

Installation and commissioning instructions

Online vibration viscometer

APX401

Shandong Aipuxin Automation Instrument Co., Ltd
Site: Zhongnan High tech Canal New City Smart Valley Project Phase 1,
Rencheng District, Jining, Shandong Province, China#





The online vibration viscometer is suitable for various industries such as petroleum and petrochemicals, hot melt adhesives, polyamine resins, edible chemicals, fiberglass, paints, waterproof coatings, organosilicon, latex plastics, extruders, glass, insulation paints, civil explosives, scientific research institutions, etc

The working principle of the viscometer is: the principle of the vibrating online viscometer: the principle of the vibration method is that the sensor probe of the instrument does a certain frequency of amplitude movement in the fluid, and the amplitude of the probe will be attenuated due to the action of fluid viscous damping, and the energy lost due to the fluid viscosity damping is supplemented, so that the amplitude of the probe is maintained in the state before the fluid acts, then the energy supplemented by this part is related to the viscosity of the fluid. By measuring the energy added by this part, the viscosity of the fluid can be found according to a certain relationship.

The online viscometer body and power box, wherein the online viscometer body includes a detection rod, a driving chamber, an explosion-proof instrument box, and a shielding cable connecting the driving chamber and the explosion-proof instrument box. The detection rod is partially threaded at the bottom of the driving chamber; The driving chamber is equipped with a magnetic shielding frame and a driving feedback device connected to the detection rod. The top of the driving chamber is equipped with a rotary cover and an explosion-proof packing box connected to the rotary cover. The driving feedback device includes a driving device and a feedback device; The detection rod is installed at the top of the driving chamber and is equipped with a constant elasticity frame and a radial support. The bottom of the detection rod is equipped with a temperature probe. The internal part of the detection rod is equipped with a conduction rod, and one end of the conduction rod is connected to the constant elasticity frame. The other end of the conduction rod is connected to a probe, which can quickly balance the temperature difference between the environment temperature and the resistance of the coil itself. The temperature is monitored in real time and compensated to increase the accuracy of the detection data. The structure is simple and stable.

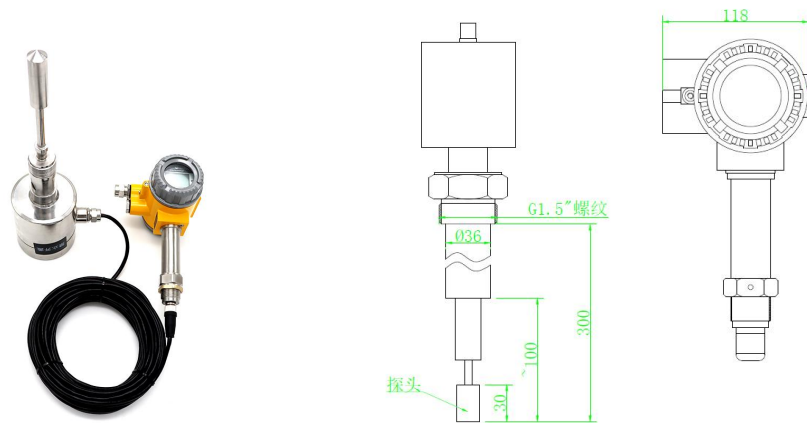
Process parameters of online vibration viscometer

Product model	APX401
Viscosity range	0-10 ⁹ mpa.s
Precision	±1%(Read numerical value)
Type	Split
Split cables	10 meters, four-core shielded wire
Housing Material	stainless steel
Temperature accuracy	0.3%
Sensor Pressure Range	<25Mpa
Sensor temperature range	<400℃
Signal response time	2s
Material	316 stainless steel (standard), 2507, 2205 duplex stainless steel, Hastelloy, titanium, zirconium, tetrafluoro;
Ingress protection	IP66
Power supply	DC24V
Output	4-20ma, Modbus-RTU protocol 485 interface; Four-wire system; Viscosity and temperature
Explosion-proof signs	Ex db Ic T6 Gb
Explosion-proof certificate number	CCRI 23.8053X
Demarcate	Standard sample solution
Connection	DN50 flange, G1.5 inch thread, Customizable
Viscosity unit	Choose from a variety of options
Sensor length	230mm, customizable
temperature compensation	support
Pressure compensation	support

product type

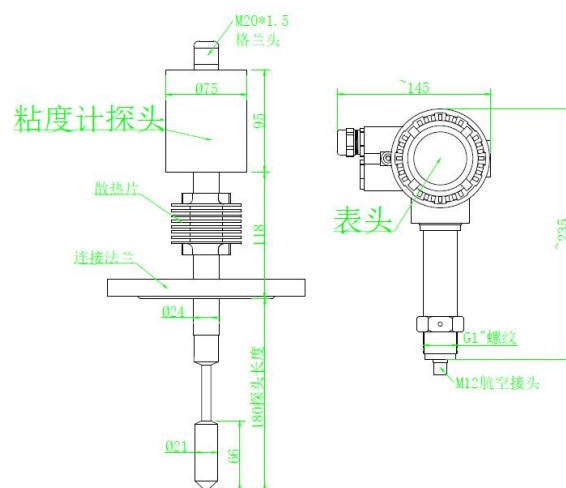
1. Online vibration viscometer - Small range viscosity online viscometer, with a range of 0~50~100mpa. s

Mainly used in solvent field, light oil, alcohol, cleaning fluid, low viscosity silicone oil, oil, lotion, fracturing fluid, low viscosity polymer, starch glue, milk drinks



2. Online vibrating viscometer - Medium range viscosity online viscometer, with a range of 0 to 10000mpa. s

The viscosity application in this area is the most extensive, covering various fields, including silicone oil, resin, optical fiber, ink, plastic, asphalt, lubricating oil, and fine chemicals in various viscosity ranges.



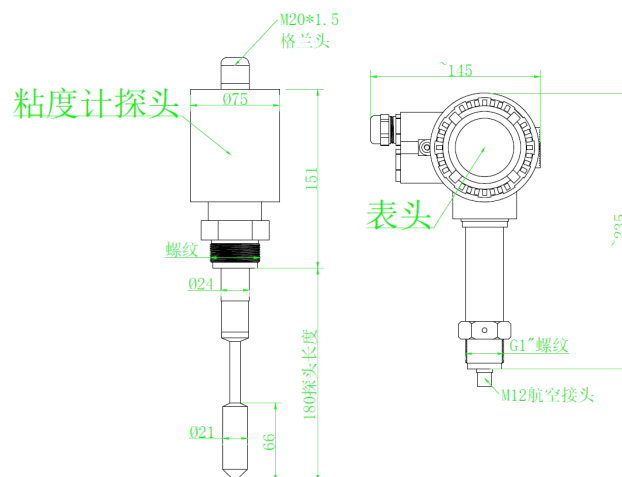
3. Online vibration viscometer - High range viscosity online viscometer, with a range of 0-50 to 200000mpa. s

Applied to high viscosity silicone oil, silicone grease, resin, and hot melt adhesive



4. Medium length online vibration viscometer, with a range of 0-200000 mpa. s

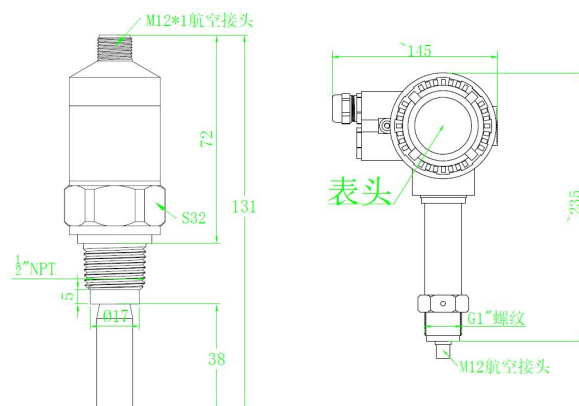
Used for measuring the full range viscosity of the medium temperature within the insertion range of L=500-2000mm.



5. Mini online viscometer, suitable for measuring the stratification of conductive solvents in tanks, such as dehydration and extraction;

Installation

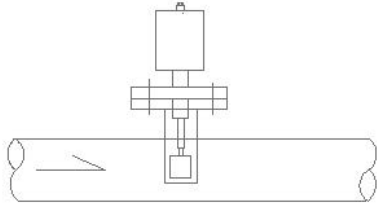
1. Process installation



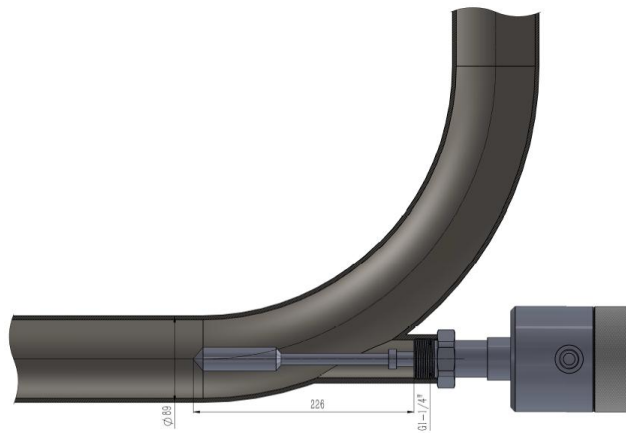
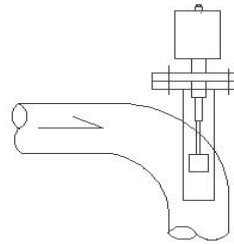
Installation

1. Process installation

Straight pipe installation

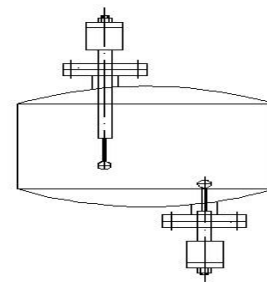
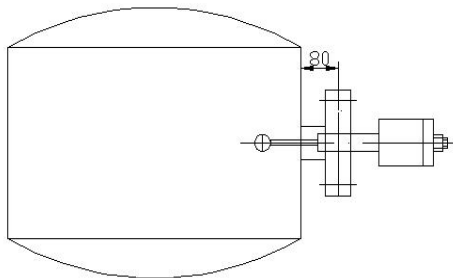


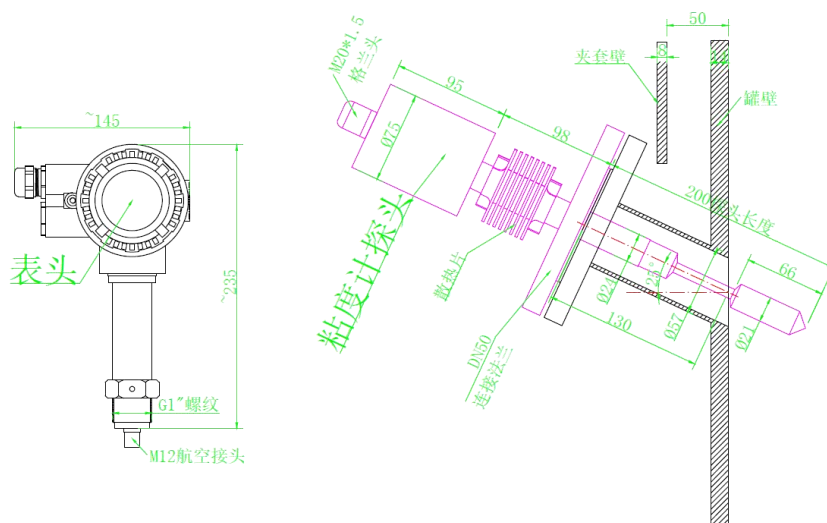
Installation of bent pipes



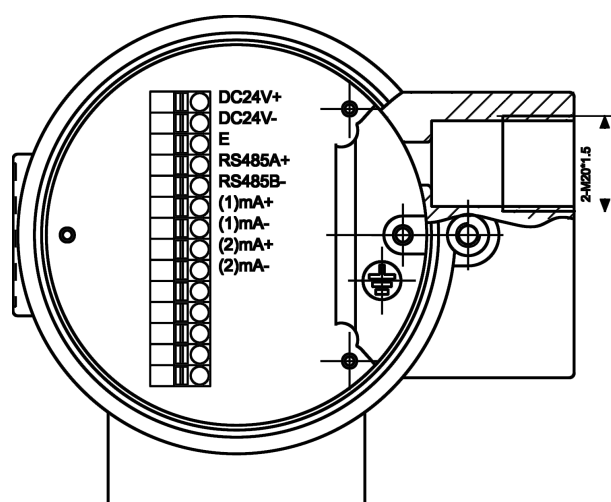
Installation at the top of the tank

Installation at the bottom of the tank





Electrical Wiring:



Power supply (DC24V+, DC24V-);

Grounding (E);

RS Modbus485 communication (RS485A+, RS485-);

One way: 4-20ma (1mA+, 1mA-);

2-way 4-20ma (2mA+, 2mA-)

Description of the key function

SET—Set returns to exit when the operation is complete

-- Revise

-- Shift

-- Confirm

Parameter settings

Parameter settings allow you to modify the values of range, component, damping time, unit, and so on. After pressing and holding the **OK** button for one second, the menu interface appears, the cursor points to "Parameters" and presses **↶** to move the cursor to other settings, select "Parameters" and press **OK** to enter the parameter setting interface "Range", press **OK** again. The underline appears below the value, indicating that this digit can be modified, press **↑** to modify the value of the current bit, continue to press **↶** to move to the bit that needs to be modified, press **↑** to modify, press the "SET" key again after the modification is completed, and press the "SET" button again to show that the "setting is successful". The modification is completed, at this time continue to press **↶**. The settings such as → range → damping → unit → adjustment → offset are displayed in turn, and the above parameters are set in the same operation method. To save, press **OK** to display that "Setup Successful" has been modified. Press "SET" to exit the current screen and go to the setting screen 1 number. Press "SET" again to return to the main interface.

Display settings

You can change the display of the main variable and the effect of the screen display through the settings. After pressing the **OK** key, the menu interface appears, the cursor points to "Parameters", press **↶**. Move the cursor to point to "Display", and then press **OK**. Enter the display settings interface, the cursor points to the display content option, press **↶**. Move ► Point to the desired display content and press **OK**. The setting is complete, if you don't need to save the settings, press "SET" before pressing **OK** to exit the previous level, continue to press **↶** to display → contrast → language → backlight → temperature and other settings in turn, set the above parameters with the same operation method, press "SET" exits the current screen to the setting screen 1 number. Press "SET" again to return to the main interface.

Output settings

This product supports two output modes 4-20mA and RS485 (MODBUS protocol) by setting the output signal, and the viscosity and temperature can be selected to output the current signal.

RS485 can output all signals.

After pressing the **OK** key, the menu interface appears, the cursor points to "Parameter Settings", press **↶** to move the cursor to point to "Output", then press **OK** to enter the output setting interface, the cursor points to the setting content option, press **↶** to move the cursor to point to the desired setting content, press **OK** to complete the setting, if you don't need to save the settings, press "SET" before pressing **OK**. The current-related settings have been set at the factory, please do not modify them.

RS485 communication

1、Modification of station number, communication baud rate, and check digit

After pressing the "OK" key, the menu interface appears, the cursor points to "Parameters", presses "Back", points the cursor to "Output", presses the "OK" key to enter the output debugging interface, continues to press "Back", and the cursor points to the station number, press the "OK" key again, and an underline appears below the upper limit value of "OK", indicating that this digit can be modified, press the "Up Arrow" to modify the value of the current bit, continue to press the "Back Key" to move to the bit that needs to be modified, and press the "Up Arrow" to modify. After the modification is completed, press the "Up" button again to display the "Setup

Successful", and the modification is completed. Station number: 1-254.

At this time, continue to press the "return button" to set the baud rate and check digit in turn, set the above parameters with the same operation method, press "SET" to exit the current interface to the setting interface 13 number, and press "SET" again to exit the current interface to the setting interface 1 number. Finally, press "SET" to return to the main interface.

RS485MODBUS Communication protocol description

1. Function code 03

Using the 03 function code of the MODBUS communication protocol, the value of the sensor or display can be read (1 value). The command format of the host is the slave address, Function code, start address, number of bytes, and CRC code. The command format of the slave response is the slave address, function code, data area, and CRC code. The number of data zones It is a binary code, two bytes, and the high bit is first, and the CRC code is two bytes, and the low bit is first.

2. Information frame format: (the slave address is 01, all binary data)

Host sends:

Station No. (1B) Function Code (1B) Start Address (2B) Number of Reading Points (2B) CRC (2B)

T1~T4 01 03 00 0X 00 0X XX XX T1~T4

Wherein: T1~T4 means that 3~5 rest periods should be reserved at the beginning and end of each frame:

Station number (address): one byte "01"

Function code: one byte "03"

Start address: two bytes: 0000~0004 can be taken

0000, returns the current viscosity value in cp;

0001, returns the current temperature value, the unit is °C, when the temperature is lower than 0°C, the temperature data is uploaded in the form of complement FF9BH=-101=-10.1°C;

Number of read points: two bytes: 0001 or 0002 ~0005 can be taken

CRC: Check Code. two bytes;

Slave Answer:

Station No. (1B) Function Code (1B) Number of Bytes Read (1B) Data (2B) CRC (2B)

T1~T4 01 03 02 XX XX XX XX T1~T4

Among them: T1~T4 means that 4 rest periods should be reserved at the beginning and end of each frame (can be customized);

Station number (address): one byte "01"

Function code: one byte "03"

Data: two bytes; The high bytes come first, constituting 16-bit binary data;

CRC: check code, 2 bytes;

3. Calculation rules of CRC code;

3.1. The reserved 16-bit register is a hexadecimal FFFF (i.e. all 1). This register bit is called the CRC register;

3.2. Put the first 8-bit data in a different position than the 16-bit CRC register or put the result in the CRC register;

3.3. Check if the lowest bit is 0, if it is 0, move the contents of the register to the right by one place (towards the low bit), and fill the high position with 0;

For example, for 1 shift the contents of the register one place to the right (towards the lower bit), fill the high position with 0, and then the CRC register is connected with Polynomial A001 (1010 0000

0000 0001);

Page 7 3.4.Repeat step 3 until you move right 8 times, so that the entire 8-bit data is processed;

3.5. Repeat steps 2 to 4 for the next 8-bit data processing;

3.6. The resulting CRC register is the CRC code. When the CRC result is placed into an infoframe, the high position is swapped and the low position comes first.

Selection Table

APX401	Online vibration viscometer										
	code	types of									
	V	Micro vibration type									
	T	Tuning fork type									
	A	Common									
	B	Explosion proof type (Explosion proof level: Ex d IIC T6 Gb; Protection level: IP66)									
	C	split type									
	D	Integrated									
		code	electrical interface								
		M	M20X1.5								
		G	3/4NPT								
		N	1/2 NPT								
		C	Other specifications (user can choose, please specify separately)								
			code	Process connection							
			L	Thread type (01) G1 "thread (02) G1.5" thread; (02) Other							
			F	Flange type (01) DN25; (02) DN32; (03) DN40; (04) DN50; (05) DN65; (06) DN80; (07) DN100; (08) DN125; (09) Other;							
			W	Sanitary type (1) 1.5 "chuck; (2) 2" chuck; (3) 3 "chuck; (4) others							
			C	Other (user can choose, please specify separately)							
				code	Insertion depth length						
				A	(01)200mm (standard) (02)500mm						
				B	Optional pole extension of 100mm to 3000mm						
				C	Optional cable extension of 1000mm to 8000mm						
					code	Liquid receiving material					
					1	316 stainless steel					
					2	Anti corrosion process: 316 stainless steel+PTFE					
					3	Anti corrosion process: 316 stainless steel+PFA					
					C	(1) 2205 duplex stainless steel; (2) Hastelloy alloy; (3) Titanium; (4) Zirconium; (5) Other					
						code	voltage				
						D	24V DC±10%				
							code	Output (with built-in temperature compensation)			
							A	One way 4-20Ma four wire system			
							B	Two way 4-20Ma four wire system			
							C	RS-485 (modbus)			
							D	other			
								code	temperature		
								A	Room temperature -50-100 °C		
								B	High temperature -50-450 °C (optional high temperature heat sink)		
								code	pressure		
								A	Atmospheric pressure -0.1-1MPa		
								B	Maximum pressure ≤ 2Mpa		
								code	show contents		
								M	0-50~500mpa.s		
								Y	0-100~5000mpa.s		
								S	0-50~10000pa.s		
								X	0-10~10000000mpa.s		
								code	display		
								A	LCD		
								B	secondary display		
								C	Other user requirements		
APX401	VC	M	F05	A01	1	D	A2	A	A	M	A