

#### GENERAL

The **BIOMAG** is an electromagnetic flowmeter designed for biopharmaceutical applications. The BM series flow tube made of polysulfone (PSU) resin has a single-use structure and can be easily replaced and sterilized with gamma rays. It can be attached to the BIOMAG4050C transmitter in a single operation, enabling stable flow measurement.

#### FEATURES

- ❑ Flow tube replaceable with one operation  
The single-use electromagnetic flowmeter adopts the easy-to-replace BM series flow tube and is available in five sizes from 1/4" to 1".
- ❑ Compact transmitter with high-performance system  
The BIOMAG4050C transmitter is available in three sizes from small (1/4"), medium (3/8" to 1/2") and large (3/4" to 1") and can output the measured flow rate as both analog and pulse signals.
- ❑ High accuracy  
The BIOMAG4050C transmitter combined with the BM series flow tube enables high accuracy of  $\pm 1\%$  of reading with flow velocity tolerance of 0.001 m/s.
- ❑ Biocompatible material  
The flow tube (wetted part) is made of biocompatible polysulfone (PSU) which complies with USP Class VI, ISO10993, and can be sterilized with gamma rays up to 50 kGy.
- ❑ No need for field adjustment  
Readjustment is not required after replacing the flow tube. It is easy to use as a single-use device.



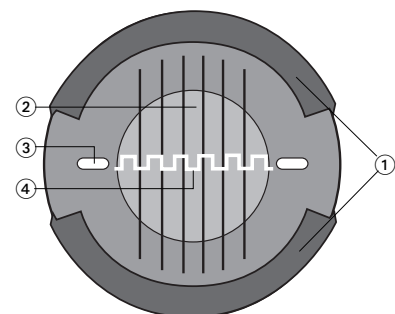
#### MEASURING PRINCIPLE

The measuring principle of an electromagnetic flow meter is based on Faraday's law of electromagnetic induction. When a conductive liquid flows vertically through the magnetic field generated by an exciting coil, an electromotive force is induced between the electrode potentials in a mutually perpendicular direction. The electromotive force is proportional to the flow velocity and magnetic flux density, and thus the flow rate can be determined by detecting the electromotive force.

$$U = v \times k \times B \times D$$

$v$  = average velocity,  $k$  = correction coefficient,

$B$  = magnetic field strength,  $D$  = diameter of flow meter



- ① Exciting coil
- ② Magnetic field
- ③ Electrode
- ④ Electromotive force (proportional to velocity)

## STANDARD SPECIFICATIONS

### General Specifications

- \* When used in combination with the BM series flow tube and BIOMAG4050C transmitter
- Ambient temperature : +2 to 60°C (-40 to +60°C for storage)
- Fluid specifications : Temperature: +2 to 45°C  
Pressure: 0 Pa abs to 0.4 MPa  
Conductivity: 20 µS/cm or more
- Accuracy : Pulse output; ±1% of reading with flow velocity tolerance of 0.001 m/s  
Current output  
; Add ±0.005 mA to Pulse output accuracy

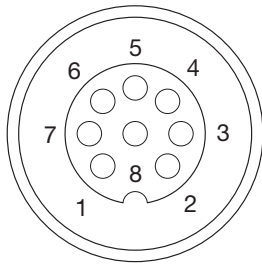
### Flow Tube Specifications

- Type : BM0250 (size: 1/4")  
BM0375 (size: 3/8")  
BM0500 (size: 1/2")  
BM0750 (size: 3/4")  
BM1000 (size: 1")
- Measuring range : BM0250: 0.015 to 3 L/min  
BM0375: 0.07 to 14 L/min  
BM0500: 0.1 to 20 L/min  
BM0750: 0.3 to 62 L/min  
BM1000: 0.5 to 75 L/min
- Wetted part materials : Tube: Udel P-1700 polysulfone (PSU)  
Electrode and earth electrode  
: Hastelloy C22
- Process connection : Barb coupling
- Mounting position : Horizontal position of the electrode shaft
- Sterilization : Up to 50 kGy gamma ray sterilization, up to 30-minute autoclave sterilization at 121°C
- Sales unit : 10 pieces per unit
- Compatible specifications and manufacturing environment
  - Material  
FDA 21 CFR Part 177  
EP 3.2 (European Pharmacopeia) covered by FDA 21 CFR 177 material certificate  
ISO 10993  
Hemolysis
  - Biocompatibility of the finished product  
USP (US Pharmacopeia) [87] and [88] Class VI biological reactivity tests  
USP (US Pharmacopeia) [661] Physicochemical plastics tests  
BSE/TSE free (Declaration of Conformity)
  - Manufacturing environment  
Cleanroom certificate ISO 13485  
Particulate USP [788], EP 2.9.19  
Endotoxin EP 2.6.14  
Bioburden (ISO 11737)

### Transmitter Specifications

- Type : BIOMAG4050C
- Power supply : 24 V DC ±25% (power consumption: maximum 3 W)
- Output
  - \* Only either current output or pulse output can be used, not both.
  - Current output
    - Output: 4 to 20 mA DC
    - Allowable load resistance: 400Ω or less
  - Pulse output
    - Output type: Voltage pulse output
    - Pulse rate: Large/Medium Size; 1000 Hz (at full scale)  
Small Size; 10000 Hz (at full scale)
    - Pulse width: Duty factor 1:1
- Cable entry : M12-dedicated connector (8 poles for power supply, current and pulse output)
- Housing material : Polycarbonate/acrylonitrile-butadiene-styrene (PC/ABS)
- Protection class : IP54 (IEC/EN 60529)
- Supplied cable : Dedicated cable with straight-type plug connector (2 m)

**WIRING DRAWING**



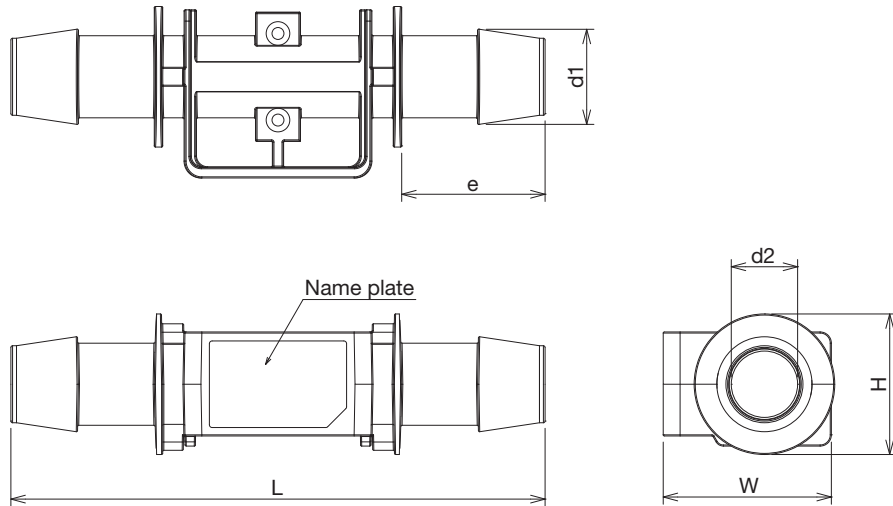
Cable entry diagram

Terminal No.	Core Wiring Color *1	Content
1	White	Unused
2	Red	+24 V DC
3	Blue	-24 V DC/GND *2
4	Yellow	Frequency output (+)
5	Gray	Frequency output (-)
6	Brown	Current output (+)
7	Green	Current output (-)
8	Pink	Terminal for service
-	-	Cable shield

- \*1 Wiring color for the dedicated cable with plug connector
- \*2 Make sure to perform grounding to ensure stable operation (grounding resistance: 100Ω or less).

**DIMENSIONS**

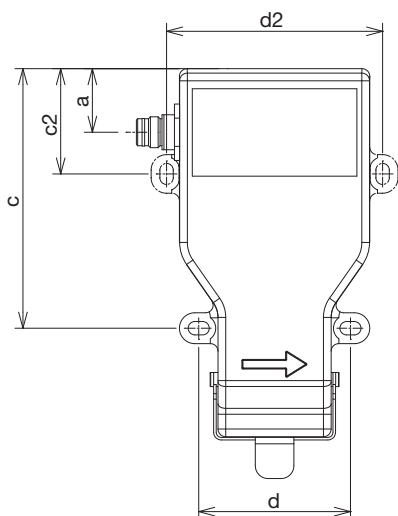
- Flow tube



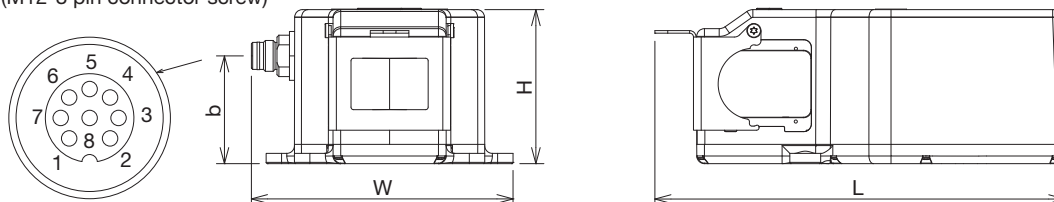
Model	Size	Dimension (mm)						Wetted part area (mm <sup>2</sup> )	Wetted part capacity (mm <sup>3</sup> )	Mass (g)
		L	W	H	e	d1	d2			
BM0250	1/4"	70	22	17	16.6	8.5	5.5	1270	1802	6.4
BM0375	3/8"	95	30	25	25.6	13.6	9.5	2652	5847	13
BM0500	1/2"	95	30	25	25.6	16.9	12.7	3650	10987	14
BM0750	3/4"	125	45	41	36	23	19	7199	33148	36
BM1000	1"	140	45	41	44	30	22.2	10026	57470	44

## DIMENSIONS

- Transmitter



Cable connection  
(M12-8 pin connector screw)



Transmitter versions *	Dimension (mm)							Mass (g)
	L	W	H	a	b	c	d	
Large	160	100	60	23	42	100	59	460
Medium	139	90	48	23	33	82	66	390
Small	144	90	48	28	33	94	66	400

Mounting hole diameter : 5.2 × 8.2 mm  
Note: c2 (41 mm) and d2 (84 mm) also available for large only

\* The transmitter versions are as follows.

- Large: BM0750 and BM1000 flow tube types
- Medium: BM0375 and BM0500 flow tube types
- Small: BM0250 flow tube type

\* Specification is subject to change without notice.

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