EsuMass Coriolis Flowmeter

Manual

Content

1. EsuMass Principle of mass flowmeter

Coriolis force is that when the object has both linear motion and rotary motion, the object will be affected by a force proportional to the vector product of linear velocity of linear motion and angular velocity of rotary motion. Coriolis mass flowmeter uses this principle. Using the magnet and coil assembly installed on the measuring tube, two parallel measuring tubes vibrate according to their natural frequencies under the action of alternating current. When there is fluid flowing through the measuring tube, the Coriolis force makes the vibration of the measuring tube phase shift. The greater the mass flow of the fluid, the greater the vibration phase shift of the measuring tube. The mass flow value can be obtained by detecting the vibration phase shift of two measuring tubes. The vibration frequency of the measuring tube is determined by the total mass of the measuring tube and the fluid in the tube. When the density of the fluid changes, the vibration frequency of the measuring tube also changes accordingly. Therefore, the density value of the fluid in the tube can be obtained. The temperature sensor installed on the measuring tube can get the temperature value of the fluid in real time with the cooperation of the measuring circuit.

2. Characteristics of mass flowmeter

Compared with the traditional flow measurement method, the flowmeter has obvious advantages. The flowmeter can directly measure the mass flow of the fluid in the pipeline without the conversion of intermediate parameters, so as to avoid the measurement error caused by the intermediate link. Its mass flow measurement has high accuracy and good repeatability. It can directly measure the fluid mass flow with high accuracy in a relatively large range ratio. The flowmeter can measure a wide range of fluids. In addition to measuring uniform fluids with general viscosity, it can also measure all kinds of high viscosity and non-Newtonian fluids. Slurry containing solid phase components and fluid containing trace gas phase components can also be used under certain conditions.

3. Specification

Size (mm)	10 ~ 150
Measuring medium	Liquid,Air
Construction	
Temp.range of the medium	compact: (-50 ~ 125) ℃
Remote: (-50 ~ 200) ℃	
High Temp.remote: (-50 ~ 300) ℃	
Low Temp.remote: (-150 ~ 125) ℃	
Sensor design	U type sensor,V type sensor
Convertor	Digital convertor
explosion-proof	explosion-proof
Working Voltage	DC24V、AC220V
Output port	RS485、without RS485
Nominal pressure (MPa)	1.6、2.5、4.0、6.3,some models can be customised with high pressure (10.0、16.0、26.0) MPa
Output signal	pulse、 (4~20mA)
Accuracy level	0.1 grade、0.15 grade、0.2 grade、0.5 grade
Sanitary type	Can be customised
Process connection	GB/T 9115-2010

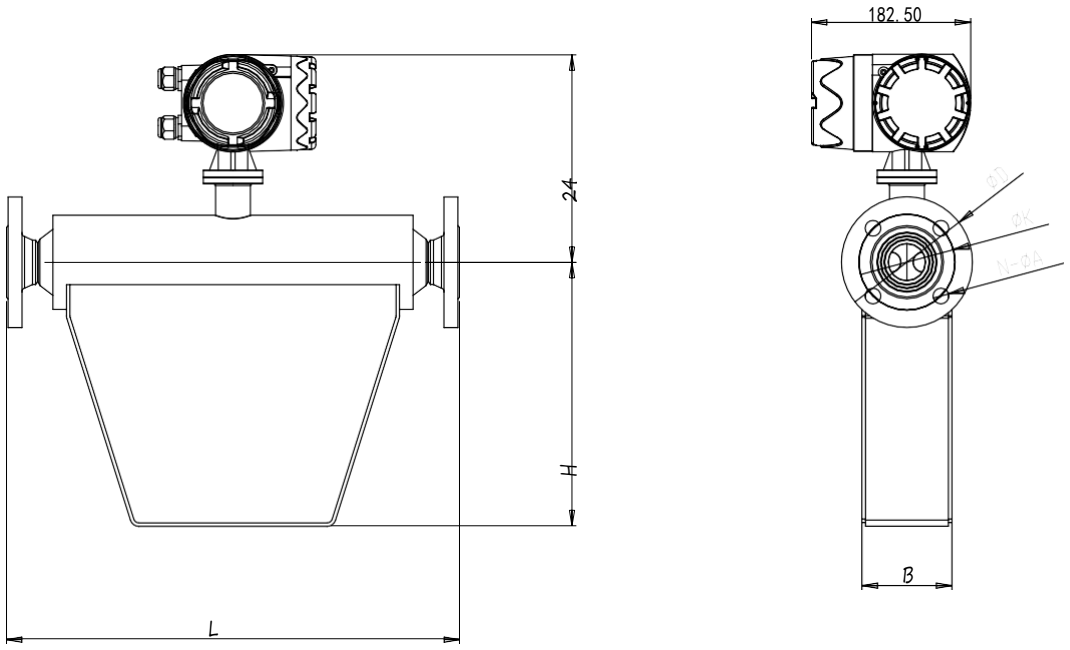
4. Flow range U type sensor

Size(mm)	Flow range(kg/h)	0.1、0.15 grade Flow range(kg/h)	0.2、0.5 gradeflow range (kg/h)	Zero point stability(kg/h)
3	1.2 ～ 120	10 ～ 120	6 ～ 120	0.015
8	10 ～ 800	60 ～ 800	40 ～ 800	0.13
10	10 ～ 1000	70 ～ 1000	50 ～ 1000	0.13
15	30 ～ 3000	150 ～ 3000	100 ～ 3000	0.38
25	80 ～ 8000	400 ～ 8000	300 ～ 8000	1.00
40	320 ～ 32000	2000 ～ 32000	1500 ～ 32000	4.00
50	500 ～ 35000	3500 ～ 50000	2500 ～ 35000	6.25
80	1400 ～ 140000	6000 ～ 140000	6000 ～ 140000	17.5
100	2000 ～ 200000	15000 ～ 200000	10000 ～ 200000	25.0
150	5000 ～ 500000	35000 ～ 500000	25000 ～ 500000	62.5

V type sensor

Size(mm)	Flow range(kg/h)	0.1、0.15 gradeFlow range(kg/h)	0.2、0.5 gradeflow range (kg/h)	Zero point Stability (kg/h)
3	1.2 ～ 120	10 ～ 120	6 ～ 120	0.015
8	10 ～ 800	60 ～ 800	40 ～ 800	0.13
10	10 ～ 1000	70 ～ 1000	50 ～ 1000	0.13
15	30 ～ 3000	150 ～ 3000	100 ～ 3000	0.38
25	80 ～ 8000	400 ～ 8000	300 ～ 8000	1.00
40	320 ～ 32000	2000 ～ 32000	1500 ～ 32000	4.00
50	500 ～ 35000	3500 ～ 35000	2500 ～ 35000	6.25
80	1400 ～ 140000	6000 ～ 140000	6000 ～ 140000	17.5
100	2000 ～ 200000	15000 ～ 200000	10000 ～ 200000	25.0
150	5000 ～ 500000	35000 ～ 500000	25000 ～ 500000	62.5

5.1 Drawing



size	Pressure	L	D	K	N-ΦA	B	H
DN10	PN40	300	90	60	4-14	55	140
DN15		300	95	65	4-14	60	170
DN20		330	105	75	4-14	70	195
DN25		420	115	85	4-14	70	230
DN32		430	140	100	4-18	70	230
DN40		520	150	110	4-18	103	303
DN50		560	165	125	4-18	103	420

5.1 Basic configuration

5.1.1 Flow unit

Basic configuration — Flow unit

Option: kg/s, kg /m, kg /h, t /s, t /m, t /h

Default value =Kg/h

5.1.2 Flow display resolution

Basic configuration -- Flow display resolution

Option: 1, 2 , 3 (Decimal places of instantaneous flow X.X, X.XX, X.XXX)

Default value =1

5.1.3 Flow unit

Basic configuration — Flow unit

Option: kg, t

Default =Kg

5.1.4 Total display resolution

Basic configuration -- Total display resolution

Option: 1, 2 , 3 (The display digits decimal of thetotal cumulative X.X, X.XXX.XXX)

Default value =1

5.1.5 Damping time (s)

Basic configuration — Damping time (s)

Floating point :99.9 - 0.1 Default value =1.0

Define the time constant of flow smoothing filter

5.1.6 Version number

Check the version information

5.2 System configuration

5.2.1 New password

System configuration--New password number:0000 - 9999 Default value =0200

5.2.2 Language

System configuration — Language
Default value = English

5.2.3 Sclae flow (Qmax)

System configuration — Signal processing — Scale flow Kg/h
floating point : 9999999.0 - 0.1
Default value = 50000.0 Scale flow refers to the current output when the instantaneous flow reaches this set value = 20mAFrequency output = "frequency upper limit Hz" setting value.Changing this parameter will affect: current output frequency output

5.2.4 Small flow abort %

System configuration — Signal processing — Small flow abort%
floating point:9.9 - 0.0
Default value =1.0 "When the absolute value of instantaneous flow is less than "scale flow"×"this setting value", Make instantaneous flow=0

5.2.5 Flow direction

System configuration — Signal processing — Flow Option:positive flow,negative flow Bi-directional default value=Bi-directional setting is positive, positive flow without measuring and display , Setting negative flow,Positive flow without measuring and display, Setting Bi-directional.Positive flow will be measured and displayed

5.2.6 flow direction indicator

System configuration — Signal processing — flow direction indicator
Option:positive negative
Default value =Positive direction indicates the installation direction of the flowmeter.setting is positive,flow ×1.0,setting is negative,flow ×-1.0

5.2.7 Density Flow range g/L System configuration --Signal processing -- density flow range g/L

Floating point :9000.0 - 10.0

Default = 3200.0 The value of this setting affects the density

Current output: density current output = (measured density/density range)*16.0 + 4.0 (mA)

5.2.8 frequency upper limited Hz

System configuration -- frequency output -- frequency upper limited Hz

floating point :5000.0 - 100.0

Default = 2000.0

The output frequency corresponding to the current scale flow: output frequency (Hz) = (current flow (Kg/h) / scale flow (Kg/h)) × frequency upper limit (Hz)

5.2.9 Pulse equivalent Kg/p

System configuration -- frequency output -- Pulse equivalentKg/p
floating point :9999999.0 - 0.0
Default = 0.0
Setting value =0
The frequency output is output according to the setting of "frequency upper limit Hz". When the setting value is >0, the output frequency (Hz) = [instantaneous flow (Kg/h) / 3600] / pulse equivalent (Kg/p) = instantaneous flow (Kg/s) / pulse equivalent (Kg/p) Output frequency upper limit : 5000.0Hz

5.2.10 Pulse width (ms)

System Configuration -- Frequency Output -- Pulse Width (ms)

Floating point : 1000.0 - 0.0
Default = 0.0
Setting value =0 时, Output square wave.
When the setting value is greater than 0, the width of the pulse level is output according to the setting value. If the set pulse width is greater than 80% of the actual output pulse period, the pulse width will be automatically reduced to 50% of the actual output pulse period. For example: "Pulse width" setting value = 100ms, but at this time the actual pulse frequency = 500Hz, then the actual pulse period at this time = 2ms, then the actual output pulse width = 1ms.

5.2.11 Pulse level

System Configuration -- Frequency Output -- Pulse Level

Option: low active high active
Default value =low active, indicates the level type corresponding to the "pulse width" setting value in one pulse output cycle. For example, pulse level =low active, pulse width = 1ms, pulse output frequency = 100Hz, then pulse period = 10ms, high level time = 9ms, low level time = 1ms.

5.2.11 RS485 output System configuration --RS485 output

No.	Item	Selection	Default
1	RS485	MODBUS-RTU, MODBUS-ASCII	MODBUS-RTU
2	Baud rate	1200, 2400, 4800, 9600, 19200, 38400	9600
3		7, 8	8 Under the RTU protocol, 7-bit data bits cannot be selected
4	Calibration method	no calibration, odd caliration, even calibration	No calibration
5	Stop bit	1, 2	1
6	Equipment address	number :1--- 247	1

No.	Item	type	Register address	Register length	Read instruction
1	Instantaneous flow			0002	03
2	Positive accumulative			0002	03
3	Negative accumulative			0002	03
4	density	FLOAT		0002	03
5	temperature	FLOAT		0002	03
6	Flow rate	FLOAT		0002	03

All data type is FLOAT, Use 2 registers to store single-precision IEEE754 format floating-point numbers.

5.2.12 HART Address

System configuration --HART address 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15 Default value = 00

5.2.13 Clear accumulative

System configuration --accumulative management --clear accumulative

Selection： No Yes

Default value = No Clear positive and negative accumulative

5.2.14 Preset positive accumulation t

System configuration — accumulative management — Preset positive accumulation t

floating point： 9999999999 - 0
Default value = 0
After setting this value, the current positive cumulative amount will be overwritten by this setting value。

5.2.15 Preset negative accumulation t

System configuration — accumulative management — Preset negative accumulation t

Floating point： 9999999999 - 0
Default value = 0
After setting this value, the current negative cumulative amount will be overwritten by this setting value。。

5.2.16 Restore factory settings

System configuration -- Restore factory settings

Selection： No Yes
Default value = No

If Choose YES
Then restore the factory parameter settings, all the current settings will be overwritten by the factory parameters, and the instrument will be forced to reset, and the instrument will be re-initialized with the factory parameter settings

5.3 Instruments calibration

5.3.1 Zero point calibration -- Zero point calibration

Selection :No Yes
Default = No Confirm that the measuring tube is full and the fluid is in a static state. After fully preheating to execute this function, and the meter will automatically zero point calibration

5.3.2 Empty Pipe Calibration -- Empty and full pipe calibration-- Empty pipe calibration

Selection :No Yes

Default = No

Confirm that the measuring tube is in the empty state, execute this function, the instrument will record the vibration frequency of the measuring tube when it is empty

5.3.3 Full Pipe Calibration -- Empty and full pipe calibration-- Full pipe calibration

Selection :No Yes

Default = No

Confirm that the measuring tube is in the full state, execute this function, the instrument will record the vibration frequency of the measuring tube when it is full.

5.3.4 Empty Pipe Calibration Frequency

Calibration-- Empty Pipe Calibration -- Empty Pipe Calibration Frequency

Floating point: 2000.0 - 40.0
Default = 90.0
Vibration frequency obtained during empty pipe frequency calibration This parameter provides manual fine-tuning and checking, as well as manual recovery after misoperation of "empty pipe calibration". Generally. it is not recommended to modify!

5.3.5 Full Pipe Calibration Frequency

Calibration-- Full Pipe Calibration -- full Pipe Calibration Frequency

Floating point: 2000.0 - 40.0
Default = 80.0
Vibration frequency obtained during full pipe frequency calibration This parameter provides manual fine-tuning and checking, as well as manual recovery after misoperation of "empty pipe calibration". Generally. it is not recommended to modify!

5.3.6 4mA calibration -1

calibration -- 4-20mA calibration--4mA calibration -1

Floating point: 4.05 - 3.95
Default = 0.0 Current output channel 1
Execute this function and measure the 4-20mA current output with a precision ammeter at the same time, and input the reading into the meter, then the meter will automatically complete the calibration operation inside

5.3.7 20mA calibration -1

calibration -- 4-20mA calibration--20mA calibration -1

Floating point: 20.05 - 19.95
Default = 0.0 Current output channel 1
Execute this function and measure the 4-20mA current output with a precision ammeter at the same time, and input the reading into the meter, then the meter will automatically complete the calibration operation inside

5.3.8 4mA calibration -2

calibration -- 4-20mA calibration--4mA calibration -2

Floating point: 4.05 - 3.95
Default = 0.0 Current output channel 1
Execute this function and measure the 4-20mA current output with a precision ammeter at the same time, and input the reading into the meter, then the meter will automatically complete the calibration operation inside

5.3.9 20mA calibration -2

calibration -- 4-20mA calibration--20mA calibration -2

Floating point: 20.05 - 19.95
Default = 0.0 Current output channel 1
Execute this function and measure the 4-20mA current output with a precision ammeter at the same time, and input the reading into the meter, then the meter will automatically complete the calibration operation inside

5.3.10 0 ohm calibration

calibration -- temp calibration--0 ohm calibration

Selection： No Yes

Default = No

Connect a 0 ohm resistor to the temperature sensor input to perform this function to determine the zero point of the temperature measurement circuit

5.3.11 100 ohm calibration

calibration -- temp calibration--100 ohm calibration

Selection： No Yes

Default = No

Connect a 100 ohm resistor to the temperature sensor input and perform this function to determine the reference resistance for temperature measurements

5.3.12 Temp zero point

calibration -- temp calibration-- temp zero point

Floating point： 999.0 - -999.0

Default = 0.0

The value after performing a 0 ohm calibration, it is not recommended to modify it!

5.3.13 Temp reference resistance

calibration -- temp calibration-- temp reference resistance

floating point： 5000.0 - 6000.0

Default = 5490.0

The value after performing a 100 ohm calibration, it is not recommended to modify it!

5.3.14 Empty pipe density g/L calibration --density calibration-- empty pipe density g/L

Floating point: 3.0 - 0.01

Default = 1.29

The density of the air inside the empty tube

5.3.15 Full pipe density g/L calibration --density calibration-- full pipe density g/L

Floating point: 9999.0 - 1.0

Default = 1000.0

The density of the medium inside the tube when it is full

5.3.16 Oil density g/L

Calibartion -- density calibration-- oil density g/L

Floating point:9999.0 - 1.0

Default = 800.0

When the measuring medium is an oil-water mixture, the density of the oil in it

5.4 Instrument inspection

5.4.1 4-20mA inspection calibration -- inspection --4-20mA inspection

floating point: 20.0 - 4.0

Default = 12.0

Execute this function, measure the 4-20mA current output with a precision ammeter at the same time, change the current given value within the allowable range, check the deviation between the output value and the given value, and check that the value acts on the current output channels 1 and 2 at the same time

5.4.2 Frequency output inspection

Calibration -- instrument inspection -- frequency output inspection

floating point: 5000.0 - 1.0

Default = 1000.0

Execute this function, at the same time measure the frequency output with a precision frequency meter, change the current given value within the allowable range, and check whether the frequency can be output normally

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