

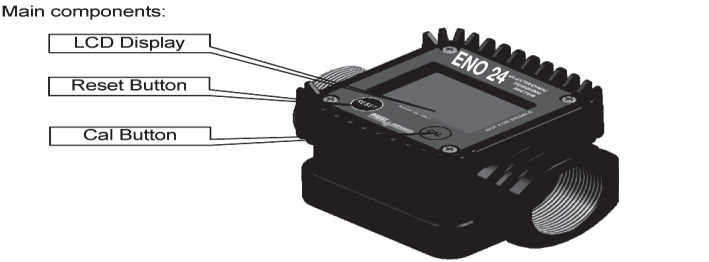
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A BECOMING ACQUAINTED WITH ENO24
Electronic digital meter featuring a turbine measurement system, designed for precise measuring of low viscosity fluids.

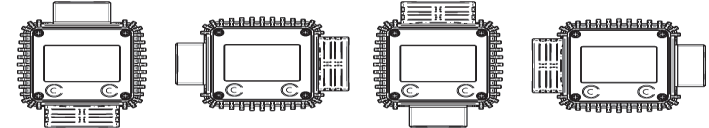
The card can be rotated with respect to its housing, thus allowing easy display readings in any position. The card housing, easily accessible, is closed by a plastic cover sealed through a rubber protection acting as a gasket as well. The whole unit can be easily removed by unscrewing the 4 screws fixing the card and the cover.

A1 Measurement System
Turbine measurement system. The turbine is placed inside a hole through the body of E24, fitted with threaded inlet and outlet. The body of E24 is made of a plastic material that allows several types of threads with relevant combinations. E24 has 2 rubber protections, designed to act as gaskets, too, and thus reducing the number of its components. The liquids compatible with E24 must be at low viscosity, namely:

- Water
- Wine
- Milk
- Beer



A2 Display Positioning
The square shape of the E24 body allows the card to be rotated in its housing, thus ensuring great versatility in positioning.



IMPORTANT!
While fitting the electronic card of E24 take care that the wires of the battery-contacts (2) are not along the turbine-body (3), in order to avoid the crushing of the reed switch (1).
For this purpose, while closing, use a screwdriver (4) to set aside the wires. Before closing the cover, remove the screwdriver and then fix the screws.



A3 Operating modes
The user can choose between two different operating modes:

- Normal Mode: Mode with display of Partial and Total dispensed quantities.
- Flow Rate Mode: Mode with display of Flow Rate, as well as Partial dispensed quantity.

The meter features a non-volatile memory for storing the dispensing data, even in the event of a complete power break for long periods. The measurement electronics and the LCD display are fitted in the top part of the ENO24 which remains isolated from the fluid-bath measurement chamber and sealed from the outside by means of a cover.

A4 LCD display



- Key:
- Partial register (5 figures with moving comma FROM 0.1 to 99999) indicating the volume dispensed since the reset button was last pressed;
 - Indication of battery charge;
 - Indication of calibration mode;
 - Totals register (6 figures with moving comma FROM 0.1 to 999999), that can indicate two types of Total:
 - General Total that cannot be reset (TOTAL)
 - Resettable total (Reset TOTAL)
 - Indication of total multiplication factor (x10 / x100)
 - Indication of type of total, (TOTAL / Reset TOTAL);
 - Indication of unit of measurement of Totals: L=Litres Gal=Gallons
 - Indication of Flow Rate mode
 - Indication of unit of measurement of Partial: Qts=Quarts Pts=Pints L=Litres Gal=Gallons

A5 User Buttons
The E24 features two buttons (reset and cal) which individually perform two main functions and, together, other secondary functions. The main functions performed are:

- For the reset key, resetting the partial register and resettable total (reset total)
- For the cal key, entering instrument calibration mode.

Used together, the two keys permit entering configuration mode, useful for changing the units of measurements and calibration factor.

A6 Battery Housing
The E24 is powered by two standard type 1.5 V batteries (size AAA). The battery housing, easily accessible, is closed by a metal cover sealed through a rubber protection acting as a gasket as well. The whole unit can be easily removed by unscrewing the 4 screws fixing the cover and the protection to the body.

B INSTALLATION
E24 features a threaded, perpendicular inlet and outlet (1" gas or ntp male and female that can be combined together). It has been designed to be easily installed in any position: fixed in-line or mobile on a dispensing nozzle. In order to improve the life of the turbine, it is recommended to fit a strainer before the meter itself

C DAILY USE
The only operations that need to be done for daily use are partial and/or resettable total register resetting. The user should use only the dispensing system of E24. Occasionally the meter may need to be configured or calibrated. To do so, please refer to the relevant chapters.

Below are the two typical normal operation displays. One display page shows the partial and reset total registers. The other shows the partial and general total. Switchover from resettable total to general total display is automatic and tied to phases and times that are in factory set and cannot be changed.



NOTE: 6 digits are available for Totals, plus two icons x 10 / x100. The increment sequence is the following:
0.0 → 99999.9 → 999999 → 100000 x 10 → 999999 x 10 → 100000 x 100 → 999999 x 100

C1 Dispensing in Normal mode
Normal mode is the standard dispensing. While the count is made, the partial and resettable total are displayed at the same time (reset total). Should one of the keys be accidentally pressed during dispensing, this will have no effect. A few seconds after dispensing has ended, on the lower register, the display switches from resettable total to general total: the word reset above the word total disappears, and the reset total is replaced by the general total. This situation is called standby and remains stable until the user operates the E24 again.

C1.1 Partial reset

The partial register can be reset by pressing the reset key when the meter is in standby, meaning when the display screen shows the word "TOTAL".

After pressing the reset key, during reset, the display screen first of all shows all the lit-up digits and then all the digits that are not lit up.

At the end of the process, a display page is first of all shown with the reset partial and the reset total

and, after a few moments, the reset total is replaced by the non resettableTotal.

C1.2 Resetting the Reset Total

The reset total resetting operation can only be performed after resetting the partial register. The reset total can in fact be reset by pressing the reset key at length while the display screen shows reset total as on the following display page:

- Schematically, the steps to be taken are:
1. Wait for the display to show normal standby display page (with total only displayed).
 2. Press the reset key quickly
 3. The meter starts to reset the partial
 4. While the display page showing the reset total is displayed
 5. Press the reset key again for at least 1 second
 5. The display screen again shows all the segments of the display followed by all the switched-off segments and finally shows the display page where the reset Reset Total is shown.

C.2 Dispensing with Flow Rate Mode display
It is possible to dispense fluids, displaying at the same time: the dispensed partial the Flow Rate in [Partial Unit / minute] as shown on the following display page:



Procedure for entering this mode:

- wait for the Remote Display to go to Standby, meaning the display screen shows Total only
- quickly press the CAL key.
- Start dispensing

The flow rate is updated every 0.7 seconds. Consequently, the display could be relatively unstable at lower flow rates. The higher the flow rate, the more stable the displayed value.

IMPORTANT
The flow rate is measured with reference to the unit of measurement of the Partial. For this reason, in case of the unit of measurement of the Partial and Total being different, as in the example shown below, it should be remembered that the indicated flow rate relates to the unit of measurement of the partial. In the example shown, the flow rate is expressed in Qts/min.



The word "Gal" remaining alongside the flow rate refers to the register of the Totals (Reset or NON Reset) which are again displayed when exiting from the flow rate reading mode.

To return to "Normal" mode, press the CAL key again. If one of the two keys RESET or CAL is accidentally pressed during the count, this will have no effect.

IMPORTANT!
Even though in this mode they are not displayed, both the Reset Total and the General Total (Total) increase. Their value can be checked after dispensing has terminated, returning to "Normal" mode, by quickly pressing CAL.

C.2.1 Partial reset

To reset the Partial Register, finish dispensing and wait for the Remote Display to show a Flow Rate of 0.0 as indicated in the illustration



then quickly press RESET

D CALIBRATION

D1 Definitions
Calibration factor or "k factor" : Multiplication factor applied by the system to the electrical pulses received, to transform these into measured fluid units.

FACTORY K FACTOR:
Factory-set default factor. It is equal to 1,000. This calibration factor ensures utmost precision in the following operating conditions:

Fluid Temperature: WATER 20°C
Flow rate: 10-120 litres/min

Even after any changes have been made by the user, the factory k factor can be restored by means of a simple procedure.

USER K FACTOR:
Customized calibration factor, meaning modified by calibration.

D2 Why Calibrate
When operating close to extreme conditions, such as for instance with fluids close to acceptable range extremes (like diesel fuel at low temperatures) or in extreme flow rate conditions (close to minimum or maximum acceptable values), an on-site calibration may be required to suit the real conditions in which the E24 is required to operate.

D3 Calibration procedure:
E24 permits making quick and precise electronic calibration by changing the calibration factor (K factor).

There are 2 different ways of calibration:

1. On-site calibration, performed by means of a dispensing operation.
2. Direct calibration, performed by directly changing the k factor.

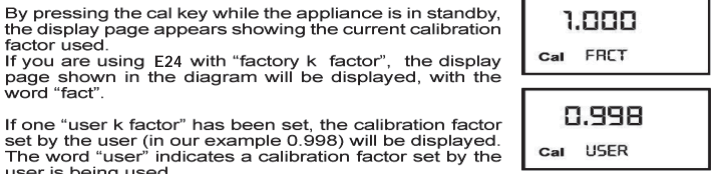
To enter the calibration phases it is necessary to press and hold down the "cal" button. Why enter the calibration phases?

- Display the currently used calibration factor
- Return to factory k factor after a previous calibration with user k factor.
- Change the calibration factor using one of the two previously indicated procedures.

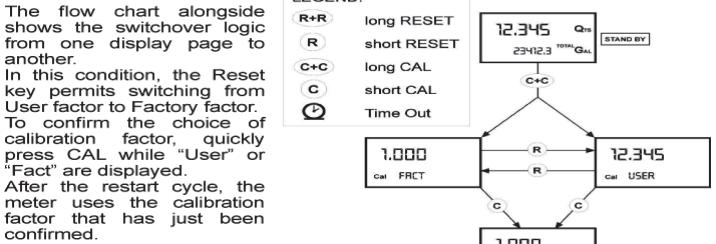
In calibration mode, the partial and total dispensed quantities indicated on the display screen take on different meanings according to the calibration procedure phase. During the calibration, the E24 cannot perform any normal dispensing operations. In calibration mode, the totals are not increased.

WARNING
The E24 features a non-volatile memory. It keeps the calibration and dispensing data stored even after replacing new batteries or long periods of inactivity.

D3.1 Display Of Current "K Factor" And Restoring "Factory K Factor"



If one "user k factor" has been set, the calibration factor set by the user (in our example 0.998) will be displayed. The word "user" indicates a calibration factor set by the user is being used.



ATTENTION
When the Factory Factor is confirmed, the old User factor is deleted from the memory

D3.2 In-field Calibration

This procedure calls for the fluid to be dispensed into a graduated sample container in real operating conditions (flow rate, viscosity, etc.) requiring maximum precision.

WARNING
For correct E24 calibration, it is most important to:

- completely eliminate air from the system before calibrating;
- use a precise Sample Container with a capacity of not less than 5 litres, featuring an accurate graduated indicator.
- ensure calibration dispensing is done at a constant flow rate equivalent to that of normal use, until the container is full;
- not reduce the flow rate to reach the graduated area of the container during the final dispensing stage (the correct method during the final stages of sample container filling consists in making short top-ups at normal operation flow rate) ;
- after dispensing, wait a few minutes to make sure any air bubbles are eliminated from the sample container; only read the Real value at the end of this stage, during which the level in the container could drop.
- if necessary, carefully follow the procedure indicated below.

D3.2.1 In-field calibration procedure:

AZIONE	DISPLAY
1 NONE E24 IN STAND BY	12.345 Qts 12.5 TOTAL Gal
2 LONG CAL KEY KEYING E24 enters calibration mode, shows "CAL" and displays the calibration factor in use instead of total. The words "Fact" and "USER" indicate which of the two factors is currently in use.	1.000 Qts Cal FRCT (USER) Gal
3 3 LONG RESET KEY KEYING E24 shows "CAL" and the partial at zero. E24 is ready to perform on-site calibration.	0.000 Qts Cal FIELD
4 DISPENSING INTO SAMPLE CONTAINER Without pressing any KEY, start dispensing into the sample container. Dispensing can be interrupted and started again at will. Continue dispensing until the level of the fluid in the sample container has reached the graduated area. There is no need to reach a preset quantity.	9.800 Qts Cal FIELD Indicated value 9.86 Real value
5 SHORT RESET KEY KEYING E24 is informed that the calibration dispensing operation is finished. Make sure dispensing is correctly finished before performing this operation. To calibrate the E24 the value indicated by the partial totaliser (example 9.800) must be forced to the real value marked on the graduated sample container. In the bottom left part of the display an arrow appears (upwards and downwards), THAT SHOWS the direction (increase or decrease) of the USER K FACTOR value change when the operations 6 or 7 are performed	9.800 Qts Cal * FIELD
6 SHORT RESET KEY KEYING Arrow direction changes. The operation can be repeated IF NECESSARY	9.800 Qts Cal * FIELD
7 SHORT/LONG CAL KEY KEYING The indicated value changes in the direction indicated by the arrow - one unit for every short CAL key keying - continually if the CAL key is kept pressed. (for the first 5 units slowly and then quickly). If the desired value is exceeded, repeat the operations from point (6).	9.860 Qts Cal * FIELD
8 LONG RESET KEY KEYING E24 is informed that the calibration procedure is finished. Before doing this, make sure the DISPLAYED factor is the ACTUAL factor.	9.860 Qts Cal * FRCT Indicated value 9.86 Real value
9 NO OPERATION At the end of the calculation, the new USER K FACTOR is shown for a few seconds, after which the restart cycle is repeated to finally achieve standby condition. ATTENTION: From now on, the indicated factor will become the calibration factor used by the meter and will continue to remain such even after a battery change	1.015 Qts Cal END
10 NO OPERATION ENO24 stores the new calibration factor and is ready for dispensing, applying the newly defined USER K FACTOR.	0.000 Qts Cal 12345 TOTAL Gal

D3.3 Direct modification of ENO24 factor
This procedure is especially useful to correct a "mean error" obtainable on the basis of several performed dispensing operations. If normal E24 operation shows a mean percentage error, this can be corrected by applying to the currently used calibration factor a correction of the same percentage. In this case, the percentage correction of the USER K FACTOR must be calculated by the operator in the following way:

Example:
Error percentage found E% - 0.9 %
CURRENT calibration factor 1,000
New USER K FACTOR 1,000 * [(100 - (- 0.9))/100]= 1,009

If the meter indicates less than the real dispensed value (negative error) the new calibration factor must be higher than the old one as shown in the example. The opposite applies if the meter shows more than the real dispensed value (positive error).

OPERATION	DISPLAY
1 NONE E24 n STAND BY: not in counting mode.	12.345 Qts 12345 TOTAL Gal
2 LONG CAL KEY KEYING E24 enters calibration mode, shows "CAL" and displays the calibration factor being used instead of the partial. The words "Fact" and "USER" indicate which of the two factors (factory or user) is currently being used.	1.000 Qts Cal FRCT (USER) Gal
3 LONG RESET KEY KEYING E24 shows "CAL" and the partial at zero. E24 is ready to perform on-site calibration by dispensing.	12.345 Qts Cal FIELD
4 LONG RESET KEY KEYING We now go on to Direct change of the calibration factor: the word Direct" appears together with the Currently Used calibration factor. In the bottom left part of the display, an arrow appears (upwards or downwards) defining the direction (increase or decrease) of change of the displayed value when subsequent operations 5 or 6 are performed.	1.000 Qts Cal * DIRECT
5 SHORT RESET KEY KEYING Arrow direction changes. The operation can be repeated to alternate the direction of the arrow.	1.000 Qts Cal * DIRECT
6 SHORT/LONG CAL KEY KEYING The indicated value changes in the direction indicated by the arrow - one unit for every short CAL key keying - continually if the CAL key is kept pressed. The speed increase rises by keeping the key pressed. If the desired value is exceeded, repeat the operations from point (5).	1.003 Qts Cal * DIRECT
7 LONG RESET KEY KEYING E24 is informed that the calibration procedure is finished. Before performing this operation, make sure the indicated value is that required.	1.003 Qts Cal * DIRECT
8 NO OPERATION At the end of the calculation, the new USER K FACTOR is shown for a few seconds, after which the restart cycle is repeated to finally achieve standby condition. ATTENTION: From now on, the indicated factor will become the calibration factor used by the meter and will continue to remain such even after a battery change.	1.003 Qts Cal END
9 NO OPERATION The E24 stores the new work calibration factor and is ready to begin dispensing, using the USER K FACTOR that has just been calculated.	0.000 Qts 12345 TOTAL Gal

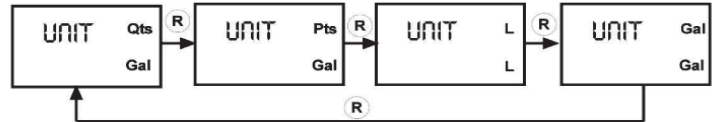
F METERS CONFIGURATION

Some models of meter feature a menu with which the user can select the main measurement unit, Quarts (Qts), Pints (Pts), Litres (Lit), Gallons (Gal); The combination of the unit of measurement of the Partial register and that of the Totals is predefined according to the following table:

Combination no.	Unit of Measurement of the Partial Register	Register Unit of Measurement of the Totals Register
1	Litres (L)	Litres (L)
2	Gallons (Gal)	Gallons (Gal)
3	Quarts (Qts)	Gallons (Gal)
4	Pints (Pts)	Gallons (Gal)

To choose between the 4 available combinations:

- wait for **E24** to go to Standby,
- press the CAL and RESET keys together. Keep these pressed until the word "UNIT" appears on the screen together with the unit of measurement set at that time (in this example Litres / Litres)



- Press the reset key to select the desired combination of unit of measurement, amongst those shown below.
- Save the new combination by pressing the cal key at length. **E24** will pass through the start cycle and will then be ready to dispense in the set units.

WARNING
The Resettable Total and Total registers will be automatically changed to the new unit of measurement. NO new calibration is required after changing the Unit of Measurement.

F MAINTENANCE

E24 has been designed to require a minimum amount of maintenance.

The only types of maintenance required are the following:

1. Battery change – necessary when the batteries have run down
2. Cleaning of the turbine with washing or mechanically-handling

1 Battery Replacement

E24 is complete with 2 x 1.5 V. alkaline batteries SIZE AAA.

E24 features two low-battery alarm levels:

- 1) When the battery charge falls below the first level on the LCD, the fixed battery symbol appears.



In this condition, **E24** continues to operate correctly, but the fixed icon warns the user that it is ADVISABLE to change the batteries.

- 2) If **E24** operation continues without changing the batteries, the second battery alarm level will be reached which will prevent operation. In this condition the battery icon starts to flash and is the only one to remain visible on the LCD.



WARNING
Do not discard the old batteries in the environment. Refer to local disposal regulations.

To change the batteries, with reference to the exploded diagram positions, proceed as follows:

- Press RESET to update all the totals
- Loosen the 4 fixing screws of the lower cover
- Remove the old batteries
- Place the new batteries in the same position as the old ones
- close the cover again, by positioning the rubber protection as a gasket
- **E24** will switch on automatically and normal operation can be resumed.

The **E24** will display the same Reset Total, the same Total and the same Partial indicated before the batteries were changed. After changing the batteries, the meter does not need calibrating again.

2. Cleaning

Only one operation is necessary to clean the **E24**.

After removing **E24** from the plant where it was built in, any residual elements can be removed by washing or mechanically-handling. If this operation does not restore a smooth rotation of the turbine, it will have to be replaced.

WARNING:
Do not use compressed air onto the turbine in order to avoid its damage because of an excessive rotation

G. MALFUNCTIONS

Problem	Possible Cause	Azione Correttiva
LCD: no indication	Bad battery contact	Check battery contacts
Not enough measurement precision	Wrong K FACTOR	With reference to paragraph H, check the K FACTOR
	The meter works below minimum acceptable flow rate.	Increase the flow rate until an acceptable flow rate range has been achieved
Reduced or zero flow rate	TURBINE blocked	Clean the TURBINE
The meter does not count, but the flow rate is correct	Incorrect installation of gears after cleaning	Repeat the reassembly procedure
	Possible electronic card problems	Contact your dealer

H TECHNICAL SPECIFICATIONS

Measurement system		TURBINE
Resolution (nominal)	Hi Flow	0.010 lit/pulse
	Low Flow	0.005 lit/pulse
Flow Rate (Range)	Hi Flow	10 ÷ 120 (Litres/minute) FOR WATER,
Operating pressure (Max)		15 (Bar)
Bursting pressure (Min)		50 (Bar)
Storage temperature (Range)		-20 + + 70 (°C)
Storage humidity (Max)		95 (% RU)
Operating temperature (Range)		-10 + + 50 (°C)
Flow resistance		0.30 Bar at 120 lit/min.
Viscosity (Range)		2 ÷ 5.35 cSt
Accuracy (between 15 and 120 l/min)		±1 of value indicated after calibration (%)
Reproducibility (Typical)		±0,3 (%)
Screen		Liquid crystals LCD. Featuring: - 5-figure partial - 6-figure Reset Total plus x10 / x100 - 6-figure non reset Total plus x10 / x100
Power Supply		2x1.5 V alkaline batteries size AAA
Battery life		18 ÷ 36 months
Weight		0.25 Kg (included batteries)

I DISPOSAL

The components must be given to companies that specialise in the disposal and recycling of industrial waste and, in particular, the

DISPOSAL OF PACKAGING.

The packaging consists of biodegradable cardboard which can be delivered to companies for normal recycling of cellulose.


DISPOSAL OF METAL COMPONENTS

The metal components, both painted and stainless steel, are usually recycled by companies that are specialised in the metal-scraping industry.

DISPOSAL OF ELECTRIC AND ELECTRONIC COMPONENTS:

these have to be disposed by companies that are specialised in the disposal of electronic components, in accordance with the instructions of 2002/96/EC (see text of Directive below).

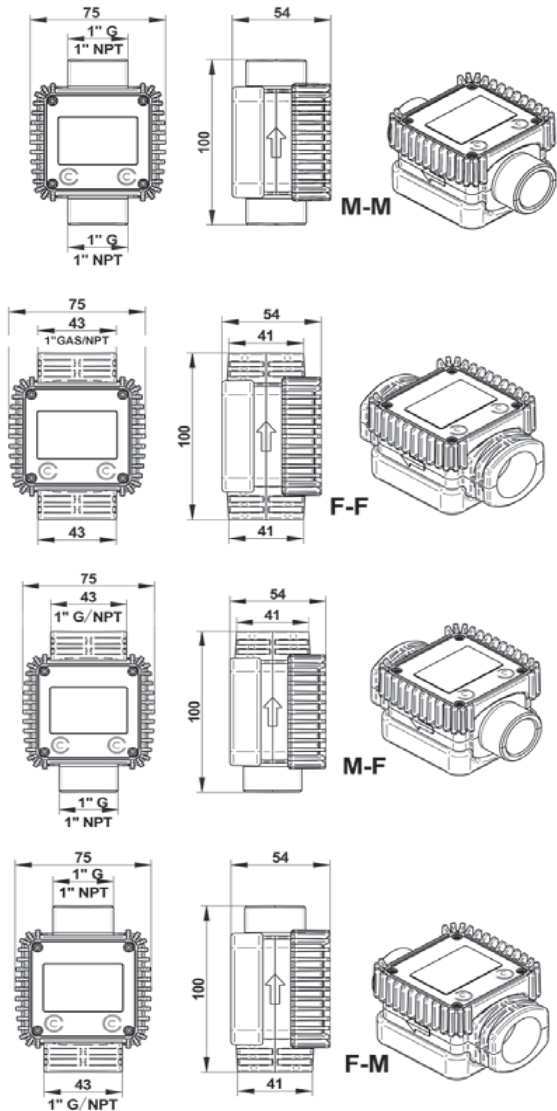
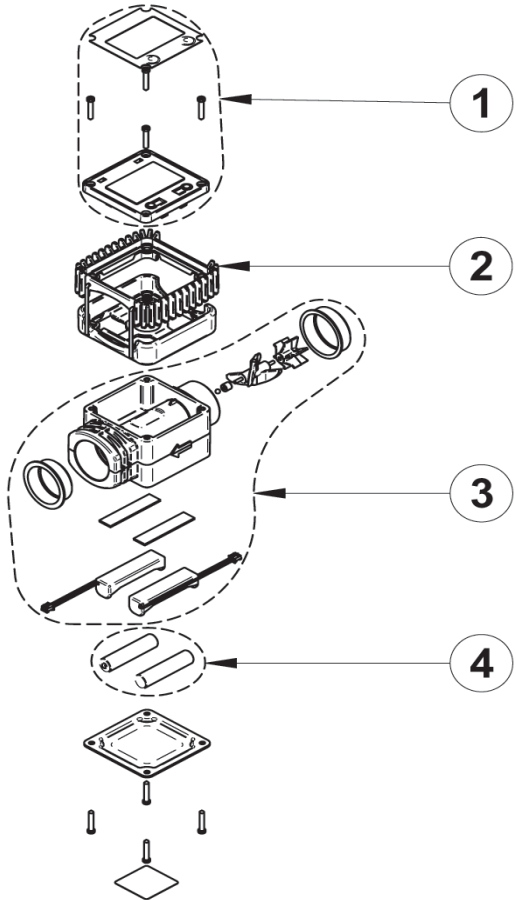
ENVIRONMENTAL INFORMATION FOR CUSTOMERS IN THE EUROPEAN UNION

 European Directive 2002/96/EC requires that the equipment bearing this symbol on the product and/or its packaging must not be disposed of with unsorted municipal waste. The symbol indicates that this product should be disposed of separately from regular household waste streams. It is your responsibility to dispose of this and other electric and electronic equipment via designated collection facilities appointed by the government or local authorities.

DISPOSAL OF OTHER PARTS:

The disposal of other parts such as pipes, rubber seals, plastic components and cables should be entrusted to companies that special in the disposal of industrial waste.

L VISTE ESPLOSE ED INGOMBRI / EXPLODED VIEWS AND OVERALL DIMENSIONS



ENO24

ELETRONIC TURBINE METER



USE, MAINTENANCE AND CALIBRATION MANUAL

DECLARATION OF CONFORMITY

The undersigned
Enoitalia srl
Via prov. Pisana 162
50050 Cerreto Guidi – Firenze – Italia

HEREBY STATES

Under its own responsibility, that the equipment:

Flow meter ENO-24

Serial number and year of construction refer to CE plate affixed to instrument

The product is in conformity with the legal prevision:
-Electromagnetic Compatibility Directive 2004/108/EC

And it is certified to be used with alimentary liquid in conformity with the legal prevision:

Italian DM 21/03/73

-EC Directive 1935/04, 1895/05, 597/08

The documentation is at the disposal of the competent authority following motivated request to Enoitalia srl or following request send to e-mail address amministrazione@enoitalia srl

Cerreto Guidi 27/05/2011


Stefano Menichetti
Legale rappresentante