S-OVAL

Oval gear flowmeter

Operating manual



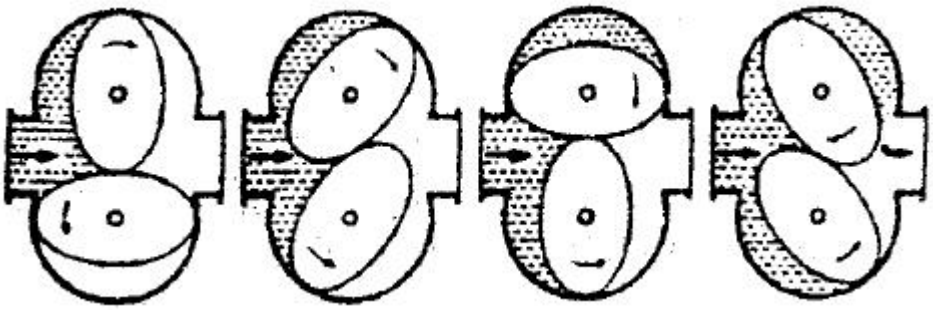
General Description

Oval meters are instruments used for the continuous and intermittent measurement and control of the pipe liquid flow, which are typical of positive displacement meter, feature large flow range, low pressure loss, large viscosity range, easy installation, high accuracy and can measure high temperature, high viscosity liquids with easy calibration.

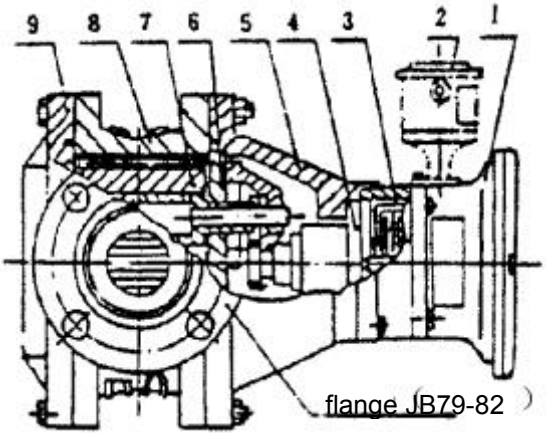
Type S-OVAL flowmeters are fitted with on-site pointer indication and roller integration device which can indicate the liquid flow and intermittent flow passing through the pipeline. For the different liquids (acid, alkali, salt, organic solution etc.), the meters can be made of different materials (cast iron, cast steel, stainless steel etc.) . The meters are widely used for the flow measurement in the field of petroleum, chemical, chemical fibre, traffic, food industries and commerce, medical and sanitary departments.

Structure and Operation Principle

Oval meter is generally comprised of a flow transducer and a counter mechanism. The main part of the transducer is a measuring chamber which consists of a pair of oval wheels and a sealing coupling. The counter mechanism contains speed reduction gears, adjusting device, counter, and pulse transmitter etc.



In the measuring chamber, a pair of oval wheels and cover plate make a crescent shape cavity which is used as a measuring unit.The oval wheels are rotated by the pressure difference in the inlet and outlet of the meter and drive the inlet liquid through the cavity to the outlet, each revolution of the oval wheels displaces fluid four time the volume of the cavity, the total revolutions of the oval wheels and the revolution rate will be transferred to the mechanical counter, and the total liquid volume and instantaneous flow will be known by the pointer display and the roller integration. The attached signal generator converts the rotary axial angular shift to the pulse signal and then transmits it to the electrical indicator for remote integrated flow and instantaneous flow indication and control.



1. Counter 2. Pulse Transmitter 3. Accuracy adjustor(above DN50) 4. Sealing Coupling
5. front cover 6.Cover Plate 7.Oval Gears 8. Shell 9. Back Cover

General Technical Specification

1.Materials of main parts and the nominal operating pressure

	Shell and cover	cover plate	oval wheel	Rotary shaft	Sheath of shaft	Nominal pressure MPa
S-OVAL-A	Cast steel	Cast iron		Stainles s	Bronze(with oil) or rolling	1.6
S-OVAL-E	Cast steel	Cast iron Stainless steel				Under DN50 6.3 DN80-100 4.0 DN150-200 2.5
S-OVAL-Q	Cast iron	Cast	Alloy aluminum, engineering Stainless		graphite	1.6
S-OVAL-B	Stainless	Stainles			graphite	1.6 2.5
S-OVAL-L	Steel Cast aluminum	Cast Iron steeless	Alloy aluminum,		Bronze(with oil) graphite	1.6
Notes:1. OCr18Ni12Mo2Ti fSotarisntleeesl type S-OVAL Ost Ce re 1 l 8Ni9Ti for type rolling S-OVAL-B bearing						

2.Accuracy class: class 0.5,class 0.2 (normal operating temperature −10℃～+60℃

3. Measured media temp. environment temperature -41 ℃ +50℃

LC-A、B、C: -20 ～+60 ; 60 ～200 (with high temp. radiator installed)

LC-Q、L: -20 ℃～+60 ℃

4. Explosion-proof mark: Exia CT5, d BT4

5. Flow range: unit: m3/h

Type	DN	Viscosity (mPa. s)								
		<0.3	0.3~0.	0.8~2		2~200		200~1000		1000~200
S-OVAL-10	10	0.	0.2-0.		0.08-0.	0.08-0.	0.05-0.	0.06-0.	0.03-0.	0.03-0.2
S-OVAL-15	15		0.75-1		0.3-1.	0.3-1.5	0.15-1.	0.2-1.0	0.1-1.0	0.07-0.75
S-OVAL-20	20		1.5-3	1-3	0.4-3 4	0.5-3	0.3-3	0.4-2.1	0.2-2.1	0.15-1.5
S-OVAL-25	25	4-6	3-6	2-6	0.8-6	1-6	0.6-6	0.8-4.2	0.4-4.2	0.3-3
S-OVAL-40	40	9-15	7.5-15	5-15	2-15	2.5-15	1.5-15	2.1-10.	1.0-10.	0.7-7.5
S-OVAL50	50	10-24	8-24	8-24	3-24	4.8-24	2.4-24	2.4-16.	1.6-16.	1.2-12
S-OVAL-B4	40 50	8-20	6-20	6-20	4-20	4-20	2-20	2.8-14	1.4-14	1.0-10
S-OVALB65	65	27-40	20-40	15-4	5-40	8-40	4-40	5.6-28	2.8-28	2-20
S-OVAL-80	80	40-60	30-60	20-6	8-60	12-60	6-60	8.4-42	4.2-42	3-30
S-OVAL-100	100	67-10	50-10	34-10	13.-10	20-100	10-10	14-70	6-70	5-50
S-OVAL-150	150	127-19	95-19	64-19	24-19	38-190	19-19	26.6-13	13.3-13	9.5-95
S-OVAL-200	200	227-34	170-34	114-3	43-34	56-340	34-34	47.6-23	23.8-23	17-170
Accuracy		0.5	0.5	0.2	0.5	0.2	0.5	0.2	0.5	0.5
class Note	1.“gal/h” could be used for special orders. 2.Flow range of type S-OVAL-A80.2 is 1760gal/h 13200gal/h									

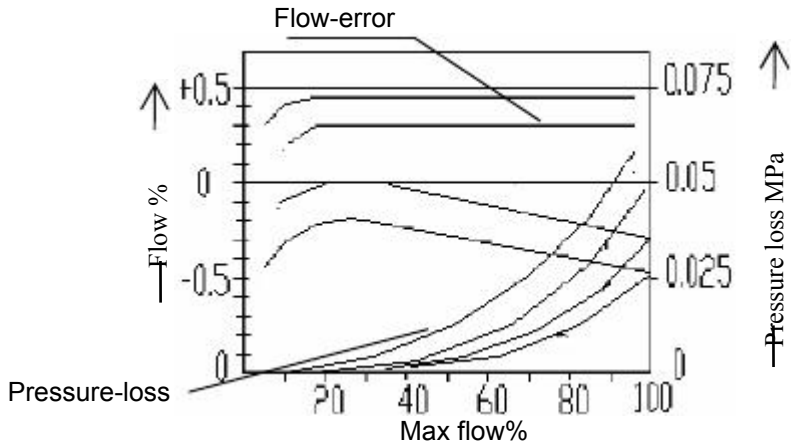
Note: If the temperature of the metered liquid is higher than 80℃ the maximum flow fate will be 90% of the primary flow, and the minimum will be 120%.

6. Performance(curves of flow error and pressure loss)

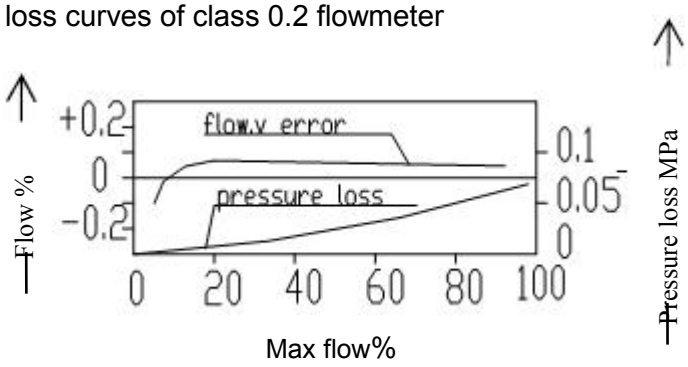
Flow error and pressure loss curves of class 0.5 flowmeter

1 aerial petrol 0.7mPa s 2 light diesel oil 5mPa s

3 water 1mPa s 4 transformer oil 20mPa s



Flow error and pressure loss curves of class 0.2 flowmeter



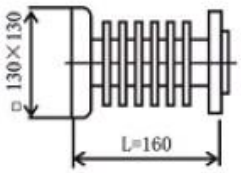
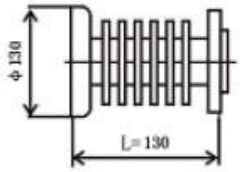
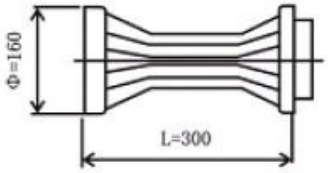
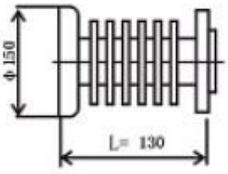
Notes:1 The above accuracy curve shows the meter error when the metered liquids have different viscosities, and the meter error can be adjusted up and down the Axis 0 by the accuracy adjustor to optimize the error.

2 For any liquid when the flow range rate is reduced, the meter accuracy can be improved by means of accuracy adjustor.

Other Special Oval Meters of Type **S-OVAL**

1. Flowmeter of high temperature

Flowmeter of high temperature is matched radiator, the which's specifications are as followings:

DN10~40		DN50~200	
			
T1	**T2**	**T1**	**T2**

Note:'T' for flowmeter of high temperature without radiator

'T1' for the meter with long radiator,120℃～200℃ 'T2' for the meter with short radiator, 60℃～120℃

2. Flowmeter of large viscosity

Type: S-OVAL-NR S-OVAL-NA for cast iron, S-OVAL-NE for cast steel

Nominal pressure(MPa):1.6 for cast iron;6.3 for cast steel under DN100;2.5 for cast steel above DN100



Measured liquid viscosity(mPa.s):20 ～

Measured liquid temp. : -20 ℃～+200℃

Accuracy class: 0.5

3. Type S-OVAL transmitter

General description

Type LC13 meter is comprised of flowmeter reality and a signal transmitter, which can convert the pipe liquid flow to pulse signals or analog signals directly. Matched the EL series indicators or other indicators and systems, the meter can realize remote displaying, control and record,.



Technical specification

a. Accuracy class class 0.5,class 0.2

b. Measured media temp. : normal operated temperature -10 ℃ +60℃

c.Types of pulse transmitter :GF MF AG19

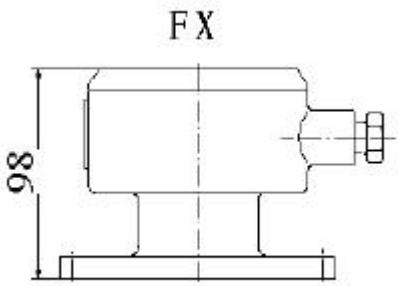
d.Structure type of transmitter:BGF I FX S-OVAL-13

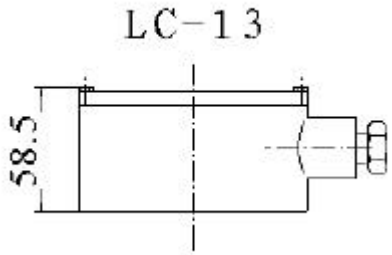
f.Explosion-proof mark: Exia CT5(intrinsically safety)--- FX, LC13

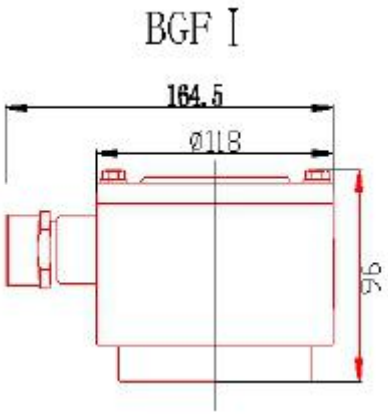
dIIBT4(separation)--- BGF I

Explosion proof approvals pending

g.Dimensions (see the following figures) :







h. Specification and parameter

DN	flow range	Output signal		Output signal		Output signal		Output signal
	viscosity	GF		QF		FX GF		MF-1
	2~200mPas	L/P	P/S	L/P	P/S	L/P	P/S	
10	0.05~0.5	0.002138	64.95	0.010692	12 99	0.000425	327	4~20mA
15	0.15~1.5	0.00748	55.7	0.0374	11.14	0.0015	277.7	4~20mA
20	0.3~3	0.011522	54.75	0.0761	10.95	0.0015	555.5	4~20mA
25	0.6~6	0.01492	111.7	0.0746	22.4	0.003	555.5	4~20mA
40	1.5~15	0.04132	100.83	0.1033	40.33	0.0078	534.2	4~20mA
Note:Because type FX transmitter outputs high frequency signals,client system shall be provided with high frequency counter interface,otherwise can't receive the pulse signals.								

j.Dimension calculation

For different types of signal transimitters ,add dimension C with the shape dimension of transmitters,thus get the total dimension.

For instance: S-OVAL-HB25.2/FX-GF-I

Height C=171
Height of type FX=98
Total height=171+98=269

i.Product identification

/

Type of transmitter
Transmitter structure
Nominal operating pressure
Diameter
Material — A cast iron; E cast steel; B,C stainless steel; L cast aluminum

Type of flowmeter

4.Light-type oval flowmeter

General description

S-OVAL-L light-type oval meters are developed according to the market,which feature light weight,high accuracy.The meters are widely used for the flow measurement in the field of many kinds of oil , low corrosive medias and affused flow.



Technical specification

a. Accuracy class class 0.5,class 0.2

b. Measured media temp. :

normal operated temperature -10 ℃～+60 ℃

c. Specification: DN10~DN50 、 DN80 、 100

d. Materials of main parts and the allowable operated pressure

Type	DN	Shell,front and back cover	Cover	Oval gear	Shaft	Sheath of shaft	Nominal
LC-L	Under	Alloy aluminum	Cast iron stainless steel	Alloy aluminum engineering material cast iron	stainless steel	Bronze(with oil),graphite ,rolling bearing,	1.6 MP
LC-A	Above	Cast iron	Cast iron	Alloy aluminum		Bronze(with oil),graphite	1.6
LOther technDicNa8l specifications are same with the ones of type S-OVAL							

5.Type S-OVAL-U oval flowmeter



To transmit and detect the medias, which are easily frozen at a normal temperature or concreting at a certain temperature, it needs to preheat and melt the media in the pipe. But for it is forbidden to pass through steam directly (to prevent the meter from being damaged),we develop the meter with thermal insulation sleeve outside of the meter shell. It can fill hot water, hot oil or steam under 200℃ into the thermal insulation sleeve, then melt the frozen media in the meter or strainer and keep the

temp.,thus ensure the meter operating normally.

The strainer before the meter can be also matched thermal insulation sleeve.

The inlet flange is normally type of DN15 flange, and also could be designed according to the customer's requirement.

Nominal operating pressure of thermal insulation sleeve is 0.5MPa, and also could be designed according to the customer's requirement.

6.Type S-OVAL-D batch oval flowmeter

General description

Type S-OVAL-D batch oval flowmeters are special meters, which are constituted of oval flowmeter transmitters reducer and batch counter. The meter can realize both integrated measurement and enact fixed value manually, and when the integrated flow reachs scheduled value, the electric circuitry will be switched off.





References for Components and Structures of the Meters

1.Counters: A A1 J1 Z A5 A6 S1 ELZ

Counter	Performance	Matched devices
A A_5	Pointer indication,Roller total calculation with 6 numbers,Unit: L	Pointer indication DN10 1L/per loop under DN25 10L/per loop DN40 100L/per loop.
A_1	Same with the above, matched pulse transmitter	
J_1	Pointer indication,Roller total calculation with 6 numbers,Unit: L, matched pulse transmitter	Under DN80 100L/per loop above DN100 1000L/per loop.
A_6	Dual-pointers indication,Roller total calculation with 6 numbers, single-shift with 4 numbers, return-to-zero,matched pulse transmitter	DN10 1L/per loop under DN25 10L/per loop under DN80 100L/per loop above DN100 1000L/per loop.
Z	Same with the above without pulse transmitter	
S_1	mechanism instantaneous flow indicator	instantaneous flow indicator
ELZ	Direct-read indicator for integrated value single-shift value instantaneous flow and return-to-zero of the single shift	Used for every type of flowmeters

2. Scheme of counter with reducer(JT1 GT/F)

Scheme	Total height	Notes
A without reducer	78	Used for Type S-OVAL meters under DN40
A_1 without	105	Used for Type S-OVAL meters under DN40,matched QF GF MF

Z without reducer	74.5(82.5)	Used for every type flowmeter,return-to-zero 74.5mm for meters under DN40 82.5mm for meters above DN50
J_1+JT_1	94+35=129	Used for Type S-OVAL meters above DN50,matched QF GF MF
A_5+GT/F	64+67.5	Used for Type S-OVAL meters,matched QF GF MF
A_6+GT/F	64+67.5	Used for Type S-OVAL meters,matched QF GF MF,return-to-zero
S_1	85.5+62 special	Used for instantaneous flow indicator above DN50
ELZ	160 145	160mm with 4~20mA output,145mm without 4~20mA output

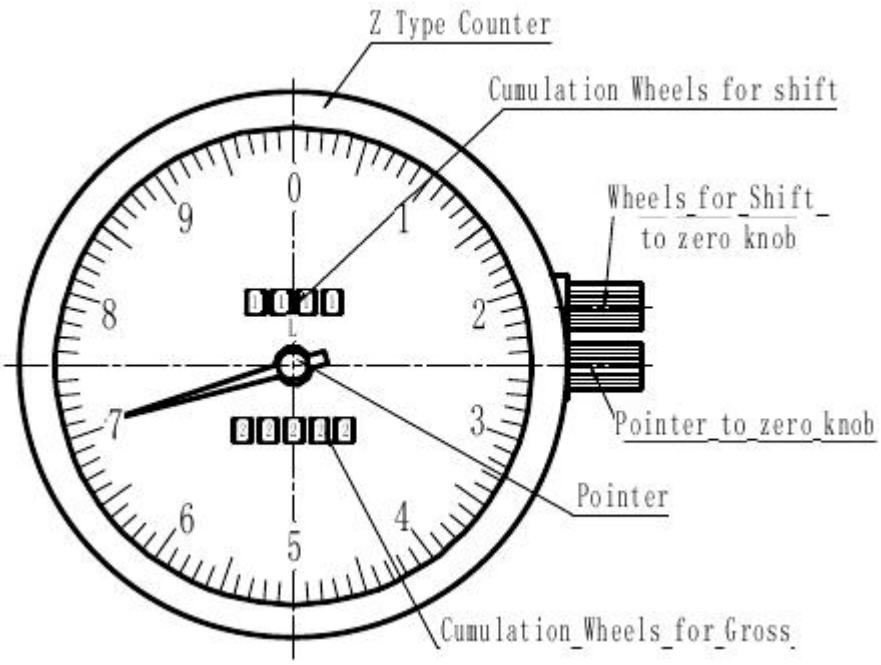
Notes:1.Operation of counter ELZ shall be referred to the corresponding manual.

2. Return-to-zero operation should be conducted only after the flow stops operation from damaging the meter.

3. Return-to-zero operation for counter Z

Return-to-zero of the needle: push the return-to-zero turnbutton of the needle toward the meter center direction. After the needle has been completely pushed, turn deasil. After the needle return the zero with accuracy, loose the turnbutton, the turnbutton will automatically rebound to the original position (in case that the rebounding is not sensitive, it can be slightly pulled to the original position).

Return-to-zero of the single-shift: directly and deasil turn the single-shift return-to-zero turnbutton to make the single-shift bit print drum turn from “1.1.1.1.” → “2.2.2.2 → “9.9.9.9” → “0.0.0.0” one by one.



3 Scheme for pulse transmitter

3.1 General description for pulse transmitter GF

Pulse transmitter GF is a sensor of the rotary angular shift matched to cubage flowmeters,which can convert the measured flow to the pulse signal for remote flow indication,and work at both intrinsically safety explosion and separation explosion.



Normal performances of transmitter GF

1.No contact, reliable transmitting,square wave output,

2.Operating frequency is direct proportion with matched meter's flow.

3. Environment temp.: -10~+65 . ℃

4.Two explosion-proof types: intrinsically safety, and separation

5. Dimensions of output pipeline interface: Internal screw thread M10×1, separation screw thread G1/2''

6. Dimensions of inner hole for thread: Φ5.6,separation Φ4.5.

7.High accuracy resisting libration,specially used for affused flow.

GF— Ⅰ technical characteristics

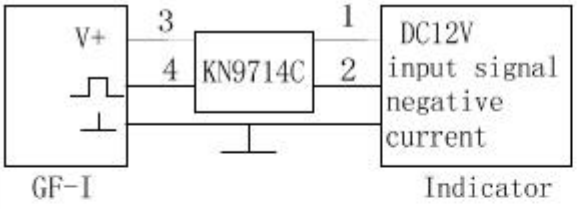
1、Nominal operating voltage: DC12V 10%

2、Output signal:low level<0.5V;high level >9V

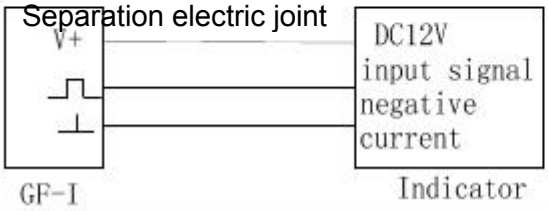
3、Matched safety grid: KN9714C

4、Three-cable system(positive electricity, signal, negative current)

5、Intrinsically safety connection



6、Separation electric joint



GF— Ⅱ technical characteristics

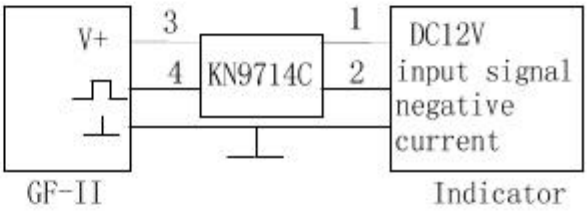
1、Nominal operating voltage: DC24V 10%

2、Output signal: low level <1V; high level >20V

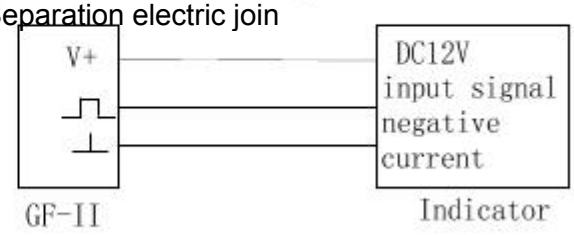
3、Matched safety grid: KN9714C

4、Three-cable system(positive electricity, signal, negative current)

5、Intrinsically safety connection



6 Separation electric join



3.2 General description for pulse transmitter QF

Pulse transmitter QF is a sensor of the rotary angular shift matched to cubage flowmeters,which can convert the measured flow to the pulse signal for remote flow indication,and work at both intrinsically safety explosion separation explosion.

Normal performances of transmitter GF

1.No contact, reliable transmitting,square wave output,

2.Operating frequency is direct proportion with matched meter's flow.

3. Environment temp.: -40~+65 .

4.Two explosion-proof types: intrinsically safety, and separation

5. Dimensions of output pipeline interface: Internal screw thread M10×1, separation screw thread G1/2''

6. Dimensions of inner hole for thread : Φ5.6,separation Φ4.5.

Performances of transmitter QF-I

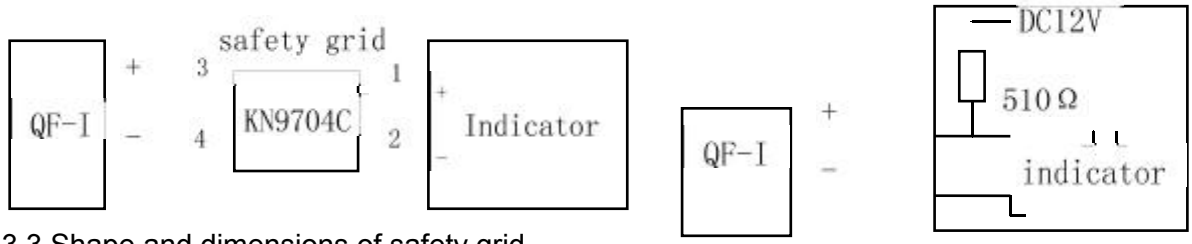
1、Nominal operating voltage: DC12V±10%

2、Output signal: low level < 4.5 V; high level >8.5V

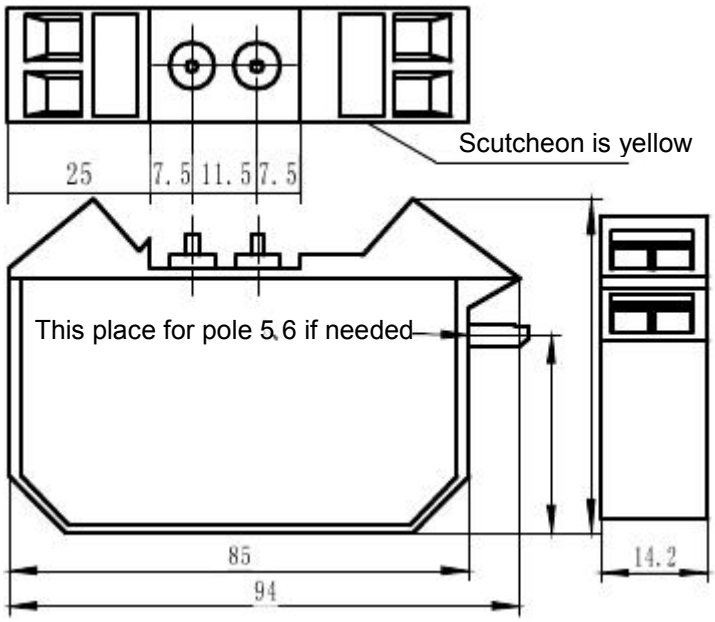
3、Matched safety grid: KN9704C

4、Two-cable system(signal transmitting uses the same cable with power supplying)

5、Intrinsically safety connection 6、Separation electric joint



3.3 Shape and dimensions of safety grid



3.4 Table of matched transmitter parameters

Counter A_5 A_6 A_1				
	Pulse transmitter		Pulse transmitter	
DN	L/P	P/S	L/P	P/S
10	0.001	111.1	0.01	11.1
15	0.01	41.6	0.1	4.16
20	0.01	83.3	0.1	8.33
25	0.01	166.6	0.14	16.66
40	0.1	41.7	1	4.17
A4	0.1	41.7	1	4.17
B40	0.04	138.9	0.1	55.56

Counter A_5 A_6 (T)J_1				
	Pulse transmitter		Pulse transmitter	
DN	L/P	P/S	L/P	P/S
50	0.04	166.75	0.1	66.7
B50	0.04	138.9	0.1	55.56
65	0.1	111.1	1	11.11
80	0.1	166.7	1	16.67
10	0.1	277.8	1	27.78
15	0.4	131.95	1	52.78
20	0.4	236.1	1	94.44

4 4-20mA analog pulse transmitter MF

4.1 Pulse transmitter MF matched to cubage flowmeter can convert the instantaneous flow to 4-20mA analog signals for remote flow indication、 regulation and control、 and export pulse signals for integration.

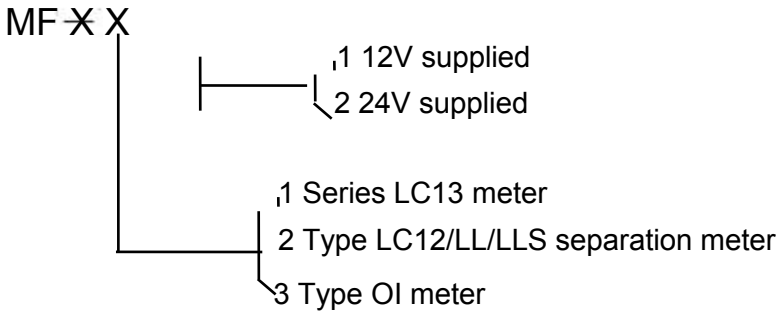
4.2 Design feature:

(1)Four-cable system (positive electricity, 4 20mA current ,signal, negative current)

Note: three-cable system for 4 —20mA output only, signal cable doesn't fetched out at the time of supplied. If need, please show when being ordered for goods.

(2) 4 —20mA output directly, high performance, reliable transmitting

(3) Nomenclature



4.3 Technical specification

1.Output signal:

a :analog signals:4 20mA

b: voltage : low level < 0.5 V; high level >9V (12V supplied)

low level < 1 V; high level >20V (24V supplied)

2.Allowable errors

analog signals:±0.5%FS

pulse signals: ±1 pulse

3.Environment temp.: -25 ~+50 . ℃

4.Analog signals load resistance(client end) <400Ω 12V supplied

<800Ω 24V supplied

5.Power supply

DC12V±10% 60mA

DC24V±10% 60mA

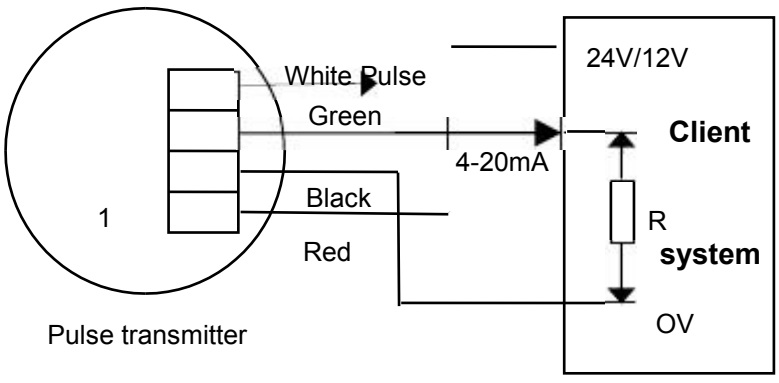
6.Explosion-proof mark: Intrinsically safety (waiting for authentication)

Separation d BT4

4.4 Note for clients

24V DC or 12V DC shall be indicated when being ordered for goods,and remember making connection with power off.

Electric joint:



4.5 Parameters tables of MF pulse output

Type LC12	L/P	P/S
DN10	0.0012	88.88
DN15	0.0125	33.28
DN20	0.0125	66.64
DN25	0.0125	133.28
DN40	0.125	33.36
DNB40II	0.05	111.12
DN50	0.05	133.4
DNB50II	0.05	111.12
DN65	0.125	88.88
DN80	0.125	133.36
DN100	0.125	222.24
DN150	0.5	105.56
DN200	0.5	188.88

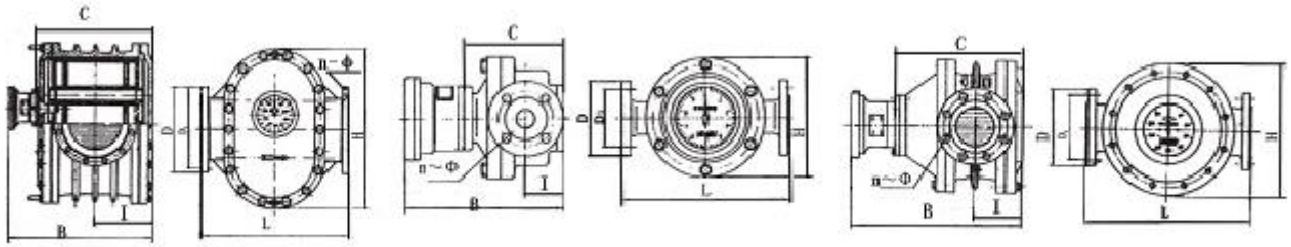
Type LC13	L/P	P/S
DN10	0.00213	64.976
DN15	0.00748	55.7
DN20	0.01522	54.752
DN25	0.01492	112
DN40	0.02066	201.6

Type OI	L/P	P/S
OI06	0.005	14
OI1	0.005	33.3
OI2	0.005	100
OI5	0.01	83.3
OI10/OM1	0.05	33.3
OI50/OM5	0.1	50
OM115	0.5	16.7
OI200	0.5	23.3
OI400	1	20

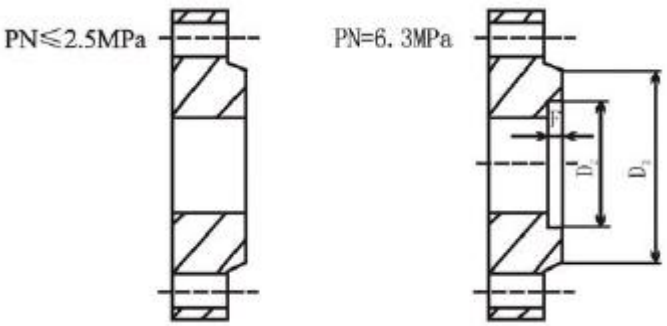
L:litre;P:number of pulse;S:second

Shape and Installation Dimension

Only for the meters matched counter A and counter J1,others refer to the attached dimensions.



Form of flange



D	D3	D	f
1	50	35	4
1	55	40	4
2	68	51	4
2	78	58	4
4	95	76	4
5	10	88	4
8	14	12	4
10	16	15	4.

Dimensions and weights for cast iron meter(dimension B for meter matched counter A or J_1)

Unit:mm

DN	L	H	B	C	I	D	D_1	n		Weight
10	15	100	213	135	45	90	60	4	14	6
15	17	118	226	147	48	95	65	4	14	8
20	20	150	238	155	53	105	75	4	14	11
25	26	180	246	164	60	115	85	4	14	18
40	24	180	271	199	77	145	110	4	18	20
50	34	250	379	249	88	160	125	4	18	46
80	42	325	441	311	118	195	160	8	18	87
100	51	418	467	337	131	220	180	8	18	160
150	54	510	565	435	210	280	240	8	23	245
200	65	650	624	494	247	335	295	12	23	400

Dimensions for alloy aluminum meter are same with those for cast iron meter.

Dimensions and weights for cast steel meter(dimension B for meter matched counter A or J_1)

Unit:mm

DN	L	H	B	C	I	D	D_1	n		Weight
15	20	138	220	142	53	105	75	4	14	12
20	25	164	244	166	63	125	90	4	18	18
25	30	202	252	173	68	135	100	4	18	22
40	30	202	283	205	83	165	125	4	23	27
50	38	262	398	268	88	175	135	4	23	66
80	45	337	460	330	118	210	170	8	23	118
100	55	442	484	354	131	250	200	8	25	210
150	54	510	565	435	210	300	250	8	26	260
200	65	650	624	494	247	360	310	12	26	430

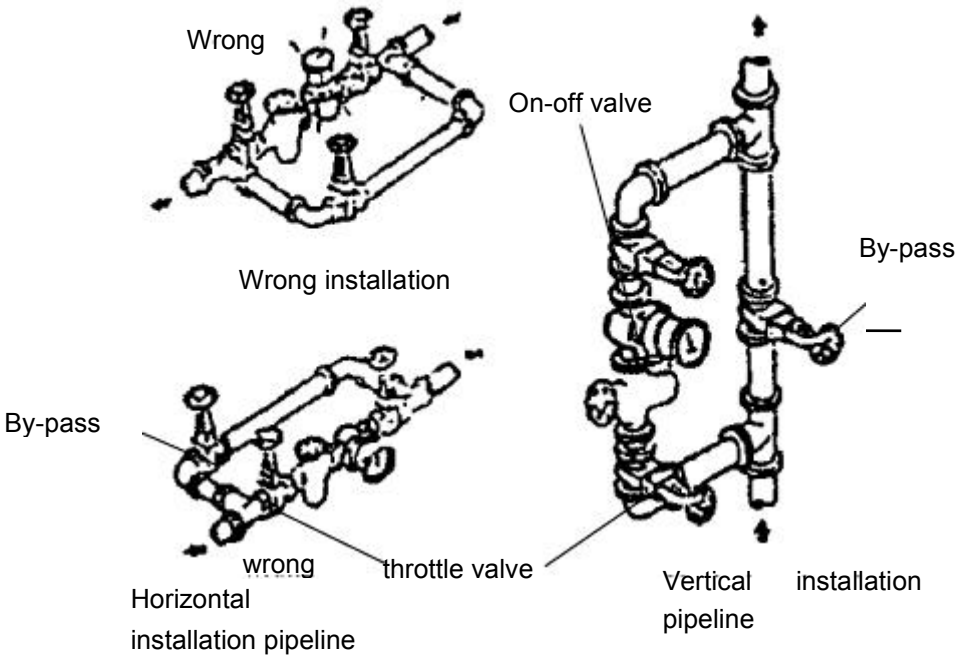
Dimensions for type B and type C stainless steel meter
Flange standard: GB9112-2000,this table for convex type.

Unit:mm

DN	L	H	B	C	I	D	D	n		Weight
B C10	17	10	216	133	4	9	6	4	1	7
B C15	20	12	226	142	4	9	6	4	1	11
B C20	23	15	238	159	5	10	7	4	1	17
B C25	28	19	249	171	6	11	8	4	1	21
B C40	26	17	349	183	9	14	11	4	1	24
C50	26	17	349	183	9	16	12	4	1	24
C65S	36	26	436	259/280	12	16	12	4	1	59
C65	36	26	436	259/280	12	18	14	4	1	59
C65K	36	26	436	259/280	12	20	16	8	1	60
B80	42	30	459	311	13	20	16	8	1	82
B100	51	40	554	405	18	22	18	8	1	127
B150	54	51	607	455	21	28	24	8	2	280
B200	65	65	646	494	24	34	29	1	2	435

Installation and Operation

1. A strainer should be installed in front of the meter, and be sure that the arrows on the casting of the meter and the strainer pointing the same direction of the liquid flow.
2. If the metered media contains gas, a gas separator should be installed in front of the meter.
3. Whether the pipe line is vertically or horizontally installed, the wheel's shaft of the meter must be fixed horizontal, that is, the dial is vertical to the surface.
4. While the meter is installed properly, the counter may be turned 18 °or 90°for easy reading.
5. Prior to the installation of the new meter, first push the oval wheels from the outlet for several times with a bamboo rod, if the wheels don't move, they can be immersed in the petrol to prevent from deposits in the meter after the factory's inspection.
6. A throttle valve must be fixed at the inlet of the meter, an on-off valve at the outlet, which must be slowly activated to prevent from a sudden impact, reverse flow, and water hammer.
7. It is forbidden to clean the meter with steam.
8. For the continuous operated departments, a by-pass should be mounted.
9. Prior to the installation of the meter, the pipe line must be thoroughly cleaned,and at the time of cleaning use a straight pipeline in stead of the meter,to prevent impurity welding residue from entering the meter.
10. It is forbidden to inspect the meter made of cast iron and cast steel using water.
11. During the operated of the meter the flow rate can't exceed the flow marked on the mamelon plate. It is preferable to operate the meter at 50—80% of the max. flow.
12. If the metered media is causticity,stainless steel shall be selected.
13. Following is the installation figure.



Error Calculation and Adjustment

1.Flowmeter's basic error is calculated by every measuring value of each tested flow dot ,as formulas followed : (Cubage method)

E=(Vm—V)/ V 100%

E:flowmeter error (generally total error),two effective numbers .

Vm: flowmeter's measuring value (displaying value).

V: after adjusted, flowmeter standard set measuring value (actual value).

It is known by basic error calculation that when Vm is larger than V, meter basic error is "+" value ,which means that meter is fast, when Vm is smaller than V , meter basic error is "—" value ,which means that meter is slow.

Flowmeter error may need to be adjusted and stay in basic error by replacing a standard gear set of the counter. That is to change mechanic transmitting ratio, which can make displaying value adjusted. Adjusting error can't change flowmeter's flow characters, but it can make the error curve stay in the new coordinates system.

Generally, in actual flow range, basic error of Max. and Min. tested dots is not able to surpass definitive basic error. Flowmeter used generally is tested by adjusting intrinsic gear wheel set and then adjust error again according to idiographic condition.

2.Error adjustment steps (Guide for the error adjustment table)

a.When designed, the standard gear set is 38/35. If the tested meter is found to be running faster,and causes a plus(+) error, for instance, if the error is +1.02~+0.3,replace the gear set by set 41/38(see table 1), so the error curve stays in the new coordinate system, then the error is adjusted within the error range of +0.39~-0.33.

b.During the operation of the flowmeter, the error range will be changed or overranged due to the wearing of the gear set etc. If the error range doesn't exceed 1%, it can be adjusted within the error range, for instance, the meter error drops to -0.7+0.2, when the gear set is needed to be replaced, first check the tooth number of it, if it is 41/38, error +0.63 corresponding to it will be regarded as zero pointer (coordinate origin), then the set 41/38 will be replaced by the set 40/37. the coordinate origin of the curve shifts from zero pointer for the set 41/38 down to the +0.43 pointer for the set 40/37, so the error curve stays in the new coordinate system,

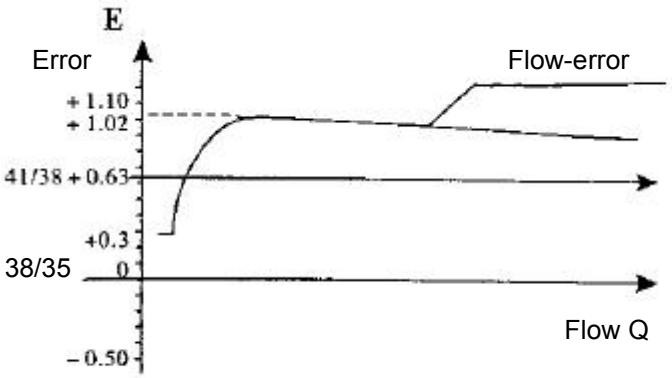


Figure 1

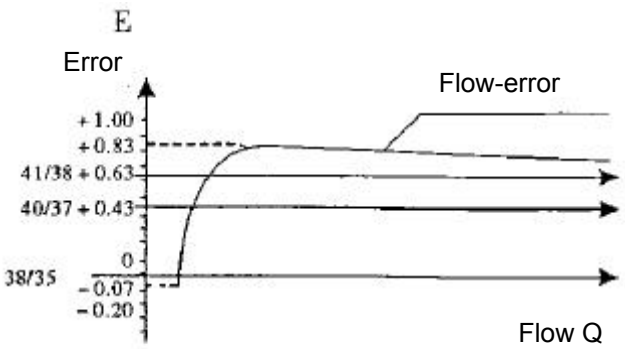


Figure 2

Error Adjustment Table

Error adjustment % under DN40		Adjustment gear set	
		Z1	Z2
↑ When the indicated flow rate is smaller than the actual value, Z1, Z2 can be selected from bottom to top. ←When the indicated value is larger than the actual value, Z1, Z2 can be selected from top to bottom.	3.27	37	33
	2.94	38	34
	2.63	39	35
	2.34	40	36
	2.06	41	37
	1.80	42	38
	1.55	43	39
	1.32	44	40
	1.09	45	41
	0.88	46	42
	0.74	35	32
	0.48	36	33
	0.23	37	34
	0.00	38	35
	0.22	39	36
	0.43	40	37
	0.63	41	38
	0.81	42	39
	0.99	43	40
	1.16	44	41
	1.32	45	42
	1.47	46	43
	1.54	31	29
	1.75	32	30
	1.95	33	31
	2.14	34	32
	2.31	35	33
	2.489	36	34
	2.63	37	35
	2.78	38	36
	2.92	39	37
	3.05	40	38

Error adjustment % DN5		Adjustment gear set	
		Z1	Z2
When the indicated flow rate is smaller than the actual value, Z1, Z2 can be selected from bottom to top→. ←When the indicated value is larger than the actual value, Z1, Z2 can be selected from top to bottom.	4.21	33	30
	3.90	34	31
	3.62	35	32
	3.35	36	33
	3.10	37	34
	2.86	38	35
	2.63	39	36
	2.42	40	37
	2.22	41	38
	2.02	42	39
	1.84	43	40
	1.75	29	27
	1.67	44	41
	1.50	30	28
	1.35	46	43
	1.27	31	29
	1.05	32	30
	0.85	33	31
	0.66	34	32
	0.48	35	33
	0.31	36	34
	0.15	37	35
	0.00	38	36
	0.14	39	37
	0.28	40	38
	0.40	41	39
	0.53	42	40
	0.64	43	41
	0.75	44	42
	0.86	45	43
	0.96	46	44
	1.14	24	23
	1.32	25	24
	1.47	26	25
	1.62	27	26
	1.75	28	27
	1.88	29	28
	2.00	30	29
	2.11	31	30
	2.21	32	31
	2.30	33	32
	2.39	34	33
	2.48	35	34
	2.63	37	38
	2.77	39	38
	2.89	41	40
	3.01	43	42
	3.16	46	45

Flowmeter reality

Trouble Shooting

Trouble	Cause	Measures
Rootswheels don't rotate	Foreign matters drops into meter, blocking the oval wheels during installation.	Disassemble and clean, then refit the meter and the strainer.
	The strainer is damaged	
	There is impurity in the pipe	
Pulse transmitters don't work	The transmitter has wrong place	Replace the transmitter
	Connected to wrong poles	Reconnect the cables,red for +pole,black for –pole
Axial sealing coupling leakage	The sealing stuffing wears or the sealing oil is in short.	Tighten the gland or replace the stuffing, fill the sealing oil.
Pointer moves unstably	The counter is not well assembled, the pointer fixed loose.	Reassemble the pointer.
	Accuracy adjusting gears loose	Tighten the screw again.
Error range is larger	Ripple is larger	Decrease the ripple
	The liquid contains gas	Fix a gas separator before meter and strainer
Error is larger,but the difference between the max. and the min.does't exceed 1%(0.4%for class 0.2)	Exceed the terminal time of the meter	Readjust and verify the meter.
	Clearances change after examination.	
Error of small meter is larger	Oval wheels touch the shell because the bearings are damaged or the shell is distorted	Replace the bearings,fix the shell and the wheels to insure the clearance,recalibrate the meter

Others

1.The stainless steel flowmeters are specially made for the chemical liquid measurement 98% sulphidic acid,60% nitric acid, 50% caustic acid.

2.Hefei Instrument General Factory also produces Series OI, OM, OK Oval meters with the technology transferred from Bopp&Renther GmbH, Germany.

3. Prior to the delivery of the meter, it has been calibrated with the light diesel oil in the factory, and water calibration is not allowable in order to prevent the oval wheels from rusting. For the detail, see the national inspecting procedures standard JJG 235-99《Verification Regulation of Oval Wheel Flowmeters》

4. The strainer is separate product with separate price(complete sets are also provided) .

Notice for Order

1.name,type,specification,material;
2.media temperature,operating pressure,flow range;
3. media'Viscosity or the name of the media;
4.special requirement(for instance explosion-proof mark ,etc);
5. name of work units of ordering and receiving products;
6.detailed address,telephone number and post code;
7.work unit for settling accounts,bank and the account code;

8.the arriving station and the linkman;

9.means for transportation;

10.Please contact us if you need more details about the related products;

11.we promise return goods,change and repair for our product and followed service during the product’s service time of use.

Oval Flowmeter Identification

Type code	Special symbol	Special function	Material		DN	Special require--ment	Allowable pressure	Counter	Pulse transmitter	Accuracy	Illumination
			shell	rotor							
1	2	3	4	5	6	7	8	9	10	11	12
LC-											Oval flowmeter
	U										Matchedthermal insulation sleeve
	G										tube thread
	H										Flowmeter of welded steel
		D									Flowmeter of batch meter
		N									Flowmeter of large viscosity
		SP									flowmeter for foodstuff
		T ,2									High temp. with radiator (1for long,2 for short)
		Q									Meter for gas
			A								Cast iron meter
			B/C								Stainless steel meter
			E								Cast steel meter
			L								Alloy aluminum meter
			C	A							Material is cast iron
			B/C	B/C							Material is stainless steel
			B/C	L							Material is alloy aluminum
			C	Z							Material is engineering material
					10						Nominal diameter 10 mm
					...						.....
					20						Nominal diameter 200 mm
					0	S (K)					Flange shrunk(widened)
						II					Improved type
							.2/				1.6 MPa
							.3/				2.5 MPa
							.4/				4.0MPa
							.6/			1 0	6.3MPa 2 0
								A			Used for counter under DN40
								A6 J1			Used for counter above DN50
								ELZ			Counter with electric indicator
								A6 Z			return-to-zero counter
									FX		used for type LC13
									GF- I		12Vthree-cable pho-electri transmitter
									GF- II		24V three-cable pho-electri transmitter
									QF- I		12V two-cable inductance transmitter
									QF- II		12V three-cable inductance transmitter
									QF- III		24V three-cable inductance transmitter
									MF-123		4 20mAanalog signal output
										J	High accuracy meter

注：

1When the oval wheel ' s material is same with the shell ' s,it can be not indicated ;

2.' B' OCr18Ni9Ti C OCr18Ni12Mo2Ti ;

3.B before generator means separation generator;

4.if without radiator the meter could be only marked T;

5.At past LC11 was used as on-site indicator and LC12 as meter with transmitter.New clients are proposed to use this new marker and old customers may use the old ones.

Explosion proof approvals pending

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