

LLT spiral rotor flowmeter

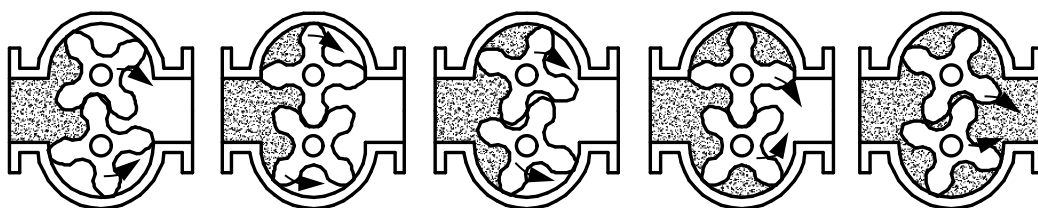
1.Overview

LLT series spiral rotor flowmeter is a high precision measuring instrument used for continuously measuring pipe liquid flow which is the latest type of volume flowmeter made adopting imported technology skill. Its features no pulsation, low noise, high precision, high reliability, large range, low pressure loss, strong viscosity, high temperature, high viscosity liquid, convenient calibration, easy installation and so on.

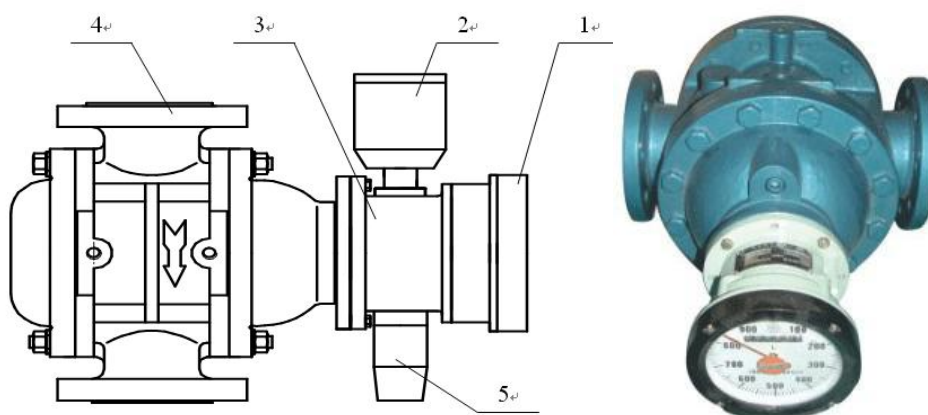
Equipped with local pointer display, word wheel accumulative counting device, it can directly display the accumulative liquid flow through the pipe, transmute the signal by connected with instrument or computer by the transmitter. The flowmeter is suitable for commercial trade measurement and engineering management control for petrochemical, chemical, chemical fiber, transportation, commercial, food, pharmaceutical and health industries.

2.Principle structure

LLT spiral rotor flowmeter is consisted of transmitter and counter two main part. The transmitter part is equipped with measuring room by a pair of special toothed helical rotors and a sealed coupling. The counting part includes speed reduction mechanism, a precision adjustment mechanism, counter output way have wheel accumulating ,electric pulse transmitter, etc



Measurement chamber has sealing cavity formed by a pair of special rotor and cover plate as measurement unit. The rotor is driven by different pressure between inlet and outlet ,after continuously measure the inlet liquid which through the sealed cavity , then send to the outlet. The amount of flow rate passing through is eight times as much as in the seal. The seal coupling transfer total number of rotations and rate speed in the pipe to counting mechanism , have pointer display and the accumulation of the word wheel ways. There is pulse transduction installed in the counting mechanism which is matched with the electric display instrument of our company. It can realize the remote(quantitative, cumulative, instant and other functions) automatic measurement and control. See instructions book about how to classify display instrument.



1.counter 2、 Output signal device 3、 precision regulator 4、 flow transmitter 5、 external precision regulator.

3、technical parameter

1、Accuracy: 0.5grade、0.2grade

2、Mediun temperature℃: (ambient temperature—41℃~+60℃)

0.5grade (—20℃~+80℃) ; 0.2grade (—20℃~+60℃) ; under high temperature adjustment Add high temperature radiator to 250℃

3、Repeatability: not exceed 1/3 absolute value of the basic error of the flowmeter.

4、Flange standard: GB/T9113.1-2000

5、Flow range m³/h (accuracy 0.5grade)

TYPE	diam eter	Viscosity mPa.s						
		0.3~0.8	0.8~2	2~15	15~400	400~1000	1000~2000	2000~3500
		gasoline	kerosene	Diesel oil	Heavy oil	High viscosity liquid		
LLT-0252	25	3~9	1.5~10	1~10	1~10	1~8	1~8	1~6
LLT-0401	40	3~9	1.5~10	1~10	1~10	1~8	1~8	1~6
LLT-0402		7~20	3~22	2.5~25	2.5~25	2~18	2~18	3~12
LLT-0501	50	7~20	3~22	2.5~25	2.5~25	2~18	2~18	3~12
LLT-0502		9~36	4.5~36	3.6~36	3.6~36	2.8~25	2.8~25	4.5~18
LLT-0801	80	9~36	4.5~36	3.6~36	3.6~36	2.8~25	2.8~25	4.5~18
LLT-0802		20~80	10~80	10~100	10~100	6.5~56	6.5~56	5~40
LLT-1001	100	20~80	10~80	10~100	10~100	6.5~56	6.5~56	5~40
LLT-1002		25~100	20~100	15~150	15~150	8.5~80	8.5~80	6.5~55
LLT-1501	150	25~100	20~100	30~150	30~150	8.5~80	8.5~80	6.5~55
LLT-1502		55~225	30~250	25~250	25~250	18~150	18~150	10~100
LLT-2001	200	55~225	30~250	25~250	25~250	18~150	18~150	10~100
LLT-2002		90~360	50~400	40~400	40~400	28~240	28~240	20~160
LLT-2501	250	90~360	50~400	40~400	40~400	28~240	28~240	20~160
LLT-2502		130~540	65~540	60~600	60~600	42~360	42~360	30~240
LLT-3001	300	130~540	65~540	60~600	60~600	42~360	42~360	30~240
LLT-3002		220~800	110~900	95~950	95~950	70~600	70~600	54~450
LLT-3501	350	220~800	110~900	95~950	95~950	70~600	70~600	54~450

Flow range m³/h (accuracy 0.2grade、0.3grade)

Type	Dia mete	Viscosity mPa.s						
		0.3~0.8	0.8~2	2~15	15~400	400~1000	1000~2000	2000~3500
		gasoline	kerosen	Diesel oil	Heavy oil	High viscosity liquid		
LLT-0252	25	3.5~8	3~10	2~10	2~10	2~8	2~8	2~6
LLT-0401	40	3.5~8	3~10	2~10	2~10	2~8	2~8	2~6
LLT-0402		8~20	5.5~22	4.5~22	4.5~22	4~18	4~18	3~12
LLT-0501	50	8~20	5.5~22	4.5~22	4.5~22	4~18	4~18	3~12
LLT-0502		15~36	9~36	7~36	7~36	6~25	6~25	4.5~18
LLT-0801	80	15~36	9~36	7~36	7~36	6~25	6~25	4.5~18
LLT-0802		30~80	20~80	15~80	15~80	14~56	14~56	10~40
LLT-1001	100	30~80	20~80	15~80	15~80	14~56	14~56	10~40
LLT-1002		40~100	25~100	20~120	20~120	18~72	18~72	14~55
LLT-1501	150	40~100	25~100	20~120	20~120	18~72	18~72	14~55
LLT-1502		88~220	57~225	44~220	44~220	38~150	38~150	25~100
LLT-2001	200	88~220	57~225	44~220	44~220	38~150	38~150	25~100
LLT-2002		150~360	90~360	72~360	72~360	50~210	50~210	40~160
LLT-2501	250	150~360	90~360	72~360	72~360	50~210	50~210	40~160
LLT-2502		180~540	135~540	100~540	100~540	90~360	90~360	60~240
LLT-3001	300	180~540	135~540	100~540	100~540	90~360	90~360	60~240
LLT-3002		250~800	220~900	180~900	180~900	150~600	150~600	110~450
LLT-3501	350	250~800	220~900	180~900	180~900	150~600	150~600	110~450

Mark: Accuracy per required.

LLT spiral rotor flowmeter

6、Main component material and pressure

Tyep	Shell ,front cover,back cover	Cover plate	Spiral rotor	shaft	shaft sleeve	pressure (MPa)
LLT—E	Cast steel	Cast iron	Cast iron, aluminum	stainless steel	Graphite	DN100 below4.0; DN150 below2.5
LLT—B/C	stainless steel	stainless steel	alloy, stainless steel	stainless steel	Graphite / ball bearing	1.6、 2.0、 2.5
LLT-S	Double body flowmeter。 specification DN80、 DN100、 DN150 pressure 6.3MPa; DN200 pressure 4.0MPa。					
Mark	LLT—C materia l0Cr18Ni12Mo2Ti; LLT—Bmaterial 0Cr18Ni9Ti					

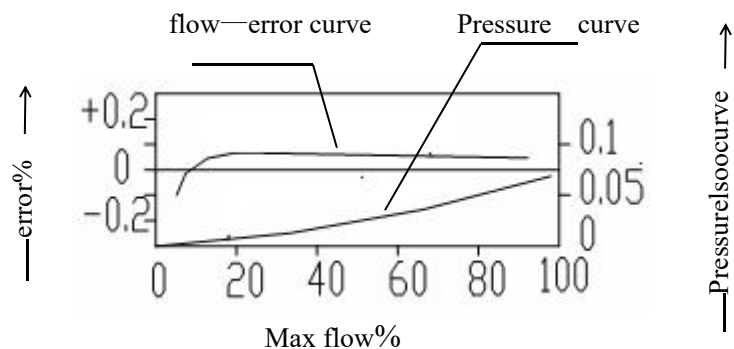
Mark: Special requirements customized。

7、Measurement feature

- spiral rotor constant speed, equal flow and equal speed in the metering chambe
- spiral rotor Smooth operation and Very low noise
- Large flow, low pressure loss
- Revolving fluid pulse is small, and transmitting pulse is stable and accurate
- Configured with a variety of counters, speed regulators and external fine-tuning devices
- installed vertically (please specify vertical installation at the time of ordering, normally belowDN200).

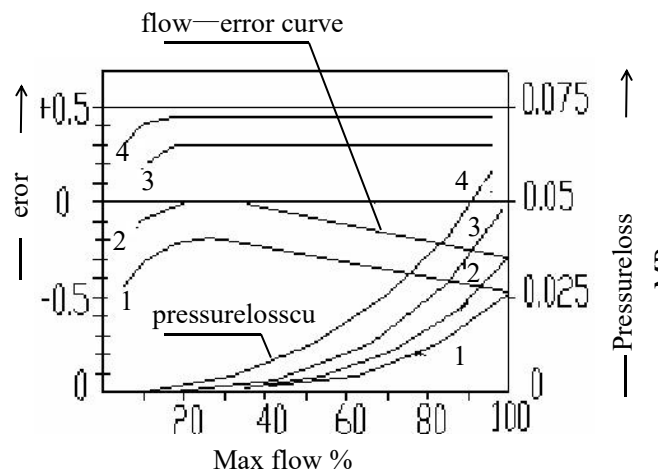
8、Capability(error and pressure loss curve)

0.2 grade



0.5grade

- 1、 Aero gasoline 0.7mPa.s
- 2、 water 1mPa.s
- 3、 Light diesel oil 5mPa.s
- 4、 transformer oil 20mPa.s



4. Transceiver and accessories

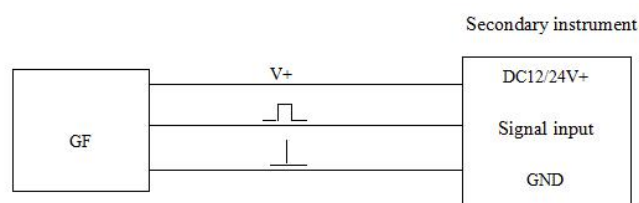
Install the transmitter on our company spiral rotor the flowmeter (or on the transmitter), can converts the flow rate into pulse signal, thus realizing the automatic control system.

4.1 GF Transceiver

GF transmitter is a pulse transmitter device matching spiral rotor flowmeter which is used in the ExiaIIBT6 and dIIBT6 levels. The explosion-proof form is divided into essential safety type and the flameproof type. There are obvious explosion-proof signs on the shell nameplate. GF transmitter works matching with instrument after connecting with the safety grid.

■ GF Transceiver feature

- 1、 Power supply: $DC12/24V \pm 10\%$
- 2、 output: Voltage pulse high level $> 9/20V$
Voltage pulse low level $< 0.5/1V$
- 3、 safety grid: KN9714C
- 4、 three line system (positive power, signal, power source)
- 5、 Explosion-proof connection diagram
- 6、 Common and flameproof interface circuit diagram



4.2 Mfseries 4~20mA Analog output transmitter

4.2.1 Overview

MF The serial transmitter matched with the volume flowmeter of our company, converted instantaneous flow into 4~20mA analog output, transmitted signal to the remote room display, adjustment and control of the instantaneous flow. At the same time, the output pulse value is used for calculation value.

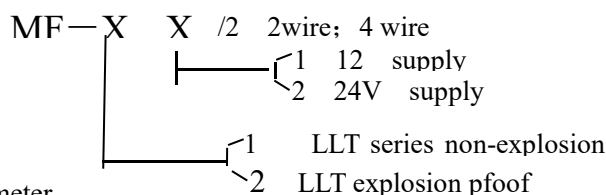
4.2.2 Feature

- 1、 Four wire system (positive power cord, 4~20mA current line, power ground wire)

Mark: 4~20mA output is two wire system

- 2、 flow output 4~20mA, far distance, safety reliable.

- 3、 Name method



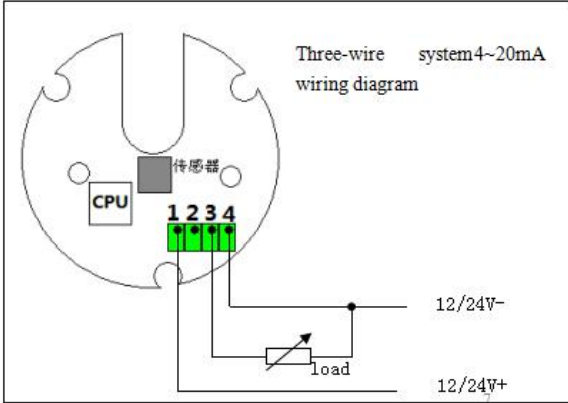
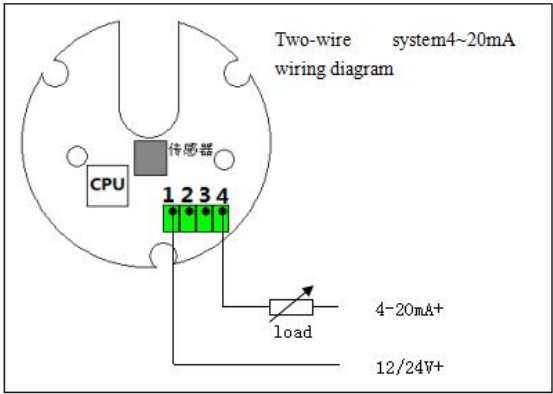
4.2.3 technical parameter

- | | |
|--|---------------------------------------|
| 1、 output: | 4、 Analog load resistance (user side) |
| a、 analog 4~20mA | <400 Ω 12Vsupply |
| b、 Voltage pulse: $V_L < 0.5V$ $V_H > 9V$ 12V; | <800 Ω 24Vsupply |
| $V_L < 1V$ $V_H > 20V$ 24V; | 5、 power supply |
| 2、 Permissible error | DC12V $\pm 10\%$ 60mA |
| analog: $\pm 0.5\%$ FS | DC24V $\pm 10\%$ 60mA |
| pulse: ± 1 pulse | 6、 explosion-proof: ExiaIIBT6 |
| 3、 ambient temperature | |
| -41~+60°C (explosion -proof-10°C~+60°C) | |

4.2.4 user notice

Ordering remark 24V or 12Vsupply。 Wiring accordance with the following diagram。

LLT spiral rotor flowmeter

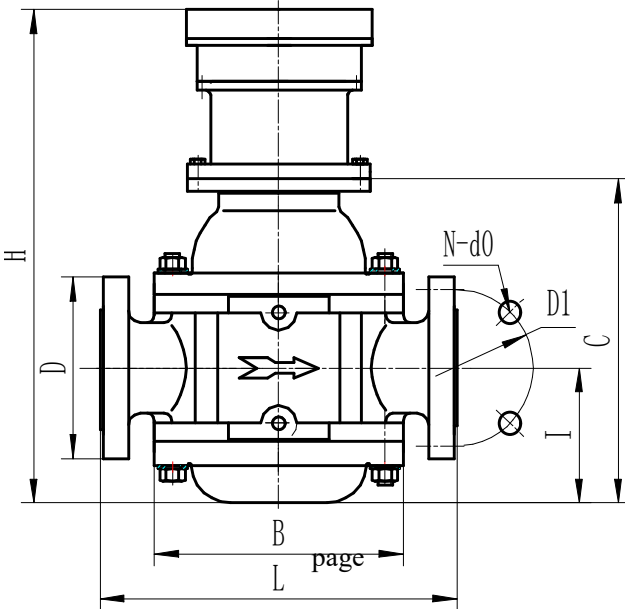


4.3 Pulse transmitter and spiral rotor flowmeter parameter table

DN	L/P	P/S	DN	L/P	P/S
type	A5+A25T+GF		type	A5+G+GF	
0252	0.01	277	1501	0.1/1	417/41.7
0401	0.01	277	1502	1	69.4
口径	A5+G+GF		2001	1	69.4
0402	0.1	69.4	2002	1	111.1
0501	0.1	69.4	2501	1	111.1
0502	0.1	100	2502	1	166.7
0801	0.1	100	3001	1	166.7
0802	0.1	277.8	3002	1	263.9
1001	0.1	277.8	3501	1	263.9
1002	0.1/1	417/41.7			

五、 shape and size

1、 LLT spiral rotor flowmeter Shape& dimension

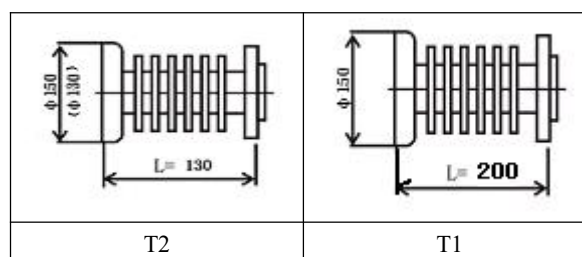


type	diamet er	L		H	B	C	I	D	D1	N	d ₀	Pressure MPa	weig ht
		stand ard	Doubl body										
LLT0252	25	300		420	175	228	90	115	85	4	14	Flange type per4.0 MPa	29
LLT0401	40	300		420	175	228	90	150	110	4	18		33
LLT0402		300		450	200	258	112	150	110	4	18		40
LLT0501	50	300		450	200	258	112	165	125	4	18		42
LLT0502		340		525	240	333	150	165	125	4	18		62
LLT0801	80	340		525	240	333	150	200	160	8	18		64
LLT0802		380	400	530	285	388	175	200	160	8	18		94
LLT1001	100	380	400	530	285	388	175	235	190	8	22		98
LLT1002		440	450	660	339	468	250	235	190	8	22		146
LLT1501	150	440	450	660	339	468	250	300	250	8	26		152
LLT1502		500	560	740	410	548	270	300	250	8	26		238
LLT2001	200	500	560	740	410	548	270	360	310	12	26		245
LLT2002		550	700	820	455	628	285	360	310	12	26	Flange type 2.5 MPa	337
LLT2501	250	550	700	820	455	628	285	425	370	12	30		350
LLT2502		700		910	550	718	350	425	370	12	30		570
LLT3001	300	700		910	550	718	350	485	430	16	30		600
LLT3002		800		1010	645	818	415	485	430	16	30		855
LLT3501	350	800		1010	645	818	415	555	490	16	30		890

Mark:

- (1) "H" size is the size of G governor and A5/A6.
- (2) flowmeter with a heat insulation jacket; inlet & outlet of the heat source is DN15 flange connection method;
- (3) if the radiator is equipped with high temperature, add the dimension of the radiator to the H size of the table is the high of perature flowmeter.
- (4) lifting rings M12 below 100 caliber; M16 above 150 caliber;
- (5) dual body flowmeter can reach 6.3MPa ,N200 4.0MPa. special design to10MPa

2. Radiators



Note: In the model

T is high temperature flowmeter in the model,used at 60~120 C, without a transmitter&without radiator.

T1 is high temperature flowmeter, used at 120~250 C ,equipped with long radiator.

T2 is high temperature flowmeter.,used for 60~120 degree transmitter and short radiator.

6.LLT-Utype Spiral rotor flowmeter with thermal insulation jacket

In order to measure medium which is easy solidify at room temperature or coagulate and crystallize at a certain temperature. the medium can be transported normally in the pipe and the flow detection. The medium often heated to dissolve the medium and keep the heat. However, because the installation of

LLT spiral rotor flowmeter

spiral rotor flowmeter is not allowed to direct through steam (to prevent damage to the flow meter), for this purpose, our company designed a series of thermal insulation jacket flowmeter products, using hot water, hot oil or lower than 200 degrees of steam ,inlet into the thermal insulation jacket to kept at a certain temperature, so as to ensure the flowmeter operation normally .

The filter installed before the screw rotor flowmeter can also be used as a structural form of the heat insulation jacket.

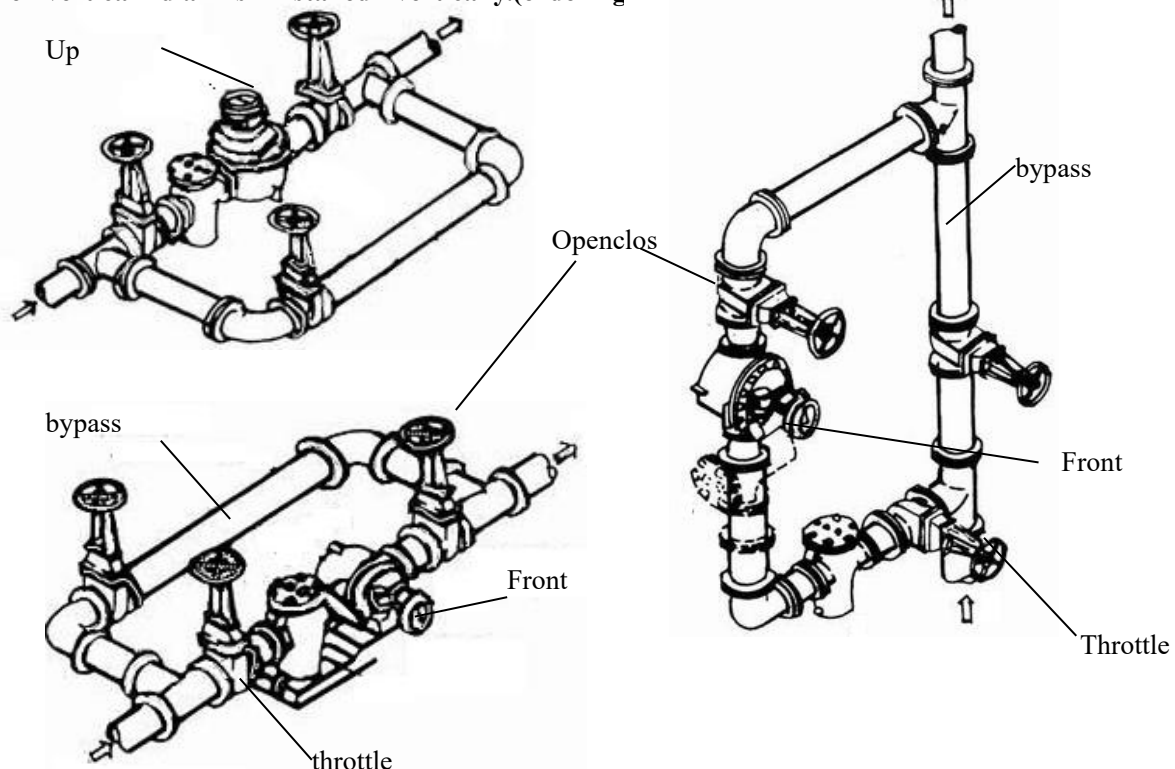
The inlet and outlet of the thermal insulation jacket is usually designed according to the DN15 caliber flange, the interface accept special requirements.

The nominal pressure of the heat insulation jacket is 0.5MPa, accept special requirements

7.Installation and use of spiral rotor flowmeter

- 1、 The filter should be installed before the flowmeter. The arrows point direction on both shells are the same.
- 2、 A gas separator should be installed first if the flowmeter contains gas.
- 3、 If the flowmeter is properly installed, readings are not easy to read, then counter turn to 180 degrees or 90 degrees.。
- 4、 Before the installation of the new flowmeter, use a bamboo stick to push the gear several times from the outlet. If found, soaked it with gasoline (avoid the deposit after the factory check)
- 5、 The throttle valve should be installed at the inlet of the flowmeter. The opening and closing valve is installed at the outlet. When using the opening and closing valve, start slowly and not suddenly open the valve.
- 6、 It is strictly forbidden to use the sweep steam through the flowmeter.
- 7、 Continuous using, flowmeters must be equipped with bypass pipes.。
- 8、 Before installation of the flowmeter, the pipeline must be flushed, with the straight pipe section (instead of the flowmeter position) is used in the flushing process to prevent the welding slag and sundries from entering the flowmeter.
- 9、 It is strictly prohibited to calibrate the flowmeters which is made of cast iron and cast steel materials.
- 10、 Flowmeters should not exceed the technical requirements when using. works best situation is at the maximum flow rate of 40-80%.

The vertical dial is installed vertically.(ordering



Correct horizontal installation of pipeline drawings

Correct vertical installation pipe diagram

8、 Error calculation and adjustment

8.1 Basic error of flowmeter is calculated by the measured values of each calibration point, respectively:

(volumetric method).

$$E = (V_m - V) / V \times 100\%$$

E—Flow error (generally referred to as cumulative error) takes two effective digits.

V_m —The measured value of a flowmeter (that is, the indication)

V —After correction, the measured value of the flow standard device is the actual value.

Formula for calculating basic error, when

$V_m > V$, error is "+", means flowmeter is fast.

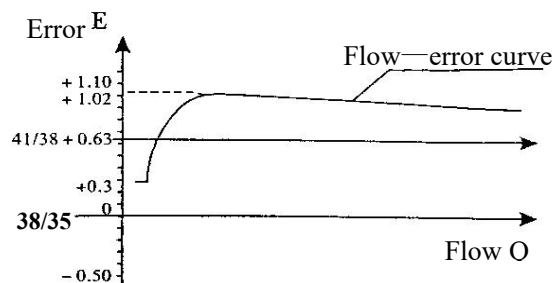
$V_m < V$, error is "-", means flowmeter is slow

. In order to make the flowmeter error within the basic error limit, use error adjustment to change a pair of adjusting gears installed in the counter (adjusting teeth), the mechanical transmission speed ratio can be changed to make the flowmeter indication worthy of adjustment.

The error adjustment can not change the flowrate characteristics of the flowmeter, only making the characteristic curve artificially located in the new coordinate system.

Generally speaking, the basic error range of the maximum and minimum flow detection point is not greater than the basic error limit of the specified precision (or actually used) flow range, and the basic error of the flowmeter can be qualified through error adjustment.

The used flowmeters usually use the original adjusting gear to carry out the error checking, and then make the error adjustment according to the specific error conditions.



8.2 Error adjustment table use instructions

8.2.1 General error adjustment method

1. The standard double gear is designed to be 38/35.

Flowmeter is fast, that is, (+) error, such as +1.02 ~ +0.3,

The double gear 38/35 should be changed to 41/38, when the error curve is at its origin.

The zero position corresponding to the 38/35 gear moves up to the 41/38 gear corresponding to +0.63.

Location (see table), so the error curve is in the new coordinate system.

The error of the flowmeter is adjusted in the range of +0.39 to -0.33.

To qualifying requirements (see Figure 1).

2. When the flow meter is used, the error is often changed because of the different working conditions and changes. The error can be over 1%. As long as the error range is not more than 1%, the error of the instrument can be transferred to the standard. For example, the instrument error is reduced to -0.7 to +0.2. When the double double gear is changed, it should first look at the number of teeth of the double gear wheel, if 38/35 is (1) When the method is adjusted, if the 41/38 gear is used, the relative error +0.63 of the gear should be taken as zero position (i.e. the origin of the coordinate), and then the 41/38 gear should be changed into a 40/37 double layer gear, and the error can be adjusted to the range of -0.5 to +0.4 (see Figure two).

3. The calibration and adjustment of the 0.2 stage spiral rotors flowmeter is based on the national metrological verification regulation JJG667-1997 "verification regulation for liquid volumetric flowmeters".

8.2.2 GF₃ Error adjustment method for external finer

GF₃ is an external precise regulator. When adjusting the error of the flowmeter, it is easy to operate, simple and accurate without the need to remove the governor.

Adjustment method Sample

When the error of the check flowmeter appears from +0.63 to 0.67%, the left and right two knobs can be seen after unscrewing the cover of the external regulator, and the adjustment is made according to the surface scale of the external finer. The coarse tune is 0.45% specifications per lattice, and the coarse tuning gear is adjusted to the negative direction one lattice, that is, -0.45%, the original error +0.63 ~ +0.67% theory can be adjusted to +0.18 to +0.22%. At this time, the adjustment gear can be adjusted to the negative direction by 2 lattices, the adjustment amount is $0.05 \times 2 = 0.10\%$, then +0.18 to +0.22% is adjusted to +0.08 to +0.12, and the optimum error is reached Value.

Recommended that the high accuracy (0.2 stage) flowmeter configuration GF₃ is better.

LLT spiral rotor flowmeter

8.3 Error adjustment table

Discription	Error adjustment rate %	Adjusting gear group		Error adjustment rate%	Adjusting gear group	
		Z up	Zdown		Zup	Z down
Display smaell than actually, DOWN TO UP Z up、Z down→ ←Display bigger than actually, frome up t down Z up、Z down	4.21	33	30	0.28	40	38
	3.90	34	31	0.40	41	39
	3.62	35	32	0.53	42	40
	3.35	36	33	0.64	43	41
	3.10	37	34	0.75	44	42
	2.86	38	35	0.86	45	43
	2.63	39	36	0.96	46	44
	2.42	40	37	1.14	24	23
	2.22	41	38	1.32	25	24
	2.02	42	39	1.47	26	25
	1.84	43	40	1.62	27	26
	1.75	29	27	1.75	28	27
	1.67	44	41	1.88	29	28
	1.50	30	28	2.00	30	29
	1.35	46	43	2.11	31	30
	1.27	31	29	2.21	32	31
	1.05	32	30	2.30	33	32
	0.85	33	31	2.39	34	33
	0.66	34	32	2.48	35	34
	0.48	35	33	2.63	37	38
	0.31	36	34	2.77	39	38
	0.15	37	35	2.89	41	40
	0.00	38	36	3.01	43	42
	0.14	39	37	3.16	46	45

9、Common causes and methods of troubleshooting

Failure phenomenon	cause	method	remark
Spiral rotor not work	1、 Sundries in the pipe 2 、 The measured liquid contains more sundries. The filter is damaged. The impurity enters the table, and the gear is stuck.	Disassemble and wash the instruments and pipes and repair the filters.	
Axial seal coupling leakage	The sealing filler is worn or lack of sealing oil.	Tighten the cover or replace the packing and fill the seal oil.	
The rotation of the pointer is unstable, or at the time of stopping	Pointers, washer... Such as loose or rotating parts are not flexible.	Re tighten to eliminate inflexibility.	
Small flow error is too negative	The rotor collided with the wall of the metering box due to the wear of the bearing or the deformation of the measuring box wall.	Replacement of bearings, repair of measuring box wall and gear at variable teeth, make the rotation flexible, ensure the required clearance.	Check after repair
Too large change in error	fluid has large pulsation or gas.	Reducing pulsating or adding a gas separator	
The error is too large, difference between the maximum and minimum error is not more than 1%.	The service life is over, or the clearance after maintenance changes.	Recheck and adjust	The maximum minimum error of 0.2 grade stage flowmeter is not more than 0.4%.
Transmitter without signal	Misposition of message block	Adjust the position, move around, move back and forth	
	Polar inverse	Reconnect "+" red line "-" black line	

十、Others

1.The flowmeter is tested with light diesel oil without special requirements before leaving the factory. Do not use water for cast steel and cast iron flowmeter in order to prevent rust. Check the verification regulation according to the state ("JJG667-2010 liquid volume flowmeter").

2、 The filter is a separate product and the price is discussed separately.