NAGMAN FLOW-LEVEL SYSTEMS AND SOLUTIONS LLP

MASS FLOW METER

NAGMASS Series

1. General

Nagmass Series Mass Flow Meter is designed according to the Coriolis Principle. It can be widely used for the process detecting and custody transfer/fiscal unit in many industries such as Petroleum, Petrochemical, Pharmacy, Paper, Food and Energy etc. As a fairly advanced kind of Flow Measuring instrument, it has been

2. Principle

Nagmass is designed according to the principle of Coriolis force. Under the alternating current effect, the magnet and coil installed on the measuring tube will make two parallel measuring tubes vibrate according to some fixed frequency. Once there is flow passing through the pipes, Coriolis force will give rise to deflection (phase shift) on the vibration of two pipes and the deflection of vibration is directly proportional to the mass flow of fluid. Pick up them and the mass flow rate could be calculated.

The vibration frequency of measuring tube is determined by the total mass of measuring tube and inner fluid. When the fluid density changes, the vibration frequency of measuring tube will be also changed, as a result the fluid density can be calculated.

The temperature transducer installed in the pipeline can pick up the fluid temperature on time under the co-ordination.

3. Feature

3.1 Digital transmitter feature

Comparing with traditional analog circuit and analog transmitter, digital circuit and digital transmitter has the following obvious merits :

3.1.1 The DSP chip is the core of digital transmitter for Nagmass. As we know, the techniques of Digital Signal Processing can greatly increase the accuracy of flow meter and broaden turndown ration.

3.1.2 The sampling rate of digital transmitter is much higher than traditional products, so it provides shorter response time for the flow, quicker reaction to the flow change, higher efficiency and better accuracy for small amount tank loading/unloading system.

3.1.3 Digital Signal Processing techniques can filter and shape the flow signal better. Well designed digital filter can remove industrial frequency electro-magnetic fields, spatial electro-magnetic fields and noise effect on mass flow meter, markedly enhance stability and reliability of mass flow meter.

3.2 Mass Flow Meter Feature

Comparing with the traditional flow measurement method, Nagmass has following obvious merits :

3.2.1 Enable to directly measure mass flow rate of fluid in the pipeline without changing any parameters, which a oids some measurement error of intermediate links. Its mass flow rate can be high accuracy and good repeatability within bigger range of turndown ration.

3.2.2 Fluid measured can be more extensive, such as the steady uniform flow of common viscosity fluid, the high viscosity fluid, non-Newtonian fluid, slurry containing some solid components and the liquid containing some trace of gas.

3.2.3 Except for the mass flow measurement, the density and temperature and even consistency can also be picked up and output.

4. Main Technical Specification

4.1 Specifications of Sensor and Flow Range for Liquid Table 1

DN (mm)	8 ~ 300
Structure	Integrate Type (-50 ~ +125)°C Separate Type (-50 ~ +200)°C Low Temperature Separated Type (-50 ~ +125)°C
Sensor	U-Series Micro-bend Series
Transmitter	Digital Type General Type
Explosion proof	General Type
Power supply	24V DC 220V AC
Output Interface	RS-485
Nominal Pressure (MPa)	1.6 2.5 4.0 6.3 (25MPa is available for some sizes)
Signal output	Pulse output (4 – 20mA)
Accuracy	0.1% 0.2% 0.5%
Hygeian type	Customize as customers' needs
Process connection	Flange (GB/DIN/ANSI….) or Thread (Customized)

U-Series Sensor with General Transmitter Table 2

DN (mm)	Max. Flow Range (kg/h)	Normal Flow Range for Accuracy 0.1% (kg/h)	Normal Flow Range for Accuracy 0.5% (kg/h)	Stability of Zero Point (kg/h)
8	16 – 800	160 – 800	80 – 800	0.13
10	20 – 1000	200 – 1000	100 - 1000	0.13
15	40 – 2000	400 – 2000	200 – 2000	0.38
25	120 – 6000	1200 – 6000	600 – 6000	1.00
40	600 – 30000	6000 – 30000	3000 – 30000	4.00
50	1000 – 50000	10000 – 50000	5000 – 50000	6.25
80	2400 – 120000	24000 – 120000	12000 – 120000	17.25
100	4000 – 200000	40000 – 200000	20000 – 200000	25.0
150	10000 – 500000	100000 – 500000	50000 – 500000	62.5
200	20000 – 1000000	200000 – 1000000	100000 – 1100000	125
250	30000 – 1500000	300000 – 1500000	150000 – 1500000	188
300	50000 - 2500000	500000 - 2500000	250000 - 2500000	313

U-Series Sensor with Digital Transmitter Table 3

DN (mm)	Max. Flow Range (kg/h)	Normal Flow Range for Accuracy 0.1% (kg/h)	Normal Flow Range for Accuracy 0.5% (kg/h)	Stability of Zero Point (kg/h)
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 – 50000	3500 – 50000	2500 – 50000	6.25
80	1400 – 140000	6000 – 140000	6000 – 140000	17.25
100	2000 – 200000	15000 – 200000	10000 – 200000	25.0
150	5000 – 500000	35000 – 500000	25000 – 500000	62.5
200	10000 – 1000000	70000 – 1000000	50000 – 1000000	125
250	15000 – 1500000	100000 – 1500000	75000 – 1500000	188
300	25000 – 2500000	170000 – 2500000	125000 – 2500000	313

Microbend Series Sensor with Digital Transmitter **Table 4**

DN (mm)	Max. Flow Range (kg/h)	Normal Flow Range for Accuracy 0.1% (kg/h)	Normal Flow Range for Accuracy 0.5% (kg/h)	Stability of Zero Point (kg/h)
8	8 – 800	80 – 800	55 – 800	0.13
10	10 – 1000	100 – 1000	70 – 1000	0.13
15	20 – 3000	300 – 3000	150 – 3000	0.38
25	60 – 6000	600 – 6000	400 – 6000	1.00
40	240 – 24000	2400 – 24000	1200 – 24000	4.00
50	500 – 50000	5000 – 50000	2500 – 50000	6.25
80	800 – 120000	12000 – 120000	6000 – 120000	17.25
100	1500 – 150000	20000 – 150000	10000 – 200000	25.0
150	5000 – 500000	50000 – 500000	35000 – 500000	62.5
200	10000 – 1000000	100000 – 1000000	70000 – 1000000	125
250	15000 – 1500000	150000 – 1500000	100000 – 1500000	188
300	25000 – 2500000	200000 – 2000000	170000 – 2000000	313

Microbend Series Sensor with Digital Transmitter for Gas **Table 5**

DN (mm)	Max. Flow Range (kg/h)	Normal Flow Range for Accuracy 0.5% (kg/h)	Stability of Zero Point (kg/h)
8	4 – 800	20 – 800	0.13
10	5 – 1000	25 – 1000	0.13
15	15 – 2000	75 – 3000	0.38
25	40 – 8000	200 – 8000	1.00
40	160 – 32000	800 – 32000	4.00
50	250 – 50000	1250 – 50000	6.25
80	700 – 140000	3500 – 140000	17.5
100	1000 – 200000	5000 – 200000	25.0
150	2500 – 500000	12500 – 500000	62.5
200	5000 – 1000000	25000 – 1000000	125
250	7500 – 1500000	37500 – 1500000	188
300	12500 - 2500000	62500 - 2500000	313

Note : The flow range for ±0.2% is 1/2 of ±0.5% which changes the minimum flow rate but same to the maximum flow rate.

4.2 Accuracy

Table 6

0.1%	0.2%	0.5%
$\pm 0.1\% \pm \left(\frac{\text{Stability of Zero Point}}{\text{Instantaneous Flow}} \times 100\% \right)$	$\pm 0.2\% \pm \left(\frac{\text{Stability of Zero Point}}{\text{Instantaneous Flow}} \times 100\% \right)$	$\pm 0.5\% \pm \left(\frac{\text{Stability of Zero Point}}{\text{Instantaneous Flow}} \times 100\% \right)$

4.3 Repeatability

Table 7

Accuracy	0.1%	0.2%	0.5%
Repeatability	±0.05%	±0.1%	±0.25%

Accuracy is calculated based on the water measurement under the condition of +20°C ~ 25°C and 0.1MPa ~ 0.2MPa

4.4 Measurement of Density

Table 8

Density Range	(0.2 ~ 0.3) g/cm^3
Basic Error	±0.002g/cm^3 (Affected by the sensor)
Repeatability	±0.001g/cm^3

4.5 Measurement of Temperature Table 9

Temperature Range	Integrated Type	(-50 ~ +125)°C
	Separate Type	(-50 ~ +200)°C
	Low Temperature Separated Type	(-150 ~ +125)°C
Basic Error	≤±1.0°C	

5.0 Specification of Function

5.1 Current Output Table 10

4 – 20 mA Current Output can be configured to denote the mass flow or volume flow

Output Range	4 ~ 20 mA
Basic Error	0.1% F.S.
Repeatability	±0.01%/°C
External resistor should be 250 ~ 600Ω	

5.2 Frequency Output Table 11

Active Frequency Output can be configured to denote the mass flow or volume flow

Output Range	0 ~ 10 kHz
Basic Error	±0.005%
Repeatability	±0.001%/°C
Max. capability of outrange is 12kHz	

5.3 RS485 Output

RS485 Output adopts the RTU communication mode which is compatible with MODBUS protocol.

5.4 Ambient Limitation

5.4.1 Ambient Vibration Table 12

Frequency Range	(10~2000) Hz
Acceleration Amplitude value	2g
Circulation time	50 times

5.4.2 Ambient Temperature Table 13

Working Temperature	(-20 ~ +55)°C
Storage Temperature	(-40 ~ +70)°C

5.4.3 Ambient Humidity Table 14

Working Humidity	<90%	+25°C No condensation
Storage Humidity	<95%	

5.4.4 Enclosure Grade : IP65

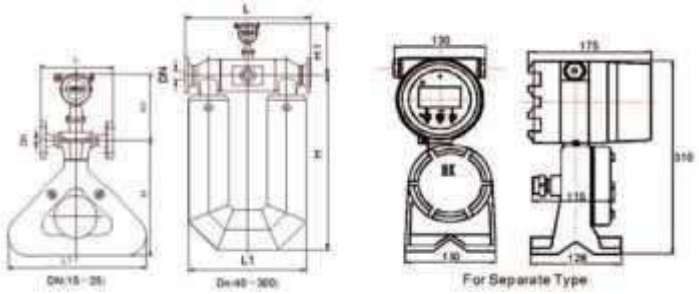
5.5 Power consumption

The normal power consumption of the flow meter is 10W, while the max value is 15W.

5.6 Weight Table 15

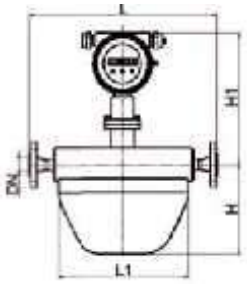
DN(mm)	15	25	40	50	80	100	150	200	250	300
Triangle type & U-type	13	17	30	40	100	190	325	536	960	3450
Micro-bend type	12	15	25	38	78	135	265	430	500	630

6. Outline Dimension (show in the following Drawings and Tables)



Outline Dimension for Triangle Type and U-Type **Table 16**

LZYN	DN	L GB/T9115-2010 (MPa)		ΔL (mm)	L1	H	H1	
		<4.0	>6.3				Integrated	Separated
015	15	180	194	±1.5	350	290	260	190
025	25	200	248		450	400	280	210
040	40	520	547	±2.5	470	660	280	210
050	50	558	588		550	750	290	220
080	80	780	808		710	1040	320	250
100	100	920	948		860	1290	350	280
150	150	1100	1140	±3.5	1050	1600	380	310
200	200	1364	1410		1160	1740	420	350
300	300	2070	2120		1270	3150	520	450



Outline Dimension for Microbend Type **Table 17**

LZYN	DN	L GB/T9115-2010 (MPa)		ΔL (mm)	L1	H	H1	
		<4.0	>6.3				Integrated	Separated
015W	15	360	374	±1.5	240	180	290	220
025W	25	500	536	±2.5	360	250	300	230
040W	40	600	634		500	340	310	240
050A	50	660	688		500	340	320	250
050B	50	800	828		500	420	320	250
080A	80	900	928		700	405	350	280
080B	80	1000			800	630	350	280
100A	100	1130	1156	±3.5	860	660	370	290
100B	100	1200			900	820	370	290
150W	150	1410	1410		1200	900	400	330
150W	200	1800	1844		1450	1170	420	350
200W	250	1850	1890		1530	1180	420	350
300W	300	2000	2050		1600	1300	460	390

Model Se NA(□□□ □ □ □ □ □ □ □ □ □ □

1 2 3 4 5 6 7 8 9 10 11

Type		1	2	3	4	5	6	7	8	9	10	11	Instructions
		DN	Medium	Structure	Sensor	Transmitter	Protection	Working Voltage	Output Port	Nominal Pressure	Signal Output	Accuracy	
NAG MAS S	-												Coriolis Mass Flow Meter
		015											15mm
		025											25mm
		040											40mm
		050											50mm
		080											80mm
		100											100mm
		150											150mm
		200											200mm
		250											250mm
		300											300mm
			Y										To measure liquid
			Q										To measure gas
				1									Integrate -50 ~ 125 °C
				2									Separated -50 ~ 200°C
				3									High temp. separated -150~125°
				4									Low temp. separated -150~125°
					U								U-Type Sensor
					W								Microbend type sensor
						P							General type
						D							DSP Type
							A						None
							B						
								1					DC24V
								2					AC220V
									S				RS485
									N				None
										1.6			1.6 MPa
										2.5			2.5 MPa
										4.0			4.0 MPa
										6.4			6.4 MPa
										10			10 MPa
										16			16 MPa (for DN 15~25)
										25			25 MPa (for DN 15~25)
											F		Pulse output
											I		(4~20mA) current output
												0.1	±0.1%
												0.2	±0.2%
												0.5	±0.5%
													W Hygeian
													D Customize

Example : Nagmass-080Y2UDB1S2.5IO.2 means : Coriolis Mass Flow Meter, DN80, to measure liquid, separated type, U-type Sensor, DSP Transmitter, DC24V as the power supply, RS485 output port, nominal pressure : 2.5 MPa, (4 ~ 20) mA current outut, accuracy ±0.2%

For more details, please contact

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