

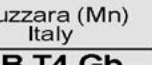
TABLE OF CONTENTS

1	FACSIMILE COPY OF EU DECLARATION OF CONFORMITY
2	MACHINE AND MANUFACTURER IDENTIFICATION
3	SAFETY INSTRUCTIONS
4	SAFETY WARNINGS
4.1	SAFETY WARNINGS
4.2	DEFINITION OF CLASSIFIED ZONES (EN60079-10)
4.3	INTENDED USE
4.4	FIRST AID RULES
4.5	GENERAL SAFETY RULES
4.6	PACKAGING
4.7	PACKAGE CONTENTS/PRE-INSPECTION
5	BECOMING ACQUAINTED WITH K24
5.1	COMPATIBLE LIQUIDS
5.2	DISPLAY LCD (METER VERSION ONLY)
5.3	DISPLAY POSITIONING (METER VERSION ONLY)
5.4	USERS BUTTONS
6	OPERATING MODES
7	INSTALLATION
8	DAILY USE
8.1	DISPENSING IN NORMAL MODE
8.1.1	PARTIAL RESET (NORMAL MODE)
8.1.2	RESETTING THE RESET TOTAL
8.2	DISPENSING WITH FLOW RATE MODE DISPLAY
8.2.1	PARTIAL RESET (FLOW RATE MODE)
9	CALIBRATION
9.1	DEFINITIONS
9.2	CALIBRATION MODE
9.2.1	DISPLAY OF CURRENT CALIBRATION FACTOR AND RESTORING FACTORY FACTOR
9.2.2	IN FIELD CALIBRATION
9.2.2.1	IN-FIELD CALIBRATION PROCEDURE
9.2.3	DIRECT MODIFICATION OF K FACTOR
10	METER CONFIGURATION
11	MAINTENANCE
12	MALFUNCTIONS (EN60079-19)
13	DISPOSAL
14	TECHNICAL DATA
15	EXPLODED VIEWS AND OVERALL DIMENSIONS

1 FACSIMILE COPY OF EU DECLARATION OF CONFORMITY

The undersigned: PIUSI S.p.A.
Via Pacinotti 16/A z.i. Rangavino - 46029 Suzzara - Mantova - Italy
HEREBY STATES under its own responsibility that the equipment described below:
Description: METER
Model: K24
Serial number: refer to Lot Number shown on CE plate affixed to product
Year of manufacture: refer to the year of production shown on the CE plate affixed to the product
complies with the following legislation:
- Electromagnetic compatibility
- ATEX Directive
The technical file is at the disposal of the competent authority following motivated request at PIUSI S.p.A. or following request sent to the e-mail address: doc.tec@piusi.com.
THE ORIGINAL AND COMPLETE DECLARATION OF CONFORMITY IS PROVIDED SEPARATELY WITH THE PRODUCT

2 MACHINE AND MANUFACTURER IDENTIFICATION

  	Suzzara (Mn) Italy
NNNN I12G	Ex ia IIB T4 Gb
IECEx CES 13.0021X	
CESI 13 ATEX 049 X	
mod. F00408Nnn	
LN 1234567	

AVAILABLE MODELS:	K24
MANUFACTURER:	PIUSI S.p.A. Via Pacinotti 16/A - z.i. Rangavino 46029 Suzzara - (MN) - Italy.
THE PUMPS COMPLIES WITH THE FOLLOWING MARKING ATEX/IECEx	
II GROUP	Group II comprises appliances intended for use in other environments (other than mining) in which explosive atmospheres are probable.
2 CATEGORY	High protection, Category 2 for AREA 1 GAS and AREA 2 GAS
G TYPE OF EXPLOSIVE ATMOSPHERE	Gas
Ex PERMANENT PREFIX	Explosion-proof equipment certified according to the European ATEX directives
io PROTECTION METHOD	Intrinsic safety (EN 60079-11)
IIB GAS CLASS	Electrical appliances for potentially explosive environments other than mining. (ethylene)
T4 TEMPERATURE CLASS	The temperature of the pump will not exceed 135°C
Gb EQUIPMENT PROTECTION LEVEL	Equipment for explosive gas atmospheres, having a "height" level protection, which is not a source of ignition in normal operation or during expected malfunctions

3 GENERAL WARNINGS

Important precautions	To ensure operator safety and to protect the meter from potential damage, workers must be fully acquainted with this instruction manual before performing any operation.
Symbols used in the manual	The following symbols will be used throughout the manual to highlight safety information and precautions of particular importance:
	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury
	NOTICE is used to address practices not related to personal injury
Manual preservation	This manual should be complete and legible throughout. It should remain available to end users and specialist installation and maintenance technicians for consultation at any time.

Reproduction rights

This manual belongs to Piusi S.p.A., which is the sole proprietor of all rights indicated by applicable laws, including, by way of example, laws on copyrights. All the rights deriving from such laws are reserved to Piusi S.p.A.: the reproduction, including partial, of this manual, its publication, change, transcription and notification - To the public, transmission, including using remote communication media, placing at disposal of the public, distribution, marketing in any form, translation and/or processing, loan and any other activity reserved by the law to Piusi S.p.A.

WARNING

WARNING

WARNING

Installation, assembly and maintenance operations of the K24, must only be performed by personnel qualified to operate in HAZARDOUS LOCATIONS ZONE1. BEFORE PROCEEDING WITH THE REFUELLING OF THE AIRCRAFT, ENSURE THAT THE SYSTEM INTENDED FOR SUCH ACTION COMPLIES WITH THE REGULATIONS IN FORCE IN THE COUNTRY OF USE

Stop operation immediately if static sparking occurs or if you feel a shock. Do not use equipment until you identify and correct the problem.

Keep a working fire extinguisher in the work area.

Do not operate the unit when fatigued or under the influence of drugs or alcohol.

Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.

Keep children and animals away from work area.

Comply with all applicable safety regulations.

4 SAFETY INSTRUCTIONS

4.1 SAFETY WARNINGS

	WARNING
Mains - preliminary checks before installation	
You must avoid any contact between the electrical power supply and the fluid that needs to be FILTERED.	
MAINTENANCE CONTROL	
Before any checks or maintenance work are carried out, disconnect the power source.	
FOR YOUR SAFETY, REVIEW THE MAJOR WARNINGS AND CAUTIONS BELOW BEFORE OPERATING YOUR METER	
When metering flammable liquids, observe precautions against fire or explosion	
When handling hazardous liquids, always follow the liquid manufacturer's safety precautions	
Always dispose of used cleaning solvents in a safe manner according to the solvent manufacturer's instructions.	
During meter removal, liquid may spill. Follow the liquid manufacturer's safety precautions to clean up minor spills	
Do not blow compressed air through the meter	
Do not allow liquids to dry inside the meter	
Use only liquids permitted	

4.2 DEFINITION OF CLASSIFIED ZONES (EN60079-10-1)

FOREWORD	Definition of zones as shown in directive 99/92/CE
ZONE 0	Place where an explosive atmosphere made up of a mix of air and inflammable substances in the form of gas, vapour or mist is continuously present, either for long periods or frequently. Note: Generally speaking, said conditions, when they occur, involve the inside of tanks, pipes and containers, etc.
ZONE 1	Place where it is probable that an explosive atmosphere, made up of a mix of air and inflammable substances in the form of gas, vapour or mist, can occur occasionally during normal operation. Note: Said zone can also include: - places in the immediate vicinity of zone 0; - places in the immediate vicinity of supply openings; - places in the immediate vicinity of filling and and emptying openings; - places in the immediate vicinity of appliances, protection systems and fragile glass and ceramic components, or components made of other similar materials; - places in the immediate vicinity of inadequately sealed stuffing boxes, e.g., on pumps and valves with stuffing box.
ZONE 2	Place where it is improbable that an explosive atmosphere, made up of a mix of air and inflammable substances in the form of gas, vapour or mist, can occur during normal operation, but which, if it does occur, only persists for a short time. Note: Said zone can include, among others, places surrounding the zones 0 or 1.
ZONE 20	Place where an explosive atmosphere in the form of a cloud of combustible powders in the air is continuously present, either for long periods or frequently. Note: Generally speaking, said conditions, when they occur, involve the inside of tanks, pipes and containers, etc.
ZONE 21	Place where it is probable that an explosive atmosphere, in the form of a cloud of combustible powders in the air, can occur occasionally during normal operation. Note: Said zone can include, for example, among others, places in the immediate vicinity of powder loading and emptying points and places where powder layers form or which, during normal operation, could produce an explosive concentration of combustible powders mixed with the air.
ZONE 22	Place where it is improbable that an explosive atmosphere, in the form of a cloud of combustible powders in the air, occur during normal operation but which, if it does occur, only persists for a short time. Note: This zone can comprise, among others, places near appliances, protections systems and components containing powder, out of which the powder can come out due to leaks with the formation of powder deposits (e.g., milling salt, where the powder comes out of the mills and deposits).
ZONE 1	ZONE 0
ZONE 2	ZONE 20
	ZONE 21
	ZONE 22

4.3 INTENDED USE

	WARNING
INTENDED USE	METER FOR TRANSFERRING FUEL SUITABLE FOR OPERATING IN ZONES CLASSIFIED "TAND "2", ACCORDING TO DIRECTIVE 99/92/CE
FORBIDDEN USE	THE DETERMINATION OF THE AREAS (ZONES) IS TO BE CARRIED OUT BY THE USER
	Using the appliance for fluids other than those listed at paragraph "COMPATIBLE LIQUIDS" and for uses other than those described at the item "authorised use" is forbidden.
PLANT OPERATION RESTRICTIONS	IT IS FORBIDDEN:
1	To use the appliance in a construction configuration other than that contemplated by the manufacturer.
2	To use the appliance with fixed guards tampered with or removed.
3	To use the appliance in places where there is risk of explosion and/or fires classified in the following zones: O; 20; 21; 22
4	To integrate other systems and/or equipment not considered by the manufacturer in the executive project.
5	To connect the appliance up to energy sources other than those contemplated by the manufacturer
6	To use the commercial devices for purposes other than those indicated by the manufacturer.
7	Do not use in case of lightnings

4.4 FIRST AID RULES

Contact with the product	In the event of problems developing following EYE/SKIN CONTACT, INHALATION or INGESTION of the treated product, please refer to the SAFETY DATA SHEET of the fluid handled.
	NOTICE
	SMOKING PROHIBITED
	When operating the dispensing system and in particular during refuelling, do not smoke and do not use open flame.
	WARNING
	When metering flammable liquids, observe precautions against fire or explosion
	When handling hazardous liquids, always follow the liquid manufacturer's safety precautions.
	Do not submerge the meter

4.5 GENERAL SAFETY RULES

Essential protective equipment characteristics	Wear protective equipment that is: suited to the operations that need to be performed; resistant to cleaning products.
Personal protective equipment that must be worn	Wear the following personal protective equipment during handling and installation: safety shoes;
	close-fitting clothing;
	protective gloves;
	safety goggles;
OTHER DEVICES	instruction manual

	WARNING
	If handling hazardous liquids, always follow the Liquid Manufacturer'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 presence of any source of ignition including running or hot engines, lighted cigarettes, or gas or electric heaters

4.6 PACKAGING

FOREWORD	K24 comes packed in a cardboard box with a label indicating the following data:
1 - contents of the package	
2 - weight of the contents	
3 - description of the product	

4.7 PACKAGE CONTENTS/PRE-INSPECTION

	NOTICE
	In the event that one or more of the components described below are missing from inside the package, please contact Piusi S.p.A. 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 might not be safe.

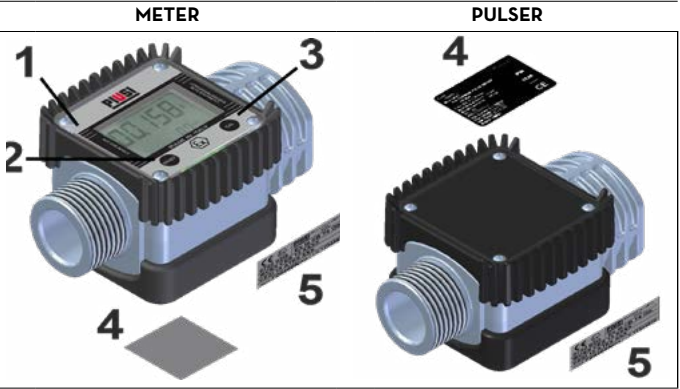
5 BECOMING ACQUAINTED WITH K24

FOREWORD	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 buttons. The body is made of aluminum (conductive) and designed for high flow 120 l/min. (32 GPM).
	WARNING
	Do not use K24 for purposes other than those intended.

5.1 COMPATIBLE LIQUIDS

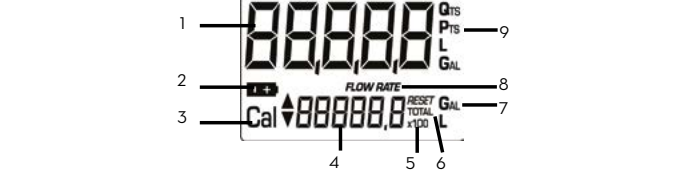
Turbine measurement system	The turbine is placed inside a hole through the body of k24, fitted with M1 threaded inlet and outlet.
COMPATIBLE LIQUIDS	The liquids compatible with k24 are at low viscosity, namely: - DIESEL - KEROSENE - PETROL - PETROL ALCOHOL MIXED MAX 20% (E20) - AVGAS 100/100LL - JET A / A1 - ASPEN 2/4 - Paraffinic HVO/XTL: EN 15940
	WARNING
INTENDED USE	DO NOT USE WITH SUNDRIES LIQUIDS
	The K24 flow meter has been designed and made for the precise measurement of pumped liquids, including under high pressure. Use only the liquids listed under the item «Compatible liquids».
UNINTENDED USE	Using the system for purposes other than those intended and indicated under "Intended use" is strictly forbidden.
	All other uses excepting those for which the litre counter was designed and described in this manual shall be deemed "MISUSE", and consequently Piusi S.p.A. disclaims all liability for any injury caused to persons or animals or damage to things or the system itself.
NOT COMPATIBLE LIQUIDS	The K24 flow meter IS NOT compatible with the following fluids: All fluids of group IIC , IC (definition like IEC60079-O) Not suitable with explosive dust (IIIC) All fluids not suitable with aluminum, PA (polyamide) , PBT (Polybutylene terephthalate).

Main components K24	
1 LCD display	3 CAL key
2 RESET key	4 Technical data plate
5 Marking	



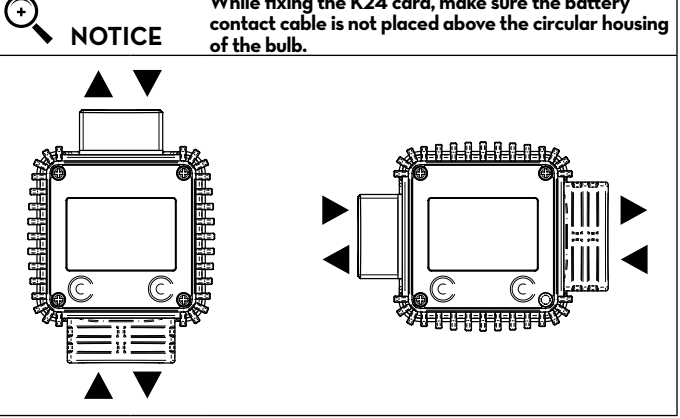
5.2 DISPLAY LCD (METER VERSION ONLY)

FOREWORD	The "LCD" of the METER features two numerical registers and various indications displayed to the user only when the applicable function so requires.
1 Partial register (5 figures with moving comma FROM 0.1 to 99999) indicating the volume dispensed since the reset button was last pressed	6 Indication of type of total, (TOTAL / Reset TOTAL);
2 Indication of battery charge	7 Indication of unit of measurement of Totals: L-Litres Gal-Gallons
3 Indication of calibration mode	8 Indication of Flow Rate 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)	9 Indication of unit of measurement of Partial: Qts-Quarts Pts-Pints L-Litres Gal-Gallons
5 Indication of total multiplication factor (x10 / x100)	

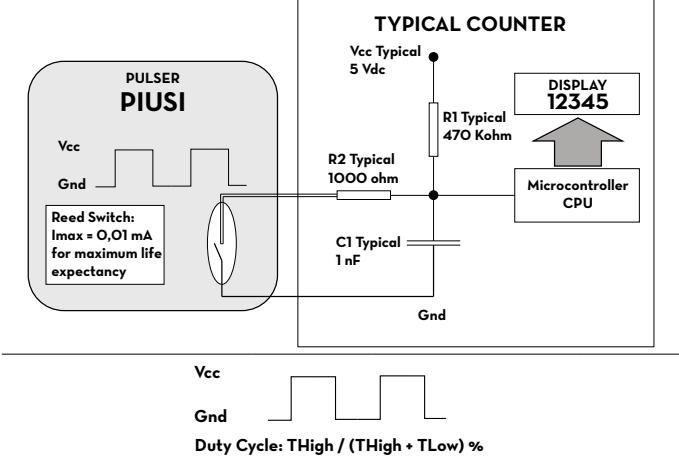


5.3 DISPLAY POSITIONING (METER VERSION ONLY)

FOREWORD	The square shape of the k24 body allows the card to be rotated in its housing, 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).



PULSER VERSION
The Pulser version is a pulse emitter (reed bulb) which translates the magnetic field variations generated by TURBINE rotation into electric pulses to be sent to an external receiver to be connected.
The pulser does not need any independent electric power supply, as it is directly powered by the receiver connection. The issued pulse type is represented by a square wave generated by the voltage variation - see the following diagram.



MODEL	FLOW RATE FIELD	PULSER	Frequency Signal Max	Square Wave Duty Cycle
	l / min. g / min	Pulse / liter (approx-mately) Pulse / Gal (approx-mately)		
K24	5 - 120 1.3 - 31.7	90 +/-2 379	200 Hz	70 - 90%

The electrical signal between K24 PULSER and the control unit device must be protected by intrinsically safe barrier. The electrical limits of signal are the follows:
Ui = 12 V - Ii = 100 mA - Pi = 0.3 W

5.4 USERS BUTTONS

FOREWORD	The METER features two buttons (RESET and CAL) which individually perform two main functions and, together, other secondary functions: - for the RESET key, resetting the partial register and Reset Total - for the CAL key, entering instrument calibration mode		
MAIN FUNCTIONS PERFORMED			
SECONDARY FUNCTIONS LEGEND	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-SURE OF CAL KEY	LONG PRES-SURE OF CAL KEY	SHORT PRES-SURE OF RESET KEY	LONG PRES-SURE OF RESET KEY

6 OPERATING MODES

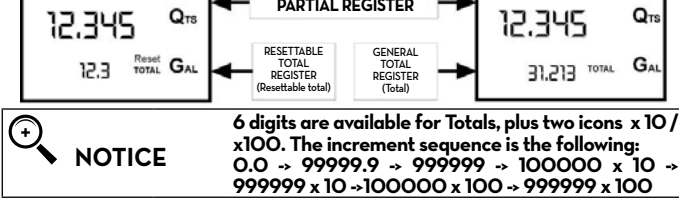
OPERATING MODES	The user can choose between two different operating modes: The meter features a non-volatile memory for storing the dispensing data, even in the event of a complete power break for long periods. The measurement electronics and the LCD display are fitted in the top part of the K24 which remains isolated from the fluid-bath measurement chamber and sealed from the outside by means of a cover. Normal Mode: Made with display of Partial and Total dispensed quantities. Flow Rate Mode: Made with display of Flow Rate, as well as Partial dispensed quantity.
1 - Normal Mode	
2 - Flow rate Mode	

7 INSTALLATION

	WARNING
	Installation, assembly and maintenance operations of the K24 , must only be performed by personnel qualified to operate in HAZARDOUS LOCATIONS ZONE1.
	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 recommended to fit a strainer before the meter itself.
	For installations on system, position meter so that the battery housing can be easily reached.
CONNECTIONS	To protect against the leakage, make sure all threads are sealed with two or three turns of thread tape or a sealing compound compatible with the liquid being metered. Make sure the thread tape or sealing compound does interfere with the 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. To minimize static electricity build up, use only static conductive hose R-1M-m when metering flammable fluids, and keep the fill nozzle in contact with the container being filled during the filling process. All parts of our system must be continuity and grounded. DO NOT exceed 145 psi - 10 bar line pressure. DO NOT install additional foot valve or check valve without a pressure relief valve; otherwise the meter may rupture. The barrier must be properly connected to an earth grounded. Improper installation of this meter and barrier could result in death or serious injury.
PULSER CONNECTIONS	The electrical signal between K24 PULSER and the control unit device must be protected by intrinsically safe barrier. The electrical limits of signal are the follows: Ui = 12 V Ii = 100 mA Pi = 0.3 W The barrier must be properly connected to an earth grounded. Improper installation of this meter and barrier could result in death or serious injury.

8 DAILY USE

FOREWORD	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 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.



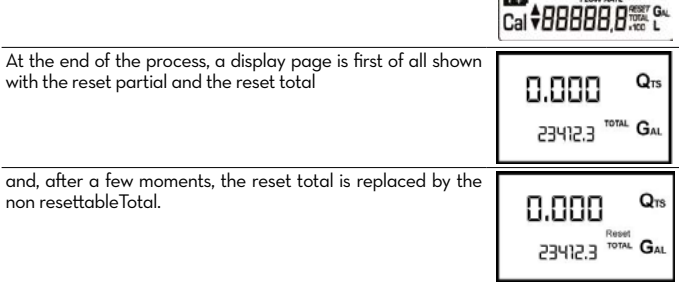
8.1 DISPENSING IN NORMAL MODE

FOREWORD	Normal mode is the standard dispensing. While the count is made, the partial and resettable total are displayed at the same time (reset total).
	NOTICE
	Should one of the keys be accidentally pressed during dispensing, this will have no effect.
stand by	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 k24 again.



8.1.1 PARTIAL RESET (NORMAL MODE)

	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.



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

	At the end of the process, a display page is first of all shown with the reset partial and the reset total
	0.000 Qts
	23412.3 TOTAL Gal
	0.000 Qts
	23412.3 TOTAL Gal

	0.000 Qts
	23412.3 TOTAL Gal
	0.000 Qts
	23412.3 TOTAL Gal

8.2 DISPENSING WITH FLOW RATE MODE DISPLAY

It is possible to dispense fluids, displaying at the same time:	
1 the dispensed partial	
2 the Flow Rate in [Partial Unit / minute] as shown on the following display page:	
	12.345 Qts
	FLOW RATE 12.5 L

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.

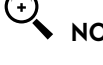
The flow rate is updated every 0.7 seconds. Consequently, the display could be relatively unstable at lower flow rates. The higher the flow rate, the more stable the displayed value.

	NOTICE
	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.

	NOTICE
	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.

8.2.1 PARTIAL RESET (FLOW RATE MODE)

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	
	12.345 L
	FLOW RATE 0.0 L

PIUSI

K24
ELECTRONIC
ALLUMINIUM
TURBINE
METER

Ex IIC G

IEC

Ex

MADE IN ITALY

Use, maintenance and Calibration manual

EN

BULLETIN M0320 E EN_00

