

The selection is detailed on page 9



FG80

Elliptic Gear Flowmeter

Working principle

The flow meter is composed of a measuring box and a pair of elliptical gears installed in the measuring box, and the upper and lower cover plates constitute a sealed initial moon shaped cavity (due to the rotation of the gear, so it is not absolutely sealed) as a calculation unit of the primary displacement. When the measured liquid enters the flow time through the pipeline, due to the pressure difference generated at the inlet and outlet, a pair of gears are continuously rotated, and the liquid measured after the initial moon cavity is continuously transported to the outlet, and the product of the number of revolutions of the elliptical gear and four times each displacement is the total amount of the measured liquid flow (see Figure 1 for the principle). The flowmeter is mainly composed of a shell, a counter, an elliptical gear and a coupling (magnetic coupling and axial coupling) (see Figure 2 for the structure).



FIG. 1 Operation principle diagram of elliptical gear

Product description

Elliptical gear flowmeter is a lightweight volumetric flow meter, with the function of word wheel accumulation counting device and zero device, widely used in various industrial fields of liquid flow control, suitable for various types of liquid measurement, such as crude oil, diesel, gasoline, etc., with a large range, high precision, easy to use and maintenance and other characteristics, the selection of different manufacturing materials, It can meet the liquid flow measurement of petroleum, chemical industry, medicine, food, metallurgy, electric power, transportation and other fields.

Functional characteristics

- High pressure resistance
- High and low temperature resistance (-196°C -200°C)
- Various viscous media can be measured
- High accuracy and repeatability
- Pulse output/analog output is optional
- Range width (1:100)
- Wide measuring range

Product application

- Oil & Gas
- Chemical engineering petrification
- Heating, Ventilation and Air Conditioning (HVAC)
- Source of energy
- Smelting and mining

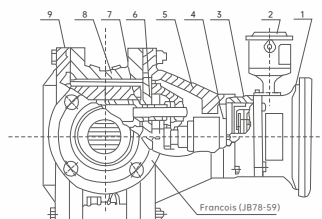


Figure 2 Structure diagram of elliptic gear flowmeter

- | | |
|---|--------------------|
| 1. counter | 6. Cover plate |
| 2. sender | 7. Elliptical gear |
| 3. Precision regulator (for use above DN50) | 8. shell |
| 4. Seal the coupling | 9. Rear cover |
| 5. protectum | |

Technical parameter

Ordinary cast iron type (A), cast steel type (E), stainless steel type (B) oval gear flowmeter

Model number		FG80-A Cast iron		FG80-E Cast steel			FG80-B Stainless steel	
category								
Pressure (MPa)		1.0	1.6	2.5	4.0	6.4	1.0	1.6
Medium viscosity		2~200 mpa.s						
Medium temperature		-20°C~+100°C						
Flow range m ³ /h								
Model number		FG80-A Cast iron		FG80-E Cast steel			FG80-B Stainless steel	
Nominal diameter	precision	precision0.5	precision0.2	precision0.5	precision0.2	precision0.5	precision0.2	
10		0.08~0.5	0.1~0.5	0.08~0.4	0.1~0.4	0.1~0.5	0.1~0.5	
15		0.25~1.5	0.3~1.5	0.25~1.5	0.3~1.5	0.3~1.5	0.3~1.5	
20		0.5~3	0.6~3	0.5~3	0.6~3	0.6~3	0.6~3	
25		1~6	1.2~6	1~6	1.2~6	1.2~6	1.2~6	
40		2.5~15	3~15	2.5~15	3~15	3~15	3~15	
50		4~24	4.8~24	4~24	4.8~24	3~20	3~20	
LA50		4~24	4.8~24	/	/	/	/	
65		8~50	10~50	8~50	10~50	12~60	12~60	
LA65		6~40	8~40	/	/	/	/	
80		10~60	12~60	6~60	12~60	12~60	12~60	
LA80		8~50	10~50	/	/	/	/	
100		16~100	20~100	16~100	20~100	20~100	20~100	
150		32~190	38~190	32~190	38~190	38~190	38~190	
200		56~340	68~340	34~340	68~340	68~340	68~340	

Technical parameter

High temperature cast iron type (TA), cast steel type (TE), stainless steel type (TB) oval gear flowmeters

Model number		FG80-TA Cast iron		FG80-TE Cast steel			FG80-TB Stainless steel	
category								
Pressure (MPa)		1.0	1.6	2.5	4.0	6.4	1.0	1.6
Medium viscosity		2~200 mpa.s						
Medium temperature		+100℃~+280℃						
Flow range m ³ /h								
Model number		FG80-TA Cast iron		FG80-TE Cast steel			FG80-TB Stainless steel	
Nominal diameter	precision	precision1.0	precision0.5	precision1.0	precision0.5	precision1.0	precision0.5	
10		0.08~0.4	0.1~0.4	0.08~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
15		0.27~1.35	0.35~1.35	0.27~1.35	0.35~1.35	0.35~1.35	0.35~1.35	
20		0.54~2.7	0.68~2.7	0.54~2.7	0.68~2.7	0.68~2.7	0.68~2.7	
25		1.08~5.4	1.35~5.4	1.08~5.4	1.35~5.4	1.35~5.4	1.35~5.4	
40		2.7~13.5	3.5~13.5	2.7~13.5	3.5~13.5	3.5~13.5	3.5~13.5	
50		4.4~21.6	5.4~21.6	4.4~21.6	5.4~21.6	5.4~21.6	5.4~21.6	
LA50		4.4~21.6	5.4~21.6	4.4~21.6	5.4~21.6	/	/	
65		9.2~46	11.5~46	9.2~46	11.5~46	11.5~46	11.5~46	
LA65		6.8~34	8.8~34	6.8~34	8.8~34	/	/	
80		10.8~54	13.5~54	10.8~54	13.5~54	13.5~54	13.5~54	
LA80		8.8~44	11~44	8.8~44	11~44	/	/	
100		18~90	22~90	18~90	22~90	22~90	22~90	
150		34~170	42~170	34~170	42~170	42~170	42~170	
200		60~300	75~300	60~300	75~300	75~300	75~300	

FG80 Technical parameters

category \ model		FG80-NA cast iron				FG80-NE cast steel				FG80-NB stainless steel			
Pressure (MPa)		1.6								2.5		4.0	
Medium viscosity		200~3000 mpa.s											
medium temperature		-10°C~+100°C											
precision		0.5											
Flow range m ³ /h													
DiameterDNmm	10	15	20	25	40	50/LA50	65	LA 65	80	LA 80	100	150	200
Flow range	0.04~0.2	0.15~0.75	0.3~1.5	0.6~3	1.5~7.5	2.4~12	4~25	3~20	6~30	5~26	10~50	19~95	34~170

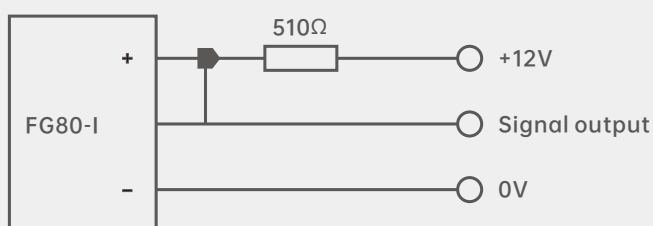
Allowable basic error	0.5%/1.0%
Viscosity of measured liquid	0.6 ~ 200mpa.s
Measured liquid temperature	-10 ~ +65°C
peak working pressure	Cast iron and stainless steel: 1.6MPa Cast steel: DN20 ~ 25, 2.5 MPa; DN~15, DN40, 6.4Mpa
Main material	Cast iron, cast steel, stainless steel
Pipe connecting flange	JB78-59, JB79-59
Sending device	G80 transmitter Power supply: 12VDC Pulse amplitude: v = 4v (square wave), low level < < 4.5V, high level > 8.5v. Transmission distance: 1Km (conductor resistance of metal shielded wire ≤39Ω)
Electrical performance accuracy	±1 pulse
explosive-proof grade	Ex ia IIC T3... T6, Ex db IIC T6... T1 Gb
Explosion-proof safety barrier model	NF713

FG80 Transmitter technical parameters

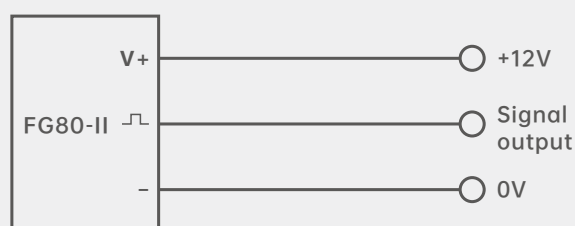
Operating voltage	12VDC
Operating voltage range	11 ~ 15VDC
Output signal	V = 4V (square wave) low level < < 4.5V, high level > 8.5v.
Remote transmission distance	1Km (Wire resistance of metal shielded wire ≤39Ω)
Ambient temperature	-10 ~ +65°C
Explosive-proof grade	Ex ia IIC T3... T6, Ex db IIC T6... T1 Gb

Transmitter output line connection

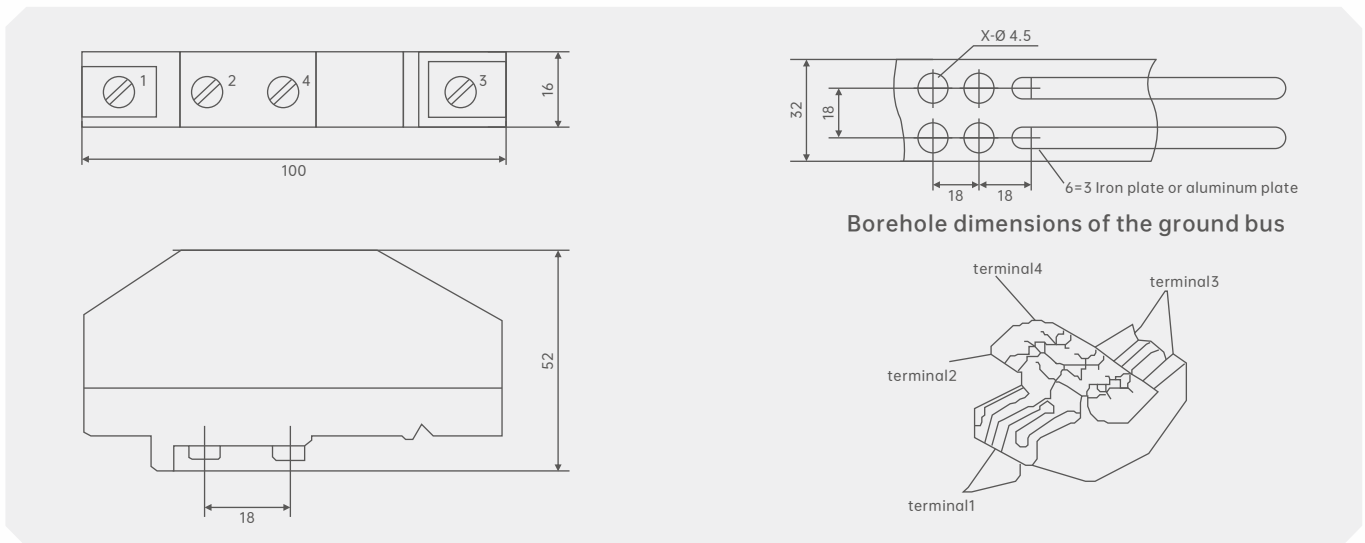
FG80-I Transmitter output line connection



FG80-II Transmitter output line connection



Safety grid appearance and installation dimensions

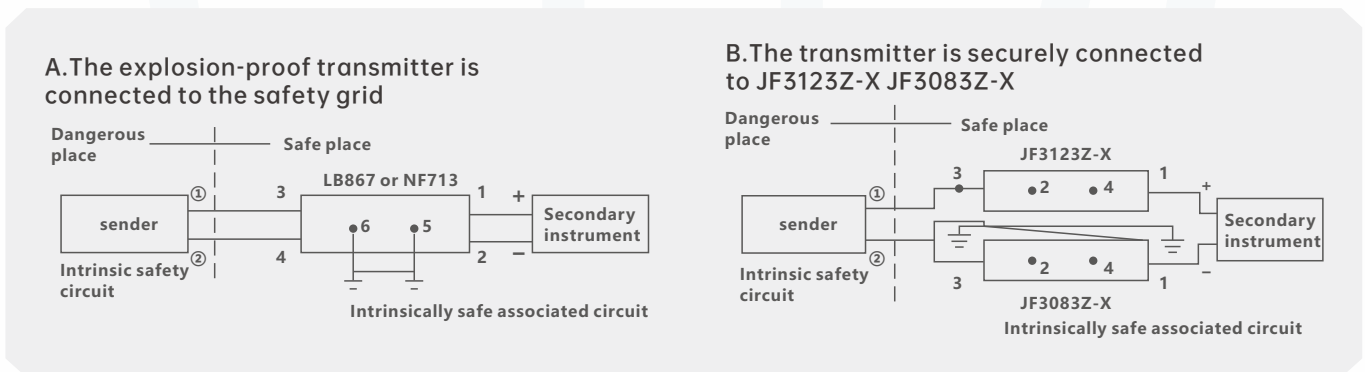


Explosion-proof property

Explosion-proof transmitter is used with elliptic gear flowmeter in the Ex d IIC T6 level of the pulse transmitter device, explosion-proof forms are intrinsically safe and flameproof type, there are obvious explosion-proof marks on the housing, G80 transmitter and safety gate connected with the display instrument supporting use.

Matters needing attention

1, the safety type explosion-proof transmitter is installed on the A counter below FG type DN40 (including DN40), flameproof type explosion-proof transmitter is installed on the E+T counter above FG type DN40, the transmitter supply voltage does not exceed the rated voltage of the safety gate.2, the transmitter is used for explosion-proof occasions but must be equipped with a safety gate, and the distributed inductance and capacitance of the connection wire are not more than 1.5mH and 0.1uF.3, the transmitter is used for occasions that do not require explosion-proof use.



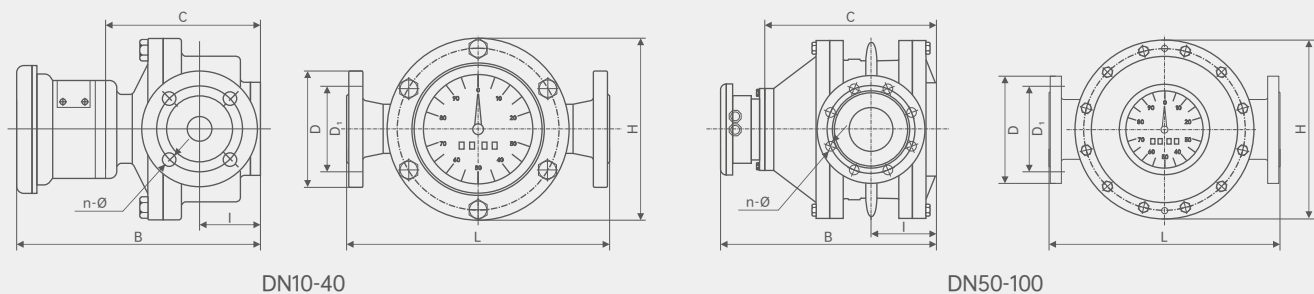
ransmitter and FG series elliptic gear flowmeter with sending parameters table

caliber mm	A1counter	
	L/P	P/S
10	0.01	11.11
15	0.1	4.16
20	0.1	8.33
25	0.1	16.16
40	1	4.17
A40		

caliber mm	E ₁ +T	
	L/P	P/S
10	0.1	66.7
15	1	11.11
20	1	16.67
25	1	27.78
40	1	52.78
A40	1	94.44

size mm

Cast iron type, cast iron high viscosity type, cast iron high temperature type, cast iron deformation type oval gear flowmeter dimensions



caliber mm	L	H	I	B	C	D	D1	n	Ø	weight kg
10	150	100	45	213	135	90	60	4	14	6
15	170	118	48	226	147	95	65	4	14	8
20	200	150	53	238	155	105	75	4	14	11
25	260	180	60	246	164	115	85	4	14	18
40	245	180	77	271	199	145	110	4	18	20
50	340	250	88	379	249	165	125	4	18	46
LA50	287	218	103	310	232	165	125	4	18	28
65	420	325	118	443	311	185	142	4	18	87
LA65	265	248	120	378	284	185	145	4	18	40
80	420	325	118	443	311	200	160	8	18	87
LA80	265	248	120	387	284	200	160	8	18	67
100	515	418	131	467	337	220	180	8	18	160
150	540	515	210	565	435	285	240	8	23	245
200	650	650	247	624	494	340	295	12	23	400

Cast steel type, cast steel high viscosity type, cast steel high temperature type oval gear flowmeter dimensions

caliber mm	L	H	I	B	C	D	D1	n	Ø	重量 kg
15	200	138	53	220	145	95	65	4	14	12
20	250	164	65	245	165	105	75	4	14	18
25	280	195	55	248	170	115	85	4	14	22
40	265	184	79	340	210	150	110	4	18	40
50	265	184	79	340	210	165	125	4	18	40
80	450	337	118	460	330	200	160	8	18	118
100	555	442	131	485	355	220	180	8	18	210
150	540	510	210	565	435	285	240	8	23	260
200	650	650	247	625	495	340	295	12	23	430

Cast iron, cast steel high temperature oval gear flowmeter dimensions: DN15~DN25, A, B size according to the table data plus 160mm hot extension tube: DN40~DN80, A, B size according to the table size plus 300mm hot extension tube, the rest size with the corresponding size of the table above.

Stainless steel oval gear flowmeter dimensions

caliber mm	L	H	I	B	C	D	D1	n	Ø	weight kg
10	170	100	45	216	133	90	60	4	14	7
15	200	120	45	226	226	95	65	4	14	11
20	230	150	48	238	238	105	75	4	14	17
25	280	195	58	246	249	115	85	4	14	21
40	265	184	79	340	210	150	110	4	18	40
50	265	184	79	340	210	165	125	4	18	40
65	365	265	125	460	460	185	145	4	18	56
80	420	305	133	459	459	200	160	8	18	82
100	515	400	181	554	554	220	180	8	18	127
150	540	515	210	607	607	285	240	8	23	280
200	650	650	247	646	646	340	295	12	23	435

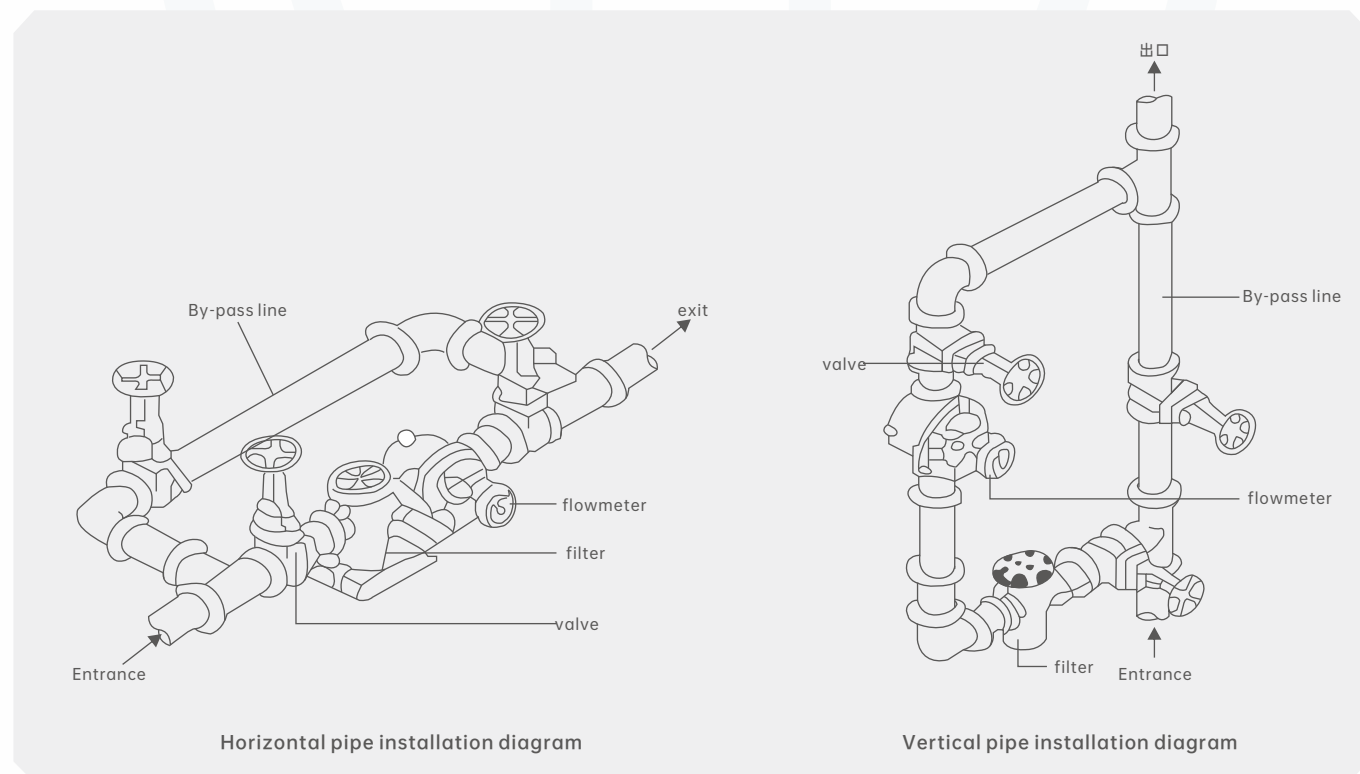
Installation mode

The pipe should be thoroughly cleaned before installation, and a filter should be installed in front of the flow meter to prevent debris from entering the flow meter. When the measured liquid contains gas, an air separator should be installed. It should be noted that the elliptical gear shaft of the flow meter must be placed in a horizontal position, that is, the dial is perpendicular to the ground plane. The valves for regulating flow and starting and closing shall be installed separately at the inlet and outlet of the flow meter.

The arrow on the flowmeter housing should point in the same direction as the liquid flow in the pipeline being installed.

For continuous flow pipes, the horizontal pipe installed with the flow meter should be equipped with a bypass valve for regular cleaning and maintenance. The flow meter on the vertical pipe should be installed in the bypass pipe to prevent debris from falling into the meter.

Flow meter in the correct installation conditions, in order to facilitate the reading, the counter can be rotated 180° or 90° according to the need for installation requirements.



Error calculation and adjustment

(1) The basic error of the flowmeter is calculated by the measured values of each verified flow point according to the following formula: (volumetric method)

$$E = \frac{V_m - V}{V} \times 100\%$$

E-flowmeter error (generally referred to as cumulative error) takes two significant digits.

V_m -meter measured value

V- After correction, the value measured by the standard device of the flow meter (that is, the actual value) is calculated by the basic error formula, when $V_m > V$, the basic error of the flow meter is a "+" value, indicating that the flow meter is faster.

When $V_m < V$, the basic error of the flow meter is the value of "-", indicating that the flow meter is slow.

In order to keep the flowmeter error within the basic error limit, error adjustment is often required. That is, the mechanical transmission speed ratio is changed by replacing a pair of adjusting gears (adjusting teeth) installed in the counter, so that the indicator value of the flowmeter is adjusted.

Error adjustment can not change the flow characteristics of the flowmeter, making its characteristic curve artificially in a new coordinate system.

In general, within the specified (or actual use) flow range, the basic error range of the maximum and minimum flow detection point is not greater than the basic error limit of the specified accuracy, and the basic error of the flowmeter can be qualified by error adjustment.

The used flowmeter generally uses the original adjusting gear set for error verification first, and then makes error adjustment according to the specific error situation.

Fault phenomenon	reason	measure	remark
Elliptical gear does not rotate	1. There is debris in the pipe. 2. The measured liquid contains much debris, and the filter is damaged. Debris into the table, gear stuck.	Disassemble meters and pipes, repair filters.	
Leakage of axial seal coupling	Seal packing wear or lack of seal oil	Tighten the gland or replace the packing and fill with sealing oil.	
The rotation of the pointer is unstable, or it stops and goes	Pointers, gaskets, etc., are loose or rotating parts are not flexible	Retighten to eliminate inflexibility	
The small flow error is too negative	The oval gear collides with the wall of the measuring box due to bearing wear or deformation of the measuring box	Replace the bearing, repair the metering box wall and gear at the tooth change position, make the rotation flexible and ensure the required clearance.	To be fixed after repair
Excessive error variation	The fluid is pulsating or contains gas.	Reduce pulsation or install gas separator.	
The error is too large, but the difference between the maximum and minimum error does not exceed $\pm 1\%$	The service life exceeds, or the gap occurs after maintenance. change	Re-check and adjust.	
Transmitter has no signal	1. Incorrect position of sending block	Relocate left and right, move back and forth	Reconnect: 1. Connect the red line with "+" 2. Connect "-" with black line
	2. Polarity reversal		

FG80-Selection composition

Selection example **FG80**

1	A	2	H	3	N	4	1-10	5	N	6	A	7	G	8	N	9	W	10	A
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1.Instrument type	A	Integrated
	B	Other installation forms
2.working power supply	G	Ac 220V
	H	Dc 24VDC
	I	Battery powered 3.6V
3.output signal	N	4-20mA
	O	4-20mA+HART
	P	pulse
	Q	RS485
	S	4-20mA+Switch output
4.Range range	R()	Range (Note Range)
5.Explosion-proof requirements	X	Intrinsically safe explosion-proof
	Y	Flameproof
	N	No explosion-proof
6.medium temperature	A	< 65°C
	B	< 120°C
	C	-196°C-200°C
7.texture of wood	G	304 stainless steel
	H	316 stainless steel
	I	aluminium alloy
	J	PP
	T()	Other materials
8.sealing material	N	FKM
	O	PP
	T()	Other materials
9.attended mode	W	threaded connection
	X	flanged connection
	Y	Sanitary flange
	Z	cutting sleeve
10.threaded connection (Flange item is not selected)	A	1/2NPT
	B	3/4NPT
	C	1/4NPT
	D	M8×1.0
	E	M10×1.0
	F	M12×1.5
	G	M14×1.5
	H	M18×1.5
	I	M20×1.5
	J	G1/2
	K	G3/4
L	G1/4	
M	G1/8	
N	G3/8	
O	G1	



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FG80-Selection composition

Selection example **FG80**

1	A	2	H	3	N	4	1-10	5	N	6	A	7	G	8	N	9	W	10	A
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11. Flange connection (Threads are not selected)	P	DN10
	U	DN15
	V	DN20
	W	DN25
	Q	DN32
	X	DN40
	Y	DN50
	Z	DN65
	A	DN80
	B	DN100
	C	DN150
	D	DN200
	E	1"
	F	1½"
	G	2"
	H	2½"
	I	3"
	J	3½"
	K	4"
	L	5"
M	6"	
N	8"	
T ()	Other flange connections	
12.special requirements	Y	high-temperature
	Z	high-pressure

Instructions:

It means that FG80 elliptical gear flowmeter is integrated, with power supply of 24VDC, output signal of 4-20mA, measuring range of 1-10t/h, no explosion-proof, medium temperature of < 65°C, material of 304 stainless steel, sealing material of FKM, and connection mode of 1/2NPT. Item 12 in the above table is optional.

Product Certification

Compliance and approval; Rodwig flow meters meet key standards and certifications for process measurement technology; To ensure the highest reliability in such settings;

