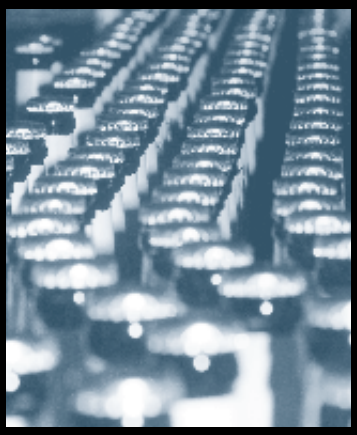
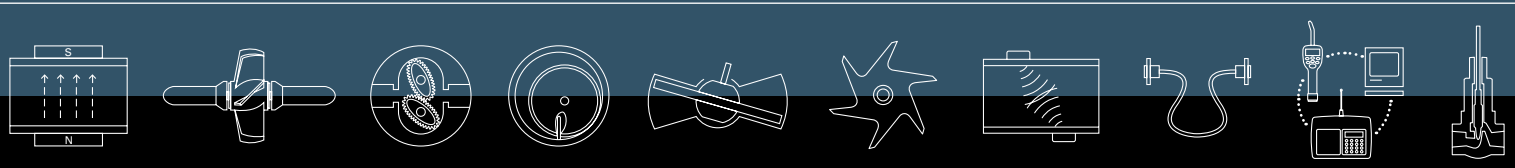
Flow Measurement & Control

Flow metering, batching, controlling



You can build on our experience

We measure and control the resources of our world

Badger Meter Europa

"Nothing in the world is as powerful as an idea whose time has come."
Victor Hugo

"Quality is not a coincidence; it is the result of our company philosophy."

Badger Meter Europa GmbH in Neuffen, Germany

Badger Meter, Inc., Milwaukee, USA

Badger Meter, Inc., Tulsa, USA

Badger Meter Czech s.r.o. in Brno, Czech Republic

Badger Meter Slovakia s.r.o. in Bratislava, Slovakia

The company

Badger Meter Europa GmbH is a wholly owned subsidiary of Badger Meter, Inc., USA, based in Milwaukee, Wisconsin. With sales of more than 350 million Euro and the dedication of more than 1300 employees all around the world, Badger Meter is a leading marketer and manufacturer of flow measurement and control devices since 1905. Badger Meter was a pioneer in flow measurement and can look back today at many patents in that field.

Badger Meter Europa GmbH is responsible for the international operations worldwide, except for the United States, Mexico and Canada which are operated from Badger Meter, Inc., USA.
Highly qualified people as well as state-of-the-art production and test facilities ensure the best sales support and service for our customers. Badger Meter Europa GmbH is DIN ISO 9001:2008 certified and, since 1997, one of the test stands is officially PTB-approved and certified from the Office of Weight and Measures as test equipment according to the OIML R 117.

Badger Meter Asia in Singapore

Long-term service and competence

We help you in a timely manner to solve your measurement problems, advise you and optimize your measurement solution, technology and site location before you make a decision. An extensive distributor and service network assures the best service all around the world. Local representatives are a big advantage for our customers. The short distance and the language make the assistance more efficient. Our distributors are trained on Badger Meter products in their own office or in our training center.

You can compare – we can´t!

Our name assures you that our products have been manufactured with the best care and in conformity with all DIN ISO 9001:2008 directives.

Quality is a tradition

A company which has successfully been providing the industry with flow meters for more than 105 years is always aware of the importance of quality in its products. However, quality is an on-going process which we, as a company, embrace every day.
At Badger Meter Europa GmbH, we consider quality as of the whole. It is the quality of our work, which you, as a customer, are entitled to expect from us.
Quality begins with the individual, our employees, and requires a company philosophy which fits accordingly. Our quality should accompany you throughout the process: from the inquiry, to the order and the product up to the service.
No compromise in terms of quality.

Test stand and innovation center of Badger Meter

Flow measuring, batching, controlling

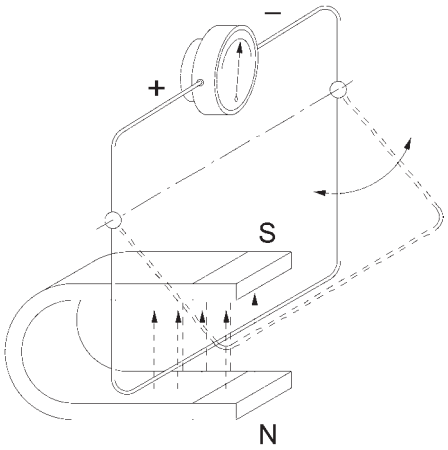
We can measure the flow of all liquids in almost all branches of the industry, and in small and large applications including pressure pipes, semi-filled pipes and open channels with a great variety of measurement principles.
A large product range of electro-magnetic flow meters, nutating disc/positive displacement meters, turbine meters, oval gear meters, oscillating piston meters, impeller meters, ultrasonic flow meters, venturi tubes, mass meters as well as batch systems provide a solution for almost any of your measurement applications in the water and waste water industry, sewage plant, water conditioning, water supply, water discharge, chemical industry, process industry, heat transfer, pharmaceutical industry, concrete industry, food and beverage industry, shipyard industry, power plants, refineries, paper industry, metallurgical industry, automotive industry, photography industry, textile industry…

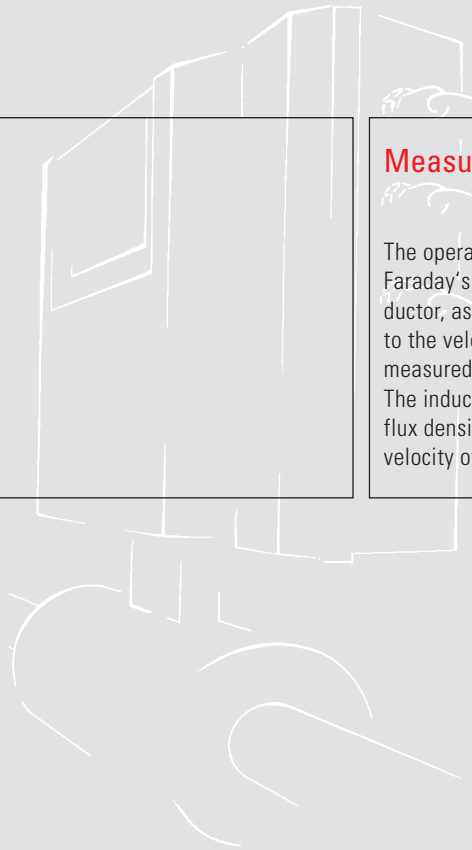
The meters for conductive

fluids

Electromagnetic flow meters

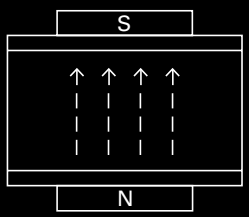
The electromagnetic flow meters are ideally suited for flow measurement of all liquids with a minimum conductivity of 5 µS/cm (20 µS/cm for demineralized water).
These meters are very accurate and the flow measurement is independent of density, temperature and pressure of the medium.





Measuring principle

The operating principle of the electromagnetic flow meter is based on Faraday's law of magnetic induction: The voltage induced across any conductor, as it moves at right angles through a magnetic field, is proportional to the velocity of that conductor. The voltage induced within the fluid is measured by two diametrically opposed internally mounted electrodes. The induced signal voltage is proportional to the product of the magnetic flux density, the distance between the electrodes and the average flow velocity of the fluid.



Detector type II

Flange process connection

Size DN 6 – 2000
Nominal pressure up to PN 100

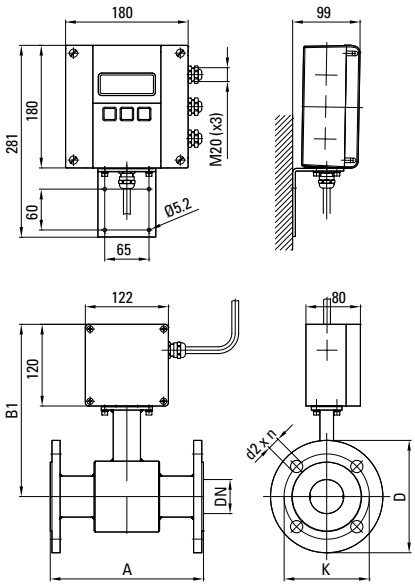
The electromagnetic detector type II is not only available in a number of different flange process connections (DIN, ANSI, JIS, AWWA, etc.) but also in a number of liners like hard rubber, soft rubber, PTFE, PFA or Halar.
The detector can be configured with up to four electrodes for measuring, empty pipe and grounding electrodes.

Available in sizes from DN 6 to DN 2000 and nominal pressures up to PN 100, the detector type II is best suited for a variety of applications in the industry and the water/waste water industry.

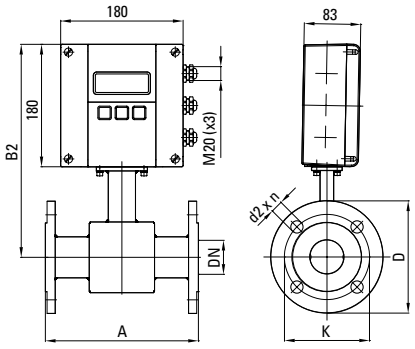
Lined measuring pipes with materials approved for drinking water: KTW/DVGW, NSF-61, WRAS, ACS.

Technical data			
Size	DN 6 – 2000 (1/4"...80")		
Process connections	Flange: DIN, ANSI, JIS, AWWA, etc.		
Nominal pressure	Up to PN 100		
Protection class	IP 67, optional IP 68		
Min. conductivity	5 µS/cm (20 µS/cm for demineralized water)		
Liner materials	Hard / soft rubber	from DN 25	0 up to +80 °C
	PTFE	DN 6 – 600	-40 up to +150 °C
	Halar (ECTFE)	from DN 300	-40 up to +150 °C
Electrodes materials	Hastelloy C (standard) Tantal Platinum / Gold plated Platinum / Rhodium		
Housing	Carbon steel / Optional stainless steel		
Lay length	DN 6 – 20	170 mm	
	DN 25 – 50	225 mm	
	DN 65 – 100	280 mm	
	DN 125 – 200	400 mm	
	DN 250 – 350	500 mm	
	DN 400 – 700	600 mm	
	DN 750 – 1000	800 mm	
	DN 1200 – 1400	1000 mm	
	DN 1600	1600 mm	
	DN 1800	1800 mm	
	DN 2000	2000 mm	

Flange process connection
Wall mounted



Flange process connection
Meter mounted



Dimensions (mm)

DN		A Std*	A ISO**	B 1	B 2	with ANSI flanges Ø D	Ø K	Ø d2 x n	with DIN flanges Ø D	Ø K	Ø d2 x n
6	1/4"	170	–	228	305	88,9	60,3	15,9 x 4	90	60	14 x 4
8	3/10"	170	–	228	305	88,9	60,3	15,9 x 4	90	60	14 x 4
10	3/8"	170	–	228	305	88,9	60,3	15,9 x 4	90	60	14 x 4
15	1/2"	170	200	238	315	88,9	60,3	15,9 x 4	95	65	14 x 4
20	3/4"	170	200	238	315	98,4	69,8	15,9 x 4	105	75	14 x 4
25	1"	225	200	238	315	107,9	79,4	15,9 x 4	115	85	14 x 4
32	1 1/4"	225	200	253	330	117,5	88,9	15,9 x 4	140	100	18 x 4
40	1 1/2"	225	200	253	330	127	98,4	15,9 x 4	150	110	18 x 4
50	2"	225	200	253	330	152,4	120,6	19 x 4	165	125	18 x 4
65	2 1/2"	280	200	271	348	177,8	139,7	19 x 4	185	145	18 x 4
80	3"	280	200	271	348	190,5	152,4	19 x 4	200	160	18 x 8
100	4"	280	250	278	355	228,6	190,5	19 x 8	220	180	18 x 8
125	5"	400	250	298	375	254	215,9	22,2 x 8	250	210	18 x 8
150	6"	400	300	310	387	279,4	241,3	22,2 x 8	285	240	22 x 8
200	8"	400	350	338	415	342,9	298,4	22,2 x 8	340	295	22 x 12
250	10"	500	450	362	439	406,4	361,9	25,4 x 12	395	350	22 x 12
300	12"	500	500	425	502	482,6	431,8	25,4 x 12	445	400	22 x 12
350	14"	500	550	450	527	533,4	476,2	28,6 x 12	505	460	22 x 16
400	16"	600	600	475	552	596,9	539,7	28,6 x 16	565	515	26 x 16
450	18"	600	–	500	577	635,0	577,8	31,7 x 16	615	565	26 x 20
500	20"	600	–	525	602	698,5	635,0	31,7 x 20	670	620	26 x 20
550	22"	600	–	550	627	749,3	692,1	34,9 x 20	–	–	–
600	24"	600	–	588	665	812,8	749,3	34,9 x 20	780	725	30 x 20
650	26"	600	–	613	690	869,9	806,4	34,9 x 24	–	–	–
700	28"	600	–	625	702	927,1	863,6	35,1 x 28	895	840	30 x 24
750	30"	800	–	650	727	984,2	914,4	34,9 x 28	–	–	–
800	32"	800	–	683	760	1060,5	977,9	41,3 x 28	1015	950	33 x 24
850	34"	800	–	708	785	1111,2	1028,7	41,3 x 32	–	–	–
900	36"	800	–	725	802	1168,4	1085,8	41,3 x 32	1115	1050	33 x 28
950	38"	800	–	750	827	1238,3	1149,4	41,3 x 32	–	–	–
1000	40"	800	–	790	867	1346,2	1257,3	41,3 x 36	1230	1160	36 x 28
1200	48"	1000	–	900	977	1511,5	1422,4	41,3 x 44	1455	1380	39 x 32
1350	54"	1000	–	975	1052	1682,8	1593,9	47,8 x 44	–	–	–
1400	56"	1000	–	1000	1077	–	–	–	1675	1590	42 x 36

Standard		
with ANSI flanges	from DN 6 to 1400	Lbs 150
with DIN flanges	from DN 6 to 200	PN 16
	from DN 250 to 1400	PN 10

*Standard **ISO 13359
Sizes DN 1600 – 2000 upon request.

Sanitary detector for food

Process connections Tri-Clamp® BS 4825/ISO 2852, DIN 11851

Size DN 10 – 100

Nominal pressure PN 10/16

Technical data			
Size	DN 10 – 100 (3/8"...4")		
Process connections	Tri-Clamp® BS 4825/ISO 2852, DIN 11851 among others		
Nominal pressure	PN 10/16		
Protection class	IP 65, optional IP 68		
Min. conductivity	5 µS/cm (20 µS/cm for demineralized water)		
Liner materials	PTFE	-40 up to +150 °C	
Electrodes materials	Hastelloy C (standard) Tantal Platinum / Gold plated Platinum / Rhodium		
Housing	Stainless steel		
Lay length	Tri-Clamp® connection	DN 10 – 50	145 mm
		DN 65 – 100	200 mm
	DIN 11851 connection	DN 10 – 20	170 mm
		DN 25 – 50	225 mm
		DN 65 – 100	280 mm

Dimensions (mm)
Type Food Tri-Clamp®

DN		A	B 1	B 2	D
10	3/8	145	228	305	74
15	1/2"	145	228	305	74
20	3/4"	145	228	305	74
25	1"	145	228	305	74
40	1 1/2"	145	238	315	94
50	2"	145	243	320	104
65	2 1/2"	200	256	333	129
80	3"	200	261	338	140
100	4"	200	269	346	156

Pressure rate PN 10

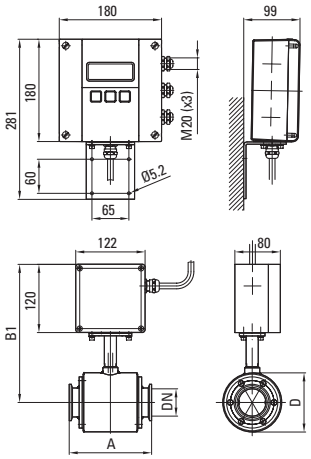
Dimensions (mm)
Type Food DIN 11851

DN		A	B 1	B 2	D
10	3/8"	170	238	315	74
15	1/2"	170	238	315	74
20	3/4"	170	238	315	74
25	1"	225	238	315	74
32	1 1/4"	225	243	320	84
40	1 1/2"	225	248	325	94
50	2"	225	253	330	104
65	2 1/2"	280	266	343	129
80	3"	280	271	348	140
100	4"	280	279	356	156

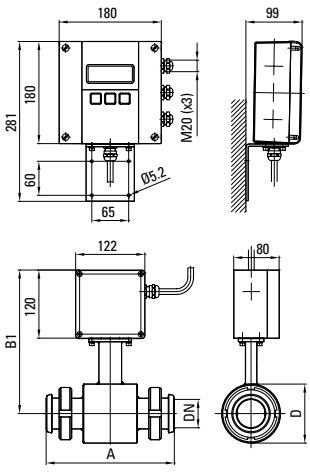
Pressure rate PN 16

The sanitary detector was developed for the flow measurement of liquid food. This model is available with Tri-Clamp® BS 4825/ISO 2852, DIN 11851 process connections and also with any special connections (customer specifications). The sanitary detector is delivered in a stainless steel housing and with PTFE lining.

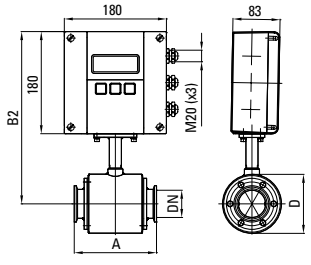
Tri-Clamp® process connection
Wall mounted



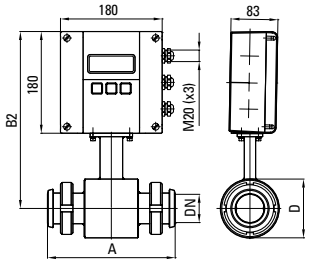
DIN 11851 process connection
Wall mounted



Tri-Clamp® process connection
Meter mounted



DIN 11851 process connection
Meter mounted



Detector type III

Wafer connection

Size DN 25 – 100

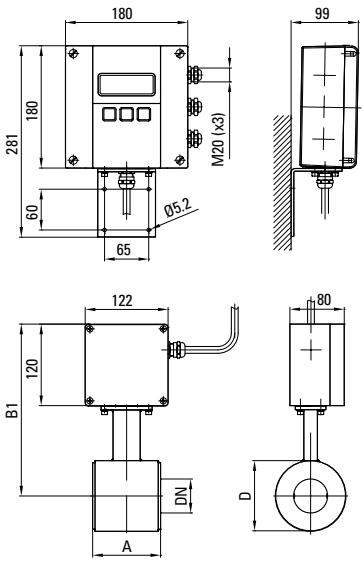
Nominal pressure PN 40

Thanks to its very short lay length, the detector type III is often the right alternative to a lot of applications. Delivered with a PTFE liner, the detector type III has a standard nominal pressure of PN 40.

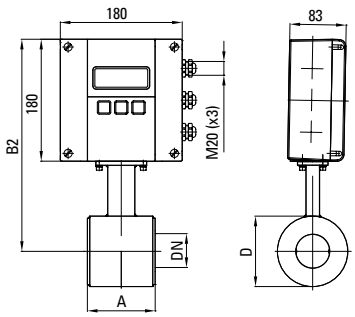
Technical data

Size	DN 25 – 100 (1"...4")	
Process connection	Wafer connection, (in-between flange mounting)	
Nominal pressure	PN 40	
Protection class	IP 65, optional IP 68	
Min. conductivity	5 µS/cm (20 µS/cm for demineralized water)	
Liner materials	PTFE	-40 up to +150 °C
Electrodes materials	Hastelloy C (standard) Tantal Platinum / Gold plated Platinum / Rhodium	
Housing	Carbon steel / optional stainless steel	
Lay length	DN 25 – 50	100 mm
	DN 65 – 100	150 mm

Wafer connection
Wall mounted



Wafer connection
Meter mounted



Dimensions (mm)

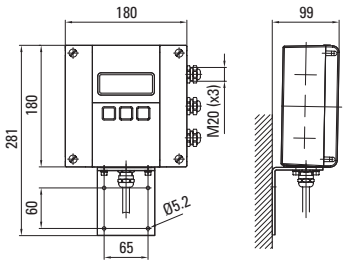
DN		A	B 1	B 2	D
25	1"	100	238	315	74
32	1 1/4"	100	243	320	84
40	1 1/2"	100	248	325	94
50	2"	100	253	330	104
65	2 1/2"	150	266	343	129
80	3"	150	271	348	140
100	4"	150	279	356	156

Pressure rate PN 40

Amplifier type ModMAG® M 2000

for all detectors

Dimensions



Accuracy ±0,25 % of actual flow (optional ±0,2 %)

Flow range 0,03 – 12 m/s

DN 6 – DN 2000

IP 67 housing

Interfaces ModBus®, HART, M-Bus, Profibus DP

Technical data	
Power supply	85 – 265 VAC, 45 – 65 Hz, <20 VA or optional 9 – 36 VDC
Analog output	0/4 – 20 mA, ≤ 800 ohms, flow direction is displayed upon a separate status output
Pulse / Frequency output	24 V active, 20 mA, 30 V passive, 100 mA (open collector) max. 10 kHz
Status output	Min./max. alarm, preselection meter, flow direction, error message
Medium control EPD	Separate electrode
Programming	3 keys
Interface	RS 232/485, ModBus® RTU, HART, M-Bus, Profibus DP
Datalogger	Internal (optional)
Flow range	0,03 – 12 m/s
Accuracy	≥0,5 m/s better ±0,25 % of actual flow <0,5 m/s ±1,25 mm/s of actual flow
	ModMAG® M 2000 SC: ≥0,5 m/s better ±0,2 % of actual flow
Repeatability	0,1%
Flow direction	Bi-directional
Pulse length	Programmable up to 10 s
Outputs	Short circuit safe and galvanically isolated
Low flow cut off	0 – 10 %
Parameter back-up function	Optional
Display	LCD, 4 lines / 20 characters, backlight, actual flow, 2 totalizers, status display
Housing	Powder coated aluminium die cast
Protection class	IP 67
Cable insertion	Power and signal cable (outputs) 3 x M 20
Signal cable	From detector M 20
Ambient temperature	-20 up to +60 °C

The amplifier type ModMAG® M 2000 is best suited for bidirectional flow measurement of fluids with a conductivity > 5 µS/cm (> 20 µS/cm for demineralized water). ModMAG® M 2000 shows a high accuracy, is easy to use and can be chosen for a large and flexible applications spectrum.
The backlight, four-line display shows all actual flow measuring data, daily and complete information, including alarm messages.

The standard amplifier has 4 programmable digital outputs, one digital input, analog output and different interfaces.
Integrated system self check-up makes the putting into operation and the service easier.

Verification Device

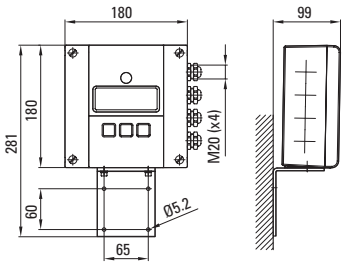
The verification device enables the electromagnetic flow meters types ModMAG® M 2000 and B-MAG™ | M 5000 to be checked on site in regular time intervals at a low cost and without interruption of the process.
All important parameters of the flow meter are measured, protocoled and evaluated.

Amplifier type B-MAG™ | M 5000

for flanged process connections

B-MAG™ Battery Operated | M5000

Dimensions



Up to 20 years battery life span
Accuracy better than ±0,5 %
Measuring range of 0,03 to 12 m/s
Sizes from DN 15 to DN 600
LCD display
IP 67 / IP 68 protection class
IrDA, ModBus® RTU, M-Bus interfaces

The B-MAG™ | M 5000 is a battery-powered electromagnetic flow meter with a very high accuracy even at very low flows. The excellent repeatability as well as the above-average battery life makes this innovative water meter indispensable for the water market. Typical applications are leak detection in water networks, water consumption measurements and irrigation plants.

The meter is best suited for applications without a power supply where exact consumption or flow rates are required. Of course, the B-MAG™ | M 5000 can also be used with an available power supply. The meter can be powered with main voltage and in case of a main failure, it is powered by an internal battery. Important data are consequently saved.

The B-MAG™ | M 5000 has been designed for very harsh environmental measurement conditions. The meter has no moving parts and can be used to measure water containing particles like sand or gravel. The B-MAG™ | M 5000 is encased in an IP 67 housing (optional IP 68), which makes it a reliable meter even when submerged.

The standard meter is equipped with an internal datalogger which can read-out via an IrDA or M-Bus with ModBus® RTU protocol. The collected data can also be retrieved via radio frequency or GSM/GPRS. The data can thus be centrally compiled and evaluated.

Technical data	
Power supply	Internal Lithium batteries 3,6 V Optional battery back-up model (AC/DC)
Sizes	DN 15 to DN 600 (PTFE / hard rubber)
Battery life span	10 years, optional 20 years
Display	LCD, 2 lines
Programming	3 keys
Measuring range	0,03 – 12 m/s
Accuracy	±0.5 % accuracy of rate ±0.5 % accuracy 2,5 mm/s of rate
Repeatability	±0.1 %
Minimum fluid conductivity	20 µs/cm
Flow direction	Bidirectional
Medium control EPD	Separate electrode
Digital outputs	4 x open collector, passive 30 VDC/20 mA, max. 100 Hz
Status outputs	Min./max. alarm, flow direction, failure report
Serial communication	ModBus® RTU, IrDA, M-Bus External AMR or GSM/GPRS module (optional)
Datalogger	Integrated
Low-flow cut off	0 – 10 %
Pulse width	Programmable up to 500 ms.
Housing	Powder coated cast aluminium
Protection class	IP 67 (IP 68 optional)
Cable entry	Signal cable (outputs) M 20
Signal cable	From detector M 20
Remote version	Max. 30 m
Ambient temperature	-20 °C to 60 °C

Amplifier type ModMAG® M 1000 / M 1500

for all detectors

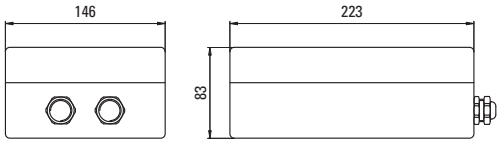
The low cost alternative
Accuracy ±0,5 % of actual flow
Flow range 0,03 – 12 m/s
Power supply 24 VDC / 115 VAC / 230 VAC

Technical data	
Power supply	24 VDC optional 115 / 230 VAC (50 / 60 Hz), 10 VA
Accuracy	±0,5 % of actual flow, ≥ 0,5 m/s ±2,5 mm/s of actual flow, < 0,5 m/s
Repeatability	< 0,1 % of full scale
Flow range	0,03 – 12 m/s
Conductivity	Min. 5 µS/cm (min. 20 µS/cm for demineralized water)
Flow direction	Bi-directional
Display, M 1500 only	LCD, 4 lines / 16 characters, backlit Actual flow, 3 totalizers, status display
Programming	Upon RS 232 or optional via 3 buttons
Interface	RS 232 for measuring values and programming
Analog output	4 – 20 mA passive, optional active Flow direction is displayed upon a separate status output
Pulse output	Passive, optional active 2 open collectors Passive 24 VDC, 50 mA, max. 10 kHz
Frequency output	Max. 10 kHz (open collector)
Status output	Min./max. alarm, preselection, flow direction, error message, free configurable
Empty pipe detection	Separate electrode
Low flow cut off	0 – 10 %
Housing	Powder coated aluminium die cast, optionally in stainless steel
Protection class	IP 65
Cable insertion	2 x M 20
Ambient temperature	-20 up to 60 °C

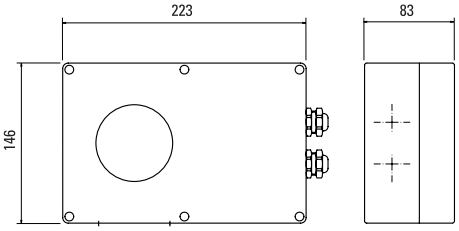
ModMAG® M 1000 has been designed to fit into the MAG meter series and especially for applications in machinery plants, vehicles and batching processes.
The applications range from DN 6 to DN 200 with the most various process connections like DIN flanges, dairy pipe connections, TriClamp®, etc.
The basic line of ModMAG® M 1000 is provided with 24 VDC power supply, without display, with passive outputs and can be programmed via a serial port RS 232. The device can also, upon request, be factory preconfigured and then just needs to be electrically connected on site.

The ModMAG® M 1000 is encased into a powder-coated aluminium diecast housing IP 65 and has two M 20 screws. The basic line can be, upon request, provided with a four-line LC display (for ModMAG® M 1500), a 115/230 VAC power supply and active pulse and analog outputs.
The standard model ModMAG® M 1000 is supplied with an analog output, two digital outputs for pulse and frequency as well as a digital input. With an accuracy of ±0,5 % of actual flow (> 0,5 m/s) and flow measurements ranging between 0,03 and 12 m/s in both directions, the flow meter covers a great variety of applications.

Dimensions
ModMAG® M 1000



Dimensions
ModMAG® M 1500



Amplifier type ModMAG® M 3000 / 4000

for all detectors

Ex-proof

Protection class IP 67

Accuracy ±0,25 % of actual flow

Flow range 0,03 – 12 m/s

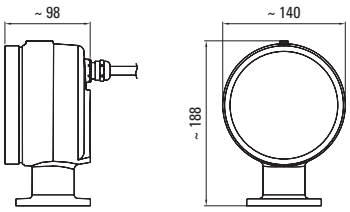
The amplifier with modular design allows flow measurements in ex-zones 1 and 2, in either the mounted or remote version.

The amplifier housing, made of powder-coated aluminium, is available in protection class IP 67 and with a separate connection space. Programming can be done either with closed housing thanks to a magnetic pen or with open housing via three buttons.
The four-line display shows all necessary data like actual flow, totalizer and status messages.

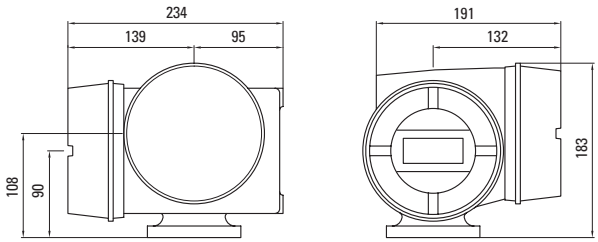
The programmable excitation frequency even enables the amplifier to be adjusted for difficult metering applications. The new developed process for amplifier compensation enables a high accuracy, especially in the lower flow range.

The ModMAG® is especially suited for flow measurements in the chemical and pharmaceutical industry, as well as water and waste water plants with explosion-proof zones.

Dimensions Junction box



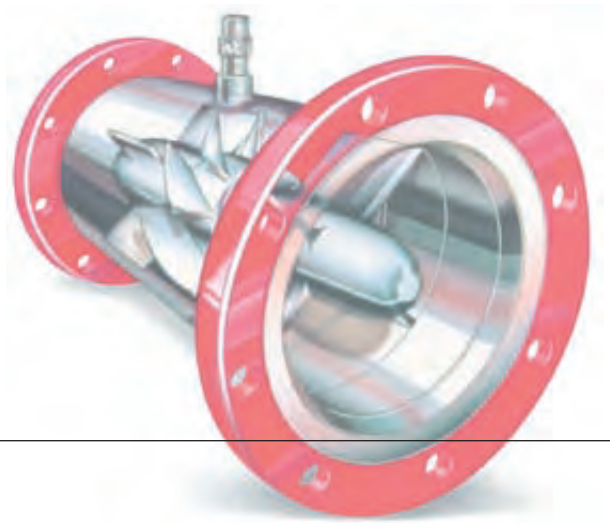
Dimensions
ModMAG® M 3000 / 4000

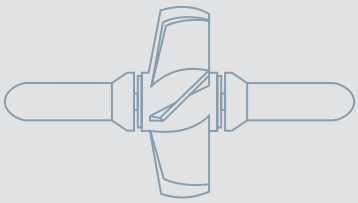


Technical data		
Power supply	85 – 265 VAC, 45 – 65 Hz < 20 VA, optional 24 VDC	
Accuracy	±0,25 % of actual flow, ≥ 0,5 m/s ±1,25 mm/s of actual flow, < 0,5 m/s	
Repeatability	< 0,1 % of full scale	
Flow range	0,03 – 12 m/s	
Conductivity	Min. 5 µS/cm (min. 20 µS/cm for demineralized water)	
Flow direction	Bi-directional	
Display	LCD, 4 lines / 16 characters, backlit Actual flow, 3 totalizers, status display	
Programming	3 buttons or via magnetic pen	
Interface	RS 232 for measuring values and programming	
Analog output	0/4 – 20 mA ≤ 750 ohms Flow direction is displayed upon a separate status output	
Pulse output	Active / passive selectable	
	2 open collectors and 2 solid state relays	
	Open collector	Active 18 VDC, 25 mA
		Passive 24 VDC, 20 mA (max. 0,5 W)
	AC solid state relay: max. 24 VAC, 500 mA	
Frequency output	Max. 10 kHz (open collector)	
Status output	Min./max. alarm, preselection, flow direction, error message, free configurable	
Empty pipe detection	Separate electrode	
Low flow cut off	0 – 10 %	
Housing	Powder coated aluminium die cast	
Protection class	IP 67	
Cable insertion	3 x M 20	
Ambient temperature	-20 up to +60 °C	
Ex-proof version	FM/CSA class I, div. 1 / div. 2 M 3000 II 3 G Ex nA ia IIC T3 M 4000 II 2 G Ex d e ia IIC T3	

Turbine meters

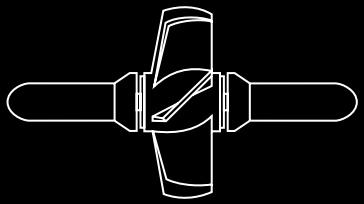
Turbine meters are only meant for applications with low viscosity fluids and gases.





Measuring principle

Turbine meters are volumetric meters. When the fluid passes through, a rotor is activated and the movement is either electronically or mechanically transmitted outside.



Cx series and LoFlo™ series with single rotor

for standard and low flow applications

Ceramic ball bearings
Large flow range
High repeatability
Long lifetime

The standard turbine meters of the Cx series are more used in applications like coolant for cutting and forming operations, process control flow measurement, component test stands for the military, batch flow metering, fuel consumption measurement in machines, motors and actuator aggregates, as well as for a great number of R&D applications.

Coupled with an advanced EC 80 flow computer, these meter systems provide fully compensated precision flow measurements. The EC 80 flow computer will linearize the meter within ±0,1 % linearity over the entire repeatable range.

The robust axial meters of the LoFlo™ series provide an exceptional repeatability of ±0,25 % of reading. When paired with the EC 80 flow computer, the calibration data is linearized to within ±0,1 % of reading, allowing for precision flow measurement over the entire usable range of the meter. The series is not position-sensitive and can be mounted in any piping orientation.

The custom long-life, ceramic low-friction ball bearing system used in the LoFlo™ series meets the demands of water, hydrocarbons and cryogenic fluids. Capable of measuring flows as low as 0,024 l/min, this meter is an ideal solution for a multitude of applications.
Typical uses include fuel injection production systems, blending of costly chemical additives, onboard fuel consumption, refrigerants, dye injections, and more.

Cox is a division of Badger Meter, Inc.

Technical data: Cx series	
Calibrator uncertainty	< ±0,05 % of reading
Accuracy	±0,25 % of reading
Repeatability	±0,02 % of reading
Linearity with electronic linearizer	±0,5 % of reading ±0,1 % of reading
Max. frequency output	500 to 1500 Hz standard
Output signal	0 – 10 V (square wave pulse)
Response time	2 – 3 mS or better

Technical data: LoFlo™ series	
Accuracy	±0,25 % of reading
Repeatability	±0,25 %
Frequency output	1500 – 1800 Hz
Pressure rating	40 bar
Response time	20 – 30 mS
Body construction	316 SST, fittings -6 AN (MS)

Exact™ series with dual rotor

for highly-precise flow measurement

No need for flow straighteners

Enhanced performance due to helical rotors

Superior absolute accuracy

Excellent repeatability

Wide operating flow range

Extended UVC* flow range

Integral pickoff impervious to vibration

NVLAP calibration

The Exact™ series is the world's most precise meter of its kind, providing extended range performance not obtainable with traditional single rotor designs. It is used for aerospace, automotive, industrial and OEM applications.

The Exact™ series provides an extended flow range capability, which often eliminates the need for manifold systems and thus simplifies installation and lowers costs. The meter's exceptional performance, enabled by the innovative dual rotor configuration. UVC* curves improve the accuracy and extend the usable measurement flow range.

With the Exact™ series (standard model CDX/CDL), flow straighteners are not required to control process fluid swirl, as the dual rotor system cancels out the rotor acceleration effect. With flow straighteners, bearing diagnostics can be determined by monitoring the ratio of the rotors to detect wear or cleanliness. The Exact™ series meters also utilize a unique pickoff system, which is impervious to vibration and minimizes space. This allows for direct coupling of electronics on a robust mount having a lower profile. Both integral and remote electronics are available to process the signal output.

The dual rotor technology is ideal for a wide range of applications. The meter is designed for bi-directional flow and high shock environments. It utilizes a robust bearing system having dual ceramic bearings on each rotor with the internals securely locked in place, resulting in excellent repeatability. The dual rotor meter allows for installation in applications that do not have space for flow straighteners without loss of measurement accuracy. Pressures of up to 2065 bar can be contained, while compensating for viscosity changes using integrated pressure sensors.

Cox is a division of Badger Meter, Inc.

*UVC = Universal viscosity curve

Technical data	
Calibration uncertainty	< ±0,05 % of reading
Accuracy	±0,1 % of reading
Repeatability	±0,02 % of reading
Linearity (with linearizer)	±0,01 % of reading
Process temperature	-270 °C to +150 °C standard
Operating pressure	Up to 2065 bar depending on size and end-fittings
Pressure drop	0,9 bar at max. flow rate @1,2 cSt
Bearing	Ceramic std. (water and hydrocarbons)

Turbine meter type VISION® 1000

for low viscosity, non-aggressive liquids, for very low flows

Good price/performance ratio

Compact construction

Easy installation

No maintenance

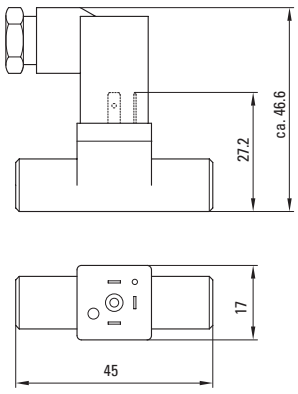
High operating pressure

Operates in any mounting position

The turbine meters of the VISION® series are for the exact metering of small quantities of liquids.
The actual flow as well as the flow already flowed through can be measured.
The VISION® 1000 series is best suited for small flow rates up to 2,5 l/min.

The meters are best suited for flow measurement of demineralized water, alkaline solutions, oils/ salad oil, fuel oil, beverage, water solutions or for fuel and fuel consumption. They are especially ideal for washing maschines and dish washers, coffee machines, laser cooling plants, solar plants, backery and steam cooking machines in large kitchen plants or CD cleaning.

Dimensions



Technical data	
Material	Trogamid (PA 12)
Viscosity range	0,8 – 16 mm²/sec
Accuracy	±3 % of value
Repeatability	< 0,50 %
Temperature range	-20 up to +100 °C
Operating pressure	Max. 25 bars
Burst pressure	200 bars
Electrical connection	Electrical connector EN 60529
Power supply	5 – 24 VDC
Current consumption	Ca. 8 mA
Output signal	Open collector NPN pulse
Pull-down resistor	1 – 2,2 kOhms
Process connections	G 1/4", NPT 1/4"

Specifications	
Type	1000 2F66
Measuring range l/min	0,1 – 2,5
K factor PPL*	18.500
Size DN (mm)	5
* PPL = pulses / liter	

Pressure drop in bars for water	
Type	1000 2F66
0,5 l/min	0,02
1 l/min	0,05
1,5 l/min	0,15
2,5 l/min	0,25

Turbine meter type VISION® 2000

for low viscosity, non-aggressive liquids, for very low flows

Good price/performance ratio

Compact construction

Easy installation

No maintenance

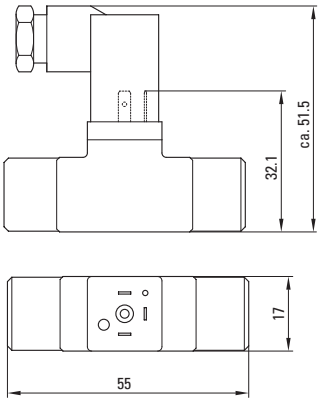
High operating pressure

Operates in any mounting position

The turbine meters of the VISION® series are for the exact metering of small quantities of liquids.
The actual flow as well as the flow already flowed through can be measured.
The VISION® 2000 series is used for flow rates up to 35 l/min.

The meters are best suited for flow measurement of demineralized water, alkaline solutions, oils/ salad oil, fuel oil, beverage, water solutions or for fuel and fuel consumption. They are especially ideal for washing maschines and dish washers, coffee machines, laser cooling plants, solar plants, backery and steam cooking machines in large kitchen plants or CD cleaning.

Dimensions



Specifications

Type	2006 4F 44	2006 2F 66	2008 4F 16,5	2008 4F 23	2008 4F 44	2008 2F 66
Measuring range l/min	1 – 10	0,5 – 5	2 – 35	1,5 – 25	1 – 15	0,5 – 7,5
K factor PPL*	3300	6900	700	1000	2200	4600
Size DN (mm)	6	6	8	8	8	8

* PPL = pulses / liter

Pressure drop in bars for water

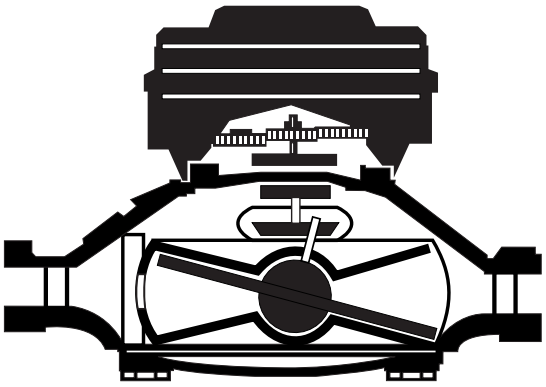
Type	2006 4F 44	2006 2F 66	2008 4F 16,5	2008 4F 23	2008 4F 44	2008 2F 66
0,5 l/min	–	–	–	–	–	–
1 l/min	~ 0	~ 0	~ 0	~ 0	~ 0	~ 0
1,5 l/min	–	–	–	–	–	–
2 l/min	0,06	~ 0	~ 0	~ 0	0,05	~ 0
5 l/min	0,2	0,12	~ 0	0,05	0,2	0,05
10 l/min	0,7	0,4	~ 0,12	0,17	0,4	0,2
15 l/min	–	0,9	~ 0,25	0,27	–	0,4
20 l/min	–	1,3	~ 0,45	0,48	–	0,7
25 l/min	–	–	~ 0,60	0,65	–	–
30 l/min	–	–	~ 0,92	0,97	–	–

Technical data

Material	Grilamid TR 55 (PA 12)
Viscosity range	0,8 – 16 mm²/sec
Accuracy	±3 % of value
Repeatability	< 0,50 %
Temperature range	-20 up to +100 °C
Operating pressure	Max. 25 bars
Burst pressure	200 bars
Electrical connection	Electrical connector EN 60529 or cable connection
Power supply	5 – 24 VDC
Current consumption	Ca. 8 mA
Output signal	Open collector NPN pulse
Pull-down resistor	1 – 2,2 kOhms
Process connections	G 3/8", NPT 3/8", O-ring

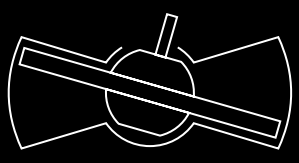
Nutating disc meters

Nutating disc meters are best suited to measure flow and volume of low and medium viscosity fluids.



Measuring principle

Nutating disc meters are positive displacement meters. The top and lower part of the meter chamber are cone shaped. A ball bearing centralizes the disc between the two cones.
A nutating motion of the disc is generated when flow enters the meter chamber. Complete separation between inlet and outlet chamber volumes is always achieved by one dedicated disc diameter line. The inlet and outlet parts of the meter chamber are separated by a partition plate. The positioning bar forces the disc to nutate around the center axis of the chamber, driving the transmission magnet.



Recordall® fluid meter

for clean and moderately dirty fluids

Magnetic coupling

Compatible with many liquids

Wide flow range

Low pressure loss

Light weight

The Recordall® series is a positive displacement meter. The series is best suited for metering fluids up to a viscosity of 700 mPas and at an operating temperature of 50 °C up to 120 °C.

Typical applications are: Clean and moderately dirty liquids, hard and soft water, oils, fuel, solvents, etc.

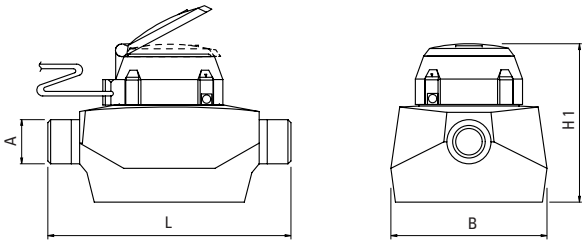
The metering chamber includes disc, positioning bar and transmission magnet. The chamber is inserted into the meter body. A screen in the inlet side of the body protects the chamber against penetration of larger solid particles.

The meter system is modular and enables the combination of mechanical or electronic displays with any meter size.

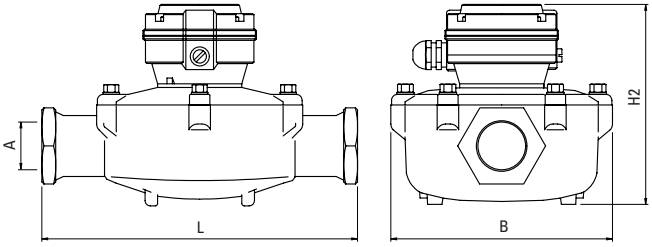
RCDL M 25 for AdBlue®

see page 24

Dimensions
Plastic model



Dimensions
Bronze model



Dimensions (mm)

Type	M 25			M 35	M 40		M 70	M 120	M 170
	Plastic	Bronze	Stainless	Bronze	Plastic	Stainless	Bronze	Bronze	Bronze
		Nickel coated	steel	Nickel coated		steel	Nickel coated	Nickel coated	Nickel coated
Connection A	R 3/4", 1"	R 3/4", 1"	R 1"	R 1"	R 1 – 1/4"	R 1 1/4"	R 1 – 1/4"	1 – 1/2" NPT	2" NPT
Lay length L	190	190	190	230	270	230	270	321	387
Width B	122	122	110	133	151	135	184	223	240
Height register H 1	125	125	130	132	150	130	165	178	204
Height transmitter H 2	128	128	155	168	180	160	200	213	239

Technical data

Type	M 25			M 35	M 40		M 70	M 120	M 170
	Plastic	Bronze	Stainless	Bronze	Plastic	Stainless	Bronze	Bronze	Bronze
		Nickel coated	steel	Nickel coated		steel	Nickel coated	Nickel coated	Nickel coated
Size DN	15, 20	15, 20	20	20	25	25	25	40	50
Nominal pressure PN	16	16	16	16	16	16	16	16	16
Max. temperature (PPO)	50 °C	50 °C	50 °C	50 °C	50 °C	50 °C	50 °C	50 °C	50 °C
Max. temperature (Vectra)	–	120 °C	120 °C	–	–	–	120 °C	120 °C	–
Flow range l/min (PPO)	1 – 100	1 – 100	1 – 100	2 – 132	2 – 160	2 – 160	4 – 265	8 – 454	8 – 643
Flow range l/min (Vectra)	–	3 – 100	3 – 100	–	–	–	19 – 265	18 – 454	–
Accuracy (1:10)	±0,5 %	±0,5 %	±0,5 %	±0,5 %	±0,5 %	±0,5 %	±0,5 %	±0,5 %	±0,5 %
Accuracy (total range)	±1,5 %	±1,5 %	±1,5 %	±1,5 %	±1,5 %	±1,5 %	±1,5 %	±1,5 %	±1,5 %
Weight	1,2 kg	1,8 kg	5,8 kg	2,7 kg	1,8 kg	7 kg	5,5 kg	10,5 kg	13,6 kg

Materials

Type	M 25			M 35	M 40		M 70	M 120	M 170
Housing	Nylon	Bronze	Stainl. steel	Bronze	Polycarbo-	Stainl. steel	Bronze	Bronze	Bronze
		Nickel coated	1.4571	Nickel coated	nate	1.4571	Nickel coated	Nickel coated	Nickel coated
Measuring chamber	PPO / Vectra	PPO / Vectra	PPO / Vectra	PPO	PPO	PPO	PPO / Vectra	PPO / Vectra	PPO
O-rings	Buna / Viton	Buna / Viton	Buna / Viton	Buna	Buna	Buna	Buna / Viton	Buna / Viton	Buna
Retainer strap (PPO)	Nylon								
Retainer strap (Vectra)	Stainless steel 316 / 316 S/S								
Screen	PPO								
Bottom (PPO)	Nylon	Cast iron	Stainl. steel	Cast iron	Polycarbonate	Stainl. steel	Cast iron	Cast iron	Cast iron
		C Nickel coat.		C Nickel coat.			C Nickel coat.	C Nickel coat.	C Nickel coat.
Bottom (Vectra)	–	Bronze	Stainl. steel	–	–	Stainl. steel	Bronze	Bronze	–
		B Nickel coat.		B Nickel coat.			B Nickel coat.	B Nickel coat.	B Nickel coat.
Retainer ring	Nylon	–	–	–	Polycarbonate	–	–	–	–
Magnet	Barium/Ferrite								
Crossbar	Nylon								
Thrust roller	Nylon								
Roller insert	Stainless steel 316 / 316 S/S								

Meters for AdBlue® and aggressive media

RCDL M 25, in-line meter LM OG-I-PVC, pulse transmitter LM OG-TI-PVC

Magnetic coupling
Rugged construction
Light weight
Modular series

The ultra pure 32,5 % urea solution, also known under the name of AdBlue®, is the basis for the reduction of toxic nitric oxides in exhaust gases from diesel operated goods vehicles.
AdBlue® is made synthetically. The high purity and quality are DIN V 70070 certified.
AdBlue® can be metered with a plastic Recordall® RCDL M 25 or M 40. All Badger Meter registers can be mounted on the meters.

Technical data

Type	RCDL M25	LM OG-I-PVC	LM OG-TI-PVC
Connection	R 3/4", R1"	1/2" BSPP	1/2" BSPP
Max. operating pressure	16 bars	10 bars	10 bars
Flow range	1 – 100 l/min	0,5 – 35 l/min	0,5 – 35 l/min
Temperature range	50 °C	-10 to +50 °C	-10 to +50 °C
Accuracy	±1,5 %	±0,5 %	±0,5 %
Viscosity range	–	1 – 5000 mPas	up to 2000 mPas
Pulse per liter	100 ppl	–	100 ppl
Lay length	190 mm	–	–

Batch systems

F 110

Totalizer, from easy display up to batch controller

PC 100

High quality batch system for all batch applications

ER-10

Totalizer, reversible to flow display with pulse output

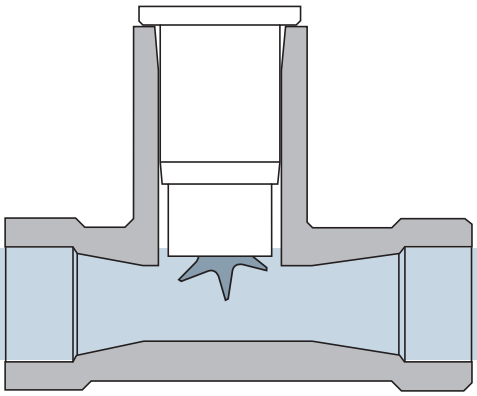
CUB 5

Multifunction register with two counters and flow displays

The meters for irrigation systems, building management and the general industry

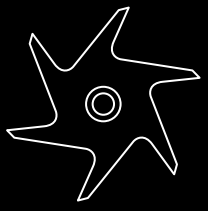
Impeller meters

Impeller meters are a low cost alternative in irrigation systems (sprinklers, chemical injection processes in water treatment, water management, etc.), in municipalities (fluoridation, pump control, etc.) in the energy management (HVAC, building management, energy consumption monitoring, etc.) and in the general industry (batch processes for bakeries, adding color dye to water for textile, food processing, inks, and other color additive mixtures, adding liquid vitamins and nutrients to feed water for livestock, automatisation in the film industry, etc.).



Measuring principle

The series feature a six-bladed impeller design with a proprietary, non-magnetic sensing mechanism. The impeller shape coupled with the absence of magnetic drag provides accuracy and repeatability throughout the flow range of the sensors. As the liquid flow turns the impeller, a low impedance square wave signal is transmitted with a frequency proportional to the flow rate.



Flow sensors

a great versality

2“ up to 48“
Special models up to 120“
Large temperature range and pressure rates
Bidirectional measurements possible
Very good price / performance ratio

Technical data I: Flow sensors

Type	200				225		226		250	228				4000		SDI	
Material																	
Brass	X				X		X			X						X	
Bronze									X								
Stainless steel		X				X		X			X						X
PVC			X										X	X			
PVDF															X		
PVCS				X													
Carbon steel												X					
Max. temperature in °C	105	150	60		105	150			105	105	150	105	60	60	104	135	150
Potted version (up to 66 °C)	X	X			X	X			X	X	X	X	X				
Max. pressure in bar																	
60 °C / 3 bar				X									X				
7 bar / 20 °C				X													
7 bar / 25 °C													X				
7 bar / 38 °C			X														
9,5 bar / 150 °C												X					
11 bar / 150 °C										X							
12 bar / 38 °C												X					
14 bar / 38 °C										X							
17 bar / 150 °C							X	X									
20 bar / 38 °C					X												
14 bar / 150 °C					X	X											
22 bar / 150 °C	X	X									X						
24 bar / 22 °C														X			
19 bar / 18 °C															X		
27 bar / 38 °C	X	X					X	X			X						
41 bar / 60 °C																X	
68 bar / 150 °C																	X

The series 200 flow sensor is an insertion style flow sensor constructed of metallic and non-metallic materials. These sensors are designed for service in corrosive and non-corrosive liquids. The series can be installed in pipe sizes of 3“ up to 40“ (special models up to 120“) and includes a special potted version (IR models) for irrigation applications (enabling direct mounting in the earth).

T-type sensors offer another model variation. These models have been designed for indoor or protected area applications such as HVAC, heat / energy monitoring, water cooling systems, pump control and industrial process monitoring.

The 4000 series flow sensor is an inline, flow-through design using a tangential six-bladed impeller. The series is available in 1/2“, 3/4“, 1“ pipe sizes and is molded of PVC or PVDF materials. The compact design allows the 4000 series be used in a wide range of industrial applications, among them the flow measurement of ultra pure water in the semiconductor industry.

The SDI series flow sensor offers unparalleled performance for liquid flow measurement in closed pipe systems. The impeller sensor is well suited for flow control, flow monitoring and batch type applications. The flow meter can be mounted in pipe sizes of 1,5“ up to 48“. This sensor can be used for water applications or as stainless steel version for corrosive fluids at high temperatures and pressure rates. Bidirectional flow measurement or battery driven systems are available as option.

Monitors and transmitters

for all flow sensor series

Universal
Energy monitoring systems
Batch controllers
Various output options

The series 2100 and 3000 are versatile flow monitors with alpha-numeric LC display. They can be configured by the user to display actual flow, total flow or other parameters like optional relay status.

The batch controller type 2200 enables a large variety of flow batch processes which require volumetric or time based measurements.

Models 2300 and 3050 together with flow sensors of series 200 or SDI series offer an excellent unit for energy consumption monitoring in many buildings which are centrally controlled. HVAC processes in residential or large complexes as well as big industrial processes can be monitored.

All flow sensors can be combined with transmitters of the series 300 and 500 thus enabling the connection to overriding plotting systems like SPS or simple monitors.

Technical data: Transmitters

Type 310	Analog output, programmable
320	Pulse output, programmable
330	Relay output, programmable
340	BTU
340 LW - LonWorks®	BTU
340 N2	BTU
340 BN	BTU
380	BTU

Technical data: Monitors

Type 2100	Wall mounted / Control panel mounted
2200	Batch controller
2300	BTU
3000	Wall mounted / Control panel mounted
3050	BTU

Can be extended with signal outputs.

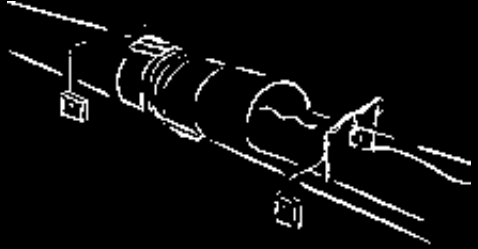
Technical data II: Flow sensors

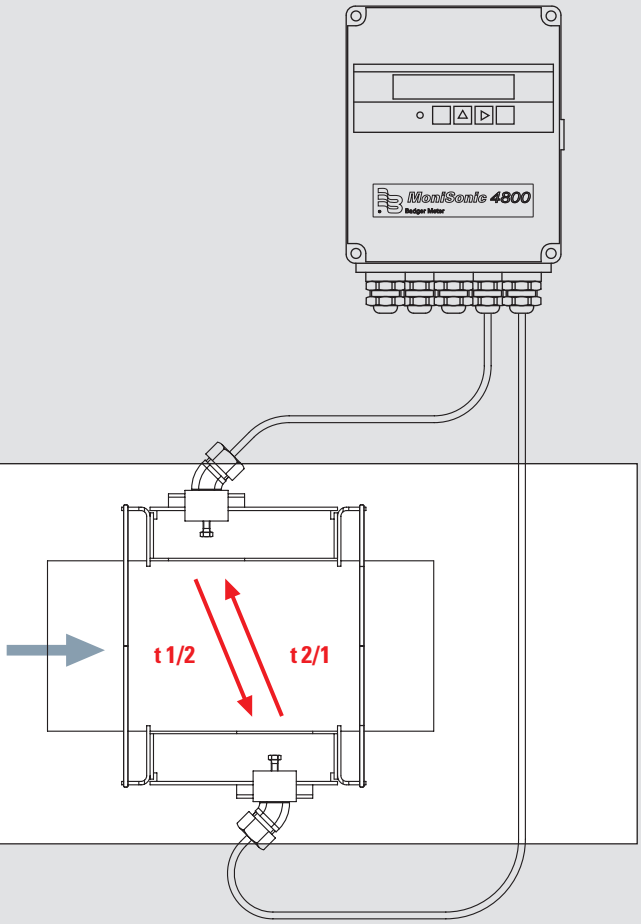
Type	200	225 / 226	250	228		380	4000	SDI
					PVC			
Mounting in pipe sizes DN	80 – 1000	80 – 1200*	6 – 32	50 – 65	32 – 100	20 – 50	6 – 25	32 – 900**
	3 – 40“	3 – 48“	0,5 – 1,5“	2 – 2,5“	1,5 – 4“	3/4 – 2“	0,5 – 1“	1,5 – 36“
Flow range in m/s (standard)	0,15 – 9	0,15 – 9	0,1 – 4,5	0,15 – 9		0,1 – 4,5	0,6 – 6	0,1 – 6
Flow range in m/s (low flow)							0,09 – 2,5	
Accuracy (full scale / Qmax.)	±1 %	±1 %	±1 % v. M.	±1 %		±3 %	< 1 %	±1 %
Accuracy (of reading)	±4 %	±4 %						
Repeatability (full scale / Qmax.)	±0,3 %	±0,3 %	±0,7 %	±0,3 %		±0,5 %	±0,5 %	±0,5 %

*Special models up to DN 3000 / 120“ **or larger upon request

Ultrasonic flow meters

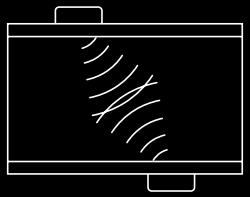
Ultrasonic flow meters are best suited for flow measurement of fluids in pressure pipes as well as in channels and semi-filled pipes.





Measuring principle (transit time)

Ultrasonic signals are alternately sent in and against the flow direction. Ultrasonic energy bursts are transmitted and received via well-defined paths across the flow stream. The velocity of the flow is accurately measured by the difference in the arrival times of signals from the upstream and downstream transducers.
The transit time difference ($\Delta t = t\,2/1 - t\,1/2$) determines the average flow velocity.



Type MoniSonic 4800

Stationary meter for flow measurement in fullfilled pipes

Non-intrusive measurement

Independent from kind of medium and pressure inside of the pipe

±1 % accuracy

Temperature range of -40 °C to +200 °C

For fulfilled pipes

Technical data

Measuring principle	Transit time 1-path		
Housing material	Aluminium		
Mounting	Wall mounting		
Dimensions H x W x D	170 x 142 x 75		
Protection class	IP 66		
Operating temperature range	-20 °C to +55 °C		
Analog outputs	4 – 20 mA, max. load 1 kΩ		
Digital outputs	2 x open collector, 30 VDC / 0,1 A 1 x open collector, 20 VDC / 1 A		
Inputs	1 x (no volt contact)		
Display functions	Actual Q and V, total for- and backward		
Display language	German, English, French, Spanish		
Supply voltage	100 to 240 VAC, 50/60 Hz or 20 to 30 VDC		
Programming	Via front keypad		
Measuring accuracy	Pipe-Ø	V	Accuracy
	DN 13 – 50	2 – 32 m/s	2,5 %
		0 – 2 m/s	0,05 m/s
	DN 50 – 300	2 – 32 m/s	1 % of act. Q
		0 – 2 m/s	0,02 m/s
	DN 300 – 6000	2 – 32 m/s	1,5 % of act. Q
		0 – 2 m/s	0,01 m/s
Data logger	–		

The flow meter MoniSonic 4800 is a transit time ultrasonic flow meter designed for accurate and reliable flow measurement of ultrasonic conductive fluids in full pressure pipes from DN 13 to DN 6000. Measuring temperatures range from -40 °C to +200 °C.

The meter is best suited for the flow measurement of water and waste water, heating and cooling water, hydrocarbons, acids and toxic liquids as well as detergents.

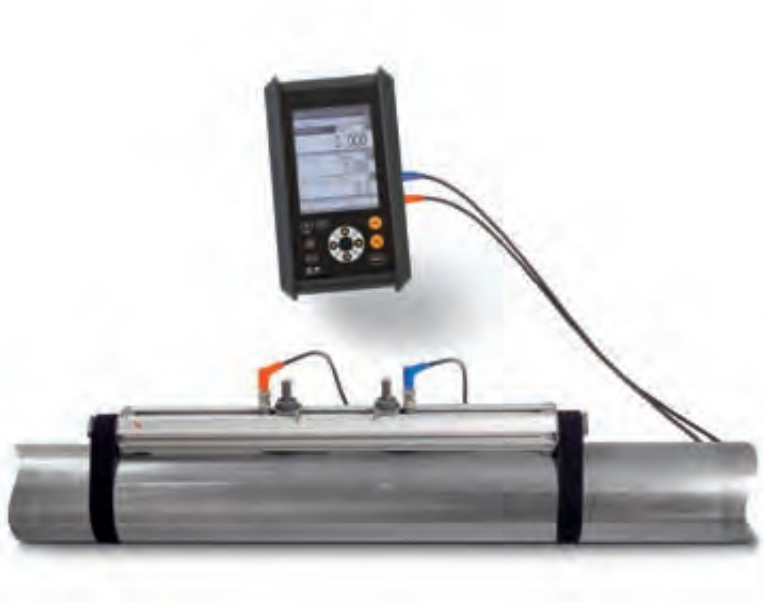
The strap-on sensors can be installed on either horizontal or vertical pipes. Condition for an accurate flow measurement is a well developed velocity profile. This can be achieved by a full pipe with sufficient straight inlet and outlet pipe length.

Strap-on sensors

Type	Size DN	Max. temperature
FSD 220	13 – 100	100 °C
FLSM 12	25 – 100 (PVC-Rohr)	120 °C
	50 – 100 (Metallrohr)	120 °C
FLSM 22	50 – 150 (PVC/Metallrohr)	120 °C
FSGM 32	50 – 300	80 °C
FLD 320	50 – 400	200 °C
FSGM 41	200 – 1200	80 °C
FSGM 51	200 – 6000	80 °C

Type PortaSonic 7000

Portable meter for flow measurements in fulfilled pipes



Compact and rugged light weight

Long battery continuous operation time

±1 % accuracy

1 sec. response time

The flow meter is waterproof

Integrated data logger (standard 256 MB SD card, extendable to max. 8 GB)

USB interface

The meters of the PortaSonic 7000 series are portable ultrasonic flow meters designed for accurate and reliable non-intrusive flow measurement of influent/effluent process water and other liquids. These meters are working according to the transit time differential method and are used for flow measuring in pressure pipe from DN 13 to DN 6000.

The strap-on sensors can be installed on either horizontal or vertical pipes. Condition for an accurate flow measurement is a well developed velocity profile. This can be achieved by a full pipe with sufficient straight inlet and outlet pipe length.

Strap-on sensors

Type	FSD 220	FSD 120	FSD 410	FSD 510	FLD 320
Size DN	13 – 100	50 – 300	200 – 1200	200 – 6000	50 – 400
Max. temperature	100 °C	80 °C	80 °C	80 °C	200 °C
Sensor material	Plastic, stainless steel				
Cable lengths	5 m				
Temperature range	-40 °C to +200 °C				
Protection class	IP 52				

Technical data

Measuring principle	Transit-time 1-path		
Housing material	Plastic		
Dimensions H x L x W	210 x 120 x 65 mm (without printer) 320 x 120 x 65 mm (with printer)		
Protection class	IP 65		
Operating temperature range	-10 °C to +55 °C (without printer) -10 °C to +45 °C (with printer)		
Outputs	4 – 20 mA, max. load 600 Ω		
Inputs	DC voltage input, 4 – 20 mA, input for 2 temperature sensors to meter warm volumes		
Printer	Optional		
Display functions	Act. Q and V, total for- and backward, trend, stored logger data		
Display language	German, English, French, Spanish, Japanese		
Supply voltage	Internal Lithium rechargeable battery, approx. 12 hrs service life, approx. 3 hrs loading time, with adapter 90 – 264 VAC, 47 – 63 Hz or 10 – 30 VDC		
Programming	Via front keypad		
Measuring accuracy	Pipe-Ø	V	Accuracy
	DN 13 – 50	2 – 32 m/s	±1,5 % of act. Q
		0 – 2 m/s	0,03 m/s
	DN 50 – 300	2 – 32 m/s	±1 % of act. Q
		0 – 2 m/s	0,02 m/s
	DN 300 – 600	1 – 32 m/s	±1 % of act. Q
		0 – 1 m/s	0,01 m/s
Data logger	Up to 8 GB SD-card, time, act. Q, act. V, totalizer, analog input and status		
Interface	USB		

Type MultySonic 8000

for flow measurement in open channels, fullfilled or partially filled pipes and channels, rivers up to 50 m width

Maintainance-free
Recording backflow and back up
No culverts required
Ex-approved
High accuracy
For channels from 0,2 to 50 m wide
For different channel profiles
Easy software updates via USB
Remote control via internet

The ultrasonic flow meter MultySonic 8000 has been especially designed for flow measurement of fluids in pipes (semi- or fullfilled pipes), rivers and streams with a width of 0.2 m – 50 m.
Measurements can take place in pressure pipes up to 100 bars and under highly variable levels. A variety of sensor forms and materials permit use under heavy mechanical load and in aggressive media with pH values from 3.5 to 10.

Accuracy

	Accuracies					
Inflow path	>10 D			<5 D		
Paths/Crosswise measurements	2	4	6	2 x 2	4 x 2	6 x 2
Filled pipes and filled rectangular crosssections	1,5 – 2 %	0,5 – 1 %	0,50 %	1,5 – 2 %	0,5 – 1 %	0,50 %
Open channels Partially filled pipes, running water	3 – 4 %	2 – 3 %	1 – 2 %	3 – 4 %	2 – 3 %	1 – 2 %

Technical data: Flow meter	
Number of mesurement cards	1 – 4
Supply	90 – 230 VAC (24 VDC upon request)
System of protection	IP 65, optional Eexd
Display	Touchscreen, grafics, 320 x 240 points, LED background lit
Interfaces	USB, RS 232, LAN
Processor	64 Bit RISK
Operating system	Embedded Linux
Dimensions (b x h x t)	300 x 400 x 210 mm
Weight	Approx. 6 kg
Installation	Wall mounting, M 8 / M 10
Number of independent measurement points	1 – 8
Approvals	CE, Exd

Technical data: Ultrasonic board	
Measurement principle	Transit-time
Number of ultrasonic transducers	8
Number of paths	4
Ultrasonic boards per measuring transducer	1 – 4 (1 – 16 measurement paths)
Number of measurement points	1 – 4
Frequency range	0,2 – 2 MHz
Path lengths	0,1 – 150 m
Measurement range	-20 to 20 m/s
Resolution	<0,001 m/s
Number of measurements	Up to 100/s (path length dependent)
	The I/O board works autonomously with its own processor
Approvals	CE, Exd

Technical data: O-board	
Inputs 4 – 20 mA	8 counts, external or own supply
Outputs 4 – 20 mA	4 counts, external or own supply
Outputs digital	2 counts, open collector, external or self-supplied (24 VDC)
Relay	2 counts, basic / NO / NC
I/O boards per measure-ment transducer	1 or 2
	External or own supply is defined via a switch on the I/O board
	The I/O board works autonomously with its own processor

Technical data: Sensor				
Sensor type	1,0 MHz	0,5 MHz	0,2 MHz	Quicklock
	For internal assembly	For internal assembly	For internal assembly	For pipe assembly from the outside
Frequency	1 MHz	0,5 MHz	0,2 MHz	1 MHz
Path lengths	0,1 – 10 m	0,5 – 40 m	3 – 150 m	0,1 – 10 m
Path angle	15 – 75° (45° Std.)	15 – 75° (45° Std.)	Freely selectable	15 – 75° (45° Std.)
Temperature range	-40 °C to +80 °C	-40 °C to +80 °C	-40 °C to +80 °C	-40 °C to +80 °C
Pressure range	Max. 10 bars	Max. 3 bars	Max. 2 bars	PN 6/16/40/100
Material (coming in contact with the medium)	PVC / PU / V4A (others upon request)	PVC / PU / V4A (others upon request)	PVC / PU / V4A (others upon request)	PVC / V4A (others upon request)
Cable length	10 – 150 m	10 – 150 m	30 – 300 m	10 – 150 m
Cable type	RG 58	RG 58	RG 58	RG 58
Delivery	By default, the sensor is supplied with a wall mounting, other mounting systems upon request.	By default, the sensor is supplied with a wall mounting, other mounting systems upon request.	The sensor mounting is specifically projected and manufactured depending on the application.	The sensor can be supplied in different structural shapes. Installing and dismantling under operating pressure possible as an option (Quicklock version).
Ex-proof version	Upon request	Upon request	Upon request	–

Type iSonic 2000, DataControl 2500 and L2 xx

for flow and level measurement in open channels, semi-filled pipes, tanks/reservoirs and stormwater overflow basins

Flow / Quantity

Level and volume measurement

Differential measurement

Pump monitoring

Data collection

High accuracy

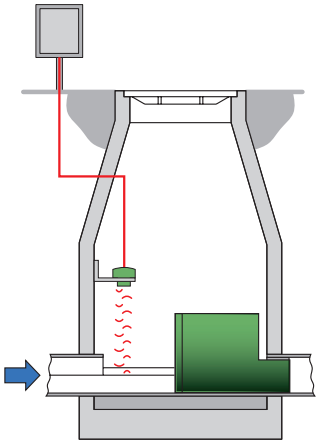
The iSonic 2000 is a versatile ultrasonic flow meter. The microprocessor-based meter was designed to measure levels/volumes in tanks or flows in open channels in combination with venturi channels, manhole flumes or effluent weirs.

The meter works according to the Echolot principle, which means that a free outlet in the channel/pipe is required for this measuring principle. Some Q/H relations are already stored in the memory. A 35 point graph can be programmed for unknown Q/H conversions.

When 2 sensors are in operation, the meter can be used for 2 channel measurements with separated totalizers or for differential measurement. The configuration of the flow meter is done via the front keypad or a PC. A data logger is integrated for recording measuring data. The memory has a capacity of approx. 44 000 records.

The DataControl 2500 is an evaluation device which can be connected to further equipments with analog or digital outputs. It is used for applications as already described for iSonic 2000. The features and functions are also similar to the iSonic 2000.

The L2 xx series is a 2-wire ultrasonic level sensor designed for continuous level measurement of liquids or viscous fluids. The maximum flow ranges are 6, 8, 10 and 15 meters depending on type at a bloc distance of ≥ 250 mm.



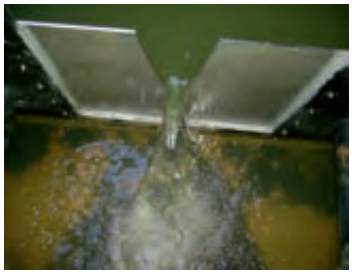
Manhole flume

Technical data: Type iSonic 2000 (2-channel measurement)		
Housing material	Plastic, UV-resistant	
Dimensions H x L x W	240 x 270 x 76 mm	
Protection class	IP 65	
Operating temperature range	-20 °C to +60 °C	
Outputs	2 analog outputs 4 – 20 mA or 0 – 5 V, isolated	
	5 relays, max. 250 VAC / 6 A	
	2 digital outputs max. 80 VDC / 30 mA	
	RS 232 or RS 485	
	Voltage output 24 VDC / 50 mA and 12 VDC	
Inputs	2 analog inputs 4 – 20 mA, isolated	
	4 digital inputs 1,3 VDC / 2 mA, optically separated	
Display function	8-lines for level, flow rate, total, volume and distance	
Display language	English, German, Spanish, French	
Supply voltage	90 – 230 VAC or 12 – 14 VDC	
Programming	Via front keypad or PC with software (password protected)	
Measuring accuracy	BAT 78 L	±1,2 mm
	BAT 52 L	±4 mm
	BAT 35 L	±24 mm
	BAT 85	±2 mm
Data logger	2 MB flash, programmable time intervals, Capacity for approx. 44 000 records, Records available as table or graphics	

Technical data: Type DataControl 2500 (4-channel measurement)	
Housing material	Plastic, UV-resistant
Dimensions H x L x W	240 x 270 x 76 mm
Protection class	IP 65
Operating temperature range	-20 °C to +60 °C
Outputs	2 analog outputs 4 – 20 mA or 0 – 5 V, isolated
	2 digital outputs max. 80 VDC / 30 mA
	6 relays, max. 250 VAC / 6 A
	RS 232 or RS 485
	Voltage output 24 VDC / 50 mA and 12 VDC
Inputs	4 analog inputs 4 – 20 mA, isolated
	4 digital inputs 1,3 VDC / 2 mA, optically separated
Display function	8-lines for level, flow rate, total, volume, distance, temperature, pH or pressure
Display language	English, German, Spanish, French
Supply voltage	90 – 230 VAC / 10 W
Programming	Via front keypad or PC with software (password protected)
Data logger	2 MB flash, programmable time intervals, Capacity for approx. 44 000 records, Table and graphics

Technical data: Sensors for iSonic 2000				
Type	BAT 78 L	BAT 52 L	BAT 35 L	BAT 85
Measuring range	4 m	8 m	16 m	3 m
Offset	0,15 m	0,2 m	0,2 m	0,15 m
Beam angle	7°	8°	9°	3°
Temperature compensation	Integrated			
Cable lengths	Max. 1000 m			
Protection class	IP 68			

Technical data: Sensors L2 xx			
Type	L2 08	L2 10	L2 15
Range	0,3 – 8,00 m	0,4 – 10,00 m	0,5 – 15,00 m
Current output	4 – 20 mA		
Accuracy	±0,25 % of maximum span		
Resolution	3 mm		
Point setting	With magnetic key		
Beam angle	11°		
Operating temperature	-20 °C bis 60 °C The sensor has internal temperature compensation		
Enclosure rating	IP 68		
Housing	ABS / Tefzel™, UV resistant	ABS / PVC, UV resistant	ABS / PVC, UV resistant
Supply voltage	17 V to 30 VDC (max.), 24 VDC typical operating voltage		
Approvals	EEx ia II C T6		



V-Weir
The weirs are calculated by us.
Various shapes possible.

Parshall flume
available from DN 75 (Q_{max} 54 l/s) to DN 915 (Q_{max} 1577 l/s).

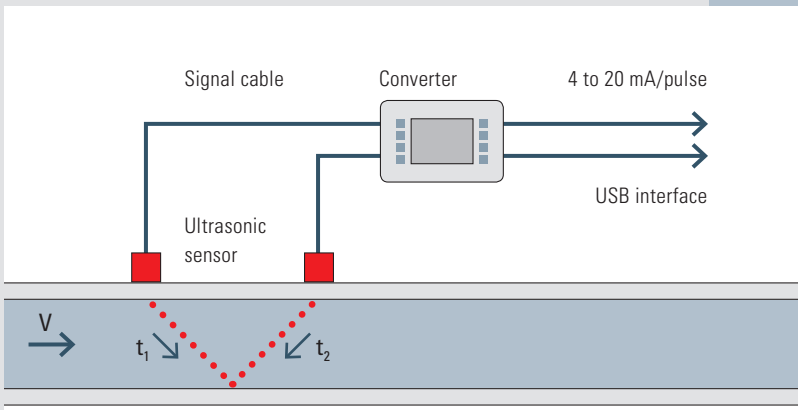
Manhole flume
available from DN 100 (Q_{max} 5,7 l/s) to DN 300 (Q_{max} 94,4 l/s).

The meters for

heat energy

Heat meters

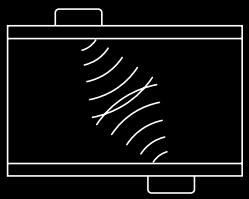
Heat meters are used in building management, the chemical and petrochemical industry and in the food and beverage industry to measure the heat/cold quantity.



Measuring principle

The heat meters use the highly precise ultrasonic transit-time measuring principle, for which two ultrasonic sensors are externally mounted on the pipeline and connected to the electronic. The ultrasonic sensors work alternately as transmitter and receiver, and mutually send ultrasonic signals. During these transmissions, the respective signal transit times of the to-and-from signals (t_1, t_2) are measured.

The electronic measures the difference of the transit time of the ultrasonic signals going with and against the flow direction t_1 and t_2. These signals are either decelerated or accelerated by the medium flow. The difference produced in both signal transit times is proportional to the flow rate and is used together with the pipeline geometry for a precise flow calculation.



Type MoniSonic 4900 and PortaSonic 9000

Stationary and portable model

DN 10 – DN 6000

Flow range +30 to -30 m/s

Temperature range -40 °C to 150 °C

Accuracy 1 %

CE approval

The ultrasonic heat meter have been designed for accurate and reliable non-intrusive flow and heat metering of process water and other liquids in pressure pipes from DN 10 to DN 6000.

With operating temperatures ranging from -40 °C to +150 °C, flow velocities of +30 to -30 m/s and an accuracy of 1 %, the series is ideal for flow and heat metering in the water and waste water industry.
In building management, the meters are best suited for the flow measurement of hot and cold water in cooling systems and HVAC applications, or for energy optimization and pump control.
In the chemical and petrochemical industry, the models are ideal for the measurement of raw and light oil, process and waste water, aggressive and toxic fluids as well as of heat transfer media like thermal oil.
In the food and beverage industry, the heat meters ensure best hygienic measurement of fluids.

The meters calculate the heat or cold quantity (BTU measurement). For this, two external PT 100 temperature sensors for the feed/return temperature (T1-hot/T2-cold) are connected to the meter. Heat or cold quantity is continuously calculated along with the actual flow.

Technical data: Ultrasonic sensor MoniSonic 4900

Type	Pipe sizes	Fluid temperature
FW20, 2 MHz	DN 10 – DN 100	-40 °C up to +150 °C
FW10, 1 MHz	DN 32 – DN 400	-40 °C up to +150 °C
FW05, 500 kHz	DN 200 – DN 6000	-40 °C up to +80 °C (optional up to +150 °C)

Technical data: Stationary model MoniSonic 4900

Measurement principle	Ultrasonic transit-time
Physical quantities	Flow, velocity, thermal output, heat rate, flow direction, total flow
Meter	Volume, mass, heat quantity
Flow range	+30 up to -30 m/s
Accuracy	Up to ±1 % of measured value or 0,01 m/s
Measuring cycle	100 Hz up to 1000 Hz
Signal damping	0 up to 100 sec (adjustable)
Diagnostic functions	Sound velocity, signal amplitude, SNR, energy signal quality, signal can be shown at the display.
Operation	Keypad
Language	German, English
Value	Metrical / inch (optional)
Outputs	2 x 4 up to 20 mA, 1 x relais, 1 x microUSB
Inputs	2 x PT 100 (for measurement of heat quantity)
Power supply	Power supply unit 90 – 240 VAC
Degree of protection	IP 65
Housing	PVC
Dimensions	245 x 260 x 115 mm (L x W x D)
Operating temperature	-20 °C up to +60 °C

GSM / GPRS

for wireless data recording

Wireless measuring sites

Access via internet independently from location

Ideal for measuring sites in difficult areas

Technical data: Portable model PortaSonic 9000	
Measurement principle	Ultrasonic transit-time
Physical quantities	Flow, velocity, thermal output, heat rate, flow direction, total flow
Meter	Volume, mass, heat quantity
Flow range	+30 up to -30 m/s
Accuracy	Up to ±1 % of measured value or 0,01 m/s
Measuring cycle	100 Hz up to 1000 Hz
Signal damping	1 up to 100 sec (adjustable)
Diagnostic functions	Sound velocity, signal amplitude, SNR, energy signal quality, signal can be shown at the display.
Operation	Keypad
Language	German, English
Value	Metrical / inch (optional)
Outputs	2 x 4 up to 20 mA, 2 x pulses, 1 x microUSB
Inputs	2 x PT 100 (for measurement of heat quantity)
Datalogger	1 GB
Loggable values	All physical quantities, totalized values and diagnostic values
Format	Text format, directly importable into standard software (e.g. MS Excel)
Log cycle	1 sec
Power supply	Lithium ion battery / power supply unit 230 VAC
Degree of protection	IP 54
Housing	Aluminium, PVC
Dimensions	265 x 190 x 70 mm (L x W x D)
Operating temperature	-20 °C up to +60 °C

For consumption monitoring and leckage reduction in water supply systems, precise flow measurement in large channels and rivers for the monitoring of navigability and issue of flooding forecasts, or monitoring and alarm of overflow basins for rainwater, sewage plants, storm water overflow plants as well as for the control of irrigation plants or level monitoring, alarm for automatical filling and connection to the supplying system, Badger Meter offers the possibility to record wireless the measuring data coming from flow meters.

Those data are transmitted to and filed on a central server via a GPRS module. The information can be retrieved, visualised, evaluated and downloaded via a password protected access; the password is set by the customer.

The module is compatible with the following Badger Meter series: MAG meters, RCDL®, turbine meters, oval gear meters, impeller meters, ultrasonic flow meters and Coriolis mass meters.

Technical data: Ultrasonic sensor PortaSonic 9000

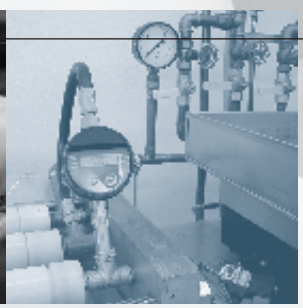
Type	Pipe sizes	Fluid temperature
PW20, 2 MHz	DN 10 – DN 100	-40 °C up to +150 °C
PW10, 1 MHz	DN 32 – DN 400	-40 °C up to +150 °C
PW05, 500 kHz	DN 200 – DN 6000	-40 °C up to +80 °C (optional up to +150 °C)

The meters for liquids

with middle and high viscosity

Oval gear meters

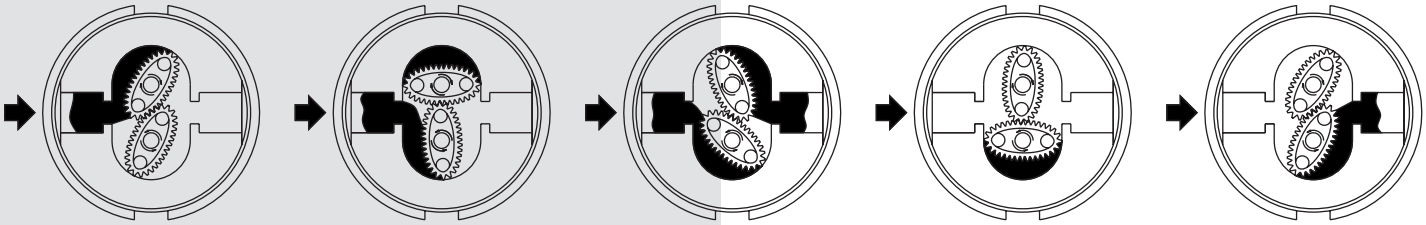
Oval gear meters are volumetric meters and are best suited for liquids with a viscosity up to 5.000 mPas. (special models up to 1.000.000 mPas.). Typical applications are mineral oils, hydraulic oils, solvents, brake fluids, coolants, transmission oils, etc.



TÜV Cert-Zertifizierungstelle der TÜV Management Service GmbH

Physikalisch-Technische Bundesanstalt Braunschweig und Berlin

Asanet



Measuring principle

As fluid passes through the metering chamber by entering the inlet port, it forces the internal gears to rotate and exits through the outlet port. Each rotation of the gear displaces a given volume of fluid. Controlled clearances between the gears and chamber wall insure minimum leakage. As the gears rotate, a magnet on each end of the gear activates the reedswitch and forward the pulses to the display or to the pulse output.

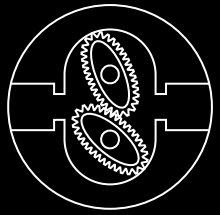
Eichdirektion Stuttgart des Landesgewerbeamts Baden-Württemberg

Bundesamt für Eich- und Vermessungswesen Österreich

National Weights and Measures Laboratory

International Organization of Legal Metrology

Český Metrologický Institut



IOG® series

for industrial applications

Combinable with all electronics and displays of the F-series

ATEX model

Various material combinations

High pressure and temperature rates

Leakproof, magnetic drive

Only two moving parts to reduce maintenance costs

Technical data

Type	LM OG-TI 100	LM OG-TI 100 PVC	LM OG-TI HF 3/4"	LM OG-TI HF 1"
Flow range	0,5 – 35 l/min	0,5 – 35 l/min	3 – 60 l/min	3 – 115 l/min
Operating pressure	0,35 – 100 bars	0,30 – 10 bars	up to 100 bars	up to 100 bars
Operating temperature	-10 to +60 °C	-10 to +45 °C	-10 to +60 °C	-10 to +60 °C
Accuracy	±0,75 %	±0,5 %	±0,75 %	±0,75 %
Pulse rate	100 pulses/liter	100 pulses/liter	66,75 pulses/liter	66,75 pulses/liter
Max. reedswitch resistance	150 VAC @ 10 Watt	150 VAC @ 10 Watt	150 VAC @ 10 Watt	150 VAC @ 10 Watt
Weight	0,9 kg	0,9 kg	0,7 kg	0,7 kg
Inlet and outlet connections	1/2" BSPP	1/2" BSPP	3/4" BSP	1" BSP

Technical data type LM OG-I / LM OG-I PVC / LM OG-I stainless steel

	Coolant / windshield liquid*	Brake fluid / waste oil**	LM OG-I HF 3/4"	LM OG-I HF 1"
Flow range*	0,5 – 35 l/min	0,5 – 35 l/min	3 – 60 l/min	3 – 115 l/min
Operating pressure	10/100 bars	100 bars	up to 100 bars	up to 100 bars
Operating temperature	-10 to +60 °C	-20 to +45 °C	-10 to +60/120 °C	-10 to +60/120 °C
Accuracy (non-approved version)	±1,0 %	±0,5 %	±0,5 %	±0,5 %
Weight without handle	1,0 kg / 1,4 kg	1,0 kg / 1,4 kg	0,8 kg	0,8 kg
5-digit LCD display, 5/16" high (8 mm)	Liters / Pints / Quarts / Gallons	Liters / Pints / Quarts / Gallons	Liters / Pints / Quarts / Gallons	Liters / Pints / Quarts / Gallons
Inlet and outlet connections	1/2" BSPP	1/2" BSPP	3/4" BSP	1" BSP
Housing	Alu / PVC / St. steel	Alu / PVC / St. steel	Alu / Stainless steel	Alu / Stainless steel
Oval gears	Delrin / Vectra / Stainless steel	Delrin / Vectra / Stainless steel	Vectra / St. steel	Vectra / St. steel

*Tested with water at ambient temperature.

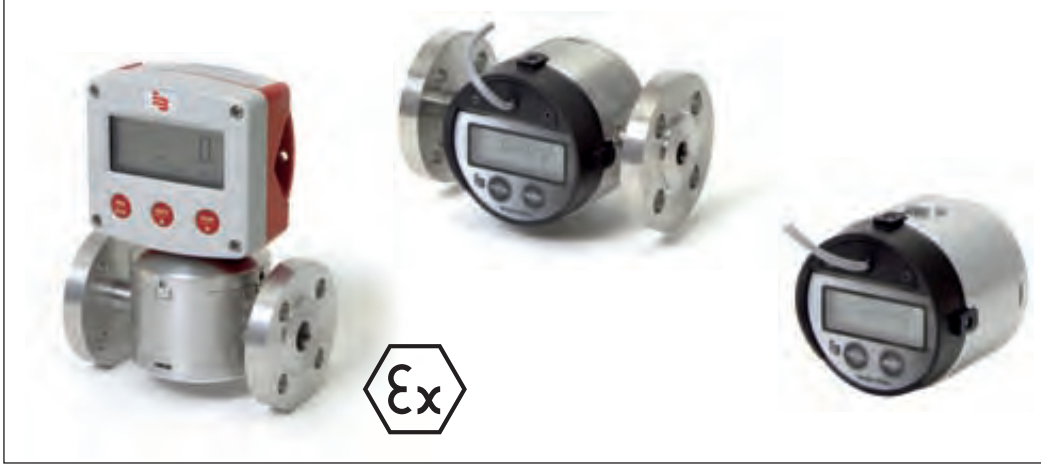
** Tested with Mobil DTE-25 motor oil at ambient temperature. Min./max. flow rates will vary with fluid viscosity.

The LM OG-I meters of the IOG® series are coated meters and have been designed to measure flows up to 115 l/m.

They can dispense fuels, hydrocarbons, water based fluids, motor oils, gear oils, coolants and other similar liquids, as well as special and aggressive fluids.

IOG® series

for industrial applications



High accuracy and repeatability

Flow ranges from 1–68 l/m

Vertical or horizontal installation

Low pressure drop

Minimum of wearable parts for long product life

Optional adjustment of lay lengthes

ATEX approval

The IOG® series is made of modular meters with economical yet highly accurate and rugged design. Due to the rugged nature of this particular flow measurement technology, the meters can be used in a number of applications where conventional meters are not acceptable.

The meters handle very viscous or highly corrosive fluidst. They have been designed for a variety of chemical applications including petroleum based fluids, water solutions, and any other liquid compatible with the materials of construction.

Technical data

	1/4" (l/h)				1/2" (l/min)		3/4" (l/min)		1" (l/min)	
Flow range	2,8-100	5,7-100	15-500	26,5-500	1-30	2-25	2-60	4,5-53	2,3-68	5,3-60
Viscosity	>5,0 cP	<5,0 cP	>5,0 cP	<5,0 cP	>5,0 cP	<5,0 cP	>5,0 cP	<5,0 cP	>5,0 cP	<5,0 cP
	Max. 1000 mPas. Consult factory for applications where a higher viscosity is required.									
Accuracy (%)	±1,0	±2,5	±1,0	±2,5	±0,5	±2,0	±0,5	±2,0	±0,5	±2,0
Repeatability (%)	±0,03									
Pulses per liter	2170		390		100		66			
Operating temperature										
Stainless steel	-30 °C up to +120 °C									
Aluminium/LCP	-30 °C up to +80 °C									
Presure rating										
NPT/BSP	10/55 bar				55 bar (800 psi)					
Flanged model	–				150 lbs – 285 psi					
	–				300 lbs – 740 psi					
	–				DIN PN16, 16 bar					
	Please consult factory for higher pressure rates.									
Housing/connections										
Aluminium	NPT, BSP				NPT, BSP, 150#, PN16					
Stainless steel	NPT, BSP				NPT, BSP, 150#, 300#, PN16					
Materials										
Housing	Stainless steel / Aluminium									
Cover	Stainless steel / Aluminium									
Rotors	Stainless steel				Stainless steel or LCP (plastic)					
O-ring	Buna-N/Viton/EPDM/Aflas				Standard: Stainless steel, Aflas, Aluminium, Viton					
					Optional: Buna, EPDM, Aflas, Viton					

Register with
single pulse output type ILR 710
double pulse output type ILR 720
analogue output type ILR 730

Standard register type ILR 700

Transmitter type ILR 740

Electronical meters

for lubricants, approved and non-approved

Rugged construction
Easy battery exchange
User friendly

LM OG-CNDA

LM OG-PNDK

LM OG-CND

LM OG-PND(A)

LM 1800 PG-E

The electronical meters are of modular design. The electronic register is controlled by wetted magnets.
Robustness, easy handling and maintenance are features of the meter series.

Easy menu driven electronic, freely programmable dispense quantities, integrated memories, display of flow and large grafic display define the electronic preset meters of the LM OG-P series. The battery can be exchanged very easily from outside while saved data remain untouched.
This series is available as either approved version or non approved version.

Technical data

Type	LM OG-CND(A)	LM OG-PND(A)*	LM OG-PNDK	LM 1800 PG-E	LM OG-CND	LM OG-HF CND
Connection	1/2" BSP	1/2" BSP	1/2" BSP	1/2" BSP	1/2" BSP	3/4" BSP
Max. operating pressure	100 bars	100 bars	100 bars	70 bars	100 bars	100 bars
Flow range	1 – 35 l/min (1 – 10)*	1 – 30 l/min (1 – 10)*	1 – 30 l/min	1 – 15 l/min	1 – 35 l/min	3 – 60 l/min
Temperature range	-10 to +50 °C	-5 to +50 °C	-5 to +50 °C	-5 to +50 °C	-10 to +50 °C	-10 to +50 °C
Accuracy	±0,5 % (±0,3)*	±0,5 % (±0,3)*	±0,5 %	±0,5 %	±0,5 %	±0,5 %
Viscosity range	20 – 2000 mPas	up to 2000 mPas	up to 2000 mPas	up to 50.000 mPas	up to 5000 mPas	up to 5000 mPas
Display	5-digit LCD display	5-digit LCD display**	6-digit LCD display	6-digit LCD display	6-digit LCD display	6-digit LCD display
Calibration	can be calibrated	can be calibrated	can be calibrated	can be calibrated	can be calibrated	can be calibrated

* Data in brackets are for approved versions. ** Measuring units, free programmable: Liters, quarts, pints, gallons

Pistol grip PG-121
with 1/2" swivel

Swivel PG-107
1/2" BSP inside, 1/2" BSP outside

Sight glass PG-113

Electronical meters

for high flow

LM OG-HF CND

Low pressure loss

Rugged construction

Large flow range

High pressure rates up to 100 bars

No wearing parts

The High Flow meter series LM OG-HF has been designed to measure flows up to 115 l/min. The meters are modular, of rugged construction and shockproof.

The electronic register is micro-processed and powered by a Lithium battery. Measuring units like liters, pints, quarts or gallons can be entered.

The meters are used to dispense lubricants in non-custody transfers in repair and service workshops.

Typical fluids metered are motor oils and automatic transmission oils up to 5.000 mPas.

Technical data

Type	LM OG-HF 1"	LM OG-HF 3/4"	LM OG-HF CND 3/4"
Accuracy	±0,5 % of flow	±0,5 % of flow	±0,5 % of flow
Flow range	3 – 115 l/min	3 – 60 l/min	3 – 60 l/min
Max. operating pressure	100 bars	100 bars	100 bars
Operating temperature	-10 °C to +60 °C	-10 °C to +60 °C	-10 °C to +60 °C

Outlet PG-114

Outlet 1/2", BSP, 90° flexible with swivel

Outlet PG-1011

Metallic outlet 30° bent, antidrop, with adjusting nut

Mechanical meters

for high viscous lubricants

LM 1800 PG-B

LM 1800 PG-M

Rugged construction

Reliable

Very large viscosity range

The hose end meters are used in combination with overhead hose reels in the automotive servicing industry to dispense motor and automatic transmission oils. The meters are best suited for the measurement of high viscous mineral oils in non-custody transfer applications.

Technical data

Type	LM 1800 PG-B	LM 1800 PG-M
Connection	1/2" BSP	1/2" BSP
Max. operating pressure	70 bars	70 bars
Flow range	1 – 15 l/min	1 – 15 l/min
Temperature range	-10 to +70 °C	-10 to +70 °C
Accuracy	±0,75 %	±0,75 %
Viscosity range	50 – 50.000 mPas	50 – 50.000 mPas

In-line meters

Approved and non approved

LM OG-A

LM OG

High accuracy

Rugged construction

LM OG-K

UH-M

The meters are of modular design and have been designed as inline meters and hose end meters for wall-mounting in oil lines.
They are best suited for approved and/or non-approved consumption measurements of lubricants in repair centers.
Typical liquids measured are motor oil and automatic transmission oil up to 5.000 mPas.

The electronic register is controlled by wetted magnets. Robustness, easy handling and maintenance are features of the meter series.
The electronic unit is shockproof and insulated against oil.

The mechanical inline meter type UH-M is ideal for the use in extreme temperature conditions. This meter has a resettable totalizer 1–10 l and a non-resettable totalizer, 5 digit register.

Technical data

Type	LM OG-A	LM OG	LM OG-K	UH-M
Connection	1/2" BSP	1/2" BSP	1/2" BSP	1/2" BSP
Max. operating pressure	100 bars	100 bars	100 bars	70 bars
Flow range	1 – 10 l/min	1 – 35 l/min	1 – 35 l/min	1 – 15 l/min
Temperature range	-10 to +50 °C	-10 to +50 °C	-10 to +50 °C	-10 to +70 °C
Accuracy	±0,3 %	±0,5 %	±0,5 %	±0,5 %
Viscosity range	20 – 2000 mPas	up to 5000 mPas	up to 5000 mPas	50 – 50.000 mPas
Calibration	can be calibrated	can be calibrated	can be calibrated	–

Pulse transmitters

Approved and non approved

LM OG-T 100

LM OG-TAER 200

LM OG-TK 100

LM OG-HFT

Rugged construction

Type LM OG-T 100 is an in-line meter with pulse output. Registers are available with either one channel pulse output (100 ppl) or two channels pulse output (100 ppl per channel, 90° offset).

Type LM OG-TAER 200 is an in-line meter for custody transfers with PTB approval for installation into any management system. This meter can be calibrated and has a two channels output (100 ppl per channel, 90° offset).

Type LM OG-TK is best suited for fluids like brake fluids and other media.

Technical data

Type	LM OG-T 100	LM OG-TAER 200	LM OG-TK 100	LM OG-HFT 3/4"	LM OG-HFT 1"
Connection	1/2" BSP	1/2" BSP	1/2" BSP	3/4" BSP	1" BSP
Max. operating pressure	100 bars	100 bars	100 bars	100 bars	100 bars
Flow range	1 – 35 l/min	1 – 35 l/min (1 – 10)*	1 – 35 l/min	3 – 60 l/min	3 – 115 l/min
Temperature range	-10 to +50 °C	-10 to +50 °C	-10 to +50 °C	-10 to +60 °C	-10 to +60 °C
Accuracy	±0,5 %	±0,3 %	±0,5 %	±0,5 %	±0,5 %
Viscosity range	up to 5000 mPas	20 – 2000 mPas	up to 5000 mPas	up to 5000 mPas	up to 5000 mPas
Pulses per liter	100 ppl	100 ppl per channel	100 ppl	66,75 ppl	66,75 ppl
Calibration	–	can be calibrated	–	–	–

* Data in brackets are for approved versions.

Oval gear meter type MN 1 and MN 2

for industrial fluids

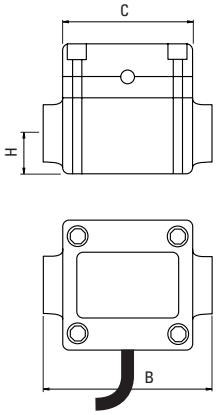
Large viscosity range
Pressure up to 550 bars
Low flow

Technical data

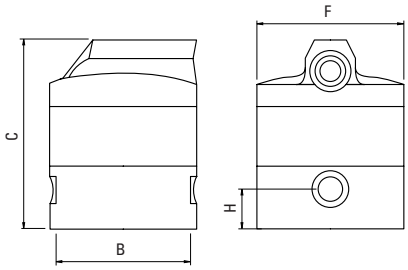
Type	MN 1				MN 2			
Model	Plastic	Stainless steel	Alumi-nium	High pressure	Plastic	Stainless steel	Alumi-nium	High pressure
Size	DN 6				DN 6			
Flow range	under 5 mPas: 2 – 100 l/h				under 5 mPas: 25 – 500 l/h			
	over 5 mPas: 0,5 – 100 l/h				over 5 mPas: 15 – 500 l/h			
Accuracy	±1 % of value				±1 % of value			
Repeatability	0,03 %				0,03 %			
Max. viscosity	1000 mPas				1000 mPas*			
Max. pressure	5 bars	10 bars 55 bars	5 bars	551 bars	5 bars	10 bars 55 bars	5 bars	551 bars
Max. temperature	80 °C / 120 °C				80 °C / 120 °C			
Pulse rate	1000 PPL				400 PPL			
Pulse transmitter	Reedswitch				Reedswitch			
Recommended filter	0,05 mm				0,05 mm			
Register	without				without			
Process connections	R 1/4"				R 1/4"			
Housing material	PPS	316 SS	Alu	316 SS	PPS	316 SS	Alu	316 SS
Oval gear material	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS
Option	Pulse transmitter with hall effect sensor				Pulse transmitter with hall effect sensor			

* with special oval gears up to 1.000.000 mPas as an option

MN 1 / MN 2 standard
with pulse transmitter



MN 2 high pressure
with pulse transmitter



Dimensions (mm)

	B	C	F	H
MN 1 / MN 2 standard	65	50	–	18
MN 1 / MN 2 high pressure	83	110	86	23

Oval gear meter type MN 4 and MN 7

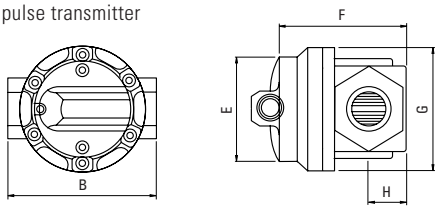
for industrial fluids

Large LCD display
Large flow range
Good accuracy

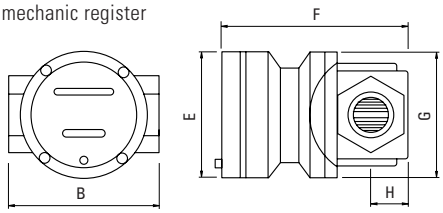
The type MN 4 is available in various models: Aluminium or stainless steel housing with pulse transmitter or mechanic register. This meter is best suited for fluids with a maximum viscosity of 1000 mPas and a maximum pressure of 55 bars.

The type MN 7 is also meant for fluids with a maximum viscosity of 1000 mPas but with a maximum pressure of 10 bars. Accessories like pulse transmitters with hall effect sensor, electronic LCD display as well as Ex-proof display for applications in zone 1, can be mounted on the meter.

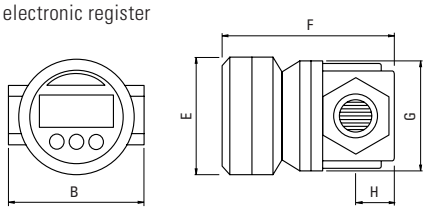
MN 4
with pulse transmitter



MN 4
with mechanic register



MN 7
with electronic register



Technical data

Type	MN 4			MN 7	
Model	with pulse transmitter	with electronic display	with mechanic display	with pulse transmitter	with electronic display
Size	DN 15			DN 25	
Flow range	under 5 mPas: 180 – 1500 l/h			under 5 mPas: 480 – 4200 l/h	
	over 5 mPas: 60 – 1800 l/h			over 5 mPas: 180 – 4500 l/h	
Accuracy	±0,5% of value		±1% of value	±0,5% of value	
Repeatability	0,03 %			0,03 %	
Max. viscosity	1000 mPas*			1000 mPas	
Max. pressure	55 bars	55 bars	34 bars	10 bars / 250 bars	
Max. temperature	80 °C / 120 °C			80 °C / 120 °C	
Pulse rate	112 PPL			52 PPL	
Pulse transmitter	Reedswitch			Reedswitch	
Recommended filter	0,1 mm			0,1 mm	
Register	without	electronic	mechanical**	without	electronic
Process connections	R 1/2"			R 1"	
Housing material	Alu/316 SS			PPS / Aluminium	
Oval gear material	PPS / 316 SS		PPS	PPS / SS	
Option	Pulse transmitter with hall effect sensor				
	Standard LCD display / Option with EEx-i				
	Deluxe LCD preset meter / Option with EEx-i				

* with special oval gears up to 1.000.000 mPas
** no pulse transmitter in connection with mechanical register

Dimensions (mm)

	B	E	F	G	H
MN 4 p	100	70	105	100	20
MN 4 e	100	115	125	96	20
MN 4 g	100	115	125	96	20
MN 4 m	100	115	125	96	20
MN 7 p	108	70	120	100	30
MN 7 e	108	137	137	100	30
MN 7 g	108	137	137	100	30

e: electronic display g: LCD standard display
m: mechanic display p: pulse transmitter

Oval gear meter
type MN 10, MN 40, MN 50, MN 80 and MN 100

for industrial fluids

Large LCD display
Large flow range
Good accuracy

The models are available with either aluminium, bronze or stainless steel housing; models MN 80 and MN 100 are available in aluminium and stainless steel. Mechanic as well as electronic registers, ex-proof, can be mounted upon request. The maximum operating pressure for the type MN 10 is 55 bars while 18 bars for the MN 40/MN 50 and 10 bars for the MN 80/MN 100 models.

Technical data

Type	MN 10			MN 40			MN 50		
Model transmitter	with pulse display	with electron. display	with mechanic transmitter	with pulse display	with electron. display	with mechanic transmitter	with pulse display	with electron. display	with mechanic
Size	DN 25			DN 40			DN 50		
Flow range	under 5 mPas: 600 – 6000 l/h			under 5 mPas: 900 – 14100 l/h			under 5 mPas: 1800 – 18000 l/h		
	over 5 mPas: 360 – 7200 l/h			over 5 mPas: 600 – 15000 l/h			over 5 mPas: 900 – 21000 l/h		
Accuracy	±0,5 % of value		±1 % of value	±0,5 % of value		±1 % of value	±0,5 % of value		±1 % of value
Repeatability	0,03 %			0,03 %			0,03 %		
Max. viscosity	1000 mPas*			1000 mPas*			1000 mPas*		
Max. pressure or acc. to flange norm PN 16	16/55 bars	16/55 bars	16/34 bars	18 bars	18 bars	18 bars	18 bars	18 bars	18 bars
Max. temperature	80 °C / 120 °C			80 °C / 120 °C			80 °C / 120 °C		
Pulse rate	36 or 72 PPL		–	14,5 PPL		–	6,68 PPL		–
Pulse transmitter	Reedswitch			Reedswitch			Reedswitch		
Pulse type	–			–			–		
Recommended filter	0,1 mm			0,1 mm			0,1 mm		
Register	without	electronic	mechanical**	without	electronic	mechanical**	without	electronic	mechanical**
Process connections	BSP/NPT R 1" / DN 25 / ANSI 1" / Triclamp			R 1 1/2" / DN 40 / ANSI 1 1/2" / Triclamp			R 2" / DN 50 / ANSI 2" / Triclamp		
Housing material	Alu / 316 SS / Bronze			Alu / 316 SS / Bronze			Alu / 316 SS / Bronze		
Oval gear material	PPS / 316 SS			PPS / 316 SS			PPS / 316 SS		
Option	Pulse transmitter with hall effect sensor			Pulse transmitter with hall effect sensor			Pulse transmitter with hall effect sensor		
	Standard LCD display / Option with EEx-i			Standard LCD display / Option with EEx-i			Standard LCD display / Option with EEx-i		
	Deluxe LCD preset meter / Option with EEx-i			Deluxe LCD preset meter / Option with EEx-i			Deluxe LCD preset meter / Option with EEx-i		

* With special oval gears up to 1.000.000 mPas
** No pulse transmitter in connection with mechanical register

Dimensions (mm)

	A	B alu / st. steel	C DIN/ANSI	D	E	F	G	H
MN 10 p	170	133/143	115/108	165	86	138	112	35
MN 10 e	170	133/143	115/108	162	115	135	112	35
MN 10 g	170	133/143	115/108	154	137	181	112	35
MN 10 m	170	133/143	115/108	185	115	157	112	35
MN 10 a	170	133/143	115/108	225	155	213	112	35
MN 40 p	212/150		150/127	163	86	190	144	40
MN 40 e	212/150		150/127	180	137	207	144	40
MN 40 g	212/150		150/127	180	140	207	144	40
MN 40 m	212/150		150/127	177	115	211	144	40
MN 40 a	212/150		150/127	228	155	260	144	40
MN 50 p	270/210		165/152	198	86	223	178	55
MN 50 e	270/210		165/152	210	137	235	178	55
MN 50 g	270/210		165/152	185	140	210	178	55
MN 50 m	270/210		165/152	208	115	230	178	55
MN 50 a	270/210		165/152	263	155	288	178	55
MN 80 p	344/256		200/191	240	86	260	220	77
MN 80 e	344/256		200/191	255	137	275	220	77
MN 80 g	344/256		200/191	255	140	275	220	77
MN 80 a	344/256		200/191	305	155	325	220	77
MN 100 a	385/300		220/229	310	156	357	290	67
MN 100 m	385/300		220/229	310	156	357	290	67
MN 100 p	385/300		220/229	252	86	293	290	67

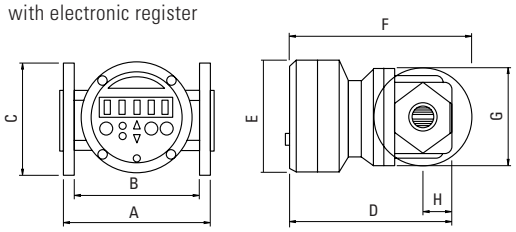
a: analog register e: electronic display g: LCD standard display
m: mechanic display p: pulse transmitter

These meters differ themselves in their size and their flow range.

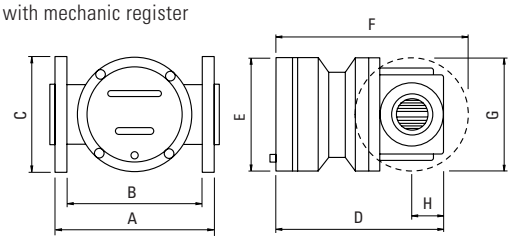
	MN 80			MN 100		
	with pulse transmitter	with electron. display	with mechanic display	with pulse transmitter	with electron. display	with mechanic display
	DN 80			DN 100		
	under 5 mPas: 1200 – 43980 l/h			under 5 mPas: 18000 – 72000 l/h		
	over 5 mPas: 3960 – 36960 l/h			over 5 mPas: 7200 – 72000 l/h		
	±0,5 % of value		±1 % o. v.	±0,5 % of value		±1 % o. v.
	0,03 %			0,03 %		
	1000 mPas			1000 mPas		
	12 bars	12 bars	12 bars	10 bars***		
	80 °C / 120 °C			80 °C / 120 °C		
	2,61 PPL		10 PPL	2.315 PPL		
	Reedswitch			Reedswitch / Hall effect or Reed / Hall		
	–			Two Reedswitches****		
	0,1 mm			0,1 mm		
	without	electronic	mechanical**			
	3" BSP/NPT / DIN DN 80 / ANSI 3" ANSI 150 lb			JIS 10 K or DN 100 PN 16 / DIN 100 / ANSI 3"		
	Aluminium / Stainless steel			Aluminium / Stainless steel		
	Aluminium / Stainless steel			Aluminium / Stainless steel		
	Pulse transmitter with hall effect sensor			Standard display ex-proof		
	Standard LCD display / Option with EEx-i			Deluxe display ex-proof		
	Deluxe LCD preset meter / Option with EEx-i			Mechanical display with pulse transm. / Option P 500		

*** As per PED 97/23/EC
**** Reedswitch necessary for standard and Deluxe LC displays

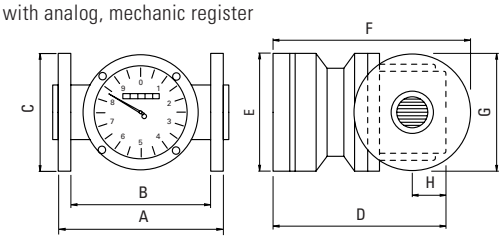
MN 10 up to MN 100
with electronic register



MN 10 up to MN 100
with mechanic register

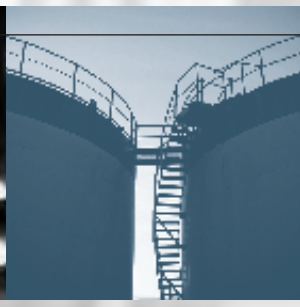


MN 10 up to MN 100
with analog, mechanic register

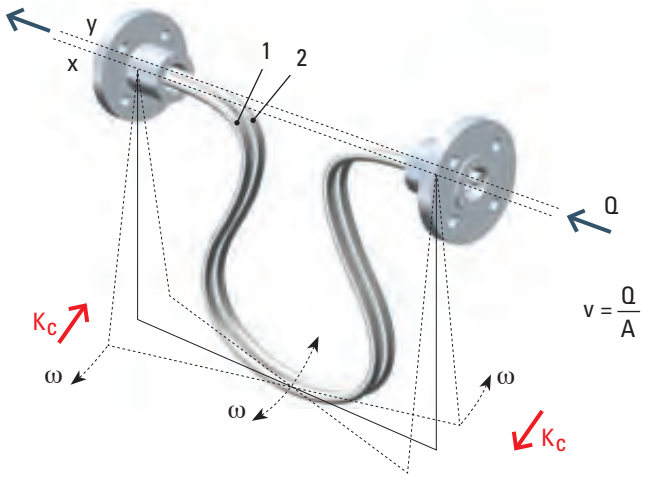


Coriolis mass meters

Coriolis mass meters are recommended for the direct, continuous measurement of the mass of flowing liquids independently of their conductivity, density, temperature, pressure and viscosity in the food, chemical and petrochemical industries. They are best suited to measure chemicals, liquid food, suspensions, molasses, inks, lacquers, pastes, etc.



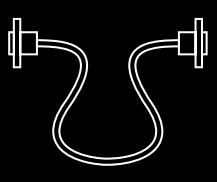
A	Cross section of pipe
M	Mass
ω	Angular velocity
v	Flow velocity
Q	Flow
K_C	Coriolis force
1 and 2	Measuring tubes



Measuring principle

Coriolis mass flow metering is based on the physical principle that a force, the so-called Coriolis force, acts on a mass that is moving towards or away from the point of rotation within a rotating system.

The symmetrical arranged measuring tubes 1 and 2 are vibrated against each other in the X and Y axis. The limbs RS 1 and RS 2 of the measuring tube 1 and the limbs RS 1 and RS 2 of the measuring tube 2 oscillate on a circular segment in case of zero flow.



Coriolis mass meter type MMC2

for the water industry, chemistry / petrochemistry, paper industry

Accuracy of 0,1 % of range

Sturdy design

Virtually wear-free

Heatable up to 200 °C

Insensitive to noise for example from external vibrations or from gas and solid content in the fluid

Ex-proof

Flow meter sensor		
Model number	MMC2	
Flange DIN 2501 / EN 1092-1	DN 15 – DN 150	PN 40 – PN 100
Flange ASME B16.5	1/2" – 6"	CL 150 – CL 600
Threaded pipe connection DIN 11851	DN 15 – DN 100 (1/2 – 4")	
Tri-Clamp®	DIN 32676 (ISO 2852) DN 15 – DN 100 (1/2 – 4")	
Aseptic flange DIN 11864-2	DN 15 – DN 100 (1/2 – 4")	
„G" threaded pipe connection	–	
NPT threads pipe connection	–	
Accuracy of mass flow rate	0,1 % / 0,15 % / 0,25 % / 0,4"	
Accuracy of density	0,005 kg/l, 0,001 kg/l	
Accuracy of temperature	1 K	
Materials in contact with fluid	Stainless steel, Hastelloy C-4	
Protection class acc. to EN 60529	IP 67	
Fluid temperature	-50 °C to +200 °C	

Transmitter	
Model number	MME2 / MMC23, MMC27
Housing	Separate, field-mount housing/compact housing
Cable length	Up to 50 m; 300 m on request
Supply power	100 – 230 V AC, 24 V AC/DC
Current output 1	Active: 0,4 – 20 mA or passive: 4 – 20 mA
Current output 2	Passive: 4 – 20 mA
Pulse output	Active (non-ignition-proof) or passive
Ext. output switch-off	Yes
Ext. totalizer reset	Yes
Forward / reverse flow metering	Yes
Communication	HART® protocol, PROFIBUS® PA, FOUNDATION, Fieldbus®
Pipe empty detection	Yes, based on preconfigured density alarm < 0,5 kg/l
Self-monitoring, diagnostics	Yes
On-site desplay / totalization	Yes
Field optimized flow / density	Yes
Protection class acc. to EN 60529	MME2: IP 65 / 67, NEMA 4X MMC: IP 67, NEMA 4X

The Coriolis MultyMass MMC2 enables the measurement of mass and volume flow, density, concentration and temperature with a single measuring instrument. It is also well-proven for lime milk density measurement. Other typical applications are the dosing of expensive biocides and high-precision fuel supply to burners in power plants where an important increase in efficiency is achieved through direct fuel mass flow measurement.

In the chemistry and petrochemistry it is ideal for filling or dosing of oils, solvents and chemicals.
It measures online the mass and volume flow, density, concentration and temperature of different fluids.

In the pulp and paper industry the Coriolis sets the standards in color and coating kitchens. It is perfect for the measurement of expensive chemicals, for air content measurement around the head box and especially for precise measurement of high viscosity fluids whilst maintaining a huge turndown ratio.

Approvals	
Explosion protection conforming to ATEX, IEC (KEM 08 ATEX 0150X / 0151X), (IECEx KEM08 00.0034X)	Zone 0 / 1 / 2 Dust-ignition-proof
FM explosion protection (PID: 3015261)	Class I Div. 1 Class I Div. 2
Other approvals for potentially explosive areas	On request
Hygienic and sterile requirements	FDA

Coriolis mass meter type MMC2 Hygiene and MME2

for food or as remote version

Accuracy of 0,1 % of range

Excellent cleanability, EHEDG certified

CIP and SIP suitable up to 200 °C

Polished fluid wetted parts

Insensitive to noise for example from external vibrations or from gas and solid content in the fluid

The Coriolis MultyMass MMC2 is used for many applications in dairies, breweries, the alcohol industry, the beverage industry and starch production.
Direct calculation of concentration like Brix, Plato or Baumé provides advantages for blending processes of, for example, fruit juices or for the fat content adjustment of milk.

As the Coriolis MultyMass MMC2 is insensitive to noise from gas or solid content in the fluid it is ideal for the most demanding applications in the pharmaceutical, food and beverage industry.

Approvals	
Explosion protection conforming to ATEX, IEC (KEM 08 ATEX 0150X / 0151X), (IECEx KEM08 00.0034X)	Zone 0 / 1 / 2 Dust-ignition-proof
FM explosion protection (PID: 3015261)	Class I Div. 1 Class I Div. 2
Other approvals for potentially explosive areas	On request
Hygienic and sterile requirements	FDA, EHEDG

Flow meter sensor	
Model number	MMC2 _ _ _3
Flange DIN 2501/EN 1092-1	–
Flange ASME B16.5	–
Threaded pipe connection DIN 11851	DN 20 – DN 80 (3/4 – 3")
Tri-Clamp®	DIN 32676 (ISO 2852) DN 20 – DN 80 (3/4 – 3")
Aseptic flange DIN 11864-2	DN 20 – DN 80 (3/4 – 3")
„G" threaded pipe connection	–
NPT threads pipe connection	–
Accuracy of mass flow rate	0,1 % / 0,15 % / 0,25 % / 0,4"
Accuracy of density	0,005 kg/l, 0,001 kg/l
Accuracy of temperature	1 K
Materials in contact with fluid	Stainless steel 1.4435 (316 L)
Protection class acc. to EN 60529	IP 67
Fluid temperature	-50 °C to +200 °C

Transmitter	
Model number	MME2 / MMC23, MMC27
Housing	Separate, field-mount housing/compact housing
Cable length	Up to 50 m; 300 m on request
Supply power	100 – 230 V AC, 24 V AC/DC
Current output 1	Active: 0,4 – 20 mA or passive: 4 – 20 mA
Current output 2	Passive: 4 – 20 mA
Pulse output	Active (non-ignition-proof) or passive
Ext. output switch-off	Yes
Ext. totalizer reset	Yes
Forward/reverse flow metering	Yes
Communication	HART® protocol, PROFIBUS® PA, FOUNDATION, Fieldbus®
Pipe empty detection	Yes, based on preconfigured density alarm < 0,5 kg/l
Self-monitoring, diagnostics	Yes
On-site desplay/totalization	Yes
Field optimized flow/density	Yes
Protection class acc. to EN 60529	MME2: IP 65 / 67, NEMA 4X MMC: IP 67, NEMA 4X

Venturi tubes

for flow measurement of gases, steams and liquids

Large flows
Minimum pressure loss
Rugged construction
Easy to replace

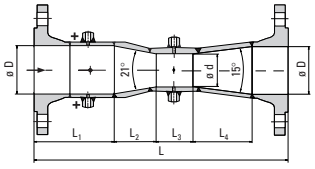
The measurement flow by differential pressure primary elements is still the most preferred technology in the process, water and waste water and petrochemical industry. The flow tubes are robust, simple, easy to remove and can be field calibrated.
The relationship between dimensions, flow and differential pressure can be computed and is published in a number of national and international standards.
The differential pressure technology has received an excellent acceptance in the industry.

Installation lengths:
Due to the determined opening angles of inlet and outlet cones, the overall-length depends mainly on the restriction diameter d. Following table of installation lengths are guiding data and refer to a mean opening ratio ß = 0,6.

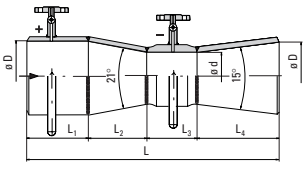
Fabricated full form	
Type	BVT-U, PMT-U, PVFU
Materials	Any weldable material
Annular chamber	Customer choice
Vent cleaners	Customer choice
Throat material	Any weldable material

Installation lengths		
Nominal	Overall length L	
diameter DN	weld-in	flange-in
50	250	300
100	500	550
200	950	1050
300	1400	1550
400	1900	2050
500	2400	2600
600	2800	3000
700	3300	3500
800	3800	4000
900	4250	4500
1000	4700	5000

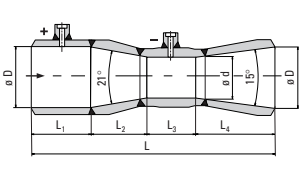
Classical venturi tube type H 800
For flanging in with treated inlet cone, 4 tapping bores.



Classical venturi tube type H 800
For welding-in with rough, out of steel panel welded inlet cone. Neck treated. Pressure tapping with ring circuit.



Classical venturi tube type H 800
For welding-in; all inner surfaces treated; 1 tapping bore.



D = Pipe inside diameter
d = Throat diameter
L_1 = Inlet cone
L_2 = Inlet cone
L_3 = Neck
L_4 = Outlet cone
L = Total length

Flow calibrators

for calibration and test of flow meters

NIST-traceable

Printed, plotted calibration data

Automated data acquisition

Uncertainty
< ±0,05 % of reading

Positive displacement liquid calibrators are volumetric type measurement devices, which measure the exact volume of fluid that passes through the flow meter under test while compensating for fluid viscosity and temperature. They ensure extremely high precision fluid flow measurement.

With a repeatability of ±0,01 % of reading, the calibrators are most precise. The NIST fluid flow measurement laboratory uses this type of calibrator for their liquid flow meter calibrations requiring high accuracy. The calibrators are easy to maintain and will last 50 years or more in service. They conform to the guidelines of NIST for Round Robin Testing.

Three models of calibrators provide calibration for 4" to 1/2" meters or smaller. The PDLC calibrators are capable of performing flow calibrations on various types of flow meters, including turbine, differential pressure orifice plate, variable area, Coriolis and other types of special meter designs.

Technical data

Model	PDLC 10	PDLC 60	PDLC 400
Fluid	Hydrocarbons and water		
Flow range	0,003 – 38 l/min (0,001 – 10 GPM)	0,2 – 225 l/min (0,06 – 60 GPM)	0,03 – 1515 l/min (0,01 – 400 GPM)
Viscosity range	0,5 – 1000 mPas		
Uncertainty	±0,05 % of reading		
Ambient operating temperature	15 – 32 °C		
Fluid operating temp.	4 – 60 °C		
Operating pressure	Up to 8 bar		

The systems for controlled

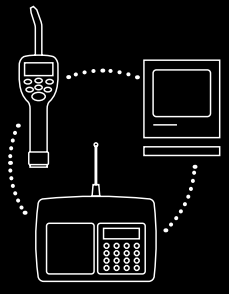
dispense of fluids

Fluid management systems

Whether as wireless or cabled systems, the Badger Meter oil management systems have been designed to control and manage the dispense of oil products in the automotive workshop.

Approved oil management systems dispensing volumes of fluids in the automotive workshops require highly accurate flow meters and pulse transmitters, trouble-free and secured manipulation in the remote transmission equipments as well as a durable data memory able to retrieve dispense data, quantities and oil products at any time.

The radio frequency based systems with PTB and BEV approvals offer the advantage of a wireless communication between dispense terminal and meter.



RF System

Wireless oil management systems

LMS-RF master keypad

Mobile systems
In combination with a trolley, the RF system becomes a fully stand alone unit.

LMS-RF dispense keypad

BARCODE

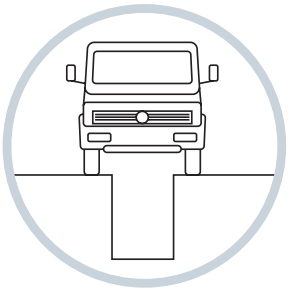
LM OG-RF meter

More than 80 % saving in installation time and cost
No cutting into existing pipes
Easy upgrades
No more cabeling mistakes
Parts reduction to two system components
2-way exchange of data
Ideal for mobile systems
Troublefree and reliable
Incl. PC software package
Barcode reader

The RF oil management system offers a cablefree communication between dispense terminal and meter upon a radio frequency technology which has specially been developed for the garages. The system can communicate with any host computer of the workshop upon a free programmable RS 232 interface.

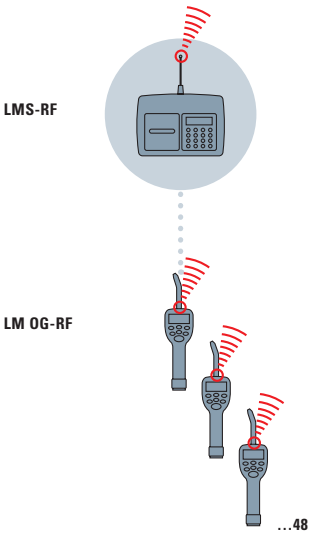
The system is PTB-approved for custody transfers.

asanetwork

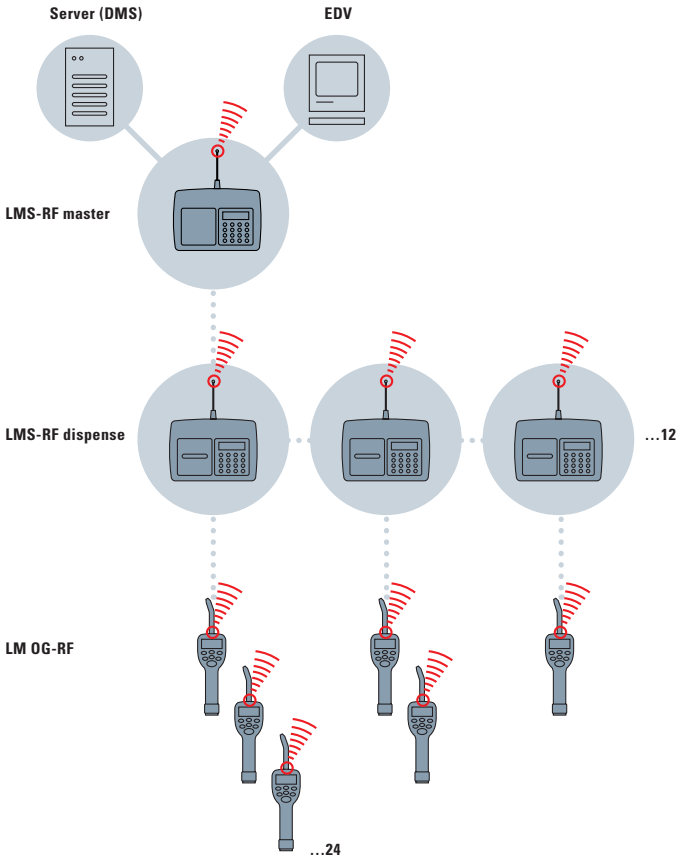


Optimized for garages
The recording and transfering of data is reliable and convenient.

Low End System



High End System

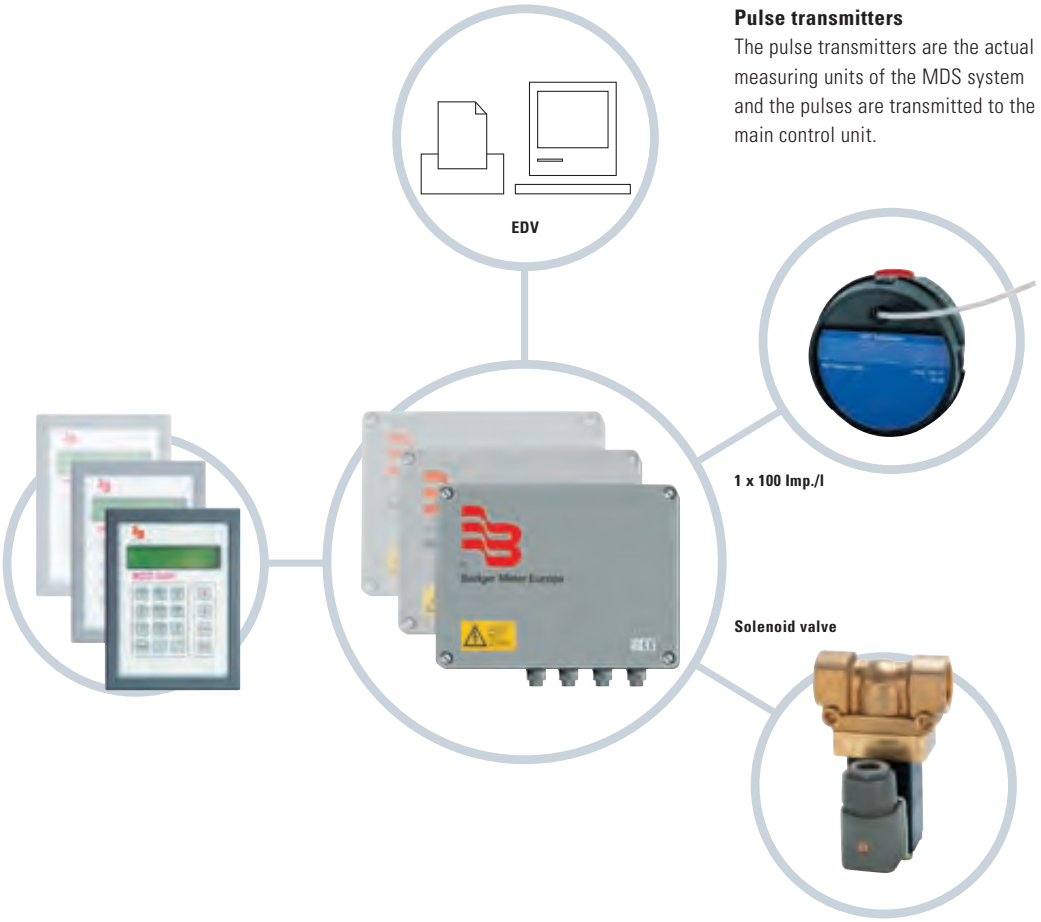


Technical data

LMS-RF master keypad	LMS-RF dispense keypad	LM OG-RF meter
1 RF master keypad with a 2 line LCD display	1 RF dispense keypad with a 2 line LCD display	Graphic display
		Preselection or free dispense
Up to 150 users per master (high end)	1 serial printer port	No dispense possible without prior dispense release from the dispense keypad
Up to 45 users per master (low end)	Up to 24 meters per dispense keypad	
Up to 12 RF dispense keypads	Max. 99 meters per system	
Max. 99 meters		Integrated solenoid valve
Oil product management reports		Manual override still tracks totals dispensed
Up to 16 oil products		
All dispenses and deliveries are kept in memory		Easy battery replacement
		Standard 1,5 V AA batteries
RS 232 serial port for remote printer		Battery lifetime of 15 000 dispenses
Printer port		
Network connection		

MDS 2000

Cabled fluid management systems



Pulse transmitters
The pulse transmitters are the actual measuring units of the MDS system and the pulses are transmitted to the main control unit.

Keypad
The alphanumeric keypad enables the dispensing of fluids and configuration of the MDS system.

I/O unit
The I/O unit is the heart of the MDS system and governs all control and switch functions.

Valves
The valves enable the preselected dispense quantity to switch off at the precise moment.

CAN-Bus technology

Compatible with asanet

Connection to garage software

The oil management system MDS 2000 has been designed to control and manage lubricants to achieve product accountability and profit center protection. The system is especially designed to be installed in small or large garages, car pools, forwarders and the industry.

The entry level consists of one alphanumeric access keypad, network linked to one I/O control unit, controlling up to 8 (4)* dispensing points each of which could be a different fluid/grade or the same fluid/grade. Transaction data are retrieved on a standard serial printer. The system upgrades easily to control up to 64 (32)* dispensing points, all working simultaneously with multiaccess keypads.

Transaction ticket printers can be connected on each keypad to hold the mechanic accountable and/or to print the data at different workshop departments. The data can be archived, restored and exported to the main workshop computer. The system can communicate with any host computer of the workshop upon a free programmable RS 232 interface.

* Data in brackets are for the approved version.

asanetwork

LMS Baby System

Compact and easy systems

4 dispense points

4 fluids

Integrated ticket printer

Alphanumeric keypad

RS 232 serial port for PC or printer

The LMS Baby System is an easy batch controller with integrated ticket printer. Up to four flow meters and four solenoid valves can be connected.
Inventories and batchings can be monitored and documented thanks to the tank monitoring function. The system also manages minimum tank levels.
PIN numbers can be entered for the users to protect from unauthorized access.

All inputs and outputs of the system are realized through plug contact. Thus, it is not necessary to open the housing to reach the connectors and to put the system into operation. The “plug & play” technology facilitates the installation and the putting into operation. The rugged housing – available in various materials – and high quality plug connectors guarantee a reliable operation, even in harsh environments. Equipped with an integral printer, an alphanumeric keypad and grafic display, the system is best suited for all user and dispense applications.

An additional PC software is optionally available to read-out and analyze the data history on the PC.

The valves for the control

of medium to smallest flow rates

Small control valves

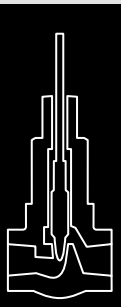
Badger Meter's control valves are specifically designed for controlling small to medium flow rates of liquid or vapor, in pipe sizes from 1/4" to 2". They cover a Cv range from 0.0000018 to 54 in different innervalve sizes.

$$F_d = \frac{N_{31} \cdot v \cdot F_L^2 \cdot F_R^2 \sqrt{C \cdot F_L}}{Q\left[1 + N_{32}\left(\frac{C}{d^2}\right)^{2/3}\right]}$$

Theoretically, there are millions of possible combinations of valves that can be configured to suit a wide variety of applications or specific requirements. The choices range from process valves (standard bronze valves, flanged stainless steel or other exotic material), to hygienic valves (barstock or cast, tube or clamp ends), to special valves (3-way, angle, high-pressure, high-temperature and cryogenic).

Valves can be made with most flange types and sizes, welded connections, NPT or tube fittings. Although the standard material is stainless steel, many other materials are available for corrosive applications, including solid Titanium and Tantalum. The valves are available with a wide variety of innervalves, many individually made by hand, standard and special bonnets, conventional and low-emission seals, pneumatic, electric or manual actuation, along with many accessories to meet almost any application requirement.

Service
Urgent orders may be delivered overnight with our „Hot-Shot" service.



ReCo® valves

for R & D, pilot plants, technical plants and fine batching applications

RCV
RESEARCH CONTROL® | ReCo® VALVES

Large material choice
Large innervalve choice
Customerized

Standard valve

Flanged valve

Angle valve

Cryogenic valve

High pressure valve

Barstock valve

3-way valve

The RC series is the classical standard line of small control valves originally developed for pilot plant and research applications for customers in all types of process industries. In addition to standard stainless steel housings, many other materials can be used. The wide range of material combinations, innervalves and other components is almost unlimited.

The pneumatic actuator can be enhanced with positioners, regulators, solenoid valves and pressure gauges, all in a compact design adjusted to the valve size. Upon request, one-of-a-kind valve solutions can be produced.

Technical data

Type	Standard valve	Flanged valve	Angle valve	High pressure valve	Cryogenic valve	Barstock valve	3-way valve
Internal threads	NPT internal threads or BSP-P	Welded-on flanges	NPT internal threads	NPT internal threads or Autoclave conn.	NPT internal threads or BSP-P	NPT internal threads	NPT internal threads
Size	DN 1/4" – 1"	DN 1/2" – 1"	DN 1/4" – 1"	DN 1/4" – 1/2"	DN 1/4" – 1"	DN 1/4" – 1"	DN 1/4" – 1"
Cvs	0.0000018 – 6.0	0.00008 – 6.0	0.0000018 – 6.0	0.0000018 – 2.5	0.0000018 – 6.0	0.0000018 – 6.0	0.05 – 5.0
Max. op. pressure	up to PN 340	up to PN 340	up to PN 340	up to PN 700	up to PN 170	up to PN 340	up to PN 100
Temperature range	-70 °C to +530 °C	-70 °C to +530 °C	-70 °C to +530 °C	-70 °C to +530 °C	-270 °C to +530 °C	-70 °C to +530 °C	-70 °C to +530 °C

Process valves

for the control of liquids, steam and gases in the process industry

Standard valve

Flanged valve

Cryogenic valve

Bronze valve

Rugged construction
Easy maintenance
Non corrosive
Easy handling

This series of valves is especially suited for the harsh demands of certain process industries. These valves are designed for modulating control of liquids, vapors and gases in industrial applications where performance, quality and small physical size are important. The rugged, corrosion-resistant construction offers features and performance normally found in more expensive designs. The compact, high performance, all-steel actuator, along with standard body assembly construction of stainless steel, is designed to provide years of service and simple easy maintenance.

A few more standard features include: adjustable spring preload, adjustable travel stop, heavy body cross section and replaceable seals on all reduced inner-valves.

Technical data

Type	Standard valve	Flanged valve	Cryogenic valve	Bronze valve
Internal threads	Clamped between flanges with NPT internal threads	Welded-on flanges	Clamped between flanges with NPT internal threads	NPT internal threads
Size	DN 1" – 2"	DN 1" – 2"	DN 1" – 2"	DN 3/4" – 2"
Cvs	0.02 – 25	0.02 - 25	0.02 - 25	8 – 54
Max. op. pressure	up to PN 50	up to PN 50	up to PN 50	up to PN 20
Temperature range	-70 °C to +530 °C	-70 °C to +530 °C	-270 °C to +530 °C	-30 °C to +200 °C

Sanitary valves

for the hygienic, pharmaceutical and food industry

Cast sanitary valve

Barstock sanitary valve

Aseptic valve

No dead volume

Easy to clean

The SC series has been designed to meet the demand of hygienic, pharmaceutical or food applications. Valves with flanges or special pipe connections, extended bonnets for hot or cold fluids, and 3-way valves. All designs can be provided with pneumatic actuators and a wide variety of accessories.

Technical data

Type	Cast sanitary valve	Barstock sanitary valve	Aseptic valve
Internal threads	Tri-Clamp© connection	Tri-Clamp© connection	Tri-Clamp© and NPT connections
Size	DN 1" – 1.5"	DN 1/2" – 2"	DN 1/2" – 1"
Cvs	0.05 – 2.0	0.05 – 4.0	3 – 11.5
Max. operating pressure	up to PN 20	up to PN 20	up to PN 10
Temperature range	-20 °C to +150 °C	-20 °C to +150 °C	0 °C to +145 °C

Positioners

for the communication with and monitoring of a valve

8049 digital (Schubert & Salzer)

TZID-C (ABB)

SIPART PS 2 (Siemens)

3730 (Samson)

SRD 991 (Eckardt)

BLRA / TLDA (Badger Meter)

Able to give a diagnostic
Reliable
Sure

Whichever you prefer – I/P-positioners, digital or analogue, or pneumatical positioners, you get the positioner of your choice. I/P-converter, solenoid valves, regulators and manometers are available in different types and from various manufacturers.

The positioners can be used for all three series (RC, OR and SC series).

Product line overview

- Electromagnetic flow meters
- Ultrasonic flow meters
- Venturi flumes and venturi tubes
- Turbine meters
- Nutating disc meters
- Oscillating piston meters
- Impeller meters
- Mass meters
- Heat meters
- Lubrication meters
- Oil management systems
- Control valves

For worldwide operations
Badger Meter Europa GmbH
Nürtinger Str. 76
72639 Neuffen
Germany
Tel. +49-70 25-92 08-0
Fax +49-70 25-92 08-15
badger@badgermeter.de
www.badgermeter.de

For the USA and Canada
Badger Meter, Inc.
P.O. Box 245036
Milwaukee, WI 53224-9536
USA
Tel. +1-414-355-04 00
Fax +1-414-355-74 99
infocentral@badgermeter.com
www.badgermeter.com

For Mexico
Badger Meter de las Americas S. A. de C. V.
Pedro Luis Ogazon #32
Col. Guadalupe Inn
Mexico, D. F. 01020
Mexico
Tel. +52-55-56 62-08 82
Fax +52-55-56 62-75 81
bmdla@badgermeter.com

For Asia
Badger Meter Asia
Singapore Representative Office
80 Marine Parade Road
#21–04 Parkway Parade
Singapore 449269
Singapore
Tel. +65-63 46 48 36
Fax +65-63 46 48 37
awang@badgermeter.com

For China
Badger Meter, Inc. Shanghai Office
Rm 501, N° 11 Longyue Apartment
N° 180 Longjin Rd,
Jiuting Songjiang District,
Shanghai, CHINA 201615
Tel. +86-21-57 63 54 12
Fax +86-21-57 63 54 12
robertxtc@126.com

For Slovakia
Badger Meter Slovakia s. r. o.
Racianska 109 / B
83102 Bratislava
Slovakia
Tel. +421-2-44 63 83 01
Fax +421-2-44 63 83 03
badger@badgermeter.sk
www.badgermeter.sk

For the Czech Republic
Badger Meter Czech Republic s. r. o.
Maríkova 2082/26
62100 Brno
Czech Republic
Tel. +420-5-41 42 04 11
Fax +420-5-41 22 97 24
itomas@badgermeter.cz
www.badgermeter.cz

Badger Meter Europa

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