ARAG
A Nordson Company

orion2
VISUALFLOW

ELECTROMAGNETIC FLOWMETER

CE

462X2AXXXXX

INSTALLATION, USE AND MAINTENANCE

⚠ = **Generic danger**

🖐 = **Warning**

This manual is an integral part of the equipment to which it refers and must accompany the equipment in case of sale or change of ownership. Keep it for any future reference; ARAG reserves the right to modify product specifications and instructions at any moment and without notice.

• MANUAL USE MODES

THE INSTALLATION MUST BE CARRIED OUT BY AUTHORIZED AND SKILLED PERSONNEL ONLY. ARAG IS NOT RESPONSIBLE FOR ANY INSTALLATION CARRIED OUT BY UNAUTHORIZED OR UNSKILLED PERSONNEL.

• RESPONSIBILITY

It is the responsibility of the installer to perform the installation "in a workmanlike manner" in order to ensure proper operation of the system.
ARAG recommends using its components to install control systems.
The installer will be held responsible for any malfunction if he decides to use other brands' components even without actually changing the system parts or harness.
The compatibility check with components and accessories of other manufacturers shall be carried out by the installer.
If the ARAG components installed together with other brands' components get damaged, no direct or indirect warranty will be provided.

• INTENDED USE

Device designed to work on agricultural machinery for spraying and crop spraying applications.
The machine is designed and built in compliance with ISO 14982 standard (Electromagnetic compatibility - Forestry and farming machines), harmonized with 2014/30/EU Directive.

1.1 Product description

The electromagnetic flowmeter orion2 VISUAL FLOW is a device which allows measuring and displaying the quantity of liquid flowing through it.
Through electromagnetic measurement, the flowmeter (which features no moving mechanical parts) emits a signal that is proportional to the flow of fluid passing through it. orion2 VISUAL FLOW displays the relevant flowrate, which is calculated according to the impulses generated and the value of the flowmeter constant previously set.
orion2 VISUAL FLOW can be used as a filling flowmeter: this function allows setting the quantity of liquid to be filled in the tank during filling and stopping filling, through the Pump Stop Kit (optional), once the set value is reached.

• USE LIMITS

The flowmeter CANNOT be used:
- **for the measurement of gases, vapors, or the like;**
- **in the presence of explosive atmospheres;**
- **in contact with liquids for human consumption;**
- **for use in the non-professional market.**

• RISKS AND PROTECTIONS

The installation works must be done with battery disconnected using suitable tools and any personal protection equipment deemed necessary.
Use ONLY clean water for treatment tests and simulations: using chemicals during simulated treatment runs can seriously injure persons in the vicinity.
DO NOT WORK IN THE VICINITY OF THE DISTRIBUTION AREA WHILE THE SYSTEM IS OPERATING.

• PRECAUTIONS

• Do not aim water jets at the equipment.
• Do not use solvents or fuel to clean the case outer surface.
• Do not clean equipment with direct water jets.
• Comply with the specified power voltage (12 Vdc).
• In case of voltaic arc welding, remove connectors from the device and disconnect the power cables.
• Only use ARAG genuine spare parts and accessories.

1 PACKAGE CONTENT

Fig. 1

The package includes: Electromagnetic flowmeter orion2 VISUAL FLOW (the flange shown is indicative)

TO BE ORDERED SEPARATELY (Ref. ARAG general catalog):

- Power cable

2 INSTALLATION

2.1 Dimensions

Threaded coupling

Flange material	DN	F	L	A	A1	H	H1
Nylon®	4	G 3/4" M	185 *(7.3")*				
Brass		G 3/4" M	184 *(7.2")*				
Nylon®	5	G 3/4" M	185 *(7.3")*				
Brass		G 3/4" M	184 *(7.2")*				
Nylon®	7	G 3/4" M	185 *(7.3")*				
Brass		G 3/4" M	184 *(7.2")*				
Nylon®	10	G 3/4" M	185 *(7.3")*	103 *(4")*	117 *(4.6")*	96 *(3.8")*	169 *(6.6")*
Brass		G 3/4" M	184 *(7.2")*				
Nylon®	14	G 1" M	185 *(7.3")*				
Brass		G 1" M	184 *(7.2")*				
Nylon®	18.5	G 1" M	185 *(7.3")*				
Brass		G 1" M	184 *(7.2")*				
Nylon®		G 1 1/4" M	189 *(7.4")*				
Nylon®	28	G 1 1/2" M	199 *(7.8")*				
Nylon®		G 2" M	234 *(9.2")*				

Tab. 1

Clamp fastening

Flange material	DN	F	L	A	A1	H	H1
Nylon®	28	2" Full port	189 *(7.4")*	103 *(4")*	117 *(4.6")*	96 *(3.8")*	169 *(6.6")*

Tab. 2
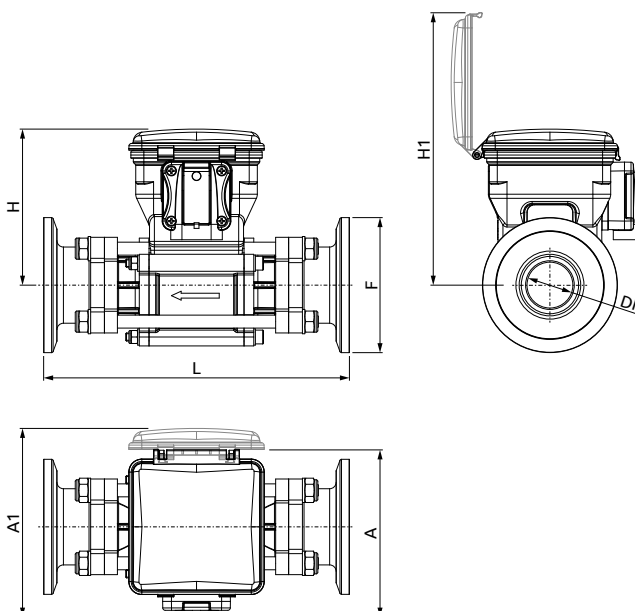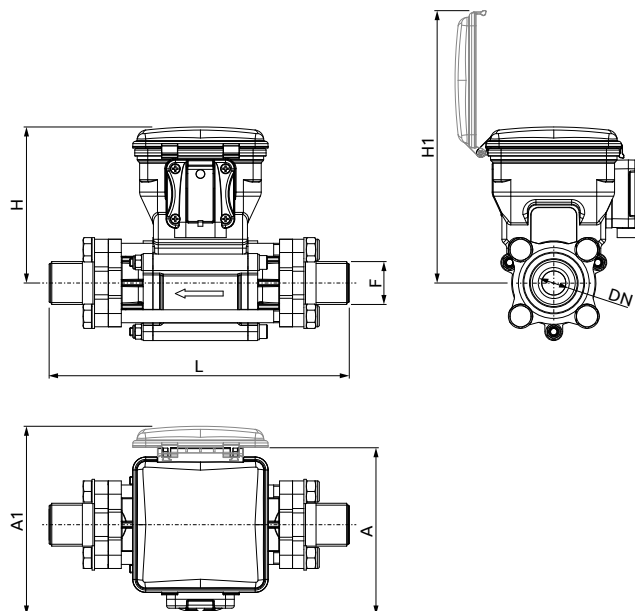
2.2   Assembly

2.2.1   General precautions

Install the flowmeter **at least 20 cm** from the elements that could cause turbulence inside the pipe (valves, bends, bottlenecks, etc.).
The flowmeter can be installed either horizontally or vertically.

WARNING:
For proper sealing of the flowmeter, use ONLY the appropriate ARAG assembly kit (Ref. ARAG General Catalog - Accessories for modular valves).

ARAG is not liable for any damage to the system, persons, animals or property caused by the use of material different from the one indicated.

2.2.2   Assembly

For a correct operation, respect the installation direction (*Fig. 2* and *Fig. 3*).

The connector MUST NEVER BE AIMING UPWARDS.
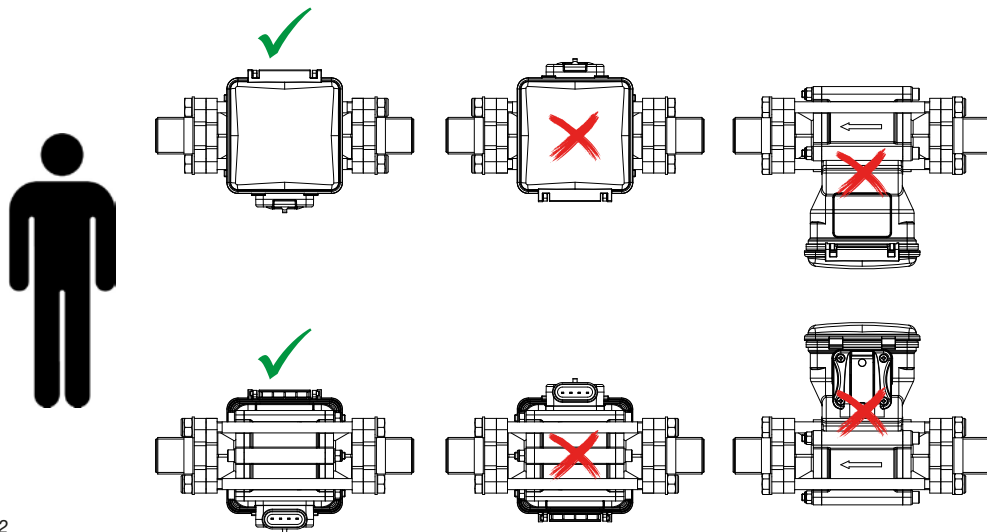
HORIZONTAL ASSEMBLY

Fig. 2

VERTICAL ASSEMBLY

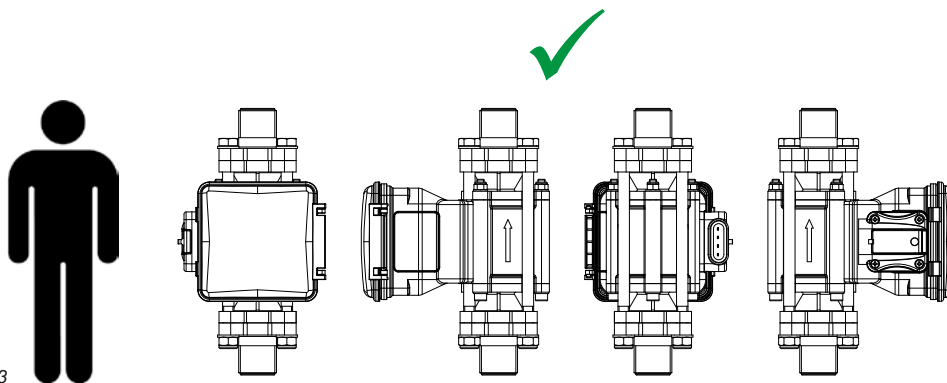*Fig. 3*

- **Observe the correct inlet-outlet direction of the liquid**, as indicated by the arrow printed on the flowmeter body (*Fig. 4*).
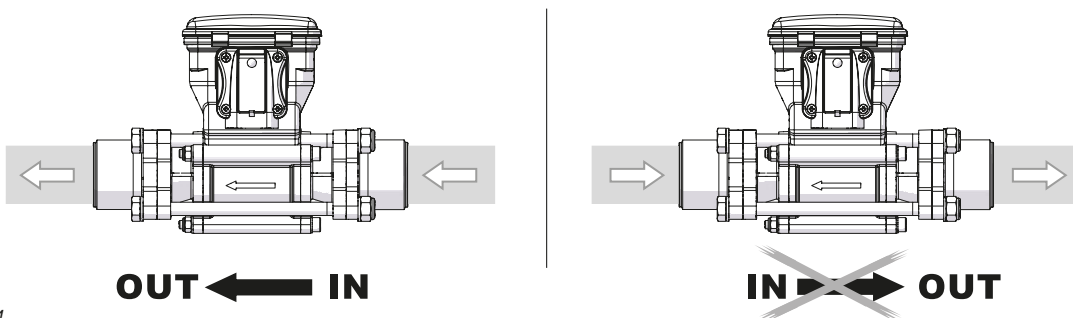

OUT ⬅ IN   IN ➡ OUT

Fig. 4

Use inlet and outlet pipes of the same diameter as the internal passages (DN) of the flowmeter; for any reference, consult *Tab. 1 and Tab. 2***.**

2.2.3 Hydraulic connections

For the connection to the system, use suitable fittings (Ref. ARAG General catalog).

Avoid bottlenecks or twists before the fittings and on pipes.

⚠️ **For the connections, use pipes and fittings duly dimensioned for the system operating pressure.**

Hose tails must be tightened with special metal clips ensuring a perfect sealing even at high pressure values.

The connection with threaded fittings must be carried out by taking into account the operating pressure.

✋ **WARNING: For the implementation on already operating systems, it is necessary to follow all safety rules described herein. System assembly and start-up must be carried out by expert personnel according to the safety rules so as to ensure the same safety level of the system where the flowmeter is installed.**

2.2.4 Wiring connections

orion2 VISUAL FLOW flowmeter is intended to be connected to ARAG devices (computer, monitor, displays) but can also be connected to third-party equipment as long as it is preset for using flowmeters of this type.

To use this device as a filling flowmeter, the latter must be connected ONLY to ARAG devices.

✋ **ARAG is not liable for any damage to the system, persons, animals or property caused by flowmeter wrong or unsuitable assembly. Failure to observe the above instructions automatically voids the warranty.**
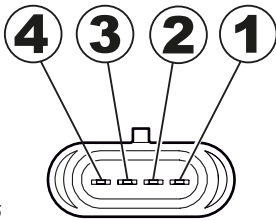
Fig. 5

Position	Connection
1	GND
2	+12 Vdc
3	Signal (square wave)
4	Pump check

Tab. 3

3   PROGRAMMING

Tests and checks before setting

⚠️ **Before setup, check:**
• that all components are correctly installed;
• the correct connection to the power source;
• the component connection.

🖐 **Failure to correctly connect system components or to use specified components might damage the device or its components.**

3.1   Using the keys

Fig. 6   This allows accessing menu item settings and saving the selected option.

Fig. 7   It allows scrolling through the menu items.
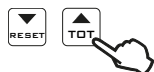It allows performing the calibration of the 0 value.

Fig. 8   It allows scrolling through the menu items.
While turning on the device it allows access to the Advanced Menu (*2.2*).

- After changing a parameter within the Advanced Menu "oPt"; to return to the Main Menu power the device off and then back on.

- While changing the value of a parameter or when you are in a menu other than the Main Menu and no key is pressed within 10 sec, the display automatically returns to the Main Menu.

- When changing a numeric value, prolonged pressing of the key causes the value to change quickly.

3.2   Preliminary setup for use - Advanced Menu "oPt"

oPt
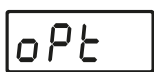
When installing the flowmeter in the filling system, some settings are required to display filling data correctly:
   • Operating mode
   • Units of measurem.
   • Valve actuation time

To access the Advanced Menu, keep the key pressed **while turning on** the device until the message **"oPt"** appears on the display.

3.2.1   "oPt" menu structure

|	Menu	Default	Min	Max	Other values that can be set / Notes
3.2.1.1	ModE	0	---	---	1 - 2
3.2.1.2	br	4	0	10	---
3.2.1.3	bLAL	oFF	---	---	on
3.2.1.4	bL	Grn	---	---	YELL - MAGE - CYan - bLuE - oFF - ALL
3.2.1.5	UAL	0.0	0.0	20.0	---
3.2.1.6	unit	Eu	---	---	uS

3.2.1.1   Function $\Box odE$

It is possible to set 3 different operating modes:
MODE 0 = Tank filling count with pump control command (0 ÷ 9999 EU: I [default setting] - US: Gal)
MODE 1 = Flowrate display
MODE 2 = Tank filling count with pump control command (0 ÷ 999.9 EU: I - US: Gal).
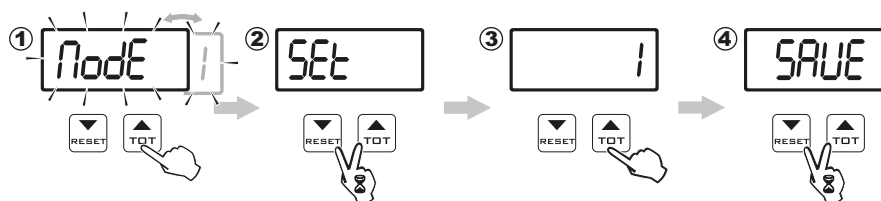
1) Press a few times to display the active operating mode; the value alternates with the message "$\Box odE$".

2) To change the figure, hold down the keys simultaneously until the message "SEt" appears on the display.

3) Press a few times to select the mode you want to use.

4) To confirm the setting, hold down the keys simultaneously until the message "$SAUE$" appears on the display.

The set operating mode is displayed alternately with the message "$\Box odE$".

3.2.1.2   Function br

It allows adjusting the display brightness. Values range from 0 to 10. The default value is 4.

3.2.1.3   Function $bL\ AL$

It allows the display to be illuminated in red when the error alarm is activated. The default value is OFF.

3.2.1.4   Function bL

It allows choosing the display backlighting color. The following table shows the available colors:

Color	Display item
Yellow	$YELL$
Magenta	$\Box AGE$
Cyan	$CYdn$
Green (DEFAULT)	Grn
Blue	$bLuE$
No color	oFF
White	ALL

3.2.1.5   "*URL*" valve actuation time

This parameter allows setting the time that the valve installed on the system takes to complete the closing operation; by setting this data, the flowmeter will be able to anticipate the exact moment at which to start the closing operation, preventing more product from entering when the set value is reached.
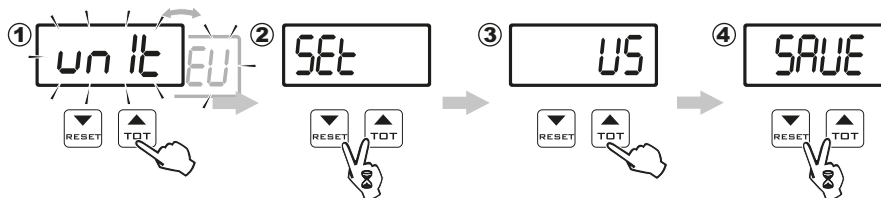
URL **= 0 ÷ 20 s.**
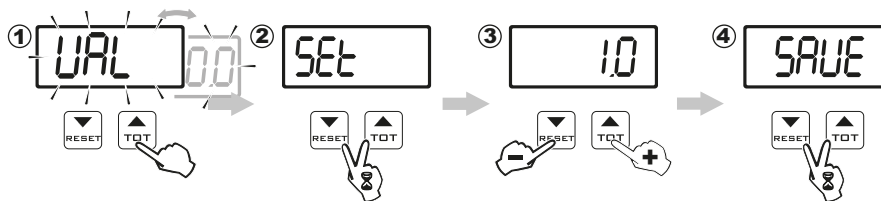
1) Press in succession to display the "*URL*" valve actuation time.

2) To change the figure, hold down the keys simultaneously until the message "*SEt*" appears on the display.

3) Set the actuation time value by using the **TOT** (increase) and **RESET** (decrease) keys; prolonged pressing of the keys allows quick change of the value.

4) To confirm the setting, hold down the keys simultaneously until the message "*SAUE*" appears on the display.

The set actuation time is displayed alternately with the message "*URL*".

3.2.1.6   Units of measurement "*unit*"

You can choose the units of measurement in which to display the data:

EU = Europe (l - l/min) [default setting].
US = USA (Gal - Gpm).

1) Press a few times to display the active type of unit of measurement; the value alternates with the message "*unit*".

2) To change the figure, hold down the keys simultaneously until the message "*SEt*" appears on the display.
3) Press to select the type of unit of measurement to use.

4) To confirm the setting, hold down the keys simultaneously until the message "*SAUE*" appears on the display.

The set unit of measurement is displayed alternately with the message "*unit*".

3.3   Preliminary settings for use - Access to programming menu "*CoSt*"

The right "constant" needs to be programmed in order to visualize the data on the display correctly.
WARNING: this data has already been entered in the production phase.
If the value measured by the flowmeter is different from the actual sprayed value, the precise constant that needs to be entered can be calculated by using the following formula:

$$\frac{[\text{quantity measured by equipment}]}{[\text{actual sprayed quantity}]} \times [\text{constant indicated on flowmeter body}]$$

Therefore, when the constant that is either calculated or shown on the label applied to the body of the flowmeter (*Fig. 9*) needs to be verified or calculated, access the "*CoSt*" menu by holding down the [**RESET**] button during start-up until the "*CoSt*" page is displayed:
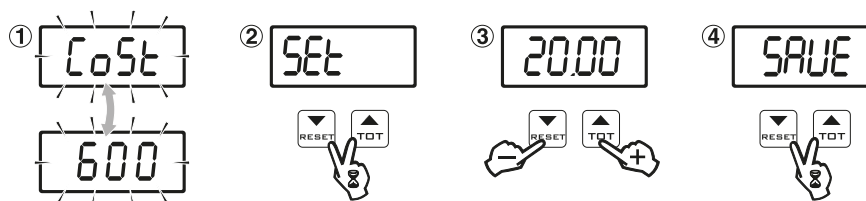 • Flowmeter constant (1 ÷ 29999 - EU: cm/imp - US:inch/imp)

Fig. 9

The data in the image are approximate, always refer to the values on the label of the model you own.

3.3.1   Flowmeter constant setting

① CoSt / 600   ② SEt   ③ 20.00   ④ SAUE

1) After performing the start-up procedure indicated in paragraph 3.1, the device switches to the display of the currently set flowmeter constant value alternating with the "CoSt" indication.

2) To change the figure, hold down the keys simultaneously until the screen "SEt" appears on the display.

3) Set the flowmeter constant using the [TOT] increase and [RESET] decrease keys;
prolonged pressing of the keys allows quick change of the values.

4) To confirm the setting, hold down the keys simultaneously until the screen "SAUE" appears on the display.

The set flowmeter constant is displayed alternately with the "CoSt" screen.

The display shows values above 9999 (pls/l - pls/gal) with the help of some graphics on the display as shown below:
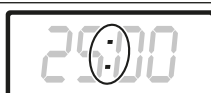
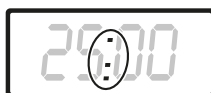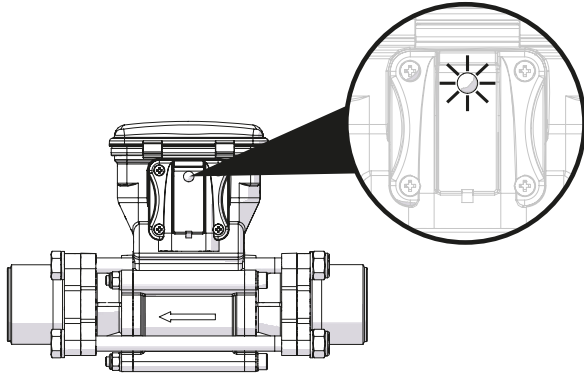| 2500 | When the symbol ":" appears on the display, count the value of the constant in this way: Constant = Displayed value + 10000 |
	E.g. 2500 + 10000 = **12500**
2500	When the symbol ":" appears on the display, count the value of the constant in this way: Constant = Displayed value + 20000
	E.g. 2500 + 20000 = **22500**

4   USE

While the system is in use, the flowmeter sends pulses to the computer, which, based on the previously set constant value, will indicate the instant flowrate.

An LED on the connector housing indicates the status of the device:

○	**LED off:**	The device is not powered.
◓	**LED on NOT BLINKING at low luminous intensity:**	the device is powered but does not detect liquid passage.
☀	**LED on BLINKING at high luminous intensity:**	the device is powered and detects liquid passage. The frequency of blinking is proportional to the flowrate.

The orion2 VISUAL FLOW flowmeter can detect the passage of conductive liquids with a conductivity equal to or higher than 50 µS/cm.

- Do not place the equipment under pressurized water.

- Comply with the specified power voltage (12 Vdc).

- If arc welding is needed, make sure that the flowmeter power supply is disconnected; if necessary disconnect power cables.

- Use the flowmeter only within the flowrate limits indicated in *Par. "Technical data" on page 15*.
Outside this range, the flowmeter may provide incorrect data, thus misleading the operator or the automatic system.

ARAG can not be held responsible for any damage caused to persons, animals or things from the incorrect or unintended use of the flowmeter or its parts.

4.1   Use of Mode 0 - Mode 2

4.1.1   Display of data

The following parameters can be displayed during operation:

Total liquid filled in the tank	0 ÷ 9999 (EU: l - US: Gal) - "Mode 0"
	0 ÷ 999.9 (EU: l - US: Gal) - "Mode 2"
Instant flowrate	0 ÷ 999.9 (EU: l/min - US: Gpm)

4.1.2   Setting the amount of liquid to be filled in the tank

In this operating mode, the flowmeter displays the total amount of liquid to be filled in the tank:
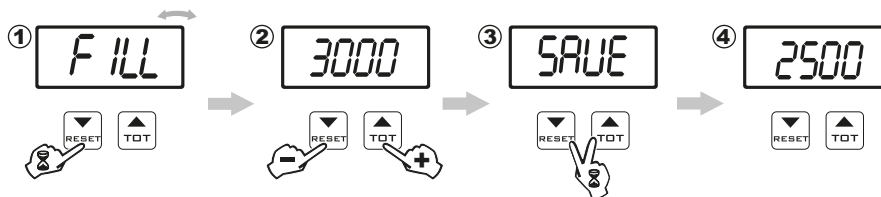
After switching on, the display shows the value of the amount of liquid to be filled in the tank; to change it, proceed as follows:

1) Press the **RESET** key until the message "*FILL* " **is displayed.**

2) Set the quantity of liquid to be filled in the tank by using the **TOT** (increase) and **RESET** (decrease) keys; prolonged pressing of the keys allows quick change of the value.

3) To confirm the setting, hold down the keys simultaneously until the message "*SAVE* " appears on the display.

4) The set amount of liquid to be filled in the tank is displayed preceded by the message "**TOT**".

4.1.3   Operation of Mode 0 - Mode 2
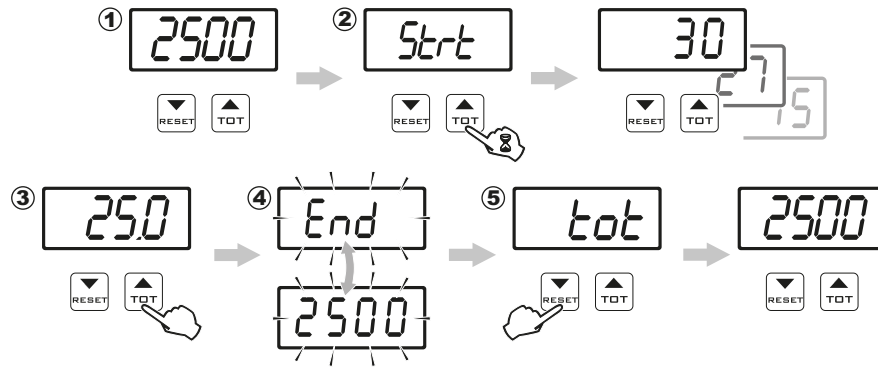
1) After start-up the amount of fluid to be poured into the tank is displayed.

2) To start the filling procedure, keep **TOT** key pressed until the message "*Strt*" appears; the value corresponding to the total amount of fluid poured into the tank is displayed in real time.

3) By pressing the **TOT** key the instant flowrate value of the fluid poured into the tank is displayed, preceded by "*L It*" (or "*GAL*"). By pressing the key again, the display goes back to indicating the quantity of fluid poured into the tank.

4) Once the set value has been reached, the message "*End*" is displayed, alternated with the total quantity of fluid poured into the tank.
If the Pump Stop Module is present, the filling device will stop automatically; otherwise, it must be stopped manually.

5) To end the tank filling, press the **RESET** key : the display will return to the beginning of the filling procedure, showing the amount of liquid to be filled in the tank preceded by the message "*tot*"*:*

4.1.4   Interruption/stop before reaching the programmed quantity
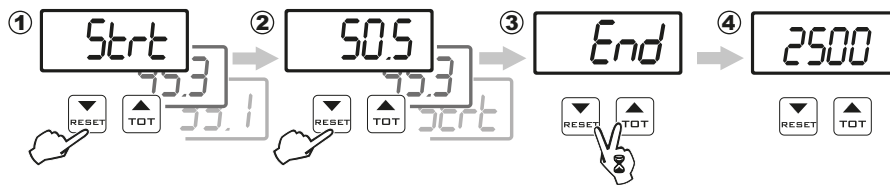
1) During the filling procedure, pressing the **RESET** key can momentarily stop the pump (*); the message "*Strt*" is shown on the display.
However, if you are displaying the instant flowrate, the message "*Strt*" is not displayed: to display it, press the **TOT** key.

2) To resume filling, press the **RESET** key again.

3) To finish filling before the programmed threshold is reached, hold down the keys simultaneously until the "*End*" **message is displayed.**

4) At this point, the filling procedure is finished; the display returns to show the value of the programmed amount of liquid.

(*) Filling can be started or stopped automatically only if the flowmeter is connected to the ARAG Pump Stop Module.
Otherwise, the flowmeter is unable to start or stop the pump and will function only as a display.

4.2   Use of Mode 1

4.2.1   Data display

After power on, the display shows the measured parameters for **Total liquid filled in the tank** and **Instant flowrate** using the previously selected units (EU / US):

- Total liquid filled in the tank = 0.00 ÷ 9999 (EU: l - US: Gal).
- Instant flowrate = 0.0 ÷ 999.9 (EU: l/min - US: Gpm).

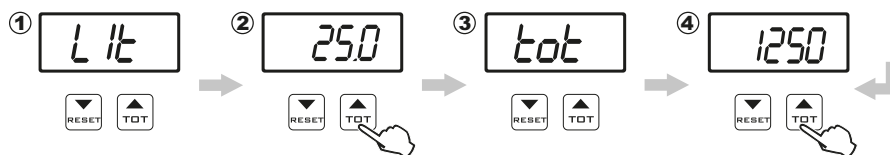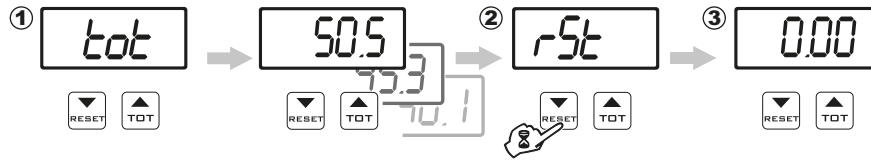4.2.2   Resetting the counter of the liquid filled in the tank

① tot → ② 50.5 → ③ rSt → 0.00
        75.3
        10.1

1) Access the display of the total liquid filled in the tank (*4.1.2*).

2) To reset the total amount of liquid filled in the tank to zero, press and hold the **RESET** key until the message "rSt" **is displayed.**

3) At this point, the display will show the message **"TOT"** followed by the total quantity counter reset to zero.

4.2.3   Reaching full scale

① OL → ② rSt → 0.00
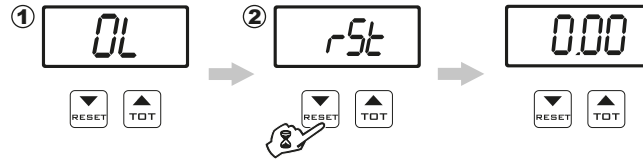
1) The display will show this screen when the full-scale value (9999 Liters - Gal) is reached, and it is then necessary to reset the totalizer to zero.

2) To reset the count of the amount of liquid filled in the tank to zero, press and hold the **RESET** key until the message "rSt" **is displayed.**

5   MAINTENANCE / DIAGNOSTICS / REPAIRS

5.1   Precautions for maintenance operations and for cleaning the external parts
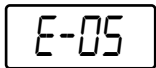
- **DISCONNECT THE POWER CABLES.**
- **WEAR SUITABLE PERSONAL PROTECTION EQUIPMENT, OVERALLS, GLOVES AND FACE MASK.**
- **DO NOT CARRY OUT ANY OPERATION ON THE SYSTEM IF INDOORS OR IN POORLY VENTILATED AREAS.**
- **DO NOT USE SOLVENTS OR FUEL TO CLEAN THE OUTER SURFACE.**
- **DO NOT USE AGGRESSIVE DETERGENTS OR PRODUCTS.**
- **DO NOT USE PRESSURIZED WATER JETS (PRESSURE WASHERS, ETC.).**

5.2   Cleaning rules

- **Clean only with a soft wet cloth.**
- **Do NOT use aggressive detergents or products.**
- **At the end of each spraying, let clean water flow inside the pipe.**
- **Do not use metal or abrasive objects to clean the pipe.**

5.3   Error messages

During operation, in case the following error codes are shown, follow the instructions in the table below:

MESSAGE ON DISPLAY	PROBLEM	SOLUTION
E-05	Short circuit or too high absorption on the pump control output	• Check the efficiency of the filling flowmeter. • Check connections to the filling flowmeter • Check connections and proper operation of the Pump Stop Module

5.4   Troubleshooting

PROBLEM	CAUSE	SOLUTION
The flowmeter does not read any value	No power supply	• Check the harness of the flowmeter.
The value read by the flowmeter is not linear or stable	Presence of turbulence or air in the circuit.	• Check the circuit.
The flowmeter shows wrong data	Wrong setup	• Check the programming related to the displayed data.
	Sensor fault	• Contact the nearest Service Center.
	Flowmeter-related problems	
The flowmeter shows the message *OL*	The full scale value has been reached	• Reset the display by following the procedure described in the section related to the displayed datum.

6   TECHNICAL DATA

ELECTRICAL FEATURES

•	Power supply voltage	10 ÷ 16 Vdc
•	Consumption	300 mA
•	Liquid minimum conductivity	50 µS/cm

ENVIRONMENTAL FEATURES

•	Operating temperature	0 °C ÷ 60 °C / +32 °F ÷ +140 °F
•	Storage temperature	-30 °C ÷ 80 °C / -22 °F ÷ +176 °F

PHYSICAL FEATURES

•	Size	184 ÷ 234 (according to the model) x 117 x 169 mm / 7.2" ÷ 9.2" (according to the model) x 4.6" x 6.6"
•	Weight (without cables)	906 ÷ 1670 g / 32 oz. ÷ 59 oz.(according to the model)

MATERIALS

•	Outer body	Nylon®
•	Flange	Nylon® / Brass
•	Inner tube	TEFLON® / PPVF

TECHNICAL FEATURES

•	Flowrate	**Specific values can be found on our website in the relevant data sheets.**
•	Maximum operating pressure	**Specific values can be found on our website in the relevant data sheets.**
•	Pressure drop at maximum flowrate	0.2 ÷ 0.5 bar / 3 ÷ 7 PSI (according to the model)

7   GUARANTEE TERMS

1. ARAG s.r.l. guarantees this apparatus for a period of 360 days (1 year) from the date of sale to the client user (date of the goods delivery note).
   The components of the apparatus, that in the unappealable opinion of ARAG are faulty due to an original defect in the material or production process, will be repaired or replaced free of charge at the nearest Assistance Center operating at the moment the request for intervention is made.
   The following costs are excluded:
   - disassembly and reassembly of the apparatus from the original system;
   - transport of the apparatus to the Assistance Center.

2. The following are not covered by the guarantee:
   - damage caused by transport (scratches, dents and similar);
   - damage due to incorrect installation or to faults originating from insufficient or inadequate characteristics of the electrical system, or to alterations resulting from environmental, climatic or other conditions;
   - damage due to the use of unsuitable chemical products, for spraying, watering, crop sprayer or any other crop treatment, that may damage the apparatus;
   - malfunctioning caused by negligence, mishandling, lack of know how, repairs or modifications carried out by unauthorized personnel;
   - incorrect installation and regulation;
   - damage or malfunction caused by the lack of ordinary maintenance, such as cleaning of filters, nozzles, etc.;
   - anything that can be considered to be normal wear and tear.

3. Repairing the apparatus will be carried out within time limits compatible with the organizational needs of the Assistance Center.
   No guarantee conditions will be recognized for those units or components that have not been previously washed and cleaned to remove residue of the products used;

4. Repairs carried out under guarantee are guaranteed for one year (360 days) from the replacement or repair date.

5. ARAG will not recognize any further expressed or intended guarantees, apart from those listed here.
   No representative or retailer is authorized to take on any other responsibility relative to ARAG products.
   The period of the guarantees recognized by law, including the commercial guarantees and allowances for special purposes are limited, in length of time, to the validities given here.
   In no case will ARAG recognize loss of profits, either direct, indirect, special or subsequent to any damage.

6. The parts replaced under guarantee remain the property of ARAG.

7. All safety information present in the sales documents regarding limits in use, performance and product characteristics must be transferred to the end user as a responsibility of the purchaser.

8. Any controversy must be presented to the Reggio Emilia Law Court.

8   END-OF-LIFE DISPOSAL

INFORMATION TO USERS OF PROFESSIONAL EQUIPMENT

Pursuant to Art.26 of Italian Legislative Decree 49 of 2014, "Implementation of Directive 2012/19/EU on waste electrical and electronic equipment (WEEE)

The crossed-out wheeled bin symbol on the equipment or on its packaging indicates that the product must be collected separately from other waste to allow proper treatment and recycling at the end of its useful life.
Appropriate separate collection for subsequent recycling, treatment and environmentally compatible disposal of the scrapped equipment helps to avoid possible negative effects on the environment and health, and promotes the reuse and/or recycling of the materials that make up the equipment.
Unauthorized disposal of the product by the user results in the application of the sanctions provided for by current legislation.

ARAG S.r.l. - WEEE identification no.: IT11080000007284 - has chosen to join a Collective System that guarantees the correct treatment and recovery of WEEE and the promotion of policies for environmental protection.

9   DECLARATION OF CONFORMITY

The declaration of conformity is available at the website www.aragnet.com, in the relevant section.

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A Nordson Company