

Electromagnetic flowmeters



Sensors MUT 2200 EL / MUT 2500 EL

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MUT 2200 EL / MUT 2500 EL sensors represent the state of the art of EUROMAG INTERNATIONAL production for water cycle and process applications. The new structure for the generation of the magnetic field, the innovative route of the signal generated by the electrodes, provide a sensor with an extremely wide measurement range:

EL= Extended Linearity.

This new sensors series follows the successful tradition of the MUT 2200 / MUT 2500, introducing a measurement range of more than 1:1000 without linearization software. These kinds of performances allow very accurate measures on a wide flow rate range and to count lower flow rates that, before, would have been reset because of the effect of the converters cut off.

1. Body and flange

The flange and the sensor external surface are Epoxy painted. This treatment gives the sensor an excellent resistance to water, even in permanent immersion. When special ambient conditions require it, the MUT 2000 EL / MUT 2500 EL may be supplied in stainless steel, flange included (see Table 2).

2. Internal lining

The standard internal insulating lining is in PTFE for diameters from ND 15 to ND 50, in hard rubber (ebonite) for diameters of more than ND 50. On request, the sensors may be supplied coated with PTFE with diameters of more than ND 50. The temperature of the liquid to be measured is limited by the kind of internal lining used. (see Table 4).

3. Electrodes

The standard electrodes are in Hastelloy C and, therefore, guarantee a wide compatibility with the process liquids, if required, they may be supplied in the materials shown in Table 3.

4. Coupling and connecting to sensor

MUT 2200 EL / MUT 2500 EL sensors may be coupled with any EUROMAG converters (see Table 5). In the separate version the sensor is connected to the converter by means of a cable whose length depends on the liquid conductivity; the maximum length not exceeding 100 metres as shown in Figure 1. If these sensors are inserted in a plastic or lined pipe line, they require the use of two grounding rings of the liquid, which are inserted between the flange and the counter flange or the installation of the grounding electrode. An empty pipe device is also available .

5. Choice of diameter

When choosing the diameter we advise keeping at the full scale flow rate, a liquid velocity of at least 2–3 m/s. The maximum acceptable velocity is of 10 m/s. Table 23 provides the flow rate for each ND (nominal diameter) according to the liquid velocity.

7. Calibration and maximum error

MUT 2200 EL / MUT 2500 EL sensors belong to the reference Group B1 (ISO 11631). Each sensor is calibrated by a hydraulic bench equipped with a reference weighting system and SIT certified. The uncertainty of the measure is equal to 0.2% of the read flowrate value when the velocity of the liquid is more than 0.2 m/s. The repeatability of the measure is in the order of 0.1%.

8. Reference standards

The EUROMAG magnetic meters are marked CE and are manufactured according to the following standards:

- * CEI EN 61010-1
- * UNI EN ISO 6817
- * 2006/95/CE, 93/68 (LVD)
- * 2004/98/CE, 92/31 (EMC)
- * EN 50081 - 1
- * EN 50082 - 1
- * EN 1434

On request, MUT 2200 EL and MUT 2500 EL sensors can be provided with certification ATEX II 2 GD EEx mb IIC T4 U.

9. Applications

The sensors of the family MUT 2200 EL / MUT 2500 EL are suitable for any application of on-line measuring. These sensors are typically used in the measurement of potable, reuse water, industrial waste water, industrial process liquids, mud, concretes and sewage.

Maximum length of cables according to the liquid conductivity

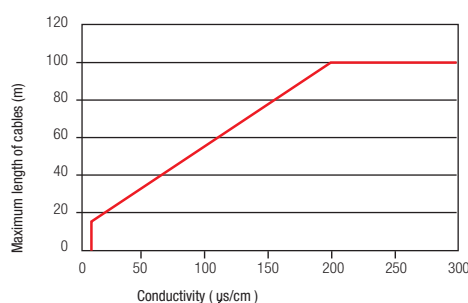


Figure 1

Flow tube materials

AISI 304 ss

Flanges materials

Carbon Steel Painted (std)

AISI 304 ss

AISI 316 ss

Table 2

Available electrodes

Hastelloy C (std)

Hastelloy B

Titanium

Tantalum

Platinum

Table 3

Internal lining - Liquid temperature

Internal lining	Liquid temperature
PTFE	Standard -40 /+140°C (up to +180° on request)
EBANITE FOR FOOD	-40°C / +80°C

table 4

General characteristics of Sensor MUT2200 EL / MUT 2500 EL

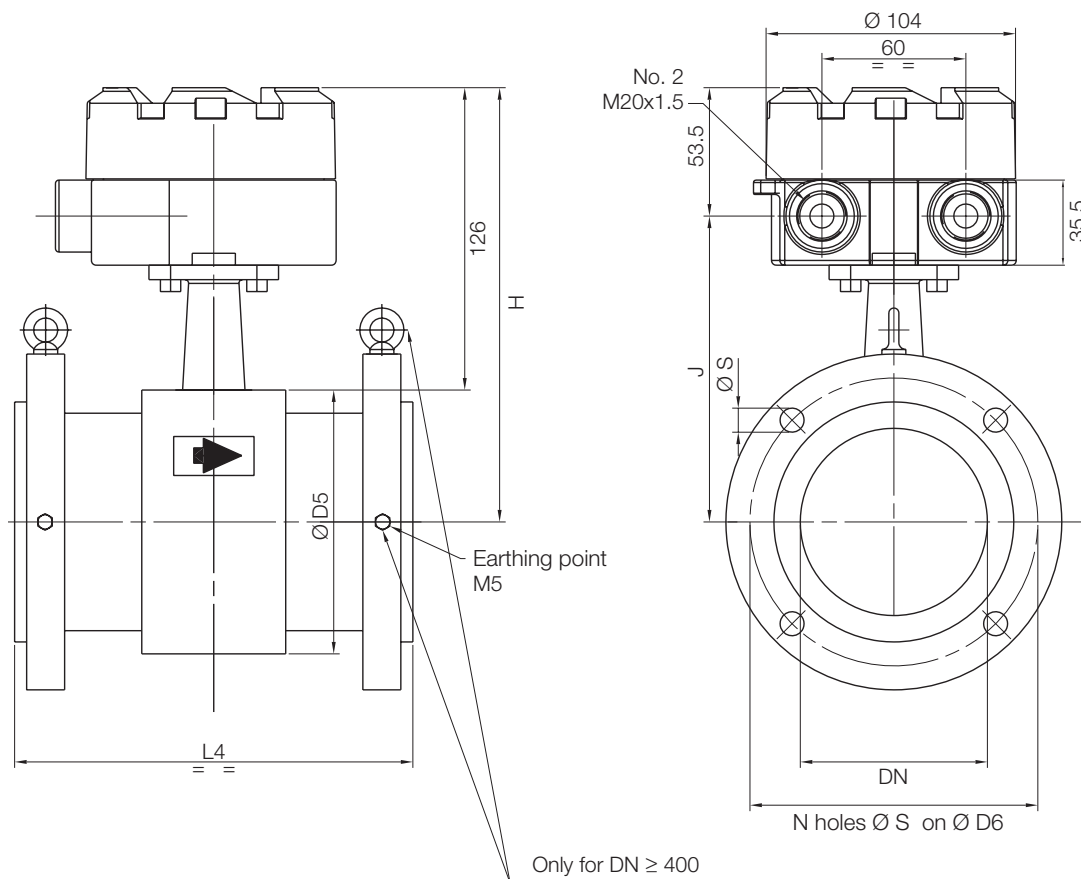
Available diameters	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400				
	1/2"	3/4"	1"	1.1/4"	1.1/2"	2"	2.1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"				
	450	500	600	700	800	900	1000	1200	1300	1400	1500	1600	1700	1800	2000					
	18"	20"	24"	28"	32"	36"	40"	48"	52"	56"	60"	64"	68"	72"	80"					
Standard flanged connections	AS4087																			
Flanged connections on request	BS45404				ANSI 150				ANSI 300				ISO7005							
Standard operation pressure [1]	16 bar																			
Degree of protection	IP68 continuous immersion at 1,5 m (IEC 529)																			
Converters compatibility	MC 106 A				MC 106 B				MC 608 A				MC 608 B				MC 608 R			
Dimensions	See figure 2																			
Parts in contact with the liquid [2]	PTFE DN15 TO DN50								Ebonite DN ≥ 65											
Electrical connections	Cableglands PG 11 + terminal box + sealing resin																			

[1] On request up to 150 bar

table 5

[2] Others on request.

Fig. 2 - Overall dimensions. Separate Version



MUT 2200 EL Separate PN16

Ø DN	Ø D5	L4	J	Ø D6	N	Ø S	H
15	84	200 ⁰ ₋₃	114.5	65	4	14	168
20	84	200 ⁰ ₋₃	114.5	75	4	14	168
25	64	200 ⁰ ₋₃	104.5	85	4	14	158
32	77	200 ⁰ ₋₃	111	100	4	18	164.5
40	82	200 ⁰ ₋₃	113.5	110	4	18	167
50	98	200 ⁰ ₋₃	121.5	125	4	18	175
65	114	200 ⁰ ₋₃	129.5	145	4	18	183
80	127	200 ⁰ ₋₃	136	160	8	18	189.5
100	152	250 ⁰ ₋₃	148.5	180	8	18	202
125	178	250 ⁰ ₋₃	161.5	210	8	18	215
150	206	300 ⁰ ₋₃	175.5	240	8	22	229
200	257	350 ⁰ ₋₃	201	295	12	22	254.5
250	311	450 ⁰ ₋₅	228	355	12	25	281.5
300	362	500 ⁰ ₋₅	253.5	410	12	25	307
350	394	550 ⁰ ₋₅	269.5	470	16	25	323
400	444	600 ⁰ ₋₅	294.5	525	16	30	348

table 8

MUT 2200 EL Separate PN25

Ø DN	Ø D5	L4	J	Ø D6	N	Ø S	H
15	84	200 ⁰ ₋₃	114.5	65	4	14	168
20	84	200 ⁰ ₋₃	114.5	75	4	14	168
25	64	200 ⁰ ₋₃	104.5	85	4	14	158
32	77	200 ⁰ ₋₃	111	100	4	18	164.5
40	82	200 ⁰ ₋₃	113.5	110	4	18	167
50	98	200 ⁰ ₋₃	121.5	125	4	18	175
65	114	200 ⁰ ₋₃	129.5	145	8	18	183
80	127	200 ⁰ ₋₃	136	160	8	18	189.5
100	152	250 ⁰ ₋₃	148.5	190	8	22	202
125	178	250 ⁰ ₋₃	161.5	220	8	25	215
150	206	300 ⁰ ₋₃	175.5	250	8	25	229
200	257	350 ⁰ ₋₃	201	310	12	25	254.5
250	311	450 ⁰ ₋₅	228	370	12	30	281.5
300	362	500 ⁰ ₋₅	253.5	430	16	30	307
350	394	550 ⁰ ₋₅	269.5	490	16	33	323
400	444	600 ⁰ ₋₅	294.5	550	16	36	348

table 10

MUT 2500 EL Separate PN16

Ø DN	Ø D5	L4	J	Ø D6	N	Ø S	H
450	519	450 ⁰ ₋₇	332	585	20	30	385.5
500	570	500 ⁰ ₋₉	357.5	605	20	33	411
600	682	600 ⁰ ₋₉	413.5	770	20	36	467
700	783	700 ⁰ ₋₉	464	840	24	36	517.5
800	885	800 ⁰ ₋₉	515	950	24	39	568.5
900	996	900 ⁰ ₋₁₅	570.5	1050	28	39	624
1000	1098	1000 ⁰ ₋₁₅	621.5	1170	28	42	675
1200	1312	1200 ⁰ ₋₁₅	728.5	1390	32	48	782
1400	1512	1400 ⁰ ₋₁₅	828.5	1590	36	48	882
1500	1616	1500 ⁰ ₋₁₅	880.5				934
1600	1712	1600 ⁰ ₋₁₅	928.5	1820	40	56	982
1800	1922	1800 ⁰ ₋₁₅	1033.5	2020	44	56	1087
2000	2122	2000 ⁰ ₋₁₅	1133.5	2230	48	62	1187

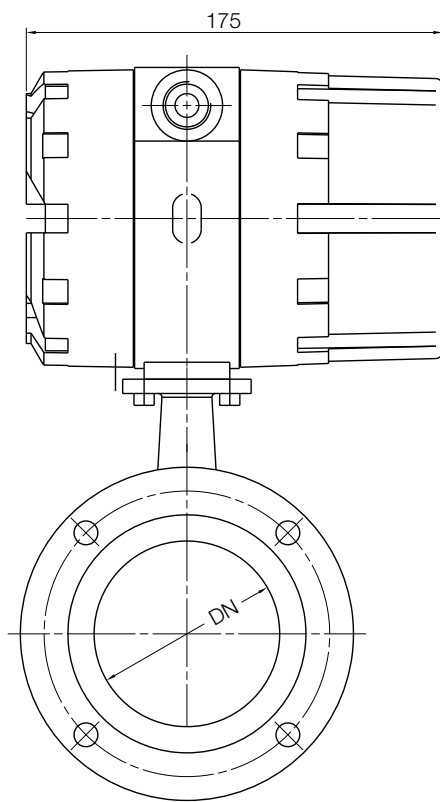
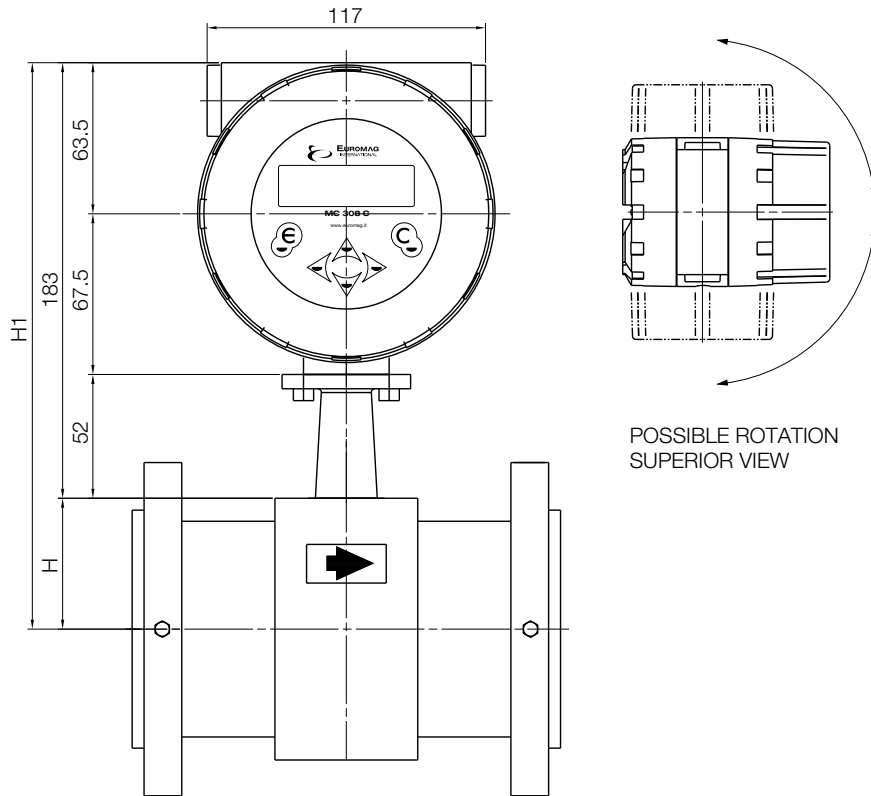
table 9

MUT 2500 EL Separate PN25

Ø DN	Ø D5	L4	J	Ø D6	N	Ø S	H
450	519	450 ⁰ ₋₇	332	600	20	36	385.5
500	570	500 ⁰ ₋₉	357.5	660	20	36	411
600	682	600 ⁰ ₋₉	413.5	770	20	39	467
700	783	700 ⁰ ₋₉	464	875	24	42	517.5
800	885	800 ⁰ ₋₉	515	990	24	48	568.5
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1500	1616	1500 ⁰ ₋₁₅	880.5				934
1600	1712	1600 ⁰ ₋₁₅	928.5				982
1800	1922	1800 ⁰ ₋₁₅	1033.5				1087
2000	2122	2000 ⁰ ₋₁₅	1133.5				1187

table 11

Fig. 7 - MUT 2200 EL / MUT 2500 EL Compact - Converter MC 608 A



	Ø DN	H	H1
MUT 2200 EL	25	32	215
	32	38.5	221.5
	40	41	224
	50	49	232
	65	57	240
	80	63.5	246.5
	100	76	259
	125	89	272
	150	103	286
	200	128.5	311.5
	250	155.5	338.5
	300	181	364
MUT 2500 EL	350	197	380
	400	222	405
	450	259.5	442.5
	500	285	468
	600	341	524
	700	391.5	574.5
	800	442.5	625.5
	900	498	681
	1000	549	732
	1200	656	839
	1400	756	939
	1500	808	991
1600	856	1039	
1800	961	1144	
2000	1061	1244	

table 22

Flowrate Table (Blue values are preferable)

DN	VELOCITY [m/s]			
	0,05	0,5	5	10
25	88.36 l/h	883.57 l/h	8,835.73 l/h	17,671.46 l/h
32	0.14 m ³ /h	1.45 m ³ /h	14.48 m ³ /h	28.95 m ³ /h
40	0.23 m ³ /h	2.26 m ³ /h	22.62 m ³ /h	45.24 m ³ /h
50	0.35 m ³ /h	3.53 m ³ /h	35.34 m ³ /h	70.69 m ³ /h
65	0.60 m ³ /h	5.97 m ³ /h	59.73 m ³ /h	119.46 m ³ /h
80	0.90 m ³ /h	9.05 m ³ /h	90.48 m ³ /h	180.96 m ³ /h
100	1.41 m ³ /h	14.14 m ³ /h	141.37 m ³ /h	282.74 m ³ /h
125	2.21 m ³ /h	22.09 m ³ /h	220.89 m ³ /h	441.79 m ³ /h
150	3.18 m ³ /h	31.81 m ³ /h	318.09 m ³ /h	636.17 m ³ /h
200	5.65 m ³ /h	56.55 m ³ /h	565.49 m ³ /h	1,130.97 m ³ /h
250	8.84 m ³ /h	88.36 m ³ /h	883.57 m ³ /h	1,767.15 m ³ /h
300	12.72 m ³ /h	127.23 m ³ /h	1,272.35 m ³ /h	2,544.69 m ³ /h
350	17.32 m ³ /h	173.18 m ³ /h	1,731.80 m ³ /h	3,463.61 m ³ /h
400	22.62 m ³ /h	226.19 m ³ /h	2,261.95 m ³ /h	4,523.89 m ³ /h
450	28.63 m ³ /h	286.28 m ³ /h	2,862.78 m ³ /h	5,725.55 m ³ /h
500	35.34 m ³ /h	353.43 m ³ /h	3,534.29 m ³ /h	7,068.58 m ³ /h
550	42.76 m ³ /h	427.65 m ³ /h	4,276.49 m ³ /h	8,552.99 m ³ /h
600	50.89 m ³ /h	508.94 m ³ /h	5,089.38 m ³ /h	10,178.76 m ³ /h
650	59.73 m ³ /h	597.30 m ³ /h	5,972.95 m ³ /h	11,945.91 m ³ /h
700	69.27 m ³ /h	692.72 m ³ /h	6,927.21 m ³ /h	13,854.42 m ³ /h
750	79.52 m ³ /h	795.22 m ³ /h	7,952.16 m ³ /h	15,904.31 m ³ /h
800	90.48 m ³ /h	904.78 m ³ /h	9,047.79 m ³ /h	18,095.57 m ³ /h
900	114.51 m ³ /h	1,145.11 m ³ /h	11,451.11 m ³ /h	22,902.21 m ³ /h
1000	141.37 m ³ /h	1,413.72 m ³ /h	14,137.17 m ³ /h	28,274.33 m ³ /h
1200	203.58 m ³ /h	2,035.75 m ³ /h	20,357.52 m ³ /h	40,715.04 m ³ /h
1300	238.92 m ³ /h	2,389.18 m ³ /h	23,891.81 m ³ /h	47,783.62 m ³ /h
1400	277.09 m ³ /h	2,770.88 m ³ /h	27,708.85 m ³ /h	55,417.69 m ³ /h
1500	318.09 m ³ /h	3,180.86 m ³ /h	31,808.63 m ³ /h	63,617.25 m ³ /h
1600	361.91 m ³ /h	3,619.11 m ³ /h	36,191.15 m ³ /h	72,382.29 m ³ /h
1700	408.56 m ³ /h	4,085.64 m ³ /h	40,856.41 m ³ /h	81,712.82 m ³ /h
1800	458.04 m ³ /h	4,580.44 m ³ /h	45,804.42 m ³ /h	91,608.84 m ³ /h
2000	565.49 m ³ /h	5,654.87 m ³ /h	56,548.67 m ³ /h	113,097.34 m ³ /h

table 23



Converter MC 608 A/B/R

- Available in **powered version** 12/24 Vac-dc or 90-264 Vac (**MC608A**).
- Available in **battery powered** version with a useful life of 6 years (*) (**MC608B**).
- Available in battery mode with **solar panel (MC608R)**.
- Accuracy according to Class 1&2 of OIML R49.
- Built-in data logger with optional input for pressure measurement.
- Dedicated data logger for extended diagnostics.
- GSM/GPRS connectivity in combination with DATAFLOW TX.
- Large graphics display with totaliser indications greater than 8mm.
- Total management of electricity consumption with automatic sleep function and waking up with magnetic command.
- Batteries can be replaced on site.
- IrCOM interface for programming communication with laptop.
- MODBUS RTU interface for communication on RS 485.
- Special version with submersible IP 68 case.
- Firmware upgrades possible over time to maintain the investment value.
- All configuration, totaliser and data logger values are stored even in case of power failure.
- Multi-level password system to guarantee accessibility and confidentiality.

(*) At factory conditions.

Typical Applications

- **Billing consumption**
- **District measurements**
- **Transport lines**
- **Residual water treatment systems**
- **Irrigation**

The MC 608 converter has been designed with the purpose of meeting all the requirements of modern water management systems. It supports extended functions which make it perfectly suitable for measuring and billing in civil, industrial and agricultural sector and for flow measurement in residual water treatment. On board batteries in 608-B version guarantee at least 6 years operation under the reference conditions of use, and will maintain a useful life of 10 years from shipment.

The new generation converter extends the use of electromagnetic flowmeters to **water distribution network**, allowing a better control of flows in every point of installation. Even small flow rates can be monitored and consequently the status of leaks in the distribution network. For **billing applications**, it is an economical solution in terms of capital expenditure and operating cost. Installations in **irrigation systems** guarantee that each farmer pays for the water used, and allow optimization of water management.

This converter is ideal for installation in remote areas, thanks to battery powering and sturdy and strong structure.



CONVERTER INSTALLATION	Compact on the sensor or remote version. <ul style="list-style-type: none"> • MC608B/R up to 30 meters from the sensor. • MC608A up to 100 meters from the sensor.
CONVERTER CASE	Aluminium epoxy painted IP 67/68, with front window in toughened glass.
ELECTRICAL CONNECTIONS	Cable glands 20x1.5 in plastic or metal. It can also take 1/2" NPT cable glands.
CONNECTION CABLES	Dedicated cables supplied by EUROMAG INTERNATIONAL
POWER SUPPLY	MC608A 90...264 Vac 12/24 Vac/dc MC608B Battery powered supply or 12/24 Vac/dc Expected life T=0/50°C (32/122°F) Internal battery pack 6-10 years MC608R Rechargeable battery + solar panel
SIGNALS IN OUTPUT	<ul style="list-style-type: none"> • Active analogue output 4-20 mA; (when powered) • Digital output for pulses maximum 1000 Hz duty cycle max 50% for instant load, positive only, positive and negative; • Programmable digital output for: <ul style="list-style-type: none"> -- Maximum pulses 1000 Hz duty cycle max 50% for negative load; -- Negative load indication; -- Cumulative alarm • Digital output in active frequency 0-10 kHz; All outputs are optoisolated. Pulse outputs with a maximum capacity of $\pm 35\text{VDC}$ 50 mA.
SERIAL COMMUNICATION	<ul style="list-style-type: none"> • IrCOM interface for communicating with laptop or hand held communicator, and dedicated SW for programming, displaying and downloading data. • MODBUS RTU interface on RS 485.
TEMPERATURE RANGE	Process » -10°C to 70°C Ambient » -20°C to 60°C Storage » -30°C to 70°C
ACCURACY	<ul style="list-style-type: none"> • MC608A: 0.2% of the read value (minimum 0.2 m/s) • MC608B/R : 0.4% of the read value (minimum 0.2 m/s)
REPEATABILITY	0.1% of the read value (minimum 0.2 m/s)
CALIBRATION	Standard Generic use in water » 0.4 % Extended High performance applications » 0.2%
SAMPLING FREQUENCY	Programmable 5, 3, 1, 1/15, 1/30, 1/60, 1/120, 1/240, 1/480 Hz.
DISPLAY	Graphic LCD - 128x64 pixels, 50x25mm visual area Backlit white colour, programmable backlighting. Simultaneous display of a counter + instant variable + status flags. Counters with 8 mm high characters for reliable and easy reading. Programmable display content.
PROGRAMMING	With push buttons on board of converter for non-billing applications. By IrCOM interface and laptop with dedicated software or via RS485 and MODBUS RTU protocol; available for all applications including billing and custody transfer.
MEASUREMENT UNITS	Settable individually for counters, flow indication, pulse emission. <ul style="list-style-type: none"> • Selectable volume units: ml, cl, dl, l, dal, hl, m3 , in3, ft3, gal, USgal, bbl, oz.
REFERENCE TIME	Selectable time units: s, m, h, days.
PROCESS DATA LOGGER	4 MB flash memory, 200,000 lines of data (one line includes: instant flow, 2 counters, date, time, temperature). Completely programmable both in terms of content and acquisition times.
DIAGNOSTICS DATA LOGGER	64 kB EEPROM, 2000 lines of data (each line includes: Date, time, temperature, error codes, counters, flow rate, user actions with changes made). Tamper/reset proof.
ELECTRICAL CONDUCTIVITY	<ul style="list-style-type: none"> • MC608A: 5 $\mu\text{S/cm}$ minimum • MC608B/R: 20 $\mu\text{S/cm}$ minimum
RECOMMENDED VELOCITY	-10 to 10 m/s
PROCESS FLUID	<ul style="list-style-type: none"> • Surface or ground water • Drinking water • Water for irrigation • Waste water
APPROVALS AND CERTIFICATIONS	<ul style="list-style-type: none"> • The MC 608 converter meets all the requirements established by the EC directives. The manufacturer certifies the success of the qualification tests by applying the CE mark. • Electromagnetic compatibility » Directive 89/336/EEC, EN 61326-1:2006 • Low voltage directive » Directive 2006/95/EC • Custody Transfer » MI-001 and OIML R-49 (certification pending)

The data shown in this catalogue are subject to modification without prior notice

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Revision: 8 August 2013

COMPANY WITH
QUALITY SYSTEM
CERTIFIED BY DNV
= ISO 9001 =

