9/1/2024

Metal Tube Rotameter

Q2024101

■ Summary

AR series metal tube rotameter are comprised by a measuring tube and an on-site indicator, which are suitable for liquid and gas measurement. There are on-site indication type and intelligent remote type. This flowmeter contains various forms of pointer indicating instant flow, LCD display instant and accumulated flow, upper and floor alarm, switch signal alarm, frequency output, standard two-wire system type 4~20mA current output, HART protocol and so on.

According to the different of measuring tube structure, the metal tube rotameter can be divided into: upper inlet and bottom outlet type, left(right) inlet and right(left)outlet type, side inlet and side outlet type, bottom inlet and side outlet type, the users can choose different installation type according to different demand. With higher reliable and cost performance, the instruments are widely used in the industries of petrochemical, iron and steel, power, metallurgical, light and food, pharmacy, water treatment and so on.

■ Features

1. All metal construction, suitable use for high temperature, high pressure and strong corrosive medium.
2. Short stroke, compact structure.
3. Low pressure loss design.
4. New style magnetic coupling structure ensures with stable signal transmission.
5. Magnetic filter can be added as customized.
6. Thermal insulation or tracing heat jacket is optional.
7. Used for measuring the gas and liquid around all industries. The measurement parts can adopt different materials to be suitable for different medium.

8. Widely used for rugged environment and highly corrosive medium, feature with good heat resistance and pressure resistance.
9. Intelligent dual-line LCD display, on-site instant/cumulative flow display and back light asoptions.
10. Two-wire system, lithium battery, DC24V power supply.
11. With data recovery, data backup and power fail protection functions.

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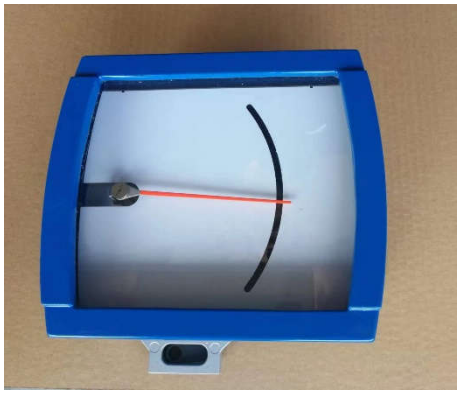
■ M9 Indicator

A. In indicator make use of a pair of coupling magnet steel to display flow and convert electric signal;
B. Adopting to the newest ESK signal transmitter both with HART protocol communication function.
C. It can be optional fixed inside of the on-site indicator.
1) ESK signal transmitter with (4~20) mA linear output and no-lag;
2) Upper and lower alarm switch.



■ M8 Indicator

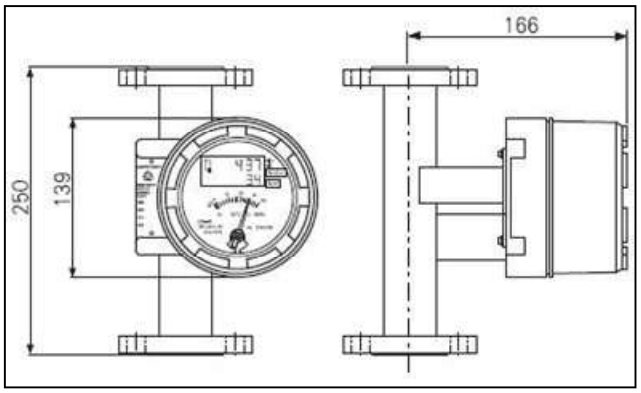
The housing of M8 indicator is metal, with CPD intelligent circuit board inside. They are designed with intrinsic safety explosion-proof, whose sign is ia-IICT5.These two indicators not only have separate mechanical needle to indicate the instant flow but also have 5-bit LCD digit to display the instant flow and 8-bit LCD digit 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 M8 indicator is different with M8 indicator, adopting to 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 settled in the software without wire jumper between upper/lower limit and can be connected directly with PLC through intermediate relay or safety barrier.

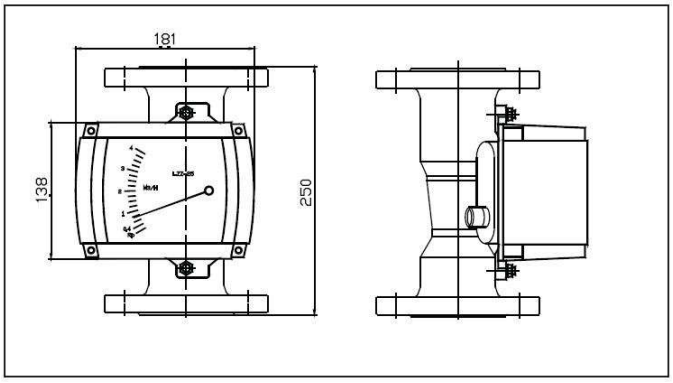
M8 indicator has the functions of setting, data backup, data recovery and power-fail protection. Also, when the power supply isn't two-wire system, LCD back light display can be chosen.

M8 indicator also can use 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℃～+45℃.

■ Indicator Profile Drawing

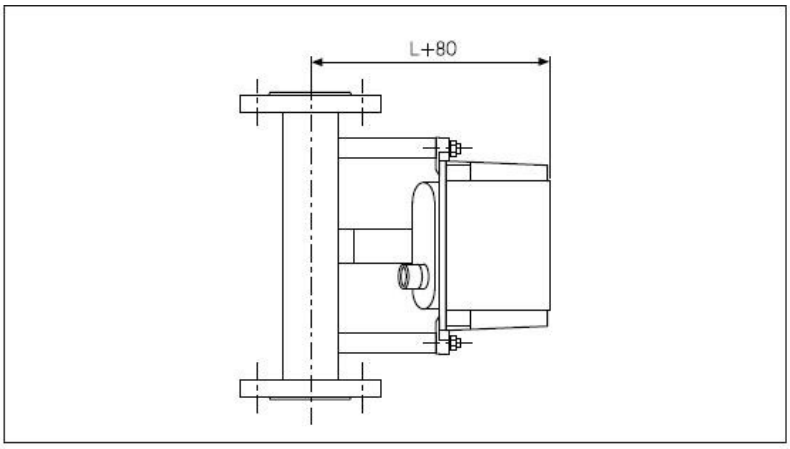


M8



M9

M8



M9 High Temp. Type

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■ Type Selection

Table 1

AR-	A	On-site indicate															
	B	Electric transmission															
		DN	15、25、50、80、100														Diameter
			R1	Stainless steel 304				RF	Fluoroplastics lining								Measuring tube material
			R6	Stainless steel 316				Ti	Titanium alloy								
			RL	Stainless steel 316L				HC	Hastelloy C								
				M8	Multifunction indicator, explosion-proof type												Indicator type
				M9	Pointer nonlinear indicate instant flow												
						E1	Pointer, ESK transmission,										Remote transmitter
						E2	Pointer, ESK transmission, LCD display, backlight										
						E3	Pointer, ESK transmission, LCD display, backlight, HART										
							Exi	Intrinsic safety type									Explosion proof type
							Exd	Explosion-proof (only for M8 & M8B indicator)									
								K0	No alarm								Switch alarm output
								K1	With an upper switch alarm point								
								K2	With a floor switch alarm point								
								K3	With two-switch alarm point								
									L1	Vertical installation							Structure Note: show flow and header direction in order
									L2	Horizontal installation							
									L3	Same side inlet side outlet							
									L4	Difference side inlet side outlet							
									L5	Bottom inlet side outlet							
									L6	Side inlet top out							
										T	Clamp type						Accessary
										H	High temp. (special)						
												-40℃~+350℃					Medium temperature
													≤6.4MPa				Working pressure
														g/cm3			Medium density
															Q	Gas	Medium type
															Y	Liquid	
AR-																	

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■ Technical Parameter

Table 2

Measuring Range			ANSI Flange	DN15~DN100
Water (20℃)	(25~100.000) L/h		ANSI Flange	DN15~DN100
Air(101325Pa,20℃)	(0.7~1000) m ³/h		ANSI Flange	1/2″~4″150lbs/RF or 300lbs/RF
Turndown ratio	1:10		Sanitary connection	DN15~DN100
Accuracy grade	1.5;2.5		Thermal isolation jacket flange	DN15(standard); special type can order
Measuring tube	Taper measuring tube		Protection grade	IP65
Graduated disc distribution	Divided according to flow unit		Explosion-proof	Exib Ⅱ CT5
Test pressure	1.5 times of rated pressure		Exd	d Ⅱ BT6(only for M8 indicator)
Meter diameter		Medium temperature	on-site indication	-40℃~+400℃ (on-site indication)
Flange connection	DN15~DN100 or 1/2″~4″		electricremote	-40℃~+80℃ (normal/PTFE lining)
Thermal isolation jacket	DN15~DN100			-80℃~+300℃ (high temperature type)
Food grade connection	DN15~DN100		Ambient temperature	-25℃~+55℃
LCD display	Instant flow diaply:0~50000		Viscosity	DN15: ≤5mPa.s; DN25~DN100: ≤250mPa.s
	Integrated flow display: eight digits (with decimal point)			
Alarm output	Upper and floor instant flow alarm		Power supply	Standard:24VDC, two-wire 4~20mA(18VDC~30VDC)
	Open-collector output (Max100mA,30VDC internal impedance100Ω)			
	Relay output (contact capacity1A,30VDC or 0.25A,250VAC or 0.5A,125VAC)			
Cable interface	M16×1.5; M20×1.5			Battery operated:3.6V, 7.5AH lithium battery
	Explosion-proof type:1/2NPT internal thread			

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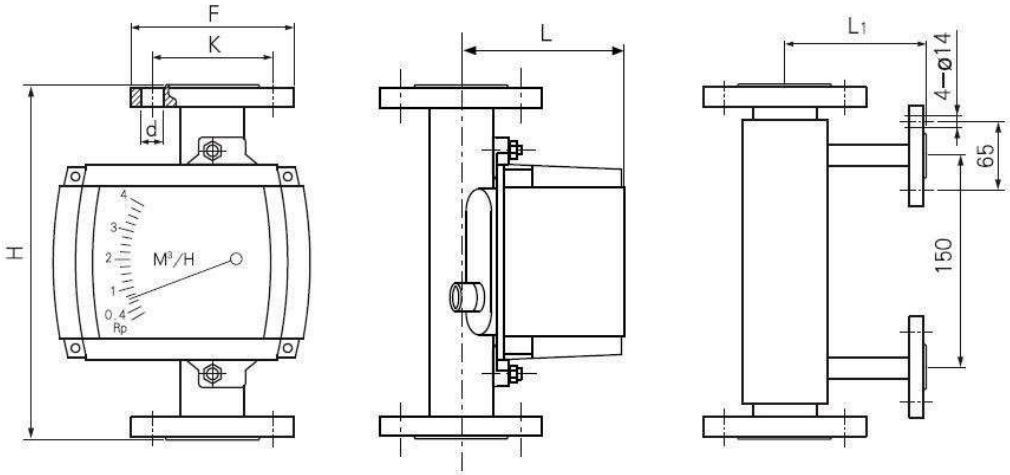
■ Flow Range

Table 3						
DN (mm)	Flow range				Pressure loss(kPa)	
	Water L/h		Air m^3 /h		Water	Air
	Normal	Corrosion-proof	Normal	Corrosion-proof		
DN15	2.5~25	—	0.07~0.7	—	2.6	2.1
	4.0~40	2.5~25	0.11~0.1	0.07~0.7	2.6	2.1
	6.3~63	4.0~40	0.18~1.8	0.11~0.1	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	16~160	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^3 /h	630~6300	25~250	18~180	4.7	1.3
	(1.6~16) m^3 /h	(1~10) m^3 /h	40~400	25~250	5.5	1.3
DN80	(2.5~25) m^3 /h	(1.6~16) m^3 /h	70~700	40~400	4.6	1.8
	(4~40) m^3 /h	(2.5~25) m^3 /h	100~1000	70~700	6.5	1.8
DN100	(10~100) m^3 /h	(6.3~63) m^3 /h	—	—	9.0	—

■ Installation Dimension



Unit:mm

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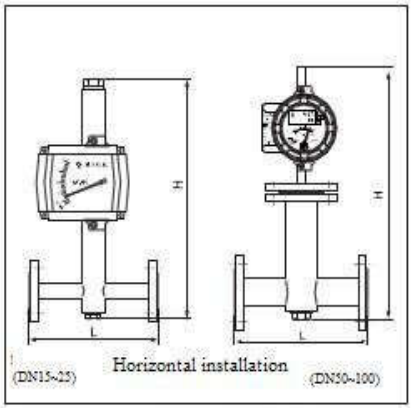
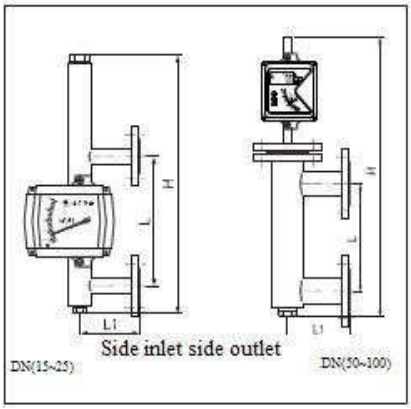
Vertical Installation Size (table 4)						
Diameter	F	K	d	H	L	L1
DN15	95	65	4-ø14	250	125	100
DN25	115	85	4-ø14	250	138	100
DN50	165	125	4-ø18	250	168	120
DN80	200	160	8-ø18	250	198	140
DN100	220	180	8-ø18	250	230	150

Notes: Jacket-type flange can be order in special.





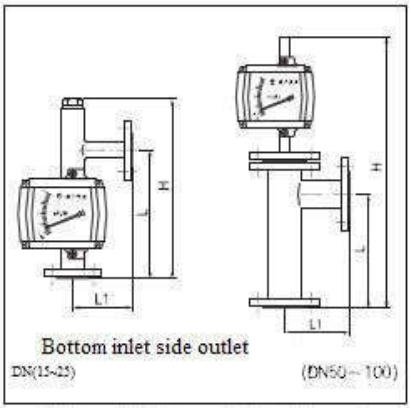


Table 5 **Unit: mm**

Horizontal installation size		
Diameter	H	L
DN15	400	250
DN25	400	250
DN50	500	300
DN80	500	400
DN100	500	400

Table 6 **Unit: mm**

Side inlet side outlet size			
Diameter	H	L	L1
DN15	320	250	120
DN25	350	250	120
DN50	650	250	120
DN80	800	300	150
DN100	800	300	150

Table7 **Unit: mm**

Bottom inlet side outlet			
Diameter	H	L	L1
DN15	350	250	120
DN25	350	250	120
DN50	600	250	120
DN80	700	250	150
DN100	700	250	150

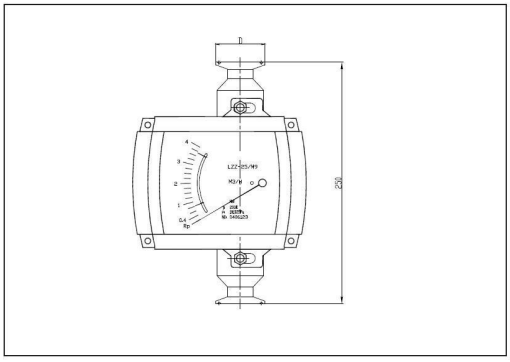


Table 8 **Unit: mm**

Diameter	D
DN15	50.5
DN25	50.5
DN50	64
DN80	91
DN100	119

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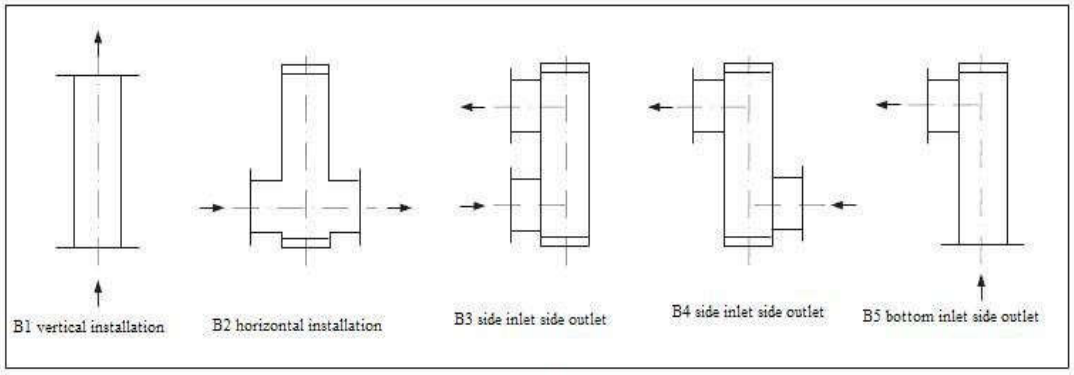
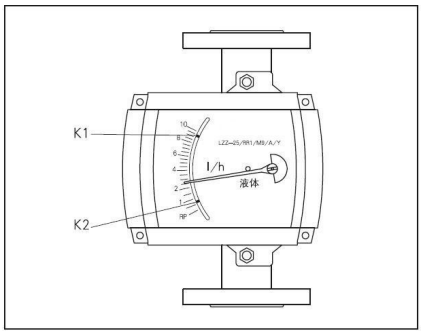
■ Connection Type



■ Upper and Lower Alarm Switch (M8, M9 Indicator)



In flowmeter can install one or two electronic limit switches, once the instant flow reach to the setting value it will send out the alarm signal.

Limit switch install inside of flowmeter, switch point can be set by limit pointer in graduated disc The position of limit pointer can indicate the setting limit value.

■ Technical Parameter

Table 9

Limit Switch	Two-wire SC3.5-NO	Three-wire SB3.5-E2
Rated Voltage	8V DC	10~30V DC
Sustained Current		100mA
Unload Current		15mA
Voltage Drop		3V
Current Consumption Active area open	3mA	
Active area close	1mA	
Auto-inductance	150 μ H	
Auto-capacitance	100nF	
Electromagnetic Compatibility (EMC)	EN60947-5-2	EN60947-5-2
IP Grade	IP67	IP67
Working Temperature	-25 deg.C~100 deg.C	-25 deg.C~70 deg.C

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◆ SC3.5-NO Suitable for dangerous location, must install disconnector amplifier and only canbe parallel with the intrinsic safety circuit with the peak value as following:

◇ Non-load voltage: Uo 15.5V
◇ Auto-inductance: Li 150 μH
◇ Short circuit current: IK 52mA
◇ Auto-capacitance: Ci 150nF
◇ Output power: P 169mW

◆ SB3.5-E2 not suitable for dangerous location.

■ ESK Electric Signal Output

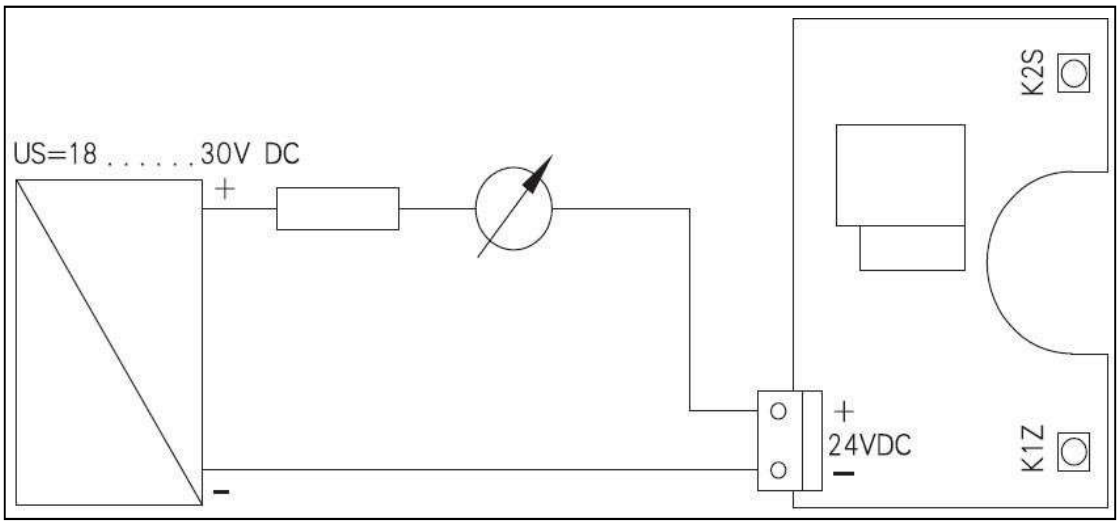
ESK electric signal output transmitter is a kind of no touch no machinery connecting rod transmission structure, no-lag effect converter.

Two-wire ESK type can output continuous (4~20) mA current signal, the signal is in proportion to instant flow.

All of the flowmeter (indicator, recorder) connects to measuring circuit shall be connect series form, and can not exceed the allowed max load of transmitter.

Transmitter connect in intrinsic safety circuit, can be suitable for dangerous situation.

ESK-SL-2 both have HART protocol communication function, it will not affect the output (4~20) mA signal. But except that it works in multipoint communication model, and the max of HART equipment can work in parallel is 15, the meter current output can set in stable model (current about 4mA).



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◆ **ESK type technical parameter**

① Power supply: (18~30) VDC

◆ ② Current loss: (4~21.6) mA

③ Ambient temperature: -20℃~+65℃

④ Output signal: (4~20) mA two-wire nonlinear output

⑤ Max load resistance:270Ω (24V DC)

⑥ Linearity: ≤0.1%

⑧ Temperature effect: ≤0.02%/℃

Explosion-proof connecting equipment LB906 LB902

(**Notes**: In dangerous situation flowmeter with ESK transmitter current must be connect with intrinsic safety current or isolation safety barrier, all of this power supply equipment must install out of the dangerous environment)

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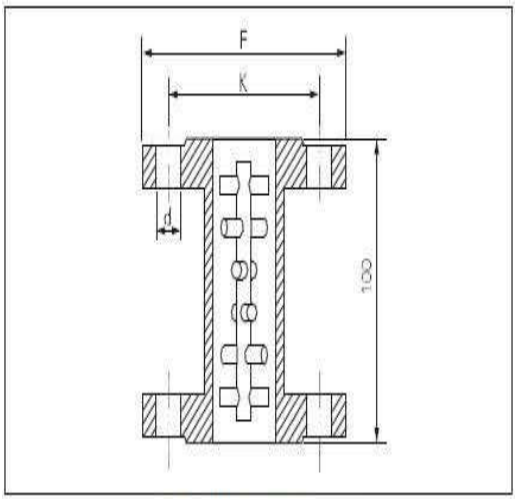
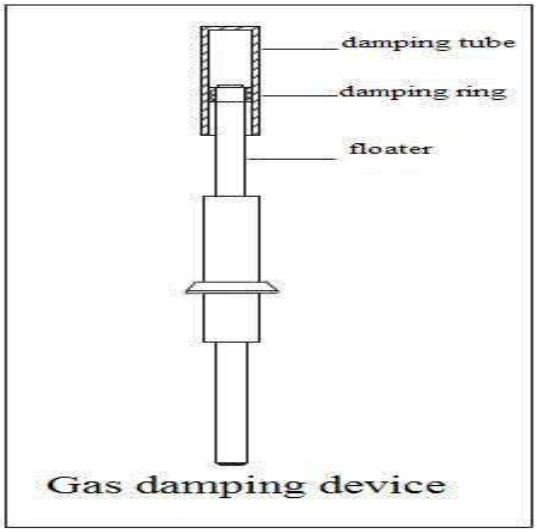
■ Magnetic Filter



If there are ferromagnetic particles in the medium, should install the magnetic filter in the flowmeter inlet. In the magnetic filter there are magnetic rods arranged with spiral type, in order to minimize the pressure loss. There are two kinds of magnetic filter, which can suitably use for all size of flowmeter. Materials are SS304,SS316,SS316L. When use in pipeline with corrosive medium, the magnetic rods shall be packing with PTFE to prevent corrosion from medium.

The flange size of magnetic filter shall be same as the corresponding flowmeter, detailed size see table 4.



■ Damping Device

If the flow is unstable in flowmeter inlet, please install a damping device in measuring parts, to make sure a long term, stable and reliable usage. (Only applicable for measuring clean gas, if there are particulates or dust in the gas, the damping device not applicable).

In order to ensure the proper operation of flowmeter in the condition, the inlet pressure shall be two times more than flowmeter pressure loss.

Notes: In the condition of magnetic valve opening, it may cause the floater shock.

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ARW/WB/ARWH/ARWD Micro Flow Metal Tube flowmeter

■ Summary

ARW/WB, ARWH is metal tube flowmeter, feature with strong, stable and widely usage.
ARW/WB series can be equip with self-operation pressure regulator(Galvano stat).
ARW/ARWB horizontal installation. ARW without valve, ARWB with valve.ARWH vertical installation, without valve.
ARWD column display, output 4-20mA current signal, with Hart communication protocol.
Power supply is 24V DC, electric interface M16x1.5.

■ Profile Drawing

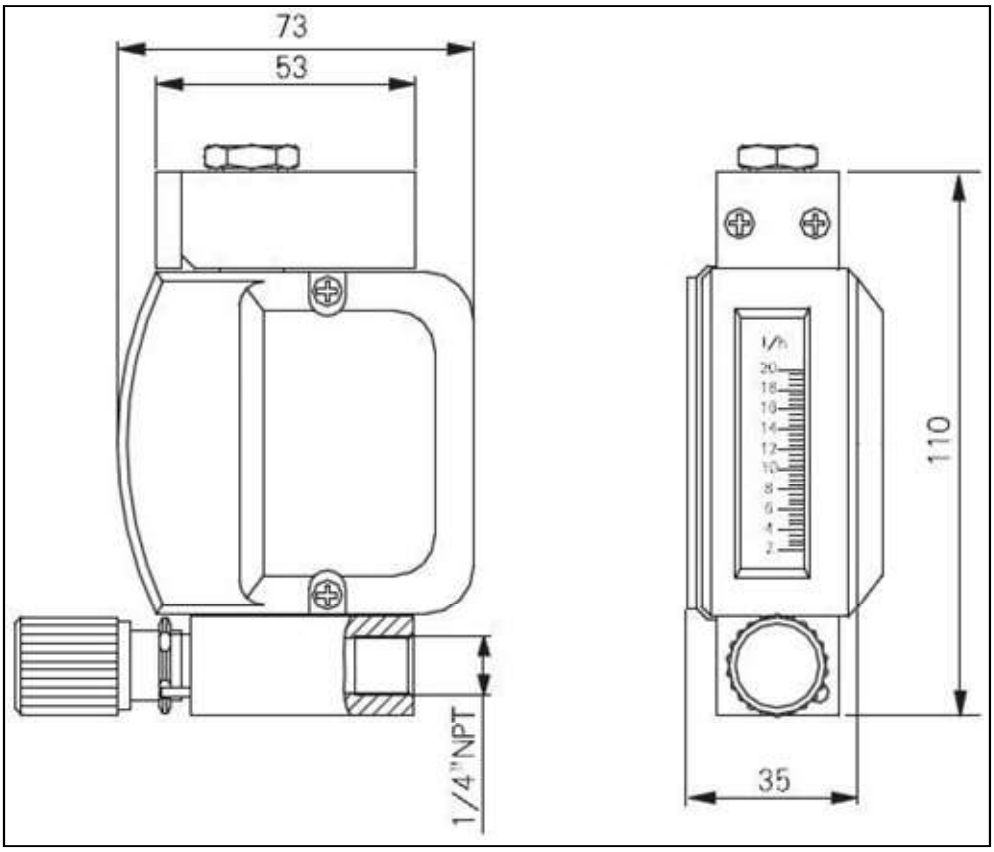

Fig.1 ARW/ARWB

Fig.2

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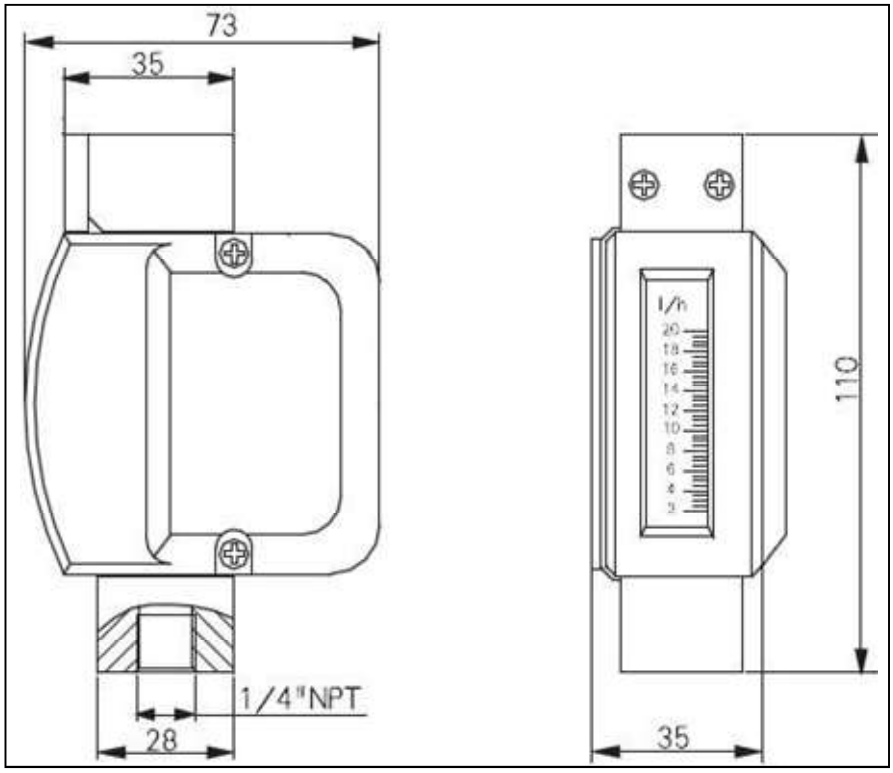

Fig.4 ARWH

Fig.3

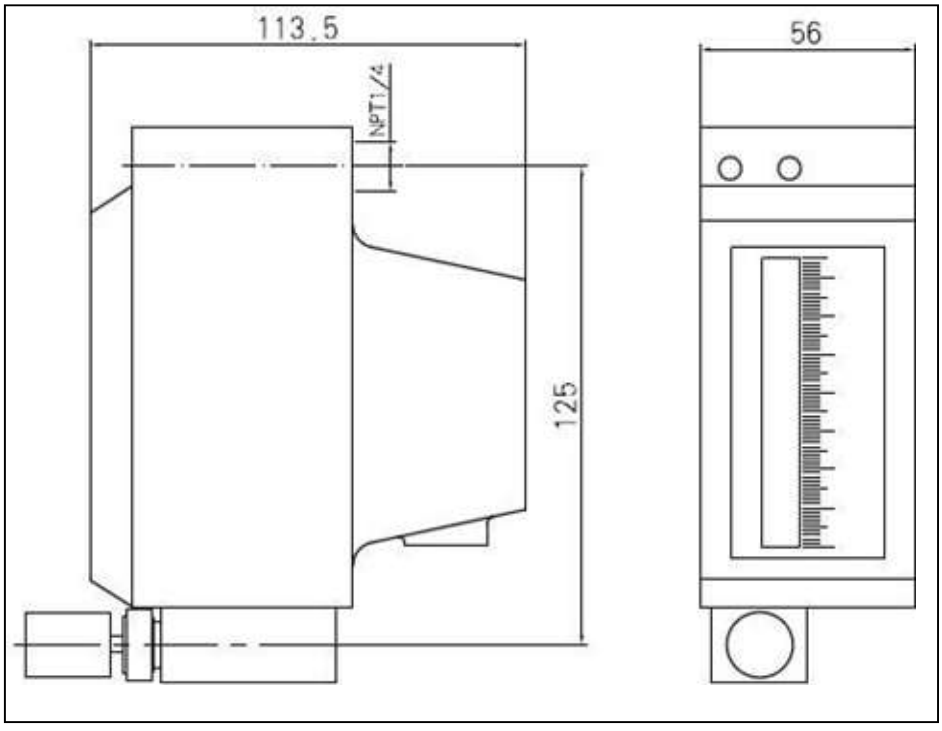

Fig.5 ARWD

Fig.6

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■ Technical Parameter

Table 1	
Flow Range	Medium Temperature: -40~150deg.C
Water:20 deg.C 6L/H-100L/H	Ambient Temperature: -25~65deg.C
Air:20 deg.C 101325Pa 50L/H-3400L/H	Connection:1/4NPT female or swagelok Φ 8(Φ 6 and so on)
Flow Ratio: 10:1 or 5:1	Material: stainless steel base
Accuracy:4% FS	Indicator body: Cast Aluminum, injection modeling
Max. Pressure:2.5MPa (can be customized)	Taper and floater: stainless steel

■ Flow Range

Table 2			
Taper Model	Water(L/H)	Air(L/H)	Pressure Loss(kPa)
W01	-	50	1.2
W02	-	100	1.4
W03	6	150	1.5
W04	10	400	1.8
W05	25	800	3.5
W06	40	1250	6.5
W07	60	2000	13.0
W08	80	2500	23.5
W09	100	3400	40.0

Notes: Full scale flow range show in the table;

Calculation condition: water 20 deg.C; air 20 deg.C,101325Pa.

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