

HR3051-LT Differential Pressure Level Transmitter

1 Application

The diaphragm of the differential pressure level transmitter is used to prevent the medium in the pipeline from directly entering the pressure sensor component of the differential pressure transmitter. It uses a filling fluid such as silicone oil to transmit pressure between the transmitter and the transmitter.

The HR3051-LT differential pressure level transmitter measures the level, density, pressure, and flow of a liquid, gas, or vapor and converts it into a 4-20 mA DC HART current signal output. The RP2001 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-LT differential pressure level transmitter (when not moved) is 0-1kPa~2MPa, and the rated pressure of the liquid level flange is: 1.6/4MPa, 6.4MPa, 10MPa, 150psi, 300psi or 600psi.

2 Working principle and structure

The HR3051-LT differential pressure level transmitter consists of a HR3051-DP differential pressure transmitter and a soldered liquid level flange. Its working principle is the same as HR3051-DP type differential pressure transmitter (see HR3051-DP type differential pressure transmitter technical specification), except that the pressure transmission path on the positive pressure side is slightly different: the pressure acting on the high pressure side is firstly The diaphragm and filling liquid on the liquid level flange

pass through the transmitter body and finally reach the high voltage side of the measuring sensor.

3 Input

Measurement parameter: Differential pressure, liquid level

Measuring range

Lower limit: -100% URL up (continuously adjustable)

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

Range

Table 1 Comparison of range code and range limits

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



Table 2 Comparison of liquid level flange and minimum range relationship

Level flange	Nominal diameter	Minimum range
Flat type	DN 50/2"	10kPa
	DN 80/3"	1kPa
	DN 4"	1kPa
Plug-in type	DN 50/2"	16kPa
	DN 80/2"	1kPa
	DN 4"	1kPa

The minimum range of the differential pressure level transmitter shall 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 level transmitter should be the minimum of both the maximum range of the transmitter body and the rated pressure of the level flange.

4 Output

Output signal

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

Output signal limit: $I_{min}=3.9mA$, $I_{max}=20.5mA$

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 level flange time constant is 0.2 to 2 s, depending on the range and turndown ratio. The additional adjustable time constant is: 0.1 to 60 s.

6 Normal conditions

6.1 Installation conditions

It can be fixed directly to any position by the level flange transmitter. 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.

6.2 Environmental conditions

Ambient temperature

Lowest: depending on the filling liquid.

the highest: 85°C

With LCD display, fluoro rubber seal -20~65°C

Storage temperature / transport temperature

The lowest: Depending on the filling liquid.

The highest: 85°C

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

Medium temperature limit: -30~180°C

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.

Liquid level 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 pressure side is the rated pressure of the liquid level flange. There may be a correctable zero drift.

Weight: DN 50/2" 约 7~10kg; DN 80/3" 约 8~11kg; DN 4" 约 9~12kg。

Explosion-proof performance

NEPSI Explosion-proof license: Ex dII C T6

NEPSI Intrinsically safe license: Ex iaII C T4

Allowable temperature is: -40°C~65°C

6.4 Power and load conditions

The power supply voltage is 24V

 $R \leq (U_s - 12V) / I_{max} \text{ k}\Omega$ among them $I_{max} = 23 \text{ mA}$

Maximum supply voltage: 42VDC

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

Digital communication load range: 230~600Ω

Material

Measuring bellows: stainless steel 316L

Diaphragm: stainless steel 316L, Hastelloy C, Ta Diaphragm film, FEP, PFA, PTFE laminating

Process flange: stainless steel 304

Filling fluid: Silicone oil, Vegetable oil

Seal ring: NBR, FKM, PTFE

Transmitter shell: aluminum alloy, Exterior spray epoxy

Shell seal: NBR

Nameplate: stainless steel 304

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

Process connection

UNF 7/16`` internal thread on the low pressure side of the transmitter. The level flange on the high pressure side of the transmitter is ANSI or DIN compliant. Can be installed directly to participate in the dimensional drawing.

Protection level

IP67

Electrical connections

Table 3 Electromagnetic compatibility (EMC)

No.	Test terms	Basic standard	Test Conditions	Performance degree
1	Radiation interference (shell)	GB/T 9254-2008 table 5	30MHz~1000MHz	qualified
2	Conducted interference (DC power port)	GB/T 9254-2008 table 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 lines) 2kV (Between line 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 testing, 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.

Outline construction

Unit (mm)

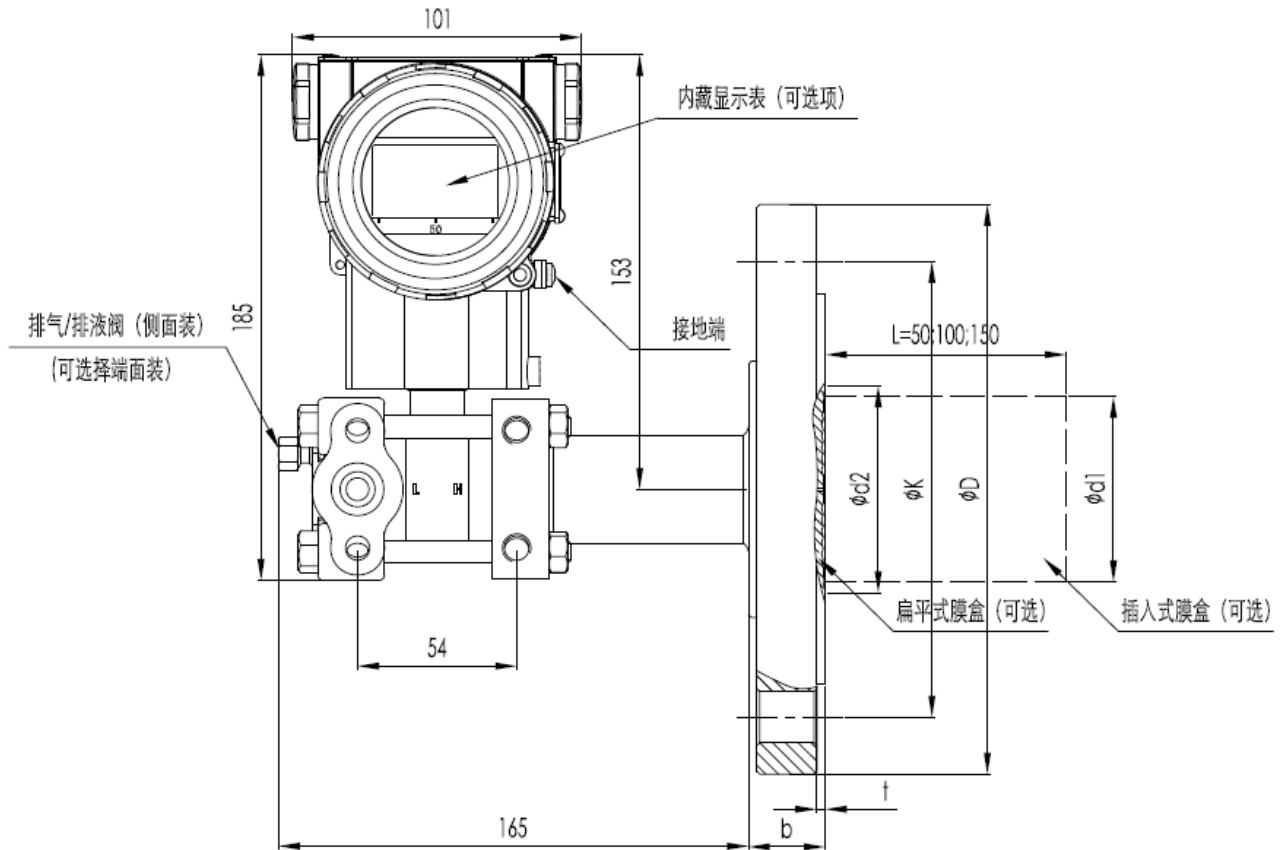
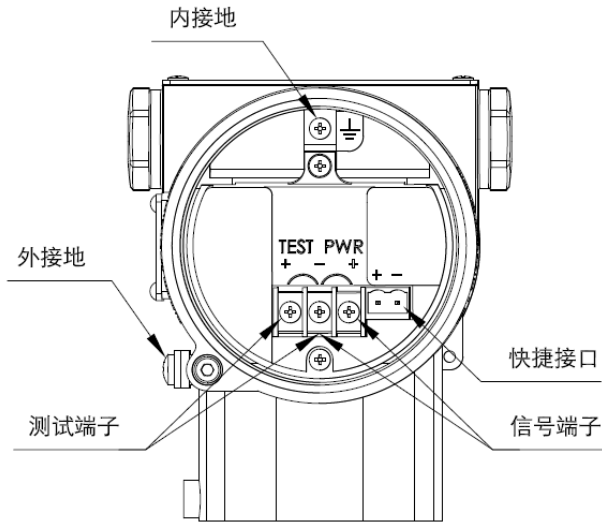


Table 4 Hydraulic flange construction specification

Nominal Diameter	Rated Pressure	ϕD	ϕK	$\phi d1$ Plug-in	$\phi d2$ Flat type	$\phi d3$	t	b	Bolt	
									Qty	Size
DN 50 (Sealing DIN 2526E) (Flange DIN 2501)	PN1.6/4MPa	165	125	48.3	57	102	$3^{+0.5}$	20	4	M16
	PN 6.4MPa	185	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 (Sealing DIN 2526E) (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)	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)	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)	150psi	229	191	89	89	157	$3^{+0.5}$	30	8	M18
	300psi	255	200	89	89	157	$3^{+0.5}$	32	8	M18

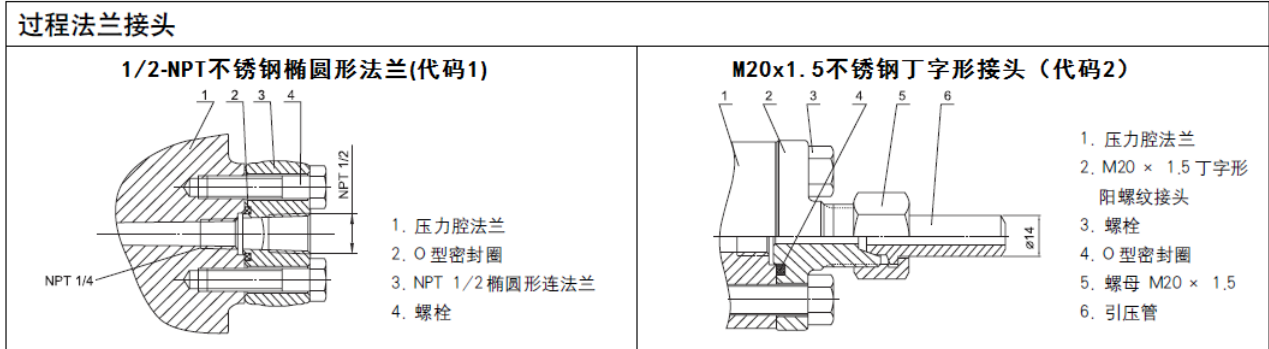
Note: Bolt and nut are optional.

7. Electrical connection



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

8 Low pressure port process connection



9. Model and specification code table^[1]

Differential Pressure Level Transmitter Order Guide						
10	Liquid sealing device					
	LT					
	-	Flange, no capillary ⊕side				
20		Process Connection material	Nominal Diameter	Sealing type	Sealing type	Diaphragm /Sealing
		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	
30			Rate 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			Connection type				
			F	Flat			
			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 fluid				
			S	Silicone oil -30~200°C			
			H	High temp. Silicone oil -10~350°C			
			U	Ultra-temperature Silicone oil -10~350°C			
			V	Vegetable oil 0~250°C			
			F	Fluoro oil -30~260°C			
60			Contacting liquid flange diaphragm housing type				
			N	None			
			1	LFEP on 316L (fluorinated ethylene-polypropylene) (temp. ≤180°C)			
			2	PFA on 316L (PFA) (temp. ≤260°C)			
			3	PTFE on diaphragm(PTFE) ^[2] (temp. ≤200°C) (Not for plug-in)			
			4	FEP on 316L (FEP) (temp. ≤180°C) (Only for plug-in)			
			5	PFA on 316L (PFA) (temp. ≤260°C) (Only for plug-in)			
			6	Anti-vacuum treatment			

Note: 1 Before flange selection, choose HR3051-DP first, then choose liquid on 60.

2. PTFE or F4 diaphragm, can be used for negative pressure measurement, but only for flat liquid flange.