



CONVERTER MC108



The **EUROMAG INTERNATIONAL** converter MC108 represents the most versatile electronics of the highest performance, able to satisfy all of the most difficult applications. They can be connected to any electromagnetic sensor manufactured by **EUROMAG INTERNATIONAL**.

1. HARDWARE CHARACTERISTICS

1.1 CASE AND ASSEMBLY

The case can be in die-cast aluminium for particularly aggressive environments, the protective rating being IP 67. The MC108 converter can be coupled to any **EUROMAG INTERNATIONAL** sensor, both in the separate version and the compact version. In the compact version, the converter can be installed vertically, independently of how the sensor is positioned. On the front of the equipment, there is an LCD display and keyboard which is provided, on request, with sealable cover.

1.2. POWER SUPPLY

The MC108 converter is produced in HV (high tension) and LV (low tension) as demonstrated in Table 1. The LV version can be used both in direct or alternating current. This type of converter is supplied with unlimited protection against short-circuit, overloading and over-temperature. Protection against momentary over-voltage is obtained by the use of fast V.D.R. (Voltage dependent resistor).

1.3. OPERATING ENVIRONMENTAL CONDITIONS

The MC108 can operate at temperatures between -20°C to $+60^{\circ}\text{C}$. With the compact version if the liquid exceeds 60°C and the environmental temperature is close to 60°C , it is advisable to contact **EUROMAG INTERNATIONAL**. In the case of installation in an open environment, it is advisable to put the converters under cover to protect it from direct sun or in the case of very low temperatures, inside a heated cupboard.

1.4. ON/OFF OUTPUT

The standard version of MC108 are provided with three ON/OFF outputs. The first can be used for totalizing impulse rates or for a frequency signal proportional to the flow rate; the second for programming alarms; the third for hardware alarms. The first and second ON/OFF outputs permit a choice of connecting the load to the collector or to the emitter, thus making the equipment adaptable to any type of receiver (electromechanical, electronic, CMOS, TTL, etc.) and to any continuous external voltage inferior to 40Vdc or to internal voltage at 24 Vdc. Only the output to hardware alarms is to open collector, in which case the load is connected between the collector and the positive clamp (+) of the output at the internal 24V. Protection is also foreseen for the

output in the case of: momentary over-tension (zener intervention), inversion of polarity ($I_{CC} \leq 1A$), short circuit for an unlimited period in the case of internal supply. Should an external power supply be used for the ON/OFF outputs, this **MUST BE CONTINUOUS AND MUST NOT EXCEED 40 Vdc.** Each output is able to pilot a maximum power supply of 100mA. In the case of internal power supply of 24 Vdc, its **MAXIMUM RECEPTIVENESS IS 100 mA**, and consequently the maximum supply deliverable from an output depends on how many ON/OFF outputs are used contemporaneously; the additional modules must be taken into account.

1.5. OUTPUT 24 Vdc

As anticipated in the previous point, the MC108 converters are supplied with an output at 24 Vdc $\pm 10\%$ for supplying the ON/OFF output, the maximum power supply being 100 aM. Protection against overloading, overheating, short-circuits and isolation (up to 1 KV) for unlimited time is present.

1.6. OUTPUT 4(0) + 20 mA

This output permits the flow signal to be transported to a distance of up to 1 Km via a shielded two-wire cable, the maximum load permitted being 1000 Ohm. This output can also supply information in conformity with the NAMUR NE 43 regulations regarding any possible faults in the meter or malfunctions in the process.

1.7. RS485 INTERFACE

This is an insulated interface found both on the terminal board and on the DIN socket. It permits the connection of up to 32 flow meters on the network. In the case of blind measurers, without display, the interface RS485 permits, via the DIN, outlet connection to the remote control **TRM100**, visualization of data and predisposition of the necessary parameters for correct functioning of the measurers. The RS485 Interface permits also connection to flow meters with the remote terminal TRM200 which can be installed at a distance of 1500 m. With this remote terminal the flow can be visualised at a distance and it is also possible to programme at a distance. More than one converter MC108 can be connected to a TRM200 through the RS485 interface.



View of the MC108: keyboard, display and outlet RS485 for remote terminal TRM100 in the top part.

1.8. DIGITAL INPUT.

This input can be used in three different modes: to reset the counters, to stop them, or to choose the measurement scale. There are two types of protection:

- for momentary over-voltage (200 Vdc MAX per 1 ms, duty cycle 1%)
- polarity inversion for unlimited time ($V_{in} \max = 32 \text{ Vdc}$ or 200 max V dc per 1 ms, duty cycle 1%)

1.9. ADDITIONAL MODULES (OPTIONAL)

One additional module can be applied inside the case of the MC108 converter, amplifying the performance. Each module is "recognised" automatically by the software which adjusts the instrument both to the new performance and to dialogue with the user (Table 2).

2. CHARACTERISTICS OF THE SOFTWARE

2.1. PRINCIPAL CHARACTERISTICS OF THE MC108 SERIES

- two-way range measure
- calculation of volume with 4 total/9 figure updating
- double sequence of measurements with the possibility of automatic auto ranging or on external command
- acquisition data of flow and volume
- automatic printing of process data and, on command, of configuration data
- empty tube alarm with semiautomatic level adjustment
- network management of more than one flow meter
- Interface: RS485, RS232.

2.2. INTERNAL DIAGNOSTICS

Each time the apparatus is switched on, the following components are tested; the WATCH-DOG, the A/D converter, the keyboard and the module scanning lines, the congruity of the configuration data.

When the meter is operating normally, the following are tested: the energizing circuit, the A/D converter, the power-supply circuit.

2.3. CALIBRATION AND INITIAL TESTING

Every MC108 converter undergoes an automatic calibration and testing process which verifies the 41 internal parameters. This operation takes place at the same time as the *burn-in* which lasts at least 50 hours. During this phase the abovementioned tests are repeated every hour. If one parameter is found to exceed the tolerance test, the programme stops and an error message appears on the control computer.

2.4. DATA SAVING

There are two copies of the work data on EEPROM. The configuration data are saved after each modification. The data contained in the totalizers and the calendar-clock are saved whenever the power supply is cut off. The data are verified every time the converter is switched on.

2.5. FUNCTION CONFIGURATION

Several levels of access to the configuration functions have been provided in order to make it extremely easy and quick to use this converter. Access to these various functions is immediate thanks to the order number which is indicated in the operating manual. In order to have access to various levels, it is necessary to enter different **passwords**. The password of level 1 can be modified by the user, the others are fixed. The most important presetting functions are indicated hereafter.

2.6. FULL SCALE FLOW RATE

The full scale flow rate can be preset between 4% and 100% of maximum flow rate (equivalent to a liquid velocity = 10 m/s). If double scale is operating, you must preset both the high and the low flow rate.

2.7. VOLUME OF TOTALIZATION IMPLUSE

It is possible to set the volume of a totalization impulse in any units and in the numerical range of 0.00001 ÷ 99999.9.

2.8. DURATION OF THE TOTALIZATION IMPLUSE

The duration of the impulse can be set in the range 0.04... 9999.99 ms. The time tolerance level is + 0, -20 microseconds.

2.9. FREQUENCY RANGE

The full scale frequency can be set in the range 10.00...10,000.00 Hz.

2.10. RESETTING FACTORY DATA

By using this function, all modifications applied to the parameters can be cancelled, and it is thus possible to return to the values which were pre-set in the factory.

2.11. TYPE OF DIGITAL OUTPUT

This function permits the choice of having an output FREQUENCY proportional to the flow, or having factorized IMPULSES whose length can be programmed using function 3. With frequency output, the most suitable impulse volume can be chosen in order to obtain the most desirable frequency at maximum volume output. One should note that, while with frequency output the impulses are distributed uniformly over time, the factorized impulses are emitted in packets.

2.12. DUAL SCALE READ-OUT

When this is functioning, it is possible to have two read-out scales of measure: one scale "contains" the other. The lower scale permits the output range to be enlarged in order to obtain a greater resolution.

2.13. SCALE CHANGING MODE

The two measurement scales (see dual scale read-out) can be switched either by flow rate, or by flow rate sign, or by external control, or by manual control. The software alarm output can be configured for signalling the scale change; that is, it becomes useful for interpreting the signal 4(0)-20 mA. Values shown on display and totalization impulses can not be misunderstood.

2.14. TOTALIZATION MODE

The totalization impulses on the terminal board (if function 14 is available) can be emitted in two different ways:

- **one-directional:** emits impulses only if $Q > 0$
- **two-directional:** emits impulses if $|Q| > 0$

NB. The internal totalizers continue to count in any case, regardless of the mode chosen.

2.15. EMPTY TUBE TEST

When this is functioning, a conductivity measurement is carried out between the electrodes. If the threshold is exceeded, the tube is considered empty, the measure on the display goes to zero and the current and frequency outputs go to a pre-set alarm value (see Namur standards).

2.16. AUTO-CALIBRATION

By using this function, the automatic calibration of the equipment is activated (eliminating any error of gain or offset of conversion). This operation requires an execution time equal to three times the sampling period. Auto-calibration can be set in four ways: disabled, every 10 minutes, every hour, on external command (input > 3 Volts) As a calibration cycle lasts three times as long as a normal measurement, it is recommended that, when metering is carried out, it be deactivated, or that the external control be used immediately before metering begins.

2.17. CUT OFF THRESHOLD

This function prevents the totalization of the flow when $|Q| < \text{threshold}$. If the value of $|Q| < \text{threshold}$, flow goes to zero on the display. The threshold range is 0% ... 25% full scale.

2.18. DATE AND TIME ADJUSTMENT

This function is used to set the date and time. When the power supply is cut off, the calendar-clock stops. When power is switched on again, it starts up from the time at which it stopped. The error shows the cut-off time. The setting range lasts until 31.12.2087. The clock is used by the DATA LOGGER and by the automatic printing system.

2.19. DATA LOGGER

One can choose whether to acquire flow or volume data. A maximum of 64 volume or flow samples can be collected. The rate of acquisition can be programmed. If there is a power failure on the network, data which have not already been transmitted will be lost.

2.20. ON/OFF OUTPUT MODULES 4-5-6

The two relay outputs of the additional modules 4-5-6 can be programmed for two of the situations indicated in Table 3.

2.21. RS485 SPEED

For communication in RS 485, one of four speeds can be selected: 1200 bps, 2400 bps, 9600 bps, 19200 bps.

2.22. ENERGY SAVING

If available, it permits for a saving of energy of up to 70%. This saving is suitable only for a relatively stable flow.

2.23. SPECIFIC WEIGHT

This function permits entering the specific weight manually (which is assumed to be constant) of the liquid to be measured (in kg/dm^3), in the range of 0.0001÷99.9999. This function is used when a unit of weight, rather than one of volume, is used for the flow rate or totalization.

CHARACTERISTICS AND PERFORMANCE	MC108 HV [1]	MC108 LV [2]
Display with 2 lines of 16 characters	•	•
Keyboard	•	•
Output Imp./ freq. 24 Vdc [3]	•	•
Output power supply 4(0) - 20 mA	•	•
Second on/off output 24 Vdc (Alarm)	•	•
Third on/off output 24 Vdc (Alarm hardware)	•	•
Interface RS 485	•	•
Entrance for TRM100	•	•
Network connection (RS485)	•	•
Empty tube alarm	•	•
Forward/reverse flow rate	•	•
Reset input for totalizer	•	•
Auto-ranging	•	•
Metric system: Decimal, English, American	•	•
Message languages: Italian, English	•	•

CHARACTERISTICS AND PERFORMANCE	MC108 HV [1]	MC108 LV [2]
Power : 3÷17 W	•	•
Assemblage: Separate, Compact	•	•
Degree of protection IP67	•	•
Weight converter: 3300 g	•	•

[1] Power supply (high): 90÷264 Vac, 45÷66 Hz
[2] Power supply (low): 16÷28 Vac, 45÷66 Hz, 19÷33 Vdc
[3] Predisposed on keyboard

Table 1.

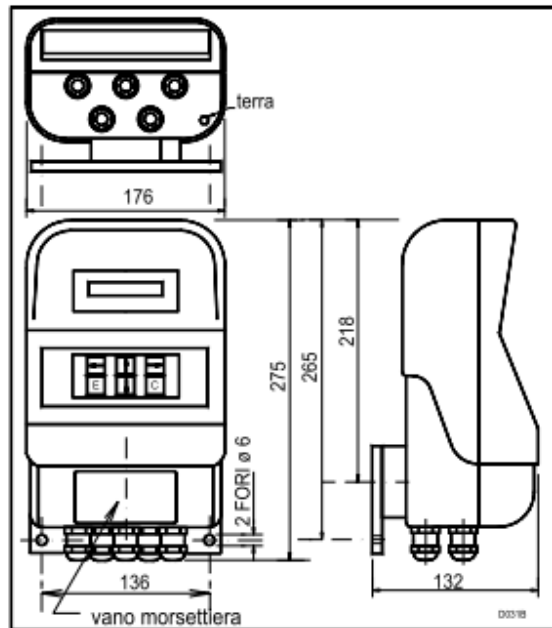
ADDITIONAL MODULES (OPTIONAL)		MC108 HV [1]	MC108 LV [2]
2	Interface RS232	•	•
3	Second interface RS485	•	•
4	2 programmable outputs in relay (v. functions 60 e 61)	•	•
5	Interface RS232 + 2 programmable outputs in relay	•	•
6	Interface RS485 + 2 programmable outputs in relay	•	•

Table 2.

ALARM	CONDITIONS OF RELAY EXCITABILITY
Low range	$ Q < \text{threshold min.}$
High range	$ Q > \text{threshold max.}$
Direction of range	$Q < 0$ (negative range)
Outside scale	$Q > 100\%$ del F.S.
Empty tube	The tube is empty
Measurement scale	Low activity scale

Table 3.

OVERALL DIMENSIONS



DIMENSIONS	MC108 HV [1]	MC108 LV [2]
Height	275 mm	275 mm
Width	176 mm	176 mm
Depth	132 mm	132 mm

Table 4.