

Orifice Flowmeter SD04/ Balanced Flowmeter SD14

Orifice Flowmeter Product Features

■ Wide range of applications

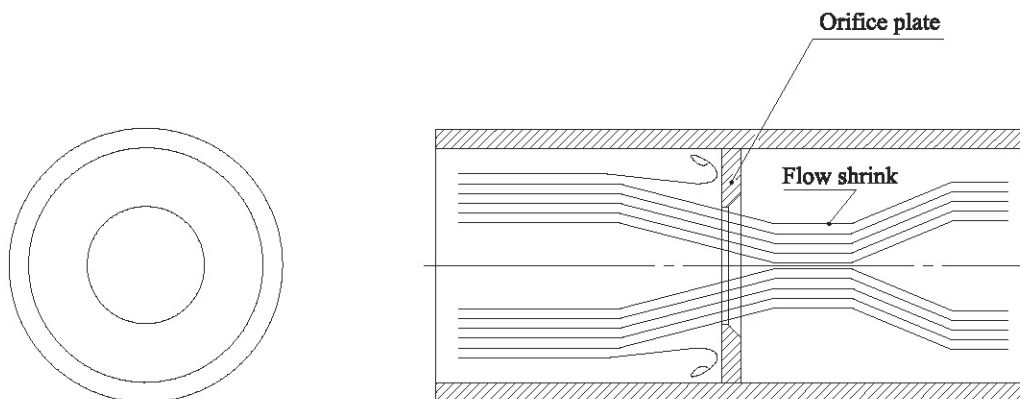
Orifice flowmeter is composed of orifice plate throttling element and differential pressure transmitter. All single-phase flow can be measured, part of the miscible flow can also be applied. The device can measure gas, steam and liquid, and is widely used in petroleum, chemical industry, metallurgy, electric power and so on.

■ Simple structure & stable performance

Standard Orifice flowmeter is designed and manufactured using the international standards, and the throttle device is simple structure. The standard throttle device can be put into operation without real flow calibration. So the throttle devices are with the advantages of simple and stable, easy maintenance, reliable performance and long service life.

Orifice Flowmeter Working Principle

When the fluid filled in the pipe flowing through the throttling device, the flow will shrink partly at the throttling device, hence the flow velocity increases while the static pressure decreases to form the differential pressure at the back and forth of the throttling device. The bigger the flow rate, the larger the differential pressure, so we can measure the flow according to differential pressure. This measuring method is based on Fluxion Continuity Equation and Energy Conservation Law.



Working principle diagram

Balanced Flowmeter Product Features

■ High accuracy

The symmetrical arrangement of the multi-hole ensures the flow profile to be steady and conditioned thus reducing the turbulence effect. As compared with traditional orifice, the accuracy attained $\pm 0.5\%$ for standard application and $\pm 0.2\%$ for high accuracy application.

■ Wide flow range

The structure of the balanced flowmeter is multi-orifice. It can be used to measure lower limit flow rate as well as the upper limit flow rate through choosing the equivalent diameter ratio. And the standard range ratio is 10:1, it can be also improved to 20:1~30:1 if appropriate parameter is selected.

■ Shorter straight pipe

Balanced Flow Sensor can balance the flow field and adjust the stability. In addition, the speed of the pressure restoration is 2 times faster than the traditional throttling devices which will greatly shorten the length requirement of the straight pipe. In most cases, the length of straight pipe can be as short as $0.5D\sim 2D$. A great deal of straight pipe can be saved when using Balanced Flow Meter, especially the straight pipe made of expensive materials.

■ Low permanent pressure loss

Due to the symmetrical structure, Balanced Flow Meters decrease the formation of vortex flow and turbulence friction, and reduce the loss of kinetic energy. Under same measurement conditions, the permanent pressure loss reduces $1/2\sim 1/3$ compared to traditional throttling devices, which greatly saving the running cost.

■ Repeatability and long-term stability

Balanced Flow Meter can balance the flow field, and improve the repeatability to 0.1% or higher.

The impact of the shearing force is greatly minimized because of the multi-orifice design. The edge side of holes will not wear out easily. The β value remain unchanged. And no moving parts. Thus the life time is 5~10 times longer than the traditional throttling devices.

■ Dirt resistance and anti-clogging

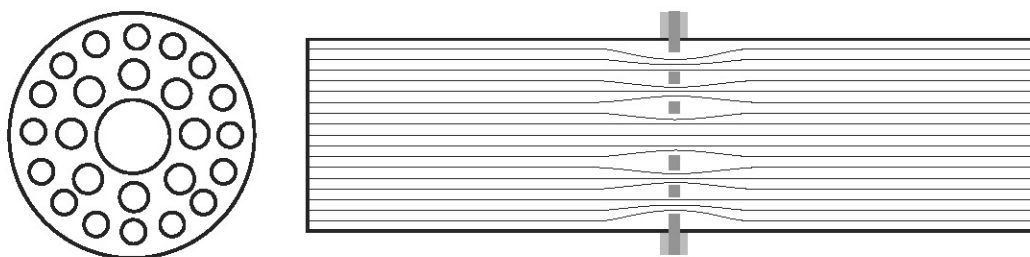
The balance design characterized by symmetrical throttling can reduce the shearing force of turbulent flow. As vortex flows and dead area are minimized, dirty and stained medium can pass through smoothly, the chance of clogging is much less.

■ Wide process parameters

While the working temperature and pressure depend on the material and grade of the pipe and flanges, the working temperature can be 800 or higher, and the working pressure can be up to 42 MPa. It is suitable for extremely low temperature of LNG fluid, liquid air, liquid nitrogen, liquid oxygen, liquid argon, liquefied ethylene, liquid hydrogen, liquid chlorine and so on, can effectively prevent from gasifying.

Balanced Flowmeter Working Principle

The Balanced Flow Meter is a differential pressure element, which is a circular plate with multi-hole layout design. The dimension and arrangement of holes are configured according to special formula and customized in accordance with numerous tests. These holes are called functional holes. The functional holes create a steady and conditioned flow profile which is measured by a differential pressure transmitter to derive the volume flow or mass flow by BERNOULLI equation.



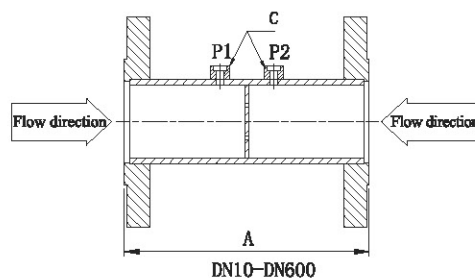
Main Technical Parameters

Medium	Gas/ Steam	Liquid
Accuracy	Balanced flowmeter: $\pm 1.0\%$ Orifice flowmeter: $\pm 1.5\%$	Balanced flowmeter: $\pm 0.5\%$ Orifice flowmeter: $\pm 1.0\%$
Repeatability	0.2%	0.1%
Nominal diameter	DN10~DN3000	
Range ratio	$\geq 10: 1$	
Operating pressure	$\leq 42\text{MPa}$	
Medium temperature	$\leq 800^{\circ}\text{C}$	
Straight pipe requirement	Balanced flowmeter: Upstream pipe 2D, downstream pipe 2D Orifice flowmeter: Upstream pipe 5~80D, downstream pipe 4~8D	

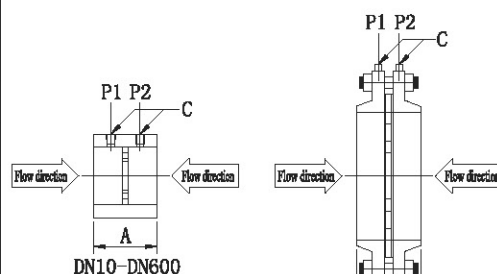
Dimensions of the Orifice/ Balanced FlowMeter

Conventional pressure tap

Diameter	Rated pressure	Flange type	Pipe wafer type	Direct welding type	Flange wafer type HG/T 20592-KWN	
DN (mm)		A (mm)	A (mm)	(mm)	A (mm) FM Face	A (mm) RJ Face
10	≤4.0MPa	226	100	150	—	—
15		226	100	150	—	—
20		226	100	150	—	—
25		226	100	150	—	—
32		226	100	150	—	—
40		226	100	150	—	—
50		226	100	150	142	148
65		290	100	150	146	152
80		290	100	150	154	160
100		290	120	180	168	174
125		310	120	180	170	176
150		310	120	180	180	186
200		314	120	180	194	200
250		354	120	180	220	226
300		394	120	180	240	246
350		394	120	210	260	266
400		428	120	210	285	291
450		458	120	210	285	291
500		488	120	210	295	301
600		558	120	210	315	321
700	/	/	/	/	/	/
800		/	/	/	/	/
900		/	/	/	/	/
1000		/	/	/	/	/
1200	/	/	/	/	/	/
1400		/	/	/	/	/
1600		/	/	/	/	/
1800		/	/	/	/	/
2000	/	/	/	/	/	/
2200		/	/	/	/	/
2400		/	/	/	/	/
2600		/	/	/	/	/
2800		/	/	/	/	/
3000		/	/	/	/	/



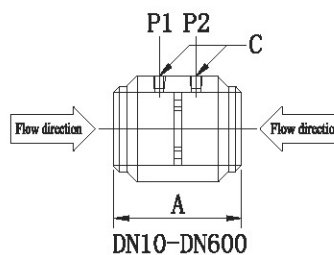
Flange type



Pipe wafer type

DN50-DN3000

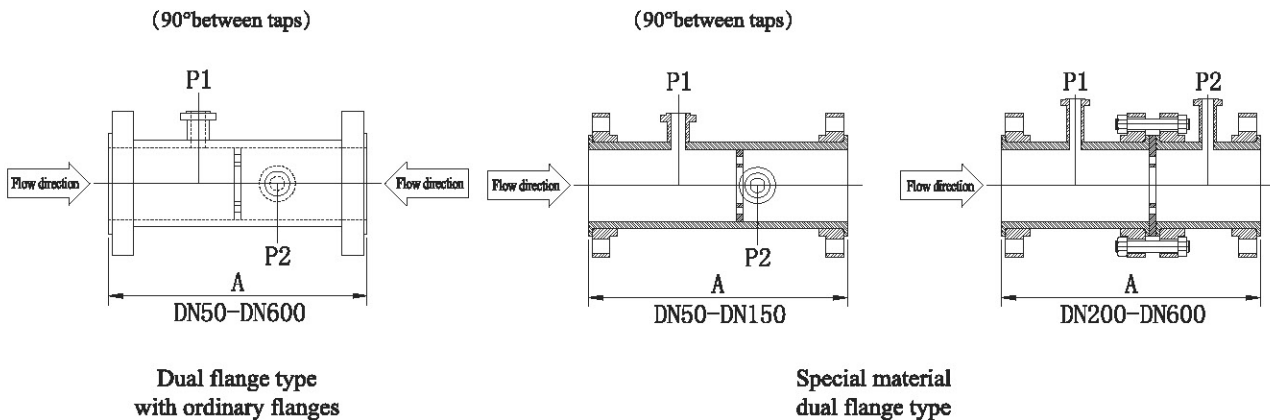
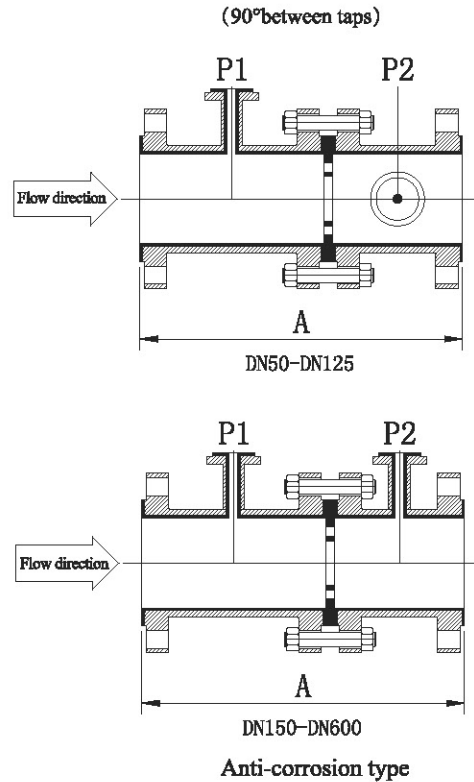
Flange wafer type



Direct welding type

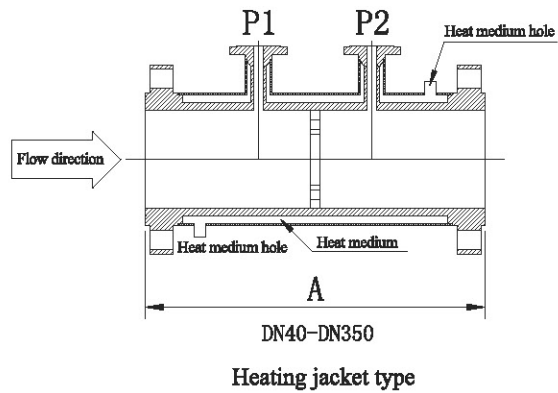
Dual flange pressure tap

Diameter	Dual flange type with ordinary flanges	Special material dual flange type	Anti-corrosion type	Pressure tap
DN (mm)	A (mm)	A (mm)	A (mm)	DN (IN)
50	340	311	376	2
65	340	362	376	2
80	340	388	376	2
100	420	422	404	2
125	420	432	462	2
150	420	473	500	2
200	420	552	595	2
250	420	631	716	2
300	420	714	834	2
350	420	785	912	2
400	420	864	1020	2
450	450	945	1130	2
500	500	1026	1235	2
600	600	1184	1455	2
700			1360	
800			1510	
900			1660	
1000			1870	



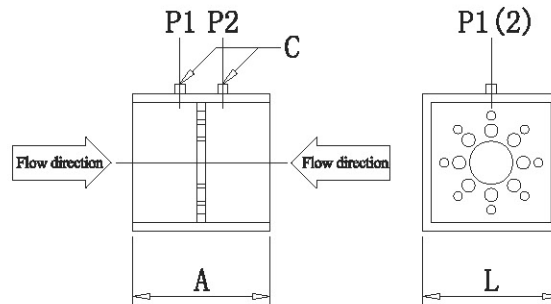
Heating jacket

Diameter	with heating jacket	Pressure tap
DN (mm)	A (mm)	DN (IN)
40	336	1
50	366	1
80	484	2
100	541	2
150	632	2
200	745	2
250	834	2
300	948	2
350	1034	2



Square pipe tapping

Side length	Pipe length	Tap C
L (mm)	A (mm)	NPT (IN)
200	254	1/2
250	254	1/2
300	254	1/2
350	254	1/2
400	254	1/2
450	254	1/2
500	254	1/2
550	254	1/2
600	254	1/2
700	254	1/2
800	254	1/2
900	254	1/2
1000	508	1/2
1200	508	1/2
1400	508	1/2
1600	508	1/2
1800	508	1/2
2000	508	1/2
2200	508	1/2
2400	508	1/2
2600	508	1/2
2800	508	1/2
3000	508	1/2



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Model	SD04/SD14																		
Pressure tap																			
PSW (welding type)																			
NPT (threaded type)																			
1" (DN25) flange																			
2" (DN50) flange																			
Number of pressure tap																			
1 pair																			
2 pair																			
3 pair																			
Tap flange pressure																			
No																			
PN40																			
PN63																			
PN100																			
PN160																			
PN250																			
CL150 (ANSI/ASME)																			
CL300 (ANSI/ASME)																			
CL600 (ANSI/ASME)																			
CL900 (ANSI/ASME)																			
CL1500 (ANSI/ASME)																			
Match transmitter																			
No																			
D/P transmitter																			
Multi-parameter																			
Match flanges (bolt, nut, gasket)																			
No																			
CS																			
304																			
316L																			
Others																			
Root valve																			
Globe valve																			
Gate valve																			
Ball valve																			
Root valve material																			
CS																			
304																			
316L																			
304 Lining PTFE (ball valve)																			
Others																			
Other accessories																			
3-valve manifold 304																			
3-valve manifold 316L																			
5-valve manifold 304																			
5-valve manifold 316L																			
Condenser 304																			
Condenser 316L																			
Condensing ring																			
Blowing ring																			
Special requirement																			
NACE processing																			
Oil-free degreasing																			
Weld inspection report																			
Third party calibration																			
Others																			

Note:

1. Pls choose Corner pressure tapping when diameter is less than DN50.
2. For NPT (threaded type), DN10~DN40 thread standard is 1/4NPT, DN50~DN3000 thread standard is 1/2NPT, can also customized according to client's requirement.
3. Root valve: Refer to the data sheet by designing institute.
 Normal liquid, gas, high pressure steam usually choose Globe valve;
 Middle & low pressure steam usually choose Gate valve;
 Mediums easy to sticky and crystallize will choose Gate valve and Ball valve;
 Dirty and corrosive mediums will choose Ball valve, and Pressure tap will choose Flange.
4. When medium is steam, will choose Condenser. And when medium is high temperature liquid, will choose Condensing ring.
5. If Pressure tap is flange type, the standard flange is 1" when diameter is less than DN50.