

*orion***3**


ELECTROMAGNETIC FLOWMETER

CE

4620XX

INSTALLATION, USE AND MAINTENANCE

 = Generic danger

 = Warning

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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 section of this manual dedicated to the installation contains information for installers. For this reason, we used technical terms without providing explanations which would be necessary for end users only.

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

• RESPONSIBILITIES

The installer must carry out "workmanlike" installations and ensure to the end user the perfect operation of the whole system both with ARAG components only and other brands' components.

ARAG always 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 because of what stated above, no direct or indirect warranty will be provided.

1 RISKS AND PROTECTIONS

All installation works must be done with battery disconnected, using suitable tools and any individual 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.

2 PRODUCT DESCRIPTION

The electromagnetic flowmeter Orion 3 is a device which allows measuring the quantity of liquid flowing through it.

Based on an electromagnetic measuring principle (there are no moving mechanical parts inside), the flowmeter provides the computer with a signal proportional to the flow of the liquid passing through it.

Several flowmeters can be connected via the CAN-Bus port: in this case, all data relating to the measured flowrate will be transmitted via CAN-Bus.

3 INTENDED USE

This device is designed to work on agricultural machinery for spraying and crop spraying applications.

The machine is designed and built in compliance with EN ISO 14982 standard (Electromagnetic compatibility - Forestry and farming machines), harmonized with EMC - 2014/30/EU Directive.



THE FLOWMETER MUST NOT BE USED TO MEASURE THE PASSAGE OF HYDROCARBONS, FLAMMABLE, EXPLOSIVE OR TOXIC LIQUIDS. THE FLOWMETER IS NOT SUITABLE FOR CONTACT WITH LIQUIDS FOR HUMAN CONSUMPTION. IT MUST NOT BE USED FOR DIRECT SALES COMMERCIAL TRANSACTIONS NOR FOR INDUSTRIAL PURPOSES.

4 PRECAUTIONS

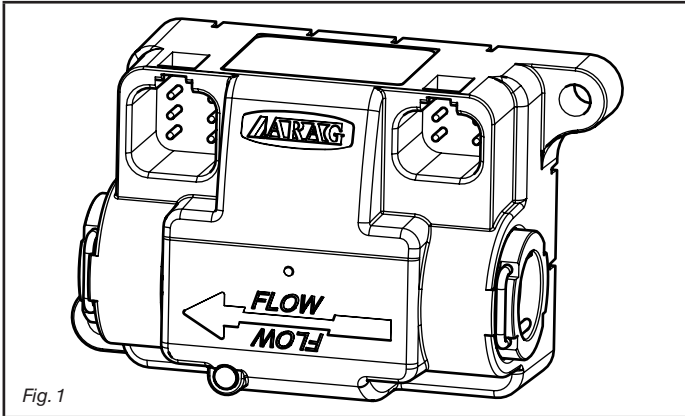


- Do not place the equipment under pressurized water.
- Do not use solvents or fuel to clean the case outer surface.
- Do not clean equipment with direct water jets.
- Comply with the specified power voltage (12 VDC).
- In case of voltaic arc welding, remove connectors from the device and disconnect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

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 this product is installed.

5 PACKAGE CONTENT



The package includes: Orion 3 including no. 2 T1 connection forks for completion fittings.

- TO BE ORDERED SEPARATELY:**
- FITTINGS
 - CONNECTION CABLES
 - FIXING SCREWS

6 INSTALLATION

6.1 Size (mm / inch)

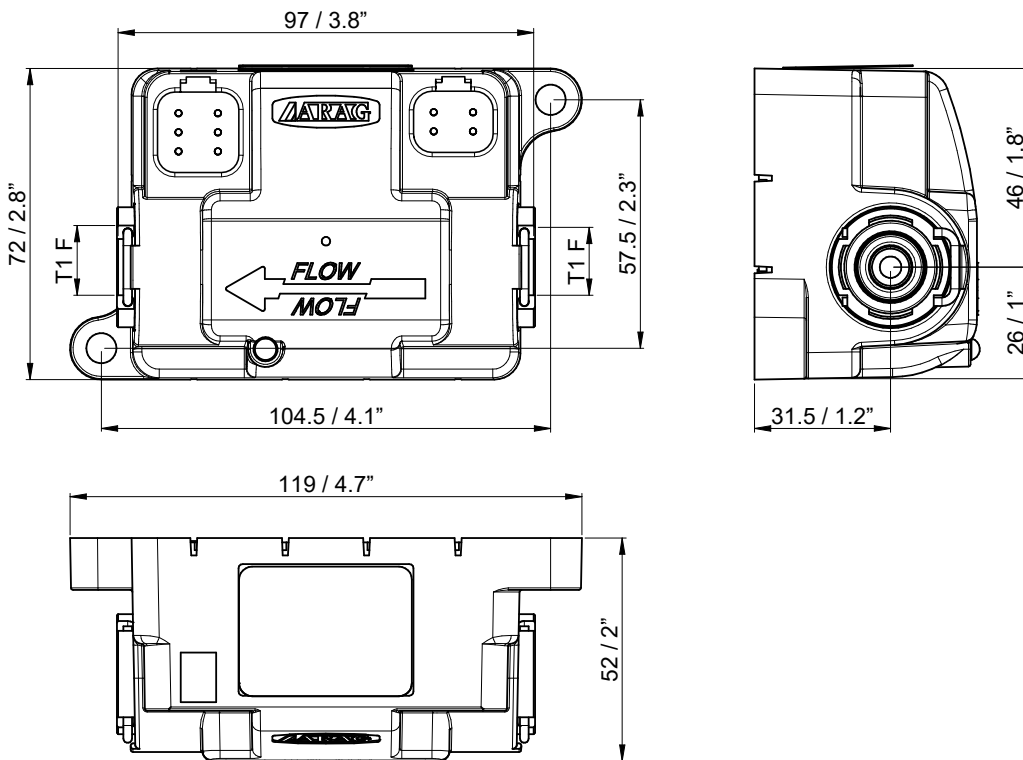


Fig. 2

6.2 Position on farming machine

The flowmeter can be installed either horizontally or vertically.

- ⚠ - **AVOID CONTACTS BETWEEN EXPOSED METAL PARTS AND GROUND (FRAME).**
- Install the device avoiding exposure to direct sunlight.
- Avoid installation in the vicinity of sources of strong magnetic fields.
- Do NOT install the device in areas where it would be subjected to excessive vibrations or shocks, to prevent any damage or accidental use of the control keys.
- Install the flowmeter at a distance of at least 20 cm / 7.9" from the elements that could cause turbulence, partial filling or vacuum inside the pipe (valves, bends, bottlenecks, etc.).
- **AVOID GRAVITY DRAIN.**
- Install the device in a visible position within easy reach by hand; bear in mind that it should not obstruct the operator's freedom of movement or block his/her view.
- Consider all necessary connections of the device, the cable length, and make sure there is enough space for connectors and cables.

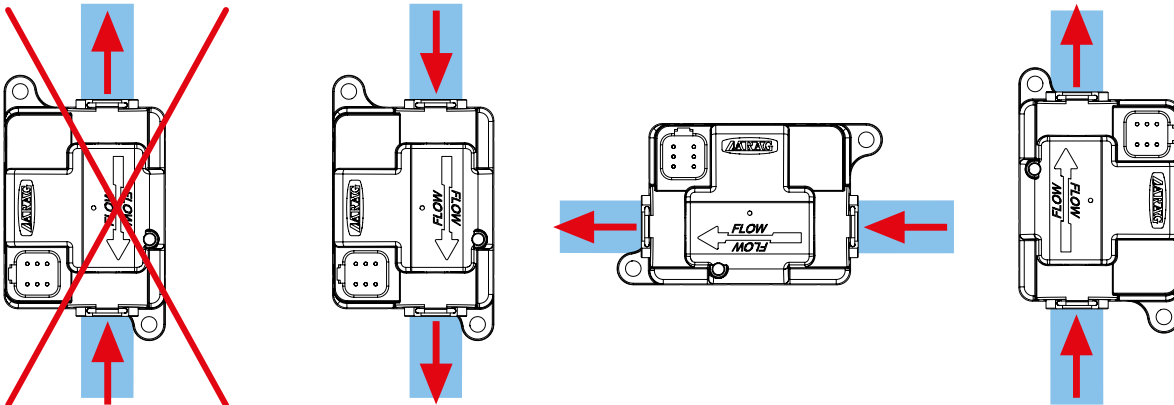


Fig. 3

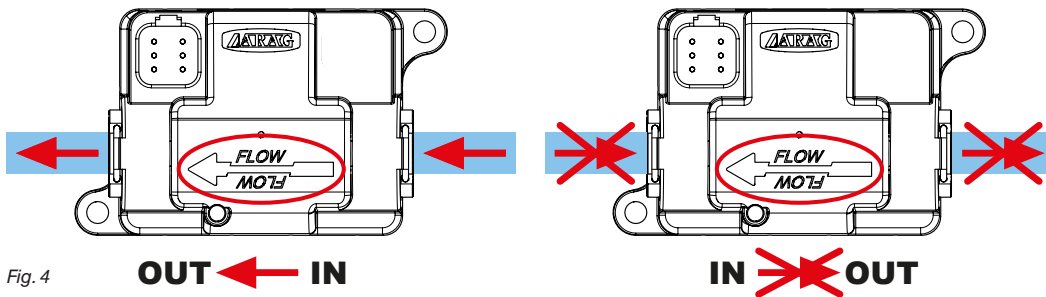


Fig. 4

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

- ✋ It is suggested to position the flowmeter so that the electrodes do not remain at the bottom, to avoid:
 - the effect of any air bubbles in the circuit;
 - that any deposits of material suspended in the liquid may settle on one of the electrodes, thus altering the measurement.

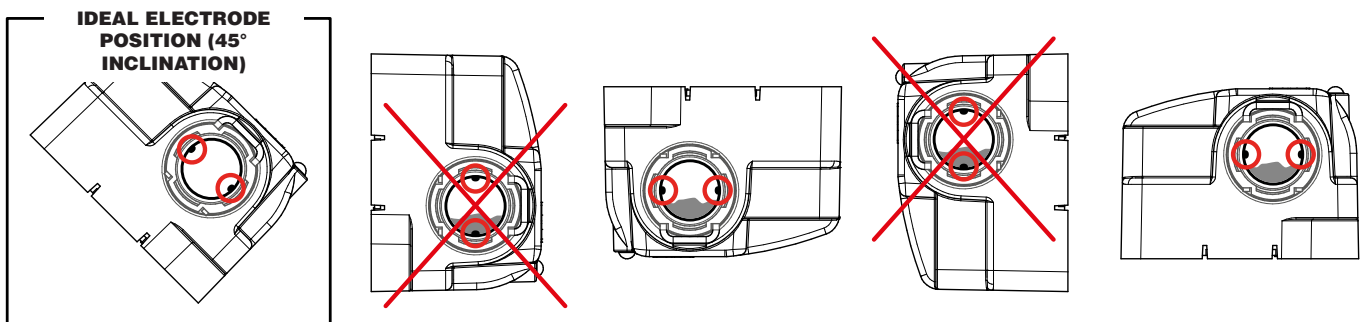


Fig. 5

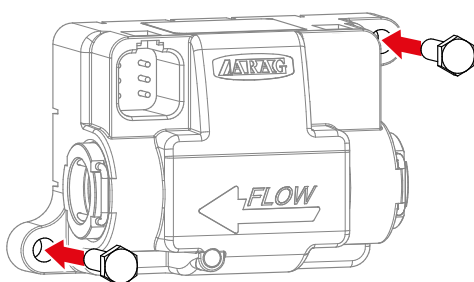


Fig. 6

- Secure the flowmeter by means of 2 M6 (or 1/4 UN) screws, using the fastening points integrated in the body (Fig. 6).

7 HYDRAULIC CONNECTIONS

7.1 General warnings

- Use ONLY ARAG fittings or accessories with T1 male fork coupling and relevant O-rings for proper flowmeter sealing (Ref. ARAG General Catalog).
- Do not use curved fittings.
- 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.
- Avoid bottlenecks or twists before the fittings and on pipes.
- Do not use the flowmeter at pressure values higher than the ones indicated in the technical specifications.
- 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.

7.2 Hydraulic connections

Connect the flowmeter inlet and outlet pipes, using suitable connectors.



- Take special care, where requested, to insert the O-ring correctly. If, for any reason, the pipes leak at connection points, apply unsintered PTFE tape to improve sealing.
- Upstream and downstream the flowmeter it is recommended to install a pipe straight line whose length is at least 5 times the inner diameter of Orion 3 (Fig. 7). Install the flowmeter far from the elements that could cause turbulence inside the pipe (valves, bends, bottlenecks, etc.).

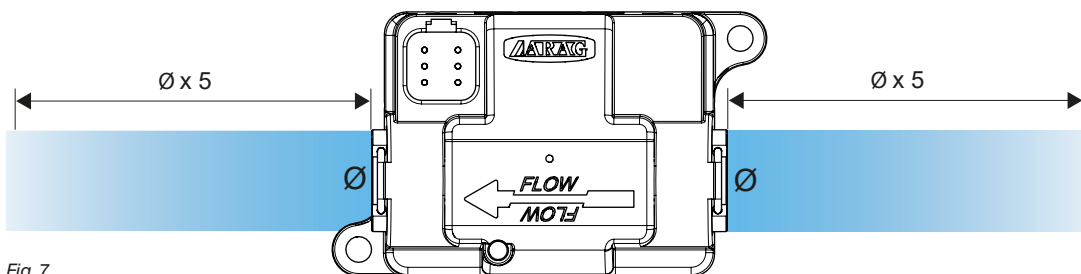


Fig. 7

8 ELECTRICAL CONNECTIONS

8.1 General precautions for a correct harness position

• Securing the cables:

- secure the harness so that it does not interfere with moving parts;
- route the harnesses so that they cannot be damaged or broken by machine movements or twisting.

• Fitting the cables to the connection points:

- Do not force the connectors by pushing too hard or bending them: the contacts may be damaged and device operation may be compromised.



• In case of voltaic arc welding, remove connectors from the device and disconnect the power cables.

Orion 3 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.



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.

Connect the harness to the relevant connector; after ensuring the correct connection, press it until blocked.

Connectors must be inserted with special care in order not to damage the seal and by pressing them until hearing a click of the retaining tooth.

Ensure that the cables are not bent for the first 20 mm; if space is limited and you need to bend a cable, be sure not to bend it by less than 90° (Fig. 8).

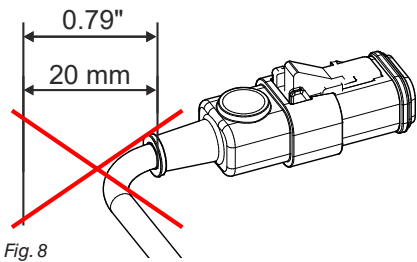


Fig. 8

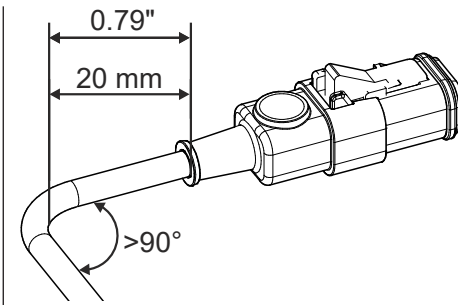


Fig. 9

8.2 Wiring harness connection

NO.	CONNECTION POINTS
1	Power supply, CAN-Bus port, signals
2	Valve control (only PLUS model)

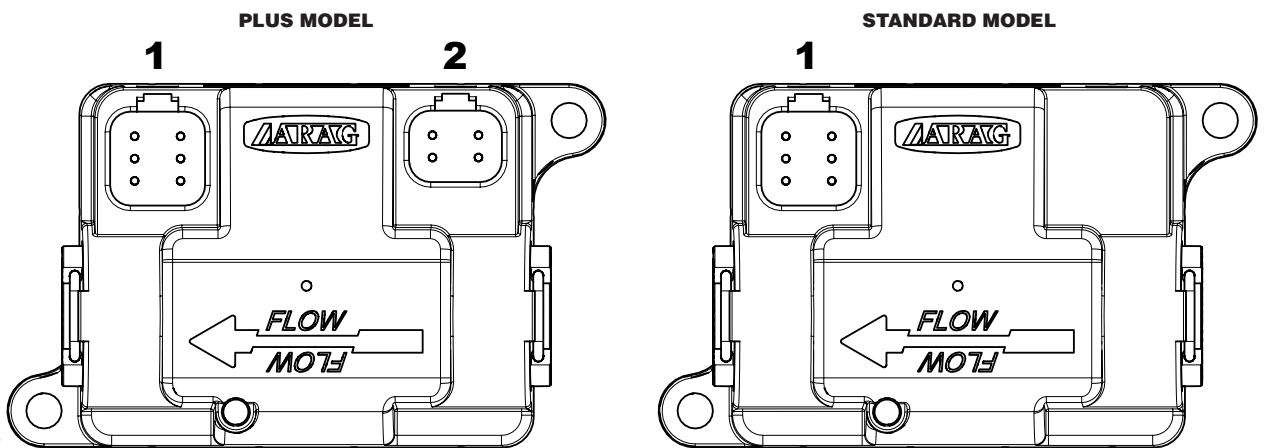


Fig. 10



The technical specifications of the connectors can be found in par. 11.9.

8.3 Connection by means of the CAN-bus line

Orion 3 can communicate the measured flowrate data via CAN-Bus.

The flowmeter is intended to be connected to ARAG devices (IBX100 ISOBUS MULTIFLOW) but can also be connected to third-party equipment as long as it is preset for using flowmeters of this type.

8.4 Connection for flowrate reading via frequency output

It is possible to read the flowrate measured by the Orion 3 flowmeter via the frequency output. To read the data, simply connect as shown in the figure.

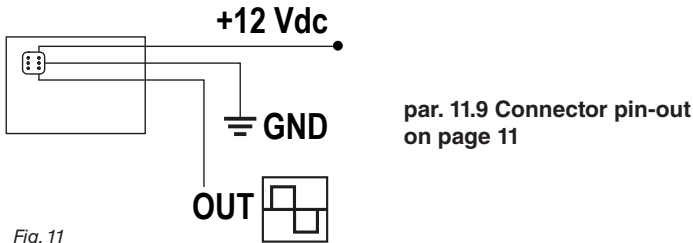


Fig. 11

Before use, set a constant flowmeter value on the device to which Orion 3 will be connected: refer to the label **A** on the body. The value is typical for each model, example **B** Fig. 12.

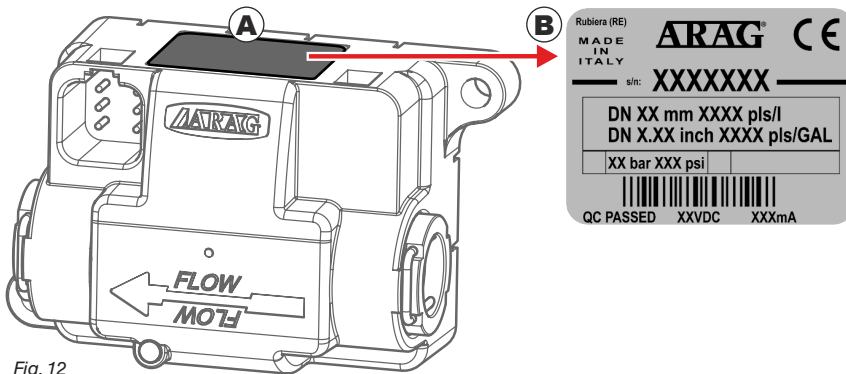


Fig. 12



For any reference on constant setting modes, refer to the use and maintenance manual provided with the device used.

8.5 Power supply connection



WARNING:

- The power circuit shall ALWAYS be protected by a 1 A fuse like the ones for automotive applications.
- Use cables with suitable terminals ensuring correct connection of all wires.
- Directly connect the power cable to the key-on power supply (15/54) or to a utility capable of delivering the required current.

WARNING, CAUTION:

the power supply line must feature a pulse suppressor limiting voltage to 58V (ISO 16750-2: 2012). Should this not be the case, the device control electronics could get damaged!

9 USE

• Reading via frequency output

While the system is in use, the flowmeter sends pulses to the computer, which, based on the previously set constant value, will indicate the instantaneous flowrate. A status LED indicates the operating status of the device.

• Reading via CAN-Bus output

Several flowmeters can be connected via the CAN-Bus port (par. 8.3 Connection by means of the CAN-bus line on page 8): in this case all information relating to the measured flowrate will be transmitted via CAN-Bus.

PLUS Model: Orion 3 can control a valve to manage the output flowrate.

9.1 Precautions



- Orion 3 flowmeter can detect the passage of conductive liquids with a conductivity equal to or higher than 10 µS/cm.
 - Avoid partial filling or vacuum creation in the measuring pipe.
 - Use the flowmeter only within the flowrate limits indicated in the “Technical data” table (chap.11 on page 11). Outside this range, the flowmeter may provide incorrect data, thus misleading the operator or the automatic system.
- ARAG cannot be held responsible for any damage caused to persons, animals or property resulting from the incorrect or unintended use of the flowmeter or its parts.**

9.2 LED operation

The status LED indicates the operating status of the device.

At start-up, during the first 5 seconds, Orion 3 displays its configuration regardless of the presence of an alarm (green LED flashing).

Each type of blinking corresponds to a signal, as indicated in table:

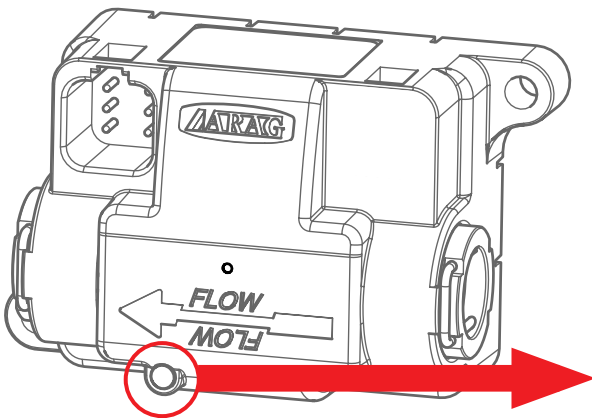


Fig. 13

	OFF	The flowmeter is not powered.
	GREEN FLASHER	The flowmeter is waiting to acquire an address on the CAN line to which it is connected.
	GREEN STEADY ON	Presence of STILL liquid inside the flowmeter.
	BLUE STEADY ON	The flowmeter is reading the passage of the liquid inside.
	VIOLET STEADY ON	No liquid has been detected inside the flowmeter.
	WHITE STEADY ON	Cleaning of the reading electrodes in progress.
	RED FLASHER	The error codes are indicated through blinks, which are described in the table on page 10.
	RED STEADY ON	SEVERE ERROR: contact a service center.
	ORANGE BLINKING	Device in bootloader mode for firmware upgrade.
	ORANGE STEADY ON	Device in bootloader mode.

Signals that can be managed are described in par. 10.2 on page 10.

10 MAINTENANCE / DIAGNOSTICS / REPAIRS



- Clean only with a soft wet cloth.
- Do not use aggressive detergents or products.
- Do not clean equipment with direct water jets.
- Do not use metal or abrasive objects to clean the pipe.
- Do not use solvents or fuel to clean the case outer surface.
- At the end of each spraying, let clean water flow inside the pipe.
- In case of malfunction, and, in any case, at the end of every season, clean the flowmeter pipe with a special detergent.

10.1 Cleaning the electronics of the reading sensors

This procedure is recommended when significant deviations are detected on the volume of liquid measured by the instrument. The function can only be activated via CAN-Bus messages. Before using the device again after the procedure, wait five minutes with still liquid inside the pipe.










During cleaning, the device does NOT take any measurements.

10.2 Errors, Troubleshooting



If two or more alarms are present at the same time (RED BLINKING LED), the highest priority error code is displayed (corresponding to the lowest number of blinks).

Problem	LED status	Number of blinks	Cause	Remedy	
No flowrate measurement	Off 	---	No power supply.	Check the connections and the harnesses.	
		---		Replace the cable. If the problem persists, contact your nearest Service Center.	
		---	Voltage is below the minimum permitted value.	Check the power supply voltage and restore the correct value.	
	Green steady on 	---	Flowrate is below the minimum measurable value	Check that the liquid passes through the flowmeter and that the flowrate is above the minimum measurable value.	
		Blue steady on 	---	The CAN-Bus address assigned is wrong.	Repeat the address assignment procedure. Check daisy chain connection (par. 8.3 on page 8).
			---	The CAN-Bus network harness is not suitable.	Make sure that the harness structure complies with CAN-Bus SAE J1939 (par. 8.3 on page 8). Check for the presence and conditions of terminating resistors (par. 8.3 on page 8).
			--	Wrong setup.	Check the flowmeter constant set on the computer connected to the frequency outputs (chap. 8.4 on page 8).
			--	Wrong communication speed	Check the communication speed of the devices connected to the CAN-Bus network: the communication speed of all devices must be the same.
		Violet steady on 	---	Orion 3 does not detect the presence of liquid inside pipe.	Make sure that there is liquid inside the flowmeter.
			---		Make sure that liquid conductivity is higher than the one stated in the technical specifications.
	White steady on 	---	Orion 3 is cleaning the sensors and cannot measure the flowrate.	Turn the flowmeter off and on again to restart the measurement.	
	Red blinking 	2	Hardware error.	Contact an ARAG authorized Service Center.	
		4	Corrupted calibration data.	Contact an ARAG authorized Service Center to check data integrity and to restore correct operation.	
5		Power supply voltage too high or too low.	Check the power supply voltage and restore the correct value.		
6		Unstable reading.	Check that the flow is normal and make sure to have complied with the hydraulic connection instructions (position, pipe dimensions, straight sections before and after the flowmeter, etc.). Check the liquid conductivity.		
8		Memory initialization error.	Contact an ARAG authorized Service Center.		
9		Maintenance required	Contact an ARAG authorized Service Center.		
Unstable measurement	Blue steady on 	---	Wrong installation.	Check that the flow is normal and make sure to have complied with the hydraulic connection instructions (position, pipe dimensions, straight sections before and after the flowmeter, etc.). Check the liquid conductivity.	
The measured flowrate does not correspond to the actual one		---	The measuring pipe shows chemical deposits.	Fill the pipe with clean water and activate the electrode cleaning procedure for at least 8 hours. Clean with a soft cloth and denatured ethyl alcohol.	
		---	Flowrate below the minimum set threshold.	Check that the actual flowrate is within the set range. Check the set values.	
		---	Flowrate above the maximum set threshold.		

11 TECHNICAL DATA

11.1 Performance

Accuracy 5% @ on reading / 1% @ on full scale
 Maximum pressure 10 bar - 145 PSI
 Flowrate (according to models).....

46203E	46204E	0.15 ÷ 6 l/min / 0.04 ÷ 1.6 US GPM
46203G	46204G	0.3 ÷ 12 l/min / 0.08 ÷ 3.17 US GPM
462031	462041	1 ÷ 40 l/min / 0.26 ÷ 10.5 US GPM
462032	462042	2 ÷ 80 l/min / 0.52 ÷ 21 US GPM

Pressure drop (according to models)

46203E	46204E	0.5 bar@3.5 l/min - 1.7 PSI@0.9 US GPM 1.5 bar@6 l/min - 22 PSI@1.6 US GPM
46203G	46204G	0.5 bar@7 l/min - 1.7 PSI@1.8 US GPM 1.5 bar@12 l/min - 22 PSI@3.17 US GPM
462031	462041	0.5 bar@23 l/min - 7 PSI@6 US GPM 1.45 bar@40 l/min - 21 PSI@10.5 US GPM
462032	462042	0.5 bar@50 l/min - 7 PSI@13 US GPM 1.3 bar@80 l/min - 19 PSI@21 US GPM

Cut-off (according to models).....

46203E	46204E	0.03 l/m / 0.008 US GPM
46203G	46204G	0.06 l/m / 0.015 US GPM
462031	462041	0.2 l/m / 0.053 US GPM
462032	462042	0.5 l/m / 0.13 US GPM

No. 1 status LED Yes (RGB)

11.2 Electrical features

Power supply..... 9 ÷ 16 Vdc
 Maximum power absorption..... 0.3 A (excluding power channel of PLUS models)
 Electrical conductivity 50 µS/cm
 Protection against polarity inversion..... Yes
 Protection against short-circuit..... Yes

11.3 Power outputs

Output channels..... no. 2
 Current for each channel 2.5 A

11.4 Pulse outputs

No. 1 frequency output..... NPN 2000 Hz
 Flowmeter constant (according to models)

46203E	46204E	20000 pls/l - 75708 pls/US GAL
46203G	46204G	10000 pls/l - 37854 pls/US GAL
462031	462041	3000 pls/l - 11356 pls/US GAL
462032	462042	1200 pls/l - 4245 pls/US GAL

11.5 CAN-Bus port

Protocol CAN-Bus SAE J1939

11.6 Environmental features

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

11.7 Physical features

Internal passage (according to models).....

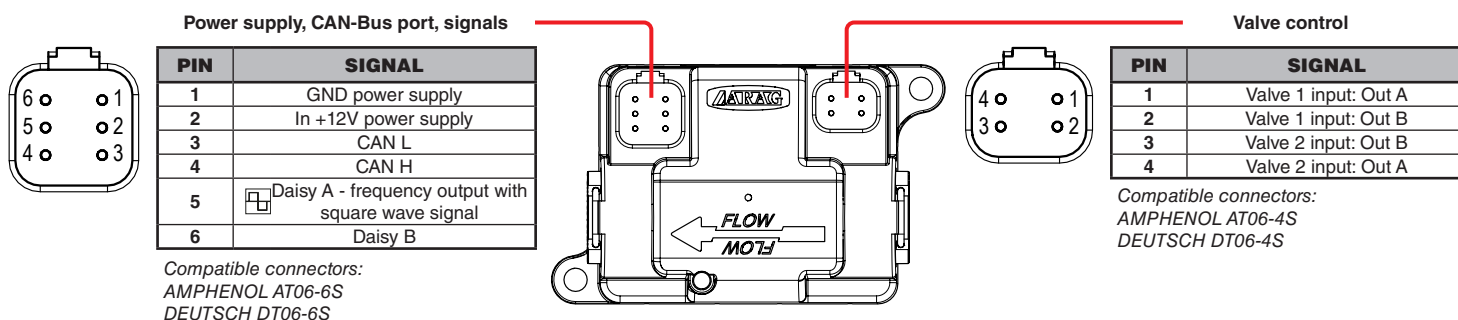
46203E	46204E	DN3
46203G	46204G	DN4
462031	462041	DN7
462032	462042	DN10

Weight..... 515 g / 18.2 oz
 Coupling..... T1 F AISI316 fork type

11.8 Materials

Sensors..... Stainless steel AISI 316
 Rings..... Stainless steel AISI 316
 Body..... PA6 reinforced with fiberglass
 Internal pipe fiberglass reinforced PP
 Seals..... FPM
 Inner material..... PU314 resin + PH114 hardener

11.9 Connector pin-out



12 END-OF-LIFE DISPOSAL

Dispose of the system in compliance with the established legislation in the country of use.

13 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, weedkilling 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.

*Only use genuine ARAG accessories or spare parts to make sure manufacturer guaranteed safety conditions are maintained in time.
Always refer to the Internet address www.aragnet.com*

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