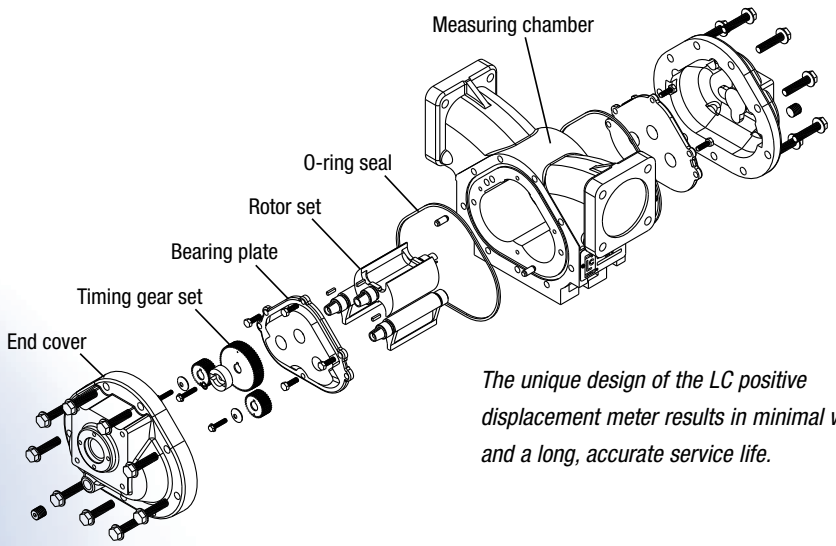


The unique design of the LC positive displacement meter results in minimal wear and a long, accurate service life.

The LC metering element

- Provides custody transfer accuracy
- Performs well with a wide range of liquids, from low viscosity to high viscosity
- Minimizes inaccuracies due to clearance changes and wear common to other meter designs
- Performs with equal accuracy when flow is in either direction (forward or reverse)
- Operates without axial thrust on rotor bearings for longer life
- Adapts to multiple installation positions
- Includes Weights and Measures approvals, worldwide

Linearity (over 10:1 range)

Capable of ±0.10% (electronic registration)
Capable of ±0.22% (mechanical registration)

Repeatability

Capable of 0.03% (±.015%)

For complete specifications, refer to page 8.

System accessories

Liquid Controls' innovation extends beyond meters to system components and accessories. Precision-engineered and manufactured LC strainers, air eliminators, and valves provide unsurpassed performance across a wide range of liquids and applications.

LC meters are also available with your choice of mechanical or electronic registers. Our state-of-the-art family of LectroCount™ electronic registers provide your meter with automated control and data management capability to improve productivity, lower your costs, and increase your profits.

At Liquid Controls' ISO-certified facility in Lake Bluff, Illinois, LC metering systems are manufactured to last. Meters crafted with quality decades ago are still in operation today. Our metering systems are sold and serviced by a worldwide network of qualified distributors and OEMs. They're backed by our reputation for quality, accuracy, and reliability. That's why Liquid Controls continues to lead the industry in Weights and Measures-approved custody transfer metering, and why you'll want your business to include Liquid Controls products.

ISO 9001 DNV CERTIFICATED FIRM Certificate No. 08732
ISO 14001 DNV CERTIFICATED FIRM Certificate No. 05049
UL LISTED
C SA US

Meters

LC meters are known worldwide for exceptional accuracy, reliability, and longevity in a broad range of applications. From truck applications metering refined petroleum products and LPG, to process applications metering a wide range of industrial liquids.

Truck meters

For custody transfer applications requiring Weights and Measures-approved accuracy, Liquid Controls M and MA Series truck meters provide the industry's most time-proven and respected records of superior value and performance. LC truck meter accessories include air eliminators, strainers, valves, and a choice of mechanical or electronic registers and printers for presetting, totalizing deliveries, and printing tickets.

M-7 with electronic registration for refined fuels (with E-7 valve, optical air eliminator, and high-capacity air eliminator)

Typical applications of the LC meter and accessories include tankwagons delivering fuel to homes for domestic heating or gasoline to service stations; bobtails delivering LPG to homes and farms; and aviation refuelers delivering avgas or jet fuel into aircraft. Other applications include metering of anhydrous ammonia and other farm-related products from vehicle-mounted tanks.

M-30 with electronic registration for aviation fuel

M-25 with mechanical counter and printer

MA-7 with electronic registration for LPG

Common truck meter model numbers

Application	Description	Model
Refined fuels	2", 100-GPM aluminum-body meter with strainer/air eliminator, backcheck valve, preset valve, electronic register, and printer	M-7-CLI-1/LCR-II
Liquified petroleum gas (LPG)	2", 100-GPM aluminum-body meter with strainer/vapor eliminator, inlet backcheck valve, differential valve, electronic register, and printer	MA-7-CLI-10/LCR-II
Aviation fuel	3", 300-GPM aluminum-body meter with register and printer	M-25-E-2

Bulk plant and loading terminal meters

The larger sizes of M and MS Series meters are ideal for bulk measurement of product during loading and unloading of tanks, transports, railcars, ships, barges, and more. The MS Series meters are housed in a spherical steel case for higher system pressure applications up to 1,440 PSI. MS Series spherical case meters provide the ruggedness, accuracy, and selection of inlet/outlet configurations to handle nearly any bulk metering requirement. Meter accessories include bulk air/vapor eliminators, strainers, valves, and mechanical or electronic registers.

MS meter with electronic registration

Turbine meters in many sizes are also available for loading terminal applications where small size due to limited available space is a consideration in meter selection.

Skid systems are designed to accommodate all necessary ancillary equipment including strainers, air eliminators, valves, and a selection of mechanical or electronic registers and load computers. Systems come fully piped and ready for installation and field calibration. Prover systems are also available built to customer specifications. Contact the factory for complete details.

Turbine meter with IT400

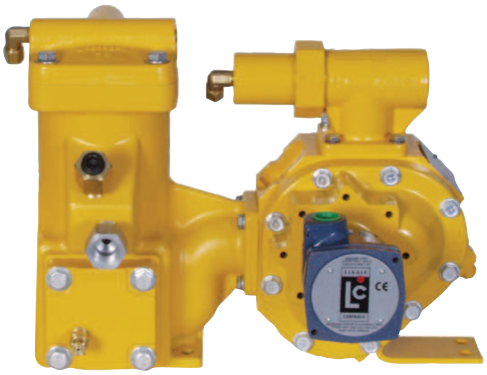
MSA meter with mechanical registration

Common load rack/terminal meter model numbers

Application	Description	Model
Refined fuels	3", 350-GPM spherical-case meter with strainer/air eliminator, valve, and register	MS-30-K-1
	4", 700-GPM spherical-case meter with strainer/air eliminator, valve, and register	MS-75-K-1

LPG and diesel fuel dispenser meters

Liquid Controls manufactures meters specially designed for high speed diesel fuel dispensers for refueling trucks as well as a meter specially designed for LPG autogas dispensers.



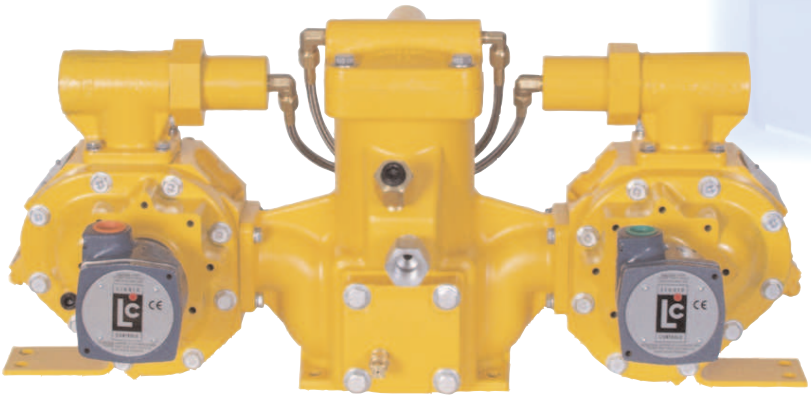
MA-4 LPG dispenser meter, single

High speed diesel dispenser meter

The high speed diesel dispenser meter is rated for flow rates from 12 to 60 GPM and is widely applied in diesel dispensers manufactured by a number of dispenser OEMs. Long operating life, minimal maintenance, and sustained accuracy make it the meter of choice for this demanding OEM application.

LPG autogas dispenser meter

The MA-4 meter is specially designed for LPG autogas dispensers. It is available in two configurations: a single meter design for dispensers with one delivery hose, and a dual meter design for dispensers with two delivery hoses. The efficient, dual meter unit economizes space by utilizing a single strainer/vapor eliminator for both meters, and incorporates an integrally mounted differential valve on top of each meter. Meters are available with electronic temperature-volume compensation. The flow range for the MA-4 LPG dispenser meter is 2.5 to 40 GPM. Regulatory approvals include NTEP, NFPA 58, and UL 25. Hazardous Location Rating is Class I, Division 1, Group D (LPG).



MA-4 LPG dispenser meter, dual

Common dispenser meter model numbers

Application	Description	Model
Diesel dispenser	2", 60 GPM diesel dispenser meter	M-5
LPG autogas dispenser	1", 40 GPM LPG dispenser meter (single)	MA-4
	1", 40 GPM LPG dispenser meter (dual)†	MA-4

†Maximum flowrate for both meters (combined) is 40 GPM.

Industrial/process meters

Liquid Controls PD meters in aluminum, stainless steel, brass, and cast iron provide the necessary accuracy for batch processing, flow rate control, blending, and custody transfer of liquids across a broad range of products, viscosities, temperatures, and pressures.

Meters can be supplied with mechanical counters and registers, or they can be optionally outfitted with the LC POD electronic pulser for compatibility with Liquid Controls LectroCount electronic registration systems or other scalable, pulser-driven counters, batch controllers, or flow computers.

Liquid Controls meters can be easily specified to include an assortment of process connections including ANSI[a] flange, slip-on weld flange, or NPT or BSPT threads.

Popular applications in the food industry include metering liquid sweeteners such as corn syrup or vegetable oils. In the industrial market, applications include metering solvents, acids, caustics, and water. Always contact the factory or refer to Engineering Data Publication 400-10 for specific recommendations.

[a]ANSI flanges only available for M-5, M-7 Class 8, and M30 Class 7, 27, and 37 meters.

Stainless steel M-7, Class 8 meter with POD pulser

Model	Metallurgy	Application class (see table on page 9)
M-5, 7; MSAA-7, 15, 30, 120	Stainless steel	8
M-7, 30	Cast iron	7, 27, 37
M-7	Brass	20
MS/MSAA/MSA/MSB/MSC-7, 15, 30, 75, 120	Steel	1, 2, 10, 14, 16, 37[b]

[b]MS-7 only.

Common process meter model numbers

Application	Description	Model
Solvents	2," 100-GPM aluminum meter with counter	M-7-A-16
Liquid sweeteners	2," 100-GPM aluminum meter with counter	M-7-A-3
Water	2," 80-GPM brass meter with counter	M-7-A-20
Acids	2," 80-GPM 316 stainless steel meter with counter	M-7-A-8
Caustics	2," 100-GPM cast iron meter with counter	M-7-A-7

Specifications

LC meters meet NTEP (NIST Handbook 44) and many International Weights and Measures accuracy requirements, as well as U.S. Military specifications.

Accuracy/Performance[a]

Repeatability

Meters with Mech. registration: capable of 0.05% (±.025%) of reading over entire range
Meters with Elect. registration: capable of 0.03% (±.015%) of reading over entire range

Linearity

- Over 5:1 range
  Mech. registration: capable of ±0.125% or better from max. nom. flow rate
  Elect. registration: capable of ±0.10% or better from max. nom. flow rate
- Over 10:1 range
  Mech. registration: capable of ±0.22% or better from max. nom. flow rate
  Elect. registration: capable of ±0.10% or better from max. nom. flow rate
- Over 40:1 range
  Mech. registration: capable of ±0.5% or better from max. nom. flow rate
  Elect. registration: capable of ±0.15% or better from max. nom. flow rate

Temperature range

-40ºF to 160ºF (-40ºC to 71ºC)
For higher temperature applications, consult factory.

[a] Stated accuracy obtainable when all variables remain constant. Reading/measurements reflect a minimum of one minute of flow at selected rate(s). All accuracy statements based on metering safety solvent (aliphatic hydrocarbon), approximate viscosity 1 CPS. On higher viscosity products, the average deviation in accuracy will be less.

Construction

Meter housing

M Series: aluminum, brass, cast-iron or stainless-steel
MS Series: steel case (elements by class), or stainless steel (epoxy-coated steel available for aviation and other applications)

Meter element and rotors

Cast aluminum (other metallurgies available including cast iron and stainless steel)

Internal components

Aluminum, Ni-Resist, stainless steel, iron

Seal materials

UL recognized component: Buna-N, Viton,® Teflon®

Bearings

Carbon, Teflon,® Ni-Resist

Viton® and Teflon® are registered trademarks of DuPont Corporation. Victaulic® is a registered trademark of Victaulic Company.

LC meter selection (by flow rate)[a]

Maximum nominal flow rate[b]				Maximum non-shock working pressure[c]						
GPM	L/min	m³/hr	Flange size	150 PSI 10.5 BAR	275 PSI 19 BAR	300 PSI 21 BAR	350 PSI 24 BAR	720 PSI 50 BAR	1,440 PSI 100 BAR	Construction classes/typical application (see descriptions below)
40	**151**	**9**	1"				MA-4			**10**
60	**227**	**14**	1½", 2" opt.	M-5	M-5[d]		MA-5			**1**, **2**, 3, 4, 8, **10**, 14, 16, 30
100	**380**	**23**	2", 1½" opt.	M-7	M-7[d]		MA-7			**1**, **2**, 3, 4, 7, 8[e], **10**, 12, 14, 15, 16, 20[e], 27, 37
100	**380**	**23**	2", 1½" opt.	MS-7	MSAA-7	MSA-7		MSB-7	MSC-7	**1**, **2**, 7, **10**, 14, 16, 37
150	**550**	**34**	2"	M-10	M-10[d]					**1**, **2**
200	**757**	**45**	3"	M-15	M-15[d]		MA-15			**1**, **2**, 3, 4, **10**, 14, 15, 16
200	**757**	**45**	3"	MS-15	MSA-15	MSA-15		MSB-15	MSC-15	**1**, **2**, 8, **10**, 14, 16
300	**1,136**	**68**	3"	M-25	M-25[d]					**1**, **2**
350	**1,325**	**79**	3", 4" opt.	M-30						**1**, **2**, 3, 4, 7, 14, 15, 16, 27, 37, 47
350	**1,325**	**79**	3", 4" opt.	MS-30	MSAA-30	MSA-30		MSB-30	MSC-30	**1**, **2**, 8, **10**, 14, 16
450	**1,700**	**102**	4"	M-40						**1**, **2**
450	**1,700**	**102**	4"	MS-40						**1**, **2**
600	**2,271**	**136**	4", 6" opt.	M-60	M-60[d]					**1**, **2**, 3, 14, 15
700	**2,650**	**159**	4"	MS-75	MSAA-75	MSA-75		MSB-75	MSC-75	**1**, **2**, **10**, 14
800[f]	**3,000**	**182**	6", 4" opt.	M-80	M-80[d]					**2**
1,000	**3,785**	**227**	6" or 8"	MS-120	MSAA-120	MSA-120		MSB-120	MSC-120	**1**, **2**, 8, **10**, 14

[a] Standard LC meters (with the exception of the M-10, M-25, M-40 and M-80) are suitable for operation on products with viscosities up to 1,000,000 SSU.
[b] Aluminum-body meters are suitable for intermittent overspeed operation at 125% of rating for clean, lubricating fluids. Consult the factory for details.
[c] Maximum, non-shock working pressure ratings are based on products at temperatures below 160ºF (71ºC). Consult the factory for pressure ratings at elevated temperatures.
[d] 275 working pressure available for meter only.
[e] Recommended operation for Class 8 and Class 20 meters should not exceed 80% of maximum rated capacity. Recommended maximum flowrate may be less depending on viscosity.
[f] M-80 Class Class 2 meter may be operated at flow rates up to 1,000 GPM for a limited period of time on jet fuel only.

Construction/application classes

Class 1 **Refined petroleum products**, biodiesel

Class 2 **Aviation and jet fuel**

Class 3 Variety of products including: liquid sugars, sweeteners, syrups, vegetable oils

Class 4 Treated waters and solvents where no red metals are allowed

Class 7 Chlorinated solvents, ethanol

Class 8 Acid pH liquids including: nitric, phosphoric, glacial acetic acids, citric juices, vinegar, ethanol

Class 10 **Liquified petroleum gas (LPG)**

Class 12 Anhydrous ammonia (NH_3)

Class 14 Crude oil, heated products, viscous liquids

Class 15 Oil- or water-based latex products, polyester resins, adhesives, herbicides, nitrogen fertilizers

Class 16 General solvents, 200 proof alcohol, ethanol

Class 20 Batch process water meter service

Class 27 Alkaline pH liquids: latex products, adhesives, liquid fertilizers

Class 30 Herbicides

Class 37 Sodium hydroxide solutions, high sulfur crude oil, alkaline pH liquids

Class 47 Mildly abrasive liquids