# ELECTRIC HEATER
# DAT kop 6,9,12kW

## OPERATING INSTRUCTION

**Dear customer!**
You have purchased a high quality product with our current line of wall electric boilers.
We are confident that our product will serve you long and reliably. With its service must follow certain rules, so in your interest to carefully read the operating instructions and act in accordance with all guidelines outlined in our leadership.

## General information

The electric boilers (the boiler) designed to heat the heat carrier in the heating closed systems with forced circulation.
In the boiler there is a hydraulic group using a synchronous pump with EEI≤0,20.
Boilers equipped regulatory and security features that provide the ability to control temperature, protection from the heat carrier temperature increasing and decreasing working pressure.
There is sensor limiting the maximum pressure of 0.3 MPa in the boiler, pipe for pouring heat carrier and drain for draining heat carrier and thermomanometer.
Heat exchanger tank made of steel with a corrosion resistant coating quality. The tank has a robust thermal insulation.
Heating elements made of stainless steel. The case of the boiler is made of steel with high quality powder paint coating.
**In boilers provided the ability to connect room thermostat. ATTENCION Only 0V on/off thermostat!.**

## Technical data

Table 1 shows the technical data which contains information in accordance with the requirements Ecodesign directive 2009/125/EU, REGULATION (EU) No 811/2013, REGULATION (EU) No 813/2013.

| MODEL / PARAMETR | KOP 4,5 230V/400V | KOP 6,0 230V/400V | KOP 9,0 230V/400V | KOP 12,0 400V | KOP 15,0 400V |
|---|---|---|---|---|---|
| Rated voltage, V 50Hz | 230/400 | | | 400 | |
| Rated power $P_{rated}$, kW | 1,5/3,0/4,5 | 2,0/4,0/6,0 | 3,0/6,0/9,0 | 4,0/8,0/12,0 | 5,0/10,0/15,0 |
| Rated current, A | 21,0/(3x7,0) | 27,0/(3x9,1) | 40,0/(3x13,6) | 3x18,2 | 3x22,7 |
| Working pressure, MPa | 0,2 | | | | |
| Volume heat exchanger, Litres | 2,3 | | 2,4 | | |
| Max. working temperature, °C | 85,0 | | | | |
| Connection wires section*, $mm^2$ (Cu wires) | 4,0/1,5 | 6,0/2,5 | | 4,0 | |
| Mass, кg | 13,0 | | | 15,0 | |
| Dimension, mm | 745x220x147 | | | | |
| Noise level, dB | 49 | | | 52 | |
| The seasonal space heating energy efficiency ($\eta_s$ ) % | 36 | | | | |
| Energy efficiency classes | D | | | | |

* - In the numerator, the value for the supply voltage 230 V, in the denominator - is for 400 V.

| | |
|---|---|
| Protection | IP22 |
| The class protection on an electric safety | Class I |
| Ambient of operating temperatures, $^0$C | 5 – 40 |

The operating modes of the pump and the instruction are given in Appendix 2

## Complete

Into a complete set of delivery enters:

- The boiler, pcs. 1
- The operation instruction, psc. 1
- Packing, pcs., 1

## Safety requirements

**WARNING!**

This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved:

- children shall not play with the appliance
- cleaning and user maintenance shall not be made by children without supervision

Children of less than 3 years should be kept away unless continuously supervised.

Children aged from 3 years and less than 8 years shall only switch on/off the appliance provided that it has been placed or installed in its intended normal operating position and they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children aged from 3 years and less than 8 years shall not plug in, regulate and clean the appliance or perform user maintenance.

**WARNING!** Installation, connection, grounding and maintenance of the boiler must be carried out by specialists of service centers that have a license for the execution of works.

**WARNING!** To connect the boiler from the counter or switchboard, a separate line must be laid on which the disconnection device is installed to ensure the isolation of all poles and an automatic safety switch. The circuit breaker must be in an accessible position.

Follow the rules and procedures for connecting to the power supply. Do not use a non-functioning boiler!

When operating the boiler it is necessary to comply with the rules of fire safety!

**WARNING!** When installing and operating, it is necessary to comply with the requirements of this operating manual.

**ATTENTION** is forbidden:

- Operation of the boiler without ground!
- Operation of the boiler without a protective automatic circuit breaker in the mains!

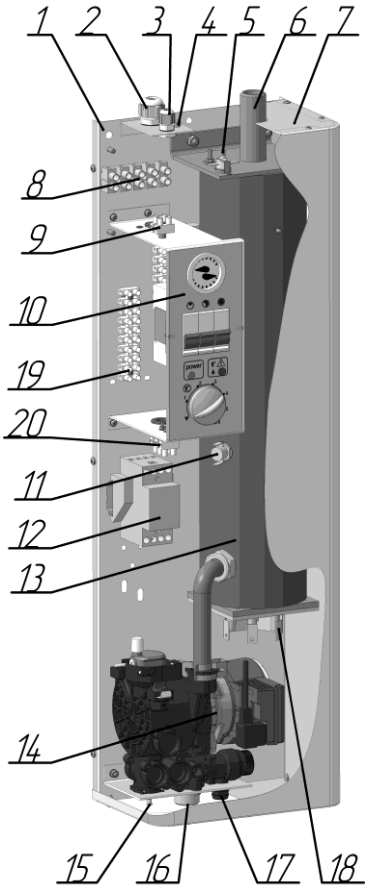
Safety rules for boiler operation:

- turn on the boiler only after making sure that the grounding and the power supply cable are not mechanically damaged; the housing cover is closed and the boiler is filled with coolant (water);
- the boiler feed network must be made of copper wire with a cross section not less than specified in the table 1 of this manual for the corresponding model of the boiler;
- to ground the boiler, if there is no ground tire in the room, the installation of the ground loop must be carried out.
- the grounding should be checked before the boiler is put into operation and at least once a year in the course of operation by the forces of representatives of local energy supplying organizations with the obligatory drawing up of an act, which is attached to this manual.
- before carrying out works that are connected with the necessity to remove the cover of the case, sure to disconnect the boiler from the power supply on the electric shield.
- do not install a boiler near baths, showers, pools.

Not allowed:

- violate the climatic conditions of operation and storage of the boiler, carry out repair of the boiler in wet rooms, premises with cement or other floors conducting electric current in explosive and fire hazardous premises.
- to make changes in the electrical installation or the design of the boiler;
- include the boiler if the water in the boiler and the heating system is frozen;
- Perform repairs when the boiler is connected to the electrical power supply, or is filled with a coolant (water);
- to remove dust or contaminants from the housing surface when the boiler is connected to the mains.
- to install a boiler in the immediate vicinity of flammable items;

- in the premises where the boiler is installed it is prohibited to store combustible materials (wood, gasoline, paper, rubber, etc.).




**The device design**

1. Mounting panel
2. Cable inlet for power cables
3. Cable inlet for room thermostat wires
4. Bolt Grounding
5. Thermal Cut-Out
6. Direct pipe
7. Casing
8. Connecting block
9. Connecting room thermostat
10. Control panel
11. Manostat
12. Contactor
13. Exchanger tank
14. The hydraulic group
15. Drain pipe
16. Return pipe
17. Maximum pressure sensor
18. Block tubular heating elements
19. Connecting block
20. Connecting block

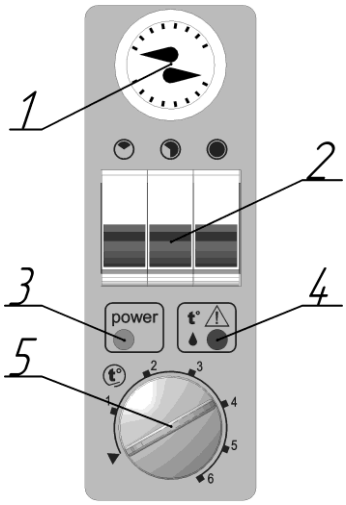
Figures 1.The structure of the boiler power 4,5 kW - 15,0 kW

The structure of the boiler are shown in Figures 1.boiler consists of the mounting panel 1 on which are mounted components and casing 7. On the mounting panel is installed: steel heat exchanger tank 13, on the tank installed pressure sensor 11 on the flange of tank is installed, temperature limiter with manual reset 5, direct pipe 6; control panel 10.
The hydraulic group 14 includes: synchronous pump, drain pipe 15, return pipe 16 and automatic air valve pump, maximum pressure sensor 17.

**Attention!** The operating modes of the pump and the instruction are given in Appendix 2
In the tank installed tubular heating elements from stainless steel 18, installed in flanges with sealing ring. Tank has insulation that reduces heat loss. The pipe for supplying hot water into the system (direct pipe) is located on the upper flange of the tank and is marked with a red.
The pipe for connecting to the return pipe work of the system is located at the bottom and is marked with a blue.
Boiler has a cable inlet 2 for power cables, cable inlet 3 for room thermostat. In the boiler install connecting block 8 for connecting the power cable and connecting block 9 for connect the room thermostat.
A modular electromagnetic contactor with a low noise level 12 is installed on the mounting panel.
Switches and indicators are located on the control pane

**Protection functions**
In the boiler provides three steps of protection of an emergency: overheat protection; sensor of the min. pressure 0,06 bar; sensor of the max. pressure 3 bar;
If triggering devices protection during emergency lowering growth temperature or pressure included indicators 4 in the control panel.

Check that fulfilled all requirements for the operation of the boiler, in particular, whether the system is full heating heat carrier. With growth above the maximum allowable pressure triggered the automatic safety valve and automatically resets the system pressure.




1. Termomanometers
2. Circuit breaker
3. Power supply indicator
4. Indicator for the protection of by temperature or pressure
5. The thermostat handle

Figures 2. Control panel

**Control panel**
View of the control panel shown in Figure 2.

On the control panel there are circuit breaker of degrees of regulation of the heating power (3 steps), thermostat, indicators of switching on the supply voltage, emergency shutdown, thermomanometer. Depending on the position of the thermostat handle, the boiler will maintain the set coolant temperature in the system from 5 ° C to (85 ± 5) ° C. The temperature control of the coolant and the pressure in the system is carried out according to the indicators of the indicative thermomanneter.

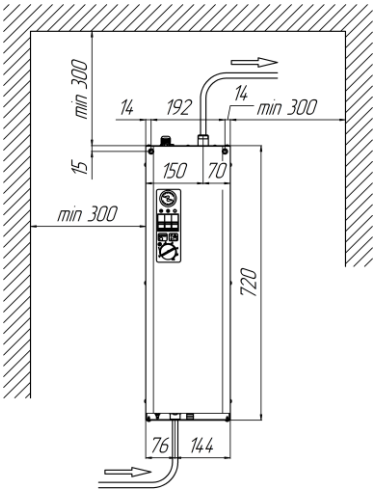



Figure 3 Example of mounting the boiler on the wall

**Installation and connection procedure**
First of all, the connection of the boiler to the heating system is carried out in the second place - the electrical connection.
**Connecting the boiler to the heating system.**
The boiler must be installed on an even vertical surface in dry rooms with a relative humidity of not more than 60% at 20 ° C and low dust content.
The distance from the boiler to the surrounding surfaces should be not less than 0,2 m, from the gas stove not less than 0,3 m, free access to all elements of the boiler design should be provided.

Mark the holes for wall mounting in accordance with figure 3 of the manual. Depending on the material from which the walls are made at the installation site, select and install the dowels to secure the boiler (not supplied).

Remove the lid and secure the boiler on the vertical surface.
**Attention,** remove the cover carefully! The boiler lid is connected to the ground loop.

Before installing the cover in place, you must first attach the ground wire.
It is strictly forbidden to work the boiler without connecting the cover to the boiler ground circuit.
Connect the boiler to the heating system. Connect the pipe marked a red rectangle (upper connector - G3/4) to hot water, the pipe, marked a blue rectangle (lower connector G1), to the return pipe.
The recommended scheme of the heating system is shown in the figure in Appendix 2.
In the heating system, it is necessary to install a filter for cleaning the heat carrier (not included in the delivery kit). Absence of a filter can cause pollution of the pump, which can cause a decrease in circulation, a significant increase in temperature of the coolant and failure of the THE.
The heating system must be equipped with an expansion tank and a valve for automatic airflow, located at the highest point of the system.
**ATTENTION!** The minimum pressure in the heating system, at which it is possible to start the boiler must be not less than 0.06 MPa!

**Connection of the boiler to the electrical power supply**
Check that the data on the boiler label corresponds to the technical parameters of the electrical network to which the boiler will be connected, and the cross section of the copper wires to connect to the power supply meets the requirements of this manual (table 1).
To connect the boiler from the meter or switchboard, there must be a separate line on which a separation device is installed, which provides the disconnection of all poles and an automatic safety switch. The rated current must correspond to the current consumed by the boiler (Table 1).
Connect the ground wire to the grounding bolt marked ⏚. The grounding must be performed by a wire with a cross section of at least 4 $mm^2$ on which the tip is soldered.
In the absence of a grounding bus, the installation of the ground circuit must be carried out.
Replace the wires (copper) power cable lugs and connect phase wire to the contact L1, L2, L3 connecting block XT1, zero wire - to contact N for boilers with a supply voltage of 400 V.
**WARNING!** Boilers KOP 4.5 230 V/400 V, KOP 6.0 230 V/400 V, KOP 9.0 230 V/400 V can be connected to a power supply 230 V or to a power supply 400 V,according to the connection circuit on the label.

**Connecting to 230 V network**
Connect the phase wire to terminal L1 of the XT1 pad. Do not remove the jumper from contacts S, L1, L2 of the connecting block XT1, the neutral wire to terminal N.

**Connecting to 400 V network**
Remove the jumper from the contacts S, L1, L2 of the XT1 connector block. Connect the phase wire to terminals L1, L2, L3 of the XT1 connector block, the neutral wire to terminal N.

**To connect a remote control**, remove the jumper from the contacts of the connector for remote control and connect a remote control wires to these contacts (not included in the contents of delivery).
Before installing the cover in place, it is necessary to first connect the ground wire to the casing. Close the lid of the boiler. Fill the system with a coolant.

**ATTENTION! Filling the system and operation of the boiler with the removed lid - is forbidden!**
**Preparation for a work**
**ATTENTION! Before turning on the boiler, ensure that there is a coolant in the heating system, no air cocks, and clean the filter. The inclusion of a boiler without a heat carrier will trigger the protection devices. Prove the pressure in the system up to (0,1 ± 0,06) MPa.**

**Boiler activation:**
Before starting, all the keys of the circuit breaker in the control panel must be set to the position OFF.
**ATTENTION!** When working from a remote control, the thermostat handle of the boiler must be in the extreme right position.
Set the thermostat handle of the boiler or remote control the middle position.
Switch on the circuit breaker on the shield, the power supply voltage is fed to the boiler inlet. On the control panel of the boiler, the power supply indicator " power " and the boiler pump must be lit.
Consistently, at intervals of 3 - 5 sec, turn on the power switches ◔, ◑, and ●.

**ATTENTION! When operating the boiler, it is necessary to observe the following sequence of switching ON / OFF the power levels: when the boiler is switched on, the stages ◔, ◑, and ● must be sequentially switched ON, with the boiler switched off, the stages ●, ◑, and ◔ must be switched OFF successively.**

It is forbidden to break the sequence of switching on / off the power levels!

To achieve a comfortable indoor temperature, the thermostat handle must be set to the appropriate mark. The price of the division on the thermostat handle is approximately 15 ° C. The extreme left position of the thermostat handle, corresponds to the minimum temperature value. The extreme right position corresponds to the maximum temperature value. Set the thermostat handle to a specific position and control the temperature of the coolant according to the indicating thermomanometer of the boiler. After setting the temperature, it will be automatically supported.

**Operation of the boiler protection system**

In the boiler provides three steps of protection of an emergency: overheat protection; sensor of the min. pressure 0,06; sensor of the max. pressure 3 bar;

In the event of an emergency, the indicator «⚠» in the control panel lights up and the power supply voltage from the boiler THE-s is switched off.

Check that all boiler operation requirements have been met, including whether the heat carrier is full.

**Attention! If the boiler emergency system works, do not try to repair it yourself. Contact a service center specialist!**

**Procedure for shutting down the boiler**

Before turning off the boiler, turn the thermostat handle to the left position. Switch the stages of regulation of the heating power of **●, ◑, and** ◔ to the position OFF.

**ATTENTION!** After the boiler heater is switched off, it is necessary to give the circulation pump at least 5 - 10 minutes, then remove the boiler.

Exclude the boiler, for this you need to set the key of the circuit breaker on the shield to the OFF!

**ATTENTION!** Be sure to switch off the power switch on the power outlet. Leave the boiler with the automatic switch turned on - it is forbidden!

**Maintenance and repair**

**Attention!** Maintenance and repair of boiler has the right to only specialist Authorized service center that has permission to carry out the relevant work. Maintenance should be done at least once a year.

Before we turn to specialists to repair the boiler make sure the breach the boiler is not caused by lack or low level of the heat carrier contamination filter lack voltage power grid or other violation of, which is connected boiler.

Before the work on prevention or repair disconnect the boiler from the electrical switch on the power supply switchgears.

Depending on the quality of the heat carrier which is filled in on the heating elements is formed salt deposits (scale), which increase the heating and consumption electricity.

Once a year is recommended to check the status of the heater. To do this, cut shut-off valve at the inlet of the boiler (heating element), dismantle the heater from the tank heat exchanger clean them from scale and set in place.

At least once a year is recommended to check the safety valve.

Attention! Scale may form on the inner opening of the pressure sensor. When carrying out preventive maintenance, it is necessary to remove the conductors and disassemble the sensor from the tank, if necessary, carefully, in order not to damage the membrane, to descale the inner hole. Replace the gasket from the paranite (2 mm), install the sensor in place, connect the conductors, test the sensor. The test is recommended to be carried out by the method of manual etching of a small amount of coolant, with the pressure should decrease and the alarm indicator on the control panel should light up.

The structure includes the following maintenance work:

- Control of all water connections;
- Control of the pump;
- Control of all security elements;
- Check the correct operation of the boiler;
- Check insulation resistance, resistance should be below 1 MΩ;
- Check the resistance between the grounding bolt and metal structures, which can under voltage,

resistance should be less than 0.1 Ω;
- Verification of the absence of temperature increase contacts connections;
- Check the circuit elements on the breakdown, breakage, etc.
- Delay the weakened bindings;
- The opening of the boiler and descaling of heater parts by wiping with a cloth, which soaked in a solution of vinegar, followed by careful mechanical descaling metal scraper;
- Replacement of electrical elements that are out of order;
- Checking the condition of gaskets and replace them if necessary.

**Possible Malfunctions and Remedies**

Table 3

| Name of malfunction | Probable cause | Remedy | Note |
|---|---|---|---|
| At power on, network indicator light is not lit | 1) No power supply;<br>2) Faulty lamp. | Check the presence of voltage.<br>Replace the faulty component | Replacement and validation performs specialist |
| When enabled keys 1, 2 and 3, boiler does not reach the rated power | 1) low power supply;<br>2) faulty THE;<br>3) open circuit. | Check power supply;<br>Replace THE.<br>Reactivate the circuit. | |
| Low carrier temperature in the heating system devices | 1) boiler thermal power is insufficient to compensate for high losses of heat from the premises;<br><br>2) there is no circulation of heat carrier. | Align boiler thermal power and heating system<br><br>Check the circulation of the coolant.<br>Check the pump operation in accordance with the recommendations set out in Appendix 3 | Technical and economic assessment carried out by a specialist<br>Validation performs a specialist |

**Transportation and storage**

During transport and storage boiler secure packaging to prevent it damage.

When transporting the need to provide standard conditions transportation, namely to prevent shock, vibration, exposure to magnetic fields, mechanical and biological influences on the packaging, which can damage the product.

Transporting the boiler must be carried out in closed vehicles provided that the requirements laid down signs and manipulation under the rules freight each mode of transport. The boiler should be stored in dry indoors with natural ventilation, while ambient temperature can vary from + $5^0$ C to + $40^0$ C, relative humidity air no more than 60%, measured at + $20^0$C.

Not allowed to keep the boiler together with liquids that vaporize, acids and other substances that can cause corrosion.

Preventive works are carried out 2 times a year (before and after the end of the heating season), and also if necessary. A note should be made about the work done, indicating the date of the tutorial in the voucher.

The current repair includes:

- elimination of damage that occurred during maintenance;
- tightening of loose fasteners;
- opening the boiler and removing scale from the TEN parts by wiping with a rag that is soaked in a solution of table vinegar, with further careful mechanical removal of scaling by a metal scraper and a pressure sensor;
- replacement of electrical equipment items that are out of order;
- check the condition of the gaskets and, if necessary, replace them.

The current repair is carried out by the specialists of service centers, or their authorized installation organizations. All works performed must be recorded in the registration sheet, the date and the name of the organization that conducted the work should be indicated.

**Disposal of the device**

The product does not contain materials that require special disposal technologies. After the end of its service life, the product must be disassembled, followed by sorting of scrap into groups into non ferrous, ferrous metals and non-metals and their disposal in accordance with the norms, rules and methods that are in place at the disposal sites.

Application 1

Electrical circuits

KOP 4,5 (p) 230V/400V,  KOP 6,0 (p) 230V/400V, KOP 9,0 (p) 230V/400V

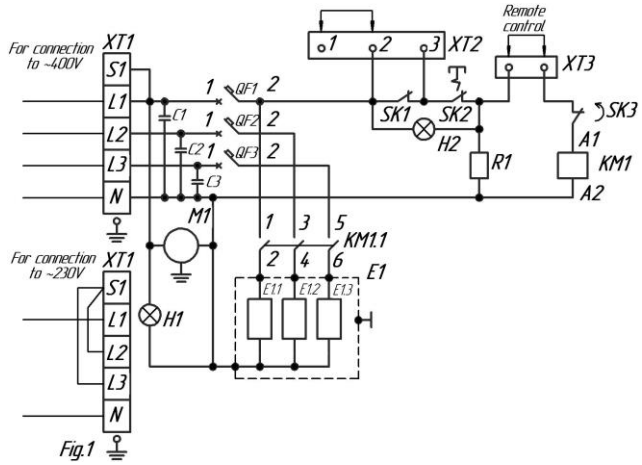
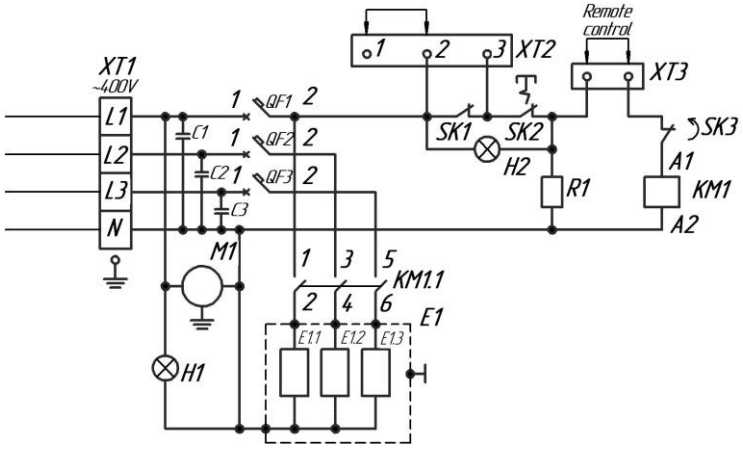
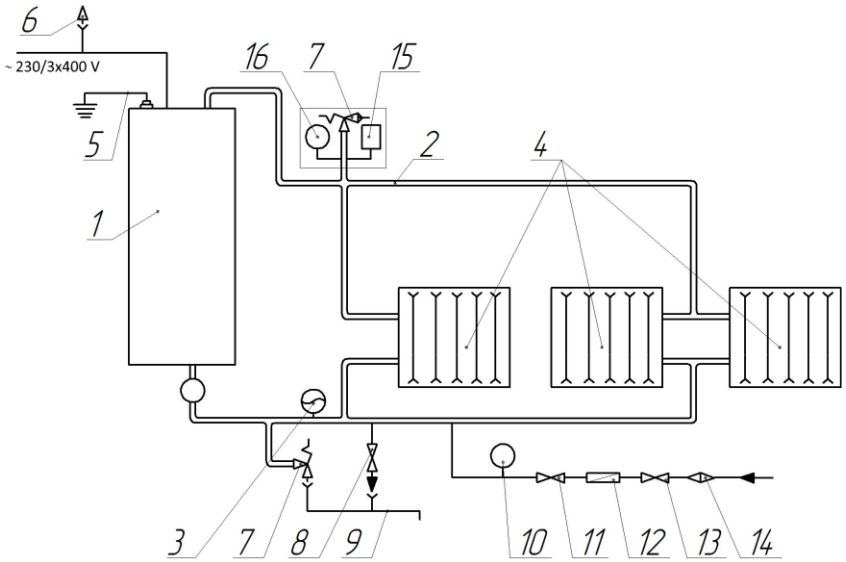



Fig.1

KOP 12,0 (p) 400 V; KOP 15,0 (p) 400 V

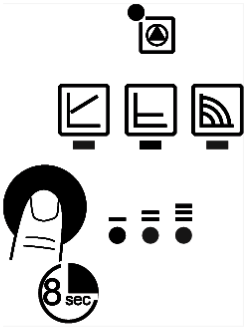


Hydraulic circuit




1. Boiler
2. Hot water pipeline
3. Expansion tank
4. Radiators
5. Grounding
6. Circuit breaker
7. Safety valve
8. Valve
9. Drainage
10. Manometer
11. Reducer
12. Reverse valve
13. Valve
14. Filter
15. Air exhaust valve
16. Manometer

***Lock/unlock the button***

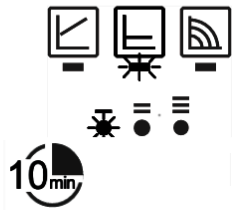



- To activate the key lock, press and hold the operating button for 8 seconds until the LEDs for the selected setting briefly flash, then release.

➥LEDs flash constantly at 1-second intervals.

➥The key lock is activated: pump settings can no longer be changed.

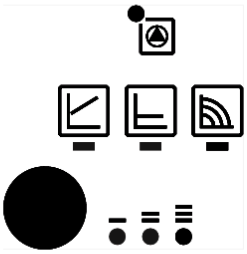
- The key lock is deactivated in the same manner as it is activated.




**NOTICE**
All settings/displays are retained if the power supply is interrupted.

## Setting the control mode

***Select control mode***



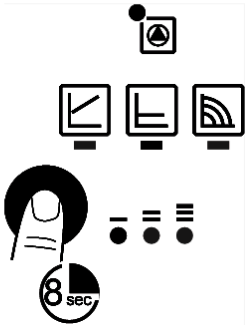
The LED selection of control modes and corresponding pump curves takes place in clockwise succession.

- Press the operating button briefly (approx. 1 second).

➥LEDs display the set control mode and pump curve.

The following shows the various possible settings (for example: constant speed / characteristic curve III):

***Lock/unlock the button***

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- The key lock is deactivated in the same manner as it is activated.

**NOTICE**
All settings/displays are retained if the power supply is interrupted.

| | LED display | Control mode | Pump curve |
|---|---|---|---|
| 1 |  | Constant speed | II |
| 2 |  | Constant speed | I |
| 3 |  | Variable differential pressure<br>Δp-v | III |
| 4 |  | Variable differential pressure<br>Δp-v | II |
| 5 |  | Variable differential pressure<br>Δp-v | I |
| 6 |  | Constant differential pressure<br>Δp-c | III |
| 7 |  | Constant differential pressure<br>Δp-c | II |
| 8 |  | Constant differential pressure<br>Δp-c | I |
| 9 |  | Constant speed | III |

- Pressing the button for the 9th time returns to the basic setting (constant speed / characteristic curve III).

***Activating factory setting***

The factory setting is activated by pressing and holding the operating button whilst switching off the pump.

- Press and hold the operating button for at least 4 seconds.

➥All LEDs flash for 1 second.

➥The LEDs for the last setting flash for 1 second.

When the pump is switched on again, the pump runs using the factory settings (delivery condition).

## Decommissioning

***Shutting down the pump***

Shut down the pump immediately if the connecting cable or other electrical components are damaged.

- Disconnect the pump from the power supply.
- Contact Wilo customer service or a specialist technician.

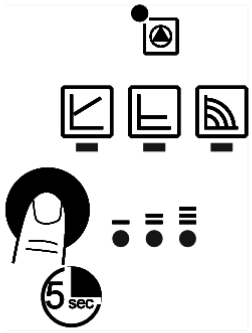
## Maintenance

***Cleaning***

- Carefully remove dirt from the pump on a regular basis using a dry duster.
- Never use liquids or aggressive cleaning agents.

***Manual restart***

- The pump attempts an automatic restart upon detecting a blockage.



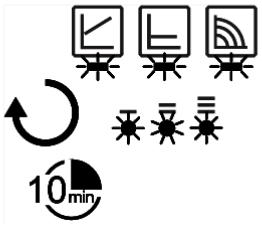

If the pump does not restart automatically:

- Activate manual restart via the operating button: press and hold for 5 seconds, then release.

➥The restart function is initiated, and lasts max. 10 minutes.

➥The LEDs flash in succession clockwise.

- To cancel, press and hold the operating button for 5 seconds.




**NOTICE**
After the restart, the LED display shows the previously set values of the pump.

**If the fault cannot be remedied, contact a specialist technician or Wilo customer service.**

## Faults, causes and remedies

**The troubleshooting must only be carried out by a qualified specialist, and work on the electrical connection must only be carried out by a qualified electrician.**

| Faults | Causes | Remedy |
|---|---|---|
| Pump is not running although the power supply is switched on | Electrical fuse defective | Check fuses |
| | No voltage supply at pump | Rectify the power interruption |
| Noisy pump | Cavitation due to insufficient suction pressure | Increase the system pressure within the permissible range |
| | | Check the delivery head and set it to a lower head if necessary |
| Building does not warm up | Thermal output of the heating surfaces is too low | Increase setpoint |
| | | Change the control mode from Δp-c to Δp-v |

### Fault signals

- The fault signal LED indicates a fault.
- The pump switches off (depending on the fault) and attempts a cyclical restart.

| LED | Faults | Causes | Remedy |
|---|---|---|---|
| Lights up red | Blocking | Rotor blocked | Activate manual restart or contact customer service |
| | Contacting/ winding | Winding defective | |
| Flashes red | Under/overvoltage | Power supply too low/high on mains side | Check mains voltage and operating conditions, and request customer service |
| | Excessive module temperature | Module interior too warm | |
| | Short-circuit | Motor current too high | |
| Flashes red/ green | Generator operation | Water is flowing through the pump hydraulics, but there is no mains voltage at the pump | Check the mains voltage, water quantity/pressure and the ambient conditions |
| | Dry run | Air in the pump | |
| | Overload | Sluggish motor, pump is operated outside of its specifications (e.g. high module temperature). The speed is lower than during normal operation | |