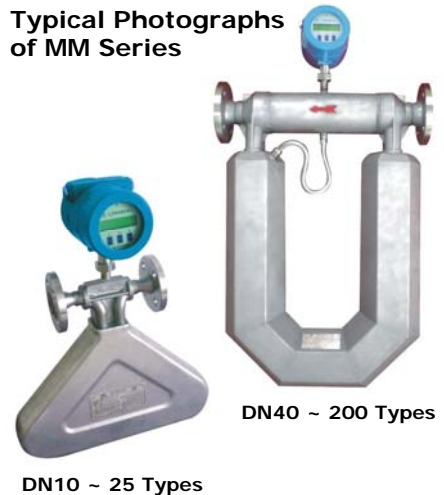


The Growco MM Series is our Intelligent Mass Flow Meters which are designed based on Coriolis Principle and are typically used for flow measurement in water treatment plants, waste water plants, food and beverage plants, pharmaceutical plants, chemical and Petroleum plants or related processing installations.

➤ **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.

## ➤ GENERAL FLOW METERS SPECIFICATIONS

### 2.1.1 Sensor specifications

Specification of Sensor and Flow Range (For Liquid only)

DN (mm)	Allowable Flow Range (kg/h)	Normal Flow Range for Accuracy $\pm 0.2\%$ & $\pm 0.5\%$ (kg/h)	Stability of Zero Point (kg/h)
10	20~1000	80~1000	0.200
15	40~2000	150~2000	0.400
20	80~4000	400~4000	0.800
25	120~6000	600~6000	1.200
40	600~30000	3000~30000	6.000
50	1000~50000	5000~50000	10.00
80	2400~120000	12000~120000	24.00
100	4000~200000	20000~200000	40.00
150	10000~660000	50000~500000	100.0
200	20000~1200000	80000~1000000	200.0

### 2.1.2 Mass Flow Measuring

2.1.2.1 Flow Range: See Above Table

2.1.2.2 Conversion of Basic Error for Mass flow

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

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

Accuracy	$\pm 0.2\%$	$\pm 0.5\%$
Repeatability	$\pm 0.1\%$	$\pm 0.25\%$
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

Density Range	(0.2~2.0)g/cm <sup>3</sup>
Basic Error	$\pm 0.002\text{g/cm}^3$ (Affected by the sensor)
Repeatability	$\pm 0.001\text{g/cm}^3$

### 2.1.4 Temperature Measuring

Temperature Range	(-50~+125)°C	Integrated Type
	(-50~+200)°C	Separate Type
	(-50~+350)°C	High Temperature Separate Type
Basic Error	$\leq \pm 1.0 \text{ }^{\circ}\text{C}$	

## 2.2. Specification of Functions

### 2.2.1 Current Output

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

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

### 2.2.2 Pulse Output

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

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

### 2.2.3 Low Flow Cutoff

When the flow value measured is lower than the value of Low Flow Cutoff, the MM Series will output zero flow and the totaliser will stop to accumulate. The value of Low Flow Cutoff is usually sets to be 1% of the maximum flowrate.

## 2.3 Environment Limitations

### 2.3.1 Environment vibration

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

### 2.3.2 Environment temperature

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

### 2.3.3 Environment humidity

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

### 2.3.4 Enclosure Grade: IP65

➤ **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.

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**TOTAL MEASUREMENT SOLUTIONS PROVIDER**

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Printed in Singapore.