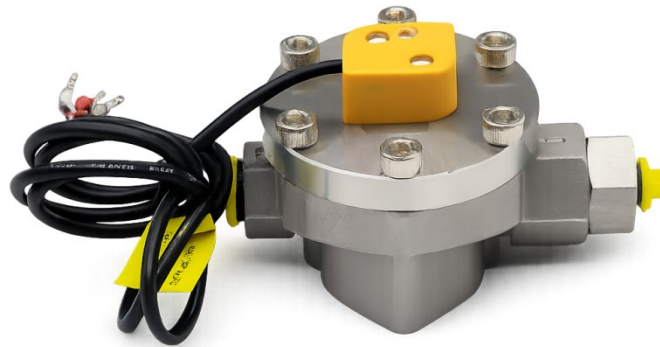


Small Flow Meter

LC-M-ESP Series | Small Oval Gear Flowmeter



Silver Automation Instruments Limited

www.silverinstruments.com

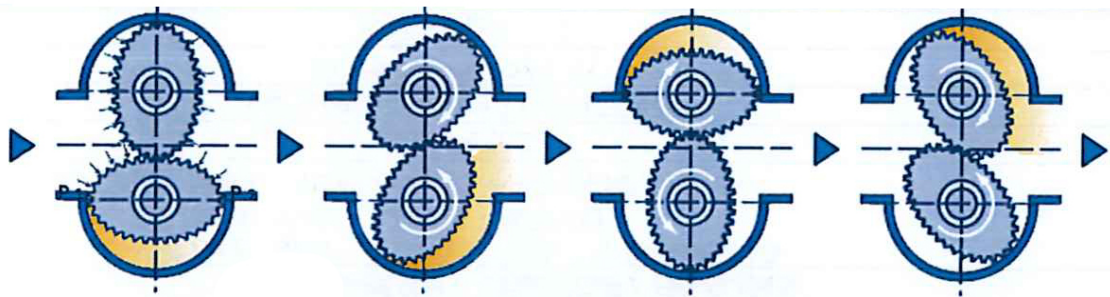
Product Overview

The LC-M-ESP series is a positive-displacement (oval gear) flowmeter designed for precise continuous or intermittent measurement of liquid flow rate and totalized volume in pipelines. It is well suited to high-viscosity, high-pressure applications such as heavy fuel oil, polyvinyl alcohol (PVA) and resin, and is capable of accurately measuring very small flow rates.

The series covers most market requirements and can be used for water, oil, food products, lubricants, chemicals, cosmetics, fertilizer, ink, pharmaceuticals, coatings, petroleum, automotive fluids, adhesives, polyurethane, electrolytes, additives and many other media.

Working Principle & Construction

Inside the meter body, a pair of intermeshing oval gears act as rotors. Each rotation of the gears against the housing displaces a fixed, known volume of liquid (the “standard volume”). The flow rate is calculated from the number of standard volumes displaced per unit time.



Working principle: liquid is displaced through a fixed volume by the rotating oval-gear pair

Key Features

- The higher the medium viscosity, the smaller the internal leakage between the gears and the measuring chamber — so higher-viscosity media give better measurement accuracy.
- Compact and lightweight; low vibration and noise during operation; suitable for high-viscosity fluids.
- Standard accuracy of $\pm 0.3\%$ of reading (SF0.3%), with a wide flow turndown ratio of up to 100:1.
- Standard configuration is suitable for all types of clean liquids at very low (micro) flow rates.
- No straight-pipe-run requirement upstream or downstream.
- Suitable for pulsating flow measurement.
- Suitable for short-duration micro-dosing / batching applications.

Specifications & Model Codes

Selection Codes

Code	K Factor	Flow Range (ml/min)	Process Connection	Shell	Gear	Pressure
LC-M-ESP20	0.11 mL/p	6.6~400	G1/4"	Cast 304 SS	PPS	200 / 400 bar
LC-M-ESP50	0.25 mL/p	15~900	G1/4"	Cast 304 SS	PPS	200 / 400 bar
LC-M-ESP100	0.5 mL/p	30~1800	G1/4"	Cast 304 SS	PPS	200 / 400 bar
LC-M-ESP500	2.5 mL/p	150~9000	G1/4"	Cast 304 SS	PPS	200 / 400 bar
LC-M-ESP1700	8.5 mL/p	500~30000	G1/2"	Cast 304 SS	PPS	50 / 400 bar
LC-M-ESP4600	23.0 mL/p	1300~83000	G1"	Cast 304 SS	PPS	50 / 400 bar

Category	Code	Description
Pressure	P8	Custom pressure rating (X bar) – please specify required value
Temperature	T1	-40 ~ 80°C
Display	x	No display (pulse output)
	D	Integrated (built-in) display, with 4-20 mA and Modbus output
	FT	With remote flow totalizer / display, 1 m cable – selectable 4-20 mA or Modbus

Accuracy: $\pm 0.3\%$ of reading (SF0.3%)

Temperature range: -40 ~ 80°C (code T1)

Pressure rating: LC-M-ESP20 / ESP50 / ESP100 / ESP500 – 200 bar standard, 400 bar optional; LC-M-ESP1700 / ESP4600 – 50 bar standard, 400 bar optional; custom ratings available (see pressure code P8)

No-display version power supply: 5-24 VDC; output signal: square-wave pulse; remote (split) display optional

Selection Example

LC-M-ESP500-P8-T1-D

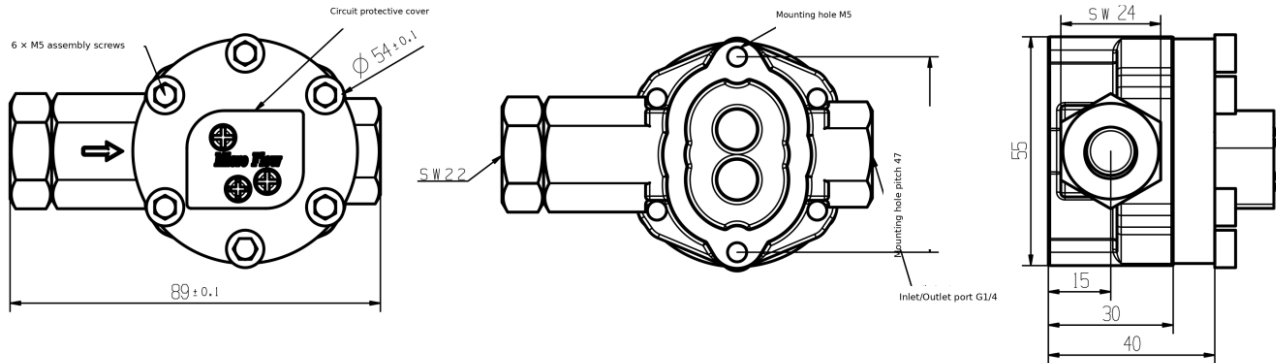
- LC-M-ESP500: flow range 150~9000 ml/min, K factor 2.5 mL/p, G1/4" connection, cast 304 stainless steel shell, PPS gear, pulse output
- P8: custom pressure rating – to be specified (e.g. 200 bar / 400 bar)
- T1: operating temperature -40 ~ 80°C
- D: integrated (built-in) display, with 4-20 mA and Modbus output

Dimensional Drawings (Reference)

The drawings below illustrate the typical body styles and connection sizes across the LC-M-ESP series. Exact dimensions vary slightly by model — please confirm with the datasheet.

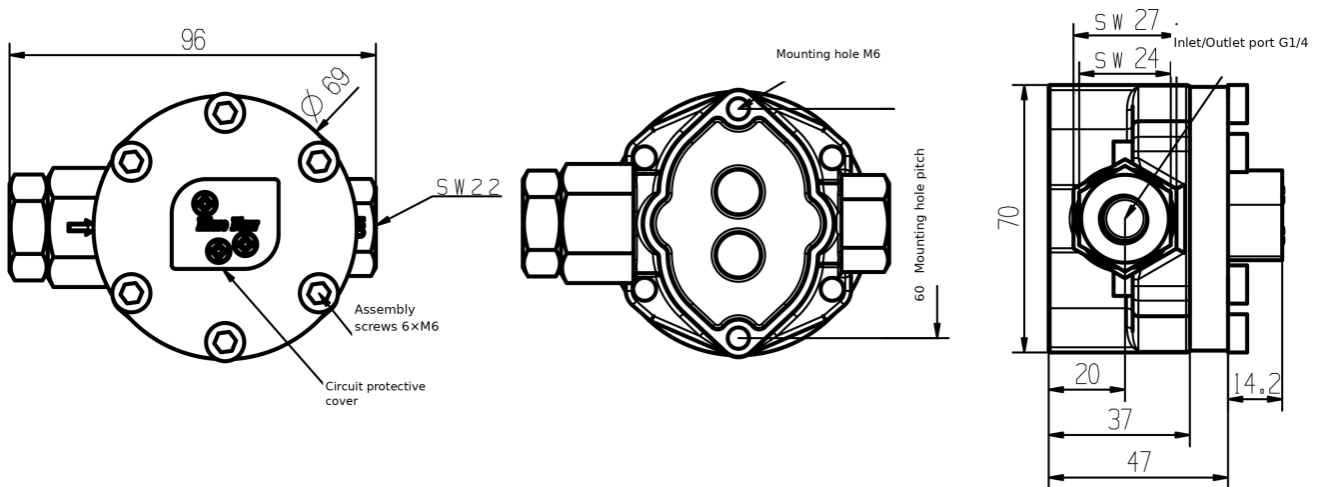
LC-M-ESP20/ LC-M-ESP50 / LC-M-ESP100 Series – G1/4" Connection

These three models share the same body envelope and connection size; only the internal gear set and K-factor differ.



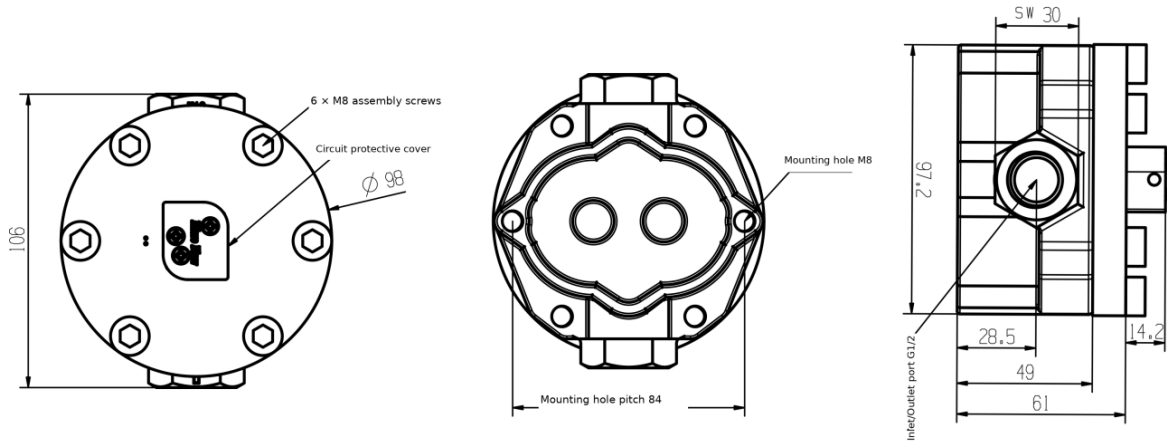
Body style for LC-M-ESP22 / LC-M-ESP50 / LC-M-ESP100 (G1/4" port, SW22 fitting)

LC-M-ESP500 Series – G1/4" Connection



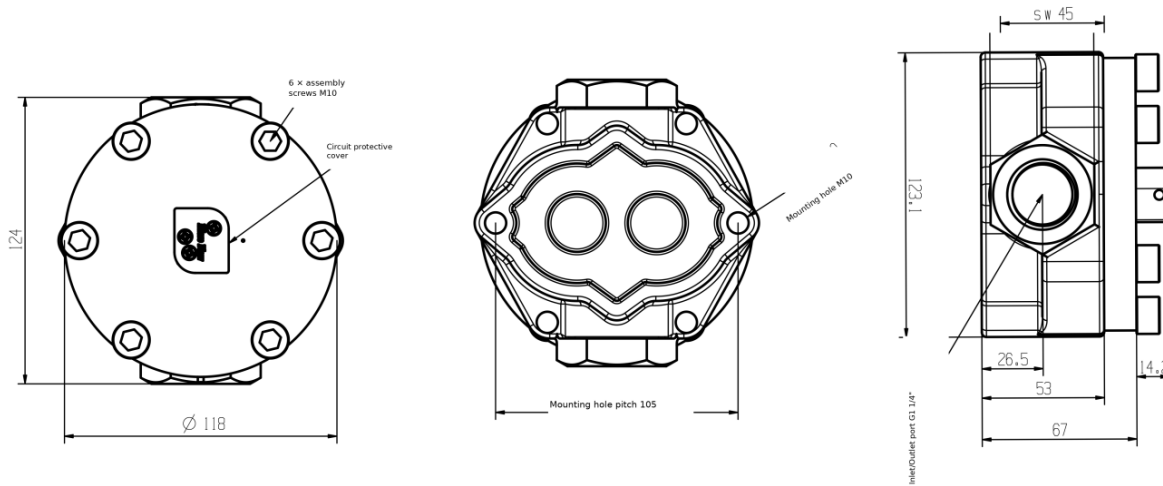
Typical body style for LC-M-ESP500 (G1/4" port, larger body, SW22 fitting)

LC-M-ESP1700 Series – G1/2" Connection



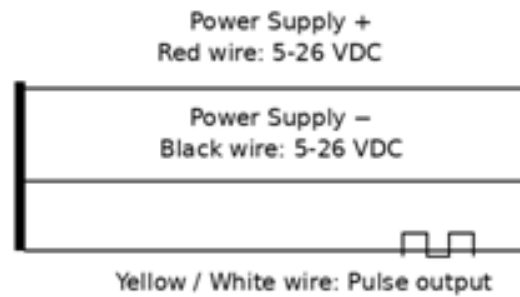
Typical body style for LC-M-ESP1700 (G1/2" port, SW27/SW24 fittings)

LC-M-ESP4600 Series – G1" Connection



Typical body style for LC-M-ESP4600 (G1" port, SW45 fitting)

Electrical Connection



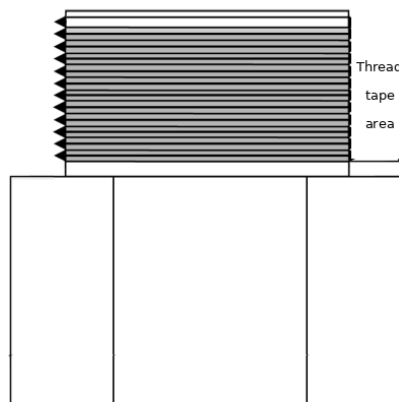
Wiring diagram – pulse output sensor (left) and cable color reference (right)

- Red wire: power supply +, 5-26 VDC
- Black wire: power supply –, 5-26 VDC
- Yellow / white wire: pulse output

Before connecting the flowmeter into the pipeline, always verify the wiring and pulse signal first (the gears can be rotated by hand or by blowing air through the meter to check that a pulse signal is generated).

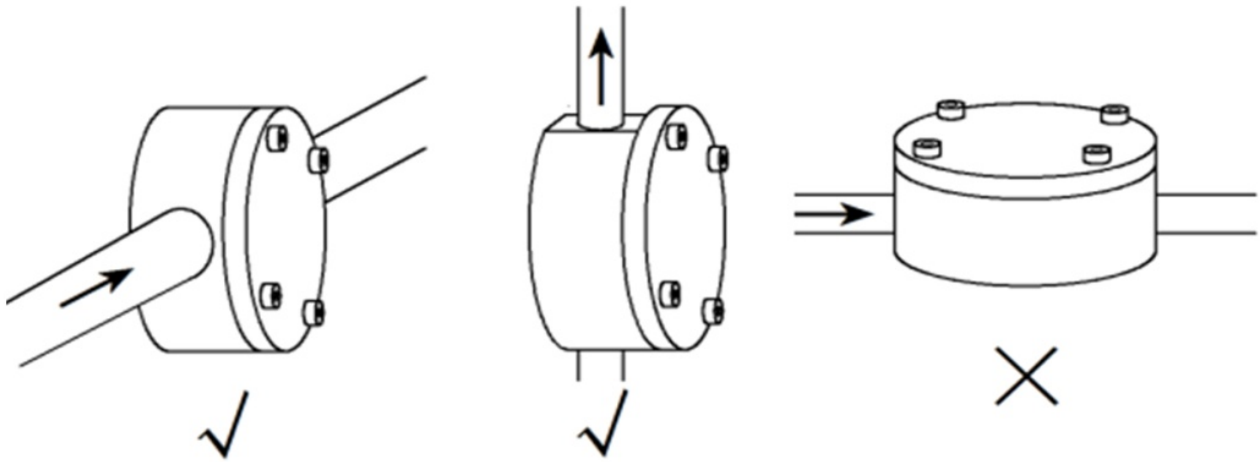
Installation Guidance

- Before connecting to the pipeline, always connect the electrical circuit first and test whether the signal is properly matched. (You can manually rotate the gear by hand or blow into the flowmeter to make the gear spin, and then check the pulse signal.)
- Ensure the pipeline is clean before installation; flushing the line beforehand is recommended.
- Install a filter of 200 mesh or finer upstream of the flowmeter.
- When connecting fittings, do not over-wrap thread tape / thread sealant onto the connection, as excess tape or sealant can enter the meter body and cause problems (see diagram below).



Avoid wrapping thread tape beyond the marked area near the connection thread

Recommended mounting orientations:



Recommended (✓) and not recommended (X) installation orientations

Operating Precautions

- Open or close shut-off valves slowly during start-up/shutdown to avoid sudden pressure shocks.
- Avoid reverse/back-flow, which can generate false pulses.
- Always install a strainer/filter upstream of the meter.
- For media prone to crystallization, take measures to prevent the liquid from crystallizing inside the meter body or pipe section.

Local Integral Display – Quick Reference (Optional)

For models fitted with the optional local digital display (totalizer / instantaneous flow indicator), the key points for selection reference are summarized below. Full operating instructions are provided with the product on delivery.

- Display power supply: 24 VDC
- Display modes (selectable via Up/Down keys): Totalizer / Instantaneous rate / Totalizer + rate with alarm
- Key parameters configurable on site: K-factor (mL per pulse), low-pass filter coefficient, rate alarm value (high/low), batch (preset) totalizer value, multi-segment linearization (up to 10 segments, K01-K10 / F01-F10), 4-20 mA output range, totalizer/rate display units and decimal points
- Relay output capacity (for alarm/batch control): 5A / 250VAC, 5A / 30VDC
- RST key clears the totalizer in measurement mode, or returns to measurement mode directly from the parameter menu



RS485 Communication – Quick Reference

For models with RS485 output, communication uses the Modbus RTU protocol with the following default settings:

- Protocol: Modbus RTU
- Serial format: N-8-1 (no parity, 8 data bits, 1 stop bit)
- Data format: 32-bit floating point, low word first / high word second
- Default baud rate: 9600 bps (the device must be power-cycled after changing the baud rate)
- Typical Modbus register map for reference:

Code	Description
Instantaneous Flow	32-bit float, register address 100 (read)
Totalized Flow	32-bit float, register address 200 (read)
Clear Totalizer	16-bit unsigned, register address 300 (write only)