

EMERALD[®]

OPERATING MANUAL

EMERALD HOME 60 DEVICE

FOR FRESH WATER PURIFICATION AND ELECTROCHEMICAL TREATMENT



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Important! Before using the EMERALD HOME 60 Device (hereinafter referred to as «EMERALD Device» or «Device»), please carefully study this Operating Manual. With careful use and compliance with the requirements specified in this Operating Manual, the EMERALD Device will serve you for many years.

1. INTRODUCTION

Congratulations on your purchase of the EMERALD HOME 60 Device for water purification and electrochemical treatment. You have invested wisely in the well-being of your family, and you have also taken a very important step towards improving your health!

EMERALD HOME 60 Device is a professional compact system to produce from ordinary tap water in flow-through mode pure drinking water with antioxidant properties (CATHOLYTE), purified from microbes and microbial toxins, iron, manganese, hydrogen sulfide, heavy metal ions and harmful organic compounds (including herbicides, pesticides, hormones, antibiotics, antidepressants). Antioxidant water enriched with molecular hydrogen using electrochemical activation (ECA) technology, has a beneficial effect on the entire body, normalizing metabolism and the functioning of internal organs, cleansing them from toxins, strengthening the immune system, and toning up the whole body.

EMERALD HOME 60 Device is used in apartments, offices, country houses, cottages, fitness centers and spas to obtain clean and biologically beneficial antioxidant drinking water.

EMERALD HOME 60 Device is certified both in Russia and abroad, including European CE certificate of conformity, European ROHS declaration (environmental certificate), ISO 9001 quality management system certificate, hygiene certificate (expert report) of Rospotrebnadzor, EAC certificate of conformity, GOST R certificate of conformity.

EMERALD HOME 60 Device is developed jointly with the Vitold Bakhir Institute of Electrochemical Systems and Technologies, which is the world's main scientific center in the field of electrochemical activation. Many years of experience and modern discoveries, as well as the direct participation of V.M. Bakhir, Doctor of Technical Sciences, professor, have made it possible to combine the most advanced water purification and activation technologies in the EMERALD HOME 60 Device.

2. INFORMATION ABOUT ANTIOXIDANT WATER - CATHOLYTE

Theoretical concepts

Electrochemically activated catholyte is antioxidant water with pronounced electron-donor properties. Catholyte is obtained from fresh water, in which powerful unipolar action (in the double electric layer at the cathode of the electrochemical module) causes formation and storing of metastable products of cathode electrochemical reactions, in particular, molecular ions HO_2^- , O_2^- , OH^- .

Electrochemically activated catholyte exhibits an electron-donor ability, i.e., it is a strong reducing agent and reduction catalyst in various physicochemical reactions, including biochemical ones. Catholyte provides for effective neutralization of toxic forms of active oxygen, including free radicals, and restoration of the optimal balance of oxidative and reduction reactions (REDOX-status) of the body in the intercellular fluid and in cells, which is directly related to the correct course of all fundamental life processes of the body.

Practical application of catholyte

Electrochemically activated catholyte is one of the best antioxidants. Antioxidants found in foods, vitamins or dietary supplements do not give a person proper protection. Due to their large size, their molecules are not able to penetrate into cells and neutralize toxic oxidants (including free radicals).

Antioxidant water from EMERALD HOME 60 Device has a beneficial effect on the entire body, normalizing metabolism and the functioning of internal organs, cleansing toxins, and also strengthening the immune system, improving memory and toning up the body.

Antioxidant water has a positive effect on the body when consumed as part of a regular diet and protects against the action of strong toxic oxidants. The mechanism of action of antioxidant water is based on the transfer of protective electron-donor properties to the body's internal environments, helping the body's internal antioxidant system to cope with excessive exposure to various oxidative factors of technogenic origin (polluted air, poor quality of drinking water and food, stress and overwork, alcohol and cigarettes). Catholyte stimulates tissue respiration, which enhances the action of vitamins and chemical antioxidants in the body. Antioxidant water also weakens the effect of ionizing radiation, i.e. exhibits radioprotective properties characteristic of antioxidants. Antioxidant water improves passive immunity and general condition of the body, improves the functioning of the gastrointestinal tract and urinary tract, and normalizes blood counts.

Water treated in EMERALD HOME 60 Devices, like any natural antioxidant water, retains its electron-donor properties for no more than a day from the date of obtaining. After this period, the redox potential (ORP) of the treated water returns to the original ORP values of non-activated water, on average, in the range $(+100) \div (+250)$ mV, SCE. When boiling, the electron-donor properties of antioxidant water also decrease. Antioxidant water produced in the EMERALD Device should be stored for no more than a day in glass containers with a closed lid, away from direct sunlight and heat sources.

SOME APPLICATIONS OF CATHOLYTE

Consuming as part of a normal diet - The human body is more than 70% water. Water plays the most important role in the life of the human body. An adult needs to consume about 2 or 3 liters of water per day to maintain the normal functioning of the body.

Cooking - food on antioxidant water is cooked faster and retains more beneficial properties. Antioxidant water is great for soaking fruit, vegetables, fish and meat - due to its strong extraction properties, catholyte actively removes harmful chemicals from foods, such as growth hormones and antibiotics.

Making drinks - in addition to drinking antioxidant water from EMERALD Device, you can enhance the antioxidant effect due to synergistic phenomena and make antioxidant drinks using natural antioxidants - freshly squeezed juices of carrots, apples, various berries, by adding antioxidant water from EMERALD Device to them. Herbal teas prepared with this water acquire a special taste and aroma. Ice cubes made of frozen antioxidant water will give the drink an extra benefit.

Air humidification - antioxidant water is useful in the form of a mist when used in humidifiers. Humidified air with microdrops of antioxidant water, having the properties of a reducing agent, produces a beneficial effect on the respiratory and cardiovascular systems, prevents asthma attacks and allergic diseases.

Cosmetic purposes - for cosmetic purposes, antioxidant water is useful for washing, in the form of ice cubes for wiping the face, or in the form of a spray to moisturize the skin. Moisturizing masks based on antioxidant water will have a special effect.

Pets, plants and seeds - pets will prefer antioxidant water to regular tap or bottled water. The use of water from the EMERALD Device for watering houseplants or germinating seeds will promote their accelerated growth and development.

Important!

The latest technology in the EMERALD Device allows you to get clean and healthy antioxidant water while maintaining a neutral acid-base balance (pH level). pH neutral antioxidant water is suitable for regular consumption as part of a normal diet. Due to the similarity with the internal environment of a human, such water is instantly absorbed by the body and holistically restores it.

EMERALD HOME 60 Device is not a medical device. Before using catholyte for preventive or therapeutic purposes, consult a specialist. The information on the properties and methods of using catholyte presented in this section is for reference only and does not apply to medical reports.

3. PRINCIPLES OF WATER TREATMENT

The EMERALD Device is high performance and runs on cold tap water, producing 40 to 60 liters of purified antioxidant drinking water (catholyte) per hour.

EMERALD Device ensures high quality of drinking water purification due to the consistent combination of water activation in electrochemical modules and the use of auxiliary environmentally friendly filter elements. The main elements of the EMERALD Device are 2 (two) MB-11 type electrochemical modules (diaphragm flow-through electrochemical Bakhir modular elements), in which oxidation reactions take place at the anode and reduction reactions at the cathode (Fig. 1). Auxiliary elements in the Device are a catalytic filter and an electrokinetic filter. A distinctive feature of EMERALD Device is the absence of replaceable and wear parts.

All processes of water purification and electrical treatment in Device are as close as possible to what happens to water in wildlife. It has become possible to repeat the natural processes of water purification and treatment due to the creation of reliable electrochemical modules, which are the main elements of the system. The modules consist of two flow-through chambers: anode and cathode. It is in these chambers that, under the influence of a positive current on the anode and a negative current on the cathode, the water treatment processes suggested by nature are reproduced.

In the anode chamber of the module oxidative reactions take place, during which microbes and microbial toxins are destroyed. In nature, a similar process of antimicrobial protection, phagocytosis, has been occurring in all living organisms for millions of years without any failures. Also, in the anode chamber, harmful organic compounds (including hormones and antibiotics), iron, manganese and hydrogen sulfide are oxidized.

In the cathode chamber, reduction reactions take place during which water again acquires useful antioxidant properties due to enrichment with hydrogen. In nature, similar processes occur during the contact of spring water with rocks, as well as during phase transitions in the process of melting glaciers. Also, cathode water treatment can effectively remove heavy metals.

The auxiliary catalytic filter consisting of natural coal of the highest standard (grade A hydroanthracite) is used to purify water from oxidized organic and organochlorine compounds (including herbicides, pesticides, surfactants, phenols, antibiotics, antidepressants, hormones).

The auxiliary electrokinetic filter, consisting of the purest natural mountain quartz, is an environmentally friendly analogue of a mechanical fine filter and serves to purify water from mechanical impurities, heavy metal hydroxides, oxidized forms of iron, manganese, hydrogen sulfide.



Fig. 1. A new generation MB-11 type electrochemical module, appearance.

Useful information!

All water purification and activation processes in EMERALD Devices are as close as possible to what happens to water in living Nature, since the mechanism of fresh water purification in Nature is represented by two main processes: redox reactions and filtration.

Therefore, in EMERALD Devices the combination of electrochemical anode and cathode water treatment with environmentally-friendly filter elements requiring no replacement provides deep water purification from microbes, microbial toxins, biofilms, heavy metals, iron, manganese, hydrogen sulfide and harmful organic compounds.

The safety of water treatment using ECA technology is ensured by the complete absence of any chemicals in EMERALD Devices. MB-11 type electrochemical modules in which electrical treatment of water takes place, exchange only electrons with water, taking them from the water in the anode chamber, where oxidative reactions take place and the water is enriched with oxygen, and introducing the electrons into the water in the cathode chamber, where reduction reactions take place and the water gets enriched with hydrogen.

This allows the catalytic and electrokinetic filters to work in «clean condition». In the hydraulic scheme of the EMERALD Device, they are located after the anode destruction of microbes, microbial toxins and biofilms, which significantly increases their efficiency and service life. Therefore, the filter elements in the EMERALD Device are protected from microbial growth, fouling with harmful biofilms and water pollution by microbial toxins!

It is important to note that EMERALD Device has no consumables or wear parts. Electrochemical modules and auxiliary filter elements (catalytic filter and electrokinetic filter) do not require periodic replacement under the operating conditions described in this Operating Manual.

The main stages of water treatment in EMERALD Device



Fig. 2. Anode chamber.

Stage 1. Anode chamber of the MB-11 electrochemical module

- ◆ Destruction of microorganisms, microbial toxins and biofilms in the water flowing through the anode chamber of the electrochemical module;
- ◆ Oxidative destruction of organic compounds, such as herbicides, pesticides, antibiotics, hormones, antidepressants, surfactants, phenols, petroleum products;
- ◆ Water purification from iron, manganese and hydrogen sulfide due to instant oxidation and subsequent filtration;
- ◆ Water enrichment with oxygen.



Fig. 3. Catalytic filter.

Stage 2. Catalytic filter

- ◆ Water purification from a wide range of organic and inorganic dissolved impurities after oxidative destruction in the anode chamber of the module;
- ◆ Water purification from free chlorine and organochlorine compounds;
- ◆ Water taste improvement and elimination of unpleasant odors, including through the anode removal of phenols and hydrogen sulfide.



Fig. 4. Cathode chamber.

Stage 3. Cathode chamber of the MB-11 electrochemical module

- ◆ Water treatment in the cathode chamber of the electrochemical module imparting antioxidant (electron donor) properties to water, reducing the water redox potential to the zone of reduction values;
- ◆ Water purification from heavy metal ions converted into insoluble hydroxides to be subsequently removed on an electrokinetic filter;
- ◆ Microelements useful and necessary for human body are preserved in water: calcium, magnesium, sodium, potassium, lithium, iodine;
- ◆ Water enrichment with hydrogen;



Fig. 5. Electrokinetic filter.

Stage 4. Electrokinetic filter

- ◆ Final purification of water from mechanical impurities, hydroxides of heavy metals, iron, manganese, hydrogen sulfide;
- ◆ Guaranteed water clarity, removal of turbidity and impurities.

4. PRECAUTIONARY MEASURES

- ◆ For normal operation of the EMERALD Device, it is necessary to comply with the requirements for its operation and maintenance specified in this Operating Manual.
- ◆ Before you start using the Device, please read this manual carefully. If you have any questions regarding the connection or operation of the EMERALD Device, please contact our authorized dealers for advice or call our customer service.
- ◆ Device is intended for purification and electrical treatment of only cold drinking water from centralized water supply systems, corresponding to SanPiN 2.1.4.1074-01!
- ◆ If the tap water does not meet the requirements of SanPiN 2.1.4.1074-01, or if there are visible suspensions, turbidity and rust flakes in the tap water, it is necessary to use a preliminary water purification system before inlet to the Device, purchaseable immediately with the Device (see Table 6), or to be ordered separately.
- ◆ Do not use the Device to treat microbiologically unsafe water or water of unknown origin without appropriate pre-disinfection. If you have a weakened immune system or if you require absolutely pure water for medical reasons, please consult your doctor before using the Device.
- ◆ Do not run warm or hot water through the Device, as this may damage it (see DEVICE OPERATION section).
- ◆ Do not use for food purposes the first 15 liters of treated water immediately after connecting the Device or after flushing the Device with citric acid.
- ◆ To ensure the declared water treatment parameters, it is recommended not to use and drain the first 2 liters of purified water in the OPERATION mode (approximately 2 minutes) when the Device is idle for more than 10 hours. If the Device is idle for a long time (more than 72 hours), the first 15 liters of purified water in the OPERATION mode should also be drained (approximately 15 minutes of Device operation).
- ◆ The Device is not intended for use by children, people with physical and mental disabilities, lacking the necessary experience and knowledge, except in cases of direct instruction by a person responsible for their safety.
- ◆ When using the electrical system, basic safety precautions should always be followed to reduce the risk of fire, electric shock and/or personal injury.
- ◆ Before operating the Device, make sure that all hydraulic and electrical connections are secure. Do not leave the running Device unattended;
- ◆ Materials a plumber uses for sealing the joints must not enter the Device. Avoid adding vegetable oil, petroleum jelly, or other lubricants, solvents, ammonia, alcohols, or strong cleaning solutions to the system. They can seriously damage the Device.
- ◆ Regular maintenance of the EMERALD Device should be carried out to wash the filter elements and electrochemical modules (see DEVICE MAINTENANCE section).

Electrical safety measures:

- ◆ The assemblage of the electrical outlet to connect the Device to the electric network must be carried out by qualified electricians in accordance with the laws in force in your country of residence.

- ◆ To prevent the risk of electric shock, do not place the Device near water or other liquid substances. The socket should not be located directly above the sink or in any other place where water can enter it. Before connecting to the power supply, make sure that the Device and all its elements are dry. During operation, all elements of the EMERALD Device must be dry and not leaking.

- ◆ For the proper functioning of the EMERALD Device, your outlet must be uninterrupted, have a working ground contact and be connected through a residual current device (RCD) or a differential circuit breaker with a rated leakage current of 30 mA!

- ◆ Be sure to disconnect the Device from the power supply during long breaks in operation. Do not use any other power supply or adapter in place of the supplied power cord. Check the power cord, power plug, and the Device itself for damage. If any damage is found, please contact the nearest service center for examination or repair of the Device.

- ◆ Incorrect connection to the electric network supply can lead to the risk of electric shock.

- ◆ In order to avoid accidents, it is strictly forbidden to carry out any repair/maintenance work without disconnecting the Device from the electric network!

Additional Security Measures:

- ◆ Use only spare parts approved by the manufacturer.

- ◆ Do not use the Device for purposes other than those intended. Do not use the Device outdoors. Do not use the Device for water desalination.

- ◆ Do not disassemble or repair the Device yourself. Contact an authorized service center. In order to reduce the risk of fire or electric shock, it is strongly recommended not to disassemble the electronic components of the Device.

- ◆ Avoid rough handling of the Device, do not drop or hit it. Do not store or transport the Device with residual water at an ambient temperature below 0°C. Use Device only in vertical position.

5. DEVICE FEATURES

Table 1. Specifications

Recommended productivity, no more than, liters per hour	60
Consumed electrical power, not more than, W	60
Specific electricity consumption, not more than W* h/l	1.0
Supply voltage - standard socket with grounding (for adapter), V.	110 - 220
Power supply frequency, Hz	50 - 60
The number of electrochemical modules of MB-11 type, pieces	2
Overall dimensions (excluding inlet and protruding parts), WxHxD, mm	140x353x121.5
Gross weight, kg	5.3
Net weight, kg	3.0

Table 2. Processing parameters of water purification *

Efficiency of anode oxidation of divalent iron ions at their concentration in source water of 3 mg/l, %	92 - 95
Efficiency of catalytic conversion of chlorine-oxygen oxidants into hydroperoxides in the catalytic filter, %	60 - 70
Efficiency of conversion of trivalent iron ions into hydroxide at their concentration in source water of 0.1 mg/l, %	80 - 90
Reduction of permanganate oxidizability of water at the concentration in the source water of 10 mg/l, %	70 - 85
Efficiency of removal of hydroxides of heavy metals and iron on the electrokinetic filter at their concentration in source water of 0.5 mg/l,%	80 - 90
Disinfection of water at 300 colony-forming units (CFU) per 1 ml in source water, %	99

Table 3. Parameters of catholyte and anolyte in terms of ORP and pH *

The reduction of the ORP of the catholyte relative to the ORP of the source water, mV, SCE	(-250)...(-700)
The increase in the pH of the catholyte relative to the pH of the source water, pH units	0.5 - 2.0

Table 4. Operating conditions

Ambient temperature, °C	+5...+40
Relative air humidity (at 25 °C), no more than, %	80
Tap water temperature, °C	+1...+30
Temperature of flushing solution of citric acid, not more than, °C	+70
Water line pressure, bar	1 - 5
Total dissolved solids (TDS) of supplied tap water, mg/l	100 - 400
pH of supplied tap water	6 - 9

* The averaged parameters are given. In each specific case, the results of water treatment are individual in nature and differ from each other due to the different physical and chemical composition and the level of contamination of the treated water.

6. DELIVERY SET

Table 5. Delivery Set

No.	Name	Number, pcs.	Appearance
1.	EMERALD HOME 60 Device.	1	
2.	Power supply (adapter), 24V, 2.5A, 60W.	1	
3.	Network cable with IEC320 C14 plug for connecting the power supply to the electric network.	1	
4.	EMERALD HOME flushing tank with connection fittings.	1	
5.	T-bend with a ball valve for connection to the water supply line with connections: M G1/2" (male thread) – F G1/2" (female thread) - 1/4" tube.*	1	
6.	Clean water tap with a set of connection fittings: 1 pc. fitting F G7/16" – 1/4" tube).	1	
7.	Mud filter, a set of fittings for connecting the preliminary water purification system: 1 pc. elbow fitting 1/4" tube - 1/4" nipple; 2 pcs. fittings M G1/2" - 1/4" tube.	1	
8.	Set of connecting tubes, size 1/4", length 4 meters.	1	
9.	Fitting kit: 1/4", 3/8" fitting and tube wrench, set of fixing clip-locks and closing plugs for 1/4" fittings.	1	
10.	Operating Manual.	1	

* M (male) – external thread, F (female)–internal thread, G1/2" – cylindrical pipe thread 1/2".

Table 6. Auxiliary items purchased separately

No.	Name	Number, pcs.	Appearance
Add. 1	Activated carbon post filter, replaceable, with quick-release fitting for 1/4" tube with the connection set: fixing clips for fastening the post filter, 2 pcs.; self-tapping screws for mounting fixing clips, 2 pcs.	1	
Add. 2	Diverter with M22 connection and 1/4" tube nipples for connecting the Device above the sink, with a set of nozzles: M G1/2" x M22, F G1/2" x M22, M22 x M24, clamp adapter.	1	
Add. 3	Slim Line 10" flask for water pre-treatment cartridges with a bracket, a wrench and a set of fittings for connection. The kit includes 2 pcs. of M G1/2" - 1/4" tube fittings, for connecting the flask with water supply line and the Device.	1	
Add. 4	Mechanical polypropylene filter, 5 microns, replaceable, for Slim Line 10" flask.	1	
Add. 5	Filter with ion-exchange resin for water softening (removal of hardness salts), replaceable, for Slim Line 10" flask.	1	
Add. 6	Water iron removal filter, replaceable, for Slim Line 10" flask.	1	
Add. 7	Water mineralizer filter (to increase the electrical conductivity of water), replaceable, for a 1/4" tube.	1	

7. DEVICE CONNECTION

Description of the main elements on the EMERALD Device casing

Fig. 6 shows the main elements of the EMERALD HOME 60 Device located on the left and right side parts of the casing. For the user's convenience, the numbering of elements in fig. 6 and on the main connection diagrams of the Device in the OPERATION and FLUSHING modes is the same.



Fig. 6. Main elements on the EMERALD HOME 60 Device casing.

1. EMERALD HOME 60 Device;
2. Plug for connecting the power supply (adapter) to the Device;
5. INLET (TAP WATER) fitting for supplying water to the Device;
6. CATHOLYTE (CLEAN WATER) fitting for purified antioxidant water outlet;
7. FLUSHING fitting for supplying the flushing solution (used only in the FLUSHING mode);
8. Electronic display with ammeter and voltmeter;
9. FLUSHING mode On/Off button;

General rules for handling John Guest® type quick-release fittings

The connection of the 1/4" tubes to the fittings is done manually. John Guest® type quick-release connections allow you to repeat the procedures for connecting/disconnecting the tubes and fittings if necessary. When properly connected, the tube enters the fitting hole by 15-18 mm. Correctness and reliability of the connection is checked by the return movement of the tube, after connecting to the fitting. With a force of 8 to 10 kgf, the tube should not be pulled out of the fitting.

Important! Do not apply force when performing these procedures! Proper connection/disconnection of John Guest® tubes and fittings does not require excessive force!

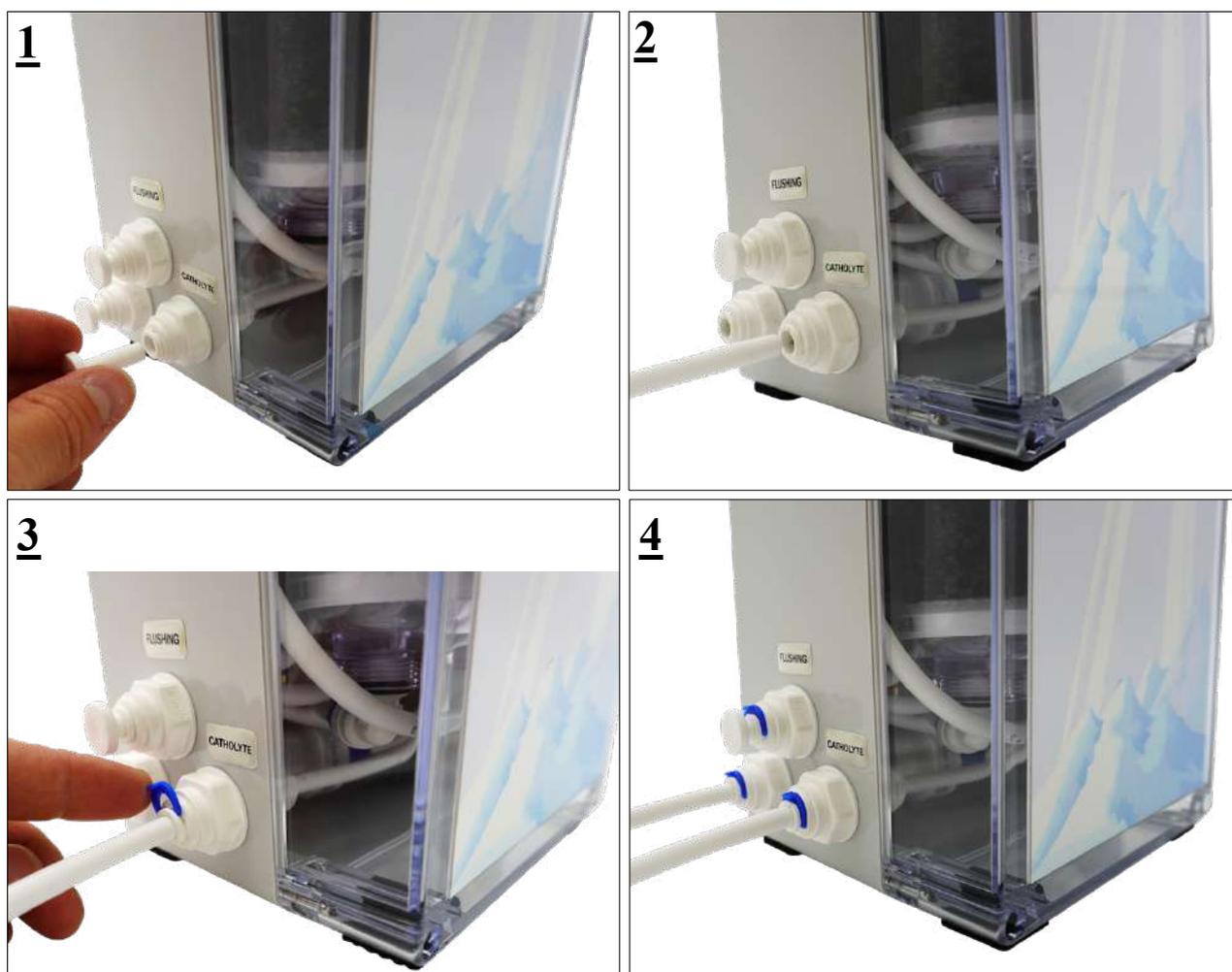


Fig. 7.1. General principles for connecting the tubes to John Guest® quick-release fittings.

CONNECTING TUBES AND CLOSING PLUGS TO QUICK-RELEASE FITTINGS.

Connecting tubes or plugs to fittings is to be performed in accordance with Fig. 7.2:

- ◆ Insert the tube by hand into the fitting hole (1) as far as it will go. When properly connected, the tube enters the fitting hole by 15-18 mm;
- ◆ Insert a fixing clip-lock (2,3) into the gap between the sliding collet ring and the base of the fitting;
- ◆ Check that the connection is secure by moving the tube back. With a force of 8 to 10 kgf, the tube should not be pulled out of the fitting.

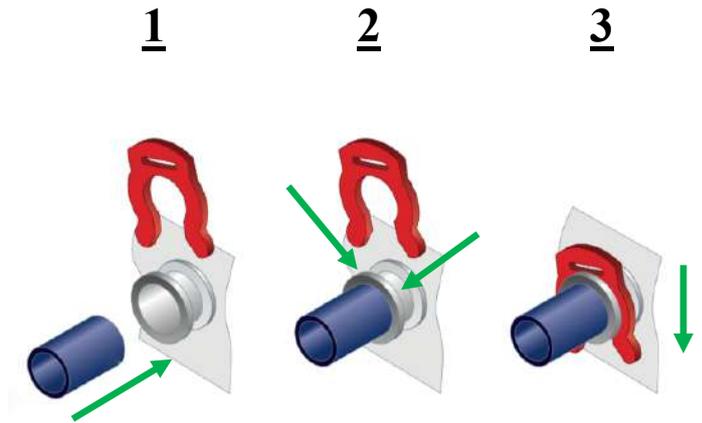


Fig. 7.2. Connecting tubes and closing plugs to quick-release fittings on the Device casing.

DISCONNECTING TUBES AND CLOSING PLUGS FROM QUICK-RELEASE FITTINGS.

Disconnecting tubes or plugs from fittings is to be performed in accordance with Fig. 7.3:

- ◆ Remove the fixing clip-lock from the fitting (2);
- ◆ Using a hand or a special wrench (9, Tab. 5), press the collet ring of the fitting to its base (3);
- ◆ While holding the collet ring of the fitting in the pressed position (3), pull the tube or plug out of the fitting by hand (4).

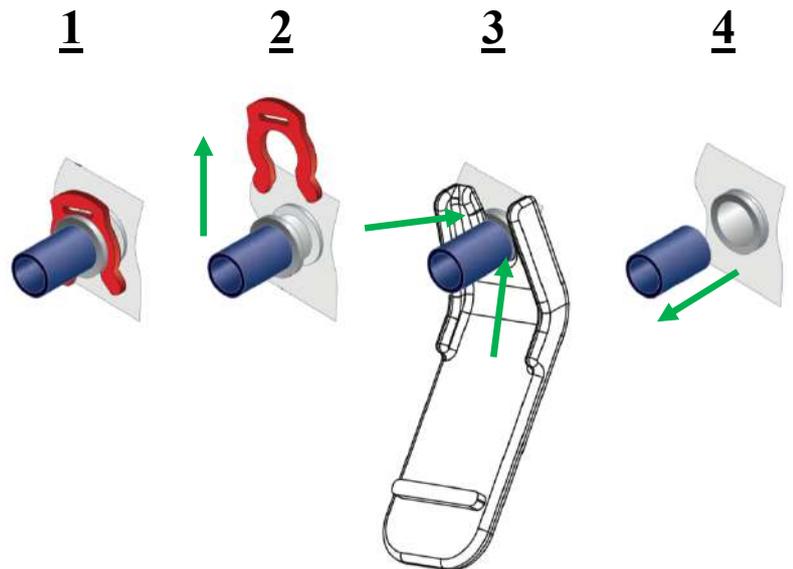


Fig. 7.3. Disconnecting tubes and closing plugs from quick-release fittings on the Device casing.

Connecting EMERALD Device under sink with clean water tap

This section describes the basic way to connect the EMERALD Device under the sink, as recommended by the manufacturer. If you use an alternative method of connecting the EMERALD Device, you must make sure that the method you choose does not contradict other conditions of this Operation Manual. In case of violation of the conditions of installation and operation of the EMERALD Device, warranty claims may be rejected.

EMERALD Device is located without fastening on the bottom shelf of the sink cabinet. To connect the EMERALD Device under the sink, it is necessary to connect the Device using connecting hoses (the white tube 1/4" in size and the parts included in the delivery set, in accordance with the diagram in Fig. 8. The white tube is cut into the required lengths already on installation site. In domestic conditions, you can cut the tube with a regular kitchen or stationery knife using a cutting board.

Important! Keep the tubes and plugs remaining after the Device installation! You will need them to carry out the FLUSHING mode (see DEVICE MAINTENANCE section), as well as to transport the Device.

Before starting the Device connection procedure, be sure to read the basic principles of connecting the white tube to fittings, described in the General Rules for Handling John Guest® Quick-release fittings

Fixed connection of EMERALD Device requires certain skills in working with plumbing equipment. We recommend using the services of authorized specialists of the company EMERALD ECOTECHNOLOGIES LLC, a representative of the dealer network or the services of a qualified plumber of the housing and communal services organization at your place of residence. Do not install the Device in a place where its maintenance would be difficult. Do not install the equipment in a place where the Device casing will be exposed to water or direct sunlight.

Turn off the cold water supply valve before connecting, and then open the cold water valve on the kitchen faucet to relieve pressure in the pipe.

After the Device is fully connected, make sure that all connections are tight. During installation, pay attention to the fact that the inlet and outlet tubes pass freely along radii to exclude kinks.

CONNECTION DIAGRAM OF EMERALD HOME 60 DEVICE UNDER THE SINK.

- ◆ The procedure for connecting the EMERALD Device is carried out in accordance with the diagram in fig. 8 and consists of the following steps:
- ◆ Connection to the cold water supply line (4,5);
- ◆ Installation and connection of the clean water tap (6,11);
- ◆ Connecting the Device to the electric network (2,3).

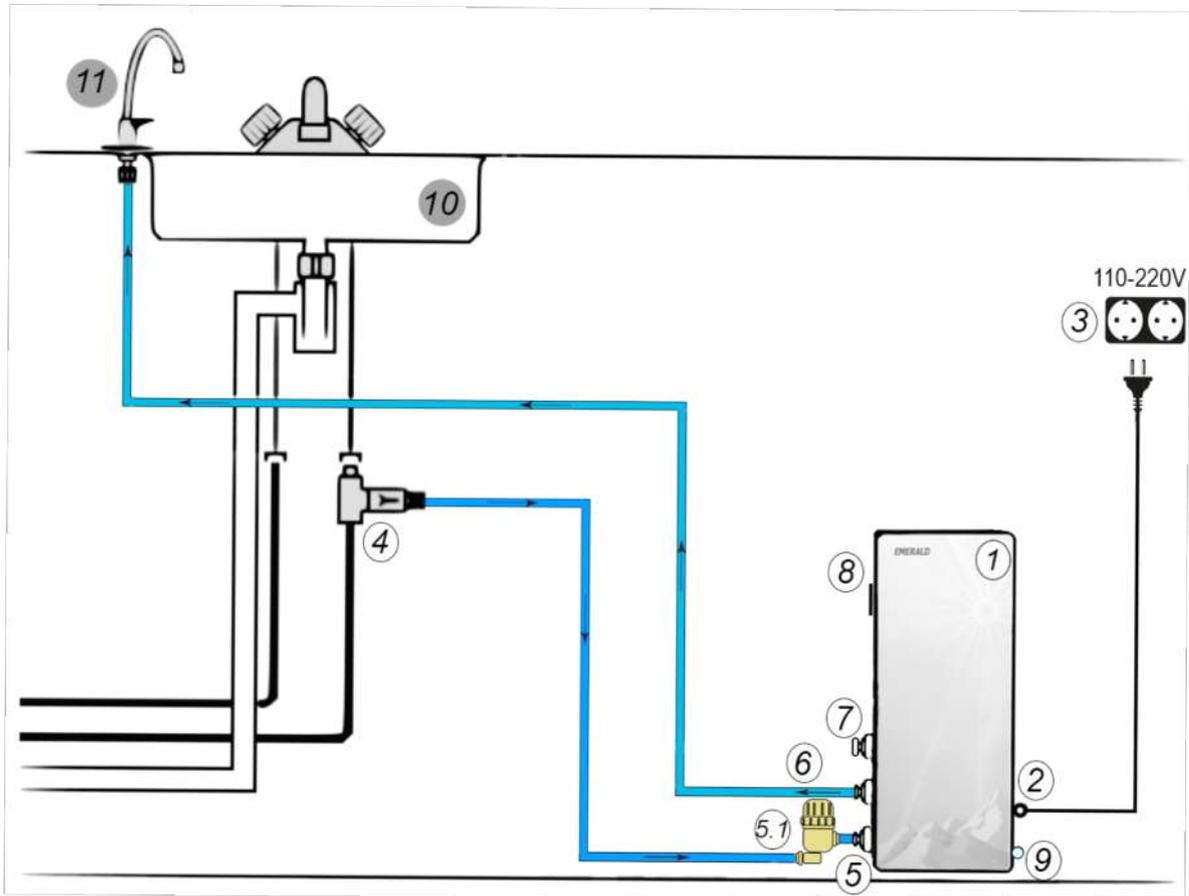


Fig. 8. Connection diagram of EMERALD Device under the sink with pure water outlet tap.*

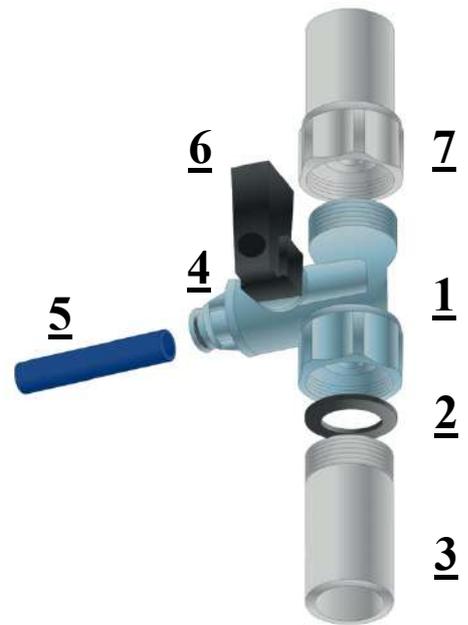
1. EMERALD HOME 60 Device;
2. Plug for connecting power supply (adapter) to Device;
3. Power supply (adapter) connected to the electrical network;
4. A t-bend with a ball valve for supplying water to the Device;
5. INLET (TAP WATER) fitting for supplying water to the Device;
- 5.1. Mud filter with a set of connection fittings for mechanical pretreatment of water (or other water pretreatment system);
6. CATHOLYTE (CLEAN WATER) fitting for the outlet of purified antioxidant water;
7. FLUSHING fitting for supplying flushing solution (used only in FLUSHING mode);
8. Electronic display with ammeter and voltmeter;
9. FLUSHING ON/OFF Button;
10. Kitchen worktop/sink;
11. Clean antioxidant water outlet tap with a shutoff valve.

* The activated carbon post filter connection diagram is given in Appendix №1.

CONNECTING THE T-BEND WITH A BALL VALVE TO THE WATER SUPPLY LINE.

The connection is made in accordance with the diagram in Fig. 9:

- ◆ Shut off the cold water supply to the sink, and then open the cold water shutoff valve on the kitchen faucet to relieve pressure in the pipe;
- ◆ When using the flexible connection, unscrew the union nut of the flexible cold water connection (7), through which water is supplied to the faucet. Insert a t-bend with a ball valve (1) into the gap between the cold water line (3) and the flexible hose. If there are no sealing rings (2) at the threaded connections, seal the connections (for example, using Tangit uni-lock[®] plumbing thread);
- ◆ Insert the union nut from the t-bend nipple (4) through the 1/4" tube (5);
- ◆ Push the 1/4" tube up to the stop on the t-bend nipple (4);
- ◆ Tighten the union nut to tightly fix the tube on the nipple;



Water is supplied through the t-bend by the valve (6). For details, see the DEVICE OPERATING section.

Fig. 9. Connecting Diagram for the t-bend with a ball valve to the water supply.

Important! When connecting these elements, do not overtighten the connections! This can lead to a damage of the t-bend or valve, including a hidden one (with long-term consequences). The amount of plumbing sealing material used must not be excessive! In the event of any mechanical damage to the connection node due to improper installation and use, warranty claims may be rejected.

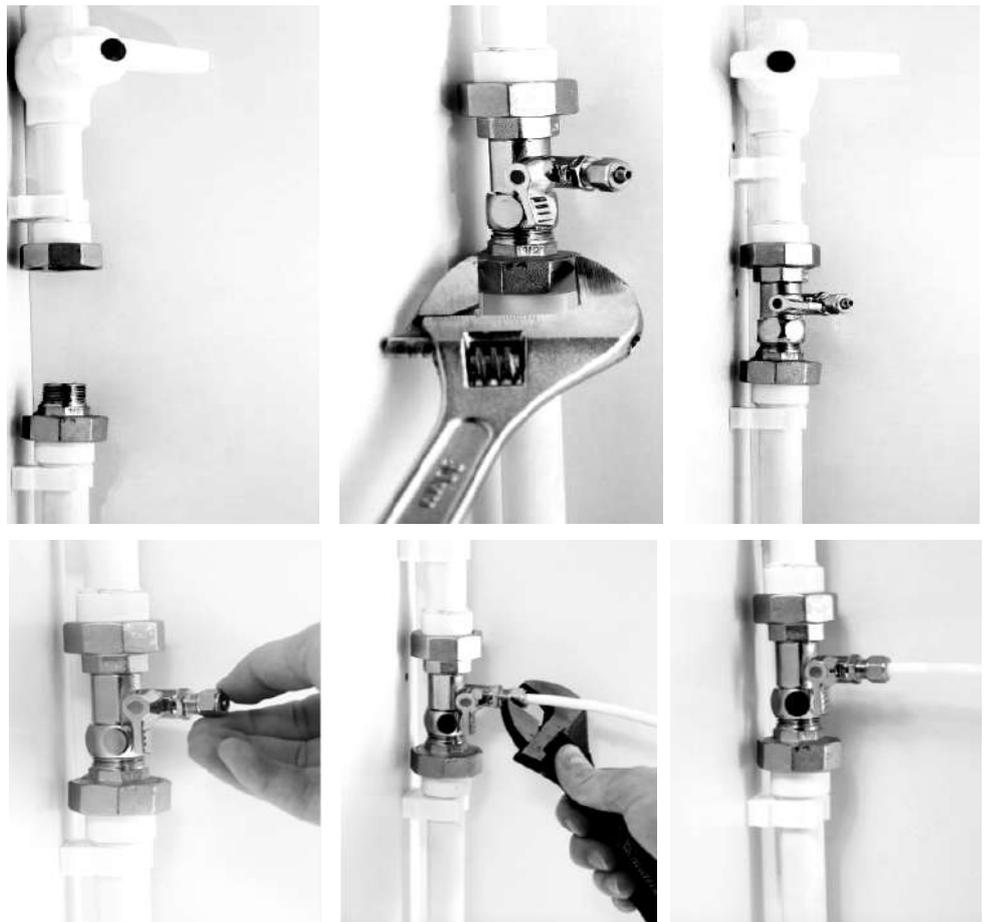


Fig. 10. Installation of the t-bend with a ball valve for water supply to the Device.

CONNECTING PRE-FILTERS BEFORE WATER INLET INTO THE DEVICE.

The delivery set includes a mud filter (Fig. 11.1) with a set of connection fittings, which serves for preliminary rough mechanical water purification before being supplied to the Device. Water filtration is carried out by a stainless steel metal mesh built into the screw-off part of the case (3, Fig. 11.1). The mud filter is connected in accordance with the diagram in Fig. 8. When connecting the mud filter, make sure that the direction of the water flow corresponds to the arrows on its case. Locking blue clip-locks are installed in all quick-release connections. The two main connection options are described below:



Fig. 11.1 Mud filter (left) with connection fitting (right).

Option 1. Connection to the gap of the water supply tube (Fig. 11.2):

- ◆ The first part of the water supply tube from the t-bend (4, Fig. 8) is connected to the inlet fitting (1) on the case of the mud filter;
- ◆ The second part of the water supply tube is connected from the outlet fitting (2) on the mud filter case to the INLET fitting (5, Fig. 8) on the Device;



Fig. 11.2 Mud filter connected to the gap in the water supply tube.

Option 2. Connection directly to the Device using an elbow fitting nipple (Fig. 11.3):

- ◆ The first part of the water supply tube from the t-bend (4, Fig. 8) is connected to the inlet fitting (1) on the mud filter case;
- ◆ The outlet fitting (2) on the mud filter case is connected with a short piece of connecting tube to the corresponding fitting of the elbow fitting (4) with nipple; The nipple of the elbow fitting (5) is connected to the INLET fitting (5, Fig. 8) on the Device casing. For ease of connection, the mud filter is immediately supplied assembled with an elbow fitting.



Fig. 11.3 Mud filter connected directly to the Device.

Important! If the source water does not comply with the requirements of SanPiN 2.1.4.1074-01, it is possible to install an additional pre-treatment system instead of the mud filter or before it (purchased separately, see Table 6). To do this, by analogy with the mud filter, before the Device the Slim Line 10" flask is connected (Fig. 11.4), into which, depending on the type of contamination in the source water, various replaceable filters are installed: polypropylene, carbon, ion exchange or iron removal filter):

- ◆ The necessary filter is installed inside the flask;
- ◆ The corresponding threaded parts of the connecting fittings (3.4) are screwed into the threaded fittings of the flask (1.2). Threaded connections are sealed;
- ◆ In accordance with the arrows of the water flow on the flask case, the water supply tube from the t-bend (4, Fig. 8) is connected to the water inlet fitting into the flask (3), and the water outlet fitting from the flask (4) is connected to the INLET fitting (5, Fig.8) on the Device; Blue fixing clip-locks are installed in all quick-release fittings.



Fig. 11.4. Main Slim Line 10" flask with connection fittings.

INSTALLATION AND CONNECTION OF CLEAN WATER TAP.

Drill a 12mm hole for the tap shank in the sink/worktop to install the tap in. Before starting drilling, select the optimal position of the tap on the sink/worktop and mark the starting point for drilling. This can be done by applying the decorative metal plate (5, Fig. 12.2) from the delivery set to the surface of the sink/worktop. Drilling the hole in the sink should only be done if it is certain that the sink will not be destroyed by this procedure. Particular care should be taken when drilling holes in ceramic, porcelain, granite, marble, teflon sinks, as well as sinks made of artificial stone, etc.

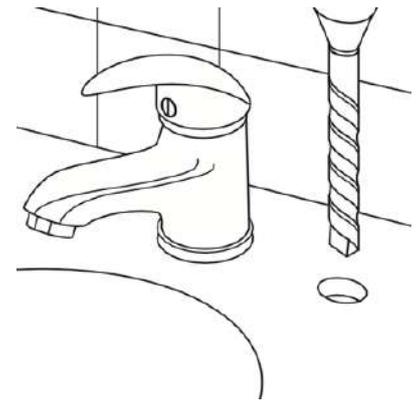


Fig. 12.1. Hole drilling pattern for clean water tap.

Further, the installation procedure of the tap consists of the following steps:

- ◆ Above the sink/worktop, first place a decorative metal plate (5, Fig. 12.2) on the threaded shank of the tap, and then a soft rubber gasket (4, Fig. 12.2). Next, insert the threaded shank of the tap into the drilled hole in the sink / worktop;
- ◆ Under the sink/worktop, first place a hard plastic gasket (3, Fig. 12.2) on the threaded shank, and then screw the clamping nut (2, Fig. 12.2) onto the tap shank. Fixing the tap to the surface of the worktop is effected via the clamping nut;
- ◆ Next, a special white quick-release fitting (7/16" female thread - 1/4" tube) is screwed onto the threaded shank, which is tightened until it stops to seal the connection. Important! Do not overtighten this connection;
- ◆ The pure antioxidant water outlet tube is connected to the bottom of the quick-release fitting. The connection is fixed with a blue clip.

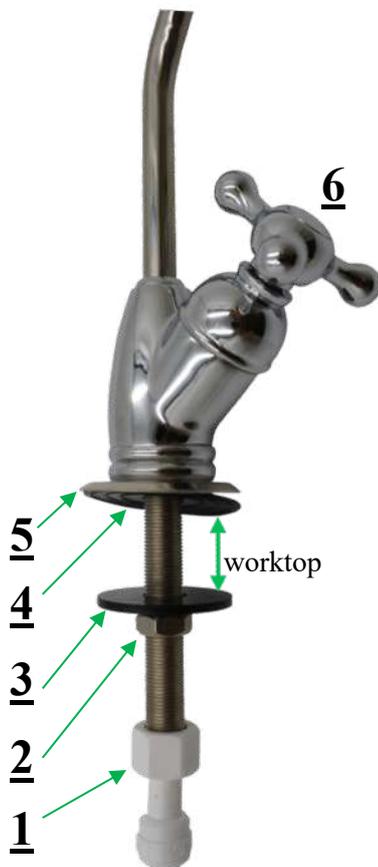


Fig. 12.2. Clean water tap assembly diagram.

1. Quick-release fitting for connecting the pure antioxidant water outlet tube to the tap; 2. Clamping nut for fixing the tap to the worktop; 3. Hard rubber gasket; 4. Sealing soft rubber gasket; 5. Decorative metal plate; 6. Shutoff valve for pure antioxidant water outlet.

Connecting EMERALD Device to the electric network

The EMERALD Device is connected to the electric network in several stages (Fig. 13):

- ◆ Connect the supplied network cable from the delivery set (1) with an IEC320 C14 plug to the appropriate power supply socket (2,3), and the network cable plug into an electrical outlet;
- ◆ Next, the power supply is connected with the corresponding plug (4) located on the side of the Device casing;
- ◆ After connecting the power supply plug (5), the built-in LED inside the Device casing will sequentially turn on all the three main indicator colors (red, green, blue) to check their operability, after which the LEDs will turn off and the



Fig. 13. EMERALD Device connecting diagram to the electrical network using a network cable.

Device will switch to STANDBY mode;

- ◆ In the STANDBY (5) mode, the Device is connected to the electric network and will turn on/off automatically if there is a flow of water due to the built-in flow sensor. When the water flow opens, the flow sensor is triggered and turns the Device into the OPERATION mode. As soon as the water flow stops, the flow sensor automatically turns off the Device, switching it to the STANDBY mode (for a description of the main modes, see the paragraph Basic operating modes, DEVICE OPERATION section).

Important!

Make sure that the Device is connected in an electrically safe manner to an electrical network with suitable characteristics (see PRECAUTIONARY MEASURES and DEVICE FEATURES sections).

Disconnecting the power supply from the plug on the Device casing, as well as disconnecting the network cable plug from the power socket is allowed only when the Device is turned off (when the Device is in STANDBY mode). Do not disconnect the power supply plug or the electric network cable plug while the Device is in the OPERATION mode.

To comply with electrical safety measures, the electrical outlet to which the EMERALD Device is connected must work uninterruptedly, have a valid ground contact, and be connected through a residual current device (RCD) or a differential circuit breaker with a rated leakage current of 30 mA!

8. DEVICE OPERATION

Basic operating modes

STANDBY mode.

In the STANDBY mode, the Device is pressurized and connected to the cold water line (with the shutoff valve on the clean water tap closed) and connected to the electric network. Water does not flow through the Device. The LED is not lit. The electronic display is off.

OPERATION mode.

In the OPERATION mode, the shutoff valve on the clean water tap opens, water starts flowing through the Device, the built-in flow sensor turns on the Device, there is a sound signal, the LED lights up green, the voltage and current begin to be displayed on the electronic display. This mode is the main one for Device operation.

In the OPERATION mode, the voltmeter always shows, on average, 24V. This is the voltage applied by the Device power supply to the electrochemical modules. The ammeter readings in the OPERATION mode take on different values depending on the total salinity of the water and the Device pollution degree, characterizing the efficiency of water treatment. The optimal values of the ammeter in the OPERATION mode should be in the range **0.5A – 3.0A**.

If the current strength values are below this range, this means either a low total mineralization of the source water (in this case, an auxiliary mineralizer filter can be placed as a pre water treatment stage before the Device - see add. 7, Table 6), or a high Device pollution degree (in this case, it is necessary to perform flushing (see DEVICE MAINTENANCE section).

Some features of the OPERATION mode.

◆ **After 480 liters** (approximately 8 hours of operation) of purified water in the OPERATION mode, the LED will turn orange when the Device is turned on, indicating that it is DESIRABLE to flush the Device with an acid solution.

◆ **After 600 liters** (approximately 10 hours of operation) of purified water in the OPERATION mode, the LED will turn red when the Device is turned on, indicating that the Device **MUST** be flushed with an acid solution. Using the Device in the OPERATION mode with red color is not allowed by the rules of this operating manual.

EMERALD Device functioning in OPERATION mode

WATER SUPPLY THROUGH A T-BEND WITH A BALL VALVE

To supply water to the Device, it is necessary to smoothly open the shutoff valve on the t-bend installed in the cold water line so that cold tap water begins to flow into the Device.

The vertical position of the valve - no water supply.

Horizontal position of the valve - water is supplied to the Device.

Important! At high water pressure in the water supply system (more than 2 bar), it is not necessary to open the t-bend valve completely. Partial opening of the valve on the t-bend will reduce the overall flow rate of water and lessen the degree of load on the hydraulic components of the Device.

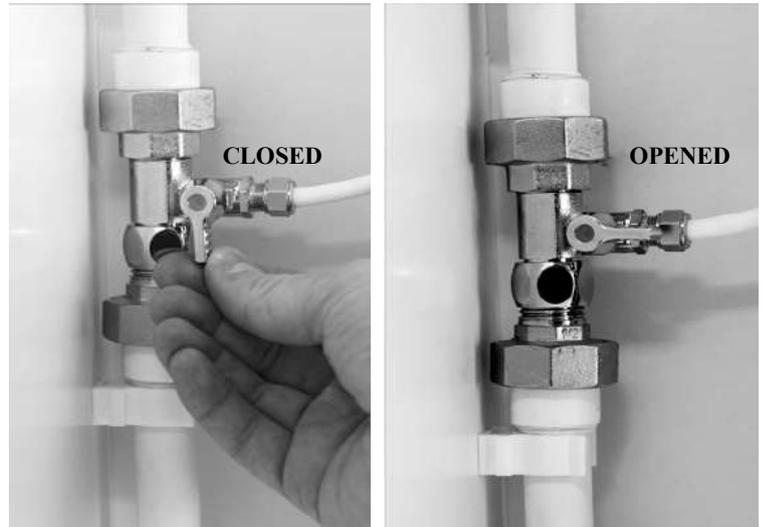


Fig. 14. Water supply to the Device using a t-bend with a ball valve.

USING THE CLEAN WATER TAP

To switch on the Device:

- ◆ Slowly open the valve on the t-bend (Fig. 14) and wait until the Device is completely filled with water (about 10 seconds);
- ◆ To switch the Device on and into the OPERATION mode, open the shutoff valve on the clean water tap (Fig. 15). As soon as water begins to flow through the Device, it will automatically switch to OPERATION mode.
- ◆ When the Device is turned on and in the OPERATION mode, there is a sound signal, the LED located inside the casing lights up, and so does the indicator display (8, Fig. 6), showing voltage (24 volts) and current (measured in Amperes and depending on the total salinity of the treated water, as well as the degree of the Device soiling). See more details in the paragraph The Device operation indication.

To switch off the Device:

- ◆ Close the shutoff valve on the clean water tap (Fig. 15). As soon as the water stops flowing through the Device, it will automatically turn off and switch to STANDBY mode, and the LED and indicator display will turn off.



Fig. 15. The shutoff valve on the clean water tap installed above the kitchen sink.

Water flow setting

Water flow through the EMERALD HOME 60 Device is regulated by:

- ◆ Valve on the water supply t-bend installed in the cold tap water line (Fig. 14);
- ◆ Shutoff valve on the clean water tap (Fig. 15).

Important! The most optimal range of water flow through the EMERALD HOME 60 Device is 0.65 - 1.0 l/min. (40 - 60 l/h)! For high-quality purification and electrical treatment of water, do not set the water flow through the Device to more than 1 l/min. (60 l/h). It is also not recommended to set the water flow to less than 0.5 l/min. (30 l/h.), as in this case the water flow sensor may fail, and the Device will turn off.

During operation, as the electrochemical modules and filter elements of the Device get dirty, the water flow rate may gradually decrease. To restore normal flow rate, it is necessary to flush the Device (see DEVICE MAINTENANCE section).

In case you are unable to set a sufficient level of water flow - see TROUBLESHOOTING GUIDE sections, Tab. 7.

The Device operation indication

Multifunctional LED

The LED built into the Device casing allows you to evaluate:

- ◆ Which of the modes the Device is in;
- ◆ How many liters of treated water have passed through the Device;
- ◆ When to flush the Device;

Electronic Display

The electronic display consists of a voltmeter and an ammeter and allows you to visually evaluate the Device efficiency. The voltmeter (upper numerical scale) indicates the voltage in volts (V) applied to the electrochemical modules. In the EMERALD Device, the voltage is stable and is 24V. The ammeter (lower numerical scale) indicates the current in amperes (A) that flows in the electrochemical modules during water treatment.

The optimal values of the ammeter in the OPERATION mode should be in the range **0.5A – 3.0A**.

The current strength on the ammeter display (Fig. 16) in the OPERATION mode has decreased **by more than 3 times** relative to the initial values (provided the Device is operating on the same water).



Fig. 16. EMERALD HOME 60 Device in the OPERATION mode under the sink.

9. DEVICE MAINTENANCE

To achieve the maximum quality of water purification and electrical treatment in the EMERALD HOME 60 Device, as well as to ensure drinking water quality standards, the user must regularly flush the Device with a solution of citric acid. With timely and uncomplicated maintenance, your Device will produce clean, high quality antioxidant drinking water with the required characteristics for many years.

Internal parts of the Device (electrochemical modules and auxiliary filter elements) are not fast-wearing and are regenerated with a citric acid flushing solution.

Important! The activated carbon post filter is a replaceable filter. For the most efficient water treatment, it is recommended to change this filter every time after carrying out the FLUSHING procedure. Before starting the FLUSHING mode, the post filter must be disconnected. Only after the full completion of the FLUSHING mode a new post filter can be connected. After connecting of a new post filter, be sure to drain the first 15 liters of water without its usage.

The EMERALD Device maintenance consists in regular flushing of the entire system (including electrochemical modules and filter elements) with a citric acid solution to remove accumulated contaminants. The frequency of maintenance of the Device and EMERALD depends on the quality of the source water and the operation mode. On average, when Device operates on tap drinking water that complies with SanPiN 2.1.4.1074-01, The Device should be flushed at least once every 2 months or after 600 liters of purified water (whichever comes first).

The EMERALD Device automatically monitors the consumption of treated water and alerts the user when flushing is required:

- ◆ **After 480 liters** (approximately 8 hours of operation) of purified water in the OPERATION mode, the LED will turn orange when the Device is turned on, indicating that it is DESIRABLE to flush the Device with an acid solution.

- ◆ **After 600 liters** (approximately 10 hours of operation) of purified water in the OPERATION mode, the LED will turn red when the Device is turned on, indicating that the Device MUST be flushed with an acid solution.

Important! LED indicator allows the user to evaluate only the maximum allowable amount of treated water, after which it is necessary to flush the Device. Given the large difference in the quality of the source water in different regions, the need for flushing may occur earlier (before the red color of the LED in the OPERATION mode).

To more accurately determine the Device pollution degree and the need to flush it, the user should focus on the following factors:

- ◆ Reduction of the current strength indicated on the electronic display (Fig. 16) **by more than (three) 3 times** relative to the initial values (provided the Device operates on the same water with the same total mineralization);
- ◆ Reduction of the water flow rate through the Device **by more than 2 (two) times** (provided the same pressure level in the cold water supply line is maintained);
- ◆ Degradation of organoleptic qualities of the treated water;

Preparing the EMERALD Device for FLUSHING mode

Before switching the Device to the FLUSHING mode one should in accordance with the diagram in fig. 17:

- ◆ Turn off the valve on the t-bend (4) installed in the cold water line and open the shutoff valve on the clean water tap (11) to depressurize the system. The shutoff valve on the clean water tap must remain open;
- ◆ Disconnect the water supply tube from the INLET fitting (5). Install a closing plug in the fitting (5) so that the flushing solution does not come out of the fitting;
- ◆ Remove the fixing clip and a closing plug from the FLUSHING fitting (7). Leave this fitting open.

Important! In order to perform the FLUSHING mode more effectively, it is necessary to first remove the remaining water from the Device so that the flushing solution does not mix with the cold water residues inside the hydraulic elements. To do so:

- ◆ Press the FLUSHING mode on/off button (9) once. After pressing the button (9) once, the Device will enter the FLUSHING mode, the LED inside the casing will turn blue, and the built-in circulation pump will start working, removing residual water from the Device through the clean water tap (11). Important! Make sure that the shutoff valve on the clean water tap is in the open position so that residual water flows freely from the tap into drainage. It is forbidden to turn on the FLUSHING mode with the shutoff valve on the clean water tap closed, as this can create excessive pressure and damage the hydraulic elements of the Device;
- ◆ Approximately 20 seconds after pressing the button (9), when the main volume of water has already left the Device, you need to press the button (9) once more to stop the FLUSHING mode and turn off the pump;
- ◆ After stopping the FLUSHING mode, disconnect the Device from the electric network by disconnecting the power supply from the plug (2) on the Device casing.

Important! Do not attempt to completely remove residual water from the Device, as small amounts of water will still continue to flow out of the Device when the pump is on. The main thing is to remove the bulk of water from the Device, so it is not recommended to use the switched on pump in this mode for more than 20 seconds!

Preparing the citric acid flushing solution

To carry out the EMERALD Device flushing procedure, it is necessary to prepare one and a half liters of citric acid flushing solution in the EMERALD HOME flushing tank (12, Fig. 17). The citric acid flushing solution is prepared at the rate of 150 grams of citric acid per one and a half liters of water. It is recommended to dilute citric acid crystals in hot water, and flush with a solution with a temperature of 60-70 ° C (not higher!).



Important! It is not allowed to flush the EMERALD Device with a citric acid solution with a temperature of more than 70°C. This can damage the hydraulic elements of the system! Use temperature gauges to accurately determine the temperature of the flushing solution.

All work related to the preparation of the flushing solution, as well as the entire flushing process of the Device, should be carried out using personal protective equipment for the skin and eyes!

Connection diagram of EMERALD Device in FLUSHING mode

The procedure for connecting the EMERALD Device in the FLUSHING mode under the sink is carried out in accordance with the diagram in fig. 17 and consists of the following steps:

- ◆ Preparation of a citric acid flushing solution in the flushing tank (12);
- ◆ Connecting the flushing solution supply tube to the Device (13,7);
- ◆ Connecting the flushing solution outlet tube (6,14);
- ◆ Connecting the Device to the electric network (2,3).

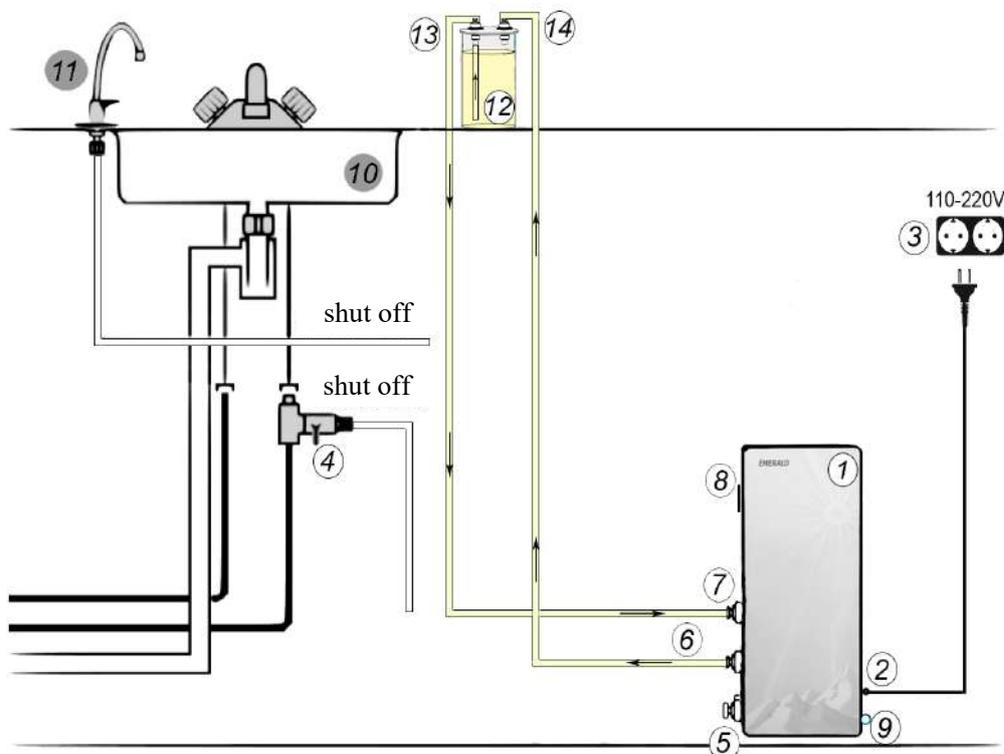


Fig. 17. Connection diagram of EMERALD Device in FLUSHING mode under the sink.

1. EMERALD HOME 60 Device;
2. Plug for connecting the power supply (adapter) to the Device;
3. Power supply (adapter) connected to the electrical network;
4. A t-bend with a ball valve for supplying water to the Device (the ball valve on the t-bend is closed and is in a vertical position - there is no water supply);
5. INLET fitting for supplying water to the Device (the water supply tube is disconnected and a closing plug is installed in the fitting while the Device is in the FLUSHING mode);
 - 5.1. Mud filter with a set of fittings for connection for preliminary mechanical water purification (disabled while in the FLUSHING mode);
6. CATHOLYTE fitting (the outlet of the flushing solution back to the flushing tank);
7. FLUSHING fitting for supplying flushing solution to the Device;
8. Electronic display with ammeter and voltmeter;
9. FLUSHING mode ON/OFF Button;
10. Kitchen worktop/sink;
11. Clean antioxidant water outlet tap with a shutoff valve;
12. EMERALD HOME flushing tank;
13. Fitting for flushing solution supply from the flushing tank to the Device (the intake tube is lowered into the tank with the flushing solution);
14. Fitting for flushing solution return from the Device back to the flushing tank.

FLUSHING mode

To start the FLUSHING mode, the EMERALD Device must be connected according to the diagram in fig. 17 and be in STANDBY mode. All hydraulic and electrical connections must be securely fixed. The flushing tank must be placed on a level and stable surface (e.g. on the worktop next to the sink, on the floor or on the bottom shelf of the sink cabinet).

FLUSHING is carried out in a semi-automatic mode and consists of three main stages:

1) **CIRCULATION** stage. At this stage, the built-in pump is turned on and the process of pumping and circulating of the flushing solution through all the main hydraulic elements of the Device begins.

2) **HOLD UP** stage. At this stage, the built-in circulation pump is turned off and the flushing solution is kept inside the hydraulic elements of the Device to more effectively dissolve the accumulated contaminants.

3) **WASHING OUT** stage. At this stage, the Device is connected again according to the OPERATION mode scheme (Fig. 8) to wash out dissolved contaminants and residual citric acid flushing solution from the Device using cold tap water supply.

To turn on the FLUSHING mode, press the on/off button FLUSHING mode once (9, Fig. 17). After pressing the button, the LED inside the casing turns blue, and the built-in circulation pump starts working and circulates the flushing solution through the system. Then, for 20 minutes, the Device works in automatic mode, alternating between the CIRCULATION and HOLD-UP stages. This procedure consists of 4 similar successive cycles, each lasting for 5 minutes. and including:

- ◆ CIRCULATION stage - **4 min.**
- ◆ HOLD-UP stage - **1 min.**



Fig. 18. Connection example of EMERALD Device in FLUSHING mode.

In 20 minutes, after completion of all 4 cycles, the LED in the Device starts flashing blue, signaling that the CIRCULATION and HOLD-UP stages are completed.

Next, the user should disconnect the flushing tank and connect the Device according to the usual scheme of the OPERATION mode (see Fig. 8). In this mode, one should carry out the WASHING-OUT stage and rinse the Device with cold tap water to wash out the dissolved dirt and residues of the citric acid flushing solution.

The WASHING-OUT stage is carried out for 15 minutes. First one should open the valve on the t-bend (4, Fig. 8) to supply cold water to the Device, and then open the shutoff valve on the clean water tap (11, Fig. 8) so that water flows through all hydraulic connections of the system and drains into the sewer. During 15 minutes of the WASHING-OUT stage, the full OPERATION mode does not start, the LED inside the casing flashes green, the electrochemical modules are not energized, the current on the ammeter is 0. After 15 minutes, the WASHING-OUT mode is

automatically turned off (the green LED stops flashing) and the Device enters the normal OPERATION mode: a sound signal is given, the LED lights up constantly green, voltage is applied to the electrochemical modules and the current strength indicator appears on the ammeter.

This completes the entire FLUSHING mode!

The Device is ready for use in OPERATION mode again!

Some features of the FLUSHING mode.

- ◆ The user can always use the FLUSHING mode on/off button (9, Fig. 17), pause the FLUSHING mode (press once) and start it from the beginning (press once again). This function allows the user to pause the FLUSHING mode if necessary (for example, if there is a problem with pumping the flushing solution into the Device) and resume this mode again.
- ◆ After activating/deactivating the FLUSHING mode, when water is subsequently added, the WASHING-OUT phase always starts for the first 15 minutes, regardless of whether the FLUSHING program has been completed or not. This function is non-volatile and has priority. This allows for protecting the user and the Device itself in case of violation of the FLUSHING mode (for example, in the event of a power failure of the Device and during the FLUSHING mode).
- ◆ If any malfunction occurs during the FLUSHING mode, you should repeat this procedure from beginning to end before using the Device in the OPERATION mode.
- ◆ To increase the useful life of the EMERALD HOME flushing tank and connecting tubes, we recommend that after the FLUSHING mode, wash out thoroughly with warm tap water, dry and remove these elements before the next flushing.
- ◆ Please note that a small amount of water or flushing solution may leak from the tubes and fittings of the Device during connection/disconnection in the FLUSHING mode.

Mud filter maintenance

During the maintenance of the Device, it is also necessary to inspect and, if necessary, clean the stainless steel filter mesh (2, Fig. 19) built into the mud filter case (1 and 3, Fig. 19). To do so:

- ◆ After making sure that there is no pressure in the water supply line, disconnect the mud filter from the water supply tube and the Device. Next, manually or using an adjustable wrench, unscrew the upper part of the case (1, Fig. 19) of the mud filter from the lower part (3, Fig. 19);
- ◆ Remove the filter mesh and, if soiled, thoroughly rinse the mesh under running water for 2 minutes;
- ◆ If part of the dirt keeps on the filter mesh, it must be soaked for 20 minutes in the citric acid flushing solution. The parameters of the solution and the method of preparation are described in the paragraph “*Preparing the citric acid flushing solution*”. For soaking the filter mesh, prepare 500 ml of the flushing solution from a proportion of 50 grams of citric acid per 500 ml of water. Citric acid crystals are recommended to be diluted in hot water, and soaking is carried out in the solution with a temperature of 60-70 ° C (not higher!);
- ◆ After soaking the filter mesh in the solution of citric acid, it must be thoroughly rinsed again under running water for 2 minutes to remove dissolved impurities and residues of the flushing solution;
- ◆ Put the filter mesh tightly back into the bottom part of the mud filter case and screw the upper part of the case onto the lower one until it stops (manually or using an adjustable wrench).



Fig. 19. Disassembled mud filter.

Important! When tightening the mud filter case, especially when using an adjustable wrench, do not overtighten this connection, as this can lead to violations (including hidden ones, with long-term consequences) in the integrity of the design and tightness of the mud filter elements.

10. TROUBLESHOOTING GUIDE

Table 7. Troubleshooting guide

Trouble	Probable Cause	Troubleshooting practice
<p>Device does not turn on.</p> <p>LED and electronica display do not light up.</p>	<p>1. The hydraulic and electrical connections of the Device are connected incorrectly.</p> <p>2. The flow sensor does not work and does not turn on the Device due to insufficient pressure and/or insufficient water flow rate in the Device.</p> <p>3. No electrical contact/electric network power</p>	<p>1. Connect the hydraulic and electrical connections according to the DEVICE CONNECTION section.</p> <p>2. Ensure the necessary pressure in the tap water supply line (see Table 1), and also set the water flow rate in the Device to at least 0.65 l/min. (40 l/h).</p> <p>3. Check for electrical contact/electric network power.</p>
<p>Unable to increase water flow rate.</p> <p>The water flow rate in the Device is below normal.</p> <p>The citric acid flushing solution is not pumped into the Device.</p>	<p>1. Insufficient pressure in the tap water line.</p> <p>2. The filter elements are dirty and/or deposits of hardness salts have formed in the cathode chambers of the electrochemical modules.</p> <p>3. The filter element at the mud filter is clogged (2, Fig. 19)</p>	<p>1. Provide the necessary pressure in the water supply line (see Table 1).</p> <p>2. Flush the Device with a citric acid solution and change replaceable filters (see DEVICE MAINTENANCE section).</p> <p>3. Rinse the mud filter (see Section 9, paragraph Mud filter Maintenance)</p>
<p>The citric acid flushing solution is not pumped into the Device.</p> <p>It is necessary to pause the FLUSHING mode for troubleshooting.</p>	<p>1. The hydraulic and electrical connections of the Device in FLUSHING mode are made incorrectly.</p> <p>2. The FLUSHING mode can be paused using the on/off FLUSHING mode button.</p>	<p>1. Join the hydraulic and electrical connections to the FLUSHING mode according to the diagram in fig. 17. Check that the connection tubes pass freely along the radii without kinks.</p> <p>2. To pause the FLUSHING mode, press the FLUSHING mode on/off button (9, Fig. 17) once. To start the FLUSHING mode, press the button again.</p>

11. WARRANTY

The manufacturer guarantees that the Device complies with the requirements of the technical specifications, subject to observing the conditions of operation, transportation, storage and installation specified in this Operating Manual. The period of free warranty service for EMERALD Device is 2 (two) years from the date of its sale, but not more than 3 (three) years from the date of manufacture. In the absence of the date of sale and the stamp of the trading organization, the period of free warranty service is calculated from the date of production.

The manufacturer warrants that the EMERALD Device (excluding accessory and replacement filters/cartridges) will be free from defects (as defined below) under correct use for a period of 2 years from the date of purchase. A product is considered to be defective if the defect is due to defective material or workmanship, or if such a defect interferes with or impairs the end customer's use of the EMERALD Device.

Warranty obligations are valid only in the presence of correctly completed payment documents and this Operating Manual.

The warranty does not cover:

- ◆ EMERALD Device, which has been used for other purposes or in a way that is contrary to the instructions in this Operating Manual;

- ◆ Any EMERALD Device that has been used incorrectly, crashed, physically damaged, improperly installed or misused, altered, mishandled, or exposed to adverse external factors (including but not limited to, lightning, flood or fire);

- ◆ Any EMERALD Device that has been damaged due to improper repair, modification, alteration or service by anyone other than an authorized warranty and service representative of the manufacturer or an authorized sales partner;

- ◆ Any EMERALD Device found to be defective or degraded due to the use of any non-original spare parts or accessories (including non-original water pre-treatment filters) not intended for use with the EMERALD Device;

- ◆ Any EMERALD Device not installed using the original kit supplied with the pack.

The manufacturer is also released from liability in the following cases: EMERALD Device or its parts have external mechanical damage; EMERALD Device has not been serviced in a timely manner (in accordance with the instructions of this Operating Manual); the filter elements (if they are included in the delivery and the specific Device model) have exhausted their resource, but have not been replaced or serviced in a timely manner; this Operating Manual with the dates of production and/or sale are lost and there are no other ways to determine the service life of the product; when the consumer uses spare parts from other manufacturers that are different from the original components included in the kit; when installing and operating the Device in excess of the limits established by the technical requirements for the operating conditions of the product; under the influence of force majeure circumstances; in other cases provided for by law.

Legal disclaimers

The design of EMERALD Devices is constantly being improved, so the product you have purchased may differ slightly from that described in this Operating Manual while maintaining all the declared performance properties. The manufacturer reserves the right to make changes and improvements to the Device design that do not impair the Device operational properties and the quality of the resulting product;

Although all necessary measures have been taken to verify the text of this Operating Manual, the manufacturer does not guarantee its completeness or the absence of errors.

Claims

EMERALD ECOTECHNOLOGIES LLC is the authorized company to receive all complaints and requests, including warranty claims for the EMERALD Device.

To make claims under this warranty, you can leave a claim on our official website www.emerald.eco, as well as call the company's service department at the unitary number: 8 (495) 928-77-71 or write to info@emerald.eco. You are kindly requested to contact us at the above contacts before you decide to send the Device for diagnostics.

In order to make a claim under this warranty, the buyer must notify EMERALD ECOTECHNOLOGIES LLC in writing of the defect found within two (2) months after the defect was discovered, but no later than two (2) months after the end of the relevant warranty period.

Important! The manufacturer and official trading partners are not responsible in case of problems caused by the condition of the water pipes and sanitary fittings of the buyer. The unsatisfactory condition of the supply water pipes, plumbing fittings and the buyer's failure to comply with the conditions necessary for connecting the Device and the conditions set forth in this Operating Manual are grounds for refusing to install the Device, as well as warranty service. In the case of independent connection and service maintenance of Device, the manufacturer and official trading partners are not responsible and do not accept claims in case of problems caused by violation of the rules for connection and maintenance of Device stated in this Operating Manual. The manufacturer and official trading partners are not responsible and do not accept claims if the EMERALD Device was used for other purposes or in a way that contradicts the instructions in this Operating Manual.

12. TRANSPORT AND STORAGE

EMERALD HOME 60 Device does not contain harmful, toxic, flammable or explosive substances. Transportation of the Device can be carried out by any type of land or air transport (except for unheated compartments during the cold season). The product is stored in a packed form, avoiding drying, freezing, direct sunlight, at a distance of at least 1 meter from heating Devices, at an ambient temperature of at least 5 °C and not above 40 °C, away from substances with a strong odor. EMERALD Device has a warranty period of 3 (three) years from the date of manufacture.

13. ACCEPTANCE AND SALE CERTIFICATE

EMERALD HOME 60 Device (shortened name EMERALD) complies with Tech. cond. № 28.29.12-001-19313776-2018 and is recognized as serviceable.

Factory number _____
Release date _____
Quality control test _____

MANUFACTURER:

EMERALD ECOTECHNOLOGIES Limited Liability Company (abbreviated name EMERALD ECOTECHNOLOGIES LLC)

600035, Russia, Vladimir city, Kuibysheva street, 26A



EMERALD HOME 60 Device (shortened name EMERALD) is manufactured by EMERALD ECOTECHNOLOGIES LLC. The company EMERALD ECOTECHNOLOGIES LLC has the exclusive rights to manufacture EMERALD Devices, as well as to carry out their service and warranty maintenance. The company EMERALD ECOTECHNOLOGIES LLC has the exclusive right to transfer to its official trading partners all the necessary powers for the sale of EMERALD Devices, as well as for their service and warranty maintenance.

For service and warranty issues, please contact:

EMERALD ECOTECHNOLOGIES Limited Liability Company

600035, Russia, Vladimir city, Kuibysheva street, 26A

Tel.: 8 (495) 928-77-71; E-mail: info@emerald.eco;

Website: www.emerald.eco

WARRANTY CARD

Date of sale _____

Shop stamp _____

L.S.

Electronic version of this document is available by the link below:



APPENDIX №.1. POST FILTER CONNECTION

To enhance the antioxidant properties of purified water, as well as to improve its organoleptic qualities, it is possible to connect a replaceable activated carbon post filter after the EMERALD HOME 60 Device.

Table 8. Activated carbon post filter delivery set

№	Name	Number, pcs.	Appearance
1	Activated carbon post filter, IL-11WC -EZ, replaceable, with quick-release fitting for 1/4" tube, 1 pcs.	1	
2	Fixing clips for fastening the post filter, 2 pcs.	2	
3	Self-tapping screws for mounting fixing clips, 2 pcs.	2	

The post filter is connected after the purified water goes out from the CATHOLYTE fitting (6, Fig. 8) and before supplying the water to clean water tap (11, Fig. 8). To connect the post filter in accordance with Fig. 19.1.:

- ◆ Mount the fixing clips to the wall of the kitchen sink cabinet using self-tapping screws. The clips should be placed vertically above each other. The distance between the clips is 10 cm;
- ◆ Slowly install the post filter into the fixing clips;
- ◆ Cut the CATHOLYTE outlet tube into two parts;
- ◆ According water flow direction arrows on the filter housing, the first part of the 1/4" connecting tube which comes out of CATHOLYTE fitting (6, Fig. 8) is connected with the upper quick-release fitting of the post filter (1);
- ◆ The second part of the tube is connected with the lower quick-release fitting of the post filter (2) and is connected to the clean water tap (11, Fig. 8);
- ◆ All quick-release fittings are fixed with blue fixing clip-locks.



Fig. 19.1. Activated carbon post filter connection.

Important! The activated carbon post filter is a replaceable filter. For the most efficient water treatment, it is recommended to change this filter every time after carrying out the FLUSHING procedure of the EMERALD HOME 60 Device.

Before starting the FLUSHING mode, the post filter must be disconnected. Only after the full completion of the FLUSHING mode a new post filter can be connected. After connecting of a new post filter, be sure to drain the first 15 liters of water without its usage.

CONNECTION DIAGRAM OF EMERALD HOME 60 DEVICE UNDER THE SINK WITH POST FILTER.

The connection of the EMERALD Device is carried out in accordance with the diagram in fig. 19.2 and consists of the following steps:

- ◆ Connection to the cold water supply line (4,5);
- ◆ Connection of the post filter and installation of the clean water tap (6, 6.1, 11);
- ◆ Connecting the Device to the electric network (2,3).

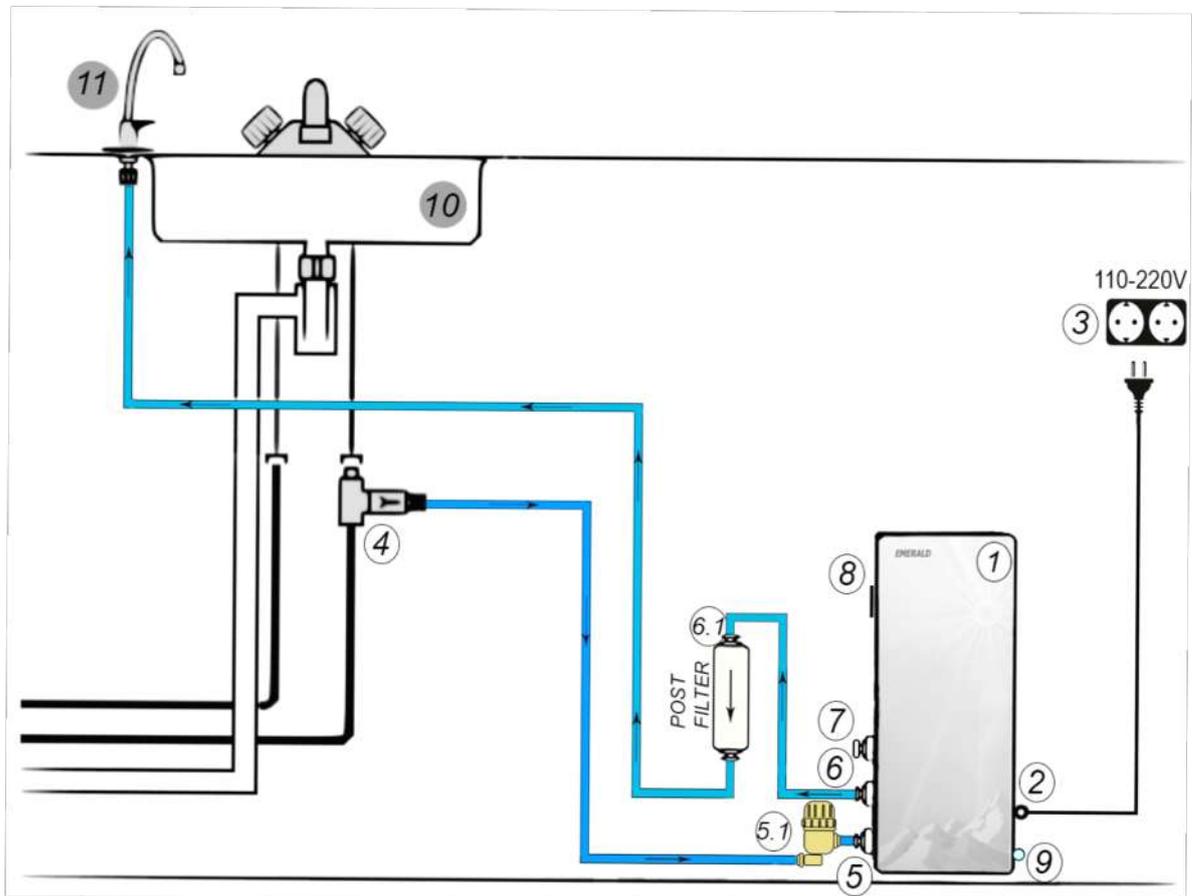


Fig. 19.2. Connection diagram of EMERALD Device under the sink with post filter.

1. EMERALD HOME 60 Device;
2. Plug for connecting power supply (adapter) to Device;
3. Power supply (adapter) connected to the electrical network;
4. A t-bend with a ball valve for supplying water to the Device;
5. INLET (TAP WATER) fitting for supplying water to the Device;
- 5.1. Mud filter with a set of connection fittings for mechanical pretreatment of water (or other water pretreatment system);
6. CATHOLYTE (CLEAN WATER) fitting for the outlet of purified antioxidant water;
- 6.1. Post filter with activated carbon;
7. FLUSHING fitting for supplying flushing solution (used only in FLUSHING mode);
8. Electronic display with ammeter and voltmeter;
9. FLUSHING ON/OFF Button;
10. Kitchen worktop/sink;
11. Clean antioxidant water outlet tap with a shutoff valve.

APPENDIX №.2. CONNECTING EMERALD DEVICE ABOVE THE SINK

An alternative way to connect the EMERALD HOME 60 Device is to connect it above the sink through a special diverter nozzle, which is put on the kitchen faucet spout instead of the standard aerator (Fig. 20, 21). In this option, the Device is located without fastening on the worktop/sink, or it is fastened to the wall with screws, for which there are special hangers on the rear wall of the Device casing. To connect the EMERALD Device above the sink, use a diverter nozzle with a set of adapters (purchased separately and not included in the standard delivery set) to supply cold tap water directly from the kitchen faucet to the Device.



Fig. 20. Connecting the EMERALD Device above the sink through a diverter nozzle.

Important! Be sure to read all the above sections of this Operating Manual before starting the procedure of connecting and using the Device above the sink! This will allow you to make sure that the way you have chosen to connect the EMERALD Device above the sink does not contradict other conditions of this Operating Manual. In case of violation of the installation and operation conditions of the EMERALD Device, warranty claims may be rejected.



Fig. 21. Nozzle-diverter with a set of adapters for connecting Device above the sink.

The main elements of the diverter (Fig. 21):

1. Female thread F22 for connection to a faucet spout or adapters;
2. Top nipple with clamping nut for water supply to the Device;
3. Bottom nipple with a clamping nut for the outlet of purified water from the Device through a separate line;
4. Catholyte outlet in Device water supply mode;
5. Main line for the operation of the diverter in the mode of a conventional kitchen faucet.
6. Water flow regulator/switch on the diverter.

The following adapters are also included with the diverter *:

- ◆ Diverter adapter M G1/2 x M 22;
- ◆ Diverter adapter F G1/2 x M 22;
- ◆ Diverter adapter M 22 x M 24;
- ◆ Worm-drive clamp adapter for diverter.

* M (male) – external thread, F (female) – internal thread, G1/2" – cylindrical pipe thread 1/2".

INSTALLING DIVERTER ON THE FAUCET.

Turn off the cold water supply valve before connecting, and then open the cold water valve on the kitchen faucet to relieve pressure in the pipe.

To connect the diverter to the faucet (1, Fig. 22):

- ◆ Remove the regular aerator from the faucet spout;
- ◆ Using the necessary adapters from the delivery set, install the diverter on the faucet;
- ◆ To fix the diverter on the faucet, press it against the faucet and tighten the ring with sealing rubber in the base of the diverter by hand or with an adjustable wrench.
- ◆ Check the reliability and tightness of the connection.

To connect the tubes to the diverter (2, Fig. 22):

- ◆ Unscrew both clamping nuts from the nipples on the side of the diverter;
- ◆ Pass the 1/4" tube through each nut and put the tubes on the diverter nipples until they stop;
- ◆ Tighten the clamping nuts to tightly fix the tubes on the nipples.



Fig. 22. Connecting the diverter to the faucet.

SUPPLYING WATER TO THE DEVICE WITH A DIVERTER.



Fig. 23. Switching water supply modes on the diverter.

Vertical position of the water flow regulator on the diverter (1, Fig. 23) - water drains into the sink and is NOT supplied to the Device. The kitchen faucet operates normally.

Horizontal position of the water flow regulator on the diverter (2, Fig. 23) – water is supplied to the Device. The kitchen faucet operates in cold tap water supply mode to the Device.

Important! After the Device is fully connected, make sure that all connections are tight. During installation, pay attention to the fact that the inlet and outlet tubes pass freely along radii excluding kinks. Do not install the system in a place where its maintenance would be difficult. Do not install the system in a place where the Device casing will be exposed to water or direct sunlight.

CONNECTION DIAGRAM OF EMERALD HOME 60 DEVICE ABOVE THE SINK.

The procedure for connecting the EMERALD Device is carried out in accordance with the diagram in fig. 24 and consists of the following steps:

- ◆ Installing the diverter on a kitchen faucet (the procedure is described above);
- ◆ Connecting the Device to the cold water supply line (4.5);
- ◆ Connecting the Device to the purified water outlet line (6.11);
- ◆ Connecting the Device to the electric network (2,3);

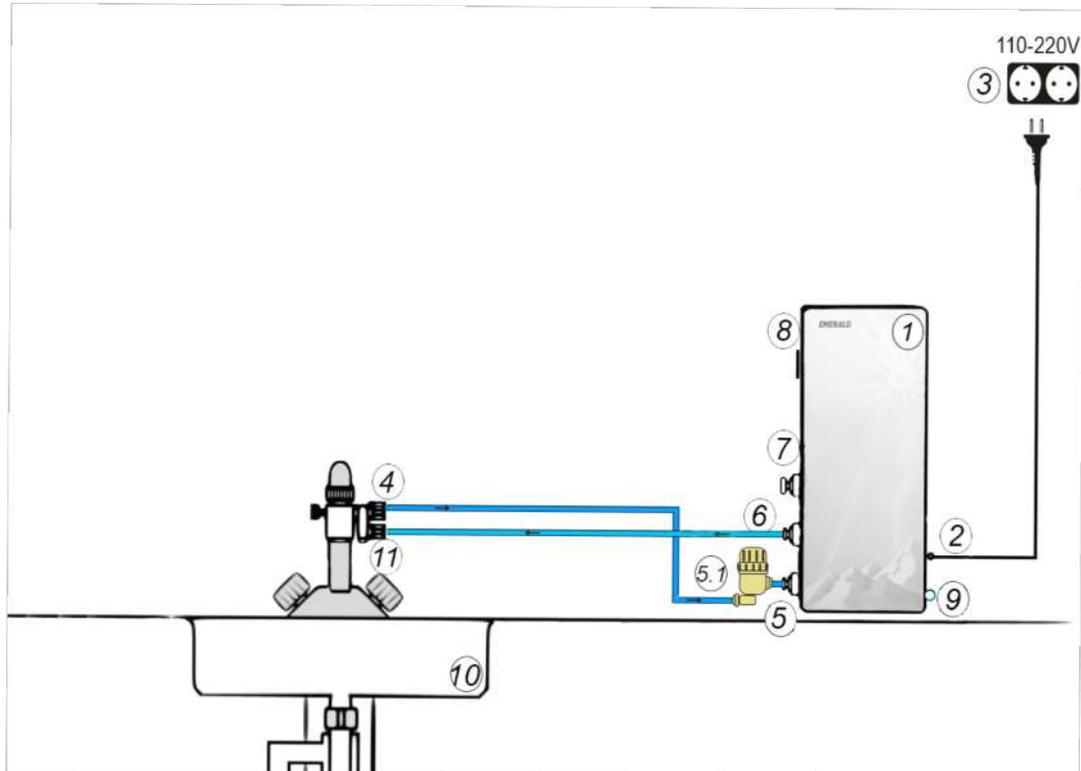


Fig. 24. Connecting diagram of EMERALD Device above sink with diverter.

1. EMERALD HOME 60 Device;
2. Plug for connecting the power supply (adapter) to the Device;
3. Power supply (adapter) connected to the electric network;
4. Top nipple on the diverter for cold water supply;
5. INLET (TAP WATER) fitting for supplying water to the Device;
- 5.1. Mud filter with a set of fittings for connection for preliminary mechanical water purification;
6. CATHOLYTE (CLEAN WATER) fitting for the outlet of purified antioxidant water;
7. FLUSHING fitting for supplying flushing solution (used only in FLUSHING mode);
8. Electronic display with ammeter and voltmeter;
9. FLUSHING ON/OFF Button;
10. Kitchen worktop/sink;
11. Button nipple on the diverter for purified antioxidant water outlet.

*CONNECTING DIAGRAM OF EMERALD HOME 60 DEVICE
IN FLUSHING MODE ABOVE THE SINK.*

The procedure for connecting the EMERALD Device in the FLUSHING mode above the sink is carried out in accordance with the diagram in fig. 25 and consists of the following steps:

- ◆ Preparation of the citric acid flushing solution in a container (12);
- ◆ Connecting the flushing solution supply tube to the Device (13,7);
- ◆ Connecting the flushing solution outlet tube from the Device (6,14);
- ◆ Connecting the Device to the electric network (2,3);

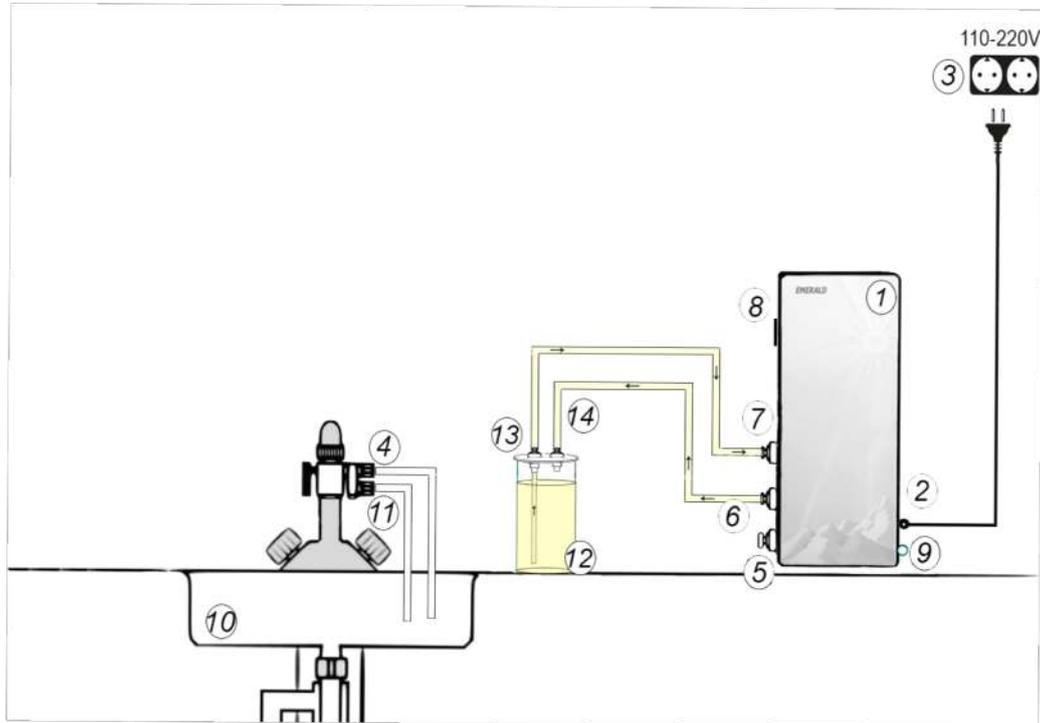


Fig. 25. Connecting diagram of EMERALD Device in FLUSHING mode above the sink.

1. EMERALD HOME 60 Device;
2. Plug for connecting the power supply (adapter) to the Device;
3. Power supply (adapter) connected to the electric network;
4. Top nipple on the diverter for cold water supply (the tube is disconnected from Device);
5. INLET fitting for supplying water to the Device (the water supply tube is disconnected and a plug is installed in the fitting for the duration of the FLUSHING mode);
- 5.1. Mud filter with a set of fittings for connection for preliminary mechanical water purification (disabled for the duration of the FLUSHING mode);
6. CATHOLYTE fitting for the outlet of purified antioxidant water;
7. FLUSHING fitting for supplying flushing solution;
8. Electronic display with ammeter and voltmeter;
9. FLUSHING ON/OFF Button;
10. Kitchen worktop/sink;
11. Button nipple on the diverter for purified antioxidant water outlet (the tube is disconnected from the Device).
12. EMERALD HOME flushing circulation tank;
13. Fitting 1 - intake of the flushing solution from the flushing tank (the inlet tube is lowered into the tank with the flushing solution);
14. Fitting 2 - return of the flushing solution from the Device back to the tank.

APPENDIX №3. CERTIFICATES

1. CE CERTIFICATE OF CONFORMITY OF THE EUROPEAN UNION

شهادة - 증명서 - Certificat - Сертификат - 證明書

Form QAT_10-M05, version 00, effective since March 25th, 2020



Certificate of Compliance

No. 0D201203.EEW054

Certificate's Holder: EMERALD ECOTECHNOLOGIES, LLC.
600026, Russia, Vladimir city, Kulbysheva street, 26A

Certification ECM Mark: 

Product: Devices for Purification and Electrochemical Treatment of Water and Aqueous Solutions

Brand: EMERALD

Model[s]: PRO, HOME, OFFICE, COTTAGE, SPA, STEL, VENDING, ECO, BIO, AQUA

Verification to: Standard:
EN 60335-1:2012/A13:2017, EN 55014-1:2017,
EN 55014-2:2015, EN 61000-3-2:2014,
EN 61000-3-3:2013

related to CE Directive(s):
2014/35/EU (Low Voltage)
2014/30/EU (Electromagnetic Compatibility)

Remark: This document has been issued on a voluntary basis and is a product of the manufacturer. It is our opinion that the technical documentation received from the manufacturer is satisfactory for the requirements of the ECM Certification Mark. The conformity mark above can be affixed on the products according to the ECM regulation about its use and its use.

Additional information: Additional information about the marking:
The manufacturer is responsible for the CE-Marking process, and if necessary, must refer to a Notified Body. This document has been issued on the basis of the regulation on ECM Voluntary Mark for the certification of products. RG01_ECM rev.3 available at www.entecema.it

Issuance date: 03 December 2020
Expiry date: 02 December 2025

Reviewer
Technical expert
Amanda Payne



Addressee
ECM Service Director
Luca Boganni



Ente Certificazione Macchine Srl
Via C.A. Bello, 243 - Loc. Castello di Serravalle - 40053 Valsamoggia (BO) - ITALY
☎ +39 051 6705141 | ✉ +39 051 6705156 | ✉ info@entecema.it | www.entecema.it

2. RoHS EUROPEAN UNION DECLARATION OF CONFORMITY



EC Declaration of Conformity

No: DaC.047.2020 Dated «03» December 2020

RoHS Directive (2011/65/EU)

of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast).

Manufacturer: EMERALD ECOTECHNOLOGIES LLC

Legal address: 600026, Russia, Vladimir city, Kulbysheva street, 26A

Product: Devices for purification and electrochemical treatment of water and aqueous solutions

Brand: EMERALD

Type/Model: PRO, HOME, OFFICE, COTTAGE, SPA, STEL, VENDING, ECO, BIO, AQUA

Pb, Hg, Cd, Cr (VI), PBBs and PBDEs could not be detected over the limited by the European Directive 2011/65/EU (recast).

This is to certify that, on the basis of the tests, the above described object of the declaration corresponds to the "Directive" 2011/65 / EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast). It is possible to use RoHS marking demonstrate the compliance with protecting environment.

Signed for and on behalf of the manufacturer by

Authorized representative: Business Mission GmbH

Address: Loozener Straße 55, 30519 Hannover, Germany

Name and function: Director Julia Tsybulevska

Signature / Stamp:  

RoHS

3. ISO 9001-2015 CERTIFICATE OF CONFORMITY OF THE QUALITY MANAGEMENT SYSTEM



4. EAC CERTIFICATE OF CONFORMITY OF THE EAEU CUSTOMS UNION

