C.1 SAFETY WARNINGS

Mains - preliminary checks before insta

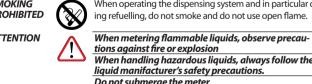
ATTENTION You must avoid any contact between the electrical power supply and the fluid that needs to be FILTERED. Before any checks or maintenance work are carried out, dis-

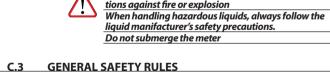
control For your safety, review the maand caution below before

C.2 FIRST AID RULES Contact with

ATTENTION







Essential pro tective equip

ment charac-Personal protective equip-









If handling hazardous liquids, always follow the Liquid

Manifacturer's Safety Precautions. Wear protective clothing such as goggles, gloves and respirator as instructed. When metering flammable liquids, observe precautions against fire or explosion. Do not meter in the pres-

ence of any source of ignition including running or hot engines, lighted cigarettes, or gas or electric heaters

connect the power source.
When metering flammable liquids, observe precautions

against fire or explosion
When handling hazardous liquids, always follow the liquid

manifacturer's safety precautions Always dispose of used cleaning solvents in a safe manner

according to the solvent manifacturer's instructions.

During meter removal, liquid may spill. Follow the liquid

nanifacturer's safety precautions to clean up minor spills
Oo not blow compressed air through the meter

In the event of problems developing following EYE/SKIN

Please refer to the safety data sheet for the product

please refer to the SAFETY DATA SHEET of the fluid handled.

When operating the dispensing system and in particular dur-

When metering flammable liquids, observe precau-

suited to the operations that need to be performed:

Wear the following personal protective equipment during

Wear protective equipment that is:

resistant to cleaning products.

handling and installation:

close-fitting clothing;

rotective gloves

afety goggles

instruction manual

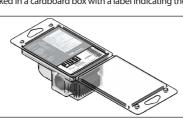
safety shoes

Do not allow liquids to dry inside the meter

ENGLISH

FOREWORD K24 comes packed in a cardboard box with a label indicating the fol-

1 - contents of the pack



C.5 PACKAGE CONTENTS/PRE-INSPECTION

To open the packaging, use a pair of scissors or a cutter, being careful not to damage the dispensing system or its components.

In the event that one or more of the components described below are missing from inside the package, please contact Piusi inc technical support. Check that the data on the plate correspond to the desired specifications. In the event of any anomaly, contact the supplier immediately, indicating the nature of the defects. Do not use equipment which you suspect

BECOMING ACQUAINTED WITH K24

Electronic digital meter featuring a turbine measurement system, designed for precise measuring of low viscosity fluids. K24 is a bi-directional meter with LCD display and calibration signed for high flow 120 l/min. (32 GPM). K24 is available in 3 versions:

METER – with LCD display and calibration buttons (SILVER LABEL) METER – with LCD display and calibration buttons (RED LABEL) PULSER – single-channel impulse, cannectable with a remote display.

D.1 COMPATIBLE LIQUIDS Turbine The turbine is placed inside a hole through the body of k24, fitted with **nent** M-f threaded inlet and outlet. The liquids compatible with k24 are at low viscosity, namely:

> Gasoline **DO NOT USE WITH SUNDRIES LIQUIDS**

Main components K24 Pulser Main components K24 Meter CD display Plate with technical data RESET key



D.2 DISPLAY LCD **FOREWORD** The "LCD" of the METER features two numerical registers and various indications displayed to the user only when the applicable function

Partial register (5 figures with moving 6 Indication of type of total, (TOTAL / comma FROM 0.1 to 99999) indicating the volume dispensed since the reset button was last pressed ndication of battery charge Indication of unit of measurement of L=Litres Gal=Gallons Indication of calibration mode Indication of Flow Rate mode

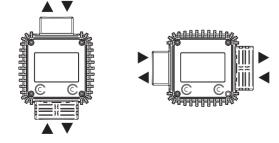
After pressing the reset key, during reset, the display screer first of all shows all the lit-up digits and then all the digits that Totals register (6 figures with moving Indication of unit of measurement of are not lit up. comma FROM 0.1 to 999999), that can Partial: Qts=Quarts Pts=Pints indicate two types of Total: 4.1. General Total that cannot be reset (TOTAL)

4.2. Resettable total (Reset TOTAL) At the end of the process, a display page is first of all shown Indication of total multiplication factor (x10 / x100)

D.3 DISPLAY POSITIONING (METER VERSION ONLY)

The square shape of the k24 body allows the card to be rotated in its busing, thus ensuring great versatility in positioning This allows easy display readings in any position. The card housing is closed by a plastic cover sealed through a rubber protection acting as a gasket as well. This can be easily removed unscrewing the 4 screws that fix both the cover and the card (1).

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



D4 USERS BUTTONS

OF CAL

FUNCTIONS

FUNCTIONS

PRES-

The METER features two buttons (RESET and CAL) which individually perform two main functions and, together, other secondary

for the RESET key, resetting the partial register and Reset Total - for the CAL key, entering instrument calibration mode Used together, the two keys permit entering configuration mode

where the desired unit of measurement can be set CALIBRATE MEANS PERFORMING ACTIONS ON THE METER KEYS. BELOW IS THE LEGEND OF THE SYMBOLS USED TO DESCRIBE THE ACTIONS TO BE PERFORMED SHORT PRES-PRES-SURE OF

wait for the Remote Display to go to Standby, meaning PRES-SURE OF the display screen shows Total only quickly press the CAL key. OF RESET OF RESET

3 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

IMPORTANT

then quickly press RESET

CALIBRATION

FACTOR OR

"K FACTOR

FACTORY K

FOREWORD

ATTENTION

FACTOR

ENGLISH

12.345

12.5

The word "Gal" rema

rate reading mode.

CAL is accidentally pressed <u>during the count</u>, this will have no effect.

G.2.1 PARTIAL RESET (FLOW RATE MODE)

Temperature: 20°C

Flow rate: 50 lit/min (13 GPM)

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

vious calibration by the user

ously indicated procedures

calibration mode, the partial and total dispensed quantities indicated on the display

calibration factor

screen take on different meanings according to the calibration procedure phase.

In calibration mode, the K24 cannot be used for normal dispensing operations.

To reset the Partial Register, finish dispensing and wait for

CALIBRATION

H2 CALIBRATION MODE

In "Calibration" mode, the totals are not increased

he Remote Display to show a Flow Rate of 0.0 as indicated

To return to "Normal" mode, press the CAL key again. If one of the two keys RESET or

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

refers to the register of the Totals (Reset or NON Reset)

which are again displayed when exiting from the flow

Even though in this mode they are not displayed, both the

12.345

0.0

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.

Multiplication factor applied by the system to the electrical pulses

Factory-set default factor. It is equal to 1,000. This calibration factor

Even after any changes have been made by the user, the factory \boldsymbol{k}

Display the currently used calibration factor:

Two procedures are available for changing the Calibration Factor:

Return to factory calibration (Factory K Factor) after a pre-

Change the calibration factor using one of the two previ-

In-Field Calibration, performed by means of a <u>dispensing</u>

Direct Calibration, performed by directly changing the

The K24 features a non-volatile memory that keeps

the data concerning calibration and total dispensed quantity stored for an indefinite time, even in the

case of a long power break; after changing the bat-

Cal FRCT

teries, calibration need not be repeated

factor can be restored by means of a simple procedure.

ensures utmost precision in the following operating conditions:

received, to transform these into measured fluid units.

hown, the flow rate is expressed in Qts/min.

OPERATING MODES

OPERATING

MODES

1 - Norma

2 - Flow rate

ATTENTION

ATTENTION

FOREWORD

WARNING

STAND BY

The user can choose between two different operating modes The meter features a non-volatile memory for storing the dispensing data, even in the event of a complete power break for long periods surement electronics and the LCD display are fitted in the top part of the K24 which remains isolated from the fluid-bath measure ment chamber and sealed from the outside by means of a cover.

ENGLISH

ormal 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.

INSTALLATION

FOREWORD K24 features a threaded, perpendicular inlet and outlet (1"NPT or BSP 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 nded to fit a strainer before the meter itself For installations on system, position meter so that the

battery housing can be easily reached. To protect against the leakage, make sure all threads are sealed with two or three turns of thread tape or a sealing ompound compatible with the liquid being metered Make sure the thread tape or sealing compound does

interfere with flow Make sure there are no leaks in the connections. To seal leaks, remove and inspect the meter and replace the thread tape or sealant. Refer to the Trouble shooting Section

DAILY USE

When operating close to extreme use or flow rate conditions (close to minimum or maximum acceptable values), an on-the-spot calibration may be required to suit The only operations that need to be done for daily use are partial and/ the real conditions in which the K24 is required to operate. or resettable total register resetting. The user should use only the dis ensing system of k24. Occasionally the meter may need to be configured or calibrated. To do so, please refer to the relevant chapters.

n resettable total to general total display is automatic and tied to phases and times that are in factory set and cannot be changed. 12.345 12.345 12.3 Reset GAL 31.213 TOTAL 6 digits are available for Totals, plus two icons x 10/ NOTA x100. The increment sequence is the follow

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

x100. The increment sequence is the following: 0.0 -> 99999.9 -> 999999 -> 100000 x 10 -> 999999 x 10->100000 x 100-> 999999 x 100

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 pensing, 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.



G.1.1 PARTIAL RESET (NORMAL MODE)

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

G.1.2 RESETTING THE RESET TOTAL

VALID JUST FOR METER VERSION WITH SILVER LABEL

The reset total resetting operation can only be performed

after resetting the partial register. The reset total can in

the display screen shows reset total as on the following

1 Wait for the display to show normal standby display page

While the display page showing the reset total is displayed

5 The display screen again shows all the segments of the display followed by all the switched-off segments and

VALID JUST FOR METER VERSION WITH SILVER LARFI

It is possible to dispense fluids, displaying at the same

the Flow Rate in [Partial Unit / minute] as shown on the

finally shows the display page where the reset Reset

C.2 DISPENSING WITH FLOW RATE MODE DISPLAY

(with total only displayed)

Press the reset key quickly

Total is shown.

following display page:

Procedure for entering this mode:

The meter starts to reset the partial

Press the reset key again for at least 1 second

fact be reset by pressing the reset key at length while

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".



Cal \$88888.0 TOTAL S

23412,3 TOTAL GA

0.000

23412.3 TOTAL G

23412.3 TOTAL G.

12.345

0.000

0.000

(_0.0

12,345

12.5

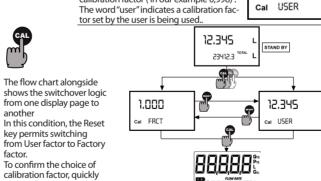
(¿23412.3 [™]

2345.6 1 Reset G.

AND RESTORING FACTORY FACTOR. By pressing the CAL key while the appliance is in Standby, the display page appears showing the current calibration fac tor used. If no calibration has ever been performed, or the factory setting has been restored after previous calibrations the following display page will appear: The word "Fact" abbreviation for "factory"

H.2.1 DISPLAY OF CURRENT CALIBRATION FACTOR

shows that the factory calibration factor is being used
If, on the other hand, calibrations have been made by the user, the display page will appear showing the currently used calibration factor (in our example 0,998) The word "user" indicates a calibration fac-



User factor to Factory To confirm the choice of calibration factor, quickly press CAL while "User" or After the restart cycle, the factor that has just been

Cal \$88888888 TIME OUT 12.345 23412.3 **ATTENTION**

another

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

H.2.2 IN FIELD CALIBRATION **FOREWORD**

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. For correct K24 calibration, it is most important to:



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

2 use a precise Sample Container with a capacity of not less than 5 litres, featuring an accurate graduated indicator.

3 ensure calibration dispensing is done at a constant flow rate equiva-lent to that of normal use, until the container is full; 4 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);

5 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

6 Carefully follow the procedure indicated below.

ENGLISH

H.2.2.1 IN-FIELD CALIBRATION PROCEDURE 12.345 LONG CAL key keying The Meter enters calibration mode, shows <<CAL>> and displays the calibration factor in use instead of partial. The words "Fact" and "USER" indicate which of the two factors factory or user) is currently in use. Important: This factor is that which the instrument also uses LONG RESET key keying The Meter shows "CAL" and the partial at zero. The Meter is 0.000Cal FIELD DISPENSING INTO SAMPLE CONTAINER Without pressing any key, start dispensing into the sample 9.800Cal FIELD 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 ach a preset quantity. ▶ 9.86 Indicated value Real value SHORT RESET key keying The Meter is informed that the calibration dispensing operation is finished. 9.800 Make sure dispensing is correctly finished before performi Cal ▲ FIELD this operation. To calibrate the Meter, 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 **ATTENTION** the value change displayed when the following operations 6 SHORT RESET key keying The arrow changes direction. The operation can be repeated 9.800ernate the direction of the arrow. SHORT/LONG CAL key keying The indicated value changes in the direction indicated by the 9.860one unit for every short CAL key keying continually if the CAL key is kept pressed. The speed increase ses by keeping the key pressed. If the desired value is Cal ▲ FIELD eeded, repeat the operations from point (6). **BATTERIES** LONG RESET key keying The Meter is informed that the calibration procedure is finished Before performing this operation, make sure the INDICATED value is the same as the REAL value. ----9.860 Cal * FRCT Indicated value Real value The Meter calculates the new USER K FACTOR; this calculation could require a few seconds, depending on the correction to ATTENTION: If this operation is performed after action (5), without changing the indicated value, the USER K FACTOR would be the same as the FACTORY K FACTOR, thus it is ignored. At the end of the calculation, the new USER K FACTOR is shown 1.015 for a few seconds, after which the restart cycle is repeated to inally achieve standby condition Cal END IMPORTANT: 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 The Meter stores the new work calibration factor and is ready to begin dispensing, using the USER K FACTOR that has just been calculated. 0.000Cal 13456 TO

H.2.3 DIRECT MODIFICATION OF K FACTOR

If normal Meter 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 opera-

old Cal Factor * $\left(\frac{100 - E\%}{100}\right)$

New cal. Factor	=	Ole
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] = 1.009tion 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).

ACTION		DISPLAY
1	NONE METER in Standby.	12,345 L
CAL AL A	LONG CAL KEY KEYING Meter 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 cal FRCT (USER)
RESET SET IN	LONG RESET KEY KEYING The Meter shows "CAL" and the zero partial total. Meter is ready to perform in-field calibration by dispensing – see previous paragraph.	1,000 L 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 L cal ▲ DIRECT
neset	SHORT RESET KEY KEYING Changes the direction of the arrow. The operation can be repeated to alternate the direction of the arrow.	1.000 Cal • DIRECT
CAL	SHORT/LONG CAL KEY KEYING The indicated value changes in the direction indicated by the	1.003 -

one unit for every short CAL key keying Cal▲ DIRECT continually if the CAL key is kept pressed. The speed increase by keeping the key pressed. If the desired value is at the operations from point (5).

LONG RESET KEY KEYING

en changed.

value is that required. NO OPERATION At the end of the calculation, the new USER K FACTOR is shown 1.003 or a few seconds, after which the restart cycle is repeated to nally achieve standby condition. IMPÓRTANT: From now on, the indicated factor will become remain such even after a battery change NO OPERATION The Meter stores the new work calibration factor and is ready to begin dispensing, using the USER K FACTOR that has just

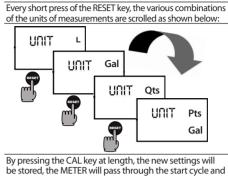
Before performing this operation, make sure the INDICATED

METER CONFIGURATION The 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 Partial Register	Unit of Measurement Totals Register
1	Litres (L)	Litres (L)
2	Gallons (Gal)	Gallons (Gal)
3	Quarts (Qts)	Gallons (Gal)
4	Pints (Pts)	Gallons (Gal)

Wait for the METER to go to Standby hen press the CAL and RESET keys together. Keep these presse until the word "UNIT" appears on the screen together with the unit of neasurement set at that time (in this example Litres / Litres

of the units of measurements are scrolled as shown below:



MANUALE D'USO, MANUTENZIONE will then be ready to dispense in the set units. € CALIBRAZION€ The Reset Total and Total registers will be automati-

Unit of Measurement.

cally changed to the new unit of measurement.

NO new calibration is required after changing the

BATTERY Use 2x1.5 V alkaline batteries size AAA REPLACEMENT K24 should be installed in a position allowing the

MAINTENANCE

batteries to be replaced without removing it from he system. Check the batteries and terminals at least every year to ensure proper operation. It is strongly rec ommended that terminals be cleaned annually K24 features two low-battery alarm levels:

When the battery charge falls below the first level on the LCD, 12.345 Q_{TS} the fixed battery symbol appears. In this condition, K24 continues to operate correctly, but the fixed icon warns the user 23412.3 ਰਿਸ਼ that it is ADVISABLE to change the batteries. If K24 operation continues without changing the batteries,

TO REMOVE BATTERY

During meter removal, liquid may spill. Follow the liquid manifacturer's safety precautions for clean up of minor spills.

lash and is the only one to remain visible on the LCD.

ne second battery alarm level will be reached which will

revent operation. In this condition the battery icon starts to

Ensure all liquid is drained from the meter. This could include draining the hose, meter, nozzle or pipe Wear protective clothing as necessary, loosen both end of the meter. Use a wrench only on the meter's flat metal

surfaces If the meter is not immediately installed again, cap the hose end or pipe to prevent spills

To change the Press RESET to update all the totals batteries, with Loosen the 4 fixing screws of the lower cover reference to the emove the old batteries and disconnect the plug exploded diagram Place the new batteries in the same position as the old ones tions, proceed (sure to put the battery in the correct way)

close the cover again, by positioning the rubber protection as a gasket K24 will switch on automatically and normal opera tion can be resumed

The K24 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. **ATTENTION** Never blow compressed air trought the meter. It could damage the rotor.

CLEANING

as follows

Only one operation is necessary to clean the k24. After removing k24 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.

ATTENTION TO STORE

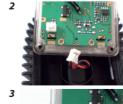
Do not discard the old batteries in the environment. Refer to local disposal regulations.

Do not use compressed air onto the turbine in order to avoid its damage because of an excessive rotation Follow the liquid manifacturer's instructions for the disposal of contaminated cleaning solvents Carefully remove the screws from the corners of the



away from the main body of the meter.

away from the main body of the meter.



Cal END

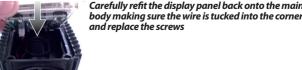
0.000

13456 TOTA



dapter is fitted correctly with the location pin in the

hen the new panel is fitted make sure the power



ELECTRONIC ALLUMINIUM TURBINE **METER - PULSER**



USE. MAINTENANCE AND

Bulletin M0225 ITEN rev. 0

MALFUNCTIONS

CALIBRATION MANUAL

Remedial Action Possible cause Bad battery contact Check battery contacts With reference to paragraph Wrong K FACTOR H, check the K FACTOR Increase the flow rate until an minimum acceptable flow been achieved

acceptable flow rate range has TURBINE blocked Clean the TURBINE correct installation of Repeat the reassembly pro-The meter does not gears after cleaning count, but the flow Possible electronic card Contact your deale

in the wrong way

K24 is switched of DISPOSAL

> If the system needs to be disposed, the parts which make it up must be delivered to companies that specialize in the recycling and disposal of industrial waste and, in particular: The packaging consists of biodegradable cardboard which can be delivered to companies for normal recycling of cellulose. **Metal Parts Dis-**Metal parts, whether paint-finished or in stainless steel, can be consigned to scrap metal collectors. Disposal of electric hese must be disposed of by companies that specialize in the disposal of electronic components, in accordance with the indica-

tions of directive 2002/96/CE (see text of directive below). European Directive 2002/96/EC requires that all equipment tion regard- marked with this symbol on the product and/or packaging not be disposed of together with non-differentiated urban waste.

parts disposal

The symbol indicates that this product must not be disposed of together with normal household waste. It is the responsibility of the owner to dispose of these products as well as other electric or within the Euro

electronic equipment by means of the specific refuse collection structures indicated by the government or the local governing authorities. Other components, such as pipes, rubber gaskets, plastic parts and wires, must be disposed of by companies specialising in the

Battery discharged or installed | Check battery charge and/or

check the battery position

EXPLODED VIEWS AND OVERALL DIMENSIONS /VISTE ESPLOSE ED INGOMBRI

disposal of industrial waste.

