



ELECTROMAGNETIC FLOWMETER



46211PXXXXX
46221PXXXXX

INSTALLATION, USE AND MAINTENANCE



= Generic danger



= Warning

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• **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 2+ is a device which allows measuring the quantity of liquid flowing through it.

Through electromagnetic measurement, the flowmeter (which features no moving mechanical parts) sends to the computer a signal that is proportional to the flow of fluid passing through it. The value of the flowrate displayed will be calculated according to the value received by the flowmeter and the value of the flowmeter constant previously set.

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 FOOD LIQUIDS OR FOR MEASURING CLEAN COLD OR HOT WATER FOR THE PURPOSES OF DIRECT SALES TRANSACTIONS.

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 2+(Ref. ARAG general catalog);
- Models with fork coupling: no. 2 T5/T6 coupling forks for completion fittings are included.

TO BE ORDERED SEPARATELY:

- FITTINGS
- CONNECTION CABLES
- FIXING SCREWS
- ASSEMBLY KIT (FLANGED MODELS)

FLANGED COUPLING

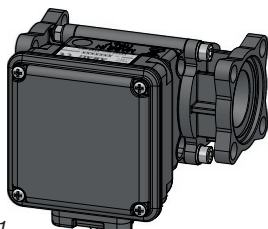


Fig. 1

FORK COUPLING

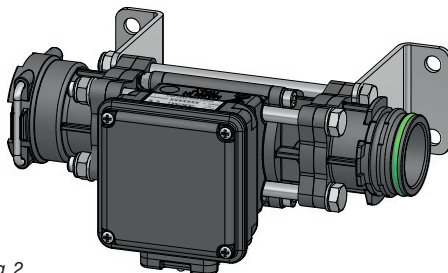
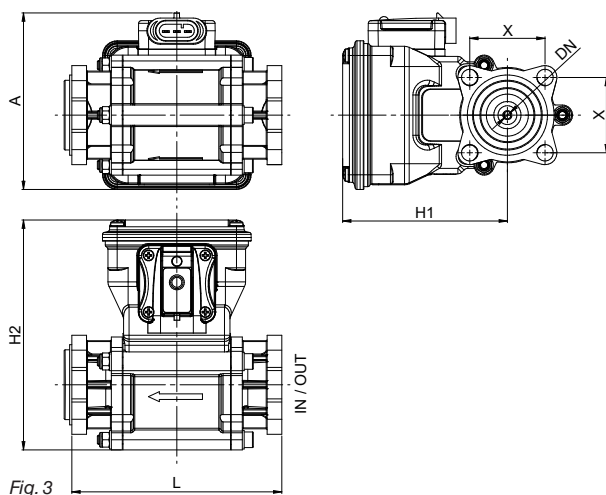


Fig. 2

6 INSTALLATION

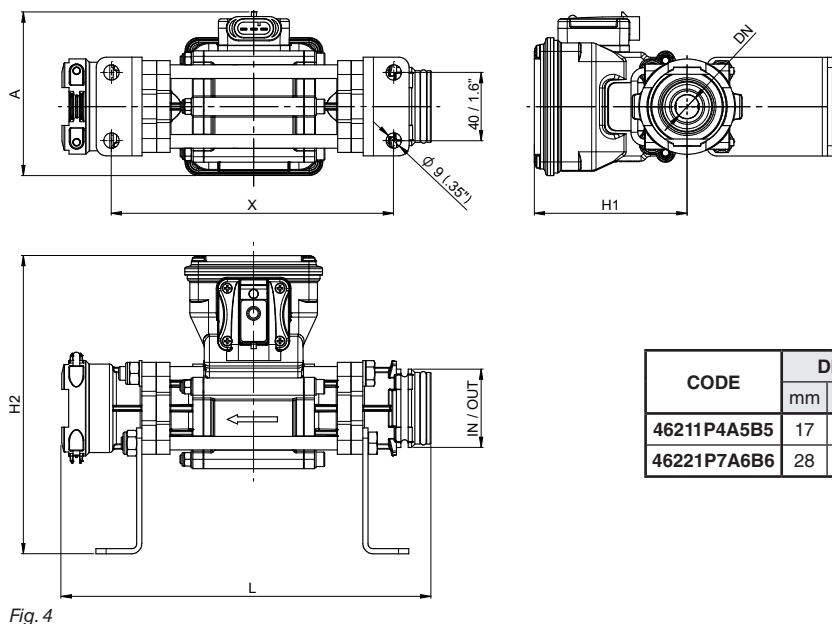
6.1 Size (mm / inch)

FLANGED COUPLING



CODE	DN		IN / OUT	A		H1		H2		L		X	
	mm	in		mm	in	mm	in	mm	in	mm	in	mm	in
46211P10000	7	0.28"	463 / 863	96.2	3.8"	89.8	3.5"	125.3	4.9"	114	4.5"	41	1.6"
46211P40000	17	0.67"	463 / 863	96.2	3.8"	89.8	3.5"	125.3	4.9"	114	4.5"	41	1.6"
46221P70000	28	1.1"	473 / 873	96.2	3.8"	89.8	3.5"	127.3	5"	114	4.5"	45	1.8"

FORK COUPLING



CODE	DN		IN / OUT	A		H1		H2		L		X	
	mm	in		mm	in	mm	in	mm	in	mm	in	mm	in
46211P4A5B5	17	0.67"	T5 M/F	96.2	3.8"	89.8	3.5"	175.3	6.9"	217	8.5"	166	6.5"
46221P7A6B6	28	1.1"	T6 M/F	96.2	3.8"	89.8	3.5"	179.3	7.1"	234	9.2"	167	6.6"

The images are for illustrative purposes only. Other models may differ in certain details while remaining the same size.

6.2 Position on farming machine

The flowmeter can be installed either horizontally or vertically. For a correct operation, respect the indicated installation directions.



- Install the flowmeter at a distance of at least 5 times the nominal diameter from elements that could cause turbulence, partial filling or vacuum inside the pipe (valves, bends, bottlenecks, etc.).
- Avoid installation in the vicinity of sources of strong magnetic fields.
- The device generates magnetic fields: reposition the devices in case of interference with other devices.
- Do NOT install the device in areas where it would be subjected to excessive vibrations or shocks to prevent any damage.
- Install the device in a visible position within easy reach by hand.
- Consider all necessary connections of the device, the cable length, and make sure there is enough space for connectors and cables.

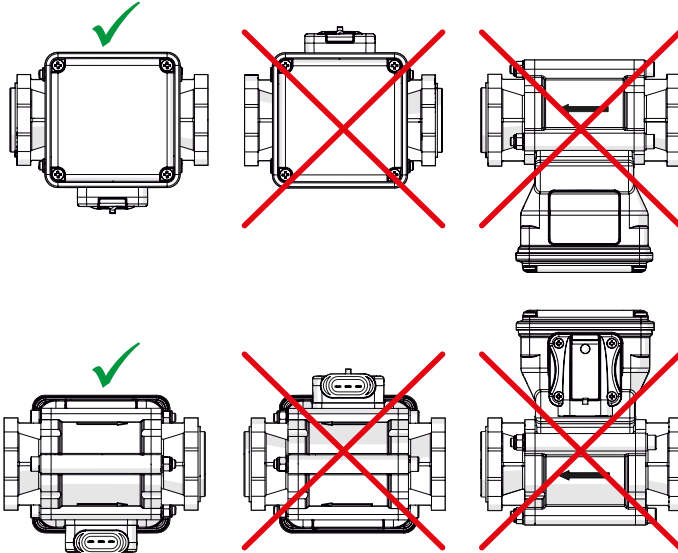


Fig. 5

HORIZONTAL ASSEMBLY



The connector must NEVER be aiming upwards.

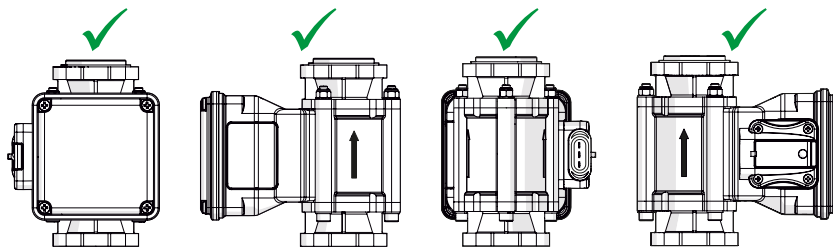


Fig. 6

VERTICAL ASSEMBLY

- Observe the correct **inlet-outlet direction of the liquid**, as indicated by the arrow printed on the flowmeter body (Fig. 7).

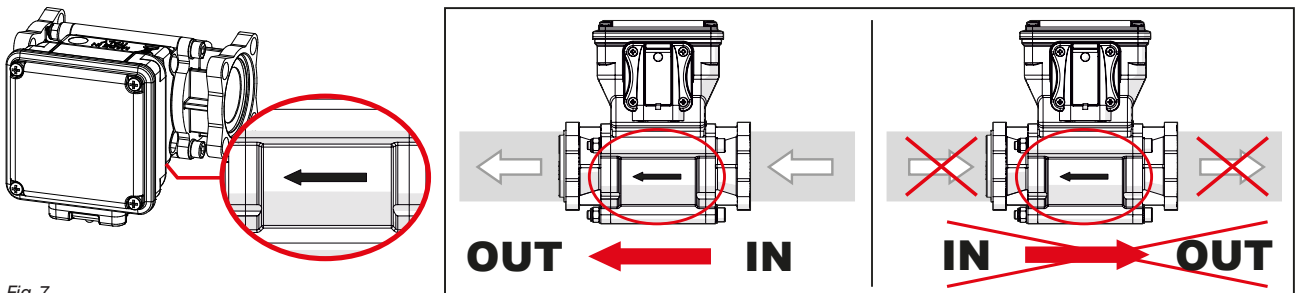


Fig. 7

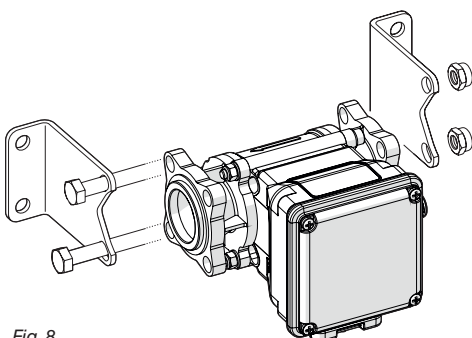


Fig. 8



FLANGED MODELS:

For proper sealing of the flowmeter, use **ONLY** the appropriate ARAG assembly kit (Fig. 8). Ref. ARAG general catalog.



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.

7 HYDRAULIC CONNECTIONS

7.1 General warnings



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.

- For proper sealing of the flowmeter, use **ONLY** ARAG accessories or 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

Use inlet and outlet pipes of the same diameter as the internal passages of the flowmeter; for any reference, consult the technical data. Connect the flowmeter inlet and outlet pipes, using suitable connectors.

Remember to position gaskets and O-rings correctly in the coupling seats, where required.

7.3 Hydraulic connections for control units

Orion 2+ flowmeters for integration into control units are available with both flanged and fork coupling.



WARNING: BEFORE INTEGRATING THE FLOWMETER INTO AN EXISTING UNIT, CHECK THAT THE OPERATING PRESSURE IS SUITABLE FOR THE CONTROL UNIT.

FLOWMETERS WITH FORK COUPLINGS CAN WITHSTAND A MAXIMUM PRESSURE OF 20 BAR.

ARAG is not liable for any damage to the equipment, persons, animals or objects caused by failure to observe the above instructions.

In standard configuration control units, the flowmeter is usually integrated between the control valve and the section valve unit (Fig. 10 and Fig. 12). This does not prevent the flowmeter from being installed at any other point in the unit. However, bear in mind that in different positions the flowmeter may read different values depending on the connected components. Liquid filtration is recommended.



In order to obtain a correct reading of the desired data, contact a dealer or installer for advice on the correct positioning of the flowmeter within the control unit.

FLANGED COUPLING INTEGRATION

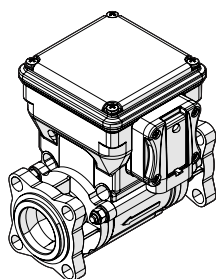


Fig. 9

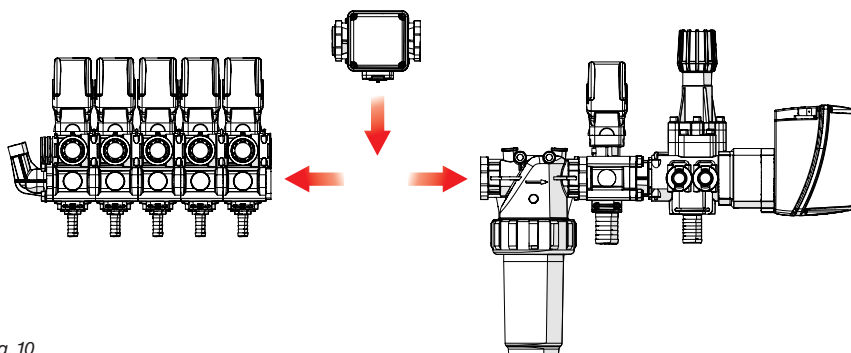


Fig. 10

If the flowmeter is to be integrated into an existing control unit, such as a type with tie rods, but previously configured without a flowmeter, please note that new tie rods will also need to be ordered in order to allow the unit to be rebuilt after the flowmeter has been incorporated (assembly kit, ref. ARAG general catalog).



Use ARAG tie rods ONLY. Should tie rods other than those specified be used, all forms of warranty shall be automatically void.

FORK COUPLING INTEGRATION

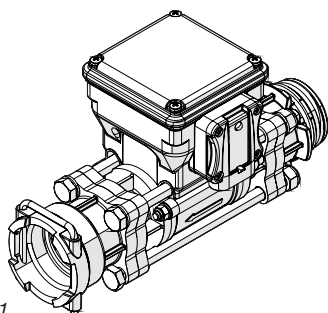


Fig. 11

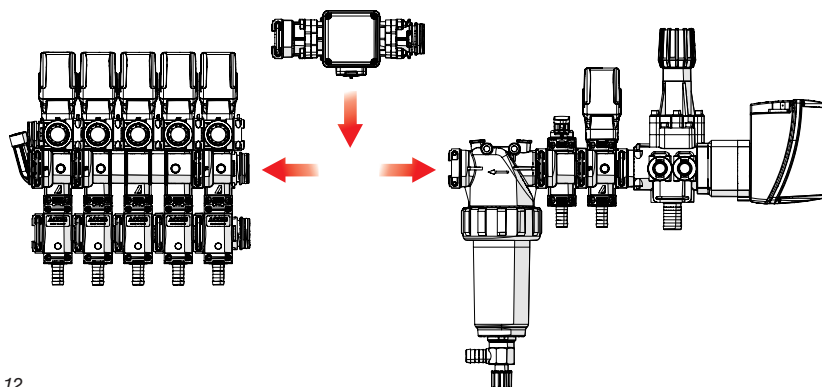


Fig. 12

Flowmeters with fork couplings do not require any additional accessories and can be inserted directly into the existing control unit, provided that they feature a corresponding fork coupling.

8 ELECTRICAL CONNECTIONS

8.1 Precautions

- **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.



- **Comply with the specified power voltage (12 VDC).**

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

- **If using the flowmeter without an ARAG device, protect the power supply line near the power source with a 500 mA slow-blow fuse.**

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.

8.2 Connection

Orion 2+ 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 with frequency reading.

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.



Fig. 13

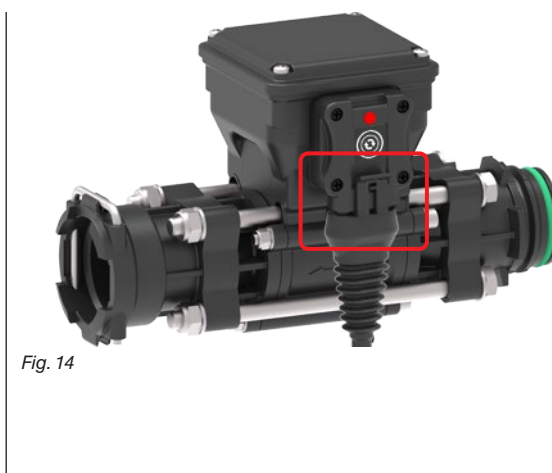


Fig. 14

The images are for illustrative purposes only. Other models may differ in certain details while leaving the connection unchanged.

9 PRELIMINARY SETUP FOR USE

Before use, set a constant flowmeter value on the device to which Orion 2+ will be connected: refer to the label **A** on the body and to the "Technical data" table (Chap.12 on page 9).

The value is typical for each model, example **B** Fig. 15.

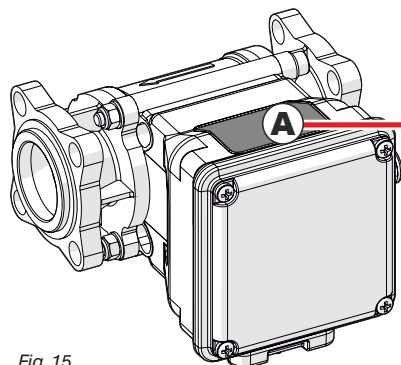


Fig. 15



This image is for illustrative purposes only.



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

10 USE

10.1 Precautions



- Orion 2+ flowmeter can detect the passage of conductive liquids with a conductivity equal to or higher than 50 $\mu\text{S}/\text{cm}$.
 - Do not place the equipment under pressurized water jets.
 - 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 the "Technical data" table (chap.12 on page 9). 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.

10.2 LED operation

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.

An LED on the connector housing indicates the operating status of the device (Fig. 10).

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

At start-up, during the first 5 seconds, Orion 2+ displays its configuration regardless of the presence of an alarm (green LED flashing).

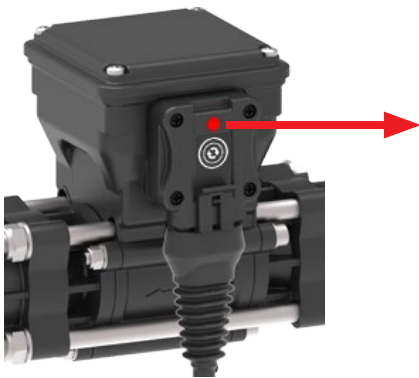


Fig. 16

	OFF	The flowmeter is not powered.
	RED STEADY ON WITH HIGH BRIGHTNESS	In the first second after it lights up: device start-up.
	RED STEADY ON WITH LOW BRIGHTNESS	The device is powered but does not detect liquid passage: • Presence of STILL liquid inside the flowmeter. • No liquid inside the flowmeter.
	RED BLINKING WITH HIGH BRIGHTNESS	The flowmeter is powered and is reading the passage of liquid inside it; the frequency of the intermittent signal is proportional to the flowrate.
	GREEN STEADY ON	Cleaning of the reading electrodes in progress.
	GREEN BLINKING alternated with RED BLINKING	Electrode cleaning active, but insufficient liquid level inside the pipe.

10.3 Self-cleaning function of reading sensors

The device has a function for electronic cleaning of the reading sensors.

This procedure is recommended when significant deviations are detected on the volume of liquid measured by the instrument.



- Do not start the self-cleaning procedure when the hydraulic circuit contains the product used for spraying.
- The flowmeter pipe must be full with the sensors completely immersed in water.
- To clean the pipe and sensors correctly, clean water must be present inside the pipe.

WARNING: IT IS RECOMMENDED TO USE APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT AND TO COMPLY WITH WASTE DISPOSAL PROCEDURES IN ACCORDANCE WITH THE REGULATIONS IN FORCE IN THE COUNTRY OF USE.



Fig. 17

- Press and hold the button on the connector (Fig. 17) for at least 5 seconds to start a cleaning cycle for the pipe and sensors. Pressing the button has no further effect during the electronic cleaning of the sensors.

- The time required to complete the cleaning cycle varies depending on the frequency of cleaning and the deviation found in the flowmeter measurement.

STANDARD CLEANING CYCLE, performed frequently: 15 minutes are required for complete cleaning.

INTENSIVE CLEANING CYCLE, for high levels of chemical residues: 90 minutes to complete the cycle.

- The cycle is interrupted only when the device is turned off.

- The running cleaning operation is indicated by specific flashes, described in paragraph 10.2 LED operation.



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.

11 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 or, if the flowmeter model allows it, perform a self-cleaning cycle (ref. to par. 10.3 on page 8).

11.1 Troubleshooting

PROBLEM	CAUSE	SOLUTION
The flowmeter does not read any value.	• No power supply.	• Check the harness of the flowmeter.
	• No flowrate. • Wrong calibration. • Unstable reading.	• Check the color of the status LED (par. 10.2). • Check the value of the flowmeter constant set on the device to which the flowmeter is connected.
The value read by the flowmeter is not linear or stable.	• 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.
	• Presence of turbulence or air in the circuit.	• Check the circuit.
	• The measuring pipe shows chemical deposits.	• Activate the electrode self-cleaning function (par. 10.3 on page 8).
At the end of the spraying treatment, the amount of liquid dispensed is less than expected: the measured flowrate does not match the actual flowrate.	• Wrong setup.	• Check the value of the flowmeter constant set on the device to which the flowmeter is connected.
	• The measuring pipe shows chemical deposits.	• Activate the electrode self-cleaning function (par. 10.3 on page 8).

12 TECHNICAL DATA

12.1 Available models



PART NO.	DN		IN - OUT Type	Flowrate		Pressure		Pressure drop		Flowmeter constant	
	mm	in		l/min	US GPM	bar	psi	bar	psi	pls/l	pls/gal
46211P10000	7	0.28"	863 - 463	0.2 ÷ 20	0.053 ÷ 5.3	40	580	0.3	4	3000	11355
46211P40000	17	0.67"	863 - 463	2 - 200	0.53 ÷ 53	40	580	0.4	6	300	1135
46221P70000	28	1.1"	873 - 473	8 ÷ 800	2.11 ÷ 211	20	290	0.4*	6*	75	284



PART NO.	DN		IN - OUT Type	Flowrate		Pressure		Pressure drop		Flowmeter constant	
	mm	in		l/min	US GPM	bar	psi	bar	psi	pls/l	pls/gal
46211P4A5B5	17	0.67"	T5 M/F	2 ÷ 200	0.53 ÷ 53	20	290	0.4	6	300	1135
46221P7A6B6	28	1.1"	T6 M/F	8 ÷ 800	2.11 ÷ 211	12	174	0.4*	6*	75	284

*In order to mitigate cavitation phenomena, which are responsible for sudden increases in pressure drop, it is necessary to ensure a minimum back pressure of 0.5 bar (7.3 psi) downstream of the flowmeter for flow rates exceeding 600 l/min (158.5 US GPM).

The images are for illustrative purposes only. Other models may differ in certain details while leaving the connection unchanged.

12.2 Performance

Accuracy	5% of the value read between 1/100 and 1/20 of the Full Scale
	1% of the value read between 1/20 and the Full Scale
Operating pressure	according to models: the maximum operating pressure varies depending on the type of connection
Flowrate	according to models
Pressure drop.....	according to models
No. 1 status LEDs	two-color red-green

12.3 Maximum operating pressure depending on connections

IN - OUT Type	Pressure	
	bar	psi
863 - 463	40	580
873 - 473	20	290
T3	20	290
T4	20	290
T5	20	290
T6	12	174
G 3/4" - G 1" brass	40	580
G 3/4" - G 1" PA6 + fiberglass	20	290
2"Std.port clamp type	10	145



Ensure that the operating pressure of the system does not exceed the limit specified for the type of connection used.

12.4 Electrical features

Power supply.....	10 ÷ 16 Vdc
Maximum absorption	300 mA
Liquid minimum conductivity.....	50 uS/cm
Protection against polarity inversion.....	Yes
Protection against short-circuit.....	Yes
No liquid detection system	Yes
Sensor electronic cleaning system.....	Yes

12.5 Pulse outputs

Flowmeter constant.....	(according to models)
-------------------------	-----------------------

12.6 Environmental features

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

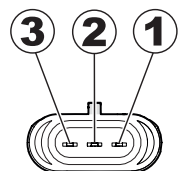
12.7 Physical features

Internal passage (DN).....	according to models
Weight.....	according to models
Coupling.....	Flanged
	Fork type

12.8 Materials

Body.....	PA6 reinforced with fiberglass
Inner pipe.....	PP reinforced with fiberglass / Nylon® / Brass / Polypropylene / Stainless Steel
Fittings	Stainless steel AISI 316
Measurement electrodes	Stainless steel AISI 316

12.9 Connector pin-out



COLOR	PIN	SIGNAL
Black	1	GND power supply
Red	2	In +12V power supply
Green	3	 Square wave signal

13 END-OF-LIFE DISPOSAL

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

14 GUARANTEE TERMS

Warranty conditions are available at www.aragnet.com, in the relevant TERMS AND CONDITIONS section.

15 EU DECLARATION OF CONFORMITY

The declaration of conformity is available on the website www.aragnet.com on the page relating to the product, in the download section.

*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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