# OPERATION AND INSTALLATION MANUAL

## WATER HEATERS FOR SOLAR SYSTEMS

**OKC 200 NTRR/SOL**
**OKC 250 NTRR/SOL**
**OKC 300 NTRR/SOL**
**OKC 400 NTR/SOL**
**OKC 500 NTR/SOL**
**OKC 400 NTRR/SOL**
**OKC 500 NTRR/SOL**

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DRAŽICE
ČLEN SKUPINY NIBE

# CONTENT

# READ CAREFULLY THE BELOW INSTRUCTIONS PRIOR TO THE INSTALLATION THE HEATER!

Dear Customer,

The Works Cooperative of Dražice – Machine Plant, Ltd., would like to thank you for your decision to use a product of our brand. With this guide, we will introduce you to the use, construction, maintenance and other information on electrical water heaters.

The manufacturer reserves the right for engineering modification of the product. The product is designed for permanent contact with drinkable water.

It is recommended to use the product in indoor environment with air temperatures from +2°C to 45°C and a relative humidity up to 80%.

Product´s reliability and safety is proven by tests implemented by the engineering Test Institute in Brno.

## Meaning of pictograms used in Manual

**Important information for heater users.**

**Recommendations of manufacturer, observance of which will ensure trouble-free operation and long service life of the product.**

**CAUTION!**

**Important notice to be observed.**

# 1 TECHNICAL SPECIFICATION OF PRODUCT

## 1.1 FUNCTION DESCRIPTION

The OKC 200, 250, 300 NTRR/SOL a OKC 400, 500 NTR,R/SOL water heaters are designed and manufactured as a part of solar system containing additional integral elements of the system, such as sun collectors and their roof holders (flat roof stands), expansion tank, collector filling distribution and other items necessary for proper and trouble-free function of a solar system.

Their nominal performance provides sufficient amount of hot water for flat units, premises, restaurants, and similar establishments.

For final heating (reheat) of HSW, electricity, various types of central heating boilers and combination of those can be chosen.

## 1.2 PRODUCT DESCRIPTION

OKC NTR/SOL - stationary heater with one coil exchangers for heating HSW with heating water from a single source. Reheat can be carried out by the boiler in the top exchanger, e.g. by the boiler and also by the electric element TJ 6/4“.

OKC NTRR/SOL - stationary heater with two coil exchangers for heating HSW with heating water from two sources. Reheat can be carried out by the boiler in the top exchanger, e.g. by the boiler and also by the electric element TJ 6/4“.

The heater tank is welded from a steel sheet; the exchangers from a steel tube and as a unit, it is entirely coated with hot water resistant enamel. For additional corrosion protection a magnesium anode is mounted in the upper part of the heater to adjust the electric potential inside the tank, reducing the risk of corrosion. This anode can be exchanged with titanium anode which is fed with electricity and stable (it need not be exchanged in two years of the tank´s operation as the magnesium anode). All types have welded on outlets of hot and cold water, a circulation opening and thermo-wells. The tank is insulated with polyurethane Freon-free foam of 50 mm thickness. The heater shell consists of a plastic container; the connecting parts are metal coated. The entire heater stands on three rectification screws with a possibility of levelling floor unevenness within the range of 10 mm. Under the plastic cover on the side of the 300 litre heater, there is a cleaning and revision opening ended with a flange. The NTR and NTRR series heaters are equipped with a 6/4“ aperture for in-screwing an additional heating element of TJ 6/4“ series.

The heater is placed on the ground, next to the heating water source, or in its vicinity. All connecting distributions must be properly insulated from heat.

The OKC 200 – 500 NTR, R/SOL are indirect heaters designed for preparation of hot service water by means of a solar system.

The NTRR version is equipped with two exchangers for an optional combination of a solar system and an additional indirect circuit (e.g. gas boiler). A heating element can be mounted, as well.

## 1.3 TECHNICAL PARAMETERS

### 1.3.1 TECHNICAL PARAMETERS OF HEATERS

| TYPE | | OKC 200 NTRR/SOL | OKC 250 NTRR/SOL | OKC 300 NTRR/SOL |
|---|---|---|---|---|
| **Capacity** | l | 200 | 245 | 282 |
| **Height of the heater** | mm | 1382 | 1562 | 1790 |
| **Diameter of the heater** | mm | 584 | 584 | 597 |
| **Weight** | kg | 106 | 120 | 125 |
| **Operating hot service water pressure** | MPa | 1 | 1 | 1 |
| **Operating heating water pressure** | MPa | 1 | 1 | 1 |
| **Max temperature of heating water** | °C | 110 | 110 | 110 |
| **Max temperature of HSW** | °C | 95 | 95 | 95 |
| **Lower exchanger heat delivery surface** | $m^2$ | 1 | 1,45 | 1,5 |
| **Upper exchanger heat delivery surface** | $m^2$ | 1 | 1 | 1 |
| **Lower exchanger capacity** | l | 7 | 9,5 | 10,5 |
| **Upper exchanger capacity** | l | 7 | 7 | 7 |
| **Lower/Upper exchanger performance at temperature drop 80/60 °C** | kW | 24/24 | 32/24 | 35/24 |
| **Permanent HSW* performance of lower/upper exchanger** | l/h | 670/670 | 990/670 | 1100/670 |
| **HSW* heating time by exchanger of (lower/upper) at head gradient of 80/60°C** | min | 28/16 | 28/16 | 24/16 |
| **Lower/Upper exchanger performance at temperature drop 60/50 °C** | kW | 13/13 | 20/13 | 21/13 |
| **Permanent HSW* performance of lower/upper exchanger** | l/h | 330/330 | 490/330 | 517/330 |
| **HSW* heating time by exchanger of (lower/upper) at head gradient of 60/50°C** | min | 38/19 | 44/19 | 35/19 |

* HSW – hot service water 45 °C

**Table 1**

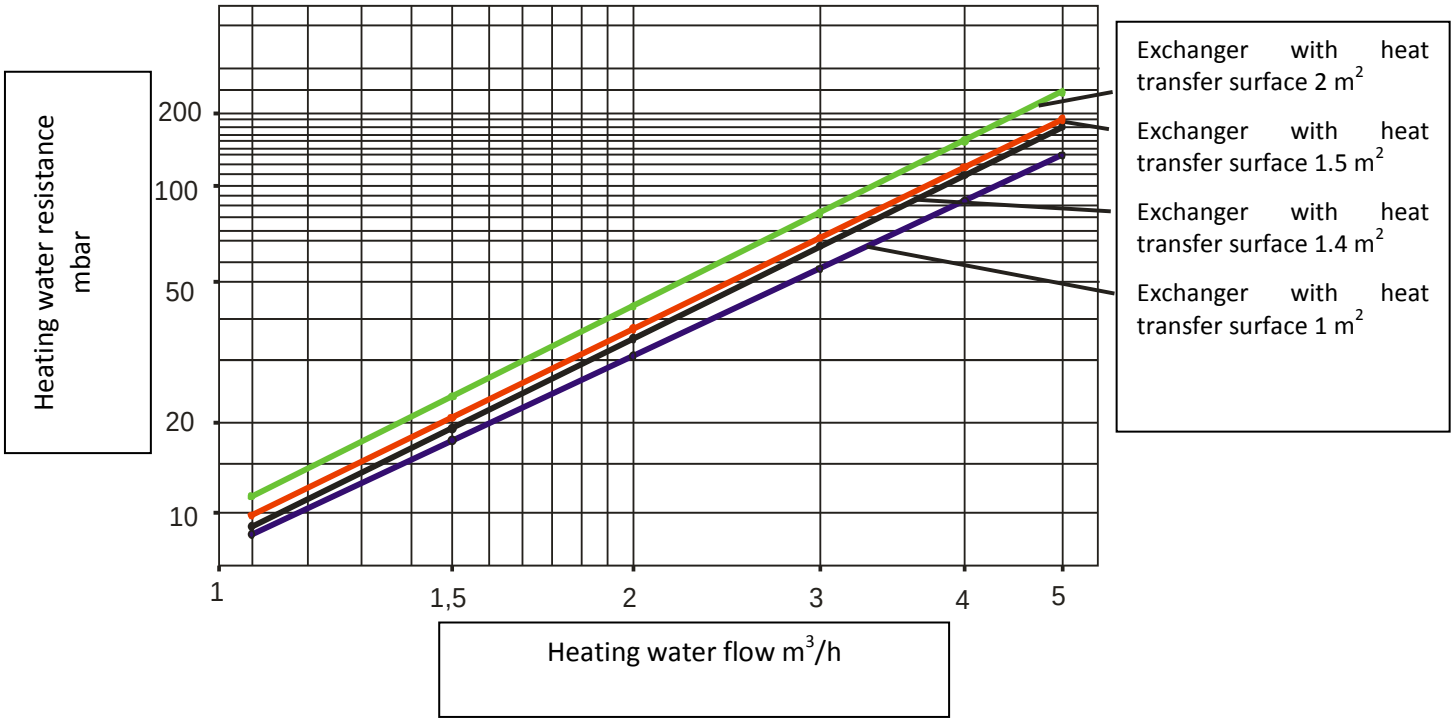
| TYPE | | OKC 400 NTR/SOL | OKC 400 NTRR/SOL | OKC 500 NTR/SOL | OKC 500 NTRR/SOL |
|---|---|---|---|---|---|
| **Tank volume (except anode and exchanger)** | l | 395 | 395 | 467 | 467 |
| **Tank volume** | l | 378 | 369 | 449 | 436 |
| **Height of the heater** | mm | 1919 | 1919 | 1892 | 1892 |
| **Diameter of the heater** | mm | 650 | 650 | 700 | 700 |
| **Weight** | kg | 119 | 137 | 135 | 160 |
| **Operating hot service water pressure** | MPa | 1 | 1 | 1 | 1 |
| **Operating heating water pressure** | MPa | 1 | 1 | 1 | 1 |
| **Max temperature of heating water** | °C | 110 | 110 | 110 | 110 |
| **Max temperature of HSW** | °C | 95 | 95 | 95 | 95 |
| **Upper exchanger heat delivery surface** | $m^2$ | - | 1 | - | 1,4 |
| **Lower exchanger heat delivery surface** | $m^2$ | 2 | 2 | 2 | 2 |
| **Rated lower exchanger output with temperature gradient 80/60 °C** | kW | 58 | 58 | 59 | 59 |
| **Rated upper exchanger output with temperature gradient 80/60 °C** | kW | - | 26 | - | 37 |
| **Continuous HSW* power of lower exchanger output with temperature gradient 80/60°C** | l/h | 1423 | 1423 | 1448 | 1448 |
| **Continuous HSW* power of upper exchanger output with temperature gradient 80/60 °C** | l/h | - | 638 | - | 908 |
| **Rated lower exchanger output with temperature gradient 60/50 °C** | kW | 25 | 25 | 26 | 26 |
| **Rated upper exchanger output with temperature gradient 60/50 °C** | kW | - | 12 | - | 18 |
| **Continuous HSW* power of lower exchanger output with temperature gradient 60/50 °C** | l/h | 767 | 767 | 797 | 797 |
| **Continuous HSW* power of upper exchanger output with temperature gradient 60/50 °C** | l/h | - | 368 | - | 552 |
| **Heating period for HSW* with a lower exchanger with temperature gradient 80/60 °C** | min | 23 | 22 | 27 | 26 |
| **Heating period for HSW* with a upper exchanger with temperature gradient 80/60 °C** | min | - | 22 | - | 17 |
| **Heating period for HSW* with a lower exchanger with temperature gradient 60/50 °C** | min | 42 | 41 | 48 | 47 |
| **Heating period for HSW* with a upper exchanger with temperature gradient 60/50 °C** | min | - | 38 | - | 27 |

* HSW – hot service water 45 °C

** Heating of tank volume, which is appropriate to upper exchanger

**Table 2**

## 1.3.2 PRESSURE LOSSES

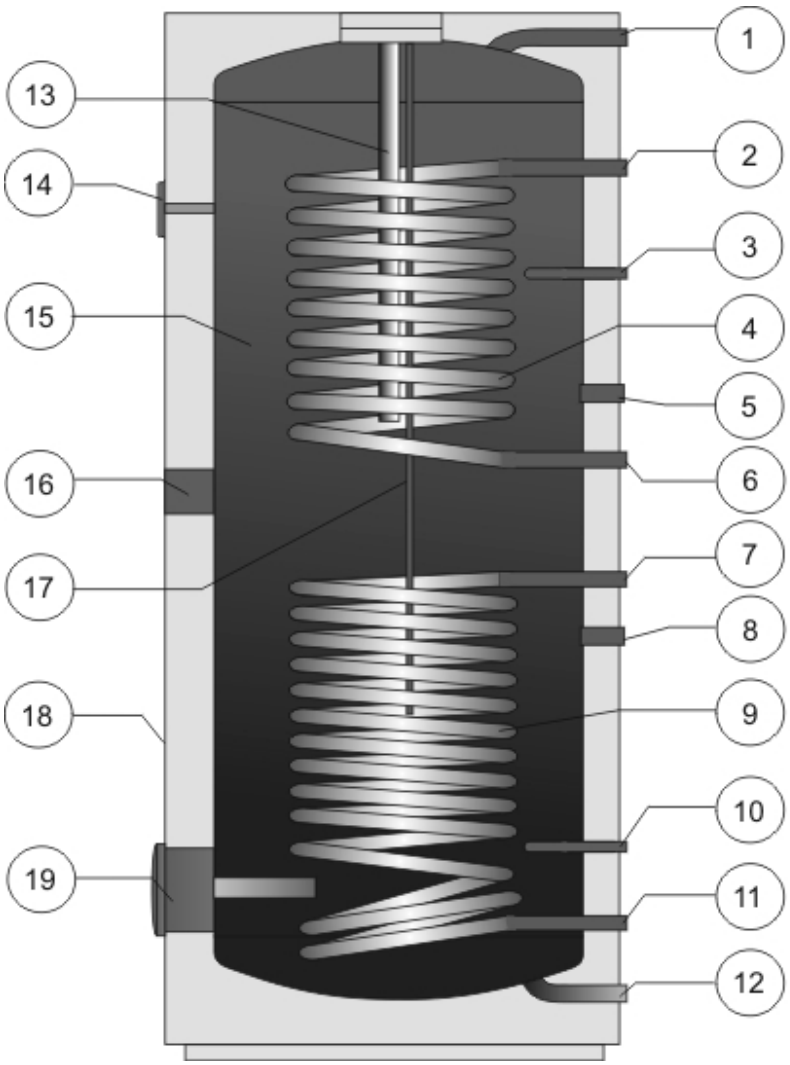



| Type | Pressure loss (mbar) tHV = 60 °C | | | | |
|---|---|---|---|---|---|
| | Amount of heating water in $m^3$/hr | | | | |
| | 1 | 2 | 3 | 4 | 5 |
| Exchanger 1 $m^2$ | 7 | 24 | 51 | 86 | 130 |
| Exchanger 1.4 $m^2$ | 9 | 32 | 68 | 115 | 174 |
| Exchanger 2 $m^2$ | 12 | 42 | 88 | 149 | 226 |

**Table 3**

### 1.3.3 TECHNICAL DESCRIPTION

OKC 200 NTRR/SOL
OKC 250 NTRR/SOL
OKC 300 NTRR/SOL
OKC 400 NTR/SOL
OKC 500 NTR/SOL
OKC 400 NTRR/SOL
OKC 500 NTRR/SOL




1 Hot water outlet 3/4"
2 Heating water input 1"
3 Thermowell sensor ½"
4 Tubular exchanger
5 Circulation 3/4"
(only 200,250,400,500 l)
6 Heating water output 1"
7 Input from the collector 1"
8 Circulation 3/4" (300 l)
9 Tubular exchanger
10 Thermowell sensor ½"
11 Input to collector 1"
12 Input cold water 3/4"
13 Mg anode
14 Thermometer
15 Enameled steel vessel
16 G 6/4" for additional
heating element TJ 6/4"
17 Thermowell for temperature
Js 14 only 200 and 250 l
18 Water heate jacket
19 Flange: bolt spacing 150 mm
(only 300,400,500 l)

**Figure 1**

# 1.4 CONSTRUCTION AND DIMENSIONS OF HEATER

**OKC 200 NTRR/SOL**
**OKC 250 NTRR/SOL**

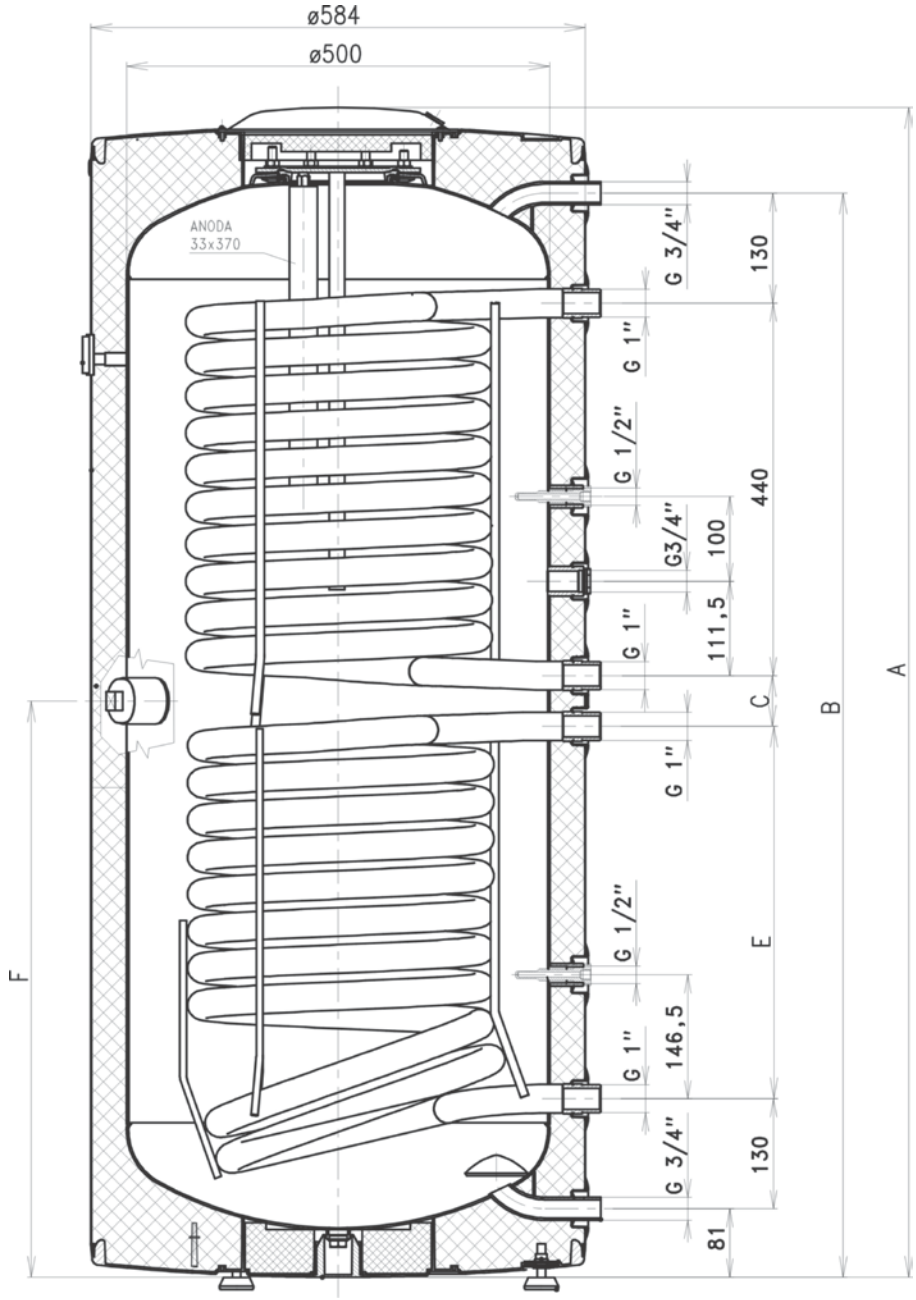



Figure 2

| Type | OKC 200 NTRR/SOL | OKC 250 NTRR/SOL |
|---|---|---|
| A | 1382 | 1562 |
| B | 1280 | 1461 |
| C | 60 | 110 |
| E | 440 | 570 |
| F | 681 | 861 |

**OKC 300 NTRR/SOL**

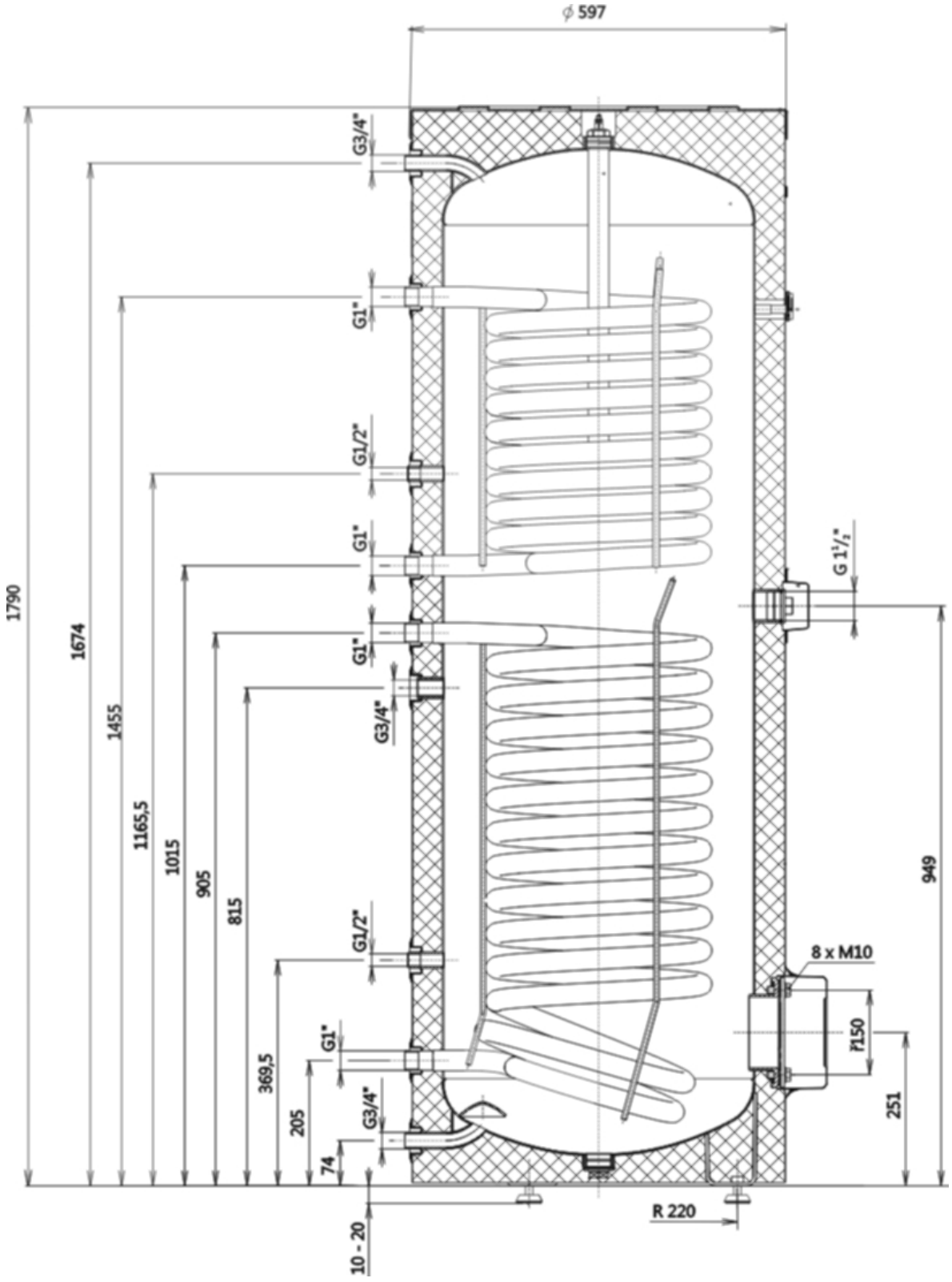



Figure 3

**OKC 400 NTR/SOL, OKC 400 NTRR/SOL**
**OKC 500 NTR/SOL, OKC 500 NTRR/SOL**

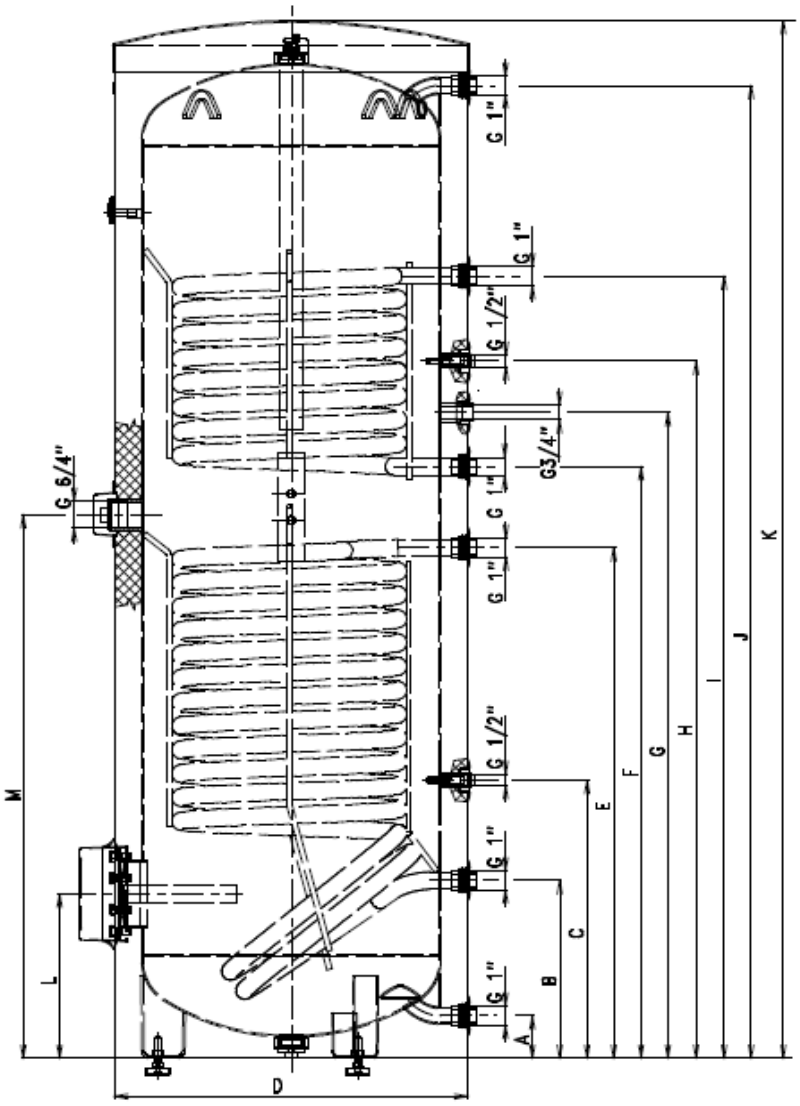



Figure 4

| Type | OKC400NTR | OKC400NTRR | OKC500NTR | OKC500NTRR |
|---|---|---|---|---|
| A | 79 | 79 | 55 | 55 |
| B | 329 | 329 | 220 | 220 |
| C | 514 | 514 | 380 | 380 |
| D | 650 | 650 | 700 | 700 |
| E | 944 | 944 | 965 | 965 |
| F | 1094 | - | 1114 | - |
| G | 1194 | 1194 | 1264 | 1264 |
| H | 1289 | 1289 | 1409 | 1409 |
| I | 1446 | - | 1604 | - |
| J | 1798 | 1798 | 1790 | 1790 |
| K | 1919 | 1919 | 1892 | 1892 |
| L | 304 | 304 | 288 | 288 |
| M | 1005 | 1005 | 1040 | 1040 |

300, 400 a 500 litre capacity heaters are screwed onto the bottom wooden palette with M12 screws. When the heater is released from the palette and prior to its putting into operation, 3 screw legs supplied as the product accessories have to be installed. With these adjustable legs, the heater may be positioned vertically to the base, within 10 mm.

# 2 OPERATION AND FITTING INSTUCTIONS

## 2.1 OPERATING CONDITIONS

The tank shall only be used in accordance with the conditions specified on the power plate and in instructions for electric wiring. Besides legally acknowledged national regulations and standards, also conditions for connection defined in local electric and water works have to be adhered to, as well as the installation and operation manual.

The temperature at the place of heater installation must be higher than +2°C; and the room must not freeze. The appliance has to be mounted at a convenient place; it means that the appliance must be easily available for potential necessary maintenance, repair or replacement, as the case may be.

**We would like to emphasise that the heater must not be connected to power supply if work involving flammable liquids (petrol, spot remover) or gases, etc., is performed nearby.**

## 2.2 EXAMPLES OF HEATERS CONNECTION

### 2.2.1 CONNECTING A HEATER TO A SOLAR SYSTEM

Heater shall be connected to a solar system by a person familiarised with these heating systems. Temperatures in a solar circuit may achieve far over 100 °C, and there are higher pressures than in typical heating systems, therefore correct selection if interconnecting materials and its coupling is of great importance, as well as correct dimensioning of the expansion tank connected to this system.

The heater is placed on the ground, next to the heating source, or in its vicinity. The heating circuit is connected to marked inputs and outputs of the heater exchanger; the deaeration valve designed for solar system is mounted in the highest place. It is recommended to flush the heating circuit before the assembly. All wiring connections must be properly insulated from heat.

Connection of heater:

The manufacturer recommends mounting of a mixing valve on the hot water outlet, on sunny days the temperature in the heater can achieve up to 90 °C which is a temperature that, in case of scalding, may cause health complications. Output temperature suitable for common use shall be set on the mixing valve.

Cold water shall be connected to an inlet marked with a blue ring or writing “HSW INLET”. Hot water shall be connected to an outlet marked with a red ring or writing “HSW INLET”. If the hot service water (HSW) distribution is equipped with circulation circuit, it shall be connected to the outlet marked with “CIRCULATION”. For potential drain of heater, the HSW inlet has to be provided with a “T” fixture with a drain valve. Each individually lockable heater must be at the cold water inlet provided with a stop gate, test cock, safety valve with a reverse flap and a pressure gauge.

### 2.2.2 EXAMPLE OF CONNECTING A HEATER WITH SOLAR COLLECTORS AND A GAS BOILER

**Connecting a heater to a boiler heating circuit:**

The heater is placed on the ground, next to the heating source, or in its vicinity. The heating circuit is connected to marked inputs and outputs of the heater exchanger; the deaeration valve is mounted in the highest place. It is necessary to install a filter into the circuit in order to protect the pumps, the three-way valve, and backflow flaps, and the exchanger from sedimentation. It is recommended to flush the heating circuit before the assembly. All wiring connections must be properly insulated from heat.

If the system works with priority heating of HSW using a three-way valve, always follow the installation instructions of the three-way valve´s manufacturer.

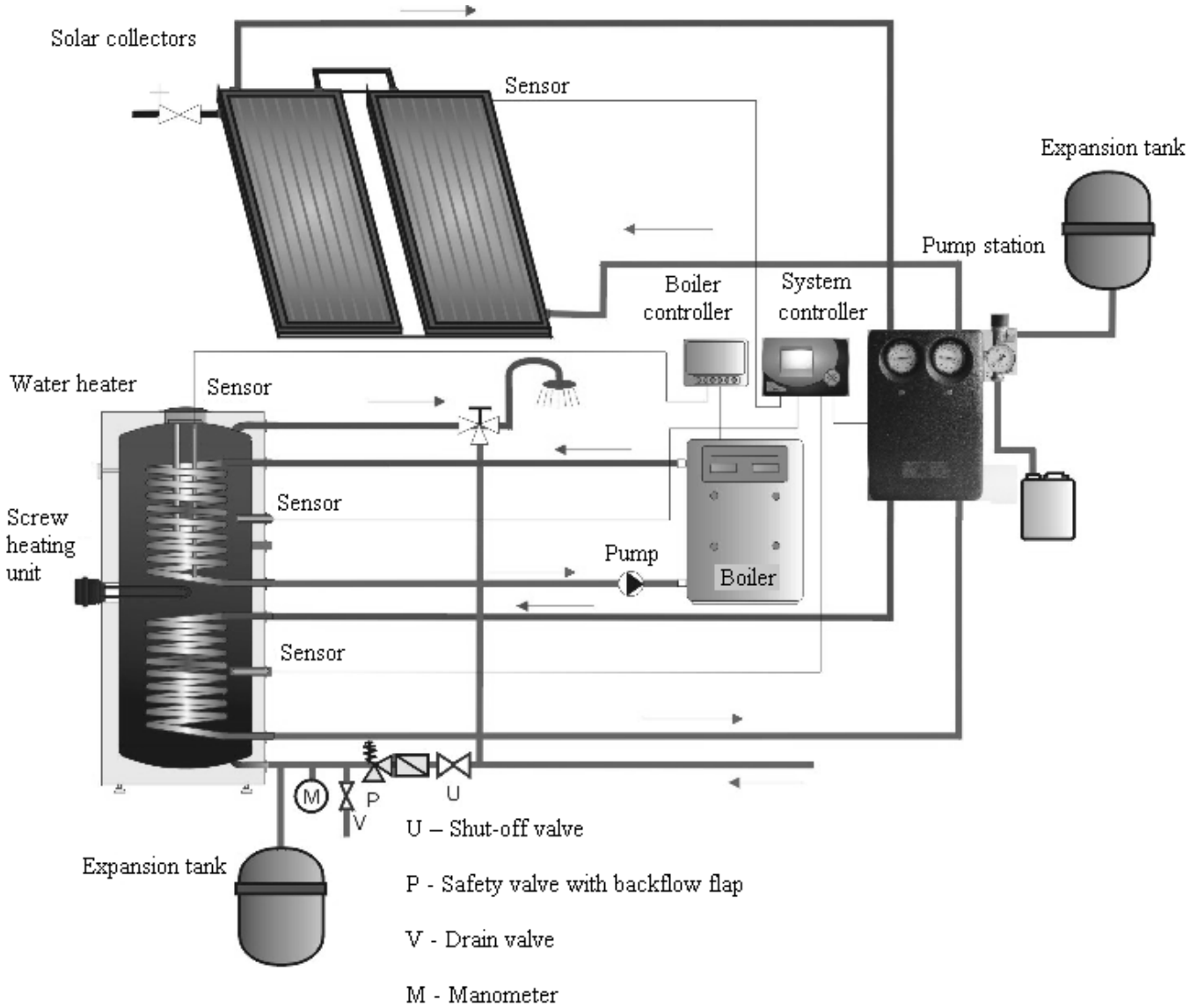



Figure 5

## 2.3 PLUMBING FIXTURE

Each hot service water pressure heater must have a membrane spring loaded with a safety valve. Nominal clearance of safety valves is defined by standard. Heaters are not equipped with a safety valve. The safety valve must be easily accessible, as close to the heater as possible. The inlet pipes must have at least the same clearance as the safety valve. The safety valve is placed high enough to secure dripping water drain by gravity. We recommend mounting the safety valve onto a branch pipe. This allows easier exchange without having to drain the water from the heater. Safety valves with fixed pressure settings from the manufacturer are used for the assembly. Starting pressure of a safety valve must be identical to the maximum allowed heater pressure and at least 20 % higher than the maximum pressure in the water main (Table 3). If the water main pressure exceeds such value, a reduction valve must be added to the system. No stop valves can be put between the heater and the safety valve. During the assembly, follow the guide provided by the safety equipment manufacturer.

It is necessary to check the safety valve each time before putting it into operation. It is checked by manual moving of the membrane from the seat, turning the make-and-break device button always in the direction of the arrow. After being turned, the button must click back into a notch. Proper function of the make-and-break device results in water draining through the safety valve outlet pipe. In common operation, such a check needs to be implemented at least once a month, and after each heater shutdown for more than 5 days. Water may be dripping off the drain pipe of the safety valve; the pipe must be open into the air, pointed down; environment temperatures must not drop below zero. When draining the heater, use the recommended drain valve. First, close the water supply into the heater.

Please find necessary pressure values in the below Table 3. For proper safety valve operation, a backflow valve must be mounted on the inlets pipes, preventing spontaneous heater draining and hot water penetrating back into the water main. We recommend that the hot water distribution from the heater was as short as possible to minimise heat losses. At least one demountable joint must be mounted between the tank and every supply pipe. Adequate piping and fittings with sufficiently dimensioned maximum temperature and pressure values must be used

| SAFETY VALVE START-UP PRESSURE [MPa] | ALLOWABLE OPERATING OVERPRESSURE OF WATER HEATER [MPa] | MAXIMUM PRESSURE IN COLD WATER PIPES [MPa] |
|---|---|---|
| 0,6 | 0,6 | up to 0,48 |
| 0,7 | 0,7 | up to 0,56 |
| 1 | 1 | up to 0,8 |

Table 4

## 2.4 PUTTING THE HEATER INTO OPERATION

PROCEDURE OF FIILING HEATER WITH WATER

1. Open the stop valve on the entry to the heater.
2. Open the hot water valve on the combination faucet. Once water starts flowing out through the combination faucet the filling is completed and the faucet shuts off.
3. Check the joints for tightness.
4. When commencing operation, flush the heater until the cloudiness in the water is gone.
5. Make sure to fill in properly the warranty certificate.

## 2.5 INSPECTION, MAINTENANCE, CARE FOR THE APPLIANCE

If water contains too many minerals, an expert has to come to remove the scale that forms inside the tank, as well as free sediments. This has to be performed after one or two years of operation. The cleaning is carried out through the hole in the flange – dismantle the flange lid and clean the tank. A new sealing has to be used for re-fitting. Since the inside of the heater has special enamel, which must not get in contact with the scale removing agent – do not work with a lime pump. Remove the lime layer with a timber and suck it off, or wipe it off with a clout. After that, the appliance must be rinsed thoroughly and the heating process is checked the same as during the initial putting in operation. Do not use any abrasive cleaning agents (such as liquid sand, chemicals – acid, alkaline) or dye thinners (such as cellulose thinner, trichlor, and the like) to clean the outer shell of the heater. For cleaning use a wet clout and add a few drops of liquid cleaning agent for household applications. Repetitive water heating causes limestone sediment on both the tank walls and chiefly the flange lid. The sedimentation depends on the hardness of water heated, its temperature, and amount of hot water consumed.

**We recommend checking and cleaning the tank from scale and eventual replacement of the anode rod after two years of operation.** The anode life is theoretically calculated for two years of operation; however, it changes with water hardness and chemical composition in the place of use. Based on such an inspection, the next term of anode rod exchange may be determined. If the anode is only blocked with sediments clean its surface and, if used up, mount a new one. Have the company in charge of service affairs clean and exchange the anode. When draining water from the heater, the combination faucet valve for hot water must be open, preventing occurrence of under-pressure in the heater tank which would stop water from draining.

ANODE ROD EXCHANGE METHOD

1. Turn off the boiler control voltage.
2. Drain about 1/5 of the volume of water from the heater.
   PROCEDURE: Close the water entry valve to the boiler.
   Open the hot water valve on the combination faucet.
   Open the boiler drain tap.
3. The anode is screwed in under the plastic guard in the top lid of the heater.
4. Unscrew the anode using adequate wrench.
5. Pull the anode out and follow reversed steps to install a new one.
6. During the assembly, make sure the ground wire is connected properly; it is essential for proper anode function.
7. Fill the boiler with water.

## 2.6 SPARE PARTS

- flange lid
- flange lid seal
- Magnesium anode
- set of M12 bolts
- insulation flange lid
- 3 pieces of legs with M12 thread
- thermowells ½“

When ordering spare parts, give part name, type, and type number from the heater label.

# 3 IMPORTANT NOTICES

## 3.1 IMPORTANT NOTICES

- Check and exchange the Mg anode regularly.
- **No stop valves can be put between the heater and the safety valve.**
- All hot water outputs must have a combination faucet.
- Before filling the heater with water for the first time, it is recommended to fasten the flange connection nuts of the tank.
- It is not allowed to handle the thermostat, aside from temperature resetting with a control button.
- All electric installation handling, adjustment and replacement of the regulation elements shall only be performed by an authorised service company.
- **The thermal fuse must not be turned off!** In case of thermostat defect, the thermal fuse interrupts electric power input to the heating element if the water temperature in the heater exceeds 90°C.
- As an exception, the thermal fuse may also switch off due to water overheating caused by overheating the hot water heating system boiler
- Prior to startup you shall run the heating circuit and possible impurities, that are trapped in the filter, to clean up. After that, the system is fully operational.

Do not try to repair the failure yourselves. Seek either expert or service help. It does not take much for an expert to remove the defect. When making a repair appointment, report the type and serial number you find on the performance plate of your water heater.

To prevent formation of bacteria (e.g. Legionella pneumophila) within stack heating it is recommended, if absolutely necessary, to increase the temperature of HSW periodically for a transitional period of time to at least 74°C. It is also possible to make use of another way of HSW disinfecting.

## 3.2 INSTALLATION REGULATIONS

**Both electric and water installation must follow and meet requirements and regulations relevant in the country of use!**

## 3.3 DISPOSAL OF PACKAGING MATERIAL AND MALFUNCTIONING PRODUCT

A service fee for providing return and recovery of packaging material has been paid for the packaging in which the water heater was delivered. The service fee was paid pursuant to Act No 477/2001 Coll., as amended, at EKO-KOM a.s. The client number of the company is F06020274. Take the water boiler packages to a waste disposal place determined by the town. When the operation terminates, disassemble and transport the discarded and unserviceable heater to a waste recycling centre (collecting yard), or contact the manufacturer.

# 4 ANODE WITH EXTERNAL VOLTAGE SOURCE

- MAINTENANCE-FREE (ON ORDER)

Anode rod is immune to wear and operates without the need of maintenance. Anode rod with an external voltage source consists of mini-potentiostat and titanium electrode that are interconnected via a connecting cable. Potentiostat for cathode protection of enamelled water heaters with integrated red/green LED signal system. Supply and referential electrode with a coating of noble metal oxides; supply with protective current without wear; referential anode to measure the actual potential in the accumulator.

Titanium anode can be mounted in 300 litre capacity heater in exchange for the original anode into the funnel G1 1/2". In 200 and 250 litre capacity heaters, the flange lid has to be replaced additionally, or order the adaptation in the production plant.

| **Mini potentiostat CORREX® MP** | | |
|---|---|---|
| Function | Potentiostat with a plug for cathode anticorrosion protection of enamelled electric water heaters (intermitting potentiostat with controlled regulation of protective current potentiostat) with an integrated function indication with red/green LED control lights. | |
| Mains power supply | Voltage:<br>Frequency:<br>Power input: | 230 V ± 10 %<br>50/60 Hz<br>< 4 VA |
| Indicators | Required potential:<br>Impulse frequency:<br>Intermittence:<br>Rated current (secondary):<br>Supply voltage (secondary): | 2,3 V ± 50 mV<br>100 Hz<br>200 µs<br>100 mA<br>max. 10,6 V at 100 mA |
| Display | Two LEDs , 5 mm diameter | green: followed by protective current supply<br><br>red: failure neither is on: no power supply |
| Operation | Temperature range (Potentiostat):<br>IP protection: | 0…40 °C<br>II, (operation in closed rooms) |
| Casing | Dimensions (without Euro socket plug):<br>Weight (without anode cable) | L x W x H = 80 x 50 x 45 mm<br><br>approx. 160 g |
| **Titanium electrode CORREX®** | | |
| Function | Supply and referential electrode with a coating of noble metal oxides; supply with protective current without wear; referential electrode to measure the actual potential in the accumulator | |
| Bolt with thread | M8 x 30 | |
| Dimensions of electrode in the part filled with water(Basic MP version) | Diameter:<br>Length:<br>Coating length: | 2 mm<br>200 mm<br>100 mm |
| Assembly options | Fitting into the sleeve<br>Fitting into an insulated hole | |

See a separate manual for more details on titanium anode, available on http: //www.dzd.cz

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