

# Metal rotameter flowmeter

## Summary

Standard LZ series metal rotameter flowmeters are composed of one measuring pipe and on side indicator. The site indicator can be installed also with additional electric devices, suitable for liquid and gas measurement.

The flowmeter adopts variable area measuring principle. The measuring device is composed of one taper measuring pipe and floater. The floater can move freely up and down in the taper measuring pipe to change the flow area in the pipe. When the flow changes, the vertical position of the floater inside the measuring pipe changes correspondingly. Through magnetic transmitting system, the position of the floater is transmitted to the dial scale of the indicator to indicate the flow.

In M6、M8、M9 indicator, the follow-up magnet movement is transmitted directly to the dial scale. In M7 indicator, when the follow-up magnet rotates, the needle driven by the cam plate indicates linearly the flow.

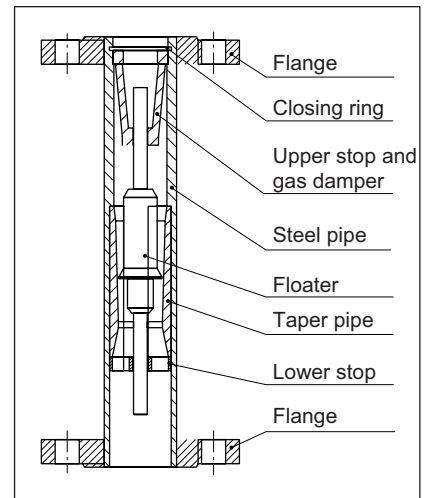


Fig.1

## Characteristics

- 1). All metal construction, strong and stable.
- 2). Short stroke、compact structure.
- 3). Low pressure loss design.
- 4). New style magnetic coupling structure ensures that the signal transmission is more stable.
- 5). Magnetic filter can be added as customer requirements.
- 6). Thermal insulation or tracing heat jacket.
- 7). Used in the gas and liquid measurement in all industries. The measurement parts can adopt different materials to be suitable for different medias.
- 8). Suitable for harsh environment and seriously corrosion media. Having good heat resistance and pressure resistance.
- 9). Intelligent dual-line LCD display, on site instant/cumulative flow display and back light as options.
- 10). Two-wire system、battery、alternating current can be choosed to supply the power.
- 11). With data recovery、data backup and power-fail protection functions.



## M7、M9 Indicator

### ◆ M7 Indicator

- A. Site indicator corrects linearly the indicating flow by the cam plate.
- B. Adopting the latest ESK signal transmitter with HART protocol communication function.
- C. It can be installed in the site flowmeter as optional:
  - ◇ 5W1 angular motion signal transmitter with (4 ~ 20)mA linear output.
  - ◇ ESK signal transmitter with (4 ~ 20)mA nonlinear output and no-lag.
  - ◇ With upper and lower limit alarm switch.

### ◆ M9 indicator

- A. Two pieces of coupling steel magnet are used in the indicator so as to finish converting the flow indication and electrical signal.
- B. Adopting the latest ESK signal transmitter with HART protocol communication function
- C. It can be installed in the site flowmeter as optional:
  - ◇ ESK signal transmitter with (4 ~ 20)mA nonlinear output and no-lag.
  - ◇ With upper and lower limit alarm switch.

## The structure and profile of the indicator

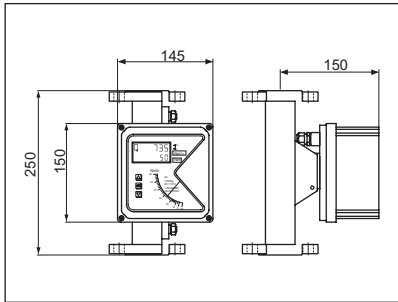


Fig.2 M6

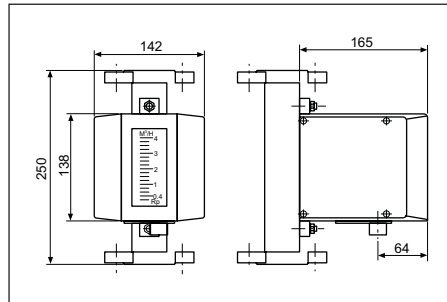


Fig.3 M7

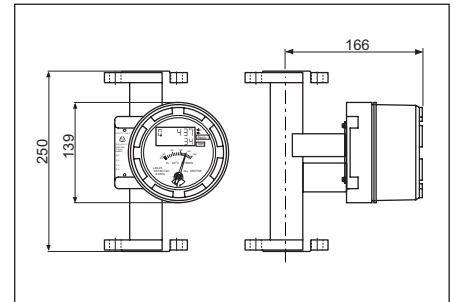


Fig.4 M8

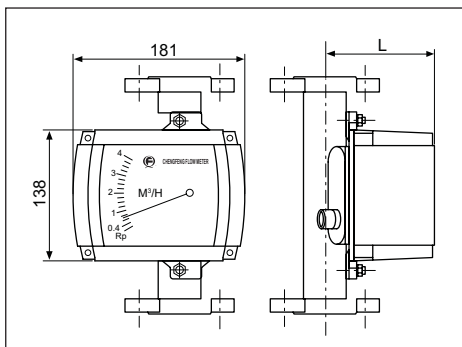


Fig.5 M9

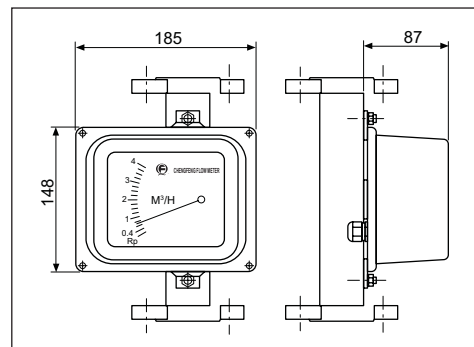


Fig.6 M9B

(Meter head material is stainless steel, especially suitable for chemical industry.)

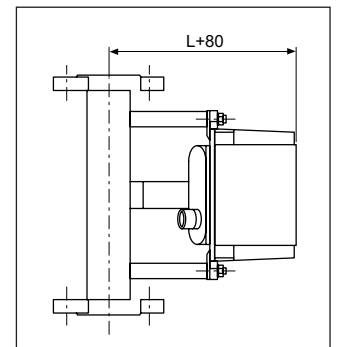


Fig.7 M9 High temperature type

## M6、M8 indicator

The housing of M6、M8 indicator is metal, with CPD intelligent circuit board inside. They are designed with intrinsic safety explosion-proof, whose sign is ia-IICT5. These two indicators not only have separate mechanical needle to indicate the instant flow but also have 5-bit LCD digit to display the instant flow and 8-bit LCD digit to display the cumulative flow. They are also equipped with operating buttons, man-machine interface. They can output 4~20mA current signal, upper and lower limit alarm signal etc.

The upper and lower limit alarm way of M6, M8 indicator is different from M7, M8 indicator, adopting electric appliance output, button operation. It's convenient, flexible, accurate, reliable and featured with power-fail protection, logic function. Open/closed contact, that is: the alarm output can be set in the software without wire jumper between upper/lower limit and can be connected directly with PLC through intermediate relay or safety barrier.

M6、M8 indicator has the functions of setting, data backup, data recovery and power-fail protection. Also when the power supply isn't two-wire system, LCD back light display can be chosen.

M6、M8 indicator can also realize the battery power supply, adopting a high-energy lithium battery 3.6V@7.5AH to supply the power, it can continuously work for more than 3 years. In the lower right corner of LCD screen, there's the power showed to remind users to change the battery timely. Also the battery has the highest efficiency, stable discharge and long working time in -10°C ~ +45°C.

Note: M8 indicator is an indicator with multifunctions which including all the functions of M6、M9 and with flameproof function.



M6 indicator



M8 indicator

## Model selection explanation

Table 1

LZ -	Z	Site indication												
	D	Electric transmission												
	DN	15、25、50、80、100										Bore		
	RR1	Stainless steel 1Cr18Ni9Ti										Material of the measuring pipe		
	RR0	Stainless steel 10Cr18Ni12Mo2Ti												
	RL	Stainless steel 100Cr17Ni12Mo2												
	F	PVDF or F46 Fluoroplastics lining												
	M6	Pointer indicating non-linear instant flow,LCD display instant and cumulative flow										Indicator type		
	M7	Pointer indicating linearly instant flow												
	M8	Multifunction indicator,anti-explosion type												
	M9	Pointer indicating non-linear instant flow												
	M9B	Stainless steel housing pointer indicating non-linear instant flow												
	A1	85 ~ 265VAC,50Hz power supply,4 ~ 20mA output,back light as options(only M6,M8)												
	A2	No signal output when power supplying,no back light,no alarm(only M6,M8)												
	A3	24VDC power supply by two-wire system,4 ~ 20mA output(Hart as options)												
	A4	24VDC power supply by three-wire system or four-wire system,4 ~ 20mA output,back light as options (only M6,M8)												
	Nil	No back light											Remote transmitter	
	L	With back light												
	E1	5W1 angular motion transmission (4 ~ 20)mA 24V DC two-wire system										Remote transmitter		
	E2	ESK transmission (4 ~ 20)mA 24V DC two-wire system												
	Exi	Intrinsic safety										Explosion- proof type		
	Exd	Flameproof enclosure(only M8 indicator)												
	Nil	No alarm										Switch alarm output		
	K1	With one upper limit swith alarm point												
	K2	With one lower limit swith alarm point												
	K3	With two swith alarm points												
	B1	Vertical installation										Structural style		
	B2	Horizontal installation												
	B3	Side inlet,side outlet												
	B4	Side inlet,side outlet												
	B5	Bottom inlet,side outlet												
	T	Jacket type										Additional structure		
	H	High temperature type(only LZD)												
	<input type="checkbox"/>	-40℃ ~ +400℃										Media temperature		
	<input type="checkbox"/>	≤ 6.4MPa										Working pressure		
	<input type="checkbox"/>	g/cm <sup>3</sup>										Media density		
	Q	Gas										Media state		
	Y	Liquid												
LZ-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note:Special specifications can be ordered as requirement.

## Technical parameters

Meter type		LZ series metal spinner flowmeters		
Measuring range (100% point value)		GB/T9119 Flange	DN15 ~ DN100	
Water(20℃)	(25 ~ 100,000)L/h	HG20592-20635 Flange	DN15 ~ DN100	
Air(101325Pa, 20℃)	(0.7 ~ 1000)m <sup>3</sup> /h	ANSI Flange	1/2" ~ 4" 150lbs/RF or 300lbs/RF	
Range ratio	1:10	Sanitary connection	DN15 ~ DN100	
Accuracy class	1.5; 2.5	Thermal insulation jacket flange	DN15(standard type);Other special types can be ordered.	
Measuring pipe	Taper measuring pipe	Level of protection	IP65	
Dial scale distribution	Divided according to flow unit	Explosion-proof	ExibIICT5	
Test pressure	1.5 times of rated pressure	Flameproof	dIIBT6(only M8 indicator)	
Meter bore		Media temperature	LZZ site indication	-40℃ ~ +400℃(site indication)
Flange connection	DN15 ~ DN100 or 1/2" ~ 4"		LZD electric transmission	-40℃ ~ +80℃(conventional type/with PTFE lining) -80℃ ~ +300℃(high temperature type)
Thermal insulation jacket	DN15 ~ DN100	Ambient temperature	-25℃ ~ +55℃	
Food grade connection	DN15 ~ DN100	Viscosity	DN15: ≤5mPa.s; DN25 ~ DN100: ≤250mPa.s	
LCD display	Instant flow display:0 ~ 50000		Standard type:24VDC, two-wire system:4 ~ 20mA(18VDC ~ 30VDC)	
	Cumulative flow display:8 digits(can with decimal point )	Power supply	Alternating current type:85 ~ 265VAC,50Hz	
Alarm output	Alarm of upper and lower limit instant flow		Battery type:3.6V,7.5AH Lithium battery	
	Electrode open circuit output(maximum 100mA,30VDC internal impedance 100Ω)			
Relay output(contact capacity 1A,30VDC or 0.25A,250VAC or 0.5A,125VAC)				
Cable Interface	M16X1.5; M20X1.5			
	Flameproof enclosure:1/2NPT internal thread			

## Flow range

Bore (mm)	Measuring range				Pressure loss(kPa)	
	Water L/h		Air m <sup>3</sup> /h		Water	Air
	Conventional type	Corrosion resistant type	Conventional type	Corrosion resistant type		
DN15	2.5 ~ 25	-	0.07 ~ 0.7	-	2.6	2.1
	4.0 ~ 40	2.5 ~ 25	0.11 ~ 1.1	0.07 ~ 0.7	2.6	2.1
	6.3 ~ 63	4.0 ~ 40	0.18 ~ 1.8	0.11 ~ 1.1	2.6	2.1
	10 ~ 100	6.3 ~ 63	0.28 ~ 2.8	0.18 ~ 1.8	2.6	2.1
	16 ~ 160	10 ~ 100	0.48 ~ 4.8	0.28 ~ 2.8	2.6	2.1
	25 ~ 250	6 ~ 160	0.7 ~ 7	0.48 ~ 4.8	2.6	2.1
	40 ~ 400	25 ~ 250	1.0 ~ 10	0.7 ~ 7	2.8	2.2
	63 ~ 630	40 ~ 400	1.6 ~ 16	1.0 ~ 10	3.2	2.2
DN25	100 ~ 1000	63 ~ 630	3 ~ 30	1.6 ~ 16	3.3	2.4
	160 ~ 1600	100 ~ 1000	4.5 ~ 45	3 ~ 30	3.4	2.5
	250 ~ 2500	160 ~ 1600	7 ~ 70	4.5 ~ 45	3.8	2.6
	400 ~ 4000	250 ~ 2500	11 ~ 110	7 ~ 70	4.5	3.0
DN50	630 ~ 6300	400 ~ 4000	18 ~ 180	11 ~ 110	4.5	1.3
	(1 ~ 10)m <sup>3</sup> /h	630 ~ 6300	25 ~ 250	18 ~ 180	4.7	1.3
	(1.6 ~ 16)m <sup>3</sup> /h	(1 ~ 10)m <sup>3</sup> /h	40 ~ 400	25 ~ 250	5.5	1.3
DN80	(2.5 ~ 25)m <sup>3</sup> /h	(1.6 ~ 16)m <sup>3</sup> /h	70 ~ 700	40 ~ 400	4.6	1.8
	(4 ~ 40)m <sup>3</sup> /h	(2.5 ~ 25)m <sup>3</sup> /h	100 ~ 1000	70 ~ 700	6.5	1.8
DN100	(10 ~ 100)m <sup>3</sup> /h	(6.3 ~ 63)m <sup>3</sup> /h	-	-	9.0	-

## The installing dimensions

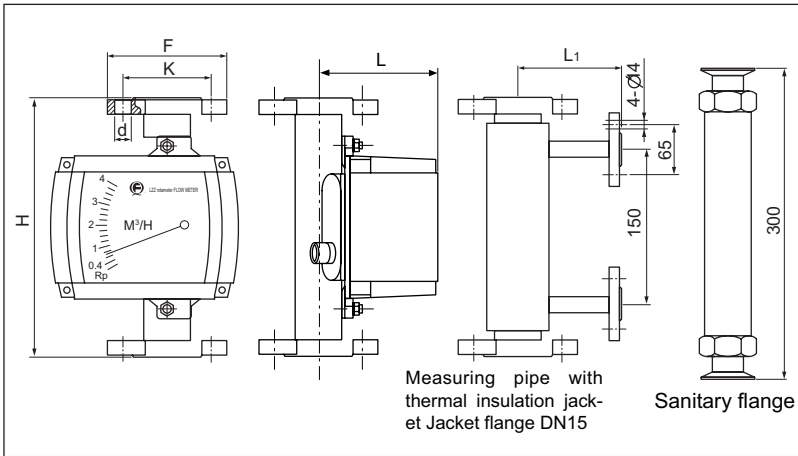


Fig.8 Vertical Installation

Unit:mm

Vertical Installation size(Table 4)						
Bore	F	K	d	H	L	L1
DN15	95	65	4-Ø14	250	125	100
DN25	115	85	4-Ø14	250	138	100
DN50	165	125	4-Ø18	250	168	120
DN80	200	160	8-Ø18	250	198	140
DN100	220	180	8-Ø18	250	230	150

Note:Jacket flange can be ordered.

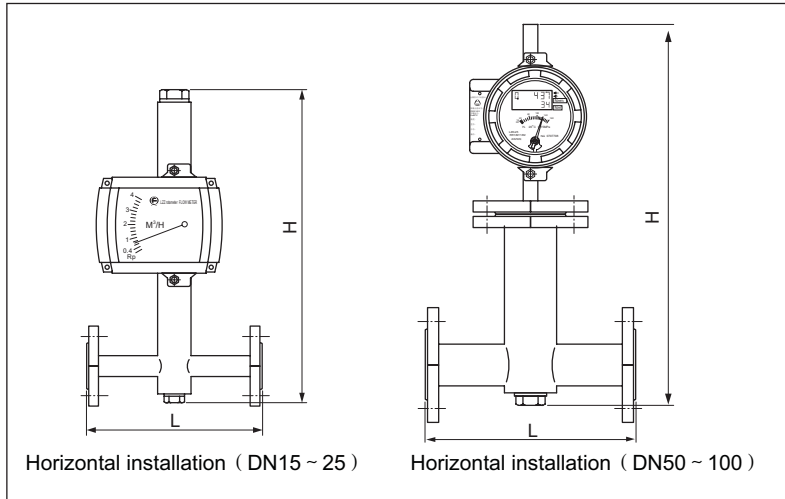


Fig.9 Horizontal installation

Unit:mm

Horizontal installation size(Table 5)		
Bore	H	L
DN15	400	250
DN25	400	250
DN50	500	300
DN80	500	400
DN100	500	400

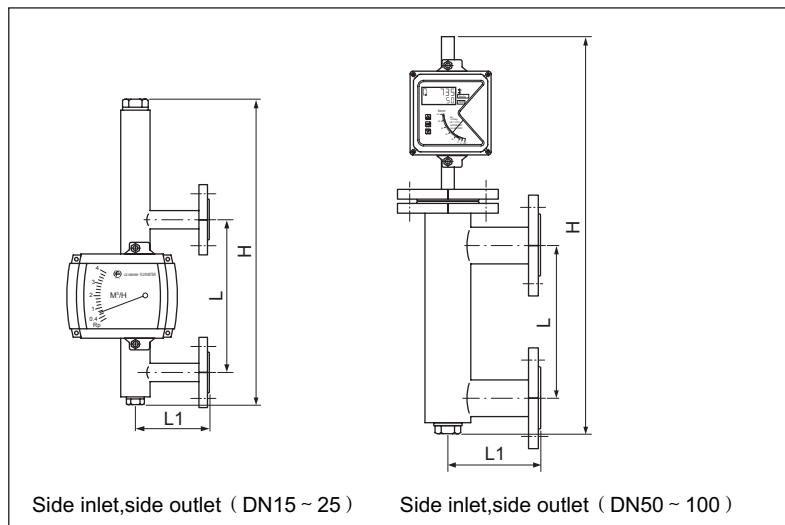


Fig.10 Side inlet,side outlet

Unit:mm

Side inlet,side outlet size(Table 6)			
Bore	H	L	L1
DN15	320	250	120
DN25	350	250	120
DN50	650	250	120
DN80	800	300	150
DN100	800	300	150

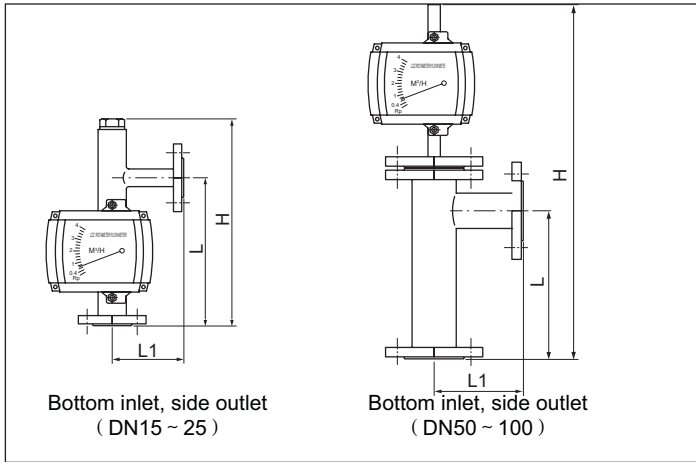


Fig.11 Bottom inlet, side outlet

Unit:mm

Bore	H	L	L1
DN15	350	250	120
DN25	350	250	120
DN50	600	250	120
DN80	700	250	150
DN100	700	250	150

## Connecting Forms

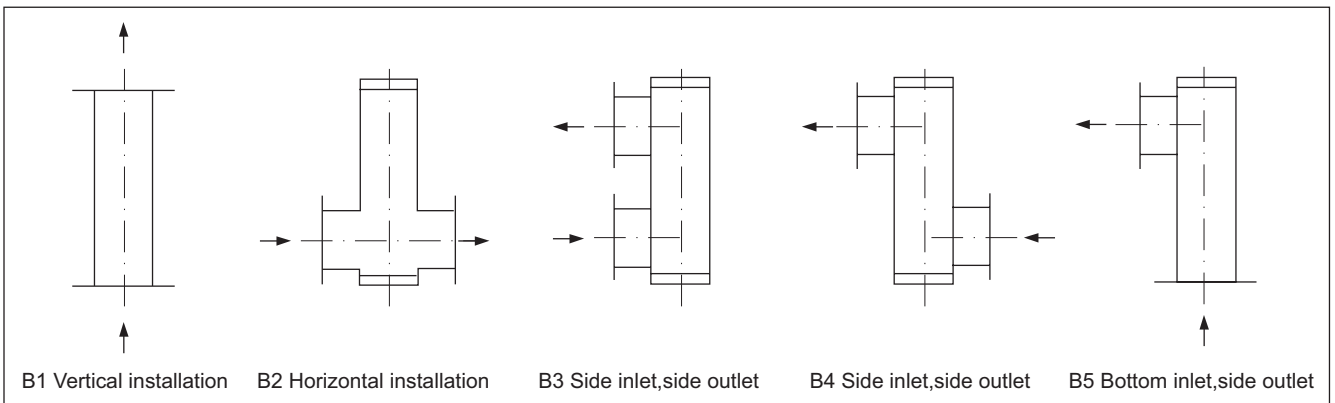


Fig.12

## Magnetic Filter

If there're ferromagnetic particles in the media ,there should install a magnetic filter at the inlet of the flowmeter.In the magnetic filter,there's magnetic rod arranged with spiral form,to minimize the pressure loss.Magnetic filter includes two types with materials of 1Cr18Ni9Ti,0Cr18Ni12Mo,00Cr17Ni12Mo2.They're suitable for all instruments.When the magnetic filter is used in corrosive media,its shell and magnetic rod coated with PTFE to stop being corroded by the media.

The flange connection dimensions of magnetic filter are the same as the corresponding flowmeter, see table 4 for details.

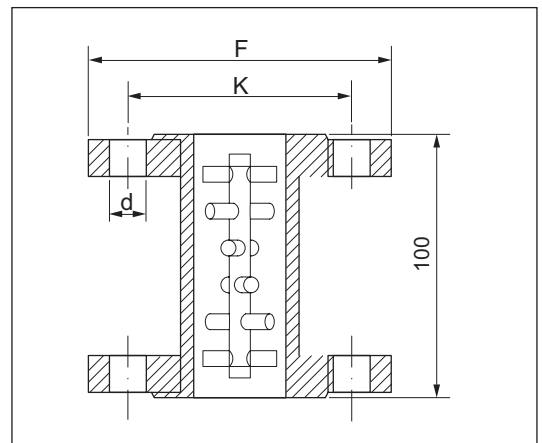


Fig.13 Magnetic filter

# Metal rotameter flowmeter

## Upper and lower limit alarm switch(M7, M9 indicator)

There can install one or two electronic limit switches for the flowmeter,when the instant flow reaches the setted point, the switch can give alarm signals.

The limit switch is installed inside the flowmeter,switching point can be setted through the pointer on the dial scale (Fig.13).The position of the limit pointer indicates the setted limit position at the same time.

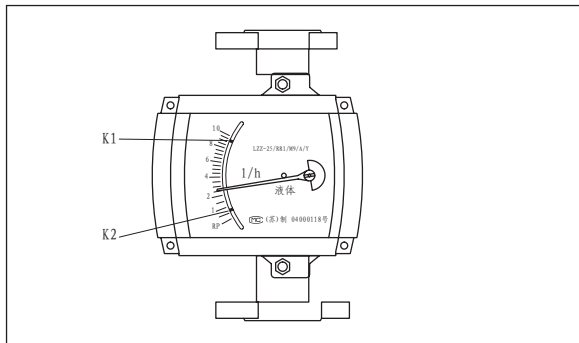


Fig.14

## Technical parameters

Limit switch	SC3.5-NO	SB3.5-E2
Rated voltage	8V DC	10-30V DC
Continuous current		100mA
No-load current		15mA
Voltage drop		3V
Current consumption Effective area switch on	3mA	
Effective area switch off	1mA	
Intrinsic inductance	150 $\mu$ H	
Intrinsic capacitance	100nF	
Electromagnetic compatibility(EMC)	EN60947-5-2	EN60947-5-2
Protection class	IP67	IP67
Working temperature	-25 $^{\circ}$ C ~ 100 $^{\circ}$ C	-25 $^{\circ}$ C ~ 70 $^{\circ}$ C

## Electrical connection graph

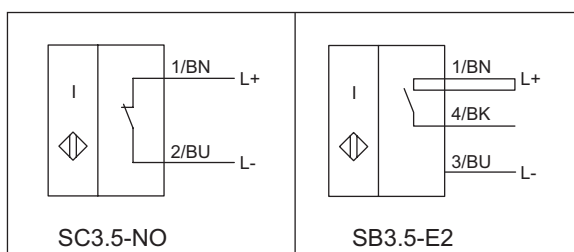


Fig.15

◆ SC3.5-NO It's suitable for dangerous occasions,the needed isolation switching amplifier can be parallel used only when having intrinsic safety circuit with peak value as follows:

- ◇ No load voltage:                      ◇ Intrinsic capacitance:
- ◇ Intrinsic inductance:                ◇ Output power:
- ◇ Short-circuit current:

◆ SB3.5-E2 It's not suitable for dangerous occasions.

## Angular motion electrical signal output(M7 indicator)

5W1 angular motion signal transmitter convert to (4 ~ 20)mA standard current signal through four-bar linkage,which is directly proportional to instant flow.

◆ Angular motion technical parameters

- ◇ Power supply: (18 ~ 30)V DC
- ◇ Current consumption: (4 ~ 21.6)mA
- ◇ Ambient temperature: -20 $^{\circ}$ C ~ 50 $^{\circ}$ C
- ◇ Output signal: (4 ~ 20)mA two-wire system
- ◇ Maximum load resistor: 270 $\Omega$ (24V DC)
- ◇ Linearity:  $\leq$  1.0%
- ◇ Temperature influence:  $\leq$  0.1%/ $^{\circ}$ C

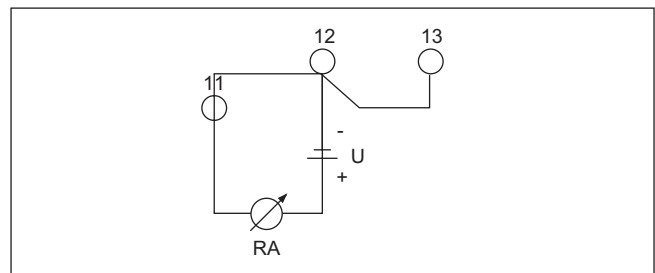


Fig.16

## ESK electrical signal output(M7;M9 indicator)

ESK electrical signal output transmitter is a transducer of non-contact, no mechanical connecting rod drive mechanism, no lagged effect.

ESK with two-wire system can output continuous (4~20)mA current signal,which is directly proportional to instant flow.

All the instruments (indicator, recorder) connected to the measurement loop should be connected in series form and cannot exceed the maximal load the transmitter allows.

The transmitter is connected in the intrinsic safety circuit and suitable for dangerous occasions.

ESK-SL-2 accompanies with HART protocol communication function.It won't have an effect on the output (4~20)mA signal,but except when it works in multi-point communication mode.At most 15 equipment with HART can be operated in parallel form,in this case,the current output of the instrument is setted in a stable mode(current is about 4mA).



# Metal rotameter flowmeter

## ◆ ESK technical parameters

- ◇ Power supply: (18 ~ 30)V DC
- ◇ Current consumption:(4 ~ 21.6)mA
- ◇ Ambient temperature: -20℃ ~ +65℃
- ◇ Output signal:(4~20)mA two-wire system
- ◇ Maximum load resistor: 270Ω(24V DC)
- ◇ Linearity: ≤ 0.1%
- ◇ Temperature influence: ≤ 0.02%/℃

Explosion-proof associated equipment LB906

(Note:In dangerous occasions,the flowmeter with ESK transducer must be connected with the qualified intrinsic safety power or isolation safety barrier.These Power supply devices must be installed in dangerous occasions!)

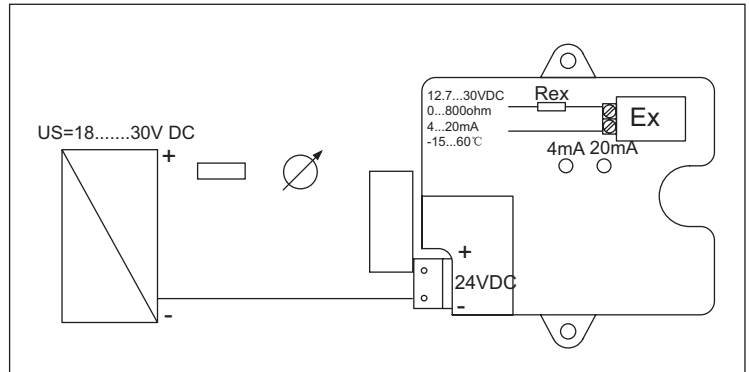
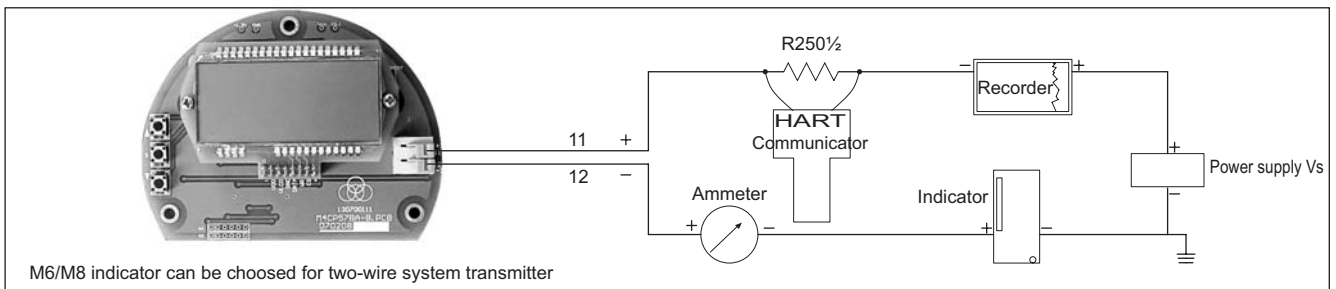


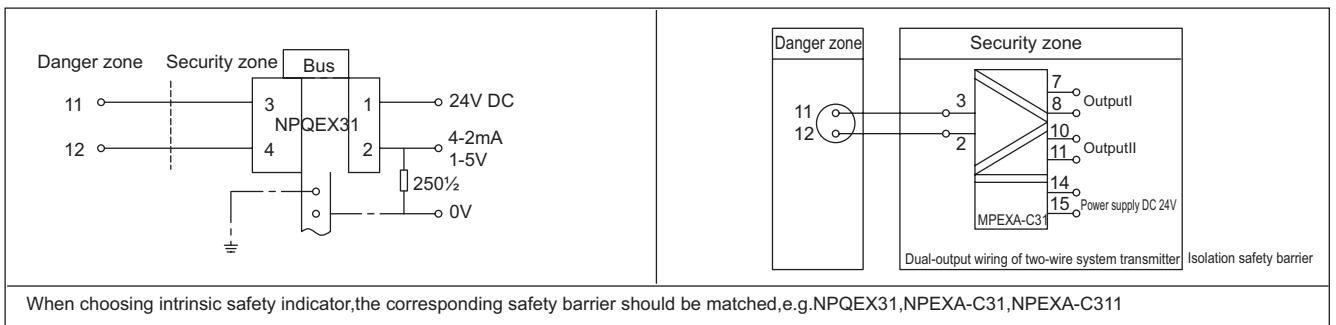
Fig.17

## M6, M8 indicator electrical connection and characteristics of frequency output

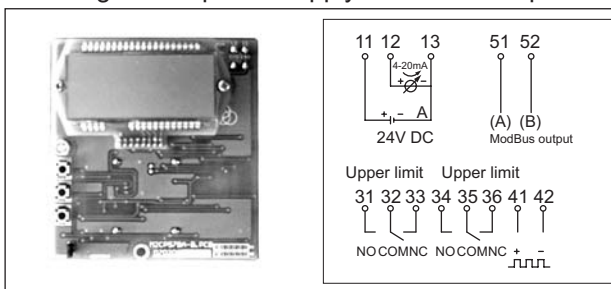
### ◇ Wiring of two-wire system 4 ~ 20mA output



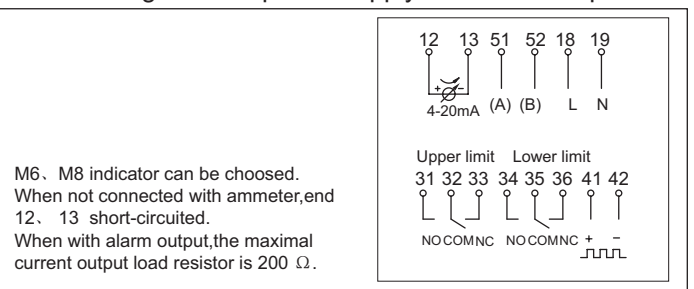
### ◇ Wiring of intrinsic safety



### ◇ Wiring of 24V power supply with alarm output



### ◇ Wiring of 220V power supply with alarm output



Note:See intelligent metal pipe float flowmeter operating manuals for the details of M6, M8 indicator electrical connection and frequency output characteristics.





Technical guidance: 13861082011 Website: <http://www.flowmetercn.com>

CHANGZHOU ORBBIT AUTOMATION COMPANY

Add:Hu Tang people Rd 158,Jiangsu Province,Changzhou City,China

Tel: +86-519-88223032 Fax: +86-519-86909383

Technical guidance: +86-13861082011

E-mail: [sensortop@gmail.com](mailto:sensortop@gmail.com)

Http: [//www.flowmetercn.com/](http://www.flowmetercn.com/)