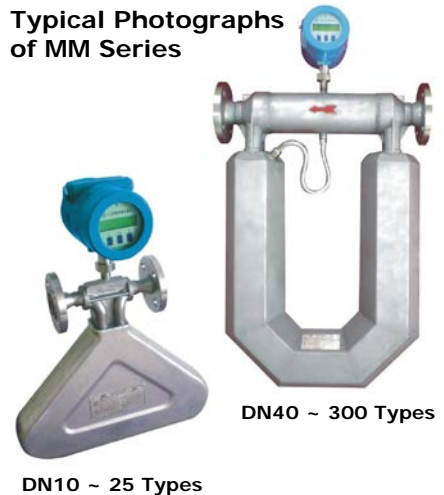


The Growco MM Series is our Intelligent Mass Flow Meters which are designed based on Coriolis Principle and are typically used for flow measurement in water treatment plants, waste water plants, food and beverage plants, pharmaceutical plants, chemical and Petroleum plants or related processing installations.

➤ **TYPICAL FEATURES OF MM Series Mass Flow Meters:**

- Stable and reliable operations.
- Simple structure and easy maintenance.
- Enable to measure directly mass flow rate of fluid in the pipeline without changing any parameters, which avoids some measurement error of intermediate links. Its mass flowrate can be high accuracy and good repeatability within bigger range of turndown ratio.
- 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.
- Due to the small vibration, measuring tube of the MM Series can be regarded as non-moving parts, which will reduce the maintenance of flowmeter as well as enhancing the stability and lifetime.
- Besides the mass flow measurement, the density and temperature and even consistency can also be picked up and output.
- Easy installation

Typical Photographs  
of MM Series



➤ **PRINCIPLE OF OPERATIONS**

The Growco MM Series is our Intelligent Mass Flow Meters which are 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 flowrate 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 changing, as a result, the fluid density can be calculated.

The temperature sensor installed in the pipeline can pick up the fluid temperature on time under the coordination of measuring circuit.

➤ **MAIN TECHNICAL SPECIFICATIONS**

DN(mm)	8 ~ 300
Medium	Liquid, gas, slurry
Type / Medium Temp.	Integrate type: (-50 ~ 125) °C Remote type: (-50 ~ 200) °C Remote type with high temp.: (-50 ~ 300) °C Remote type with low temp.: (-150 ~ 125) °C
Sensor	Triangle type, U-type, Micro-bend type
Transmitter	DSP
Certification	Ex-proof
Power Supply	DC24V, AC220V
Output Port	RS485
Pressure (MPa)	1.6, 2.5, 4.0, 6.3; Customized for high pressure: 10.0, 16.0, 26.0
Output Signal	4~20mA, pulse
Accuracy	0.1%, 0.2%, 0.5%
Hygienic Type	Customized
Process Connection	Customized

➤ **GENERAL FLOW RANGE SPECIFICATIONS**

**2.1.1 Flow Range for Liquid (U Version)**

**Table 1: Flow Range for Liquid (U Version)**

DN (mm)	Allowable Flow Range (kg/h)	Normal Flow Range for Accuracy 0.1% (kg/h)	Normal Flow Range for Accuracy 0.2% (kg/h)	Normal Flow Range for Accuracy 0.5% (kg/h)	Stability of Zero Point (kg/h)
10	10~1000	100~1000	70~1000	50~1000	0.04
15	20~3000	200~3000	150~3000	100~3000	0.12
25	80~8000	500~8000	400~8000	300~8000	0.32
40	240~32000	2000~32000	1500~32000	1300~32000	1.2
50	500~50000	3500~50000	2500~50000	2000~50000	2
80	800~140000	8000~140000	7000~120000	6000~120000	6
100	1500~200000	15000~200000	12000~200000	10000~200000	8
150	5000~500000	38000~500000	32000~500000	28000~500000	20
200	10000~1000000	100000~1000000	700000~1000000	500000~1000000	40
250	20000~2000000	300000~2000000	200000~2000000	150000~2000000	50
300	25000~2500000	500000~2500000	300000~2500000	200000~2500000	70

**Table 2: Flow Range for Liquid (Micro-bend Version)**

DN (mm)	Max. Flow Range (kg/h)	Normal Flow Range for 0.1% Accuracy (kg/h)	Normal flow range for 0.2% Accuracy (kg/h)	Normal flow range for 0.5% Accuracy (kg/h)	Stability of Zero point (Kg/h)
8	8~800	80~800	55~800	40~800	0.035
10	10~1000	100~1000	70~1000	50~1000	0.045
15	20~3000	200~3000	150~3000	100~3000	0.09
25	80~8000	600~8000	400~8000	300~8000	0.25
40	240~24000	2400~24000	1200~24000	1000~24000	1
50	500~45000	5000~45000	2500~45000	2000~45000	2
80	800~120000	8000~120000	7000~120000	6000~120000	3.5
100	1500~200000	18000~200000	12000~200000	10000~200000	7
150	5000~500000	50000~500000	35000~500000	30000~500000	23
200	10000~1000000	100000~1000000	70000~1000000	50000~1000000	45
250	15000~1500000	150000~1500000	120000~1500000	75000~1500000	70

**Table 3: Flow Range for Super-bend version**

DN (mm)	Max. Flow Range (kg/h)	Normal Flow Range for 0.1% Accuracy (kg/h)	Normal Flow Range for 0.2% Accuracy (kg/h)	Normal Flow Range for 0.5% Accuracy (kg/h)	Stability of Zero point (Kg/h)
50	500~50000	5000~40000	3500~40000	2000~50000	2
80	800~120000	10000~120000	8000~120000	6000~120000	3.5
100	1500~200000	25000~200000	20000~200000	10000~200000	7
150	5000~500000	60000~500000	50000~500000	40000~500000	23

**Table 4: Flow Range of volume for air under standard temperature and pressure condition (hereafter we call "standard condition")**

The flow value of other gas medium =

$$\frac{\text{The value in the below table} * \text{Air density under standard condition}}{\text{Medium density under standard condition}}$$

DN (mm)	Start Flow (Nm <sup>3</sup> /h)	Flow Range with Accuracy 0.5% (Nm <sup>3</sup> /h)
15	12.50	62.5 ~ 2500.0
25	33.33	166.7 ~ 6666.7
40	133.33	666.7 ~ 26666.7
50	208.33	1041.7 ~ 41666.7
80	583.33	2916.7 ~ 116666.7
100	833.33	4166.7 ~ 166666.7
150	2083.33	10416.7 ~ 416666.7

The volume under working condition can be calculated by the following formula:

Volume flow under working condition =

$$\text{Standard volume flow} \times \frac{0.1}{\text{Working Pressure} + 0.1} \times \frac{\text{Working Temperature} + 273}{273}$$

(Notes: 1. The unit of working pressure is MPa, the unit of the working temperature is °C.

2. Other gas medium data can be calculated based on above table data

\* air density under standard condition / medium density under standard condition)

**Table 5: Flow Rate factor**

In many cases, we need to know the flow rate of the medium while using DSP type Mass Flowmeter Mass Flowmeter for gas measurement. The connection size reducing is popular in mass flowmeter gas measurement application, thus the flow rate of Mass Flowmeter (with DSP transmitter) need to be calculated according to the formula below:

$$\text{Medium Flow Rate} = \frac{\text{Volume Flowrate under working condition}}{\text{Flow Rate Factor}}$$

DN ( mm )	15	25	40	50	80	100	150
Flow Rate Factor	0362	1.046	3.535	5.436	15.89	26.15	58.84

Notes: 1. The gas flow rate is usually much higher than liquid when measured by flowmeter, so there will be noise caused by gas medium and tube wall of flowmeter under high speed gas flow and if the noise become larger, the signal of flowmeter will be influenced, so please use Mass Flowmeter for gas medium measurement at speed less than 1/3 of sound velocity!

2. Please use Mass Flowmeter for gas with pressure drop not more than 0.2Mpa!

## 2.1.2 Mass Flow Measuring

2.1.2.1 Flow Range shown in Table 1- 4

2.1.2.2 For Liquid: Conversion of Basic Error for Mass flow (Table 6)

0.1%	0.2%	0.5%
$\pm 0.1\% \pm \left( \frac{\text{Stability of Zero Point}}{\text{Instantaneous Flow Rate}} \times 100\% \right)$	$\pm 0.2\% \pm \left( \frac{\text{Stability of Zero Point}}{\text{Instantaneous Flow Rate}} \times 100\% \right)$	$\pm 0.5\% \pm \left( \frac{\text{Stability of Zero Point}}{\text{Instantaneous Flow Rate}} \times 100\% \right)$
Accuracy is calculated based on the water measurement under the condition of +20°C~25°C and 0.1MPa~0.2MPa.		

2.1.2.3 Repeatability (Table 7)

Accuracy	0.1% for liquid	0.2% for liquid	0.5% for both of liquid and gas
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.			

### 2.1.3 Density Measuring (Table 8)

Density Range	(0.2~3.0)g/cm <sup>3</sup>
Basic Error	±0.002g/cm <sup>3</sup> (Affected by the sensor)
Repeatability	0.001g/cm <sup>3</sup>

### 2.1.4 Temperature Measuring (Table 9)

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

## 2.2. Specification of Function

### 2.2.1 Current Output (Table 10)

Passive 4 to 20mA Current Output can be configured to denote the mass flow or volume flow or density.

Output Range	(4~20)mA
Resolving Power	0.000244mA
Basic Error	0.2%F.S
Temperature Influence	±0.005%F.S/°C
External resistor should be 250~600Ω	

### 2.2.2 Pulse/Frequency Output (Table 11)

Active Pulse/Frequency Output can be configured to denote the mass flow or volume flow or density.

Output Range	(0~10)kHz
Resolving Power	0.152Hz
Basic Error	±0.075%
Temperature Influence	±0.001%F.S/°C
Capability of Outrange is 12kHz	

### 2.2.3 RS485 Output

RS485-Modbus-RTU is optional for each set Mass Flowmeter.

### 2.2.4 Low Flow Cut-off

When the flow value measured is lower than the value of Low Flow Cut-off, the Mass Flowmeter will output zero flow and the totalizer will stop to accumulate. The value of Low Flow Cut-off is usually sets to be 1% of the maximum flowrate.

## 2.3 Environment Limitation

### 2.3.1 Environment vibration (Table 12)

Frequency Range	(10~2000)Hz
Acceleration Amplitude Value	2g
Circulation Time	50 times

### 2.3.2 Environment temperature (Table 13)

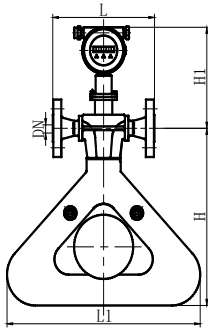
Working Temperature	(-40~+55)°C
Storage Temperature	(-20~+70)°C

### 2.3.3 Environment humidity (Table 14)

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

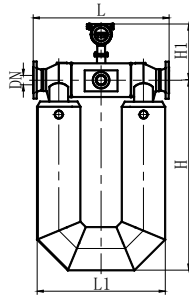
### 2.3.4 Enclosure Grade: IP67

## 2.4. Outline Dimensions (See the following Drawings and Tables)



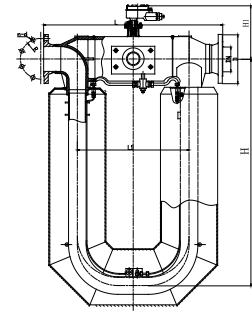
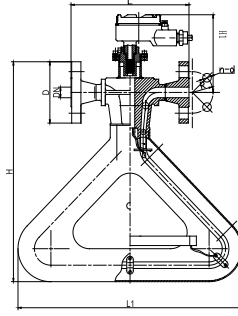
DN (10~25)

Drawing 1: Compact Version



DN (40~200)

Drawing 2: Compact Version

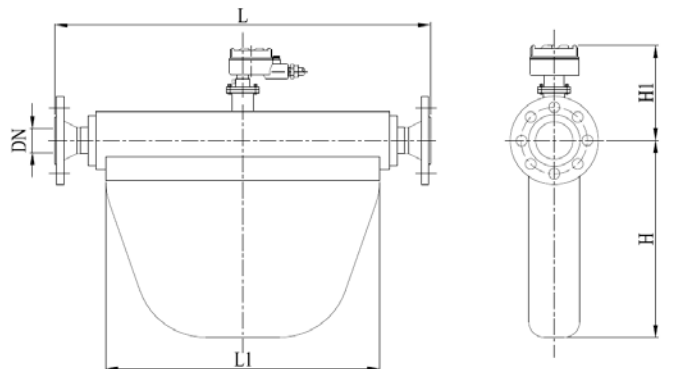
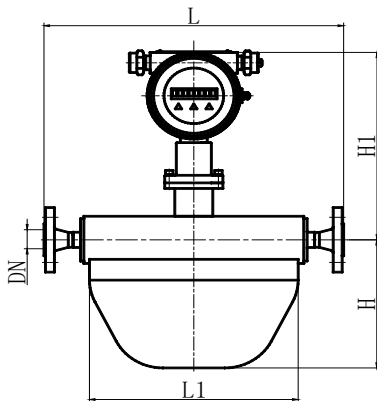


Drawing 3: Separate Version

Dimensions of Compact & Separate Versions (Drawings 1, 2 & 3)

Unit: mm

Code	DN(mm)	L		L1	H	H1	
		≤ 4.0MPa	≥ 6.3MPa			Integrate	Separate
010	10	150	170	350	290	260	190
015	15	180	194	350	300	260	190
025	25	200	248	450	420	280	210
040	40	520	547	470	660	280	210
050	50	558	588	550	710	290	220
080	80	780	808	710	1040	320	250
100	100	920	948	860	1140	350	280
150	150	1100	1140	1050	1520	380	310
200	200	1364	1410	1160	1655	420	350

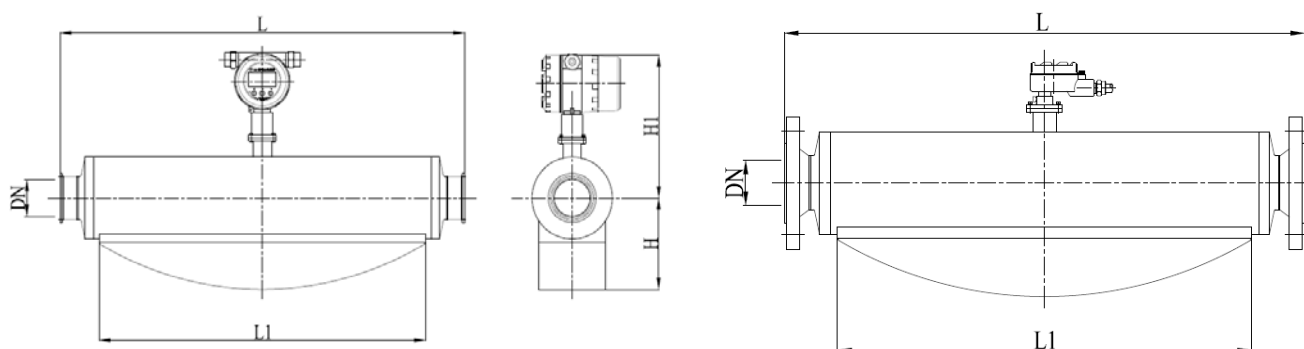


Drawing 4: Micro-bend Version

Dimensions of Micro-bend Version (Drawing 4)

Unit: mm

Mass Flowmeter	DN(mm)	L		L1	H	H1	
		≤ 4.0MPa	≥6.3MPa			Integrate	Separate
008	8	424	484	302	154	270	185
010	10	270	290	160	130	280	210
015	15	400	414	280	184	290	220
025	25	500	536	360	250	300	230
040	40	600	634	460	300	310	240
050	50	800	828	640	410	320	250
080	80	900	928	700	490	350	280
100	100	1130	1156	860	660	370	290
150	150	1410	1450	1200	900	400	330
200	200	1800	1844	1450	1170	420	350
250	250	1966	2006	1530	1300	468	383

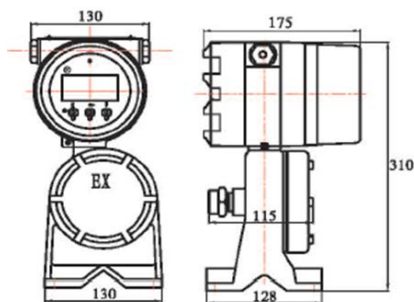


Drawing 5: Super-bend Version

Dimensions of Super-bend Version (Drawing 5)

Unit: mm

Mass Flowmeter	DN(mm)	L		L1	H	H1	
		≤ 4.0MPa	≥6.3MPa			Integrate	Separate
050	50	800	834	588	200	330	250
080	80	935	973	730	200	355	270
100	100	1130	1182	870	275	370	290
150	150	1370	1410	1070	378	400	330



Drawing 6: Dimensions for separate type transmitter (unit: mm)



## 2.5. Weights

Table 15: Approx. net weights

Unit: kg

DN ( mm )	10	15	25	40	50	80	100	150	200
Triangle and U type	10	13	17	30	40	100	190	325	536
Micro-bend type	8	12	15	25	38	78	135	265	430

Note: transmitter for separate type is 5kg.

### ➤ CAUTIONS FOR THE INSTALLATION:

- ❑ Welding slug, foreign sharp particles, etc. in the pipe must be cleared up before the Flow meter is installed.
- ❑ Install the Flow meter correctly (eg. Horizontally based on purchased requirement).
- ❑ Ensure that medium is completely filled in the pipe on the upstream of the flow meter and on the downstream of the flow meter.
- ❑ Please also follow any required local standard recommendations of pipeline installations to ensure compliance to local safety requirements.

### ➤ NOTES WHEN ORDERING:

- Describe its application and specify minimum & maximum flow rates.
  - Specify accuracy type.
  - Specify its model/series or size.
  - Specify working & maximum pressures.
  - Specify minimum & maximum temperatures.
  - Specify medium name.
  - Specify voltage.
  - Other useful details or contact us.

---

**TOTAL MEASUREMENT SOLUTIONS PROVIDER**  
**Member of Singapore Manufacturing Federation (Since 1932)**

---



Distributed by:

### **GROWCO INTERNATIONAL**

*International Business Office :*

**271 Bukit Timah Road, #03-04 Balmoral Plaza Singapore 259708**

**Tel : (65) 6842 1170**

**Fax : (65) 6842 1182**

**Email: [sales@growco.biz](mailto:sales@growco.biz)**

**Web : [www.growco.biz](http://www.growco.biz)**

Growco International reserves the rights, without notice, to alter or improve the designs or specifications of the products described herein.

Origin of Singapore.