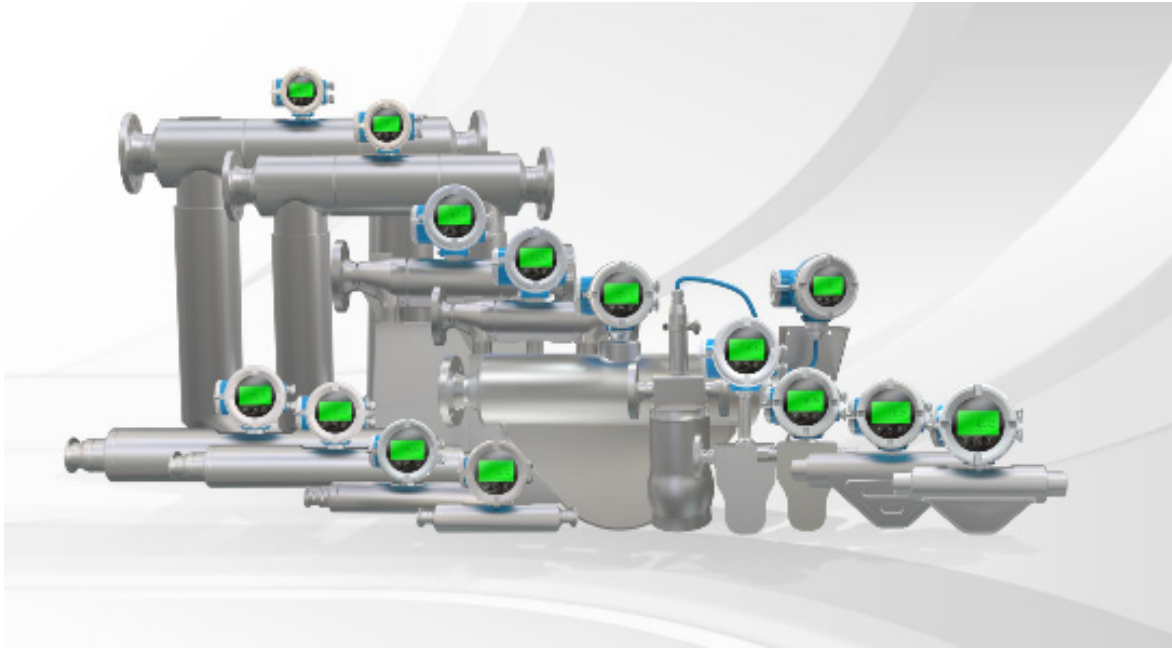


ANF384 Mass Flowmeter



Features

● Measurement advantage

It can directly measure the mass flow rate and display the mass flow rate, volume flow rate, cumulative flow rate, density, temperature and other parameters are not affected by temperature, pressure, flow rate, etc. Small flow measurement performance is excellent, the maximum range ratio can reach 50:1.

● High measurement accuracy

The accuracy of batch products can reach 0.15 (high pressure and cryogenic batch products can reach 0.5), and the measurement stability is high.

● Design advantages

This product has integrated design, small size, easy to install; It also has a compact design for smaller mounting spaces. More stable performance and long service life. The sensor and transmitter adopt a split structure, and the connection part is lengthened to ensure that the metering performance is not affected. (Cryogenic standard) The contact medium parts are made of composite metal material, which has excellent hydrogen brittleness resistance. (High pressure type standard) Sufficient pressure design surplus to ensure the safety and reliability of ultra-high pressure applications. (High pressure type standard)

● Wide selection

A variety of flow tube designs and flow rate ranges are available to meet the measurement needs of various processes and applications. Multiple sensor interface sizes, transmitter mounting options and a wide range of output signal options for maximum compatibility with your system.

Description

The ANF384 mass flowmeter is based on the Coriolis principle, which vibrates the measuring tube through which the medium flows. The sensor detects and analyzes changes in the frequency, phase difference, and amplitude of the measuring tube, directly measuring the current mass of the medium flowing through the measuring tube, and calculating the density based on the vibration frequency. It can also measure multiple process variables of the pipeline, such as volume flow and temperature.

Measurement principle

◆ Mass flow measurement

The drive coil located inside the sensor ensures that the measuring tube always remains vibrating, and if there is no medium flowing, it vibrates evenly. When the medium is transported and distributed through the sensor measuring tube, due to its inertia, the vibration of the measuring tube is distorted, resulting in vibration of different orientations at the inlet and outlet of the pipeline. The detection coils located at the inlet and outlet accurately record the temporal and spatial variations of the pipeline vibration, calculate the phase difference through proprietary algorithms, and convert it into instantaneous flow. The instantaneous flow is then integrated to obtain the mass of the medium flowing through the current pipeline.

◆ Density measurement

When the flowmeter is working, the sensor measuring tube vibrates at its natural frequency. Changes in the density of the medium inside the measuring tube can cause the resonant frequency of the measuring tube to change. By detecting the resonant frequency of the measuring tube and using proprietary algorithms for correction calculations, the density of the medium inside the tube can be accurately measured.

◆ Volume flow measurement

The volume flow rate is calculated by measuring the mass flow rate and density obtained.

◆ Temperature measurement

The sensor has a built-in temperature sensor, and the temperature can be directly output as a measurement variable.

Specification

● Accuracy and repeatability

Accuracy	±0.15% flow rate (level 0.15), ±0.2% flow rate (level 0.2), ±0.5% flow rate (level 0.5), ±1.0% flow rate (level 1.0)
Repeatability	0.075% flow, 0.1% flow, 0.25% flow, 0.5% flow
Density Accuracy	±0.001g/cm3 (±1 kg/m3)
Temperature Accuracy	±1°C or ±0.5%× measured value
Temperature Repeatability	0.2°C

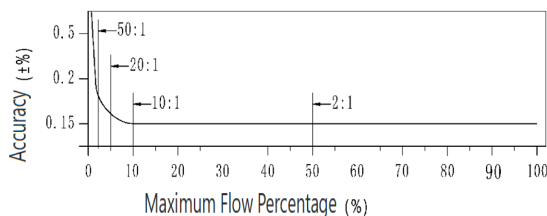
● Flow Rate

Model	Standard Caliber		Max Flow Rate	
	inch	mm	kg/min	lb/min
ANF38404	1/8"	DN04	10	22
ANF38408	1/4"	DN08	20	44
ANF38415	1/2"	DN15	60	132
ANF38420	3/4"	DN20	100	220
ANF38425	1"	DN25	200	440
ANF38450	2"	DN50	800	1763

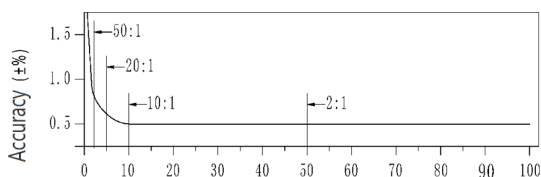
● Flow and Accuracy Curves

The graph below shows the relationship between flow, range ratio, and accuracy, as measured by the flow meter of water.

Conventional/Sanitary/Filling type:

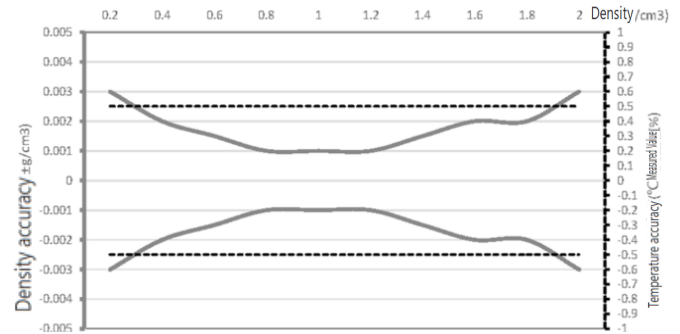


Cryogenic type/High pressure type/Moisture type:



● Density and Accuracy Curve

The graph below shows the relationship between density, temperature, and accuracy, based on operational data obtained in the laboratory.



● Process Pressure Rating

Conventional/Cryogenic/Density Type:

model	MPa	barg	psig
ANF38408	4	40	580
ANF38415	4	40	580
ANF38420	4	40	580
ANF38425	4	40	580
ANF38450	4	40	580

Note: Not suitable for cryogenic type.

High-Pressure Type:

Model	MPa	barg	psig
ANF38404	43.8/87.5	438/875	6377/12740
ANF38408	25/43.8	250/438	3640/6377
ANF38415	25	250	3640
ANF38420	25	250	3640

● Transmitter

Installation:

Transmitter installation, provide integrated and split installation, optional according to user needs. For the cryogenic type, the factory standard provides split installation.

Display:

An optional transmitter with display function is available. Display interface to provide users with A better user experience, provide users with a display function of the transmitter, see Appendix A for details.

The output signals include:

Modbus RTU/RS-485 (default);
Pulse active (default);
4-20mA current ring active (optional);
HART (optional).

Electrical Connection:

The cable connection at the customer site is M20 x 1.5 through (default).

Operating Conditions

Refer to the working conditions as follows:

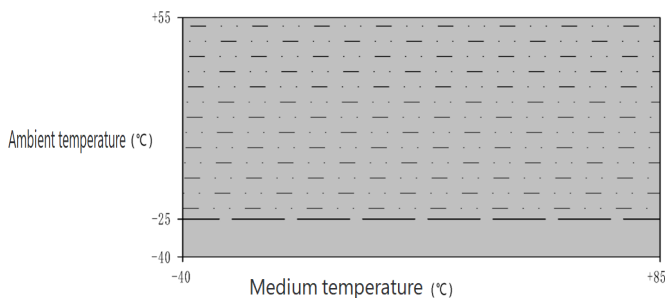
Adapt Temperature	-40℃ ~ +85℃ (conventional type, high pressure type, density type) -196℃ ~ +70℃ (cryogenic type)
Environmental Temperature	-40℃ ~ +55℃ , (with display: -25℃ ~ +55℃)
Relative Humidity	≤95%
Measuring Media	Gas, liquid, homogeneous multiphase flow
Power Supply	15VAC ~ 30VAC / 15VDC ~ 40VDC

Vibration Limitation:

In accordance with GB/T 2423.10, the frequency is swept 5 ~ 55Hz, the amplitude is 0.35mm, and the frequency is swept 5 times on each of the three perpendicular axes.

Temperature Limitation:

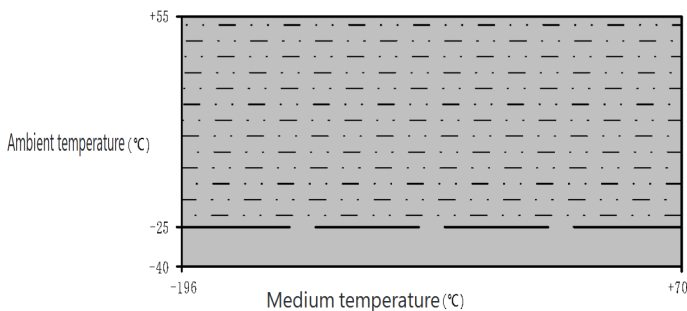
Conventional Type/High Pressure Type/Density Type



Display

No display

Cryogenic Type



Display

No display

Physical Specifications

- Grade of protection for structural materials and enclosures

Conventional/Cryogenic/Density Type:

Model	Wetted Parts		Non-wetted Parts	
		Other Component Materials	Sensor	Transmitter Housing Material and Protection Class
ANF38408	316L	304/304L	304	ZL401(IP67)
ANF38415	316L	304/304L	304	ZL401(IP67)
ANF38420	316L	304/304L	304	ZL401(IP67)
ANF38425	316L	304/304L	304	ZL401(IP67)
ANF38450	316L	304/304L	304	ZL401(IP67)

Note: Not suitable for cryogenic type.

High-Pressure Type:

Model	Wetted Parts		Non-wetted Parts	
		Other Component Materials	Sensor Housing Material	Transmitter Housing Material and Protection Class
ANF38404	904L	904L	304	ZL401(IP67)
ANF38408	904L	904L	304	ZL401(IP67)
ANF38415	316L	316L	304	ZL401(IP67)
ANF38420	316L	316L	304	ZL401(IP67)

●Process Connection

Conventional/Cryogenic/Density Type:

Model	The Type of Process Connection	
	Standard (Factory Default)	Optional
ANF38408	HG/T 20592 DN15 PN40 flange	
ANF38415	HG/T 20592 DN15 PN40 flange	
ANF38420	HG/T 20592 DN20 PN40 flange	
ANF38425	HG/T 20592 DN25 PN40 flange	
ANF38450	HG/T 20592 DN50 PN40 flange	

Note: Not suitable for cryogenic type.

High-Pressure Type:

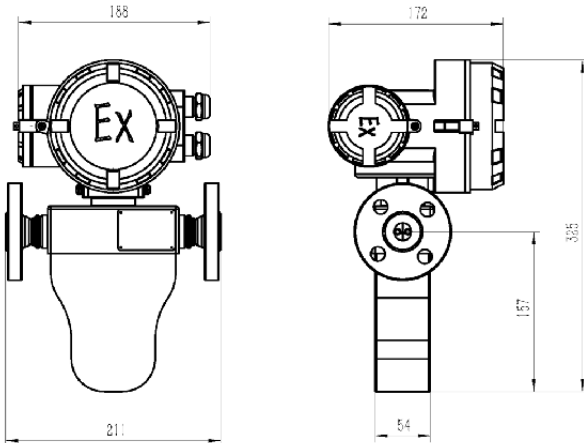
Model	The Type of Process Connection	
	Standard (Factory Default)	Optional
ANF38404	UNF3/4"-16 internal thread	NPT1/4" internal thread
ANF38408	13/16-16UN internal thread	NPT1/2" internal thread
ANF38415	G3/4" internal thread	
ANF38420	NPT1" internal thread	

● Size

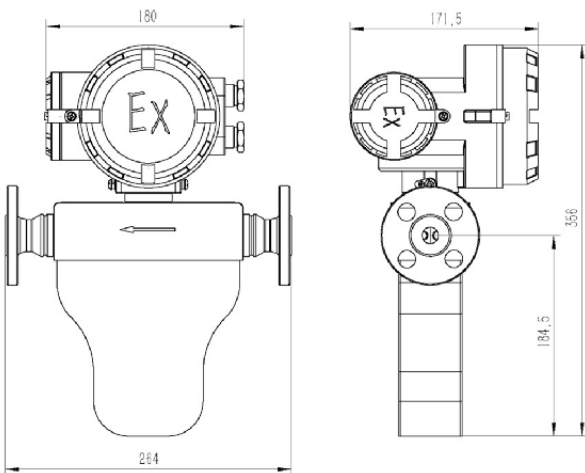
Please refer to the previous article “Process connection” for detailed process connection dimensions, the following figure is the factory’s default standard process connection, and optional process connection types are available for customers.

In the diagram below, the dimensions are in millimeters. Error: $\pm 2\text{mm}$.

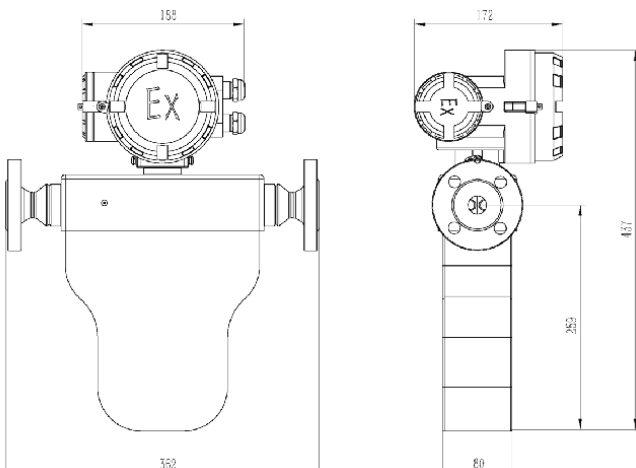
Regular Type/Density Type
ANF38408(U-shaped sensor, all-in-one):



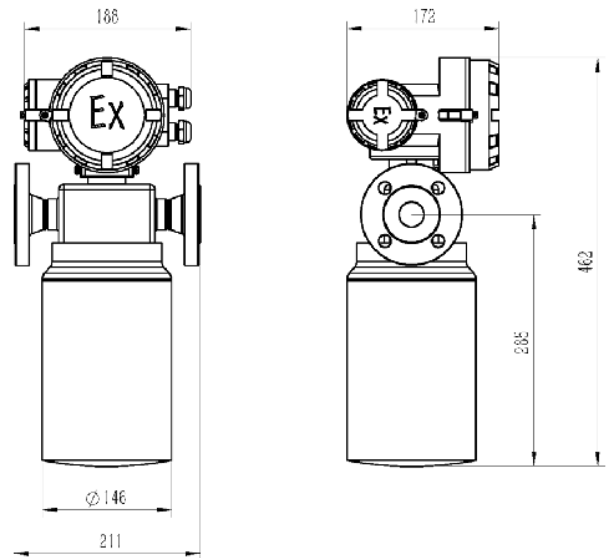
ANF38415(U-shaped sensor, all-in-one):



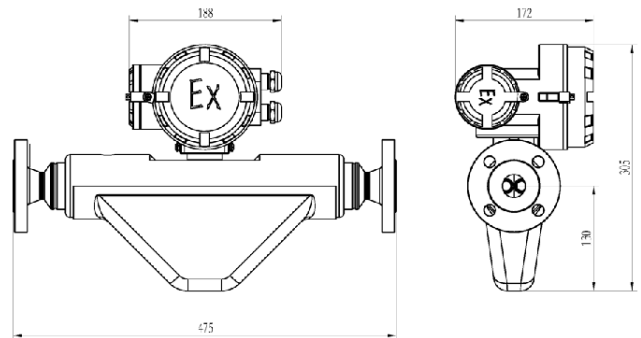
ANF38420(U-type sensor, all-in-one):



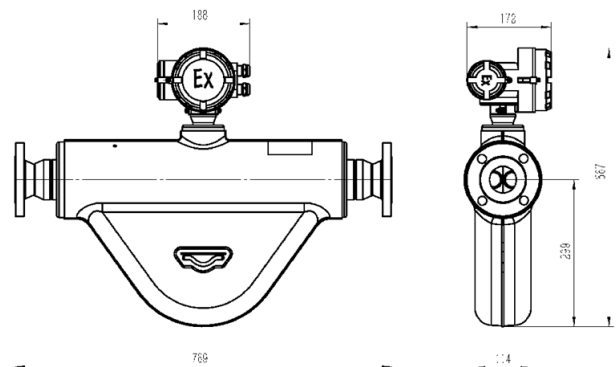
ANF38425(Canister sensor, all-in-one):



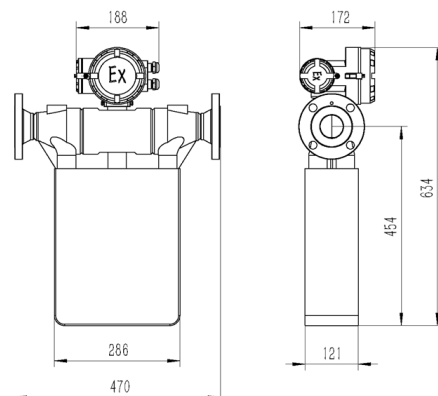
ANF38425(Micro Bend sensor, all-in-one):



ANF38450(Micro Bend sensor, all-in-one):

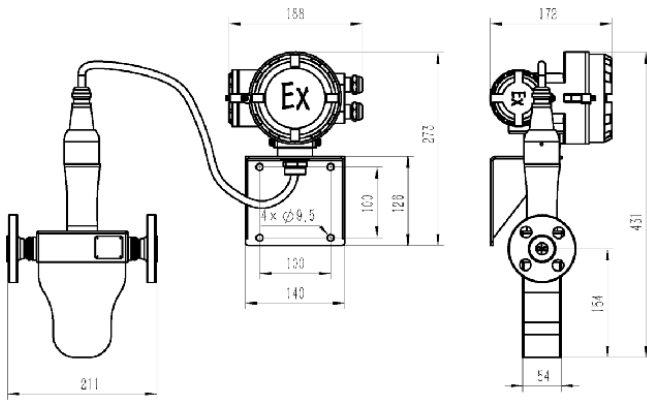


ANF38450(U-type sensor, all-in-one):

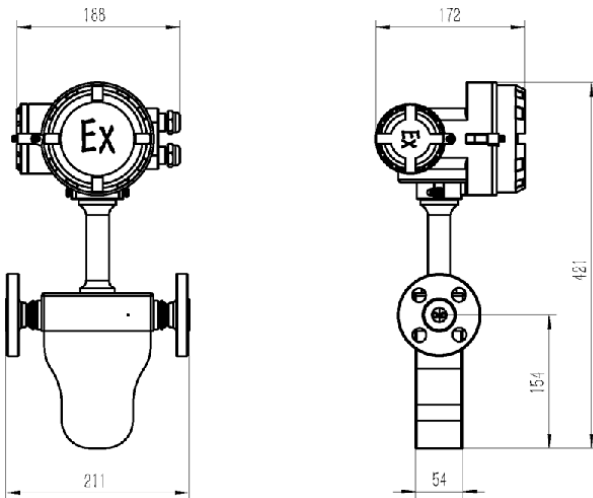


Cryogenic Type

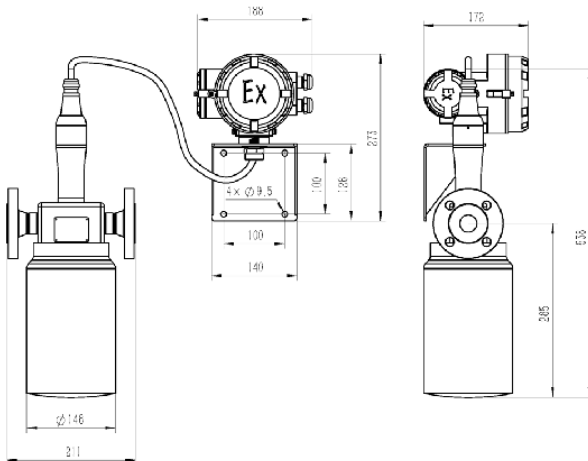
ANF38408(U-type sensor, split type):



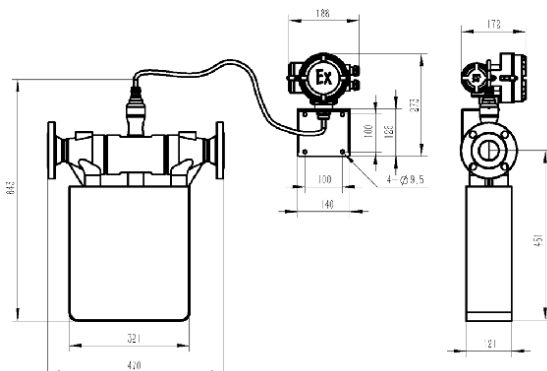
ANF38408(U-shaped sensor, all-in-one):



ANF38425(Cartridge sensor, split type):

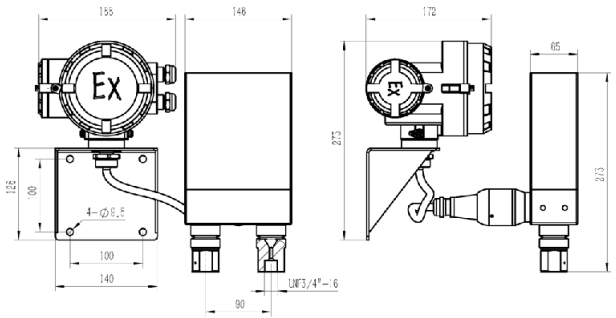


ANF38450(U-type sensor, split type):

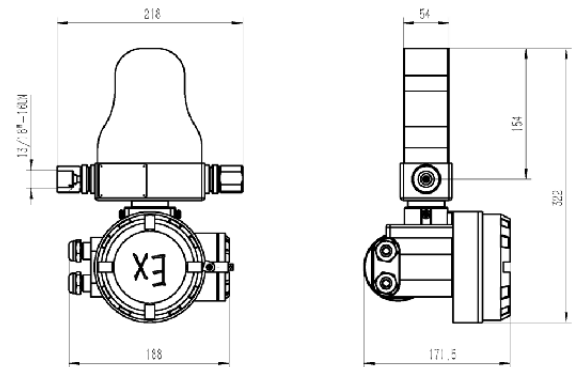


High-Pressure Type

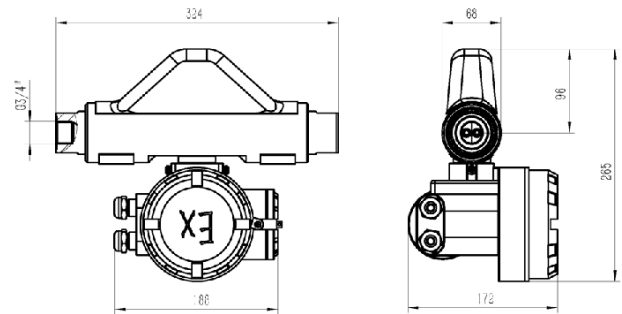
ANF38404(U-type sensor, split type):



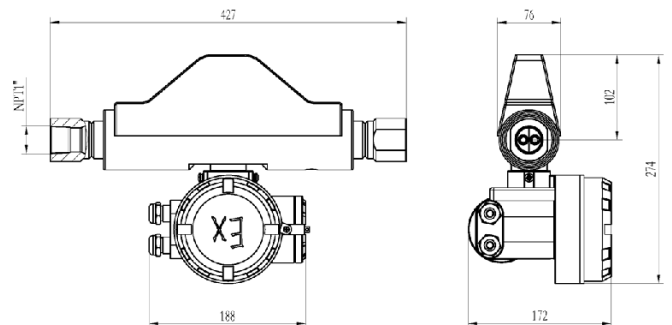
ANF38408(U-shaped sensor, all-in-one):



ANF38415(Micro Bend sensor, all-in-one):



ANF38420(Micro Bend sensor, all-in-one):



Selection Guide

Parameter	Code	Description	Remarks
Model	ANF384	Mass Flowmeter	
Delimiter	-		
Nominal Diameter	04	DN04	
	08	DN08	
	15	DN15	
	20	DN20	
	25	DN25	
	40	DN40	
	50	DN50	
	80	DN80	
100	DN100		
Delimiter	-		
Application Code	T	Conventional Type	
	L	Cryogenic type	
	P	High pressure type	
Delimiter	-		
Sensor Series	U	U-type sensor	
	T	Canister sensor	
	W	Micro-bent sensor	
	L	Straight tube sensor	
Delimiter	-		
Process Connection Standard	FS	HG/T 20592 flange	
	F1	ANSI B16.5 flange	
	F2	ASME B16.5 flange	
	GS	G pipe thread	
	NS	NPT thread	
	US	American Standard UNF thread	
	HS	Sanitary quick connectors	
	C9	Customized other standard types of connections	
Delimiter	-		
Measuring Tube Material	S	316L(Default)	
	C	904L	
	H	Hastelloy	
	X	Dual-phase Steel	
	T	Titanium alloy	
Delimiter	-		
Calibrational Capacity	A	0.15% mass	
	B	0.2% mass	
	C	0.5% mass	
	D	1.0% mass	
Delimiter	-		
Transmitter Mounting Form	N	Integrated Type	
	S	Separated Type	
	J	Customized	
Delimiter	-		
Display Function	C	Display	
	M	No display (default)	
Delimiter	-		
Signal Output	M	Modbus RTU/RS-485、Pulse Active (default)	
	L	4-20mA Current loop active with default signal	
	H	Hart,4-20mA Current loop active with default signal	
Delimiter	-		
Certificate	N	null	

Factory Standard Product Information

Type	Model	Process Connection	Nominal	Transmitter Mounting Form		Structural Options	Net Weight (kg)
				Integrated Type	Split Type		
Conventional Type Sealed Type	ANF38408	HG/T 20592 DN15 PN40 flange	4	●		U-type sensor	7
	ANF38415	HG/T20592 DN15 PN40 flange	4	●		U-type sensor	9
	ANF38420	HG/T20592 DN20 PN40 flange	4	●		U-type sensor	14
	ANF38425	HG/T20592 DN25 PN40 flange	4	●		Canister sensor	14
	ANF38450	HG/T 20592 DN50 PN40 flange	4	●		Micro bending sensor	42
	ANF38450	HG/T 20592 DN50 PN40 flange	4	●		U-type sensor	33
Cryogenic Type	ANF38408	HG/T 20592 DN15 PN40 flange	4		●	U-type sensor	7
	ANF38425	HG/T 20592 DN25 PN40 flange	4		●	Canister sensor	22
	ANF38450	HG/T 20592 DN50 PN40 flange	4		●	U-type sensor	36
High-Pressure Type	ANF38404	UNF3/4"-16 Internal Thread	35/70		●	U-type sensor	11
	ANF38408	13/16-16UN Internal Thread	20/35	●		U-type sensor	6
	ANF38415	G3/4" Internal Thread	20	●		Micro bending sensor	9
	ANF38420	NPT1"Internal Thread	20	●		Micro bending sensor	10

Note:

- (1) The process connection of the flange type in the above table is a protruding surface welded type.
- (2) "●" in the table indicates the factory standard configuration.