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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Read carefully the below instructions prior to the installation of 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 indirect water heaters.
Product's reliability and safety is proven by tests implemented by the Engineering Test Institute in Brno.

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

Guide Contents

1. USE

The OKC 200, 250 & 300 NTR/SOL and OKC 400, 500 NTR,R/SOL water heaters are designed and manufactured as a part of a 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.

2. BASIC VARIANTS PRODUCED

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“.

3. PRODUCT DESCRIPTION

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 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 to be placed on the ground.

The OKC 200 - 500 NTRR/SOL heaters 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.

Placement and environment type:

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

NOTICE

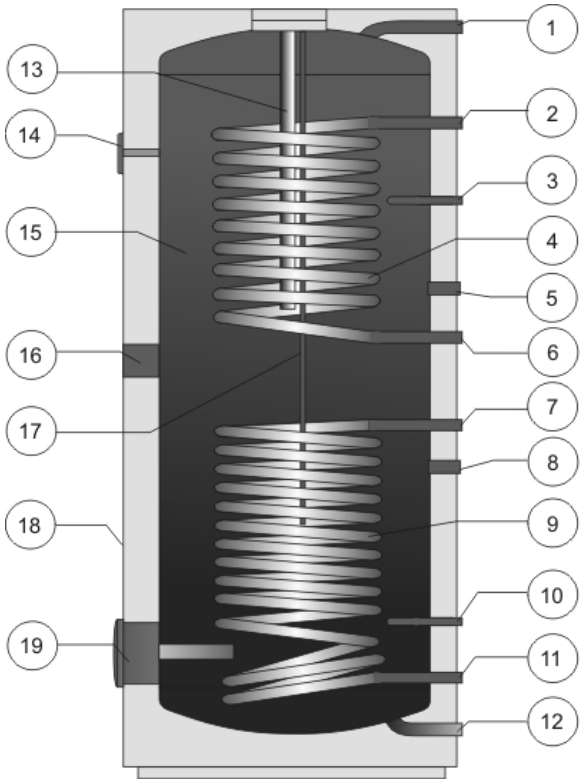
We would like to emphasise that the heater must not be connected to power supply if work involving flammable liquids (petrol, spot remover) or gases, etc., is performed nearby.

Caution!

300, 400, 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.

4. 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

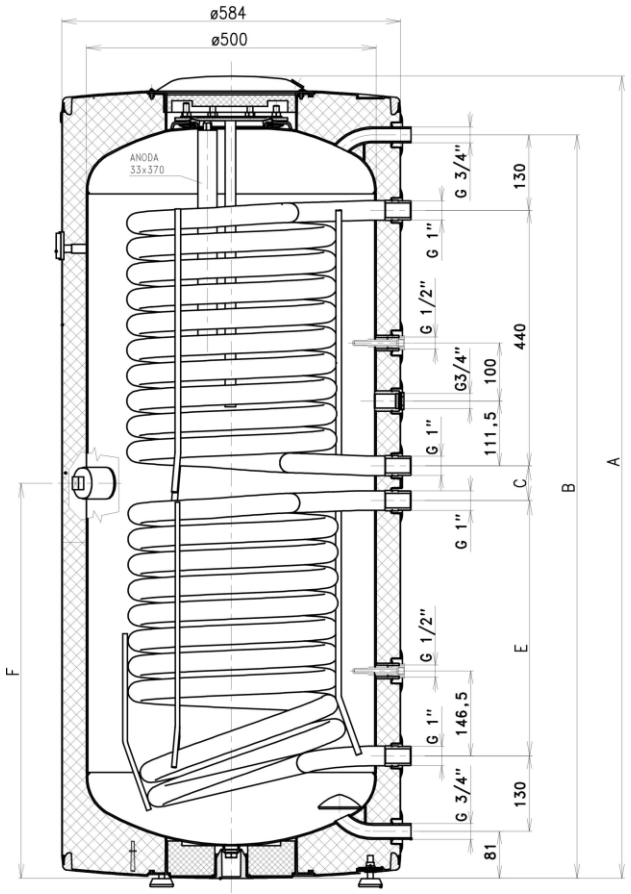


1 Hot water outlet 3/4"
2 Heating water input 1"
3 Thermowell sensor ½"
4 Tubular exchanger
5 Circulation 3/4"
(only 200,250,400,500 l)
6 Heating water output 1"
7 Input from the collector 1"
8 Circulation 3/4" (300 l)
9 Tubular exchanger
10 Thermowell sensor ½"
11 Input to collector 1"
12 Input cold 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)

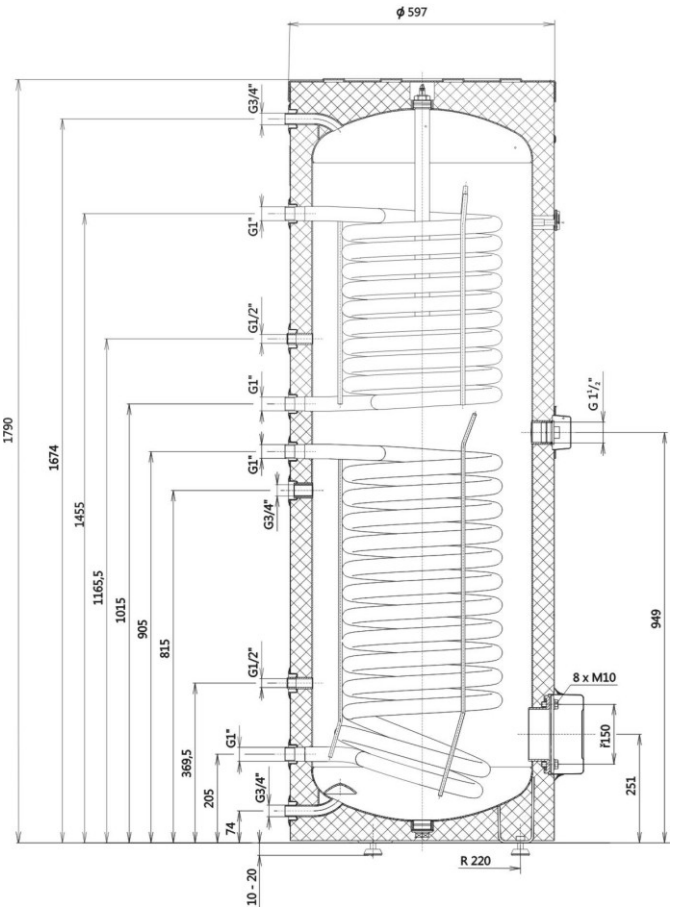
5. TECHNICAL PARAMETERS & DIMENSIONS

Type		OKC 200 NTRR/SOL	OKC 250 NTRR/SOL	OKC 300 NTRR/SOL
Tank capacity	l	200	245	282
Diameter of the heater	mm	584	584	597
Height of the heater	mm	1382	1562	1790
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 tepmperature of HSW	°C	95	95	95
Lower exchanger heat delivery surface	m2	1	1,45	1,5
Upper exchanger heat delivery surface	m2	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
Heat losses	kWh/24h			
*HSW - Hot service water 45°C				

OKC 200 NTRR/SOL
OKC 250 NTRR/SOL

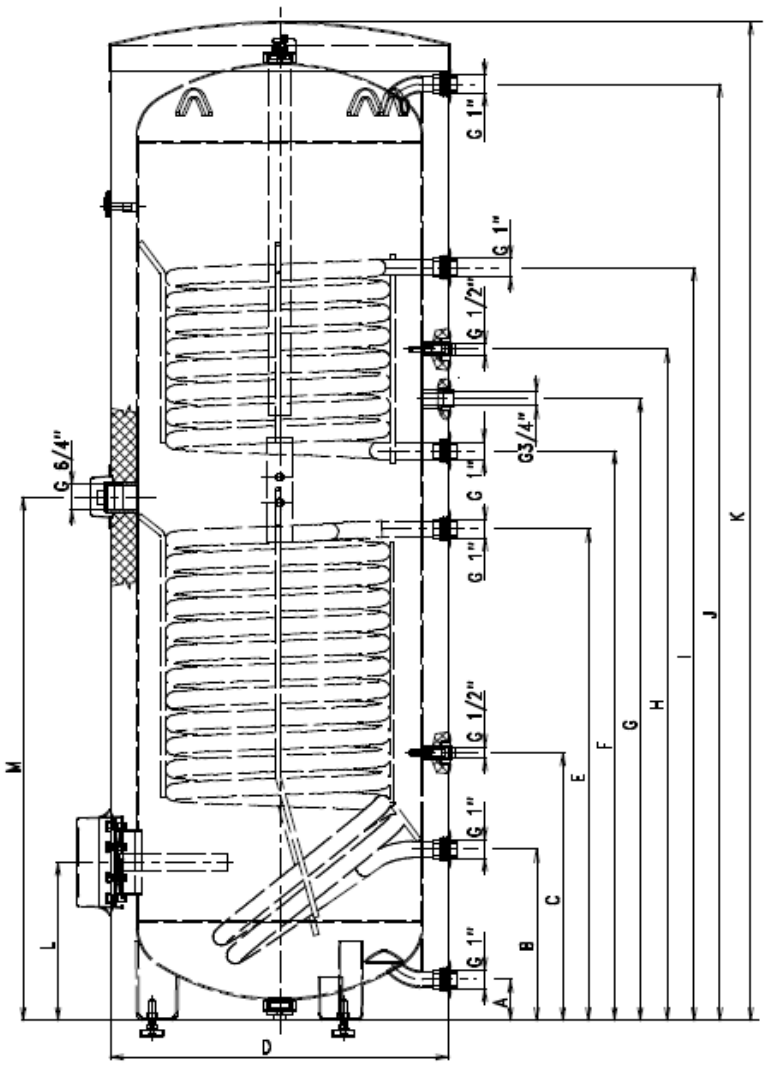


OKC 300 NTRR/SOL



Type	OKC 200 NTRR/SOL	OKC 250 NTRR/SOL
A	1382	1562
B	1280	1461
C	60	110
E	440	570

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



Typ	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

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
Diameter of the heater	mm	650	650	700	700
Weight	kg	119	137	135	160
Max. operational overpressure in the tank	Mpa	1	1	1	1
Max. operational overpressure in the exchanger	MPa	1	1	1	1
Max rating water temperature	°C	110	110	110	110
Max temperature of HSW	°C	95	95	95	95
Upper exchanger heat delivery surface	m2	-	1	-	1,4
Lower exchanger heat delivery surface/	m2	2	2	2	2
Rated lower exchanger output with temeperature gradient 80/60°C	kW	58	58	59	59
Rated upper exchanger output with temeperature gradient 80/60°C	kW	-	26	-	37
Continuous HUW* power of lower exchanger output with	l/h	1423	1423	1448	1448
Continuous HUW* power of upper exchanger output with	l/h	-	638	-	908
Rated lower exchanger output with temeperature gradient 60/50°C	kW	25	25	26	26
Rated upper exchanger output with temeperature gradient 60/50°C	kW	-	12	-	18
Continuous HUW power of lower exchanger output with temeperature gradient 60/50°C	l/h	767	767	797	797
Continuous HUW power of upper exchanger output with temeperature gradient 60/50°C	l/h	-	368	-	552
Performance number ac. to DIN 4708 upper exchanger	NL	-	-	-	-
Performance number ac. to DIN 4708 lower exchanger	NL	-	-	-	-
Heating period for HUW* with a lower exchanger with temperature gradient 80/60°C	min	23	22	27	26
Heating period for HUW* with a upper exchanger** with temperature gradient 80/60°C	min	-	22	-	17
Heating period for HUW* with a lower exchanger with temperature gradient 60/50°C	min	42	41	48	47
Heating period for HUW with a upper exchanger** with temperature gradient 60/50°C	min	-	38	-	27
Heat losos	kWh/24h				

*HSW -hot utility water 45°C

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

6. EXAMPLES OF HEATERS CONNECTION

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 of 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 deaerating 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.**

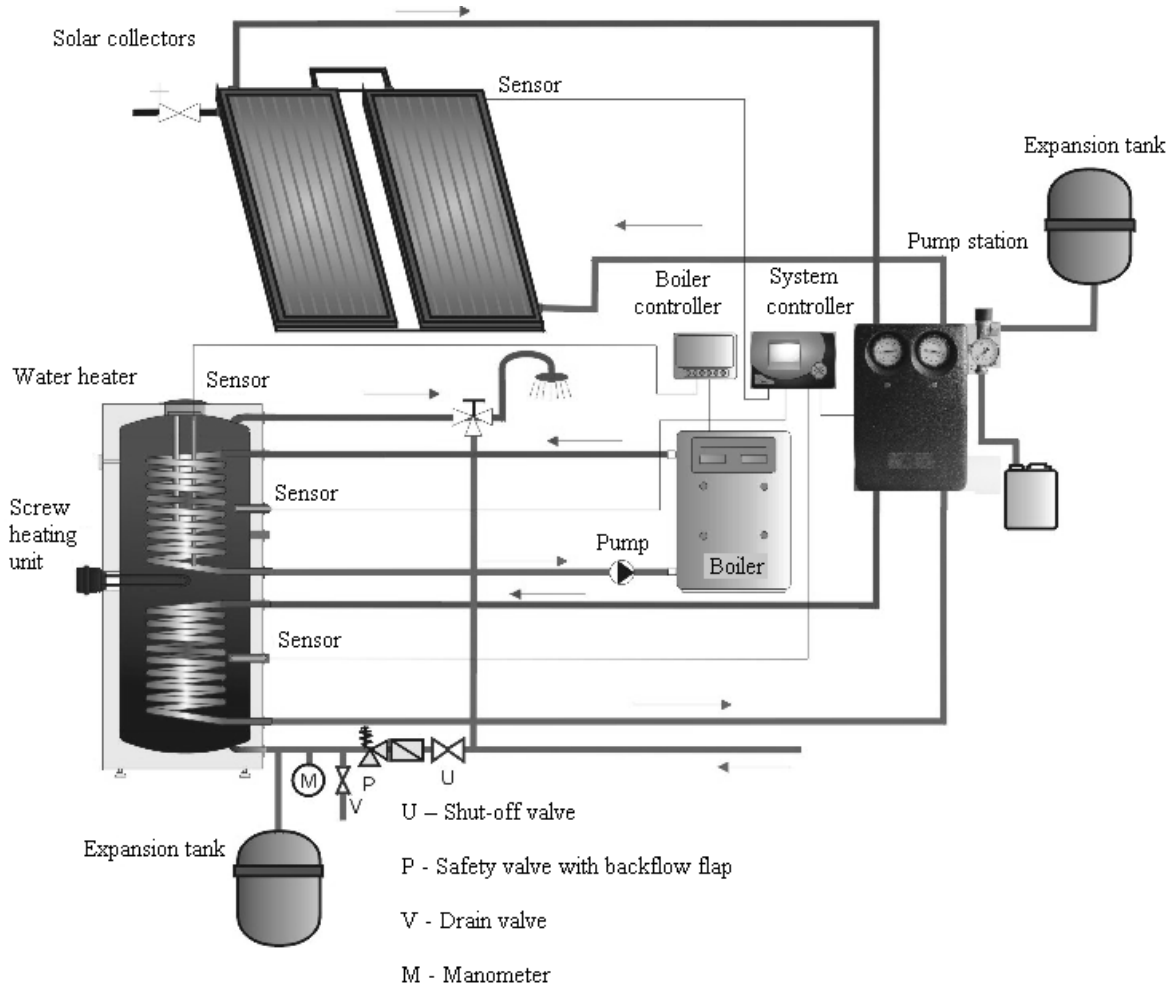
Cold water shall be connected to an inlet marked with a blue ring or writing “HSW INLET”. Hot water shall be connected to an outlet marked with a red ring or writing “HSW INLET”. If the hot service water (HSW) distribution is equipped with circulation circuit, it shall be connected to the outlet marked 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.

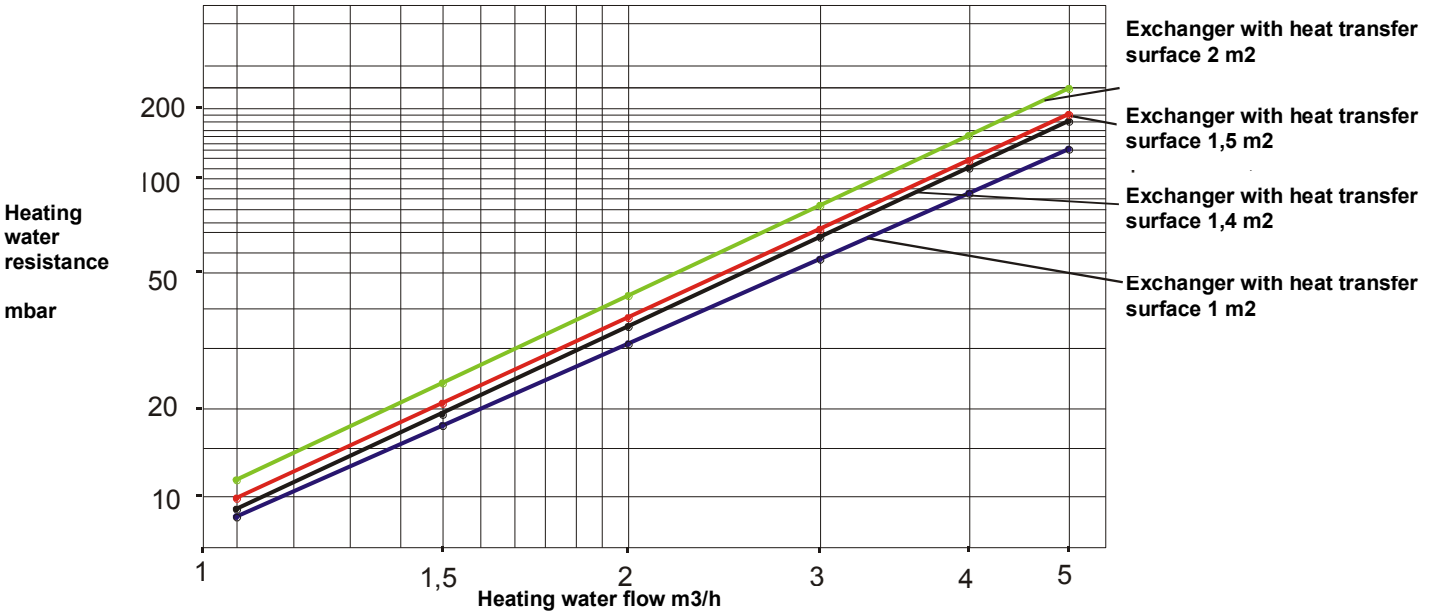
Example of connecting a heater with solar collectors and a gas boiler

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 deaerating 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.



7. PRESSURE LOSSES



Type	Presure loss (mbar) tHV = 60 °C Amount of heating water in m3/hr				
	1	2	3	4	5
Exchanger 1m2	7	24	51	86	130
Exchanger 1,4m	9	32	68	115	174
Exchanger 2m2	12	42	88	149	226

8. SECURITY EQUIPMENT

Each hot service water pressure heater must have a a membrane spring loaded with a safety valve.
Rated clearance of safety valve complies with the standard DN 20 for 251-1000 litre heaters.

Principles of safety valves fitting

Safety valve is mounted on a cold water inlet, no stop or throttling fitting shall be installed between the safety valve and the heater.
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 the branch led above the heater. 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. 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. Connecting a heaters to plumbing fixtures is shown on page 6.
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. 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 can drip from the safety valve through the drain pipe; the pipe must be freely open to the atmosphere, placed vertically and shall be in an environment free of temperatures below freezing. When draining the heater, use a recommended drain valve. First, close water input into the heater.

Find necessary pressure values in the following table.

Safety valve starting pressure (MPa)	Admissible operating water heater pressure (MPa)	Max. pressure in the cold water pipe (MPa)
0.6	0.6	do 0.48
0.7	0.7	do 0.56
1	1	do 0.8

For proper safety valve operation, a backflow valve must be mounted on the inlet pipes, preventing spontaneous heater draining and hot water penetrating back into the water main.
When assembling the security equipment, follow ČSN 06 0830.

9. PROCEDURE OF FILLING 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.

10. MAINTENANCE

Maintenance of the heater consists in checking and exchanging of the anode rod.
Magnesium anode sets the electric potential inside the tank to a level that limits boiler tank corrosion.
Theoretically, its lifetime is calculated to two years of operation; however, it changes based on water hardness and chemical composition at the place of use. Anode rod check and possible replacement is recommended every two years of operation. Based on anode wear, set the time of the next check. We recommend you do not underestimate the importance of this additional protection of the boiler tank.

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.

Have the company in charge of service affairs exchange the anode.

WARNING:

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 70 ° C. It is also possible to make use of another way of HSW disinfecting.

Theoretical kinetics of Legionella necrotising for practice.

Temperature range	Operation time necessary
50 to 60°C	several hours
60 to 70°C	several minutes
over 70°C	several seconds

11. INSTALLATION REGULATIONS

Regulations and instructions that must be obeyed if the heater is connected

a) to the heating system
   ČSN 06 0310 – Thermal systems in buildings – Designing and Installation
   ČSN 06 0830 – Thermal systems in buildings – Protecting devices
b) to the electrical network
   ČSN 33 2180 - Connecting of electric devices and appliances
   ČSN 33 2000-4-41 - Low voltage electric installations Protective measures to ensure safety – Protection against electric shock
   ČSN 33 2000-7-701 - Low voltage electric installations: Single-purpose devices and devices in special premises - Premises with tub or shower
c) to the hot water heating system
   ČSN 06 0320 - Thermal systems in buildings - Hot water preparation – Design and Project Engineering
   ČSN 06 0830 – Thermal systems in buildings – Protecting devices
   ČSN 73 6660 – Internal water conduits
   ČSN 07 7401 - Water and steam for thermal energy equipments with working steam pressure up to 8 MPa
   ČSN 06 1010 - Tank water heaters with water and steam heating; and combined with electric heating. Technical requirements. Testing.
   ČSN 75 5455 – Calculation of water installations inside buildings
   ČSN EN 12897 – Water supply – Indirectly heated closed tank-type water heaters

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

12. 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.

Disposal of packaging material and functionless 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, 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.

13 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 a 300 litre capacity heater in exchange for the original anode into the funnel G5/4". In 200 and 250 litre capacity heaters, the flange lid has to be replaced additionally, or order the adaptation in the production plant.

Technical Data

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: Frequency: Power input:	230 V ± 10 % 50/60 Hz < 4 VA
Indicators	Required potential: Impulse frequency: Intermittence: Rated current (secondary) Napájecí napětí (sekundární):	2.3 V ± 50 mV 100 Hz 200 µs 100 mA max. 10,6 V při 100 mA
Display	Two LEDs, 5 mm diameter	green: followed by protective current supply Red: failure neither is on: no power supply
Operation	Temperature range (Potentiostat): IP protection:	0…40 °C II (operation in closed rooms)
Casing	Dimensions (without Euro socket plug): Weight (without anode cable)	L x W x H = 80 x 50 x 45 mm approx. 160 kg
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: Length: Coating length:	2 mm 200 mm 100 mm
Assembly options	Fitting into the sleeve 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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