# **Operation and Installation Manual**



# WATER HEATERS FOR SOLAR SYSTEMS

# OKC 300 NTR/SOLAR SET

OKC 300 NTRR/SOLAR SET



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# Read carefully the below instructions prior to the installation of the heater!

Data sheet pursuant to Directive No 442/2004 Coll. and Annex No 7

Heater types	Energy efficiency class	Heat losses Wh/24hr/l	Nominal capacity (I)	Time of content heating (hours)	Electricity consumption for heating of the contents from 15°C to 65°C in kWh	Heat losses kWh/24hr
OKC 300 NT/SOLAR SET			300	8,5	17,6	
OKC 300 NTRRR/SOLAR SET			300	3-4,5-6	17,6	

### 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.

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#### **IMPORTANT NOTICE**

# Prior to filling the solar circuit, check whether the screws on the pump assembly, safety part and screwed fitting with a gravity brake in this circuit are fastened properly.

#### **1. USE**

The OKC 300 NTR/SOLAT SET and OKC 300 NTRR/SOLAR SET water heater is 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 300 NTR/SOLAR SET	- Stationary heater with one coil exchangers for heating HSW with heating water
	from a single source. Reheat can be carried out by an electric element TJ 6 / 4"
	only.
OKC 300 NTRR/SOLAR SET	- Stationary heater with two coil exchangers for heating HSW with heating water
	from two sources. Reheat can be carried out by a boiler in the top exchanger and
	also by an 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 the outlets of hot and cold water and a circulation opening welded to them. The tank is insulated with polyurethane foam of 60 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 10mm. Under the plastic cover on the side of the heater, 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 inscrewing an additional heating element of TJ 6/4" series. The heater is to be placed on the ground.

The OKC 300 NTR/SOLAR SET and OKC 300 NTRR/SOLAR SET heaters are indirect heaters designed for preparation of hot service water by means of a solar system.

The NTR version has an exchanger placed in the bottom part of the heater. Only the solar circuit and reheat by means of a heating element is used for heating.

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 wiring connections must be properly insulated from heat.

It is recommended to use the product in an indoor environment with air temperatures from +2 to  $45^{\circ}$ 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.

# 4. TECHNICAL DESCRIPTION

The SOLAR SET heater has already installed pump assembly REGUSOL 130 and a single-circuit regulation ESR 21.

The pump assembly REGUSOL 130 is fitted with a circulation pump WILO and a flowmeter with a flow of 2-15 litres per minute. It further contains a gravity brake, a safety compartment (an integral part of the unit that serves even potential refilling of the entire system) and a thermometer used also as a shut-off valve. See the manufacturer's guide attached to the heater for a detailed description of the pump assembly.





# 5. TECHNICAL PARAMETERS & DIMENSIONS

Туре		OKC 300 NTR/SOLAR SET	OKC 300 NTRR/SOLAR SET
Capacity	I	300	295
Height of the heater	mm	1600	1600
Diameter of the heater	mm	670	670
Max weight f the heater without water	kg	145	155
Maximum operating overpressure in the tank	MPa	1	1
Maximum operating overpressure in the exchanger	MPa	1	1
Maximum heating water temperature	°C	110	110
Maximum hot water temperature	°C	90	90
Solar exchanger heating power	m <sup>2</sup>	1,5	1,5
Boiler exchanger heating power	m²	-	1
Solar exchanger capacity	I	10,5	10,5
Boiler exchanger capacity	I	-	7
Connecting voltage		230V/50Hz	230V/50Hz
Heat losses	KWh/24h		



#### Caution!

300 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.

### 6. **REGULATION UNIT**

Single-circuit regulation ESR 21 allows control and regulation of a simple solar connection (collector and heater used for hot water preparation only).

# <u>The programmes and their setting are described in the manual of this controlled which forms a part of the product documentation.</u>

There is a "0" Simple solar device programme in the controller set by the manufacturer. Heat values are also defined by the manufacturer based on long-term experience. These values can be adjusted specifically by local criteria, the procedure of changing these values is also described in the manual to the controller.

Another of the most frequently used programmes is the programme "80". The programme suits mostly the OKC 300 NTRR/SOLAR SET version with two exchangers. Another exchanger can be attached to a gas boiler that serves water reheat to the desired temperature when solar collector do not have the required efficiency (e.g. at night or in winter).

Reheat with a gas boiler cannot be used with the OKC 300 NTR/SOLAR SET type since this heater has only the lower exchanger, and reheat can only be performed by means of an electric heating element. Suitable is TJ 6/4" with the output from 2 to 9 kW, depending on the type. You will find the entire assortment in the DZ DRAŽICE catalogue.

# 7. PRESSURE LOSSES



# 8. 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.

4

109

192

5

170

300

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.

Angle screwing and gravity brake are supplied as accessories to the heater. It is mounted on the supply piping from the collector to the exchanger. The function of it is protection from spontaneous circulation of the filler in the supply branch from the collectors (if the collectors' efficiency is low, they may cause cooling of the heater = e.g., during the day. the heater heats and cools down in the night). This undesired phenomenon is avoided by the FLOWSTOP gravity brake.

#### Connecting a heater to a hot service water distribution:

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 and 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.



### 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 inlets and outlets 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.

# 9. ELECTRIC WIRING

#### NOTICE

The heater is provided with a flexible supply conductor connected directly on the controller terminal board.

The fitter or used shall only connect the cable plug into the socket. Pulling the plug out does not affect the function of the controller.

Avoid plugging into the network unless the solar circuit is filled with a fill. It may damage the pump when runs dry.

Connection, repairs, and wiring inspections may only be implemented by a company (person) authorised to such activity. Expert connection must be confirmed on the warranty certificate.

Installations in bathrooms, lavatories and showers must comply with the ČSN33 2000-7-701 standard.

The power supply must contain a breaker disconnecting all poles of the network.

Perform the installation in compliance with applicable ČSN standards.

# **10. SECURITY EQUIPMENT**

Each hot service water pressure heater must have a membrane spring loaded with a safety valve. Rated clearance of safety valve complies with the standard DN 20 for 251-1000 litre heaters. The 300 litre heaters are not equipped with a safety valve.

#### 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 input 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. The 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 pressure control 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. 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;environmenttemperaturesmustnotdropbelowzero.When draining the heater, use a recommended drain valve. First, close water supply into the heater.First, close water supply into the heater.Find necessary pressure values in the following table.

Safety valve	Admissible operating	Max. pressure in
starting pressure	water heater	the cold water pipe
(MPa)	pressure (MPa)	(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.

# 11. 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.

# **12. 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 function7. 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  $^{\circ}$  C. It is also possible to make use of another way of HSW disinfecting.

# **13. 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 to hot service water heating system

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 EN 12897 – Water supply – Indirectly heated closed tank-type water heaters

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

# **14. SPARE PARTS**

- heater tank (including thermal insulation and sheathing)
- Flange lid
- flange lid seal
- Magnesium anode
- control lights with wires
- set of M12 bolts
- insulation flange lid
- 3 pieces of legs with M12 thread

When ordering spare parts, define the 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.

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.



# Anode with an 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.

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 % 5060 Hz < 4 VA	6	
Indicators	Required potential: Impulse frequency: Intermittence: Rated current (secondary) Supply voltage (secondary):	2,3 V ± 50 r 100 Hz 200 μs 100 mA max 10.6 V	nV 7 at 100 mA	
Display	Two LEDs, 5 mm diameter	green: power su with protect red: failure neither is on: no powe	pply ive current follows r supply	
Operation	Temperature range (Potentiostat): IP protection:	040 °C II (operation in clo	osed rooms)	
Casing	Dimensions (without Euro soch Weight (without anode cable)	ket plug): L x W x F approx. 10	$I = 80 \times 50 \times 45 \text{ mm}$ 60 kg	
Titanium electrode CORREX®				
Function	Supply and referential electrode wi protective current without wear; re- potential in the accumulator.	th a coating of noble metal ferential electrode to measu	oxides; supply with re the actual	
Bolt with thread	M8 x 30			
Dimensions of elect	rode in the part filled with water	Diameter:	2 mm	
parts filled with wat	er	Length:	200 mm	
(Basic MP version)		Coating length:	100 mm	
Assembly options	Fitting into Fitting into	the sleeve an insulated hole		

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