HR3051-LD Differential Pressure Remote Transmitter

1 Application

The diaphragm of the differential pressure remote transmitter is used to prevent the medium in the pipeline from directly entering the pressure sensor component of the differential pressure transmitter, and the pressure is transmitted between the transmitter and the filling liquid such as silicone oil.

The HR3051-LD Differential Pressure Transmitter is used to measure the level, density, pressure, and flow of liquids, gases, or vapors and then convert it to a 4-20mADC HART current signal output. The HR3051-LD can also communicate with the RST375 handheld terminal or the RSM100 Modem for parameter setting, process monitoring, and more. The measuring range of the HR3051-LD differential pressure remote transmitter (when not moved) is 0-1kPa~2MPa, and the rated pressure of the remote flange is: 1.6/4MPa, 6.4MPa, 10MPa, 150psi, 300psi or 600psi.

2 Operating principle

The HR3051-LD differential pressure remote transmitter consists of a HR3051-DP differential pressure transmitter and a welded remote flange with a capillary. Its working principle is the same as HR3051-DP type differential pressure transmitter (see HR3051-DP type differential pressure transmitter technical specification), but the pressure transmission path is slightly different: the pressure acting on the remote flange side is firstly The diaphragm and filling liquid on the remote flange are passed through the capillary tube and finally reach the corresponding positive and negative sides of the measuring sensor.

3 Input

Measurement parameter:differential pressure, liquid level

Measuring range

lower limit:from -100%URL (continuously adjustable)

Upper limit:to +100% URL (continuously adjustable)

Range

Table 1 Comparison of range code and range limit

Range code	Minimum range	Maximum range	Rated pressure (maximum)
B	1kPa	6kPa	Rated pressure of the remote flange
C	4kPa	40kPa	
D	25kPa	250kPa	
E	200kPa	2MPa	

Table 2: Remote Flange and Minimum Range Relationship

Level flange	Nominal diameter	Minimum range	
		Unilateral Remote transmission	Bilateral Remote Transmission
Flat type	DN 50/2”	10kPa	10kPa
	DN 80/3”	6kPa	1kPa
	DN 4”	6kPa	1kPa
Plug-in type	DN 50/2”	16kPa	16kPa
	DN 80/2”	6kPa	1kPa
	DN 4”	6kPa	1kPa

The minimum range of the remote transmitter should be the larger of the minimum range in Tables 1 and 2. The adjusted range must not be less than the minimum range. The maximum range of the remote transmitter should be the minimum of both the maximum range of the transmitter body and the rated pressure of the liquid level flange.

4 output

output signal

2 wire system, 4 - 20mADC HART output, digital communication, HART protocol is loaded on 4-20mADC signal.

Output signal limit: Imin=3.9mA, Imax=20.5mA

Alarm current (mode can be set)

Underreport mode (minimum): 3.7 mA

High-report mode (maximum): 21 mA

No report mode (hold): Maintain the effective current value before the fault.

Alarm current standard setting: High-report mode

5 response time

The amplifier component has a damping constant of 0.1 s; the sensor and remote flange time constant is 0.2 to 6 s, depending on the sensor's range, turndown ratio, capillary length, and viscosity of the fill fluid. The additional adjustable time constant is: 0.1 to 60 s.

6 general conditions

6.1 Installation conditions

The transmitter body can be fixed directly to any position. The best condition is to have the process flange axis in a vertical position and the positional deviation will produce a correctable zero offset. The electronic case can be rotated up to 360° and the set screw can be fixed in any position.

The remote flange is connected to the ANSI/DIN-compliant mating flange. The mating flange should be equipped with soft gaskets and bolts and nuts (user-selectable mounting bolts, nuts).

For bilateral flange remote transmitters, capillary components and remote flanges should only be installed in the same ambient temperature. The minimum bending radius of the capillary is 75mm, and it is strictly prohibited to entangle!

6.2 Environmental conditions

Ambient temperature

lowest: Depending on the filling liquid

highest: 85℃

With LCD display, fluoro rubber seal -20～65℃

Storage temperature / transport temperature

Lowest:Depending on the filling liquid

highest: 85℃

Relative humidity: 0～100%

Impact resistance

Acceleration: 50g

Duration: 11ms

Shock resistant

2g to 500Hz

Electromagnetic compatibility(EMC)

》See Table 3 "Electromagnetic Compatibility attached form" on the next page.

6.3 Process media limits

Temperature limit

Medium temperature: -30～400℃

Table 3 Table of filling liquid, working temperature and minimum working static pressure.

Filling liquid	Silicone oil (S)	High temp. silicone oil (H)	Ultra high temp. silicone oil(U)	Vegetable oil (V)
Density 25℃	960 kg/m³	980 kg/m³	1020 kg/m³	937 kg/m³
Operating temp. range	-30～200℃	-10～350℃	-10～400℃	0～250℃
Temperature	Operating pressure range (kPa absolute pressure)			
20℃	>10	>10	>10	>25
100℃	>25	>25	>25	>50
150℃	>50	>50	>50	>75
200℃	>75	>75	>75	>100
250℃		>100	>100	>100
350℃		>100	>100	
400℃			>100	

Note: Exceeding the above range of working temperature and static pressure relationship should be specifically pointed out, can be met by special design.

Transmitter body pressure limit

From 3.5 kPa absolute to rated pressure, the protection pressure can be greater than 1.5 times the rated pressure and applied to both sides of the transmitter.

Remote flange rated pressure

ANSI standard : 150psi～600psi

DIN standard: PN 1.6MPa～PN 10MPa

One-way overload limit

The low pressure side is the rated pressure of the transmitter body, and the high voltage side is the rated pressure of the remote transmission flange. There may be a correctable zero drift.

Weight

The unilateral distance is DN 50/2" about 7-10kg, DN 80 / 3" about 8 ~ 11kg, DN 4" about 9-12kg;

The bilateral long-distance transmission is about 10 - 16.5 kg for DN 50/2", about 12 - 18 kg for DN 80/3", and about 14 - 21 kg for DN 4".

Explosion-proof performance

NEPSI Explosion-proof license: Ex dⅡC T6

NEPSI Intrinsically safe license: Ex iaⅡC T4

Allowable temperature is: -40℃～65℃

6.4 Power and load conditions

The power supply voltage is 24V

R≤(Us-12V)/Imax kΩ

among them Imax=23 mA

Maximum supply voltage: 42VDC

Minimum supply voltage: 12VDC, 15VDC (Backlit LCD display)

Digital communication load range: 250～600Ω

Material

Measuring bellows: stainless steel 316L

Diaphragm: stainless steel 316L, Hastelloy C, Ta

Process flange: stainless steel 304

Filling fluid: Silicone oil, High temperature silicone oil, Ultra high temperature silicone

oil,Vegetable oil

Seal ring:NBR, FKM, PTFE

Transmitter shell: aluminum alloy, Exterior spray epoxy

Shell seal:NBR

Nameplate: stainless steel 304

Electrical connections

M20X1.5 cable sealing buckle, the terminal block is suitable for wires of 0.5~2.5mm2.

Process connection

The low pressure side of the transmitter has NPT 1/4 and UNF 7/16` internal threads. The level flange on the high pressure side of the transmitter is ANSI or DIN compliant. Can be installed directly, refer to Page.42 Part.7.

Protection level： IP67

Table 4 Electromagnetic compatibility schedule

No.	Test items	Basic standard	Test Conditions	Performance degree
1	Radiation interference (shell)	GB/T 9254-2008 form 5	30MHz ～1000MHz	qualified
2	Conducted interference (DC power port)	GB/T 9254-2008 form 1	0.15MHz～30MHz	qualified
3	Electrostatic discharge (ESD) immunity	GB/T 17626.2-2006	4kV(contact) 8kV(air)	B
4	Radio frequency electromagnetic field immunity	GB/T 17626.3-2006	10V/m (80MHz~1GHz)	A
5	Power frequency magnetic field immunity	GB/T 17626.8-2006	30A/m	A
6	Electrical fast transient burst immunity	GB/T 17626.4-2008	2kV(5/50ns,5kHz)	B
7	Surge immunity	GB/T 17626.5-2008	1kV (Between wires) 2kV (Between wire and ground) (1.2us/50us)	B
8	Radio frequency field induced conducted interference immunity	GB/T 17626.6-2008	3V (150KHz～80MHz)	A

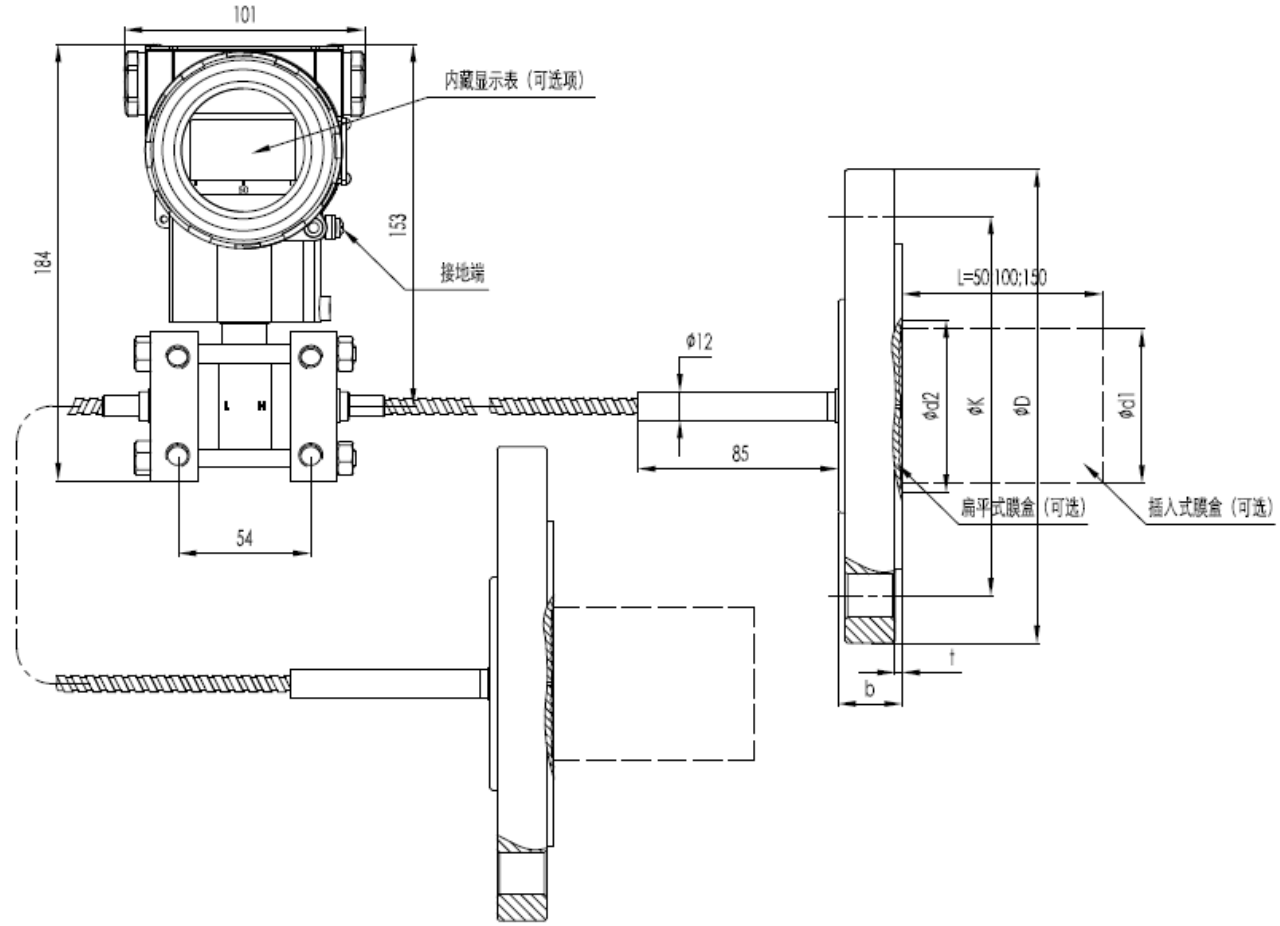
Note:(1) A degree： performance is normal within the technical standard range during testing.

(2) B degree: During the function or performance is lowered or lost temporarily, but it could be recovered by itself. Actual operation state, storage and data will keep the same.

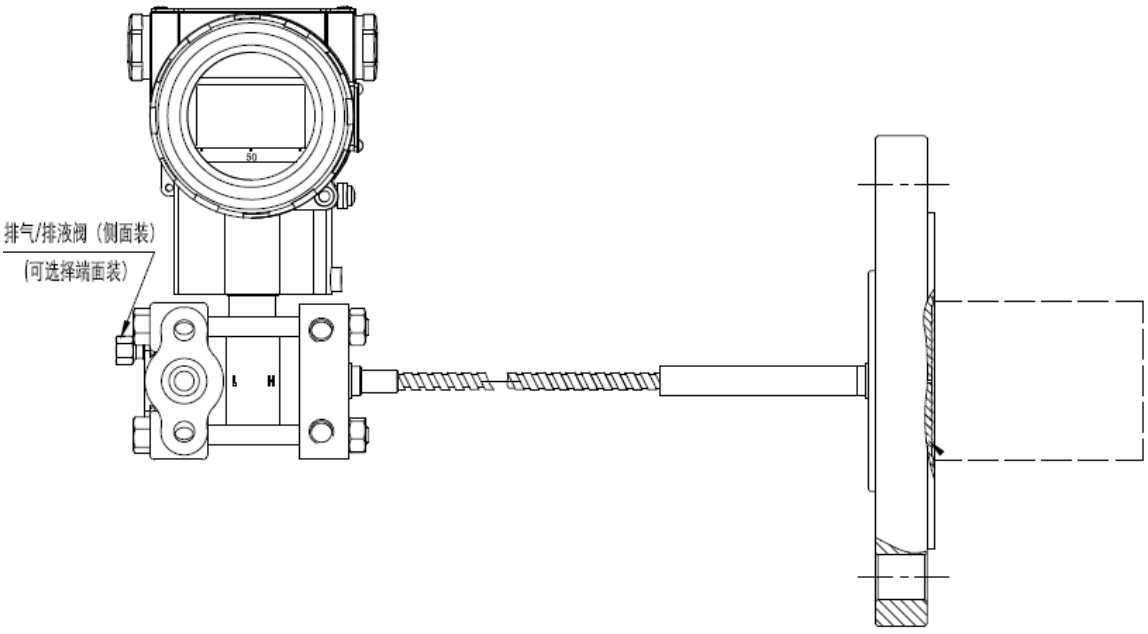
7 Dimensions

Unit（mm）

P1 Basic type remote sealed installation diagram(RS type)



P2 Basic type Unilateral Remote differential remote sealed construction



Note:1 The b**asic type u**nilateral remote differential remote sealed construction can be installed at

both the high pressure side or low pressure side of the transmitter.

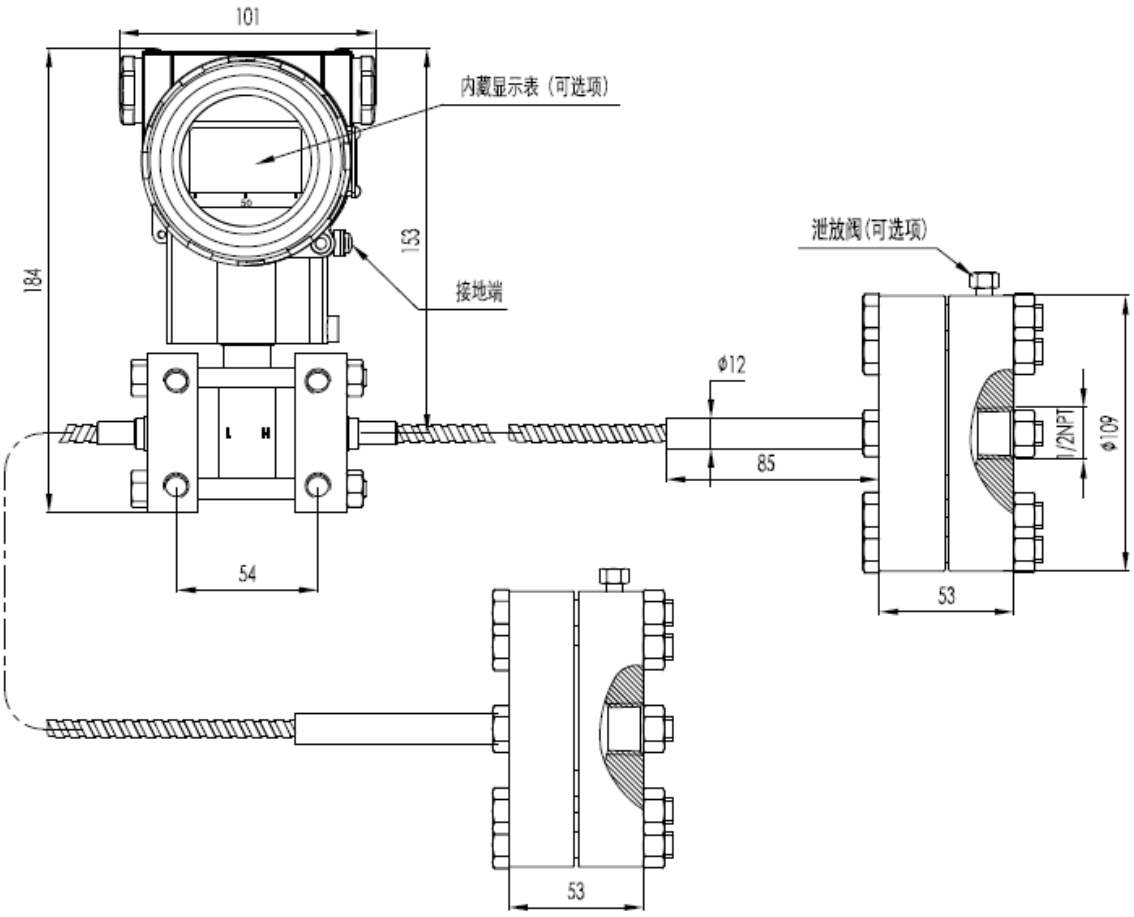
2. The installation of b**asic type u**nilateral/ bilateral remote differential remote sealed construction is the same as RP2001 series DP transmitter.

Table 5 Remote flange construction size

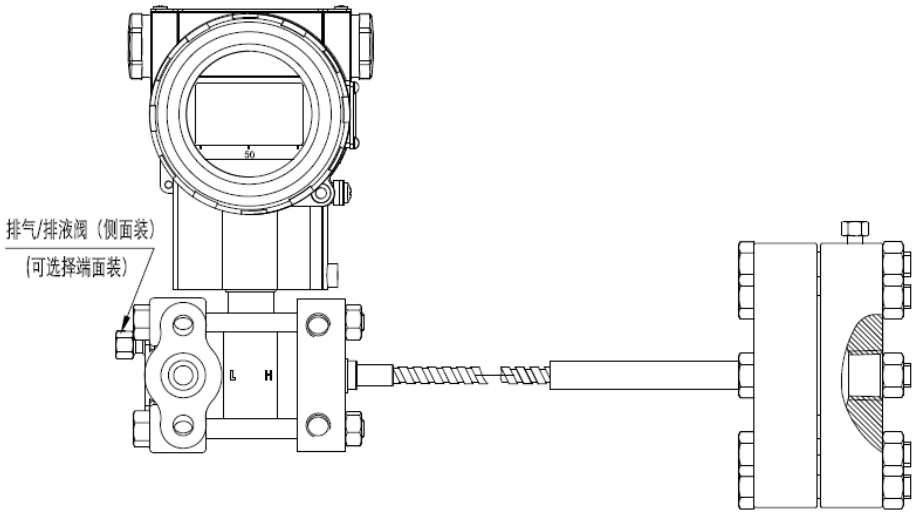
Nominal Diameter	Rated Pressure	ΦD	ΦK	Φd1 Plug-in	Φd2 Flat	Φd3	t	b	Bolt	
									Qty	Size
DN 50 (DIN 2526E type sealed face) (Flange DIN 2501)	PN1.6/4MPa	165	125	48.3	57	102	$3^{+0.5}$	20	4	M16
	PN 6.4MPa	18	135	48.3	57	102	$3^{+0.5}$	26	4	M20
	PN 10MPa	195	145	48.3	57	102	$3^{+0.5}$	28	4	M20
DN 80 (DIN 2526Etype sealed face) (Flange DIN 2501)	PN1.6/4MPa	200	160	76	75	138	$3^{+0.5}$	24	8	M16
	PN 6.4MPa	215	170	76	75	138	$3^{+0.5}$	28	8	M20
	PN 10MPa	230	180	76	75	138	$3^{+0.5}$	32	8	M24
DN 2" (ANSI B 16.5 RF type)	150psi	152.4	120.6	48.3	57	92.1	$3^{+0.5}$	17.4	4	M18
	300psi	165.1	127.0	48.3	57	92.1	$3^{+0.5}$	20.6	8	M18
	600psi	165.1	127.0	48.3	57	92.1	6.35	31.75	8	M18
DN 3" (ANSI B 16.5 RF type)	150psi	190.5	152.4	76	75	127	$3^{+0.5}$	22.2	4	M16
	300psi	209.5	168.3	76	75	127	$3^{+0.5}$	27.0	8	M20
	600psi	209.5	168.3	76	75	127	6.35	38.05	8	M20
DN 4 “ (ANSI B 16.5 RF type)	150psi	229	191	89	89	157	$3^{+0.5}$	30	8	M18
	300psi	255	200	89	89	157	$3^{+0.5}$	32	8	M18

Note: Bolts ans nuts are optional for customers.

P3 Bilateral thread mounted DP remote transmitter sealed construction



P4 Unilatera thread mounted DP remote transmitter sealed construction

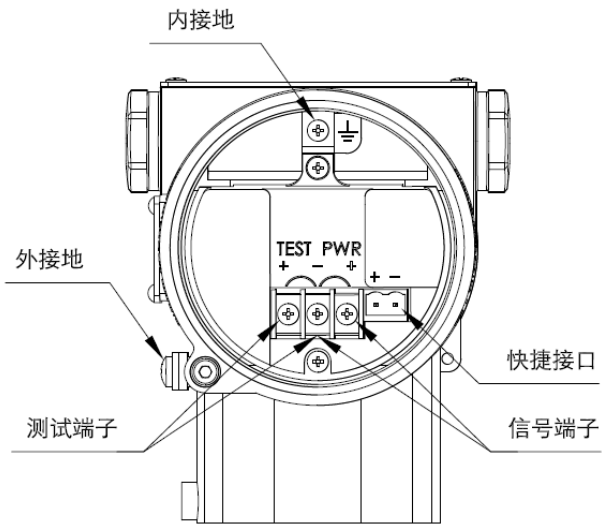


Note:1 The b**asic type u**nilateral remote differential remote sealed construction can be installed at both the high pressure side or low pressure side of the transmitter.

3. The installation of b**asic type u**nilateral/ bilateral remote differential remote sealed construction is the same as RP2001 series DP transmitter.

8 Electrical connection

电气连接图 P5 Electrical connection

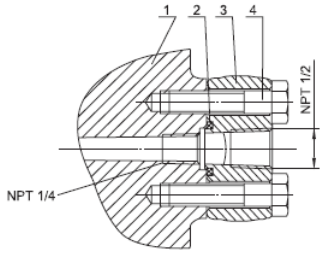


Note:The shortcut interface function is equivalent to the signal terminal.

9 Unilateral remote without remote flange process connection

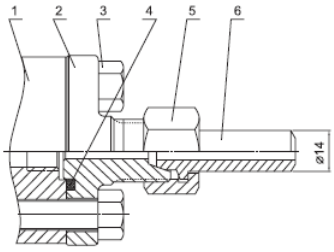
过程法兰接头

1/2-NPT不锈钢椭圆形法兰(代码1)



1. 压力腔法兰
2. O 型密封圈
3. NPT 1/2 椭圆形连法兰
4. 螺栓

M20x1.5不锈钢丁字形接头（代码2）



1. 压力腔法兰
2. M20 × 1.5 丁字形阳螺纹接头
3. 螺栓
4. O 型密封圈
5. 螺母 M20 × 1.5
6. 引压管

10 Specification [1]

1 **Basic type** unilateral remote differential remote sealed construction selection					
10	**Basic type DP remote sealed construction**				
	RH-	With capillary ⊕ side			
	RL-	With capillary ⊖ side			
20		Process Connection	Nominal Diameter	Sealing type	Diaphragm/Sealing material
	A	DN50 DIN 2501		E type DN2526	stainless steel 316L
	B	DN50 DIN 2501		E type DN2526	Hastelloy C
	C	DN50 DIN 2501		E type DN2526	Ta
	H	DN80 DIN 2501		E type DN2526	stainless steel 316L
	I	DN80 DIN 2501		E type DN2526	Hastelloy C
	G	DN80 DIN 2501		E type DN2526	Ta
	D	DN2″ ANSI B 16.5		RF type ANSI B 16.5	stainless steel 316L
	E	DN2″ ANSI B 16.5		RF type ANSI B 16.5	Hastelloy C
	F	DN2″ ANSI B 16.5		RF type ANSI B 16.5	Ta
	K	DN3″ ANSI B 16.5		RF type ANSI B 16.5	stainless steel 316L
	L	DN3″ ANSI B 16.5		RF type ANSI B 16.5	Hastelloy C

		M	DN3″ ANSI B 16.5	RF type	ANSI B 16.5	Ta		
		N	DN4″ ANSI B 16.5	RF type	ANSI B 16.5	stainless steel 316L		
		O	DN4″ ANSI B 16.5	RF type	ANSI B 16.5	Hastelloy C		
		P	DN4″ ANSI B 16.5	RF type	ANSI B 16.5	Ta		
		Q	DN100 DIN 2501	E type	DN2526	stainless steel 316L		
		S	DN100 DIN 2501	E type	DN2526	Hastelloy C		
		T	DN100 DIN 2501	E type	DN2526	Ta		
30			Rated pressure	Pressure level	Flange pressure			
			1	PN 1MPa/4MPa	DIN 2501			
			2	PN 6.4MPa	DIN 2501			
			3	PN 10MPa	DIN 2501			
			6	150psi	ANSI B 16.5			
			7	300psi	ANSI B 16.5			
			8	600psi	ANSI B 16.5 (exclusive DN4″ ANSI B 16.5)			
40				Connecting type				
				F	Flat type			
				H	Plug-in, stainless steel 316L	length 50mm		
				I	Plug-in , stainless steel 316L	length 100mm		
				G	Plug-in , stainless steel 316L	length 150mm		
				L	Plug-in, Hastelloy C	length 50mm		
				M	Plug-in , Hastelloy C	length 100mm		
				N	Plug-in , Hastelloy C	length 150mm		
50					Filling liquid			
					S	Silicone oil	-30～200℃	
					H	High temp. silicone oil	-10～350℃	
					U	Ultra-temperature silicone oil	-10～400℃	
					V	Vegetable oil	0～250℃	
					F	Fluoro oil	-30~260℃	
					L	Low temp. filling fluid	-100~100℃	
					F	Ultra-temperature filling fluid	10~600℃	
60						Capillary length		
						01	1m	
						02	2m	
						03	3m	
						04	4m	
						05	5m	
						06	6m	
						07	7m	
						08	8m	
						09	9m	
						10	10m	
						11	11m	
						12	12m	
						…	…	

70							Capillary		
							N	None	
							P	With PVC protection	
80								Contacting liquid flange diaphragm housing type	
								N	None
								1	FEP on316L (temp.≤180℃)
								2	PFA on 316L (temp.≤260℃)
								3	PTFE on diaphragm[2] (temp.≤200℃)
								4	FEP on 316L (temp.≤180℃) (only for plug-in)
								5	PFA on 316L (temp.≤260℃) (only for plug-in)
								6	Anti-vacuum treatment

2 Thread mounted DP remote sealed construction						
10	**Thread mounted DP remote sealed construction**					
	TH-	With capillary ⊕ side				
	TL-	With capillary ⊖ side				
20		Diaphragm/sealing face material				
		U	stainless steel 316L			
		V	Hastelloy C			
		W	Ta			
30			Backup washing hole			
			1	N		
			0	Y		
40				Filling liquid		
				S	Silicone oil -30～200℃	
				H	High temp. Silicone oil -10～350℃	
				U	Ultra-temperature Silicone oil 10～400℃	
				V	Vegetable oil 0～250℃	
				F	Fluoro oil -30~260℃	
				L	Low temp. filling liquid -100~100℃	
				F	Ultra-temperature filling liquid 10~600℃	
50					Capillary length	
					1	1m
					2	2m
					3	3m

					4	4m		
					5	5m		
					6	6m		
					7	7m		
					8	8m		
					9	9m		
					10	10m		
					11	11m		
					12	12m		
					...	...		
60						Capillary		
						N	None	
						P	With PVC protection	
70							Contacting liquid flange diaphragm housing type	
							N	None
							P	Anti-vacuum treatment