



Flow Measurement

Selection Guides and Flowmeter Products

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Basics of Fluid Properties

Flow measurement is vital to industry and industrial applications, from medical research, water supply, food processes, oil exploration, gas distribution and many more. Flow applications are very diverse and each situation has its own challenges and engineering requirements.

Understanding customer challenges

OMEGA supplies the current and evolving flow technologies that are driving industries and industrial processes. We can help make these processes more efficient and cost effective, while also understanding the time constraints that customers face.

What is a flowmeter?

A flowmeter is a device used to measure the flow rate or quantity of a gas or liquid moving through a pipe.

How do we quantify flow rate?

With most flow measurement instruments, the flow rate is determined by measuring the velocity of the substance. Velocity depends on the pressure differential that is forcing the liquid or gas through a pipe. Because the pipe's cross-sectional area is known and remains constant, the average velocity is an indication of the flow rate. The basic relationship for determining the liquid's flow rate in such cases is:

$$Q = V \times A$$

where:

Q = liquid flow through the pipe per unit time (SI Unit m³/s)

V = average velocity of the flow (SI Unit m/s)

A = cross-sectional area of the pipe (SI Unit m²)

Other factors that affect fluid flow rate include the density and the friction of the fluid in contact with the pipe.

How to predict fluid behaviour

The Reynolds number (**Re**) is an important dimensionless number used to help predict flow patterns in different fluid flow situations. This number is what governs if a liquid or gas is laminar, turbulent or transient and is defined as the ratio of the liquid's inertial force to its drag force.

At low Reynolds numbers, flow tends to be dominated by laminar (sheet-like) flow, but at high Reynolds numbers

turbulence results from differences in the fluid's speed and direction, which may sometimes intersect or even move counter to the overall direction of the flow.

The equation is:
$$Re = \frac{\rho \times v \times d}{\mu}$$

where **Re** = Reynolds Number

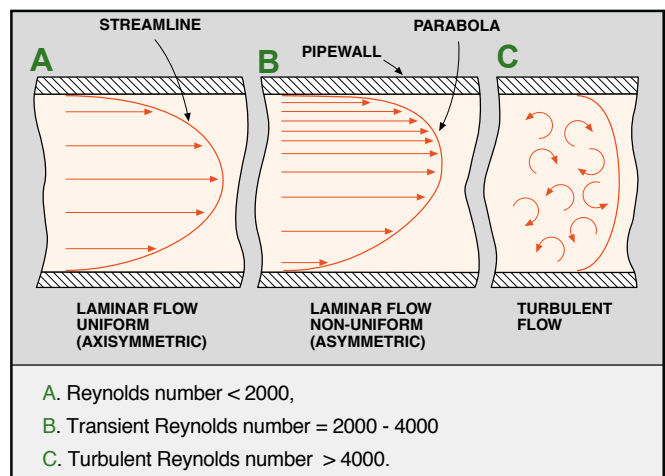
ρ = density of fluid (kg/m³)

v = mean flow velocity (m/s)

d = diameter of the pipe (m)

μ = viscosity of fluid (Pa.s)

The diagram below shows that laminar (uniform and non-uniform) and turbulent flows are the two types normally encountered in flow measurement operations. Most applications involve turbulent flow, with **Re** values above 4000. Viscous liquids usually exhibit laminar flow, with **Re** values below 2000. In between these two levels there may be either laminar or turbulent flow.



The best measurements are achieved when the flow is turbulent and the flow profile is fully developed. The more developed the flow profile is, the better the quality of measurement. This is usually achieved through careful consideration of the installation requirements of the flowmeter, with regard to the number of straight pipe lengths required after a disturbance caused by either a bend or valve installed upstream of the flowmeter.

In general, gases require more straight lengths of pipe to make the best measurement, whilst liquids require less. Always consider the requirements of the installation, the measurement objectives and the requirements of the flow technique under consideration to ensure a successful measurement.

Types of OMEGA Flowmeters

OMEGA flow products work with both liquids and gases and are used in many applications including chemical processing, filter and leak detection, pulp and paper processing, petroleum and oil, and wastewater handling. Our highly qualified sales and application engineers are at your service to guide you through our extensive product range.

What type of flowmeter is best?

Flowmeters come in many different styles and use different technologies, therefore there is not one universal flowmeter suitable for all applications. Selecting the appropriate technology for your application requires writing a flow specification which covers the use of the meter. Knowing the critical specifications is important. For example, Coriolis meters don't respond fast enough for injection flow and Turbine flowmeters will not work in thick slurries.

Considerations before selecting a flowmeter

The basis of good flowmeter selection is a clear understanding of the requirements of the application. Therefore, time should be invested in fully evaluating the nature of the process fluid and of the overall installation. Your development of the specifications needed should be a systematic, step-by-step process.

First steps to choosing the right flowmeter

1. What is the fluid being measured?
2. Do you require volume or mass flow measurement?
3. What is the nature and viscosity of the liquid?
4. What is the minimum and maximum process pressure?
5. What is the minimum and maximum process temperature?
6. What is the minimum and maximum flowrate?
7. Is the fluid chemically compatible with the flowmeter's wetted parts?
8. What is the size of the pipe?
9. Do you require a local display on the flowmeter?
10. Do you require an electronic signal output and/or specialised communications protocol e.g. RS232/RS485, Ethernet, HART, MODBUS etc?

Choosing the right flowmeter type



Coriolis

Renowned for their outstanding accuracy and versatility in measuring challenging flow applications, Coriolis meters can detect the flow of all liquids, as well as that of moderately dense gases. These meters are excellent on applications where multiple measurements such as mass flow, volume flow, temperature, and density are needed. A Coriolis flow meter works on the principle that the inertia created by fluid flowing through an oscillating tube causes the tube to twist in proportion to mass flowrate.



Ultrasonic flowmeters

Ultrasonic flowmeters are non-invasive and commonly used in clean or dirty applications that ordinarily cause damage to conventional sensors. The basic principle of operation employs the frequency shift (Doppler effect) of an ultrasonic signal when it is reflected by suspended particles or gas bubbles in motion. The transit time method depends on the slight difference in time taken for an ultrasonic wave to travel.



Magnetic flowmeters

Electromagnetic meters can handle most liquids and slurries that are electrically conductive. Pressure drop across the meter is the same as it is through an equivalent length of pipe because there are no moving parts or obstructions to the flow. Electromagnetic flowmeters operate in accordance to Faraday's law of electromagnetic induction, which states that a voltage will be induced when a conductor moves through a magnetic field. The liquid serves as the conductor; the magnetic field is created by energised coils outside the flow tube.

Types of OMEGA Flowmeters

Choosing the right flowmeter type



Mass flowmeters

Thermal-type mass flow meters are used for the measurement of mass flow rate of a fluid, primarily gases. Popular applications include leak testing and low flow measurements in the milliliters per minute range.

They operate with minor dependence on density, pressure, and fluid viscosity. This style of flowmeter utilises either a differential pressure transducer and temperature sensor, or heated sensing elements and thermodynamic heat conduction to determine the true mass flow rate.



Vortex meters

Vortex meters are able to measure high temperatures in steam, gas and liquids. The main advantages of vortex meters are their low sensitivity to variations in process conditions and low wear. Vortex

meters make use of a natural phenomenon called vortex shedding that occurs when a liquid flows around an object. The frequency of the vortex shedding is directly proportional to the velocity of the liquid flowing through the meter.



Variable area flowmeters

A variable area flowmeter consists of a tapered tube and a float. It is most widely used for gas and liquid flow measurement because of its low cost, simplicity, low pressure drop, relatively wide rangeability, and linear output.

Positive displacement flowmeters



These meters are used for low to high viscous applications when no straight pipe is available. Operation of these units consists of separating liquids into accurately measured increments and moving them on.

These meters are good for liquids where a simple mechanical meter system is needed.



Turbine flow transmitter

Turbine meters give very accurate readings and can be used for the measurement of clean liquids. They require a minimum of 10 inch

pipe diameters of straight pipe on the inlet and 5 inch on the outlet. The unit consists of a multi-bladed rotor mounted within a pipe, perpendicular to the liquid flow. The rotor spins as the liquid passes through the blades. The rotational speed is a direct function of flow rate and can be sensed by a magnetic pick-up, photoelectric cell, or gears. Turbine meters are particularly good with low-viscosity liquids.



Paddle wheel sensors

One of the most popular cost-effective fluid and water flowmeters. Many are offered with flow fittings or insertion styles. These meters require a minimum of

10 inch pipe diameters of straight pipe on the inlet and 5 inch on the outlet. Chemical compatibility should be verified when not using water. Outputs come in Sine wave, Square wave, and also transmitters for panel mounting and built-in systems.



Spring and piston flowmeters

Also used in gas and liquid flow measurement, these flowmeters can be mounted in any orientation. Scales are based on specific gravities of 0.84 for oil meters, and 1.0 for water meters. Their simplicity of design and the ease

with which they can be equipped to transmit electrical signals has made them an economical alternative to variable area flowmeters for flowrate indication and control.

Contact us on 0800 488 488, sales@omega.co.uk, to discuss which flowmeter is best for you.

What Fluid do you Need to Measure?

Use this table to identify which type of flowmeter suits your needs.

Things to consider are:

- Are you measuring a fluid or gas?
- Is the substance clean or corrosive?
- Do you need measurement and control?
- Do you need an indication of the measurement?

	Coriolis Page 7	Ultrasonic Page 8	Magnetic Page 11	Thermal Mass Page 15	Vortex Page 20	Variable Area Page 22	Positive Displacement Page 25	Turbine Page 28	Paddle Wheel Page 32
Liquid/ Application									
Clean	yes	yes	yes	no	yes	yes	yes	yes	yes
Dirty	yes	yes	yes	no	yes	yes	no	no	limited
Conductive	yes	yes	yes	no	yes	yes	yes	yes	yes
Viscous	yes	yes	yes	no	no	limited	yes	limited	no
Slurries	yes	yes (Doppler)	yes	no	no	no	no	no	no
Corrosive	yes	yes	yes	no	yes	yes	yes	yes	yes
Reverse flow	no	yes	yes	no	no	no	yes	no	no
Pulsating flow	no	no	no	no	no	no	no	no	no
Semi filled pipes	no	no	no	no	no	no	no	no	no
Open channel	no	no	no	no	no	no	no	no	no
Gases/ Application	Coriolis	Ultrasonic	Magnetic	Thermal Mass	Vortex	Variable Area	Positive Displacement	Turbine	Paddle Wheel
Steam	no	no	no	no	yes	yes	no	yes	no
Clean	yes	no	no	yes	yes	yes	no	yes	no
Wet	no	no	no	no	no	yes	no	no	no
Contaminated	no	no	no	no	no	no	no	no	no
Corrosive	no	no	no	yes	yes	yes	no	yes	no

Measures Mass Flow, Density, Temperature and Volume

FMC-5000 Series

Accuracy over a wide flow range from a single meter optimises your plant's efficiency

Designed according to the principle of Coriolis force, this advanced flow and density measurement instrument is widely used in the measurement of liquids, gases and slurries. Coriolis meters are typically used in applications like batch control, blending, filling, dosing, process gas measurements, and more.

- 2 Year Warranty
- Calibration Certificate
- CE Approved
- IP65 Rated

Applications

Chemical Processing
Pharmaceutical
Pulp & Paper Industry
Food & Dairy
Solvents & Resins
Paints & Adhesives



Visit www.omega.co.uk/fmc-5000

Specifications

Maximum Pressure:

16 bar (230 psi), [Optional: 25 bar (360 psi),
40 bar (580 psi) and 63 bar (9156 psi)]

Flow Accuracy/Repeatability:

FMC-5100: 0.1/0.05% RD (Liquid Only)
FMC-5200: 0.2/0.1% RD (Liquid Only)
FMC-5500: 0.5/0.25% RD (Gases Only)

Process Temperature Range:

Integrate Type: -50 to 125°C
Remote Type: -50 to 200°C

Ambient Temperature: -40 to 55°C

Working Humidity: (5 to 95%) RH at 25°C

Temperature Accuracy: $\pm 1.0^{\circ}\text{C}$

Density Measuring:

Range: 0.2 to 3.0 g/cm³
Error: ± 0.002 g/cm³
Repeatability: 0.001 g/cm³

Pulse Output:

0 to 10 KHz, $\pm 0.075\%$ Full scale

Power Supply:

18 to 36vdc, 85 to 265 Vac (AC option), 15W

Current Output:

4 to 20 mA, 0.005% Full Scale

Approvals: CE, RoHS (Pending)

Communications:

RS485 (RTU Modbus®), HART®

Ultrasonic Flowmeter Selection Guide

Ultrasonic flowmeters are able to perform measurement. Certain models can perform measurement & control, and display the measurement.

Ultrasonic Flowmeter Applications

Suitable Fluids	Clean	Dirty	Conductive	Viscous	Slurries	Corrosive	Reverse Flow	Pulsating Flow	Semi Filled Pipes	Open Channel
	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No

Suitable Gases	Steam	Clean	Wet	Contaminated	Corrosive
	No	No	No	No	No

Page	Ultrasonic Flowmeter	Accuracy	Repeatability	Down Turn Ratio	Max Flow	Max Pressure	Max Temp	Min Temp	Output	Connection
9	FDT-21 	±1% RD	±0.2% RD	150:1	30 m/s	N/A	160 °C	0 °C	RS232C Open collector transistor output	Clamp on
9	FDT-40 	±1% RD	±0.5% RD	40:1	12 m/s	N/A	176 °C	-40 °C	Frequency PNP or NPN open collector, 4-20mA output, Modbus RTU	Clamp on
10	FD-400 	±2% FS	± 0.2% RD	180:1	9 m/s	N/A	200 °C	-40°C	Pulse 4 to 20 mA relay	Clamp on
10	FDT500 	±2% RD	± 0.1% RD	50:1	6000 LPM	230 PSIG/ 15.8 BARG	50 °C	0 °C	USB RS232 4 to 20 mA	ANSI or DIN flange

Ultrasonic Flowmeters



Handheld Non-Invasive Ultrasonic Flowmeter

FDT-21

- Perfect for Quick Checks and Maintenance Tasks
- Measures the Fluid Velocity of Liquid in a Full/Closed Pipe
- For Metallic, Plastic and Fibreglass Pipes
- Data Logging Capabilities of Over 2000 Line Data
- Positive, Negative and Net Totaliser
- 4-Line LCD Display
- 3 Different Range Sensors to Fit Pipes from DN20 - 6000
- RS232 Output
- Open Collector Output

www.omega.co.uk/fdt21

Clamp-on Ultrasonic Flowmeters for Liquid and Energy Monitoring

FDT-40/40E Series

- Fits pipe sizes from 12 to 2540 mm
- Measures Energy Consumption
- Clamp-on Ultrasonic Flowmeter with Bi-Directional Flow Measurement
- Rugged, Aluminium Enclosure
- Rate and Total Backlit Display
- 4 to 20 mA and Dual Alarm Outputs
- USB Programming Port
- RS485 MODBUS® Network Connection



www.omega.co.uk/fdt-40

Ultrasonic Flowmeters



Ultrasonic Meter for Liquids with Sound Reflectors or Gas Bubbles

FD-400 Series

- Measures the Flow of Liquids with Suspended Particles or Bubbles Larger than 100 Microns
- Non-Invasive, Clamp-On Transducer for Most Pipes from 6 mm to 3m (1/4 to 120 in.)
- Wide Measuring Range of 0.05 to 9 mps (0.15 to 30 fps)
- Power Supply Selector Jumper Switch to change 115/230 Vac or 12-28vdc

www.omega.co.uk/fd-400

Ultrasonic Measurement and Leakage Detection

FDT500

- Available with DIN 32 to 200 or 2 to 8 Inch Flanges
- Battery Powered
- Displays Flow Rate and Total
- Extended Low Flow Range
- Virtually No Pressure Loss
- No Moving Parts for Long Life
- USB/RS232 and 4-20MA (Optional)



www.omega.co.uk/fdt500

Magnetic Flowmeter Selection Guide

Magnetic Flowmeters Applications

Suitable Fluids	Clean	Dirty	Conductive	Viscous	Slurries	Corrosive	Reverse Flow	Pulsating Flow	Semi Filled Pipes	Open Channel
	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Suitable Gases	Steam		Clean		Wet		Contaminated		Corrosive	
	No		No		No		No		No	

Page	Magnetic Flowmeter	Accuracy	Repeatability	Down Turn Ratio	Max Flow	Max Pressure	Max Temp	Min Temp	Output	Connection
12	FMG600 	±0.5% from 5 to 100% Qs, ±1% from 1 to 5% Qs	±0.1% RD	100:1	26,687 LPM	145 PSIG/ 10 BARG	150 °C	0 °C	Adjustable from 0.1 to 1000 gallons/pulse/ 4-20mA, RS485	Ansi Cl.150lb Flange
13	FMG90 	±1% RD	±1% RD	60:1	300 LPM	145 PSIG / 9.6 BARG	60 °C	-10 °C	Frequency PNP or NPN open collector	BSP or NPT Thread
13	FMG70B 	±1.5% RD with ±0.3% Range	±1% RD	60:1	250 LPM	232 PSIG / 16 BARG	90 °C	-20 °C	Frequency 4 to 20 mA	BSP or NPT Thread
14	FMG3000 	±1% RD with ±0.01% m/s	±0.5% RD	100:1	21,700 LPM	145 PSIG/ 9.6 BARG	85 °C	0 °C	Frequency 4 to 20 mA Relay	Tee/saddle Fittings
14	FMG980 	±1% FS	-	75:1	26,687 LPM	200 PSIG/ 13.7 BARG	93 °C	0 °C	PNP/NPN Frequency	Tee/saddle Fittings

Electromagnetic Flowmeter

Designed for Measurement of Conductive Liquids

FMG600 Series

The FMG600 meters have no moving parts and a PTFE lining

These magnetic meters can handle many harsh applications and standard outputs include analogue, frequency, and RS485 communications. Optional sanitary mounting allows for use of the FMG600 flowmeters in applications not previously open to magmeters. Local and remote display models are available.

- **Virtually No Pressure Loss**
- **Suitable for Pipes Up to 12"**
- **CE Approved**
- **4 to 20 mA and Frequency Outputs**
- **Empty Pipe Indication with Alarm**
- **Batch Control Function**

Applications

Wastewater
Pulp
Food & Dairy
Slurries



FMG-601-S



FMG-606

www.omega.co.uk/fmg600

Specifications

Flange Sizes:

150# ANSI: 19 to 305 mm (¾ to 12")
Sanitary Tri-Clamp: 13 to 305 mm (½ to 12")

Maximum Pressure:

145 psi

Minimum Conductivity:

20 µS

Electrode Material: Hastelloy C4

Environmental Temperature: -5 to 55°C

Sensor Lining: PTFE

Liquid Temperature:

0 to 50°C Standard
0 to 150°C with remote electronics

Accuracy:

±0.5% from 5 to 100% Qs,
±1% from 1 to 5% Qs

Repeatability: ±0.1% RD

Output:

Adjustable from 0.1 to 1000 gallons/pulse

Current:

4 to 20 mA with galvanic isolation

Communications:

RS485

Power:

24 Vdc, 115/230 Vac switchable (optional)

Magnetic Flowmeters



Electromagnetic Flowmeter for OEM Applications

FMG90 Series

- Electromagnetic Flowmeter with No Moving Parts
- Independent to Changes of Temperature, Pressure, Viscosity
- Lightweight and Compact Design
- PVDF and 316L Wetted Parts
- Response Time < 100 mS
- Six Flow Ranges

www.omega.co.uk/fmg90

Electromagnetic Flowmeter for Extremely Small Spaces

FMG70B

- Extremely Compact
- Intended for Continuously Measuring
- No Moving Parts
- No Flow Obstructions
- Maintenance Free
- Operation / Flow Indicator LED
- Response Time < 500 mS
- Straight Pipe Requirements,
Inlet: 10 x ID Outlet: 5 x ID



www.omega.co.uk/fmg70B

Magnetic Flowmeters



Magnetic Flowmeter for Contaminated Liquid

FMG3000 and FMG3100 Series

- Can be Used in Contaminated Liquids
- For 0.5 to 8 inch Pipes
- 0.05 to 5 m/s (0.15 to 16.4 ft/s) Flow Rate Range
- Bi-Directional Flow Measurements
- Blind 4 to 20 mA or Frequency Output
- Remote Display Option
- Corrosion Resistant Polypropylene

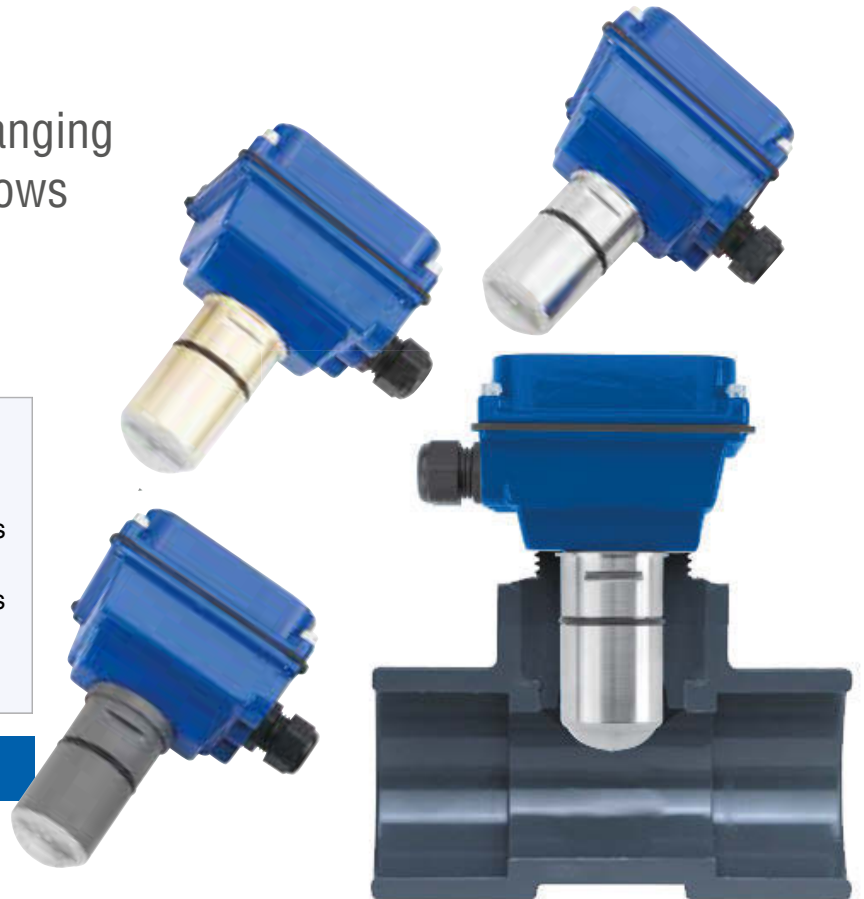
www.omega.co.uk/fmg3000_fmg3100

Magnetic Flowmeter for Changing Viscosities and Pulsating Flows

FMG980 Series

- For Use with Conductive Liquids
- No Moving Parts
- Stainless Steel, Brass, and PVC Versions
- Suitable for Difficult Applications with Changing Viscosities and Pulsating Flows
- Perfect for "Debris Filled" Applications
- Square Wave Pulse Output

www.omega.co.uk/fmg980



Mass Gas Flowmeter Selection Guide

Mass flowmeters are able to perform and indicate measurement, and provide measurement control.

Mass Gas Flowmeter Applications

Suitable Liquids	Clean	Dirty	Conductive	Viscous	Slurries	Corrosive	Reverse Flow	Pulsating Flow	Semi Filled Pipes	Open Channel
	No	No	No	No	No	No	No	No	No	No

Suitable Gases	Steam	Clean	Wet	Contaminated	Corrosive
	No	Yes	No	No	Yes

Page	Mass Flowmeter	Accuracy	Repeatability	Down Turn Ratio	Max Flow	Max Pressure	Max Temp	Min Temp	Output	Connection
16	FMA-LP2600A 	± 0.8% RD ± 0.2% FS High accuracy option: 0.4% RD ± 0.2% FS	±0.2% FS	200:1	3000 SLPM	50 PSIG / 3.4 BARG	50 °C	-10 °C	4 to 20 mA, 0 to 10 Vdc	10-32 UNF thread (on smaller models) and FNPT
16	FMA-2600A 	± 0.8% RD ± 0.2% FS High accuracy option: 0.4% RD ± 0.2% FS	±0.2% FS	200:1	3000 SLPM	145 PSIG / 9.6 BARG	50 °C	-10 °C	0 to 5 volts and 4 to 20 mA	10-32 UNF thread (on smaller models) and FNPT
17	FMA1700A 	± 1.5% FS	± 0.5% FS	40:1	1000 SLPM	Up to 1000 PSIG / 68 BARG	50 °C	0 °C	0 to 5 volts and 4 to 20 mA	Compression fitting or FNPT
17	FMA6600 	± 1% FS	± 0.15% FS	50:1	100 SLPM	100 PSIG / 6.8 BARG	50 °C	0 °C	0 to 5 volts, 4 to 20 mA, RS485, RS232, Relay -output	1/4" and 3/8" compression fitting, VCR fitting
18	FMA6500 	±1% of FS	±0.15% FS	50:1	500 SCCM	500 PSIG / 34.5 BARG	25 °C	15 °C	RS-485, RS-232, 0 to 5 Vdc or 4 to 20 mA	1/4" and 3/8" compression fitting
18	FMA-A2000 	± 1% FS	± 0.15% FS	100:1	100 SLPM	500 PSIG / 34.4 BARG	50 °C	0 °C	0 to 5 volts, 4 to 20 mA	Compression fitting FNPT,
19	FMA-4300 	± 1% FS	± 0.15% FS	50:1	100 SLPM	500 PSIG / 34.4 BARG	50 °C	5 °C	0 to 5 volts, 4 to 20 mA, RS232, RS485	1/4" Compression Fitting, 1/8" or 3/8" compression available
19	FMA-PC16 	± 0.8% RD ± 0.2% FS High Accuracy option ± 0.8% RD ± 0.2% FS	± 0.2% FS	200:1	1500 SLPM	145 PSIG / 9.6 BARG	50 °C	-10 °C	RS232, USB	10-32 UNF thread (on smaller models) and FNPT

Mass Gas Flowmeters



Low Pressure Drop Gas Mass Flow Meters and Controllers for Clean Gases

FMA-LP2600A

- 130+ Gas Calibrations Including Pure and Mixed Gases
- Pressure, Temperature, and Mass Flow Displayed
- PID Operated Proportional Control Valve
- Response Time of 50 to 100 ms
- Turndown Ratio of 200:1
- RS232 Standard
- Optional 2 x Analogue Outputs

www.omega.co.uk/fma-lp2600a

Mass Flow Meters and Controllers with 20+ Gas Select Functions

FMA-2600 Series

- 20+ Gas Calibrations Including: He, O₂, Neon, N₂O, N₂, Air, Argon, CO, CO₂, Methane, Ethane, Propane, Butane, Acetylene, Ethylene, H₂
- Pressure, Temperature, Volumetric and Mass Flow Simultaneously Displayed
- Adjustable Response Time - Typical 100 mS
- No Warm Up Time

www.omega.co.uk/fma2600_fvl2600



Mass Gas Flowmeters



Gas Mass Flowmeters and Controllers for Clean Gases

FMA1700A and FMA5500A

- Read and Control Gas Mass Flow without Temperature or Pressure Compensation
- Tilting LCD Display for Easy Reading
- Ideal for In-The-Field Calibration of Flowmeters or Testing of Air Sampling Equipment
- Aluminium/Brass Construction for Typical Gas Flows, 316 SS Construction for Applications Requiring more Corrosion Resistance.

www.omega.co.uk/FMA1700A_1800A

Multi Parameter Mass Flowmeter

FMA6600

- Multi-Drop Capability of up to 256 Units
- Stores Calibration Data for Up to 10 Different Gases
- 10 Different Engineering Units
- Programmable 12 Digits Totaliser
- High and Low Alarm
- Internal Conversion Factors of up to 32 Gases

www.omega.co.uk/fma6600_fma6700



Mass Gas Flowmeters



Gas Mass Flow Controller with Alarm Functions for Clean Gases FMA6500ST Series

- Digital and Analogue Modes Operate Simultaneously
- Programmable Flow Configurations
- RS485 Standard, Multi-Drop Capability of Up to 256 units
- Stores Calibration Data for Up to 10 Gases
- Totaliser Indicates Total Gas Quantity

www.omega.co.uk/fma6500

Mass Flowmeter with or without Integral Display FMA-A2000 Series

- Stainless Steel Versions Available
- Thermal Technology to Directly Measure Mass Flow of Gases
- No Temperature, Pressure or Square Root Corrections are Required
- Linear Output
- Specific Gas Calibration
- Power Supply Included

www.omega.co.uk/fmaa2100_2200_2300_2400



Mass Gas Flowmeters



Mass Flowmeter and Totaliser for Gas FMA-4100/4300 Series

- Mass Flow Totaliser and Meter with 23 Selectable Units
- Programmable Totaliser
- High and Low Gas Flow Alarms
- Selectable Analogue 0 to 5 Vdc or 4 to 20 mA Outputs
- Internal Conversion Factors for Up to 32 Gases
- Digital Interface RS-232 Standard

www.omega.co.uk/fma4100_4300

Portable Mass Flowmeter and Calibration Kit FMA-PC16

- Ranges of 0 to 0.5 SCCM up to 0 to 1500 SLM
- 30+ Gas Calibrations Including Air, Ar, CH₄, CO, CO₂, Ethane, H₂, He, N₂, N₂O, Neon, O₂, Propane, Butane, Iso-Butane, Acetylene, Ethylene, Krypton, Xenon, and Sulfur Hexafluoride
- Simultaneously Display Pressure, Temperature, Volumetric and Mass Flow



www.omega.co.uk/fma-pc16

Vortex Flowmeter Selection Guide

Vortex flowmeters are able to perform and indicate measurement, and provide measurement control

Suitable Fluids	Clean	Dirty	Conductive	Viscous	Slurries	Corrosive	Reverse Flow	Pulsating Flow	Semi Filled Pipes	Open Channel
	Yes	Yes	Yes	No	No	Yes	No	No	No	No

Suitable Gases	Steam	Clean	Wet	Contaminated	Corrosive
	Yes	Yes	No	No	Yes

Page	Vortex Flowmeter	Accuracy	Repeatability	Down Turn Ratio	Max Flow	Max Pressure	Max Temp	Min Temp	Output	Connection
21	FV-500C Series 	$\pm 0.75\%$ FS- Liquid $\pm 1\%$ FS - Gas	$\pm 0.2\%$ FS	20:1	9492 GPM / 2155 LPM	914 PSIG / 63 BARG	260 °C	-40 °C	4 to 20 mA, Pulse Output, Open Collector	ANSI 150, 300 LB Flange
21	FV100 	$\pm 5\%$ FS	$\pm 0.25\%$ FS	10:1	600 GPM / 136 M3/HR	200 PSIG 13 BARG	66 °C	0 °C	4 to 20 mA	FNPT fitting, ANSI 150lb flange (on 3" & 4")

Vortex Flowmeters



Measures Steam, Gas and Low Viscosity Liquids FV-500C Series

- Measures Steam, Gas and Low Viscosity Liquids
- Displays Simultaneous Flow Rate and Process Diagnosis
- Compact Housing is Light, Small and Easy to Handle
- Simultaneous Analogue and Pulse Outputs (Pulse requires Display)
- Low Flow Stability
- Advanced Self-Diagnostics

www.omega.co.uk/fv500C

Vortex Shedding Flowmeter and Temperature Transmitter FV100 Series

- Can be Used with Non-Viscous, Clean, or Dirty Liquids that are Compatible with Brass, PVDF and FKM
- Ideal for Cooling Loops using Water or 50% Glycols, and for Water-Soluble Machine Coolant (up to 10%).
- Individual 4 to 20 mA Outputs for Flow and Temperature
- No Moving Parts
- For Industries Including Rubber, Steel, Fabrication, Manufacturing, Refining, Paper, Chemical, Food, Petrochemical, and Power



www.omega.co.uk/fv100

Variable Area Flowmeters Selection Guide

Variable area flowmeters are able to indicate measurement and provide control

Variable Area Flowmeters Applications

Suitable Fluids	Clean	Dirty	Conductive	Viscous	Slurries	Corrosive	Reverse Flow	Pulsating Flow	Semi Filled Pipes	Open Channel
	Yes	Yes	Yes	Limited	No	Yes	No	No	No	No

Suitable Gases	Steam	Clean	Wet	Contaminated	Corrosive
	Yes	Yes	Yes	No	Yes

Page	Variable Area Flowmeter	Accuracy	Repeatability	Down Turn Ratio	Max Flow	Max Pressure	Max Temp	Min Temp	Output	Connection
23	FL-2000 Series 	Model specific, ranges from $\pm 2\%$ FS to $\pm 5\%$ FS	$\pm 0.25\%$ FS	10: 1	4000 LPM 100 SCFM 20 GPM	100 PSIG	65 °C	0 °C	N/A	Brass as standard, stainless steel and plastic available 1/8" 1/4" & 1" FNPT Fittings
23	FL-3600 	$\pm 2\%$ FS	$\pm 0.25\%$ FS	10: 1	59 LPM	200 PSIG 13.8 BARG	121 °C	0 °C	N/A	1/8 FNPT
24	FL-2500 	$\pm 5\%$ FS	$\pm 0.25\%$ FS	10: 1	AIR: 50 LPM WATER: 1.4 LPM	100 PSIG/ 6.9 BARG	65 °C	0 °C	N/A	1/8 FNPT
24	FLD Series 	$\pm 5\%$ FS	$\pm 0.25\%$	10: 1	GASES: 42 LPM / LIQUID: 2 LPM	200 PSIG 13.8 BARG	121 °C	0 °C	N/A	1/8 FNPT

Variable Area Flowmeters



Acrylic Flowmeters for Water and Air

FL-2000 Series

- Water Ranges from 4 CCM to 20 USGPM
- Air Ranges from 40 CCM to 4000 LPM
- Threaded Brass Inserts for Quick Installation
- Easy Disassembly and Assembly for Maintenance
- Applications:
 - Air Sampling Equipment
 - Gas Analysers
 - Medical Systems
 - Desalination Equipment
 - Water Treatment and Distribution Systems

www.omega.co.uk/fl2000

65 and 150 MM Variable Area Flowmeters

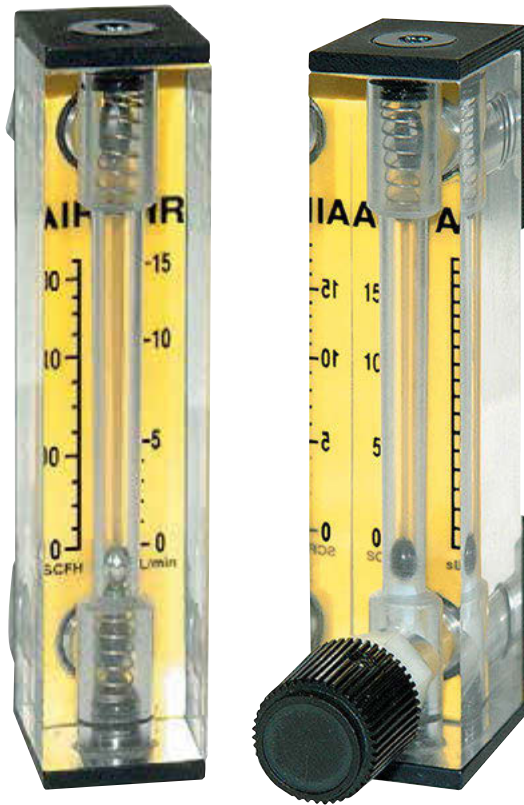
FL-3600 Series

- Aluminium and Stainless Steel Frames Available
- Easy-to-Read Scale Design
- Special Lock Nut Design for Easy Tube Replacement
- Shielded for Pressurized Systems
- Panel Mounting Design
- Millimeter Scale and Correlation Charts to Measure a Large Range of Gases

www.omega.co.uk/fl3600_fl3800



Variable Area Flowmeters



Variable Area Flowmeters with or without Needle Valve

FL-2500 Series

- Easy-to-Read Dual Imperial and Metric Scales
- Interchangeable Scales for 6 Common Gases and Water
- Economical and Compact
- Easy Disassembly and Assembly for Cleaning
- Each Kit Includes Seven Interchangeable Direct Read Scales for Air, Water, Argon, CO₂, Helium, Nitrogen and Oxygen

www.omega.co.uk/fl-2500_series

Variable Area Flowmeters for Gas and Liquid

FLD Series

- Measures Air, Water, N₂, H₂, CO₂, Ar, He, and O₂
- Rib-Guided or Fluted Metering Tubes Facilitate Stable, Accurate Readings
- Magnifier Lens Enhances Reading Resolution
- Interchangeability of Flow Tubes and Floats
- Simple Means of Panel Mounting

www.omega.co.uk/fld



Positive Displacement Flowmeter Guide

PD flowmeters are able to perform measurement, provide control, and indicate measurement

PD Flowmeter Applications

Suitable Fluids	Clean	Dirty	Conductive	Viscous	Slurries	Corrosive	Reverse Flow	Pulsating Flow	Semi Filled Pipes	Open Channel
	Yes	No	Yes	Yes	No	Yes	Yes	No	No	No

Suitable Gases	Steam	Clean	Wet	Contaminated	Corrosive
	No	No	No	No	No

Page	Positive Displacement	Accuracy	Repeatability	Down Turn Ratio	Max Flow	Max Pressure	Max Temp	Min Temp	Output	Connection
26	FPD3300 	±0.5% RD	±0.03%	15:1	317 GPM / 1200 LPM	2000 PSIG / 137 BARG	80 °C	-40 °C	4 to 20 mA,	DIN, JIS, ANSI, NPT or BSP
26	FPD3100 	±0.5% RD	±0.03%	15:1	8 GPM / 30 LPM	150 PSIG / 10 BARG	80 °C	-40 °C	4 to 20 mA,	BSP or NPT thread
27	FPD3000 	±1% RD	±0.03%	15:1	130 GPM / 500 LPM	500 PSIG / 34.4 BARG	120 °C	-40 °C	Mechanical totaliser,	DIN, JIS, ANSI, NPT or BSP
27	FPD2000 	±0.5% RD	±0.1%	10:1	26,687 LPM	5000 PSIG / 345 BARG	204 °C	0 °C	4 to 20 mA & Pulse output	FNPT thread

Positive Displacement Flowmeters

Positive Displacement Flow Sensor for Solvents

FPD3300 Series



- Maintain Consistent Accuracy Despite Changing Viscosity
- Ideal for Solvents and Non-Abrasive Lubricating Fluids
- Affordable and Accurate
- Aluminium Body
- Temperatures up to 80 °C
- BSP, NPT, JIS, DIN, ANSI Fittings Available
- Non-Display Version Available

www.omega.co.uk/fpd3300

Positive Displacement Flow Sensor for Corrosive Liquids

FPD3100

- Ideal for Corrosive Environments
- Maintain Accuracy with Different Viscosity Ranges
- Affordable and Accurate
- Aluminium Body
- Temperatures up to 80 °C
- NPT or BSP Threads
- Non-Display Version Available

www.omega.co.uk/fpd3100



Positive Displacement Flowmeters



Oval Gear Totaliser for Viscous Liquids

FPDM3000

- Measurement of Viscous Fluids
- Measures Temperatures up to 120°C
- BSP, NPT, JIS, DIN, ANSI Fittings Available
- Aluminium or Stainless Body
- Rate and Total Available in Gallons or Litres
- Maximum Viscosity: 1000 cPs standard
- Maximum Pressure: 3400 kPa (500 psi)

www.omega.co.uk/fpdm3000

Flowmeter for Oil, Grease, Fuel, Solvents, Polyurethanes and Brake Fluid

FPD2000 Series

- Ideal for Non-Abrasive Lubricating Fluids
- No Need for Straight Run Piping
- Economical Cost
- High Temperature Version Available
- Aluminium, 303 or 316 SS Bodies
- Bi-Directional Flow Capabilities

www.omega.co.uk/fpd2000_series



Turbine Flowmeter Guide

Turbine flowmeters are able to perform measurement, indicate measurement and provide control

Turbine Flowmeter Applications

Suitable Fluids	Clean	Dirty	Conductive	Viscous	Slurries	Corrosive	Reverse Flow	Pulsating Flow	Semi Filled Pipes	Open Channel
	Yes	No	Yes	Limited	No	Yes	No	No	No	No

Suitable Gases	Steam	Clean	Wet	Contaminated	Corrosive
	Yes	Yes	No	No	Yes

Page	Turbine Flowmeter	Accuracy	Repeatability	Down Turn Ratio	Max Flow	Max Pressure	Max Temp	Min Temp	Output	Connection
29	FTB600B 	±1% RD	±1% RD	30:1	120 LPM	150 PSIG/ 10.3 BARG	82 °C	-40 °C	Pulse PNP/NPN frequency	Hose fitting, NPT Fitting
29	FTB2000 	±3% RD	±0.5% RD	15:1	30 LPM	198 PSIG/ 13.7 BARG	100 °C	-20 °C	NPN sinking open collector	3/8" NPT Fitting
30	FTB-1400 	±1% RD	±0.1% RD	10:1	681 LPM	5000 PSIG/ 345 BARG	Up to 232 °C	-101 °C	Pulse 4 to 20 mA	NPT, BSP Optional
30	FTB-700S 	±1% FS	-	100:1	11,350 LPM	200 PSIG/ 13.8 BARG	93 °C	0 °C	Pulse 4 to 20 mA	ANSI cl. 150 lb Flange
31	FLR1000 	±3% RD	±0.5 FS	5:1 (Gas) 10:1	500 L/ min(G) 10 L/ min(L)	500 PSIG/ 34.5 BARG (Liquid) 40 PSIG/ 2.7 BARG (Gas)	55 °C	5 °C	0 to 5V 4 to 20 mA pulse	NPT thread
31	FTB790 	±1% RD	±0.1% RD	10:1	760 LPM	3000 PSIG/ 207 BARG	121 °C	-40 °C	Pulse 4 to 20 mA	BSP or NPT Thread, TRI-clamp

Turbine Flowmeters



Flow Sensor for Low to Medium Corrosive Flows

FTB600B Series

- All Plastic, Perfect for Corrosive Environments
- For Translucent liquids Only
- Viscosity Range 1-15 cSt
- Six Flow Ranges, from 0.1 to 120 LPM
- Turn Down Up to 30:1
- Easily Mounts in Any Position
- Hose-Barb or Threaded Connections

www.omega.co.uk/ftb600

Flow Rate Sensor for OEM Applications Involving Low-Flow Monitoring

FTB2000 Series

- Economical and Ideal for OEM
- Measures Low Liquid Flow Rates of 0.5 to 29.9 l/m
- Can be Mounted in Any Position
- FTBMC2005 has 2-30 l/m Range, 3/8" BSPP Fitting and 1m Cable
- FTB2000 has 3/8" NPT Fitting and Spade Terminals for Electrical Connection



www.omega.co.uk/ftb2000

Turbine Flowmeters



Turbine Flowmeters with PVC or Carbon Steel Flanged Bodies

FTB700-C/FTB700-S Series

- Maximum Temperature of Carbon Steel Version: 93°C
- Maximum Temperature of PVC Version: 49°C
- Ideal for Long Life in Water and Water-Based Fluids
- Entire Rotor Assembly can be Easily Removed
- Precisely-Machined Helical Rotors and High-Quality Jewel Bearings
- Standard Meter Bodies are Flanged

www.omega.co.uk/ftb700

Liquid Turbine Flowmeters for the Oil Field

FTB1400 Series

- Rugged 316 Stainless Steel Construction Offers Long Service Life in Severe Operating Environments
- Available In NPT or BSP Threads
- Accurate and Repeatable Flow Measurement
- Installation in Pipe Sizes from 1/2 to 2 in.
- Turbine Temperature: -101 to 232 °C with High Temperature Magnetic Pulse Output Option

www.omega.co.uk/ftb1400_series



Turbine Flowmeters



Air/Water Flow Sensors with or without Display

FLR1000 Series

- Measures Extremely Low Flow Rates
- Ideal for Industrial and Laboratory Environments
- Incorporate into Data Acquisition Systems
- 0 to 5 Vdc Linear Output Signal
- Power Input 12 Vdc or 24 Vdc
- Ranges from 20 to 100 ml/min, 100 to 500 L/min

www.omega.co.uk/flr1000

Compact Turbine Flowmeters with Display

FTB790 Series

- Large Choice of Fitting Sizes
- Rate and Total Indication
- Display Models have Selectable Units of Litres, Gallons or 15-point user curve
- 6-Digit Display
- Battery and DC Powered for Pulse/4-20mA Output
- Easy Maintenance Design



www.omega.co.uk/ftb790

Paddle Wheel Flowmeter Selection Guide

Paddle wheel flowmeters are able to perform measurement, certain models can perform measurement & control, and display the measurement

Paddle Wheel Applications

Suitable Fluids	Clean	Dirty	Conductive	Viscous	Slurries	Corrosive	Reverse Flow	Pulsating Flow	Semi Filled Pipes	Open Channel
	Yes	Limited	Yes	No	No	No	No	No	No	No

Suitable Gases	Steam	Clean	Wet	Contaminated	Corrosive
	No	No	No	No	No

Page	Paddle wheel	Accuracy	Repeatability	Down Turn Ratio	Max Flow	Max Pressure	Max Temp	Min Temp	Output	Connection
33		±2% FS	±0.5% FS	10:1	189.3 LPM / 50 GPM	500 PSIG 34 BARG	107 °C	-7 °C	4 to 20 mA or 0 to 5 Vdc Pulse output and relay option	NPT fittings/ NPT to BSPP/BSPT adapters available
33		±1% FS	±0.25% FS	10:1	35 GPM / 132 LPM	150 PSIG 10 BARG	60 °C	0 °C	4 to 20 mA or 1 to 5 Vdc	NPT threads
34		±1% FS	±0.5% FS	66:1	0.1 to 6 m/s 0.3 to 20 fps	200 PSIG / 13.8 BARG at 20 °C	85 °C at 1.7 BARG / 25 PSIG	-18 °C	Open collector output	1-1/4" NPSM
34		±1.5% FS	±1% FS	10:1	29,140 GPM, 6,618 M3/HR based on velocity of 3 m/s	200 PSIG 13.8 BARG	93 °C	0 °C	Frequency output, 4-20mA output	NPT thread fitting

Paddle Wheel Flowmeters



Liquid Flow Transmitters

FPR200 Series

- Ideal for Cooling Circuits and HVAC Systems
- Blind/Visual Indication with an Analogue or Pulse Output Available
- Available in Polypropylene /Stainless Steel Bodies
- Ideal for Fluids with Viscosity of 5 cPs
- Different O-Ring Seal Materials Available

www.omega.co.uk/fpr200

Digital Plastic Paddle Wheel for Flow and Temperature

FP1400 Series

- Includes Sensor and Alarms for Flow and Temperature
- 29 Engineering Unit
- Two Programmable Totalisers
- Programmable Alarms
- Isolated Analogue 0 to 5 Vdc or 4 to 20 mA
- RS232 Communications Standard



www.omega.co.uk/fp1400

Paddle Wheel Flowmeters

Insertion Paddle Wheel Flow Sensors

FP-6500



- Can Transmit a Signal Long Distance without a Transmitter over Unshielded Cable
- Available in 316 Stainless Steel or Brass
- Installs in a Wide Range of Pipe Sizes From 2" to 40"
- Excellent Low-Flow Performance
- NEMA-4 Housing
- Special Fittings Not Required

www.omega.co.uk/FP6500

Low Flow Sensors

FP-5600

- Measures Low Flow from 0.1 m/s
- High Resolution and Noise Immunity
- Sensor can be Installed 300 Metres Away
- Installs into Pipe Sizes: DN15 to DN900, 0.5" to 36"
- Wide Chemical Compatibility
- Comes with Standard 7.6 Metre Cable
- Low pressure drop

www.omega.co.uk/fp5600_8500a



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