

Ring-11 Liquid Level Switch



Vibrating level switch

Vibrating level switch is based on a cantilever beam vibrating principle. A cylindrical rod or a fork is used as a vibration probe. Piezoelectric devices are utilized to drive and detect the vibration. With state-of-the-art techniques, the specifications of our vibrating level switch and its reliability reach to an advanced level in the field. When the vibrating probe comes in contact with the material under measure, the vibration amplitude and the frequency of the probe will substantially decrease, so does the output of the detecting piezoelectric device. The amount of decrease is analyzed by an intelligent circuit which outputs a switching signal as a result. Depending on the chemical and physical properties of the measured medium, a series of vibrating level switches can be chosen from.

Jiwei has been granted three invention patents and two utility patents on its vibrating level switches so far. One more invention patent is under checking and verification. Compared with the similar products in the market, our vibrating level switches have following advantages:

- Broader range of the medium density, can be used for the medium with extreme low density (as low as 0.008g/cm³).
- Excellent adaptability, particularly suits for the medium with unstable humidity and dielectric constant.
- Larger redundancy for medium buildup thanks to the precisely pre-adjusted resonance, highly reliable for the medium with higher viscosity and adhesiveness.
- High reliability because of higher quality chips purchasing, detail oriented design, and strict production flow and quality control.
- An industry-leading product for high process temperature applications, excellent performance under temperature up to 250 °C , or ultra-high temperature up to 400 °C with water/air cooling.
 - Smaller probe, particularly suitable for pipelines.
 - Vibrating probe is made of strong corrosion resistant materials, such as 316L.
 - Explosion protection certified, including gas/dust Flameproof Enclosure and gas/dust Intrinsic Safety & IP66/ IP67 ingress protection.
 - Strong self-diagnostic function makes it possible to accurately locate the fault.

Our vibrating level switch has four series of product to meet requirements of a variety of applications:

Tube-11 Vibrating Rod Level Switch:

This innovative vibrating rod level switch is designed with double vibration tubes, which is a first made-in-China model. It suits for the majority of level switch applications for granular and powdery bulk solids. The lowest medium density can be as low as 0.02g/cm^3 .

Fork-11 Tuning Fork Level switch:

The area of the fork body has been reasonably increased for higher sensitivity. It is particularly suitable for powder and fine-granule with the density as low as of 0.008g/cm^3 .

Ring-11 Liquid Level Switch:

With only 40mm length of the fork body, it is particularly designed to measure the liquid level in vessels, storage tanks, other process tanks, as well as bypass pipelines. The density of the liquid can be as low as 0.5 g/cm^3 .

Ring-21 Compact Liquid level switch:

It is compact, lightweight, easy to carry and inexpensive. It is mainly aimed for the applications that are cost sensitive and no explosion protection requirement. It is particularly suitable for pipelines or other applications with constricted space.



Ring-11 Liquid Level Switch

Overview

Ring-11 fork liquid level switch is a highly reliable instrument for liquid level detection and control. The Fork length is only 40 mm which makes Ring-11 applicable not only for vessels, process tanks and storage tanks, but also particularly for pipelines or other applications with constricted space. It is based on the fork resonant principle. When a fork which vibrates in harmonic resonance comes in contact with the measured liquid, its vibrating frequency will greatly decrease. The fork's harmonic resonant frequency has been precisely pre-adjusted to achieve high sensitivity so the lowest measurable density can be as low as 0.5g/cm³. Our Ring-11 liquid level switch is excellent in level measurement for acids like HCL, H₂SO₄, H₂SO₃, and alkali liquids, syrup, medical liquids, industrial wastewater, etc. And particularly, it is suitable for pressured liquefied gas (such as LNG) and applications under complicated working conditions where the measured liquid is easy to foaming, bubbling or with high viscosity and under vibration disturbance environment etc. Jiwei has been granted an invention patent (ZL201510735568.2) on Ring-11 Liquid Level Switch.



Measuring principle

In Ring-11, piezoelectric devices are utilized to achieve vibration drive and detection. Once the resonant vibrating fork comes in contact with the measured medium, the vibration frequency of forks will substantially decrease. The output signal from the piezoelectric detection device will decrease accordingly. Then an integrated circuit is designed to analyze the signal from the piezoelectric device and output a switch signal as a result.

Features

- With only 40mm fork length, specially designed for pipelines and other applications with constricted space.
- High sensitivity due to the precisely pre-adjusted harmonic resonant frequency of the fork, the lowest measurable medium density can be as low as 0.5g/cm³.
- With strong disturbance resistance ability, not influenced by foam, bubbles, viscosity, vibration

and other liquid characteristics.

- Industry-leading performance for high temperature working environment. Process temperature can reach up to 250°C.
- Three optional output methods: relay output, two-wire system and Namur.
- Optional air-tight high pressure protection insulation sleeve, special for pressurized or corrosive liquids level measurement.
- Meet the food safety standards and applicable for liquids level measurement in food industry
- Certified for both Intrinsic Safety and Flameproof Enclosure explosion protection.
- High reliability due to the detection of vibration frequency.

Applications

- Level measurement for the liquefied natural gas (LNG) with the density of 0.56g/cm³ in the transport pipelines.
 - Ring-11 liquid level switch can measure the medium with density as low as 0.5g/cm³. It provides an effective solution for level measurement of pressurized low density liquids under explosive environment. Furthermore, the shorter fork length (only 40mm) makes it ideal for pipelines and other applications with constricted space.
- Level measurement in chemical industry for high temperature and strong corrosive liquids during the production process of chemical spices in raw materials' storage tanks, other process tanks and reactors.
 - With optional ECTFE, or PFA coated fork body and flange, where may contact with measured corrosive liquids, our Ring-11 can withstand strong acidic/alkaline liquids and high process temperature up to 250°C.
- Level measurement for storage tanks of petroleum, crude oil, gasoline and lubrication oil, etc.
 - Our Ring-11 liquid level switch is an explosion protection certified product It has both Intrinsic Safety (Ex ia IIC T6) and gas flameproof enclosure (Ex d IIC T6) certificates. It is safe and dependable, ideal for oil and petrochemical industry.
- Level control for pipelines in pump protection system.

Technical data

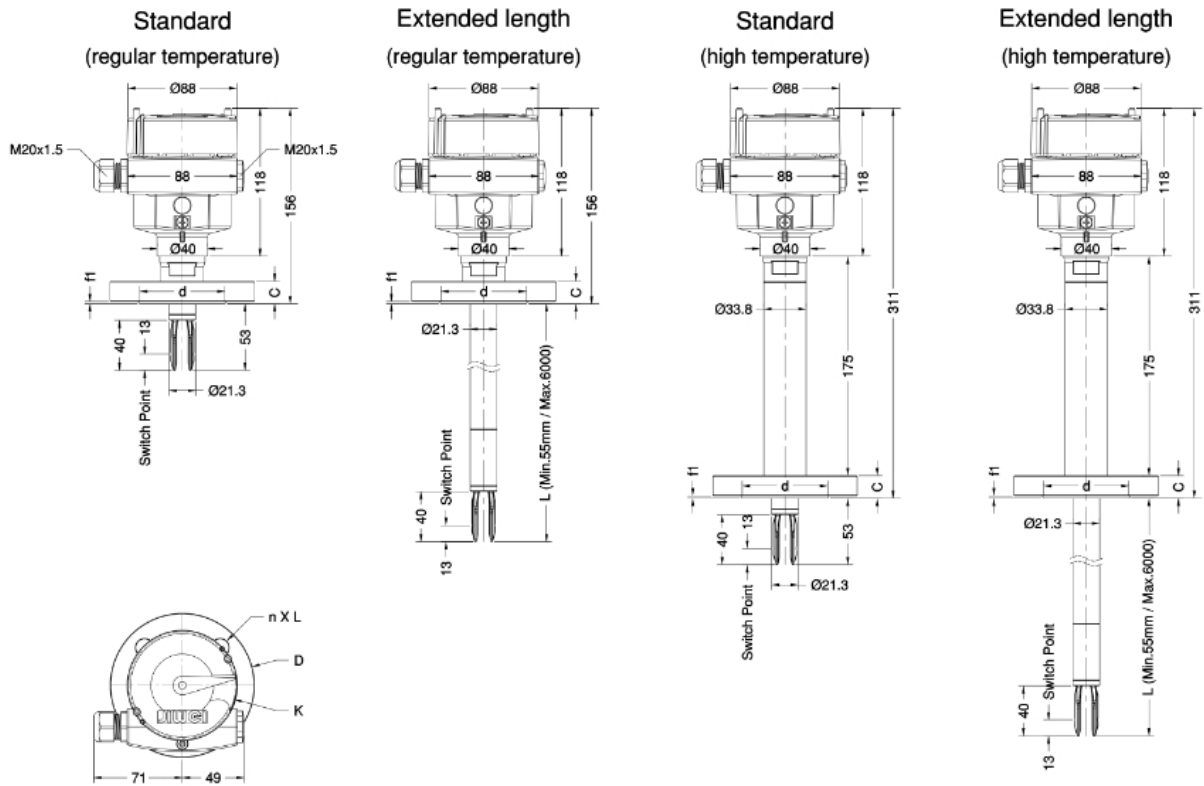
Applicable liquid	Density	>0.5g/cm ³
	Viscosity	0.1~10000mPa.s ^①
	Flow velocity	Max 6m/s
Probe data	Vibrating frequency	~1200Hz
	Fork length	40mm

Accuracy	Measurement error	$\pm 1\text{mm}$
	Delay	2mm
	Repeatability	0.1mm
Switching delay	When immersed	0.5s
	When laid bare	1s
Power supply	Relay output	20~250V AC/20~72V DC
	Two-wire	10~36V DC
	Namur	8.2 V DC
	Power consumption	AC: 1~8VA, DC: 1.5W
Output	Relay output	DPDT, 5A/253V AC/24V DC
	Two-wire	8/16mA, Alarm if <2.3mA
	Namur	$\leq 1\text{mA}$ or $\geq 2.2\text{mA}$, Fault if $\leq 1\text{mA}$
Working environment	Process pressure	-1~64bar
	Process temperature	Regular:-50°C~150°C, High temperature:-50°C~250°C
	Ambient temperature	-40~70°C
	Storage and transport temperature	-40~80°C
Overvoltage protections	Relay output	Category III, class I
	Two-wire	Category III, class II
Approvals	Protection rating	IP66/IP67
	Explosion proof types	Flameproof enclosure: Ex d IIC T6, Intrinsic safety: Ex ia IIC T6
Materials	External Housing	Aluminum Alloy
	Ground terminal	316L
	Thread fitting	316L
	Flange fitting	316L, 316L with enamel coating, ECTFE coating or PFA coating (Optional)
	Fork body	316L, 316L with enamel coating, ECTFE coating or PFA coating (Optional)
	Process seal	Klingsil C-4400

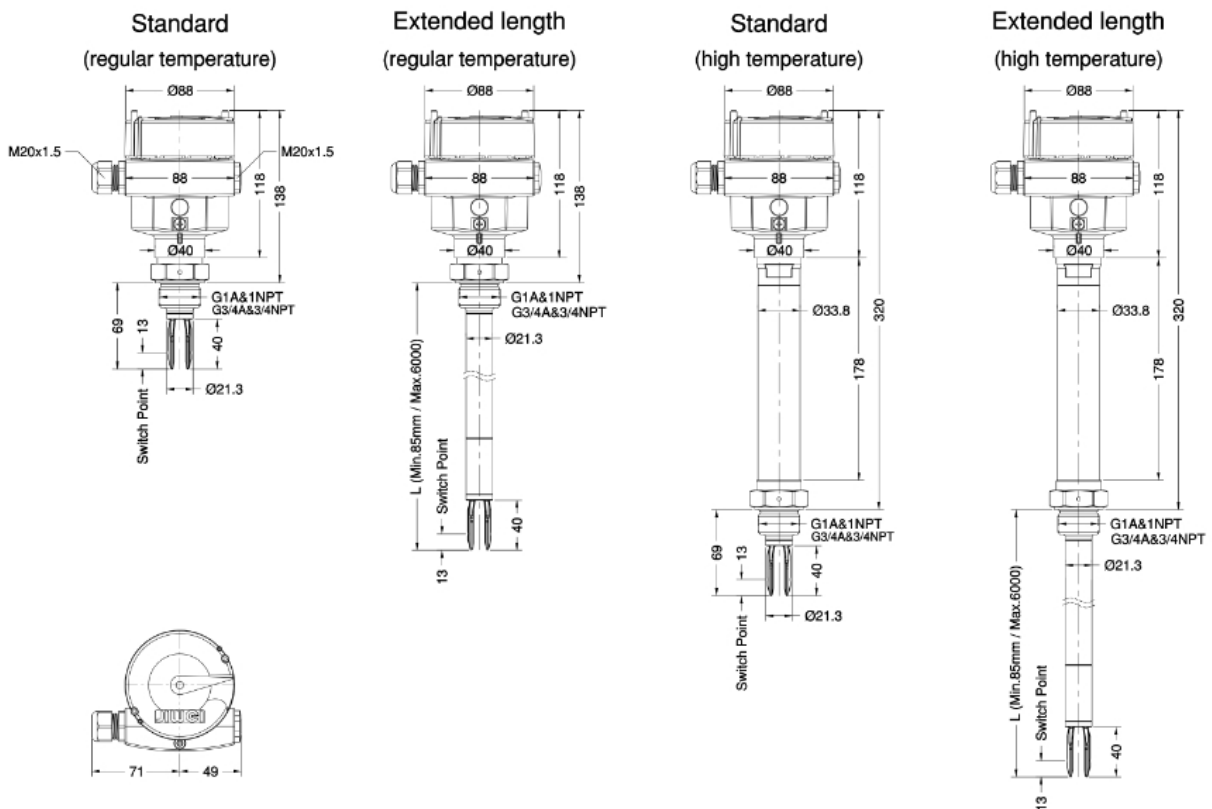
Note: ①: assume the medium density equals to 1.

Dimensional drawings

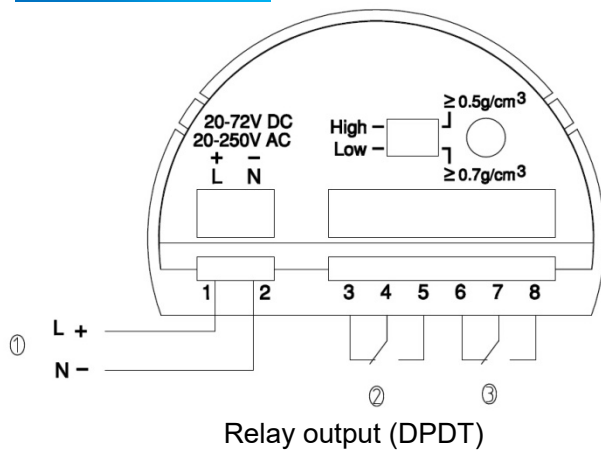
Ring-11 Flange version



Ring-11 Thread version

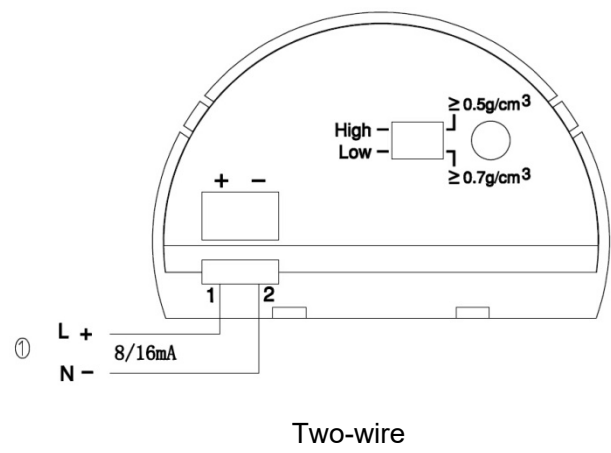


Wiring Plan



Relay output (DPDT)

- ①: Power supply terminal
- ②③: Relay output (DPDT)



Two-wire

- ①: Power supply/output (8/16mA)

Installation diagrams

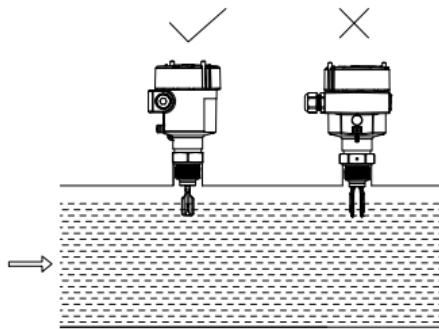


Fig.1

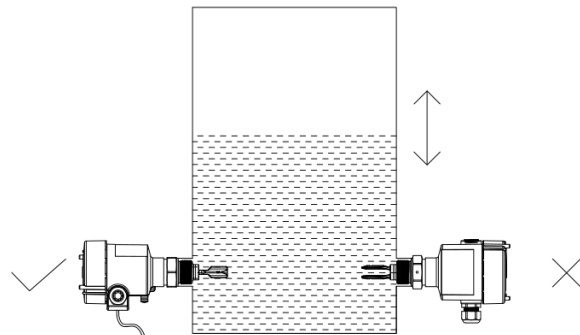


Fig.2

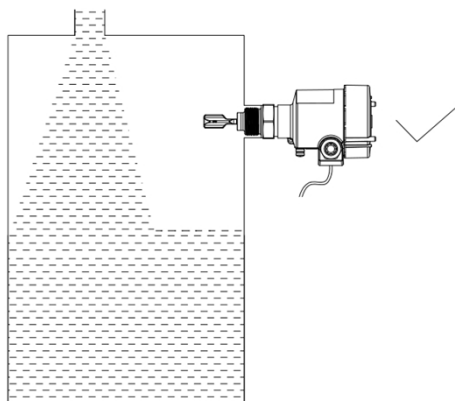


Fig.3

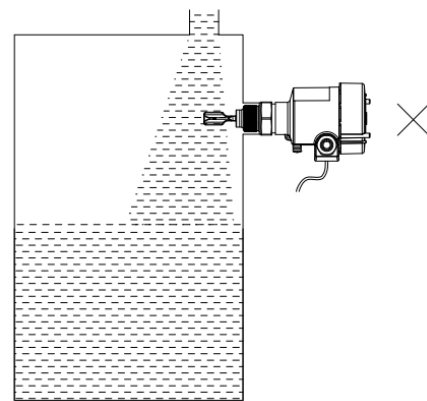


Fig.4

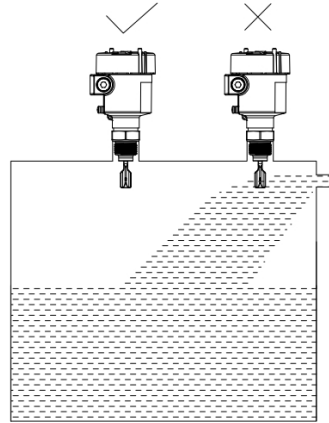


Fig.5

Notes:

- The surface of the fork wing should be parallel to the movement direction of the measured medium. Fig.1 shows the correct and wrong installation when the medium moves horizontally. Fig.2 shows the correct and wrong installation when the medium moves vertically.
- Avoid installing the instrument near the inlet and outlet points. Fig.3 and Fig.4 are schemes to show the correct and wrong installation position respectively for horizontal installation. Fig.5 is a scheme to show correct and wrong installation position for vertical installation.

Order information
Ring-11

Approvals	N	None explosion hazards					
	I	Intrinsic Safety: Ex ia IIC T6					
	D	Flameproof Enclosure: Ex d IIC T6					
Process temperature	C	-50~150°C					
	H	-50~250°C					
	A	-50~150°C / with air-tight insulation sleeve					
	B	-50~250°C / with air-tight insulation sleeve					
Process fitting	TC	Thread G $\frac{3}{4}$ " A					
	TD	Thread $\frac{3}{4}$ " NPT					
	TH	Thread G1" A					
	TM	Thread 1" NPT					
	FA	Flange DN25 PN40/316L					
	FB	Flange DN50 PN40/316L					
	FC	Flange DN25 PN40/ECTFE coating					
	FD	Flange DN50 PN40/ECTFE coating					
	FE	Flange DN25 PN40/PFA coating					
	FF	Flange DN50 PN40/PFA coating					
	FG	Flange DN25 PN40/Enamel coating					
	FH	Flange DN50 PN40/Enamel coating					
	CB	Clamp 1", Ra<0.8um					
	XX	Customized					
Power supply&signal output	R	Relay (20~70V DC/20~253V AC) DPDT ①					
	W	Two-wire (10~36V DC) 8/16mA					
External Housing/Ingress protection rating	A	Aluminum alloy/IP66/IP67 (0.2bar)					
Cable entry	M	M20×1.5					
	N	1/2"NPT					
Intruding depth	S	Standard (69mm)					
	L	Lengthened 80mm≤L≤6000mm, upon selection					
		e.g. if the intruding depth is 300mm, expressed here as L-300					

Notes: ①. Intrinsic Safety explosion proof certificate is not valid for this option.