

OPERATING and INSTALLATION MANUAL

HOT WATER TANKS 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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PRIOR TO THE INSTALLATION OF THE TANK, READ CAREFULLY THIS MANUAL!

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. The present instructions will introduce you to the use, construction, maintenance and other information regarding electrical water tanks.



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 the Manual



Important information for tank users.



Abiding by the recommendations of the manufacturer serves to ensure trouble-free operation and the long service life of the product.



Caution!

Important notice to be observed.

1 PRODUCT TECHNICAL SPECIFICATION

1.1 FUNCTION DESCRIPTION

Hot water tanks OKC 200, 250, 300 NTRR/SOL and OKC 400, 500 NTR,R/SOL are designed and manufactured as part of solar system that contains additional integral elements of that system, such as solar collectors and their roof holders (straight roof stands), expansion receptacle, collector filler distribution and other elements necessary for the right and smooth function of 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 tank with one spiral heat exchanger for heating of HSW with heating water from a single source. Reheat can be carried out by electric heater TJ 6/4“.

OKC NTRR/SOL - stationary tank with two spiral heat exchangers for heating of HSW with heating water from two sources. Reheat can be carried out by boiler in the top exchanger and also by electric heater TJ 6/4“.

The tank receptacle is welded from a steel plate; 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 tank and in the side flange to adjust the electric potential inside the receptacle, thus reducing the risk of corrosion. This anode can be **exchanged with titanium anode** which is fed with electricity and is stable (it need not be exchanged after two years of the tank's operation as the magnesium anode). All types have the outlets of hot and cold water and a circulation opening welded to them. The receptacle is insulated with polyurethane foam of 50 mm thickness. The tank shell consists of plastic container, the connecting parts are metal coated. The entire tank stands on three rectification screws with a possibility of levelling floor unevenness within the range of 10mm. Under the plastic cover on the side of the 300 litre tank, there is a cleaning and revision opening ended with a flange. Both 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 tank 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 tanks are indirect tanks designed for preparation of hot sanitary water by means of 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 DATA

1.3.1 TECHNICAL DATA FOR TANKS

MODEL		OKC 200 NTRR/SOL	OKC 250 NTRR/SOL	OKC 300 NTRR/SOL
Capacity	l	200	242	275
Height	mm	1377	1557	1791
Diameter	mm	584	584	600
Weight without water	kg	106	120	125
Hot water operating pressure	MPa	1	1	1
Heating water operating pressure	MPa	1	1	1
Max temperature of heating water	°C	110	110	110
Max temperature of hot water	°C	95	95	95
Lower exchanger heat delivery surface	m ²	0,8	1	1,2
Upper exchanger heat delivery surface	m ²	1	1	0,8
Lower exchanger capacity	l	5,5	7	8,5
Upper exchanger capacity	l	7	7	5,5
Bottom/top exchanger output at temperature drop 80/60 °C	kW	19/24	24/24	29/19
Permanent HSW* performance of lower/upper exchanger	l/h	450/670	670/670	850/450
HSW* heating time by exchanger (lower/upper)at heat drop 80/60 °C [min]	min	34/18	33/21	33/25
Static loss	W	82	87	85

*HSW - Hot sanitary water 45 °C

Table 1

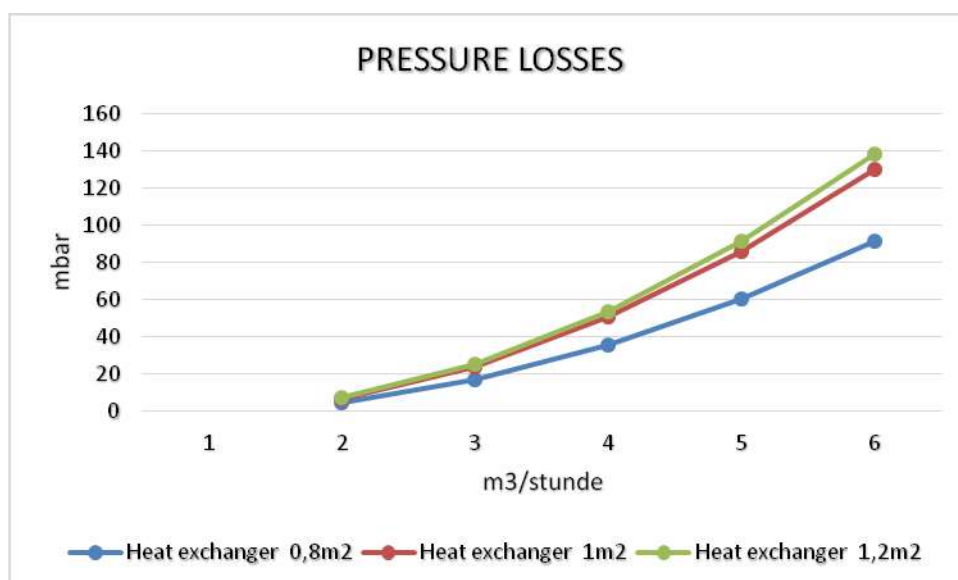
MODEL		OKC 400 NTR/SOL	OKC 400 NTRR/SOL	OKC 500 NTR/SOL	OKC 500 NTRR/SOL
Tank capacity (without anode and heat exchanger, etc.)	l	373	363	447	433
Tank capacity	l	378	369	449	436
Height	mm	1926	1926	1920	1920
Diameter	mm	650	650	700	700
Weight without water	kg	119	137	135	160
Hot water operating pressure	MPa	1	1	1	1
Heating water operating pressure	MPa	1	1	1	1
Max temperature of heating water	°C	110	110	110	110
Max temperature of hot water	°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
Lower heat exchanger output at temperature drop 80/60°C	kW	58	58	59	59
Upper heat exchanger output at temperature drop 80/60°C	kW	-	26	-	37
Bottom heat exchanger permanent output at temperature drop 80/60 °C	l/h	1423	1423	1448	1448
HSW* upper heat exchanger permanent output at temperature drop 80/60 °C	l/h	-	638	-	908
HSW* heating time by bottom heat exchanger at heat drop 80/60 °C	min	23	22	27	26
HSW* heating time by upper heat exchanger at heat drop 80/60 °C	min	-	22	-	17
Static loss	W	109	114	121	121

*HSW - Hot sanitary water 45 °C

** Heating of volume of respective upper heat 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
Heat exchanger 0.8 m ²	5	17	35	60	91
Heat exchanger 1 m ²	7	24	51	86	130
Heat exchanger 1.2 m ²	7	26	54	91	138

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

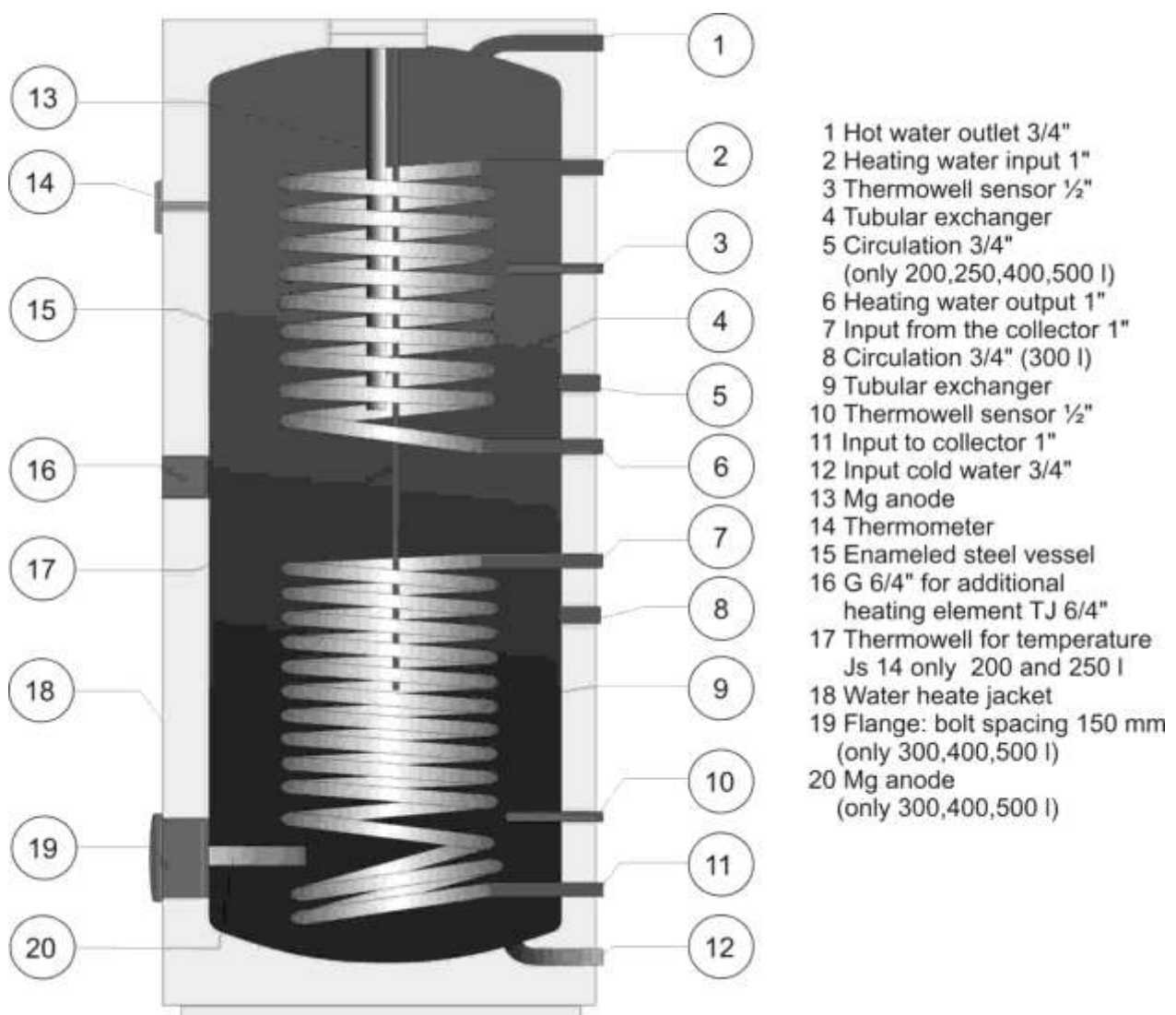
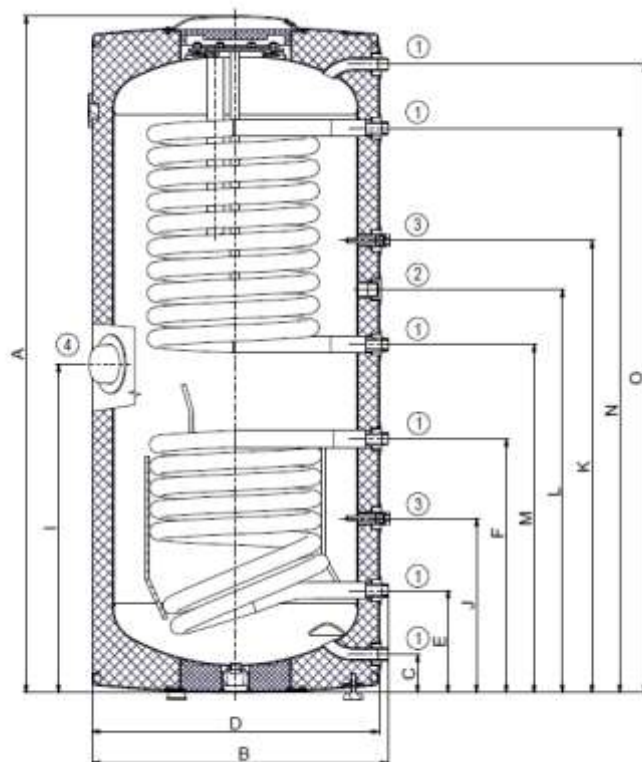


Figure 1

1.4 DESIGN AND BASIC DIMENSIONS OF TANKS

OKC 200 NTRR/SOL

OKC 250 NTRR/SOL

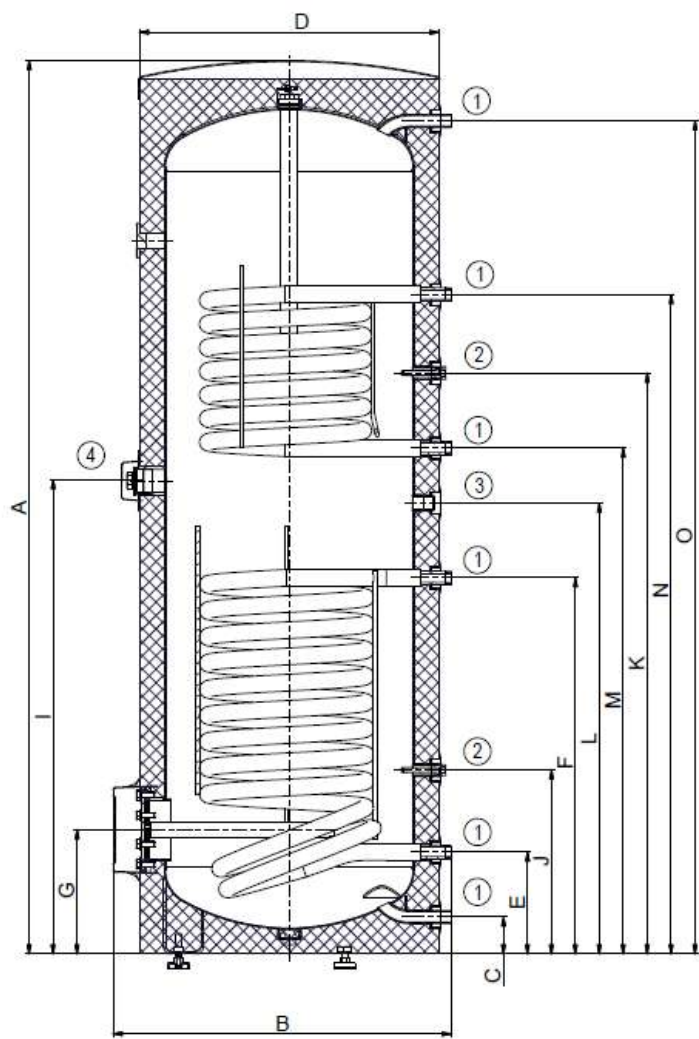


neck # 1	3/4" outer
neck # 2	3/4" inner
neck # 3	1/2" inner
neck # 4	6/4" inner

Figure 2

	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	I [mm]	J [mm]	K [mm]	L [mm]	M [mm]	N [mm]	O [mm]
OKC 200 NTRR/SOL	1377	607	78	584	208	648	668	355	920	820	708	1148	1278
OKC 250 NTRR/SOL	1557	607	78	584	208	778	840	355	1100	1000	888	1328	1458

OKC 300 NTRR/SOL

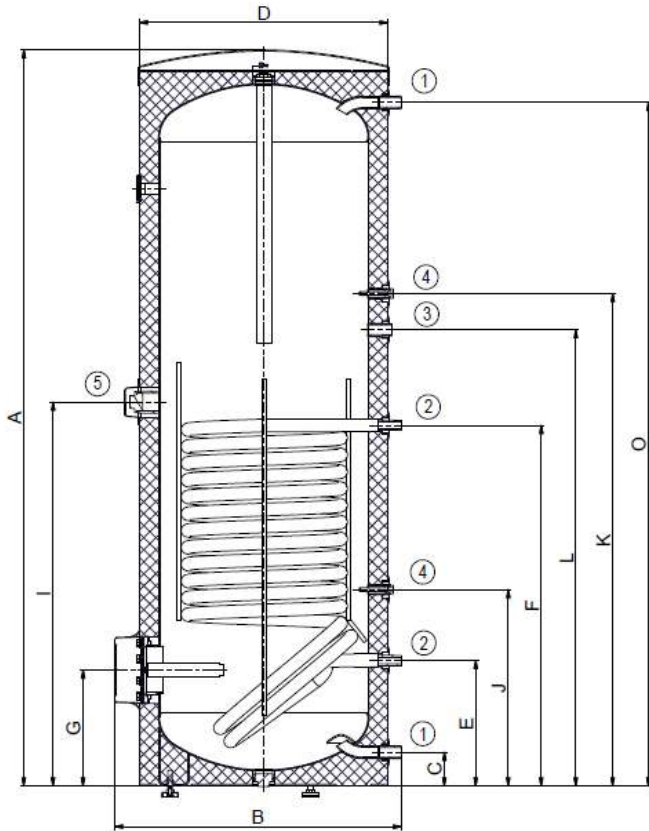


neck # 1	3/4" outer
neck # 2	1/2" inner
neck # 3	3/4" inner
neck # 4	6/4" inner

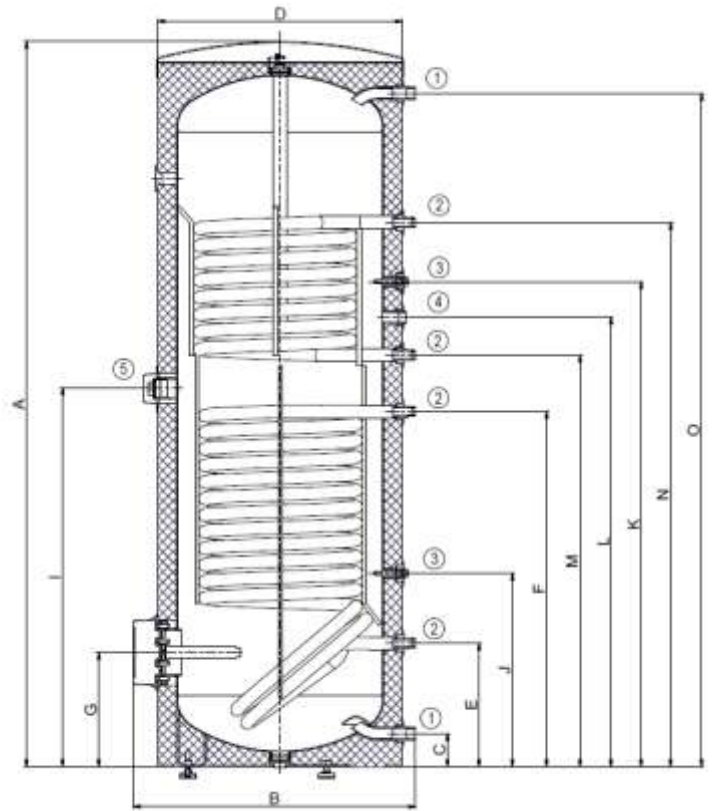
Figure 3

	A	B	C	D	E	F	G	I	J	K	L	M	N	O
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
OKC 300 NTRR/SOL	1791	678	77	600	206	907	252	954	372	1168	817	1017	1457	1674

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



neck # 1	1" outer
neck # 2	3/4" outer
neck # 3	3/4" inner
neck # 4	1/2" inner
neck # 5	6/4" inner



neck # 1	1" outer
neck # 2	3/4" outer
neck # 3	1/2" inner
neck # 4	3/4" inner
neck # 5	6/4" inner

Figure 4

	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	I [mm]	J [mm]	K [mm]	L [mm]	O [mm]
OKC 400 NTR/SOL	1926	749	88	650	328	943	303	1004	514	1288	1193	1788
OKC 500 NTR/SOL	1920	800	67	700	224	969	292	1044	384	1413	1268	1788

	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	I [mm]	J [mm]	K [mm]	L [mm]	M [mm]	N [mm]	O [mm]
OKC 400 NTRR/SOL	1926	749	88	650	327	943	303	1006	514	1288	1193	1093	1445	1788
OKC 500 NTRR/SOL	1920	800	67	700	224	969	292	1044	384	1413	1268	1118	1608	1788



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

2 OPERATION AND FITTING INSTRUCTIONS

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 the legally acknowledged national regulations and standards, also conditions for connection defined in the local electric and water works have to be adhered to, as well as the installation and operation manual.

The temperature at the place of the tank 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 emphasize that the tank shall not be connected to power supply if flammable liquids (benzine, stain cleaner) or gases, etc., are handled in its proximity.

2.2 EXAMPLES OF TANKS CONNECTION

2.2.1 CONNECTING A TANK TO A SOLAR SYSTEM



Tank 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 tank 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 tank's heat 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.

Connecting a tank:



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

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

2.2.2 EXAMPLE OF CONNECTING A TANK WITH SOLAR COLLECTORS AND A GAS BOILER

Connecting a tank to a boiler heating circuit:

The tank is placed on the ground, next to the heating source, or in its vicinity. The heating circuit is connected to marked inlets and outlets of the tank's heater exchanger; deaeration valve is mounted in the highest place. It is necessary to install a filter into the circuit in order to protect pumps, three-way valve, 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 HUW using a three-way valve, always follow the installation instructions of the three-way valve's manufacturer.

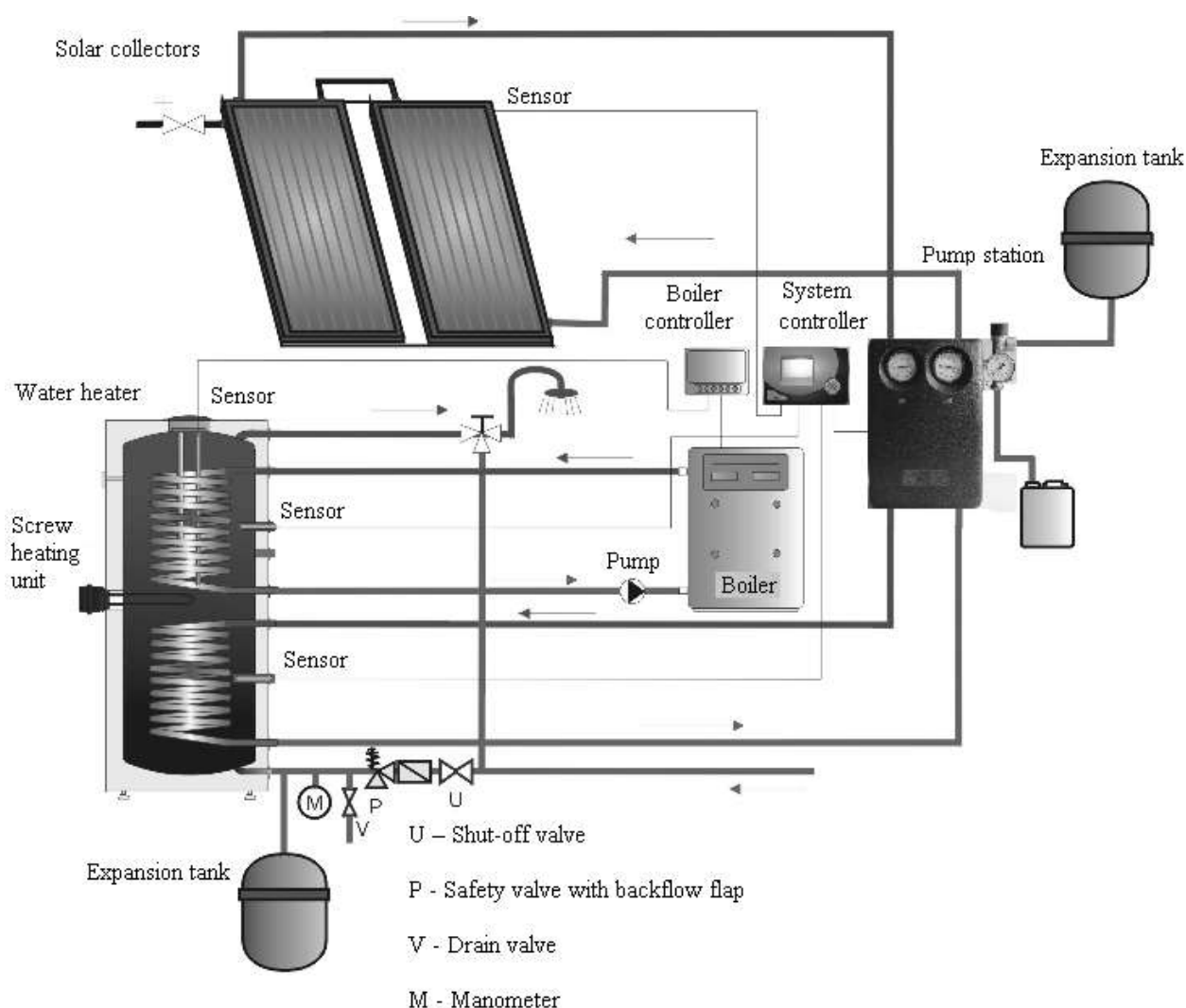


Figure 5

2.3 PLUMBING FIXTURE



Every hot utility water pressure tank shall be equipped with membrane spring loaded with safety valve. Nominal clearance of safety valves is defined by standard. Tanks are not equipped with safety valve. Safety valve shall be easily accessible, fitted as close as possible to the tank. The inlet pipes must have at least the same clearance as the safety valve. Safety valve is placed high enough to secure dripping water drain by gravity. We recommend mounting the safety valve onto a branch pipe. Easier exchange without the necessity of draining water from the tank. Safety valves with fixed pressure settings from the manufacturer are used for the assembly. The starting pressure of the safety valve must be identical to the maximum allowed tank pressure, and at least 20 % higher than the maximum pressure in the water main (Table 4). If the water main pressure exceeds such value, a reduction valve must be added to the system. No closing armature may be mounted between the tank and the safety valve. During 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 regular operation, such a check needs to be carried out at least once a month, and after each shutdown of the tank longer 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 tank, use the recommended drain valve. First of all, close water inlet in the tank.

Find necessary pressure values in the below Table 4. For proper safety valve operation, a backflow valve shall be mounted on the inlet pipes that prevents spontaneous draining of the tank and hot water penetration back into the water main. We recommend that the hot water distribution from the tank 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]	ACCEPTABLE OPERATING OVER- PRESSURE OF WATER TANK [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 FIRST COMMISSIONING

PROCEDURE OF FILLING THE TANK WITH WATER

1. Open the stop valve on the tank inlet
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 start using, keep flushing the tank until the cloud disappears.
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 tank has special enamel, which must not get in contact with the scale removing agent – do not work with decalcification 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 tank. For cleaning use a wet clout and add a few drops of liquid cleaning agent for household applications. Repetitive water heating causes lime scale sediment on both the tank walls and chiefly on the flange lid. The sedimentation depends on the hardness of heated water, its temperature, and the amount of hot water consumed.

We recommend checking and cleaning the receptacle from lime 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 a company in charge of service affairs deal with the cleaning and exchanging of the anode. When draining water from the tank, the mixing faucet valve for hot water must be open, preventing the occurrence of under-pressure in the tank receptacle that would stop water from draining.

PROCEDURE OF EXCHANGING ANODE ROD IN UPPER PART OF THE TANK

1. Turn off control voltage to the tank
2. Drain water from 1/5 tank.
PROCEDURE: Close water inlet in the tank
Open the hot water valve on the combination faucet.
Open the drain tap of the tank
3. Anode is screwed in under the plastic cover in the upper lid of the tank
4. Unscrew the anode using adequate wrench
5. Pull the anode out and follow reversed steps to install a new one

6. During the fitting, make sure the grounding cable (300-500l) is connected properly; this is the condition of the anode's proper functioning
7. Fill the tank with water

PROCEDURE OF EXCHANGING ANODE ROD IN SIDE FLANGE

1. Turn off control voltage to the tank
2. Drain water from the tank.
PROCEDURE: Close water inlet in the tank
Open the hot water valve on the combination faucet.
Open the drain tap of the tank
3. One anode is screwed in under the plastic cover in the upper lid of the tank, and the other one is screwed in on the side flange
4. Unscrew the anode using adequate wrench
5. Pull the anode out and follow reversed steps to install a new one
6. Fill the tank with water

2.6 SPARE PARTS

- flange lid
- flange lid seal
- magnesium anode
- magnesium anode 33x200
- set of M12 bolts
- insulation flange lid
- 3 pieces of legs with M12 thread
- thermowells ½"

When ordering spare parts always state the name of the part, the type and type number from the tank's plate.

3 IMPORTANT NOTICES

3.1 IMPORTANT NOTICES

- **Without a confirmation of both electric installation and assembly by expert company, the warranty certificate is invalid.**
- Check and exchange the Mg anode regularly.
- **No closing armature may be mounted between the tank and the safety valve.**
- All hot water outputs must have a combination faucet.
- Prior to the first filling the tank with water we recommend that the receptacle's flange connection nuts are tightened.
- 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 supply to the heating element if the water temperature in the tank 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.
- **It is necessary to activate the heating circuit and remove potential impurities that are captured in the filter; after that the system is fully functional.**



Do not attempt to remove potential defect by yourselves. Seek either expert or service help. It does not take much for an expert to remove the defect. When organizing repair state the model designation and serial number that is to be found on the power plate of your water tank.



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

3.2 INSTALLATION REGULATIONS



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

3.3 DISPOSAL OF PACKAGING MATERIAL AND NON-FUNCTIONING PRODUCT

A service fee for providing return and recovery of packaging material has been paid for the packaging in which the product 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 tank packages to a waste disposal place determined by the municipality. 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 DEMAND)

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 tanks 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 integrated in a 300 litre tank in exchange for the original anode in G1 1/2" funnel. In 200 and 250 litre tanks, the flange lid shall be exchanged additionally, or have the modification made in the production.

Technical data of anode

Mini potentiostat CORREX® MP		
Function	Potentiostat for anti-corrosion cathode protection of electrical enamelled water tanks (intermittent potentiostat with controlled regulation of protective current potential) with integrated red/green LED signal system.	
Mains power supply	Voltage: Frequency Power input:	230 V $\pm$ 10 % 50/60 Hz < 4 VA
Indicators	Required potential: Impulse frequency: Intermittence: Rated current (secondary) Supply voltage (secondary):	2,3 V $\pm$ 50 mV 100 Hz 200 μ s 100 mA max 10.6 V at 100 mA
Display	Two LEDs, 5 mm diameter	Green: followed by supply with protective current red: failure none is on no power supply
Operation	Temperature range (Potentiostat): IP protection:	0...40 °C II (operation in closed rooms)
Bushing	Dimensions (without Euro socket plug): Weight (without anode cable)	L x W x H = 80 x 50 x 45 mm 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 tank.	
Bolt with thread	M8 x 30	
Dimensions of electrode in the section filled with water (Basic MP version)	Diameter: Length Coating length	2 mm 200 mm 100 mm
Assembly options:	Fitting into a sleeve Fitting into an insulated hole	

Read more about titanium anode in a separate document about accessories:

<http://www.dzd.cz/images/download>

18-1-2016