See selection for details, page 8

LDG-70

Resonant Densimeter

Working principle

The resonant densitometer operates based on the principle of component vibration, with the component part being a tuning fork immersed in the measured liquid. The tuning fork is vibrated by an internal piezoelectric device fixed at the bottom end of the fork body. The oscillation frequency is detected by a secondary piezoelectric device fixed at the other end of the fork, and then amplified by a circuit at the top.The density of the liquid is closely related to the vibration frequency during the flow of the measured liquid. When the density of the measured liquid changes, the vibration frequency during the flow of the liquid also changes accordingly. The density of the measured liquid can be accurately calculated using the following equation.

D=K0+K1T+K2T2

D = Uncalibrated density of the measured medium (K G /M 3)

T= Vibration frequency (M S).

K0、K 1、K2= Constant

Function characteristics

Density, standard density, or special calculated values (solid percentage, concentration, specific gravity, etc.).

Unique inline design, with a length of up to 4 meters. The integrated transmitter can be used for analog and digital communication. It has been rigorously tested and validated before leaving the factory, ensuring accuracy and performance

Continuous real-time measurement can be carried out in pipelines, bypasses, and tanks. There are various anti-corrosion materials available, including 316L, HaC, zirconium, and other materials. The optimized design is not easily affected by vibration and pressure changes, and automatically compensates for the influence of temperature on the density of the measured medium during the density detection process

Application

Density measurement of lime slurry and gypsum slurry in the desulfurization industry Density measurement of ammonia and urea solution in the de selling industry Density measurement of sulfuric acid, hydrochloric acid and nitric acid in the chemical industry Density measurement of mineral slurry, slime, oil and product oil Density measurement of syrup, starch, lotion, fruit Density measurement of pharmaceutical solutions and concentrated solutions in the pharmaceutical industry Density measurement of chemical reagents and chemical liquids such as alcohol, methanol, ethanol, ethylene glycol, etc.

Product model

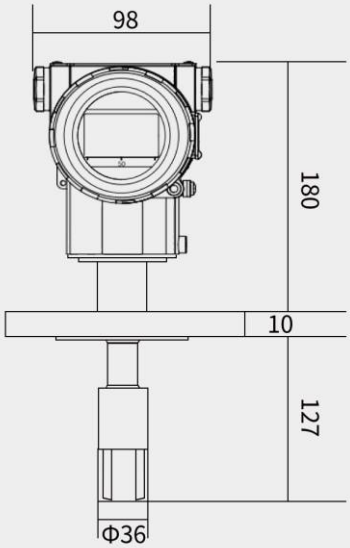
Model number	LDG-70A	LDG-70B	LDG-70C
Product drawing			
Apply	Apply	Apply	Apply
Measuring range	0.5 - 2.5G/CC (500-2500 KG/M3)	0.5-3.0G/CC(500-3000 KG/M3)	0.5-2.5G/CC(500 - 2500 KG/M3)
Measurement accuracy	± 0.001G/CC(± 1 KG/M3)	± 0.001G /CC(± 1 KG/M3)	± 0.001G/CC (± 1 KG/M3)
Repeatability	± 0.0001G/CC (± 0.1KG/M3)	± 0.0001G/CC (± 0.1KG/M3)	± 0.0001G/CC (± 0.1KG/M3)
Operating temperature range	-20℃ ~ +80℃	-50℃ ~ +150 ℃	-50℃ ~+150 ℃
Working pressure	20 BAR (2MPa)	207 BAR(3000 PSI)	10 BAR (1MPa)
Fluid viscosity range	0- 2000CP	0- 10000 CP	0 -20000 CP
Temperature coefficient	Less than 0.1 KG/M3/℃(after correction)	Less than 0.1 KG/M3/℃(after correction)	Less than 0.1 KG/M3/℃(after correction)
Pressure effect	Negligible	Negligible	Negligible
Built-in temperature sensor	Digital sensor	Digital sensor	Digital sensor
Liquid material	316L	316L stainless steel Hastelloy	316L stainless steel Hastelloy
Fork coating	Normal form	Standard type, PTFE or electrolytic polishing	Standard type, PTFE or electrolytic polishing
Power supply	24VDC, ≥50 MA	24VDC, ≥50 MA	24VDC, ≥50 MA
Analog output	4 - 20 MA RS485 MODBUS RTU	4 - 20 MA 0-1000HZ RS485 MODBUS RTU	4 - 20 MA 0-1000HZ RS485 MODBUS RTU
Output accuracy(20℃)	A reading of ±0.1% or ± 0.05% FS	A reading of ±0.1% or ± 0.05% FS	A reading of ±0.1% or ± 0.05% FS
Output repeatability(-40~+85℃)	± 0.05% FS	± 0.05% FS	± 0.05% FS
Process connection	ANSI 150 ~ 1500 RF DIN 50 PN16 DIN 50 PN40	ANSI 150 ~ 1500 RF DIN 50 PN16 DIN 50 PN40	IDF和 RJT 卫生型
Class of protection	I P65	I P65	I P65
Shell	Aluminium alloy	Aluminium alloy	Aluminium alloy

Product model

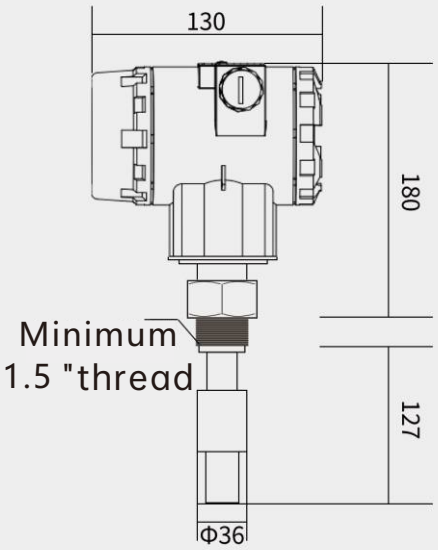
Model number	LDG-70D	LDG-70E	LDG-70F
Product drawing			
Apply	Apply	Apply	Apply
Measuring range	0.5 - 3.0G/CC (500-2500 KG/M3)	0.5-3.0G/CC(500-3000 KG/M3)	0.5-3.0G/CC(500 - 2500 KG/M3)
Measurement accuracy	± 0.001G/CC(± 1 KG/M3)	± 0.001G /CC(± 1 KG/M3)	± 0.001G/CC (± 1 KG/M3)
Repeatability	± 0.0001G/CC (± 0.1KG/M3)	± 0.0001G/CC (± 0.1KG/M3)	± 0.0001G/CC (± 0.1KG/M3)
Operating temperature range	-50℃ ~ +180℃	-50℃ ~ +150 ℃	-20℃ ~+80 ℃
Working pressure	10 BAR (1MPa)	10 BAR(1 PSI)	10 BAR (1MPa)
Fluid viscosity range	0- 1000CP	0- 50000 CP	0 -50000 CP
Temperature coefficient	Less than 0.1 KG/M3/℃(after correction)	Less than 0.1KG/M3/℃(after correction)	Less than 0.1KG /M3/℃(after correction)
Pressure effect	Negligible	Negligible	Negligible
Built-in temperature sensor	Digital sensor	Digital sensor	Digital sensor
Liquid material	316L stainless steel Hastelloy	316L stainless steel Hastelloy	316L stainless steel Hastelloy
Fork coating	Standard type, PTFE or electrolytic polishing	Standard type, PTFE or electrolytic polishing	Standard type, PTFE or electrolytic polishing
Power supply	24VDC, ≥50 MA	24VDC, ≥50 MA	24VDC, ≥50 MA
Analog output	4 - 20 MA 0-1000HZ RS485 MODBUS RTU	4 - 20 MA 0-1000HZ RS485 MODBUS RTU	4 - 20 MA 0-1000HZ RS485 MODBUS RTU
Output accuracy(20℃)	A reading of ±0.1% or ± 0.05% FS	A reading of ±0.1% or ± 0.05% FS	A reading of ±0.1% or ± 0.05% FS
Output repeatability(-40~+85℃)	± 0.05% FS	± 0.05% FS	± 0.05% FS
Process connection	ANSI 150 ~ 1500 RF DIN 50 PN16 DIN 50 PN40 IDF and RJT hygienic	ANSI 150 ~ 1500 RF DIN 50 PN16 DIN 50 PN40 IDF and RJT hygienic	ANSI 150 ~ 1500 RF DIN 50 PN16 DIN 50 PN40 IDF and RJT hygienic
Class of protection	I P65	I P65	I P65
Shell	Aluminium alloy	Aluminium alloy	Aluminium alloy

Size mm

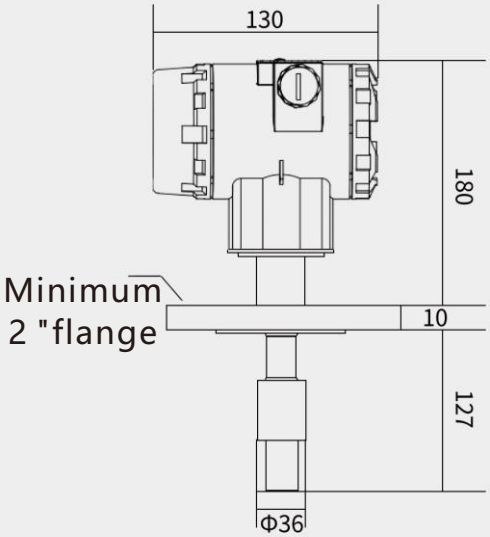
Front dimension



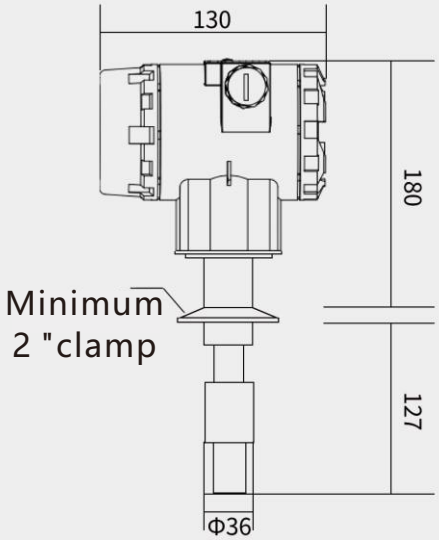
Dimension of thread connection



Flange connection size



Clamp connection dimensions



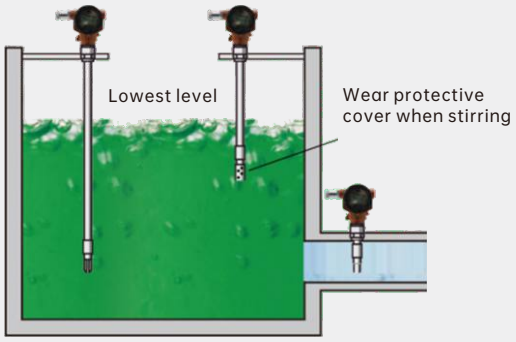
Note: The above insertion length can be up to 4 meters

LDG series practical application

When the open tank or open tank is installed, it is fixed by a support, and the tuning fork body must be below the lowest liquid level to be measured. When the open tank or open tank is stirred, it is necessary to wear a protective cover. The tuning fork insert rod in this installation method is longer, the longest can be 2 meters.

Advantage point

•The measuring probe can be shortened
• Insensitive to attachments
• Easy to debug
• Solid construction



Open pool or open tank

A. When installing the top of the tank, similar to the installation of the open pool, the tuning fork body should be below the liquid level, and the protective cover should be taken when stirring, generally for the tank with only the top opening or the buried tank. To change the insertion depth, use a length of bearing.B, the fork body part of the tuning fork densitometer is not completely closed. The boundary effect of the tube wall or container wall on the fluid and the viscosity effect of the measuring medium itself will have a certain impact on the measurement calibration of the sensor. In order to overcome these, for different environments, we summarized and set the installation method and pipe diameter to facilitate the selection under the same conditions. When the tank body is mounted on the side, the tuning fork body can be directly inserted into the tank without stirring; When there is stirring without precipitation, it can be installed with protective cover or T-sleeve, and the tuning fork body is in the protective cover or T-sleeve tube; Trumpet installation is used when stirring and settling.

Airtight tank

In the desulfurization slurry pipeline application, the flow rate of the medium is generally greater than 2m/s, and only T-sleeve installation is recommended, which can be installed on the vertical pipeline or on the horizontal pipeline.

(1) Vertical pipeline installation

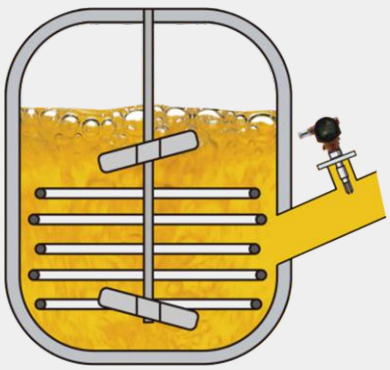
√ The Angle between the casing and the vertical pipe is 45±15 degrees to avoid the settlement of particles.

√ Do not install at the corner of the vertical pipe to reduce the impact of pulsating flow.

(2) Horizontal pipeline installation

√ The Angle between the casing and the horizontal plane should be greater than 30 degrees to avoid the settlement of particles.

√ The position is the low point of the adjacent pipe, so that the casing position can remain full.

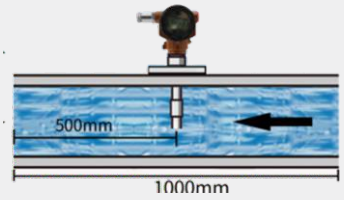


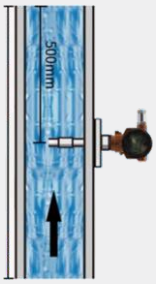
Desulfurization tower mixing tank

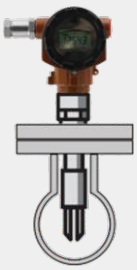
LDG series practical application

Dc piping installation

For horizontal pipe installation, it is recommended that the flange opening be on the side of the pipe. If it cannot be opened on the side of the pipe due to installation space problems, but can only be opened on the top of the pipe, ensure that the fork is completely invaded below the liquid level (the pipe at the lower end of the flange is prone to gas accumulation). When installing, pay attention to the opening direction of the fork body and the flow direction parallel. For vertical installation, the density meter is installed on the pipe with vertical upward flow, when the flow rate is less than or equal to 0.5m/s

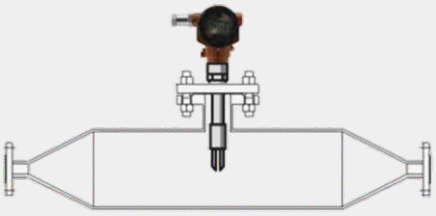


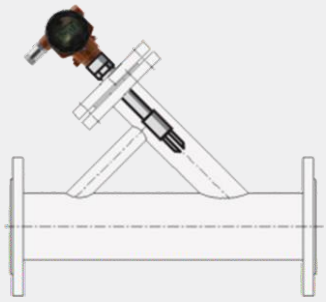




T-side opening and fluid through-container mounting

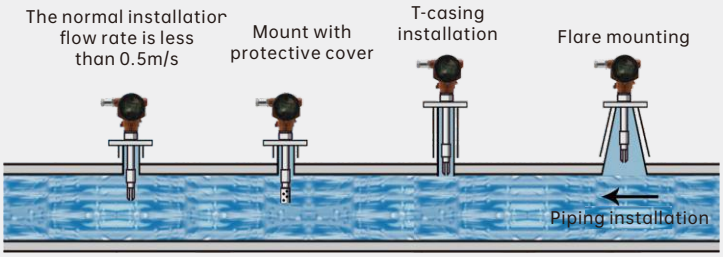
When the diameter of the main pipe is small, it can be installed by reducing the diameter, as shown in Figure 1. When the flow rate of the pipe is high, there are precipitations and bubbles, it can be installed by using Figure 2, the part on the right can be provided as an attachment, and its typical application is in the field of desulfurization lime slurry density measurement.





Common piping installation

The fork body part of the tuning fork densitometer is not completely enclosed. The wall of the tube or container will add the viscosity effect of the measuring medium to the boundary effect of the fluid, and these effects will have a certain impact on the measurement calibration of the sensor. In order to overcome these, for different environments, we summarized and set the installation method and pipe diameter to facilitate the selection under the same conditions. For pipeline installation, when the flow rate is within 0.5m/s, the tuning fork body can be directly inserted into the pipeline; When the flow rate exceeds 0.5m/s and there is no precipitation, the tuning fork can be installed with a shield or T-sleeve, and the fork body is in the shield or T-sleeve; When there is precipitation, the use of horn installation. At all times, the opening direction of the fork should be in the vertical direction to avoid sediment or bubbles accumulation on the fork.



Piping installation instructions

In order to ensure that the density meter can be measured accurately and display stability, the flow rate of the measured medium shall not be greater than 1m /s, and the location of the installation of the density meter shall be far away from the pump as far as possible, and the distance is better than 5m; When the flow rate is greater than 1m/s, expand the diameter of the pipe for installing the densimeter by 1.5 times for every 1m increase in the flow rate. There must be a straight pipe section at least 600mm in front of the meter and a straight pipe section at least 300mm in back of the meter to ensure laminar flow when the fluid flows through the fork.

Installation standard	Direct current flow	T-side opening (pipe 2" or 3" lines or welded lines)	Fluid passes through the container
Instructions	The fork part goes directly into the main body	The side opening part of the fork retraction pipe avoids the main body and is retracted into 25.4MM	The fork part is loaded into the DC container and the main stream forms a reflux
Velocity of flow	The flow rate through the fork is0.3-0.5M/S	The main flow rate is0.3-0.5M/S	10-30L/MIN
Viscosity range	Max 2000CP	Max 2000CP	Max 2000CP
Medium temperature	-20~100℃	-20~100℃	-20~100℃
Main pipe size	≥Water level pipe 1 0 0 M M (4 ") ≥Vertical pipe 1 5 0 M M (6 ")	≥50MM(2")	No limit
advantage	1, easy to install large pipe diameter 2, good effect on purifying solution or non-waxed oil	1, easy to install large pipe diameter 2, good effect on purifying solution or non-waxed oil	1. Suitable for installation of various pipe diameters or tanks 2, good effect on circulating solution and temperature adjustment 3. Quick response
shortcoming	1. Low or unstable flow rate 2, small diameter	Not applicable to: 1, turbid solution or mud 2. Low or unstable flow rate 3. Solutions with graded viscosity 4, small diameter 5, the temperature effect is significant.	It needs to be redone for special measurementsThe system is designed to flush the lines frequently

Pipeline installation instructions

Provides the liquid and material compatibility guide for LDG density meters.

Liquid type	Name	Structural formula	Concentration (%)	zirconium	Ha c	stainless steel
Sour	muriatic acid	HCL	0-40	√	○	×
	sulphuric acid	H_2SO_4	0-50	√	○	○
		H_2SO_4	50-75	○	○	×
		H_2SO_4	75-98	○	○	○
	nitric acid	HNO_3	0-100	√	○	○
	phosphoric acid	H_3SO_4	0-98	×	√	○
Alkali	sodium hydroxide	KaOH	0-100	×	√	○
	potassium hydroxide	KOH	0-50	√	√	○
	calcium hydroxide	$Ca(OH)_2$	0-50	○	√	○
Other	urea	$(NH_2)_2CO$	0-100	√	√	√
	chloros	NaOCl	0-16	×	○	×
	hydrogen peroxide	H_2O_2	0-90	×	√	√

√ recommend ○ Use under specific concentration and temperature restrictions. × do not use

LDG-70-Selection composition

Selection example **LDG-70**

A	G	N	V	A	N	S	R	C	F	M	S
1	2	3	4	5	6	7	8	9	10	11	12

1.Model	A	LDG-70A
	B	LDG-70B
	C	LDG-70C
	D	LDG-70D
	E	LDG-70E
	F	LDG-70F
2.Range range	G	0~1.5g/cm3
	H	0~2.0g/cm³
	I	0~3.0g/cm³
3.Liquid contact material	N	316L stainless steel
	O	Hastelloy alloy
	P	Titanium alloy
	Q	316L lined with PTFE
	R	Zirconium material
	T( )	Other
4.process temperature	V	-10~80℃
	U	-10~120℃
	T( )	Other customizations
5.power supply	A	24VDC
	B	12VDC
	C	220VAC
6.output form	N	4~20mA
	O	0~1000Hz
	P	RS485Modbus
	Q	Hart agreement
7.Process Connection Type	S	Threaded type
	V	Flange type
	M	Sanitary clamp type
	T( )	Other connection types
8.Connection size (thread)	R	G1 NPT
	S	G1½ NPT
	A	M27*2 NPT
	U	1-1/2"NPT
	V	2"NPT
	W	2-1/2" NPT
	X	3"NPT
	Y	4"NPT
	Z	5"NPT
	O	6"NPT
	T( )	Other thread specifications

LDG-70-Selection composition

Selection example **LDG-70**

A	G	N	V	A	N	S	R	C	F	M	S
1	2	3	4	5	6	7	8	9	10	11	12

8.1.Connection size (flange)	A	DN15
	B	DN20
	C	DN25
	D	DN40
	E	DN65
	F	ND80
	G	DN100
	T( )	Other specifications

9.pressure rating	C	150Lbs
	E	300Lbs
	F	600Lbs
	G	800Lbs
	H	PN16
	O	PN25
	P	PN40
	Q	PN63
	R	PN80
	T( )	Other pressure

10.Installation method	F	Horizontal pipeline (user pipe diameter)
	G	Vertical pipeline (user pipe diameter)
	H	Installation method
	I	Tank installation
	J	Special customization

11.Additional information	M	Protective cover
	U	Variable diameter measuring barrel
	V	Bypass pipeline
	W	Companion flange
	T( )	Other

12.Insertion length	S	128 mm
	T( )	Other lengths

Instructions:

LDG-70A resonance densitometer, measuring range 0~1.5g/cm3, liquid material 316L stainless steel, process temperature -10~80℃, power supply 24VDC, output form 4~20mA, process connection type thread type, connection size G1 NPT (8,8.1 binary choice), pressure grade 150Lbs, Installation method Horizontal pipe (user pipe diameter), additional information matching flange, length 128mm.

Product Certification

Compliance and approval; Ludwig flow meters meet key standards and certifications for process measurement technology; To ensure the highest reliability in such settings;

CE Ex SIL

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