

INDEX
1 GENERAL WARNINGS
2 SAFETY INSTRUCTIONS
3 FIRST AID RULES
4 KNOWLEDGE K600
5 INSTALLATION
6 DAILY USE
7 CALIBRATION
8 MAINTENANCE
9 BATTERY REPLACEMENT
10 MALFUNCTIONS
11 DEMOLITION AND DISPOSAL
12 TECHNICAL SPECIFICATIONS
13 EXPLODED VIEW / DIMENSIONS

13 FACSIMILE COPY OF EU DECLARATION OF CONFORMITY

The undersigned: PIUSI S.p.A.
Via Rasinotti 16/A, 21 Rangovino - 46029 Sassara - Mantova - Italy
HEREBY STATES under its own responsibility that the equipment described below:
Description: METER
Model: K600 METER - K600 PULSER
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
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 email address: doc.legis@piusi.com.

2 GENERAL WARNINGS

To ensure operator safety and to protect the dispensing system from potential damage, workers must be fully acquainted with this instruction manual before attempting to operate the dispensing system.
The following symbols will be used throughout the manual to highlight safety information and precautions of particular importance:
ATTENTION
This symbol indicates safe working practices for operators and/or potentially exposed persons.
WARNING
This symbol indicates that there is risk of damage to the equipment and/or its components.

3 SAFETY INSTRUCTIONS

3.1 SAFETY WARNINGS
Mains - preliminary checks before installation
Maintenance control
FIRE AND EXPLOSION
When flammable fluids are present in the work area such as gasoline and windshield wiper fluid, be aware that flammable fumes can ignite or explode.
EQUIPMENT MISUSE
Misuse can cause death or serious injury.
TOXIC FLUID OR FUMES HAZARD
Smoking Prohibited
3.2 FIRST AID RULES
When operating the system and in particular during refueling, do not smoke and do not use open flame.
3.3 GENERAL SAFETY RULES
Wear protective equipment that is suited to the operation to be performed, resistant to cleaning products.
Safety shoes.
Close-fitting clothing.
Protective gloves.
Safety goggles.

3.1 SAFETY WARNINGS

Mains - preliminary checks before installation
Maintenance control
FIRE AND EXPLOSION
When flammable fluids are present in the work area such as gasoline and windshield wiper fluid, be aware that flammable fumes can ignite or explode.
EQUIPMENT MISUSE
Misuse can cause death or serious injury.
TOXIC FLUID OR FUMES HAZARD
Smoking Prohibited
3.2 FIRST AID RULES
When operating the system and in particular during refueling, do not smoke and do not use open flame.
3.3 GENERAL SAFETY RULES
Wear protective equipment that is suited to the operation to be performed, resistant to cleaning products.
Safety shoes.
Close-fitting clothing.
Protective gloves.
Safety goggles.

3.2 FIRST AID RULES

When operating the system and in particular during refueling, do not smoke and do not use open flame.

3.3 GENERAL SAFETY RULES

Wear protective equipment that is suited to the operation to be performed, resistant to cleaning products.
Safety shoes.
Close-fitting clothing.
Protective gloves.
Safety goggles.

3.4 PACKAGING

K600 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

3.5 PACKAGE CONTENTS/PRE-INSPECTION

NOTE
In the event that one or more of the components described below are missing from inside the package, please contact PIUSI inc. technical support.

4 KNOWLEDGE K600

FOREWORD
K600 - meter and pulser versions - represents a family of meters developed to satisfy a wide range of requirements for the control, measurement, dispensing and transfer of lubricating oils and fuels.

measurement principle

The METER features a non-volatile memory for storing the dispensing data, even in the event of a complete power break for long periods.
Main components: K600
1- Display LCD
2- RESET button
3- Measuring chamber
4- CAL button
5- Battery housing
6- Filter
The measurement electronics and the LCD display are fitted in the top part of the meter, isolated from the fluid both measuring chamber and sealed from the outside by means of a cover.

operating modes

COMPATIBLE LIQUIDS
DIESEL FUEL, at a viscosity from 2 to 5,5 cSt (at a temperature of 38°C). Minimum Flash Point (P.M.H.) 55°, according to UNI 99.
MOTOR OIL, SYNTHETIC / MINERAL
PARAFFINIC DIESEL HVO & XTL (GTL/BTL/CTL/PTL) according to the EN 590/2019

4.1 LCD DISPLAY (ONLY METER VERSION)

FOREWORD
The "LCD" of the METER features two numerical registers and various indications displayed to the user only when the applicable function is required.

Table with 2 columns: Description of LCD display elements (1-9) and their corresponding functions (e.g., Partial register, Battery charge, Indication of unit of measurement).

Measurement Chamber

The measuring chamber is located in the lower part of the instrument. It is fitted with connections for the installation of threaded flanges at inlet and outlet. The cover on the bottom part provides access to the measurement mechanism for any cleaning operations.

Battery housing

The METER is powered by two standard type 15 V batteries (size N). The battery housing is closed by a threaded watertight cap that can be easily removed for quick battery change.

4.2 VERSION PULSER

The PULSER version is a pulse emitter (reed bulb) which translates the magnetic field variations generated by gear rotation into electric pulses to be sent to an external receiver. The receiver is to be connected according to the enclosed diagram. The pulser does not need any independent electric power supply as it is directly powered by the receiver connection.

4.3 USERS BUTTONS

FOREWORD
The METER features two buttons (RESET and CAL) which individually perform two main functions:
- the RESET key, resetting the partial register and Reset Total
- 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 function 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

4.3 USERS BUTTONS

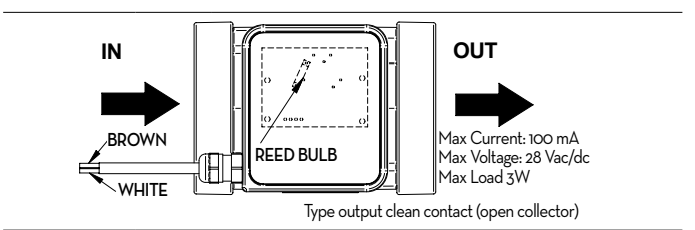
FOREWORD
The METER features two buttons (RESET and CAL) which individually perform two main functions:
- the RESET key, resetting the partial register and Reset Total
- the CAL key, entering instrument calibration mode

15 INSTALLATION

Avant-propos
K600 METER or PULSER features a 1 inch or 3/4 inch inlet and outlet, depending on the fluid for which they are trained, threaded and perpendicular. It is designed for fixed-in-line installation.

ATTENTION

Make sure the threaded connections do not interfere with the inside of the measuring chamber causing the gears to seize. Do not use any central connections which may damage the meter body or the connection flange. Only the Pulser version must be connected by means of 2 cables according to the electrical features in the diagram. Carry out installation by placing the suction filter.



6 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 K600. Occasionally the meter may need to be configured or calibrated. To do so, please refer to the manual for the applicable operation.

PULSER VERSION

The pulser version of K600's meter when properly connected to the pulse receiver, does not need any start/stop operation. 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 a factory set and cannot be changed.

The Partial register

Positioned in the top part of the display indicates the quantity dispensed since the RESET key was last pressed

The RESET Total register

Positioned in the lower part of the display, indicates the quantity dispensed since the last RESET Total key was pressed. The RESET Total cannot be reset until the Partial has been reset, vice versa, the Partial can always be reset without resetting the RESET Total. The unit of measurement of the two Totals can be the same as the Partial or else different according to the factory or user settings.

The General TOTAL register (Total)

Share the same area and digits of the display. For this reason, the two totals will never be visible at the same time, but will always be displayed alternately.

The General Total (Total)

The Reset Total is shown:
- At the end of a Partial reset for a certain time (a few seconds)
- During the entire dispensing stage
- For a few seconds after the end of dispensing. Once this short time has expired, Meter switches to standby and lower register display switches to General Total

NOTE

6 digits are available for Totals, plus two icons x10 / x100. The user can choose between:
0.00 - 99999.9 - 999999 - 10000.0 x10 - 99999.9 x10 - 100000.0 x100 - 99999.9 x100

6.1 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). This situation is called standby and remains stable until the user operates the K600 again.

6.1.1 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 6+4 digits and then all the digits that are not up to it.

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.

6.1.2 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

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.

6.2 DISPENSING IN FLOW RATE MODE

FOREWORD
It is possible to dispense, 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 meter 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.

ATTENTION

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.

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

ATTENTION

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.

6.2.1 PARTIAL RESET

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

then quickly press RESET

NOTE

Unlike Normal mode, in this case during reset, you do not pass through the stages where the display segments are first lit up and then switched off, but rather the reset partial register is immediately displayed

7 DEFINITIONS

7.1 CALIBRATION

Calibration factor or "K Factor"
This is the multiplication factor applied by the system to the electrical pulses received, to transform these into measured fluid units. Factory-set default factor: It is equal to 1.000. This calibration factor ensures utmost precision in the following operating conditions:

- Version for diesel fuel: Fluid Temperature: 38°C, Flow rate: 10-100 litres/min
Version for oil: Fluid Temperature: 20-60°C, Flow rate: 2-60 litres/min

USER K FACTOR

Customized calibration factor, meaning modified by calibration. Even after any changes have been made by the user, the factory K factor can be restored by means of a simple procedure.

7.2 CALIBRATION MODE

Why calibrate
K600 METER is supplied with a factory calibration that ensures precise measuring in most operating conditions. Nevertheless, when operating close to extreme conditions, such as for instance:
- with fluids close to acceptable range extremes (such as low-viscosity antifriction or high-viscosity oils for gearboxes)
- in extreme flow rate conditions (close to minimum or maximum acceptable values)
the on-spot calibration may be required to suit the real conditions in which the meter is required to operate.

When operating close to extreme use or flow rate conditions (close to minimum or maximum acceptable values), an on-spot calibration may be required to suit the real conditions in which the K600 is required to operate.

FOREWORD

K600 METER permits making quick and precise electronic calibration by changing the Calibration Factor (K FACTOR). Two procedures are available for changing the Calibration Factor:

- 1- In-Field Calibration, performed by means of a dispensing operation
2- Direct Calibration, performed by directly changing the calibration factor

The calibration phases can be entered (by keeping the CAL key pressed for a long time) to:

- Display the currently used calibration factor
- Return to factory calibration (Factory K Factor) after a previous calibration by the user
- Change the calibration factor using one of the two previously indicated procedures

- 1- In calibration mode, the partial and total dispensed quantities indicated on the display screen take on different meanings according to the calibration procedure phase
2- In calibration mode, the METER cannot be used for normal dispensing operations
3- In "Calibration" mode, the totals are not increased.

The METER 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 batteries, calibration need not be repeated.

7.2.1 DISPLAY OF CURRENT CALIBRATION FACTOR AND RESTORING FACTORY FACTOR.

By pressing the CAL key while the appliance is in Standby, the display page appears showing the current calibration factor 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" shows that the factory calibration factor is being used. To confirm the choice of calibration factor, quickly press CAL while "User" or "Fact" are displayed.

After the reset cycle, the meter uses the calibration factor that has just been confirmed

ATTENTION

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

7.2.2 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.

- 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 equivalent 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 rise.
6- Carefully follow the procedure indicated below.

7.2.2.1 IN-FIELD CALIBRATION PROCEDURE

Table with 3 columns: ACTION, DISPLAY, and a visual representation of the meter display showing 12.345 L and 0.000 L.

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.

SHORT RESET key keying
The Meter is informed that the calibration dispensing operation is finished. Make sure dispensing is correctly finished before performing this operation. To calibrate the Meter, the value indicated by the partial register (example 9.800) must be forced to the real value of the display 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 value change displayed when the following operations 6 or 7 are performed.

SHORTLONG CAL key keying
The indicated value changes in the direction indicated by the arrow one unit for every short CAL key keying. If the CAL key is kept pressed, the speed increases by continuously pressing the key pressed. If the desired value is exceeded, repeat the operations from point (6).

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. The Meter calculates the new USER K FACTOR. This calculation could require a few seconds, depending on the correction to be made.

NO OPERATION
At the end of the calculation, the new USER K FACTOR is shown for a few seconds, after which the reset cycle is repeated to finally achieve standby condition.

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

NO OPERATION
The Meter stores the new user calibration factor and is ready to begin dispensing, using the USER K FACTOR that has just been calculated.

7.2.3 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 operator in the following way:

New cal. Factor = Old Cal Factor * (100 - %E) / 100

EXAMPLE

Error percentage found: -E% = 0.9 %
CURRENT calibration factor: 1.000
New USER K FACTOR: 1.000 * (100 - (-0.9)) / (100 - 1.000) = 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).

1 ACTION

Table with 3 columns: ACTION, DISPLAY, and visual representation of meter display for steps 1-6.

7 ACTION

Table with 3 columns: ACTION, DISPLAY, and visual representation of meter display for steps 7-9.

10 MALFUNCTIONS

Table with 3 columns: PROBLEM, POSSIBLE CAUSE, REMEDIAL ACTION. Includes issues like Bad battery contact, Wrong K FACTOR, Meter works below minimum acceptable flow rate, etc.

8 METER CONFIGURATION

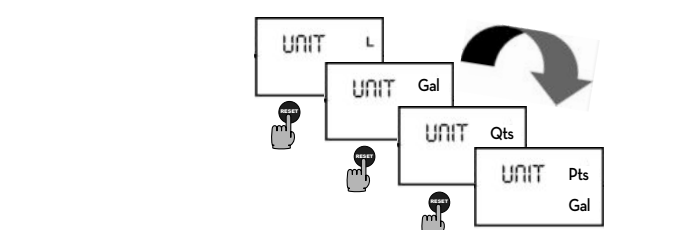
The METER features a menu with which the user can select the main measurement unit, Quarts (Qt), Pints (Pt), Litres (L), Gallons (Gal). The combination of the unit of measurement of the Partial register and that of the Totals is predefined according to the following table:

Table with 3 columns: Combination no., Unit of Measurement Partial Register, Unit of Measurement Totals Register.

To choose between the 4 available combinations:

- 1- Wait for the METER to go to Standby
2- Then 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 / Liters)

Every short press of the RESET key, the various combinations of the units of measurements are scrolled as shown below.



By pressing the CAL key at length, the new settings will be stored, the METER will pass through the start cycle and will then be ready to dispense in the set units.

4 ATTENTION

The Reset 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.

9 MAINTENANCE CHANGE BATTERY

FOREWORD
The METER has been designed to require a minimum amount of maintenance. The only maintenance jobs required are:
- Battery change - necessary when the batteries have run down
- Cleaning the measurement chamber. This may be necessary due to the particular nature of the dispensed fluids or due to the presence of solid particles following back filtering.

The METER is installed with 2 x 1.5 V alkaline batteries (SIZE N).

BATTERY REPLACEMENT WARNING

K600 should be installed in a position allowing the batteries to be replaced without removing it from the system.

K600 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, K600 continues to operate correctly, but the fixed icon warns the user that it is ADVISABLE to change the batteries.
2- If K600 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.

- 1- Press RESET to update all the totals
2- Uncrew the battery cap (pos.8)
3- Remove the old batteries
4- Place the new batteries in the same position as the old ones, making sure the positive pole is positioned as indicated on the cover (pos. 9). Re-tighten the battery cap, making sure the seal (pos.1) are correctly positioned.
5- The METER will switch on automatically and normal operation can be resumed.

The METER will display the same as the Reset Total, the same Total and the same Partial indicated before the batteries were changed. After changing the batteries, the meter does not need recalibrating again.

ATTENTION

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

9.2 CLEANING

CLEANING THE MEASURING CHAMBER ATTENTION
The K600 measuring chamber can be cleaned without removing the instrument from the line on which it is fitted. Make sure the gears are turning freely before closing the cover.

Always make sure that the liquid has drained from the meter before cleaning.

To clean the chamber, proceed as follows (with reference to the exploded diagram positions):

- 1- Loosen the four retention screws of the lower cover (pos. 7)
2- Remove the cover (pos. 7) and the seal (pos. 6)
3- Remove the oval gears.
4- Clean where necessary. For this operation, use a brush or pointed object such as a small screwdriver. Be careful not to damage the body or the gears.
5- To reassemble the instrument, perform the operations in the opposite sequence.

Perform the assembly diagram to reassemble the gears.

Only one of the two gears, modularly coupled as shown in the picture aside, features magnets. Observe the position of the gear with magnets, as shown in the figure. Fit the second gear (without magnets) with axis greater than 90° compared to the first gear.

The filter-cleaning interval is to be defined depending on the impurities contained in the fluid. To perform this operation, remove the device from the line on which it is installed, as the filter is placed between the meter body and tube connection flange.

Always make sure that the liquid has drained from the meter before cleaning.

To clean the filter, proceed as follows (with reference to the exploded diagram positions):

- 1- To access the filtering disk of the K600/3, loosen the 2 fixing screws of the connection flange at the inlet. Remove both flanges if it is necessary for the system
2- Remove the meter from the line, being careful to remove also the gaskets between the flanges and threaded connections of K600.
3- Slide out the filter (pos. 9)
4- Clean the filter with compressed air.
5- Carry out the reverse procedure to reassemble the filter.

10 MALFUNCTIONS

Table with 3 columns: PROBLEM, POSSIBLE CAUSE, REMEDIAL ACTION. Includes issues like Bad battery contact, Wrong K FACTOR, Meter works below minimum acceptable flow rate, etc.

12 TECHNICAL SPECIFICATIONS

Table with 3 columns: Resolution, Flow rate range, Operating pressure, Bursting pressure, Measurement system, Storage temperature, Degree of impermeability, Storage humidity, Operating temperature (Max), Loss of Head at maximum flow rate, Compatible Fluids, Viscosity Range, Accuracy (within capacity range), Repeatability, Weight, Input and Output Connection Thread, Batteries, Battery Life (expected).



Fluid Handling Innovation
MADE IN ITALY

Instruction for use, maintenance and calibration
Gebruiksaanwijzing, Wartung und Kalibrierung

BULLETIN MO147 D ENDE..._00

PIUSI S.p.A. - Via Rasinotti 16/A - 21 Rangovino - 46029 Sassara - Mantova - Italy

PIUSI.com

PIUSI Fluid Handling Innovation

PIUSI K600 ELECTRONIC METER

PIUSI.com

PIUSI Fluid Handling Innovation

PIUSI K600 ELECTRONIC METER

PIUSI.com

