INDEX

A BECOMING ACQUAINTED WITH K24
- A1 Measurement System
- A2 Display Positioning
- A3 Operating modes
- A4 LCD display
- A5 User Buttons
- A6 Battery Housing

B INSTALLATION

C DAILY USE
- C1 Dispensing in Normal mode
  - C1.1 Partial reset
  - C1.2 Resetting the Reset Total
- C.2 Dispensing with Flow Rate Mode display
  - C.2.1 Partial reset

D CALIBRATION
- D1 Definitions
- D2 Why Calibrate
- D3 Calibration procedure:
  - D3.1 Choose calibration procedure
  - D3.2 On-site Calibration
  - D3.3 Percentage Calibration

E METERS CONFIGURATION

F MAINTENANCE

G MALFUNCTIONS

H TECHNICAL SPECIFICATIONS

I DISPOSAL

L EXPLODED VIEWS AND OVERALL DIMENSIONS

A BECOMING ACQUAINTED WITH K24

Electronic digital meter featuring a turbine measurement system, designed for precise measuring of low viscosity fluids.

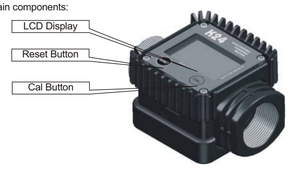
It is divided into two using macrogroups:
1 With body made of inconductive plastic material of light colour, designed to be used with water / urea solution
2 With body made of conductive plastic material of dark colour (assessed resistance: 50 ohm), designed to be used with DIESEL FUEL, WATER and windscreen 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

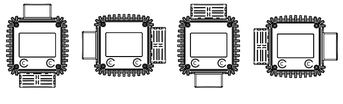
Turbine measurement system. The turbine is placed inside a hole through the body of k24, fitted with threaded inlet and outlet. The body of k24 is made of a plastic material that allows several types of threads with relevant combinations.
K24 has 2 rubber protections, designed to act as gaskets, too, and thus reducing the number of its components.
The liquids compatible with k24 must be at low viscosity, namely:
- Diesel fuel
- Water
- Water/urea solution
- Kerosene
- Windscreen
- Petrol

Main components:



A2 Display Positioning

The square shape of the k24 body allows the card to be rotated in its housing, hus ensuring great versatility in positioning.



ATTENTION

While fixing the K24 card, make sure the battery contact cable is not placed above the circular housing of the bulb.

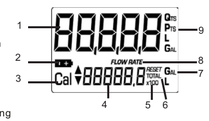
A3 Operating modes

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 K24 which remains isolated from the fluid-bath measurement chamber and sealed from the outside by means of a cover.

A4 LCD display

The "LCD" of the METER features two numerical registers and various indications displayed to the user only when the applicable function so requires.
Key:



1. Partial register (5 figures with moving comma FROM 0.1 to 99999) indicating the volume dispensed since the reset button was last pressed;
2. Indication of battery charge;
3. Indication of calibration mode;
4. Totals register (6 figures with moving comma FROM 0.1 to 999999),

that can indicate two types of Total:
- 4.1. General Total that cannot be reset (TOTAL)
- 4.2. Resettable total (Reset TOTAL)

5. Indication of total multiplication factor (x10 / x100)
6. Indication of type of total, (TOTAL / Reset TOTAL);
7. Indication of unit of measurement of Totals: L=Litres
   Gal=Gallons
8. Indication of Flow Rate mode
9. Indication of unit of measurement of Partial: Qts=Quarts
   Pts=Pints
   L=Litres
   Gal=Gallons

A5 User Buttons

The k24 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 k24 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

K24 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

ATTENTION

At the female inlets, tighten the couplings at a max. torque of 55N/m.

ATTENTION:

ITH THE GAS-FEMALE INLETS, DO NOT USE CONICAL THREADED COUPLINGS.

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 k24.
Occasionally the meter may need to be con figured or calibrated. To do so, please refer to the relevant chapters.
Below are the two typical normal operation displays.

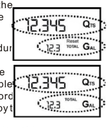
One display page shows the partial and reset total registers. The other shows the partial and general total. Switchover from resettable total to general total display is automatic and tied to phases and times that are in factory set and cannot be changed.



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

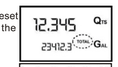
Normal mode is the standard dispensing. While the count is made, the partial and resettable total are displayed at the same time (reset total).



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 t general total.
This situation is called standby and remains stable until the user operates the k24 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

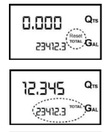


and, after a few moments, the reset total is replaced by the non resettable Total.



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 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.

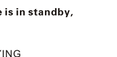
To return to "Normal" mode, press the CAL key again. If one of the two keys RESET or CAL is accidentally pressed during the count, this will have no effect.

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
Calibration factor applied in the system to the electrical pulses received, to transform these into measured fluid units. In calibration phases, the fluid and flow rate should be similar with those in real operating conditions in order to end with a precise calibration factor to be applied to the measurements.

Percentage factor
There will be some fixed offset for some reason, which can be corrected by changing this factor.

D2 Why Calibrate

When operating close to extreme conditions, 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 k24 is required to operate.

D3 Calibration procedure:

D3.1 Choose calibration procedure

There are two modes of calibration:
1. On-site calibration. Measure the real flow rate and flow in order to get the precise algorithm.
2. Percentage calibration. Amplify、minify the count by changing percentage factor.

While the appliance is in standby,

LONG CAL KEY KEYING
K24 enters calibration mode, shows "FIELD" or "PERC". "FIELD" means On-site calibration while "PERC" means Percentage calibration.

SHORT RESET KEY KEYING
Switchover between two modes of calibration.

SHORT CAL KEY KEYING
Enter the mode you have choosed.

D 3.2 On-site Calibration

Long CAL key keying in steady state, K24 enters calibration mode, shows "FIELD".
Short CAL key keying, K24 enters on-site calibration mode.
K24 can set up calibration four times. With 50L (standard volume) liquid to be measured flowing through K24 in fixed speed, the user can set up calibration of different flow rate within four times (including the fourth time) and there is no need to calibrate the flow rate in any sequence.
The user can skip other calibration by short RESET key keying if the number of calibration is less than four times.
In this mode, the figure on the upside of the screen refers to pulse value, while the downside means the number of calibration. When the liquid flows through, the figure on the upside will increase.
After this calibration, short RESET key keying to enter the next calibration and the figure downside plus one.
After the last calibration you make, the upside of the screen shows "End" or "Err". "End" refers to at least one successful calibration while "Err" means none.
Short RESET key keying to exit and enter the normal dispensing mode, and K24 will dispensing data according to the new calibration factor.

D 3.3 Percentage Calibration

In the steady state, long CAL key keying, K24 enters calibration mode, short RESET key keying, it shows PERC, short CAL key keying, enters percentage calibration mode. The upside shows the percentage to be calibrated. The original value is 100.00
This procedure is especially useful to correct a "mean error" obtainable on the basis of several performed dispensing operations. If normal K24 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 percentage factor must be calculated by the operator in the following way:

$$\text{New K Factor} = \text{Old K Factor} * \left(\frac{100 - E\%}{100}\right)$$

Example:
Error percentage found E% - 0.9 %
CURRENT calibration factor 1,000
New USER K FACTOR 1,000 * [(100 -(- 0,9))/100]=
1,000 * [(100 + 0,9)/100] = 1.009

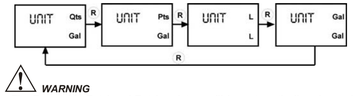
If the meter indicates less than the real dispensed value (negative error) the new calibration factor must be higher than the old one as shown in the example. The opposite applies if the meter shows more than the real dispensed value (positive error).
RESET key is for the selection of change direction, increase or decrease.
Short CAL key keying means plus one or minus one. Long CAL key keying means continuous increase or decrease. The changing speed increases gradually.
Once it comes to the exact figure, long RESET key keying to save it, exit, and enter the normal dispensing mode.

E Choose a unit

The units K24 offers are: Quarts (Qts), Pints (Pts), Litres(Lit), Gallons(Gal)
The combination of partial register unit and totals register unit are set up, and is shown in the following diagram.

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 combination:
- Wait for K24 to go to Standby,
- Press the CAL and RESET keys together shortly. the set of the unit of measurement will appear on the screen 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. K24 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 SAVING DATA

When the dispensing totals needs to be saved, take changing battery as an example, press CAL and RESET key at the same time and keep keying for one second, K24 will save all the data, which would be restored after the next battery Installation.

ATTENTION

System parameter is saved automatically, so there is no need to calibrate again after changing battery even without this procedure.

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)	K24 COL. BLACK Flow-rates:	5 ÷ 120 (Litres/minute) FOR DIESEL FUEL, WATER,.
	K24 COL. BEIGE Flow-rates	5 ÷ 100 (Litres/minute) FOR WATER/ UREA SOLUTION..
Operating pressure (Max)		10 (Bar) 145 (psi)
Bursting pressure (Min)		40 (Bar)
Storage temperature (Range)		-20 ÷+ 70 (°C)
Storage humidity (Max)		95 (% RU)
Operating temperature (Range)		-10 ÷+ 50 (°C)
Flow resistance		0.30 Bar at 100 lit/min.
Viscosity (Range)		2 ÷ 5.35 cSt
Accuracy		±1% after calibration within 10 ÷ 90 (litres/min) 2,65 ÷ 23,8 (gallons/min) range
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)
Protection		IP65

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-scrapping 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 equipement 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 EXPLODED VIEWS AND OVERALL DIMENSIONS

K24
ELECTRONIC TURBINE METER



USE, MAINTENANCE AND CALIBRATION MANUAL

English

