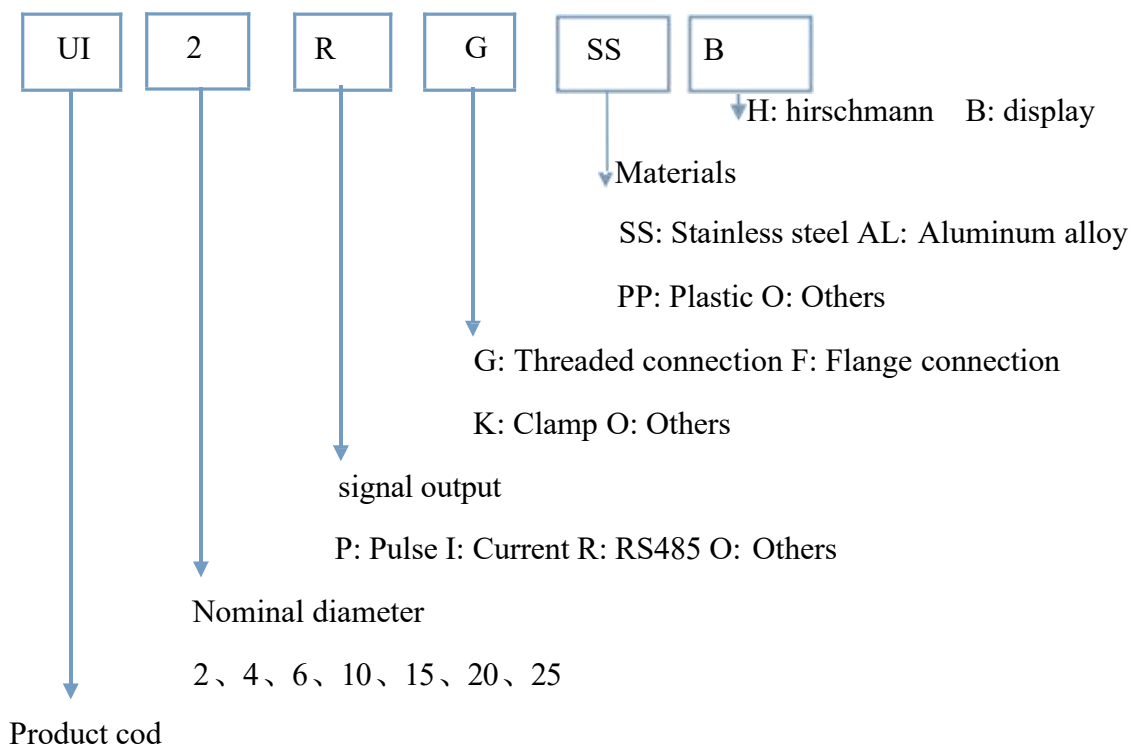


Fig. 1 Fluid flow diagram

The RPM of the gears is in proportion with the instantaneous flow rate and is precisely detected by integral pickups through the body of the meter without contacting the fluid. Pulses per volume unit will finally serve the evaluation.

Model selection



Product illustration:



Material PTFE
anticorrosion



Fig.2 Without display



Fig.3 Integrated display



Fig. 4 Integrated display
(high temperature)

Note: (Special demand may be ordered)

Calculation:

The K-factor (flow coefficient) of gear flowmeter precisely defines the number of pulses per liter per unit flow.

Apply the following formula:

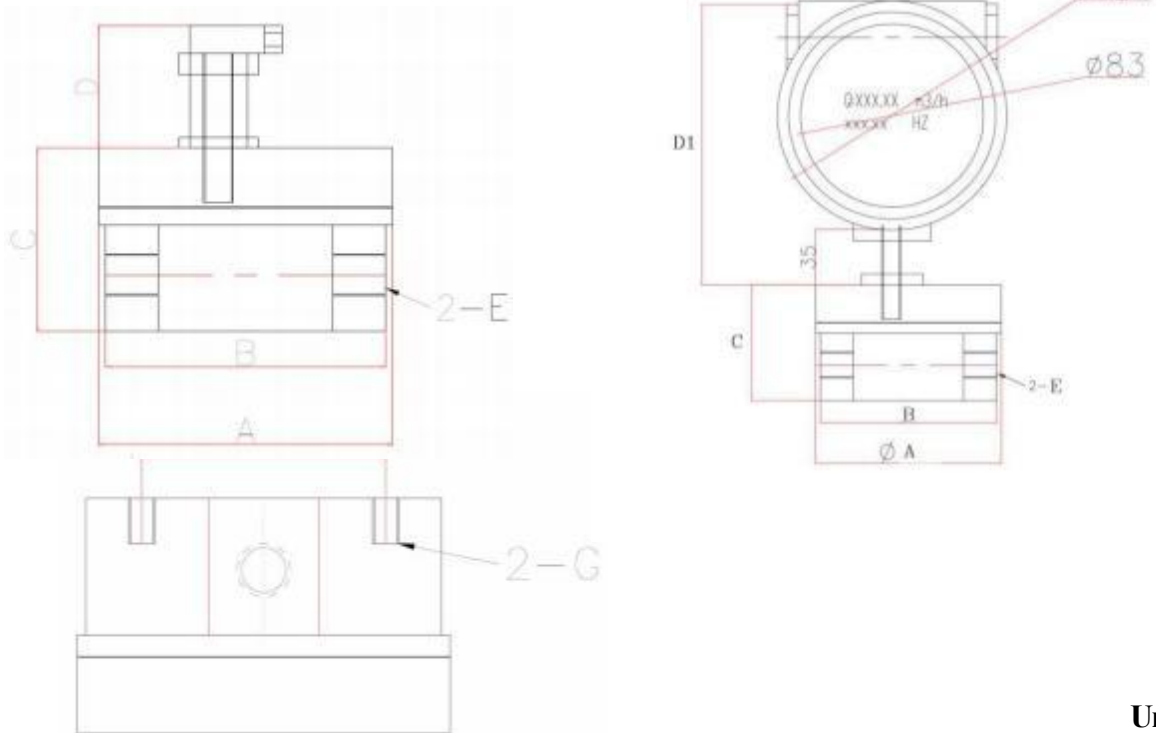
$$Q=f \times 60/K$$

Q= instantaneous flow rate (L/min)

F= Output pulse frequency (HZ)

K= Coefficient of gear flowmeter (pulses/min)

Dimensional Drawings



Unit: mm

Size	A	B	C	D/D1	E	F	G
XK02	Φ83	80	55	70/145	G1/4	40	M6
XK04	Φ83	80	55	70/145	G3/8	55	M6
XK06	Φ83	80	62	70/145	G1/2	55	M6
XK10	Φ83	80	65	70/145	G1/2	55	M6
XK15	Φ113	110	65	70/145	G3/4	90	M6
XK25	Φ158	140	85	70/145	G1	110	M8
XK32	Φ1218	160	100	70/145	G1-1/4	180	M8

The above dimensions are standard product dimensions. In special cases, they can be customized according to customers' on-site requirements

Selection Guide

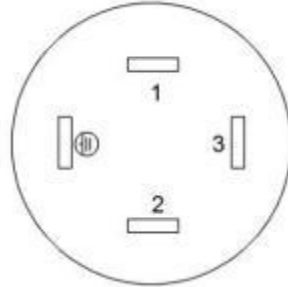
TYPE	Range (can be customizable) L/H	K-factor P/L	Maximum pressure(Bar)		Temperature	Accuracy
			Aluminu alloy	Stainless steel		
XK02	0.6-100	11200	150	400	-15-80°C	±0.5%(Measurement range 1:10) ±1.0%(Measurement range 1:100)
XK04	5-250	4780				
XK06	10-500	3468				
XK10	50-1200	2780				
XK15	200-3000	334				
XK25	1000-12000	59.9				
XK32	2000-20000	39.9				

Basic parameter:

Media	Corrosive liquid
Enclosure Exclusion Proof	Exia IICT5, d IIBT4/ IP67
Working Pressure (MPa)	1.6
Working Temperature (°C)	-20~80
Accuracy	0.5%F.S
Case Materials	Aluminum alloy, PP, PTFE, 304/316L (Optional)
Wetted materials	Aluminum alloy, PEEK, PP, 304/316L (Optional)
Shaft material	Cemented carbide
Material of transmission parts	Aluminum alloy, PP, 304/316L
Output	Pulse, 4-20mA and RS485
Power supply	DC24V
Display	Liquid crystal display (instantaneous flow + cumulative flow)
Process connection	Threaded connection, clamp, sleeve flange, etc. (Customizable)

Electrical installation and wiring diagrams

1)Hirschmann pulse connection mode: (pulse output): Three wire connection mode: Brown (1): power positive: + 11V-26V, blue (2): power negative, black (3): pulse IN;

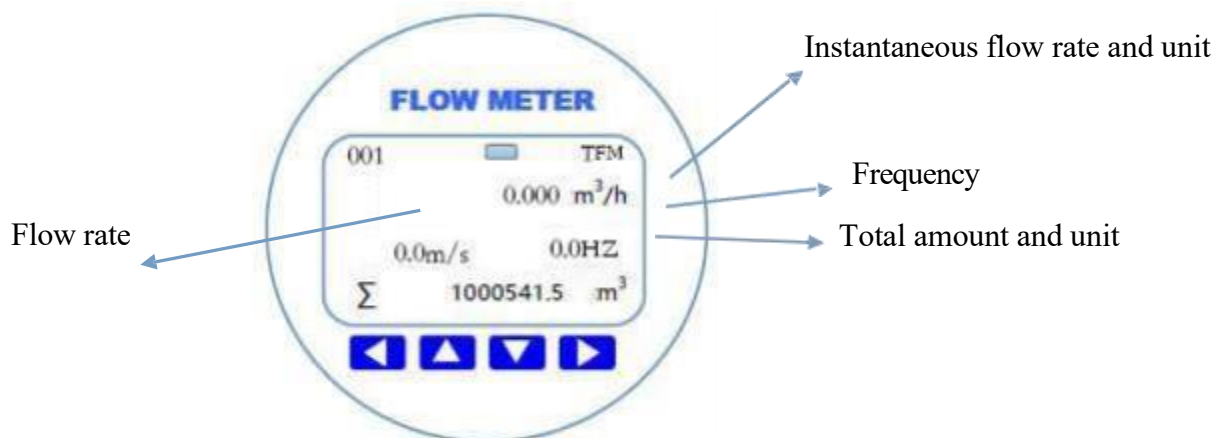





2)Electrical output connection terminal

Terminal definition	Function	Remarks
24VDC+	DC18-36V+	power24v+
24VDC-	DC18-36V-	power24v-
IOUT	4-20mA+	Load resistance $\leq 500\Omega$
ICOM	4-20mA-	
POUT	pulse+	
PCOM	com	
ALMH	High alarm	It is recommended to use 24VDC intermediate relay with current load ≤ 30 mA.
ACOM	com	
ALML	Low alarm	
ACOM	com	
RS485+	RS485+	RS485 terminal
RS485-	RS485-	

Operation instructions of meter dial

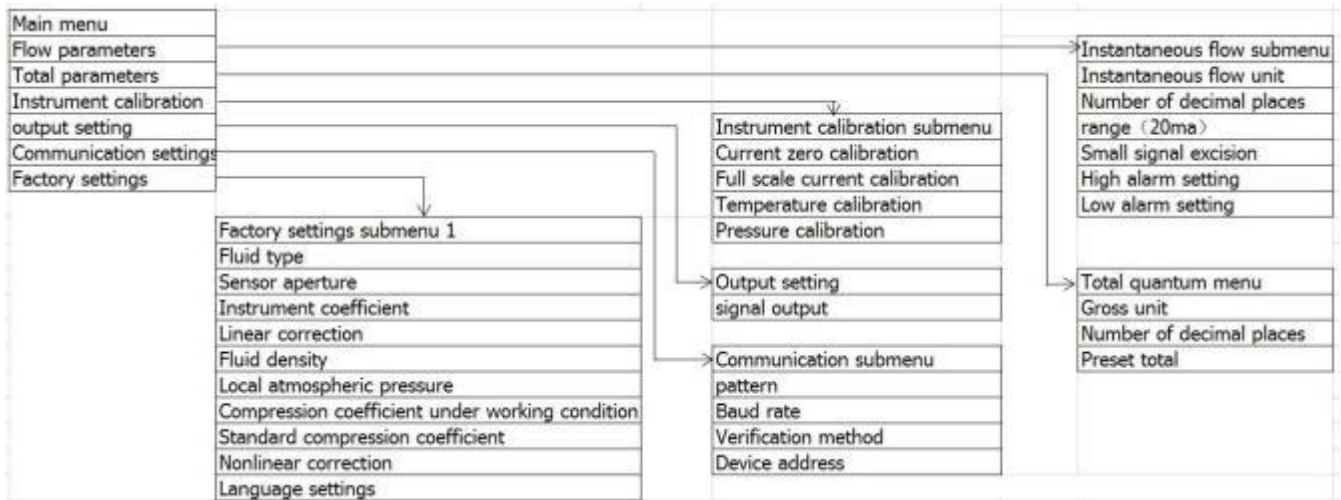
1) Keyboard definition and display



-  Move left, parameter setting confirmation key and exit subdirectory key
-  Factory set fast key, move down, number decrease key
-  Move up, number decrease key

Move right, enter parameter setting

Converter menu structure



Passwords for access: 052500

Password for zero clearing of total amount: 019818

Converter menu structure

Instantaneous flow parameter setting:

Flow unit	Options: L/s L/m L/h m ³ /s m ³ /m m ³ /h Nm ³ /h USG/s USG/m USG/h Kg/s Kg/m Kg/h t/s t/m t/h Default value: m ³ /h Define the unit of instantaneous flow L (Liter), H (Hour), t (Ton), s (second), m (minute)
Decimal places of flow rate	Options: 0 1 2 3, default value: 1 Define the number of decimal places for instantaneous flow
Range	Floating point number: 9999999.00-0.00 m ³ / h, default value: 100.0 m ³ / h When the instantaneous flow reaches the range, the converter outputs 20mA. Changing this parameter will affect the current output, high alarm and low alarm, etc. Note: when you modify this setting value (range), please pay attention to the unit of this parameter (range), you can modify the unit of this parameter (range) as needed.
Smallsignal excision	Floating point number: 9.90-0.00%, default value: 0.0%

	This setting value is a percentage of the range
High alarm	<p>Floating point number: 99.00~1.00%, default value: 90.0%</p> <p>This setting value is the percentage of the range. For example, if this setting value is set to 10, it is equal to 10% of the range. If the absolute value of the instantaneous flow is greater than (range × 10%), the converter outputs a high alarm signal and the high alarm contact is closed</p>
Low alarm	<p>Floating point number: 99.00~0.00%, default value: 0.0%</p> <p>This setting value is the percentage of the range. For example, if the value is set to 10, it is equal to 10% of the range. If the absolute value of the instantaneous flow is less than (range × 10%), the converter outputs a low alarm signal and the low alarm contact is closed.</p>
damping period	Floating point number: 30.0-0.1, default value: 1

Total amount setting: define the relevant parameters of total amount.

Unit of total amount	<p>Option: L (liter) m³ Nm₃ USG kg t (ton),</p> <p>Default value: m³</p> <p>Define the units of total amount</p>
Numbers of decimal places of the total amount	<p>Option: 0 1 2 3, default value: 1</p> <p>Defines the number of decimal places for the total</p>
Preset total amount	<p>Option: 9999999.00-0.00 m³ / h, default value: 0.0 m³ / h</p> <p>Clear the total amount or set the total amount value</p>

How to set parameters: Examples

Enter the menu for settings, as shown in the figure:

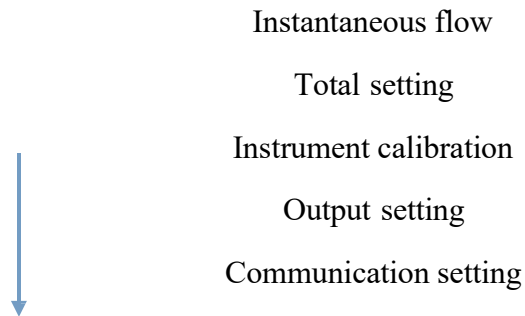


Fig.5

In the interface shown in Figure 5, press or to select different submenu. Press to return to the flow display interface;

Press or to select submenu, press to enter submenu to set parameters. For example, we need to set the "instantaneous" parameter, and when the submenu of instantaneous flow parameter is bright, press to display as shown in Figure 6 below:

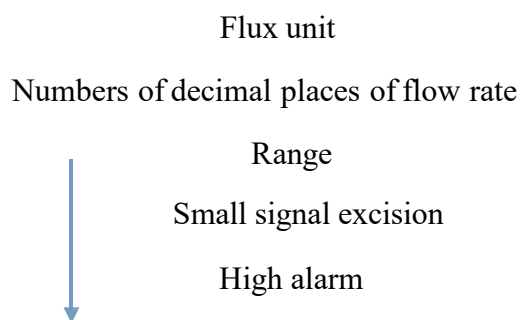


Fig.6

Press or to select the parameter you modified, and the selected parameter will light up. If you need to return to the menu shown in Figure 5, press

If you need to enter the next menu, press to set the parameters, as shown in Figure 7

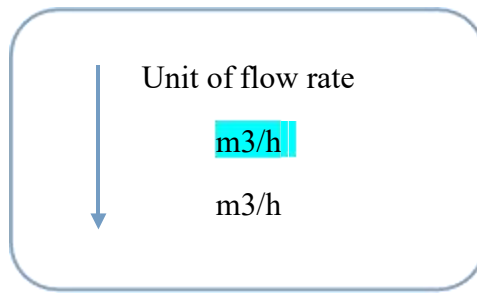



Fig.7

After modifying the parameters, if you need to save the settings, , and the system will save them automatically, as shown in Figure 8

Flux unit
m3/m

Fig.8

In this case, press **0**, save the settings and exit (Figure 8).

Installation requirements

- 1) The transmitter should be avoided being installed in the atmosphere with high temperature, large mechanical vibration, strong magnetic field interference and strong corrosion. The transmitter should be installed in a location that is easy to maintain and repair.
- 2) Generally, the transmitter should be installed horizontally, and the sensor must be firmly installed on the assembly body with screws. If it must be installed vertically, the liquid direction must be upward. The pipe should be filled with the liquid without bubbles.
- 3) When installing the transmitter accessories, the base center line should be aligned with the pipeline center line, and the sealing gasket at the connection should not protrude into the liquid
- 4) When the flow control valve needs to be installed, it must be installed on the downstream side of the sensor.
- 5) When installing the sensor on the new pipeline, in order to avoid impurities in the pipeline entering the transmitter, it is recommended to install a filter on the upstream of the transmitter.
- 6) In order not to affect the normal transmission of liquid during maintenance, bypass pipeline should be installed at the installation position of transmitter.
- 7) The magnetic field near the gear flow transmitter and similar interference sources may affect the signal picked up by the sensor. The shielded cable with metal shall be used for the connection between

the transmitter and the display instrument, and the shielding layer of the transmission cable shall be grounded at the end of the display instrument.

Use and maintenance

Precautions in use

- 1) When using, keep the liquid clean and free of fibrous and granular impurities.
- 2) Opening and closing sequence of valve when transmitter is put into operation
- 3) For the transmitter without bypass pipe, firstly open the upstream valve of the transmitter at a medium opening, then slowly open the downstream valve and operate at a small flow for 10 minutes, and then fully open the upstream valve to the required normal flow.

For the transmitter with a bypass pipe, firstly open the upstream valve by opening the upstream valve at a moderate opening, then slowly open the downstream valve and close the opening of the small bypass valve, let the transmitter operate for 10 minutes at a low flow rate, and then fully open the upstream valve and fully close bypass valve (ensuring no leakage), and finally regulate the opening of the downstream valve to the required normal flow rate.

Please open and close the valve smoothly as far as possible. If automatic control is used, especially for medium and large diameter sensors, it is better to adopt "two-stage opening and two-stage closing" mode to prevent water hammer effect caused by sudden impact of liquid, resulting in gear damage.

- 4) In order to ensure the long-term normal operation of the transmitter, it is necessary to strengthen the operation inspection at ordinary times, and take timely measures to eliminate any abnormality. Pay special attention to the monitoring of gear rotation, and timely check the transmitter if abnormal sound is heard.
- 5) The maintenance cycle of the transmitter is generally three months. When checking and cleaning, pay attention not to damage the internal parts and assemble according to the original location
- 6) When the transmitter is not in use, the internal liquid should be cleaned, and the two ends of the transmitter should be protected against dust and dirt, and then stored in a dry place.
- 7) The equipped filter should be cleaned regularly, and a protective sleeve should be added when it is not in use to prevent dust from entering, and then stored in a dry place.
- 8) The transmission cable of the sensor can be laid overhead or buried (It should be covered with plastic pipe or iron pipe when buried)

Fault handling

Troubles	Reasons	Removing
The liquid flow is normal, but the display instrument does not show	<ol style="list-style-type: none">1. The power supply is not connected or the wiring between the sensor and the instrument is wrong, or there are open circuit, short circuit, poor contact and other faults.2. Preamplifier failure.3. Gear stuck	<ol style="list-style-type: none">1. Turn on the power supply or check whether the wiring is correct, and use a multimeter to check the fault points.2. Check the preamplifier.3. Remove foreign matter and clean or replace gear. When the gear is replaced, the new instrument coefficient shall be obtained by rechecking.
There is no operation to reduce the flow rate, but the flow display value gradually decreases.	<ol style="list-style-type: none">1. Whether the filter is blocked.2. The valve core on the sensor pipeline is loose, and the valve opening is automatically reduced.3. The resistance of the transmitter gear increases and the speed decreases due to the obstruction of foreign matters	<ol style="list-style-type: none">1. Clean the filter2. Repair or replace the valve3. Remove the sensor for cleaning
When the liquid does not flow, the display of flow rate is not "zero" or the display value is not stable	<ol style="list-style-type: none">1. The shield of the transmission wire is poorly grounded, and the external interference signal is mixed into the input terminal of the display instrument2. When the pipe vibrates, the gear vibrates and produces the	<ol style="list-style-type: none">1. Check whether the grounding terminal of shielding layer display instrument is well grounded2. Reinforce the pipe or tighten the sensor screws3. Repair the display instrument
	wrong signal <ol style="list-style-type: none">3. Interference caused by internal fault of display instrument	

For the matching display instrument, please see display instrument manual for details.

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