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A. Becoming acquainted with Remote Display: General

Remote Display is a digital remote display system of the amount of fluid dispensed and measured by an electronic meter featuring an oval-gear measurement system or a turbine/impeller.

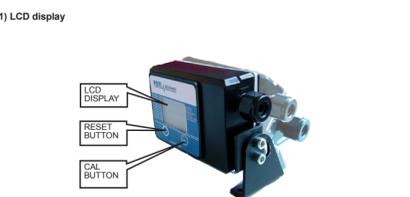
Below is the logic connection diagram:



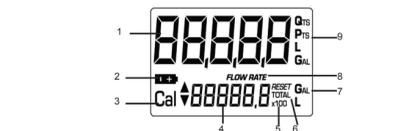
* possible connection only for the remote display versions equipped with output " Pulse Transmitter" (or " Pulse Out")
The user can choose between two different operating modes:
- Normal Mode: Mode with display of Partial and Total dispensed quantities
- Flow Rate Mode: Mode with display of Flow Rate as well as Partial dispensed quantity.

The Remote Display features a non-volatile memory for storing the dispensing data, even in the event of a complete power break for long periods.

Main components:
1) LCD display



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



Legend:
1. Partial register (6 figures with moving comma: 0.000 + 99999), indicating volume dispensed from when the RESET button was last pressed;
2. Indication of battery charge;
3. Indication of calibration mode;
4. Totals register (6 figures with moving comma 0.0+999999 x10 / x100), 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
Qts=Quarts
Pts=Pints
8. Indication of Flow Rate mode
9. Indication of unit of measurement of Partial:
L=Litres
Gal=Gallons

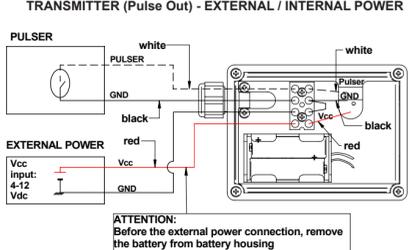
2) User Buttons
The meter features two buttons (RESET and CAL) which individually perform two main functions and, together, other secondary functions.
The main functions performed are:
- for the RESET key, resetting the partial register and Reset Total
- for the CAL key, entering instrument calibration mode
Used together, the two keys permit entering configuration mode where the desired unit of measurement can be set.

3) Battery Housing
The Remote Display is powered by two standard 1.5 V (size AA) batteries.
The batteries are inside the Remote Display (see photo chapter 1).

B. Installation

The Remote Display has been specifically designed for stationary installation. The display is fitted with a bracket that allows its rotation for best reading inclination.
To connect the pulser, loosen the 4 fixing screws of the rear lid, open the lid and insert the cable into the cable gland. The two electrical wires of the cable must be connected to a terminal (see photo) with two screws. Close the lid, ensuring that the o-ring is placed properly to guarantee a perfect seal.
Below are the connection diagrams, models without Pulse Transmitter and with Pulse Transmitter, featuring the two power options by means of battery or external power supply.

REMOTE DISPLAY CONNECTION DIAGRAM WITHOUT PULSE TRANSMITTER (Pulse Out) - EXTERNAL / INTERNAL POWER

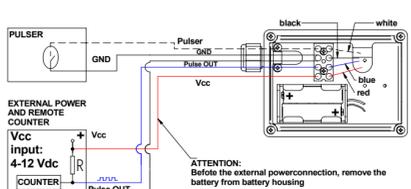


ATTENTION: Before the external power connection, remove the battery from battery housing

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.

REMOTE DISPLAY CONNECTION DIAGRAM WITH PULSE TRANSMITTER (Pulse Out) - EXTERNAL / INTERNAL POWER



C. Daily use

METER is delivered ready for use. No commissioning operations are required even after long storage periods. The only operations that need to be done for daily use are Partial and/or Reset Total resetting. 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 Reset Total to general total display is automatic and tied to phases and times that are factory set and cannot be changed by the user.



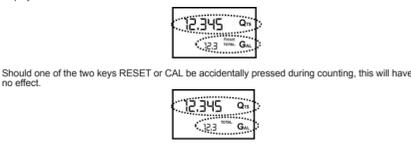
The PARTIAL REGISTER positioned in the top part of the display indicates the quantity dispensed since the RESET key was last pressed
The RESET Total register, positioned in the lower part of the display, indicates the quantity dispensed since the last RESET Total resetting. The RESET Total cannot be reset until the Partial has been reset, while 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) can never be reset by the user. It continues to rise for the entire operating life of the meter.

The register of the two totals (Reset Total and 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 meter is programmed to show one or the other of the two totals at very precise times:
- The General Total (Total) is shown during Meter standby
- 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 increment sequence is the following:
0.0 - 99999.9 - 999999 - 100000 x10 - 999999 x10 - 100000 x100 - 999999 x100

C.1. Dispensing in Normal mode

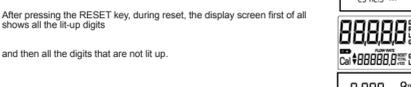
This is default dispensing during which, while the count is made, the Partial and Reset Total are displayed at the same time.



Should one of the two keys RESET or CAL be accidentally pressed during counting, this will have no effect.

C.1.1. Resetting the Partial Register

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".

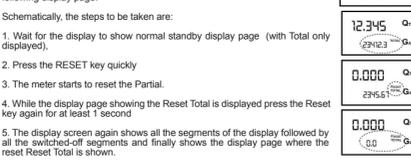


After pressing the RESET key, during reset, the display screen first of all shows all the lit-up digits and then all the digits that are not lit up.

At the end of the process, a display page is first of all shown with the reset Partial and the Reset Total

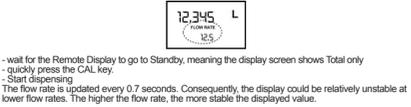
C.1.2. Resetting the Reset Total

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:



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:



IMPORTANT: The flow rate is measured with reference to the unit of measurement of the Partial.

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
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.

D. Calibration

D.1. Definitions

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 K Factor: Factory-set default factor. It is equal to 1,000.

This calibration factor ensures utmost precision in the following operating conditions:
Fluid: motor oil type 10W40
Temperature: 20°C
Flow rate: 5-25 litres/min

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

D.2. Why calibrate

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 antifreeze or high-viscosity oils for gearboxes)
- in extreme flow rate conditions (close to minimum or maximum acceptable values) on the-spot calibration may be required to suit the real conditions in which the meter is required to operate.

D.3. Calibration Procedure

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.

In calibration mode, the partial and total dispensed quantities indicated on the display screen take on different meanings according to the calibration procedure phase.

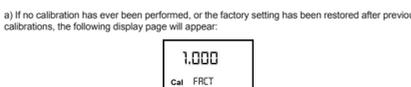
In calibration mode, the METER can not be used for normal dispensing operations. In "Calibration" mode, the totals are not increased.

IMPORTANT: 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.

D.3.1. 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.

Two cases can occur:
a) 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

b) 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 factor set by the user is being used.



The flow chart alongside shows the switch-over logic from one display page to another

In this condition, the Reset key permits switching from User factor to Factory factor.

To confirm the choice of calibration factor, quickly press CAL while "User" or "Fact" are displayed.

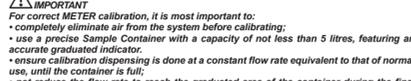
After the restart cycle, the meter uses the calibration factor that has just been confirmed

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

D.3.2. In Field Calibration

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

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



IMPORTANT: The METER feature a menu with which the user can select the main measurement unit, Quarts (Qts), Pints (Pts), Litres (L), Gallons (Gal).

The composition 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. Rows show combinations for Litres (L), Gallons (Gal), Quarts (Qts), and Pints (Pts).

D.3.2.1. Sequence of operations to be performed for correct in-field calibration:

Table with 2 columns: Action, Display. It lists 10 steps for in-field calibration, from NONE METER in Standby to NO OPERATION.

D.3. Direct Modification of K Factor

This procedure is especially useful to correct a "mean error" obtainable on the basis of several performed dispensing operations. 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 5% - 0.9% CURRENT calibration factor 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).

Table with 2 columns: Action, Display. It lists 10 steps for direct modification of K factor, from NONE METER in Standby to NO OPERATION.

E. Configuration of unit of measurement

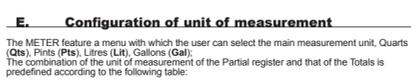
The METER feature a menu with which the user can select the main measurement unit, Quarts (Qts), Pints (Pts), Litres (L), Gallons (Gal).

Table with 3 columns: Action, Display. It lists 10 steps for unit configuration, from NONE METER in Standby to NO OPERATION.

F. Pulse Transmitter (Puls OUT)

In some models an outlet of "NPN-Open Collector" type is available. This outlet issues a certain number of pulses by Unit of measurement of the partial quantity dispensed. The number of pulses can be selected amongst 7 proposed options (1, 2, 5, 10, 20, 50, 100).

This outlet can be connected to a remote receiver having the following characteristics:
- at software level it shall have a "pulse weight" according to the transmission of the Remote Display
- at hardware level the receiver connection shall have an input circuit of "Pull-up" type with the following features:
- Vdc max = 12 V
- I max = 0.5 A



Below is the logic connection diagram of the outlet with the remote receiver:

The procedure for entering the selection menu of the number of pulses emitted by each unit of measurement of the dispensed partial quantity is the same used to change the units of measurement:



Wait for the Remote Display to go to Standby.

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 / Litres).

By quickly pressing CAL (only for models with Pulsar Out) you will pass to a new configuration menu.

It will be displayed the definition page of the pulse number that the Remote Display supplies on the outlet as required unit of measurement of Partial. By quickly pressing RESET, the available (pulse number / Units of Measurement of Partial) is scrolled down:

To choose between the 4 available combinations: Wait for the METER to go to Standby



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 / Litres).

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

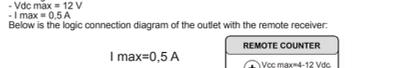
IMPORTANT: The Reset Total and Total registers will be automatically changed to the new unit of measurement.

F. Pulse Transmitter (Puls OUT)

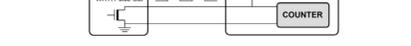
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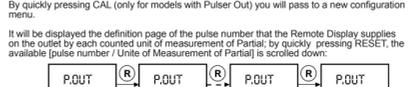
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It will be displayed the definition page of the pulse number that the Remote Display supplies on the outlet as required unit of measurement of Partial. By quickly pressing RESET, the available (pulse number / Units of Measurement of Partial) is scrolled down:



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 / Litres).

By pressing the CAL key at length, the new settings will be stored, the Remote Display will pass through the start cycle and will then be ready to dispense.

IMPORTANT: Only for the turbine/impeller model, the Pulse Out 100 option does not work with flow rates above 150 Ppm/min (70 L/min).

G. Maintenance

The only maintenance operation required on the Remote Display is the battery change, necessary only when the batteries have run down.

Changing the batteries
The Remote Display is complete with 2 x 1.5 V alkaline batteries SIZE 1N. The Remote Display 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, the Remote Display continues to operate correctly, but the fixed icon warns the user that it is time to change the batteries.

2) If the Remote Display 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.

IMPORTANT: Do not discard the old batteries into the environment. Refer to local disposal regulations.

To change the batteries, with reference to the spare parts list positions, proceed as follows:
- Press RESET to update all the totally described operations in reverse order.
- Loosen the 4 screws of the battery cover (pos.1); remove the cover (pos.2) and the gasket (pos.3)
- Remove the battery compartment (pos.4)
- Remove the old batteries
- Place the new batteries in the same position as the old ones, making sure the positive pole is positioned as indicated on the battery compartment.

Place the battery compartment in its seat and apply the gasket and cover with the relevant screws, by performing the previously described operations in reverse order.
The Remote Display will switch on automatically and normal operation can be resumed.

The Remote Display will display the same Reset Total, the same Total and the same Partial indicated before the batteries were changed.
After changing the batteries and, subsequently, every time there is a power break, the Remote Display will start again and use the same calibration factor used when the break occurred. The meter does not therefore need recalibrating again.

DECLARATION OF CONFORMITY
The undersigned, representing the following manufacturer
Piusi S.p.A.
46029 - Suzzara (Mantova) - Italy

CERTIFIES
that the equipment described below:

REMOTE DISPLAY
complies with the following directives:
2004/108/CE (Electromagnetic Compatibility Directive) and following amendments

Table with 3 columns: Problem, Possible cause, Remedial Action. Rows include LCD indications dull, Not enough measurement precision, and Reduced or zero flow rate.

The meter does not count, but the flow rate is correct

Suzzara 01.07.2009

President

think genius piusi.com

Piusi S.p.A. Suzzara - Italy

Technical Data

Table with 4 columns: Model, K600/3, K600/4, K700, TURBINE. Rows include Resolution, Measurement system, External Power, Flow Rate, Storage Temperature, Operating Temperature (Max), Humidity Resistance, Power Supply, Battery Life, and Weight.

L. Remote Display maintenance

There are no spare parts for the Remote Display. Below are diagrams showing the battery-replacement procedure. To replace the batteries, open the rear lid by loosening the 4 screws indicated by the arrows and replace them.



rear lid



remove display without pulse out



remove display with pulse out

Use cable gland "1" to connect to the fowmeter. Should additional connections be required (e.g. external power), cable glands "2" and "3" may be used (see photo). If cable gland "1" is used, the nut must be unscrewed. If cable glands "2" and "3" are used, the hole must be "opened" using an appropriate tool (e.g. screwdriver), as shown in the photo.



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

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

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

DISPOSAL OF ELECTRIC AND ELECTRONIC COMPONENTS:
These have to be disposed of by companies that are specialised in the disposal of electronic components, in accordance with the instructions of 2002/96/EC (see text of Directive below).

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

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

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