General description

CO_2- pH-reglering, item no. 414800.

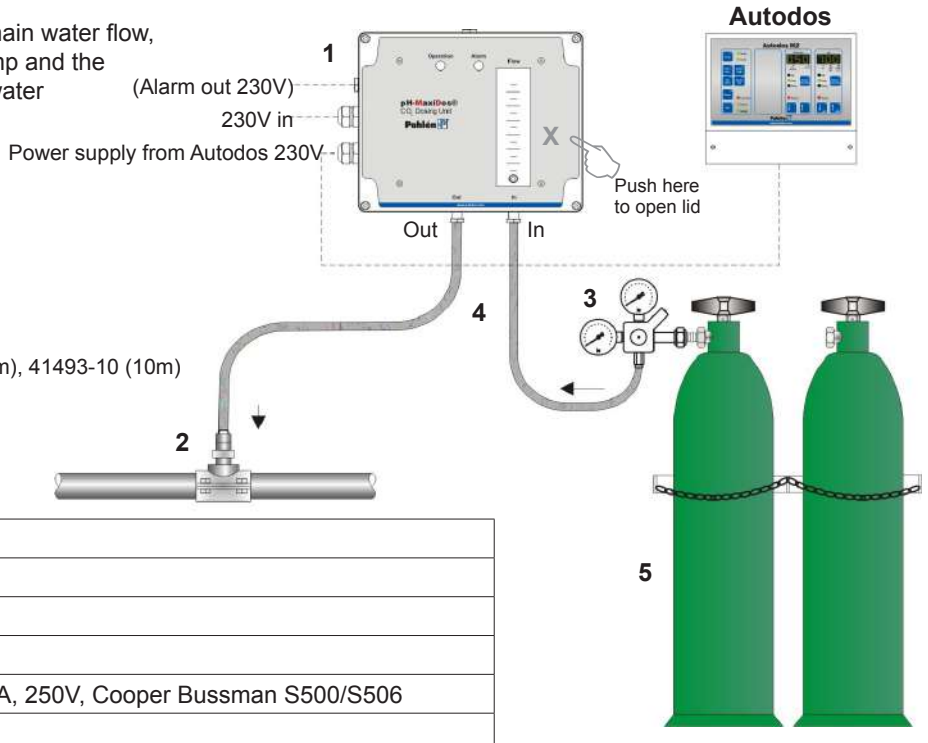
- Designed for pH regulation of pool water by the addition of carbon dioxide CO_2.
- The regulation shall be controlled as on/off over the pH-regulator Autodos.
- This product is for use indoors in a surrounding temperature of +5ºC to +40ºC.
- If the equipment is not used according to specification, the protection provided by the equipment may be impaired.
- The control unit consists of a flow meter with an integral needle valve for flow control, a 230V magnetic valve and all necessary electrical components for control and indication.
- The injector is a dosing valve including a check valve and has a sintered body for maximum gas dispersion, connection is by R½" outside thread. Connect to 6/8 mm hose.
- A regulator reducing to 6 bar must be assembled to the gas bottle.
- The steel gas bottles are available in a range of sizes from 10 to 30 kg (5 or 15 m³ gas). They contain liquid CO_2 which becomes gas during release. For certain installations a heater must be mounted before the regulator. (This depends upon placement and gas consumption etc.).
- Liquid CO_2 must not be injected directly into the equipment as this can damage the installation. CO_2 can also be supplied in packages of 240kg (120m³ gas). It is also possible to connect 2, 4 or 6 gas bottles into a package on site.
- The control unit has an alarm lamp which signals when pressure is low in the gas bottle. An external output (230V) makes it possible to connect an additional warning for low gas pressure, i.e. a light.
- The unit is designed for a maximum flow of 6,5 l/min CO_2 at 6 bar.

Installation

The equipment shall be installed by an authorized electrician and it shall be preceeded by an easy to reach all-pole switch, marked and certified according to the standard IEC 60947-1, IEC 60947-3 or similar.
Open the control box by loosen the four screws that hold the lid, push as shown in picture below.
It is important that the special metal-rubber gaskets are used on the high pressure side. (Included with the delivery).
The pressure line should use a semi-flexible pneumatic hose, dia. 8/6mm PN10, (10m included with the delivery).

Control unit The control unit should be mounted on a wall, placed so that its connections are vertical. CO_2 connections should be made as described above. The inflow to the unit is to the right and the outflow is to the left, (viewed from the front). The indicator lamp (green) is lit when power is applied and the magnetic valve is open. The gas flow is adjusted by the needle valve while the magnetic valve is open. The warning light (red) indicates a gas pressure too low.

Injector Place the injector into the main water flow, between the circulation pump and the filter and always after any water monitoring connections.

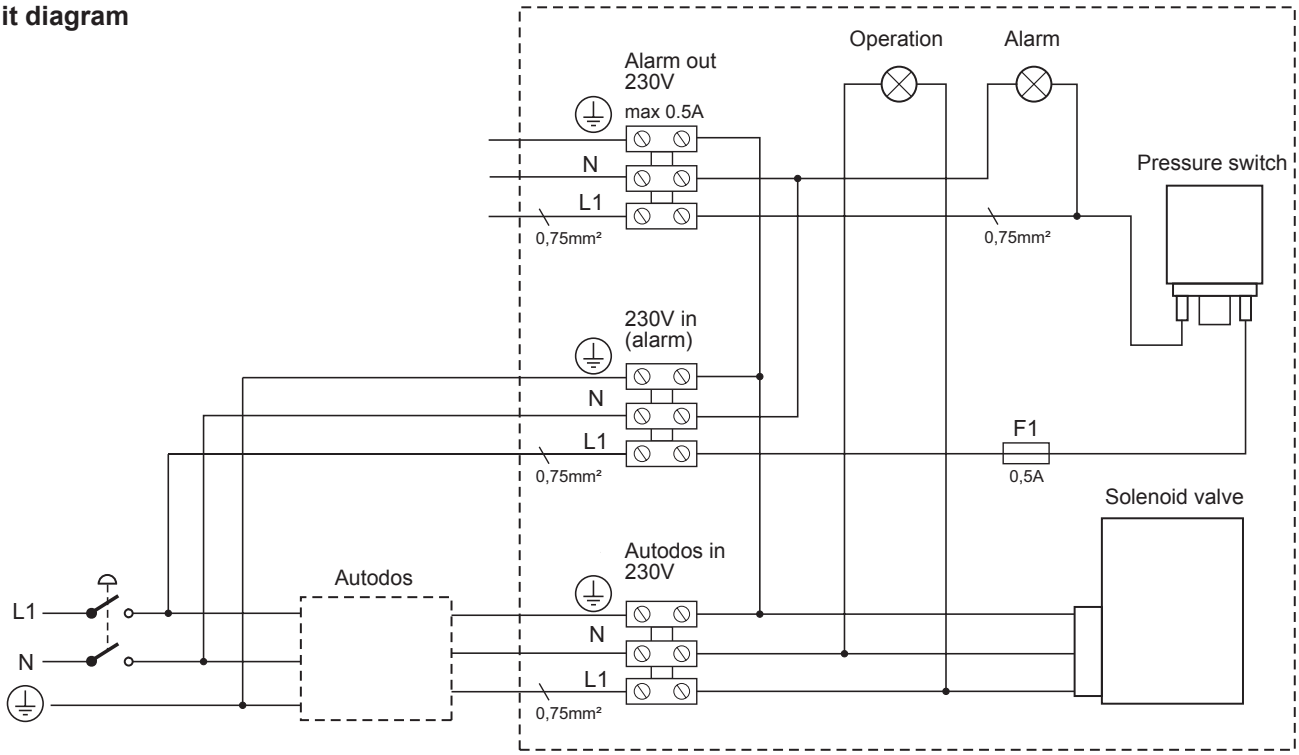


1. Control unit CO_2
2. Injector
3. Regulator
4. Pressure hose,
   item no. 41493-03 (3m), 41493-05 (5m), 41493-10 (10m)
5. Holder for gas tubes

Technical specification

Installation category	2
Voltage:	230V
Frequency:	50Hz
Power:	8VA
Built-in fuse:	T500mA, 250V, Cooper Bussman S500/S506
Protection class (control unit):	IP44
Pollution degree:	2
Size (control unit):	h190 x b240 x d110
Weight:	1,53 kg
Alarm level:	<1,4 bar (gas flow less than 3 liter/minute)

Circuit diagram



Operation

Start up

- Connect a fully charged gas bottle and open the bottle valve fully.
- Open the magnetic valve by setting the pH monitor to manual dosing.
- Regulate the CO_2 flow to about half the full capacity by means of the needle valve on the flow meter.
- Reset the pH meter to automatic dosing.
- Use the needle valve to regulate the flow according to requirements, when the magnetic valve is in the open position.

If there is no gas flow, check that

- the bottle contains gas and that the valve is open.
- the control unit is supplied with 230V from the pH monitor.
- the dosing pipes are not blocked.
- the injector is functioning correctly.

Changing gas bottle

- Close the gas bottle valve.
- Always inspect the seals when changing bottles.
- Damaged or worn seals must always be replaced.

Safety

Carbon dioxide

- All staff involved should have a knowledge and understanding of CO_2.

Staff safety

- Control that all areas where CO_2 may be dispersed or accumulated are adequately ventilated.

Safety during maintenance

- Before any work is carried out, ensure that the system is completely closed down.

Maintenance

Control unit

- This does not require any routine maintenance but the gas inlets and outlets should regularly be checked for leakage. The flow meter does not require any routine maintenance.

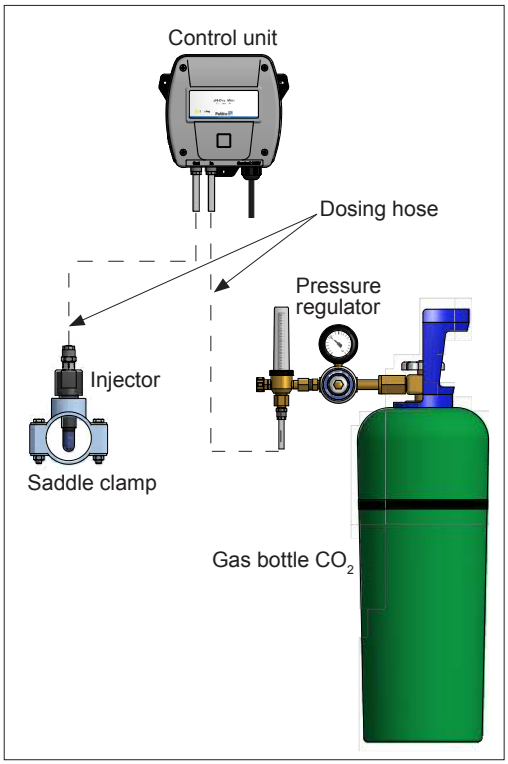
Injector

- Check the connections for leakage regularly.

pH-MiniDos

Product description

This product is intended to regulate the pH level of swimming pool water by pumping in carbon dioxide (CO_2), which reduces the pH level.
The pH-MiniDos must be connected to the MiniMaster, which measures the pH level in the swimming pool water, sending signals back to the control unit, which doses the gas if necessary. The indicator lamp on the control unit glows yellow to show when dosing is in progress.
The system is designed to be used in either indoor or outdoor swimming pools, at temperatures between +5° C and +40° C.
The product is comprised of a control unit, dosing hose, redeemer/plug, pressure regulator and gas bottle anti-tipping mechanism. Gas bottles and tapping saddles are not included.
Tapping saddles and CO_2 alarms can be purchased separately from Pahlén.



Technical data

The unit is designed for a maximum flow of 5 litres CO_2/min at 5 bar.

Control unit

Contains solenoid valve, non-return valve and electrical components for operation indication.

Voltage:	230 V
Frequency:	50 Hz
Output:	2.5 W
Enclosure protection class:	IP44
Enclosure size:	H 140 x W 150 x D 45 mm
Electrical cable	1.5 m long, for connection to the MiniMaster

Injector

Is a dosing valve with an integrated non-return valve, equipped with a body for fine distribution of the gas in the water.
Externally threaded ½" connection for installation in saddle clamp.

Dosing hose

A 5 m semi-rigid hose 8/6 mm (PN10) designed to handle CO_2 is included.

Pressure regulator

Preset working pressure:	5 bar
Gas bottle connection:	¾"
Weight:	1.2 kg

For more information, see separate instruction (MA60-20) about the pressure regulator.

Gas bottle

Made from steel with a ¾" connection. Contains liquid CO_2 that is gasified as carbon dioxide is consumed.
The standard gas bottle size is 10 kg CO_2. See our website for up to date information about your local dealer.
Note! Liquid CO_2 must not be injected directly into the equipment as this can damage the installation.

Safety

Always ensure that there is good ventilation. Avoid installing the equipment in areas where there are often people or animals. Carbon dioxide emissions in enclosed areas may cause personal injury, e.g. asphyxiation as carbon dioxide is a heavy gas that forces out oxygen. Because of this, enclosed areas must be equipped with CO_2 alarms.
See our website for more information.
Before any maintenance work is carried out, the power and gas supplies to the pH regulator must always be shut off.

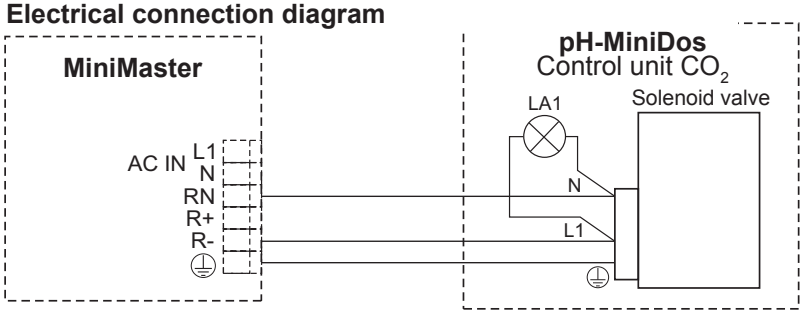
Recommended values in respect of water quality

Chlorine content:	max. 3 mg/litre (ppm)
Chloride (salt) content:	max. 5,000 mg/litre
pH value:	7.2 - 7.6
Alkalinity:	60 - 120 mg/litre (ppm)
Water hardness:	100 - 300 mg/litre (ppm)

Electrical installation

The control unit must be connected to the MiniMaster by a qualified electrical installer, see connection diagram.

Electrical connection diagram



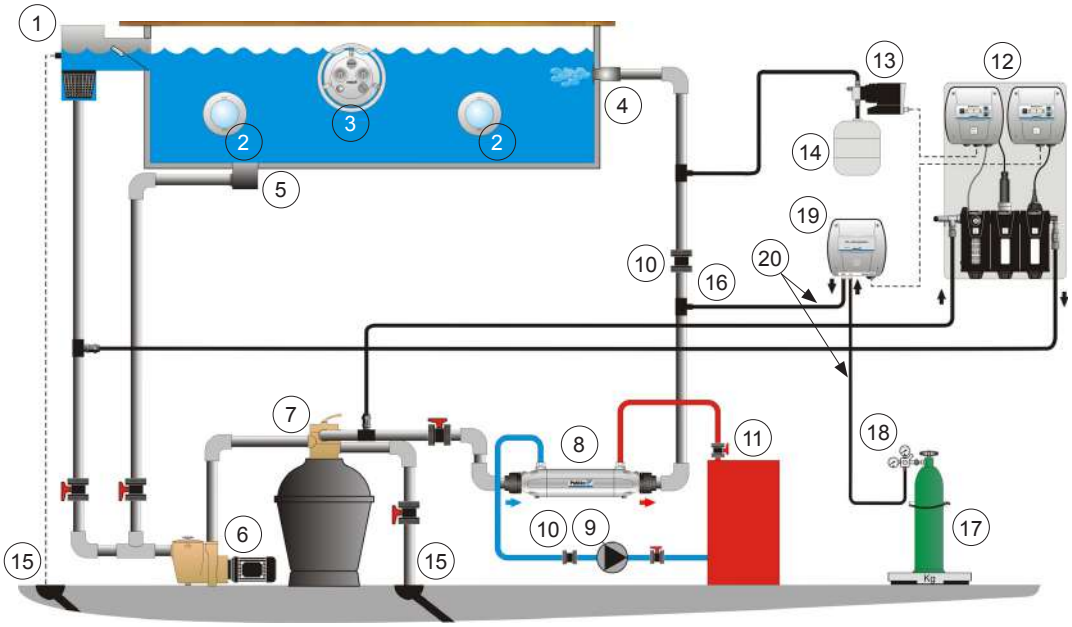
pH-MiniDos

Installation

1. Skimmer
2. Light
3. JetSwim
4. Inlet
5. Main drain
6. Pump
7. Filter
8. Heat exchanger
9. Circulation pump
10. Check valve
11. Boiler
12. MiniMaster
13. Chlorine dosing
14. Chlorine
15. Drain

pH-MiniDos

16. Injector
17. CO_2 gas bottle
18. Pressure regulator
19. Control box CO_2
20. Dosing hose



Injector (16):

1. Start by seeing where the redeemer shall be placed in the main water circulation pipe, see pos. 16 in the figure above. It must be positioned as far away from the inlet as possible, but after the heater and before the chlorine dosing. We recommend that you use a saddle clamp.
2. Screw in the tapping saddle.
3. Shut off the pump to the installation. Close any taps.
4. Fit the redeemer with a threaded tap or similar.
5. Drill a hole Ø18 mm in the water pipe where the saddle clamp is located to accommodate the injector. The included plug can be temporarily used in this hole instead of the injector in order to facilitate the installation process. Keep this plug in a safe place for future service work.
6. Fasten the injector.
7. Open the taps. Start the pump.

Gas bottle (17):

8. The gas bottle must be placed vertically, out of direct sunlight. Make sure that the bottle cannot fall over. An anti-tipping bracket for wall attachment is included. Check that the gas bottle valve connection is clean and undamaged. Open the bottle valve for a brief moment to remove any water or foreign objects from the outlet on the bottle valve (ensure the area is well ventilated). NB: Do not place your hand over the outlet.

Pressure regulator (18):

9. Fit the included hose coupling (A1, Figure 1) to the pressure regulator.
10. Check that the gasket is free of defects.
11. Assemble the pressure regulator, see Figure 1.
12. Connect the pressure regulator to the gas bottle.

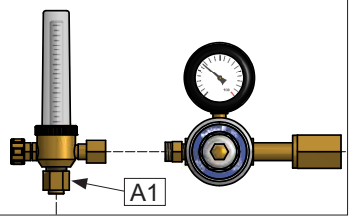
Control unit (19):

13. The control unit shall be installed against a wall with the connections pointing downwards. NB! The control unit must be connected to the MiniMaster by an qualified electrician.

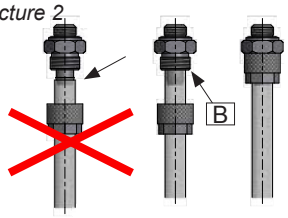
Dosing hoses (20):

14. Cut the accompanying dosing hose into two appropriate lengths (cut a straight section using a sharp knife, do not cut with scissors). The dosing hoses must lie in soft bends without kinks and be of a length that allows the pressure regulator to be handled when changing the gas bottle. Connect the dosing hoses using hose couplings, which must be fitted as shown in Figure 2.
15. Connect one dosing hose between the gas bottle pressure regulator and the “In” connection on the control unit.
16. Connect the other dosing hose from the “Out” connection on the control unit to the injector.

Picture 1



Picture 2

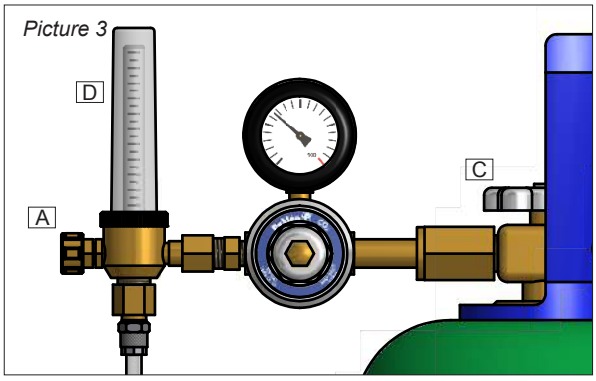


Fit hose coupling to hose as follows:

1. Loosen the ring on the hose coupling.
2. Thread on the hose up to B.
3. Tighten the ring.

Pressurisation part 1

17. Open gas bottle valve (C Figure 3).
18. Open the adjuster wheel (A Figure 3) on the pressure regulator - turn it about 5 mm anti-clockwise.
19. Using leak spray or soapy water, check that the entire circuit from the gas bottle to the control unit is leak-tight.
    Any leaks must be addressed before continuing.



Pressurisation part 2

MiniMaster

E Dosing on/off
F Flow
F+G Calibration
G Forced dosing

20. Check the pH value in the pool, ideally using digital photometric equipment. The value should be between 7.2 and 7.6; the optimal value is 7.4.
21. Calibrate the pH value on the MiniMaster. This is done by pressing the two calibration buttons (F+G) simultaneously and keeping them pressed until the calibration process is complete. The calibration continues for as long as the LEDs flash quickly (approx. 5 times/sec.). The calibration is complete once the LEDs start to flash more slowly. Only then should you release the buttons.
22. Activate the forced dosing of pH-lowering CO_2 gas by keeping button G on the MiniMaster pressed for three seconds. The dosing continues for a maximum of 30 seconds (indicated by rolling LEDs). This step may be repeated several times if necessary.

pH-MiniDos

D Indicator lamp

23. Check that the indicator lamp on the CO_2 control unit (H) is on = dosing taking place.
24. Check that there are no leaks from the control box out to the redeemer (use leak spray or soapy water on the hose connections). Any leaks must be addressed before proceeding to the next step.
25. Adjust the flow by turning the pressure regulator adjuster wheel (A). Look at the graduated flow indicator (D) on the pressure regulator.
    Each pool installation is unique and must be tested.

Basis guideline values:

Pool size	Flow
3x6m	0.5 l/min
4x8m	0.8 l/min
5x10m	1.2 l/min

26. If you want to stop the MiniMaster forced dosing prematurely (before the time limit of 30 seconds has expired), press the E button on the MiniMaster once – this will put the unit into standby mode, with a flashing green LED being shown in the centre of the display. Wait approximately 1 second and press the button again – the MiniMaster is now activated and one of the LEDs will have a solid light.
27. Check the pH value of the pool after approximately 24 hours.
28. After completing the checks and adjustments, the installer may make a mark on the pressure regulator adjustment wheel (A) or the flow indicator (D, glass tube) in order to clearly indicate the correct adjustment value for the installation. Doing so helps simplify the process of checking to ensure that everything is as it should be.

Operation - Maintenance

pH-MiniDos does not require regular maintenance other than gas bottle replacement, although all connections (except electrical) should be subjected to tightness tests using leak spray or soapy water on a regular basis, e.g. when replacing the gas bottle or during start-up following a period of inactivity. In addition, you should also examine the dosing hoses on a regular basis.

The manometer on the pressure regulator shows whether there is pressure in the gas bottle (gas remaining) or that there is no pressure (gas finished).

The graduated glass tube on the pressure regulator shows the gas flow, but only whilst dosing is in progress.

Tip! To check how much gas is left in the bottle: Weigh the full gas bottle (with the regulator fitted) before starting the system. All gas bottles are marked with their tare weight (what the empty bottle weighs).

Tare weight + regulator weight 1.2 kg = empty gas bottle

Bottle replacement

1. Put the MiniMaster pH dosing into stand-by by pressing the E button on the MiniMaster - the green LED in the centre of the unit will now start to flash = dosing cannot take place.
2. Close the tap (C) on the empty gas bottle. Leave the adjuster wheel (A) on the pressure regulator open.
3. Ensure good ventilation. Remove the pressure regulator from the empty gas bottle.
4. Make sure that the new gas bottle is stable and secure it using the accompanying anti-tipping mechanism.
5. Carefully open the valve on the new gas valve for a brief moment in order to remove any water or foreign objects.
   NB: Do not place your hand over the outlet.
6. Always check the gasket between the regulator and gas bottle. Replace if damaged or worn.
   Check that the threads are clean and free of grease on both the pressure regulator and the new gas bottle.
7. Fit the regulator to the new gas bottle.
8. Open the valve on the gas bottle.
9. Check all inlets and outlets using leak spray.
10. Activate the MiniMaster by pressing button E - one of the LEDs will now come on and remain solid = dosing can take place.

Troubleshooting

If there is no gas flow:

- Check that there is gas in the bottle. Compare the weight of the gas bottle with regulator to the tare weight of the gas bottle + 1.2 kg.
- Check that the bottle valve is open (C Figure 3).
- Check that the adjuster wheel on the pressure regulator is open (A Figure 3).
- Check that the dosing hoses are correctly connected in all positions and that they are not blocked or kinked.
- Check that the MiniMaster is correctly calibrated and is activated.
- Check that there is water flow in the system: Ensure that the MiniMaster flow indicator is moving.
- If necessary, check the function of the injector: Disconnect it from the saddle clamp on the water pipe, fit a plug in the saddle clamp, immerse the injector into a container of water so that it is covered and activate the forced dosing on the MiniMaster. Bubbles must be clearly seen coming from the redeemer during dosing.