



HSK 400 PR+

Installation and Operation Instructions  
**THERMAL STORE**  
**with stainless-steel DHW tube heat exchanger**  
**HSK 400 PR+**

**EN**

**HSK 400 PR+**

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## 1 - Description

HSK 400 PR+ Thermal Store is intended for storing and subsequent distribution of thermal energy of heating water. It is fitted with a stainless-steel tube DHW heat exchanger, permitting installation of electric heating elements and connection of other heat sources. For better thermal stratification of heating water, the tank is divided by a separating metal sheet.

The lower part is equipped with a stainless-steel solar heat exchanger. The thermal store shall always be connected to a sealed heating circuit.

In order to reach proper working of the tank, it is necessary to design optimum hydraulics of the whole system, i.e. position of circulation pumps for heat sources and heating circuits, valves, non-return valves etc. When multiple heat sources are combined, a smart controller is recommended for control of both the source and load sections of the heating system. i.e. also charging and discharging the thermal store.

### 1.1 - Models

One model of 404 litres total volume with stainless-steel tube DHW heat exchanger.

### 1.2 - Tank protection

The thermal store has no inner surface finish, the outer surface is painted in gray. The DHW heat exchanger is made of stainless steel.

### 1.3 - Thermal insulation

Thermal insulation is available as a separate item. For easier handling, the insulation shall not be fitted on the tank until it reaches its definite place of installation. The insulation is 100 mm thick, with a hard polystyrene surface. It is closed by quick locks.

### 1.4 - Packaging

Thermal stores are delivered standing, each screwed to its pallet, packed in bubble wrap.

**It is forbidden to transport and/or store the thermal stores in a horizontal position.**

## 2 - General Information

This Owners Manual is an integral and important part of the product and must be handed over to the User. Read carefully the instructions in this Manual as they contain important information concerning safety, installation, operation and maintenance. Keep this Manual for later reference. The appliance shall be installed by a qualified person according to valid rules and Manufacturer's Instructions.

This appliance is designed to accumulate thermal energy and distribute it subsequently. It must be connected to a heating system and heat sources. This appliance is designed for continuous DHW heating.

Using the thermal store for other purposes than above described is forbidden and the manufacturer accepts no responsibility for damage caused by improper or wrong use or filling procedure.

The appliance shall be installed by a qualified person according to valid rules, otherwise the warranty becomes null and void.

### 3 - Technical Data and Dimensions

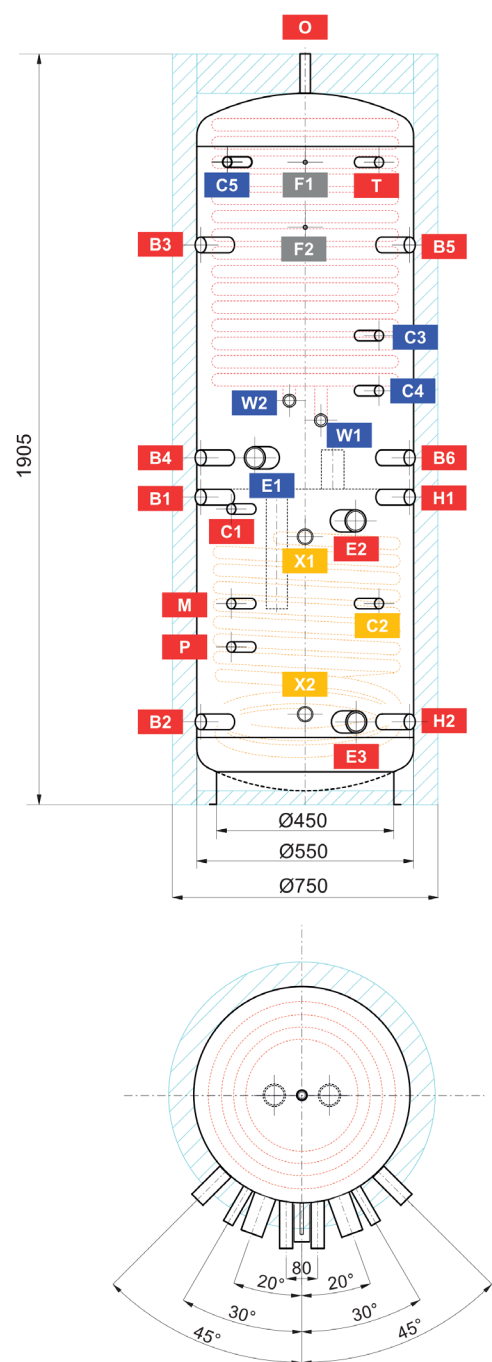
	Main Features	
	Application	Combination thermal store with DHW heating in an integrated stainless-steel heat exchanger, fitted with a tight separating metal plate that increases seasonal coefficient of performance (SCOP) of a heat pump and the efficiency of a solar thermal system, with a solar heat exchanger in the lower tank section below the plate. Thermal stores are supplied uninsulated. Thermal insulation is available as a separate item, see the codes below. "
	Working fluid	Water (heat exchanger), water; water-glycol mixture (max. 1:1) or water/glycerine mixture (max. 2:1 (thermal store)).
	Thermal store code	19610
	Insulation code	19612
Energy Efficiency Data (as per EC Regulation No. 812/2013)		
		valid for a thermal store with insulation
Energy efficiency class		C
Static loss		81 W
Storage volume		395 l
Technical data		
Total thermal store volume		404 l
Fluid volume in thermal store		374 l
Fluid volume above separating plate		220 l
Fluid volume below separating plate		154 l
Fluid volume of DHW heat exchanger above the separating plate		21.0 l
Fluid volume in solar heat exchanger		9.0 l
Surface area of DHW heat exchanger above the separating plate		6.0 m <sup>2</sup>
Solar heat exchanger surface area		1.5 m <sup>2</sup>
Max. working temperature in thermal store		95 °C
Max. working temperature in DHW heat exchanger		95 °C
Max. working temperature in solar heat exchanger		95 °C
Max. working pressure in thermal store		4 bar
Max. working pressure in DHW heat exchanger		10 bar
Max. working pressure in solar heat exchanger		10 bar
Thermal store diameter		550 mm
Thermal store diameter with insulation		750 mm
Thermal store overall height		1905 mm
Tipping height without insulation		1940 mm
Thermal store perimeter insulation thickness		100 mm
Thermal store bottom insulation thickness		50 mm
Thermal store top insulation thickness		100 mm
Empty weight without insulation		110 kg
Accessories		
Electric heating element		types ETT-A, D2, R, S, C, F2, M, P, U
Heating element max. length		635 mm

Materials	
Thermal store material	S235JR
Thermal store perimeter insulation	fleece
Thermal store outer surface insulation	hard polystyrene
Top and bottom thermal store insulation	fleece
DHW heat exchanger	AISI 316 L
Solar heat exchanger	S235JR+N

Insulation thermal conductivity  $\lambda \leq 0.037 \text{ W/mK}$ , thermal resistance (short/long term) 150/100 °C, fire class E.

Volume of supplied DHW (heated from 10 °C to 40 °C)				
Heated volume	Temperature in thermal store	Backup heater	Flow rate [l/min]	Hot water volume [l]
Entire	50 °C	10 kW	8	363
			12	237
			20	120
Entire	50 °C	none	8	222
			12	187
			20	101
Above metal sheet	50 °C	10 kW	8	195
			12	132
			20	106
Entire	60 °C	10 kW	8	534
			12	359
			20	268
Entire	60 °C	none	8	321
			12	290
			20	266
Above metal sheet	60 °C	10 kW	8	253
			12	235
			20	208
Entire	80 °C	none	8	567
			12	528
			20	516

## Dimensions



## CONNECTIONS

pos.	description	connection	height [mm]
<b>Heat sources</b>			
B1	Supply from heat source	G 1" F	780
B2	Return to heat source	G 1" F	210
B3	Supply from heat source	G 1" F	1420
B4	Return to heat source	G 1" F	880
B5	Supply from heat source	G 1" F	1420
B6	Supply from heat source	G 1" F	880
<b>Heating system</b>			
H1	Flow to heating system	G 1" F	780
H2	Return from heating system	G 1" F	210
<b>Solar thermal system</b>			
X1	Supply from solar collectors	G 1" F	680
X2	Return to solar collectors	G 1" F	230
<b>Electric heating element</b>			
E1	El. heating element (DHW)	G 6/4" F	880
E2	El. heating element (space heating)	G 6/4" F	720
E3	El. heating element (for PV system)	G 6/4" F	210
<b>DHW heating</b>			
W1	Cold water	G 1" M	975
W2	Domestic hot water	G 1" M	1025
<b>Control and safety</b>			
C1	Temperature sensor	G 1/2" F	750
C2	Temperature sensor	G 1/2" F	510
C3	Temperature sensor	G 1/2" F	1190
C4	Temperature sensor	G 1/2" F	1050
C5	Temperature sensor	G 1/2" F	1630
T	Thermometer	G 1/2" F	1630
M	Pressure gauge	G 1/2" F	510
P	Safety valve	G 1/2" F	400
<b>Air discharge</b>			
O	Air vent valve	G 1/2" F	1905
<b>Pump station support</b>			
F1	Pump station support – upper	M6	1630
F2	Pump station support – lower	M6	1470

## 4 - Operation

This tank is designed to heat water and accumulate its thermal energy for space heating in household or industrial applications, however always in closed pressure circuits with forced circulation. Various heat sources can be connected to the thermal store, like various types of hot water boilers, renewable energy sources, or possibly also electric heating elements.

Inside the thermal store, hot water is heated by heating water in the immersed stainless-steel DHW heat exchanger. The immersed stainless-steel DHW heat exchanger connects with 1" fittings. When hot water is drawn from an outlet point, cold water flows into the immersed DHW heat exchanger and heats up from the heating water.

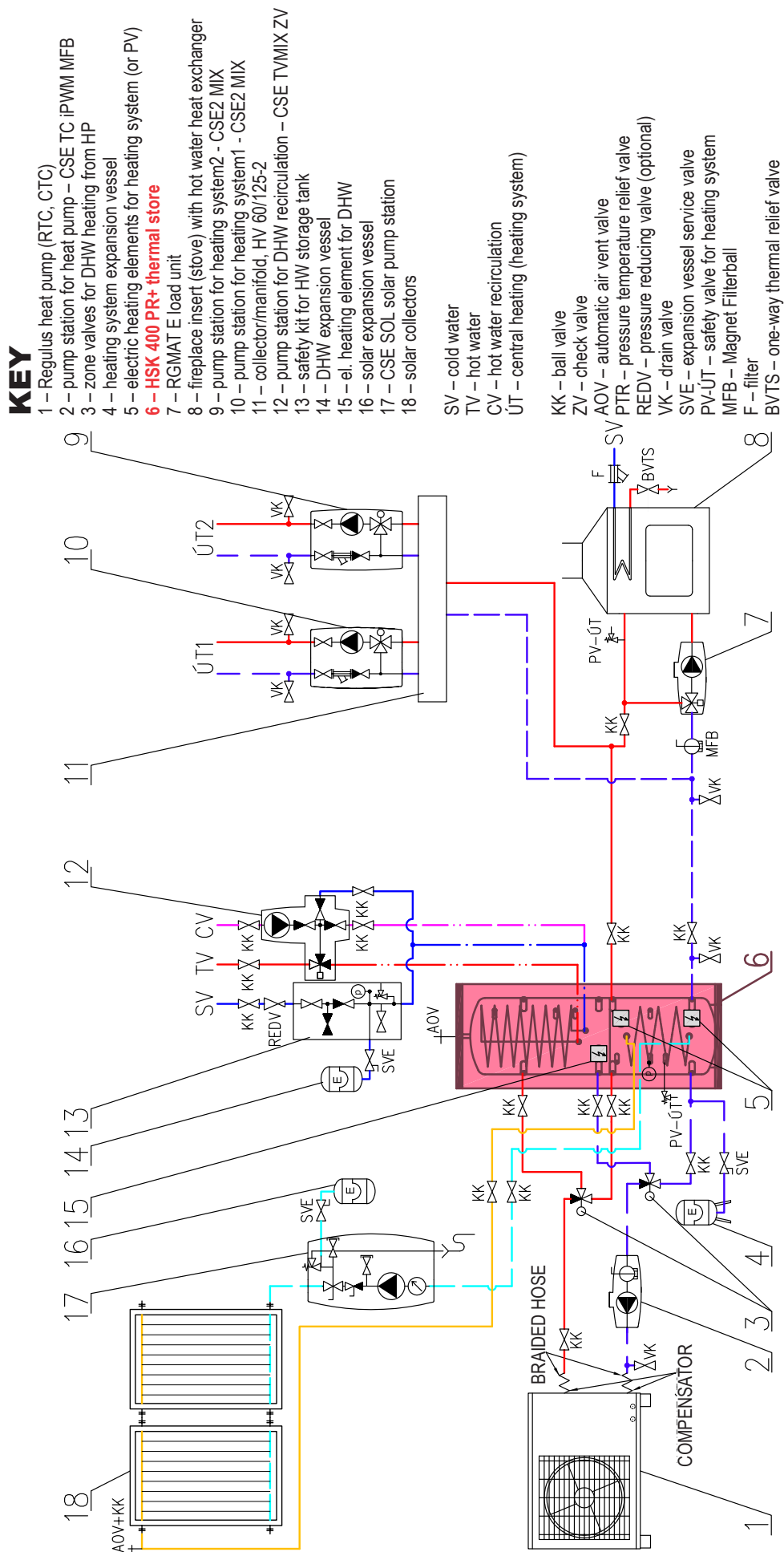
The thermal store connects to energy sources using connecting fittings.

The fitting of the individual tank outlets is carried out depending on the circuits to be connected. There are a number of options available, only some of the variants are shown in the following chapter for illustration.

## 5 - Thermal Store Connection to a Heating System

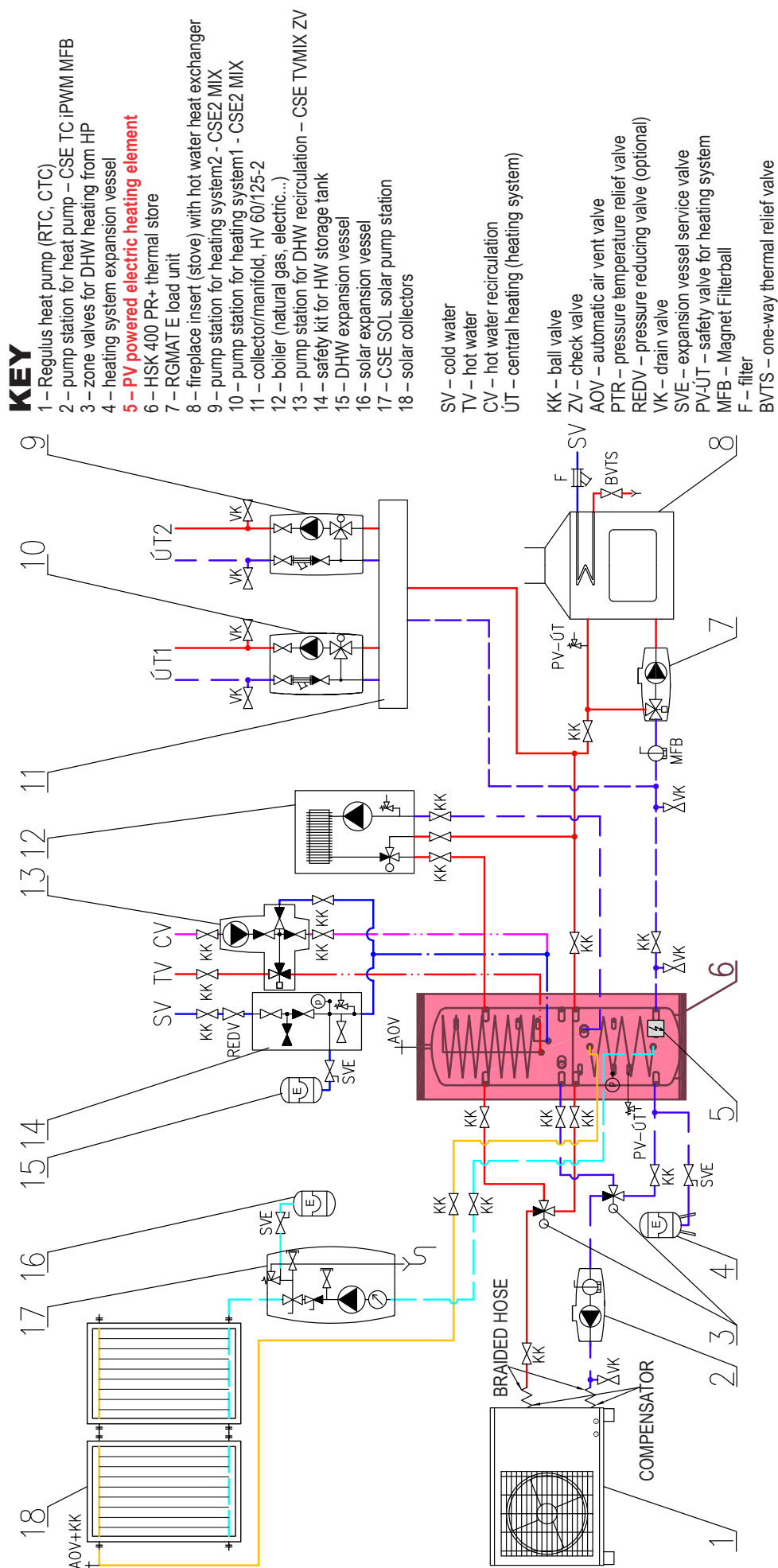
### Example I.

Solar collectors + el. heating elements + solid fuel boiler + heat pump



## Example II.

Solar collectors + gas-fired boiler + solid fuel boiler + heat pump





## 6 - Installation and Commissioning

Installation must meet valid rules and may be done only by qualified staff.

**Defects caused by improper installation, use or handling are not covered by warranty.**

After the tank is installed and connected to an existing heating system, it is recommended to clean the entire heating system using a suitable cleaning agent, e.g. BP 400.

Anti-corrosion protective liquid should be also used, e.g. BP 100 Plus.

### 6.1 - Connection to heat sources

Place the tank on the floor, as close to your heat source (heat pump, boiler) as possible. Fit the insulation, cf. Installing Insulation on the tank. Connect the heating circuits to inlets and outlets respecting the thermal stratification in the tank. Install a drain valve at the lowest point of the tank. Install an air vent valve at the highest point of the system. Insulate all the connection piping.

### 6.2 - Connection to a solar thermal system

This tank can also be used with a solar thermal system. In such a case, the inlet of heated solar fluid from a solar thermal system connects to the upper G 1" connection of the heating system heat exchanger, and the lower outlet connects to the return piping to the solar thermal system. Insulate meticulously all the piping between the tank and the solar thermal system.

### 6.3 - Installation of an el. heating element

The thermal store can be equipped with el. heating elements. They can be power-supplied either directly (thermostat-equipped elements), or via a controller for the entire heating system.

**Warning: Electric heating elements shall be protected by a safety thermostat.**

The electric heating element shall be wired by a professionally qualified person only.

### 6.4 - Connection to water mains

DHW piping shall be done according to valid rules. Installation of a pressure reducing valve on the immersed tank inlet is recommended. For water mains pressure above 6 bar a pressure reducing valve is necessary.

Install a DHW expansion vessel of 2 l min. volume at the cold water inlet. Installation of the expansion vessel is a condition for the warranty to be valid. Should the water be too hard, install a water softener before the tank. In case the water contains mechanical impurities, install a strainer.

### Table of limit values for total dissolved solids in hot water.

Description	pH	Total dissolved solids (TDS)	Ca	Chlorides	Mg	Na	Fe
Max. value	6,5 - 9,5	600 mg/l	40 mg/l	100 mg/l	20 mg/l	200 mg/l	0,2 mg/l

### 6.5 - Commissioning

The tank shall be filled up together with the heating system, respecting valid standards and rules. In order to minimize corrosion, special additives for heating systems should be used. The quality of heating water depends on the quality of filling water at commissioning, on the top-up water and on the frequency of topping up. This has a strong influence on the lifetime of heating systems. Poor quality of heating water may cause problems like corrosion or incrustation, esp. on heat transfer surfaces.

**Quality of DHW shall meet the conditions shown in the Table of limit values for total dissolved solids in hot water on this page.**

**Ground the tank before commissioning.**

Fill the heating circuits with the appropriate fluids and air-bleed the entire system. Check all connections for leaks and verify the system pressure. Set the heating controller in compliance with the documentation and manufacturer's recommendations. Check regularly the proper function of all control and adjustment elements.

## 7 - Installing Insulation on the Tank

### Product description

Thermal insulation is part of the thermal store to reducing its heat loss. For easier handling, the insulation shall not be fitted on the tank until it reaches its definite place of installation. The thermal insulation is made of fleece, with a hard surface and a lock.

### Warning

Insulation installation shall be done in two or three persons. The hard surface coated fleece insulation must be installed at temperatures above 20 °C. If lower temperatures cannot be avoided, the insulation shall be pre-warmed in another room to at least 20 °C. It is difficult to install insulation of lower temperature, there is a risk of its mechanical damage.

Do not use any tools for installation.

Keep away from open fire.

### Installing Insulation

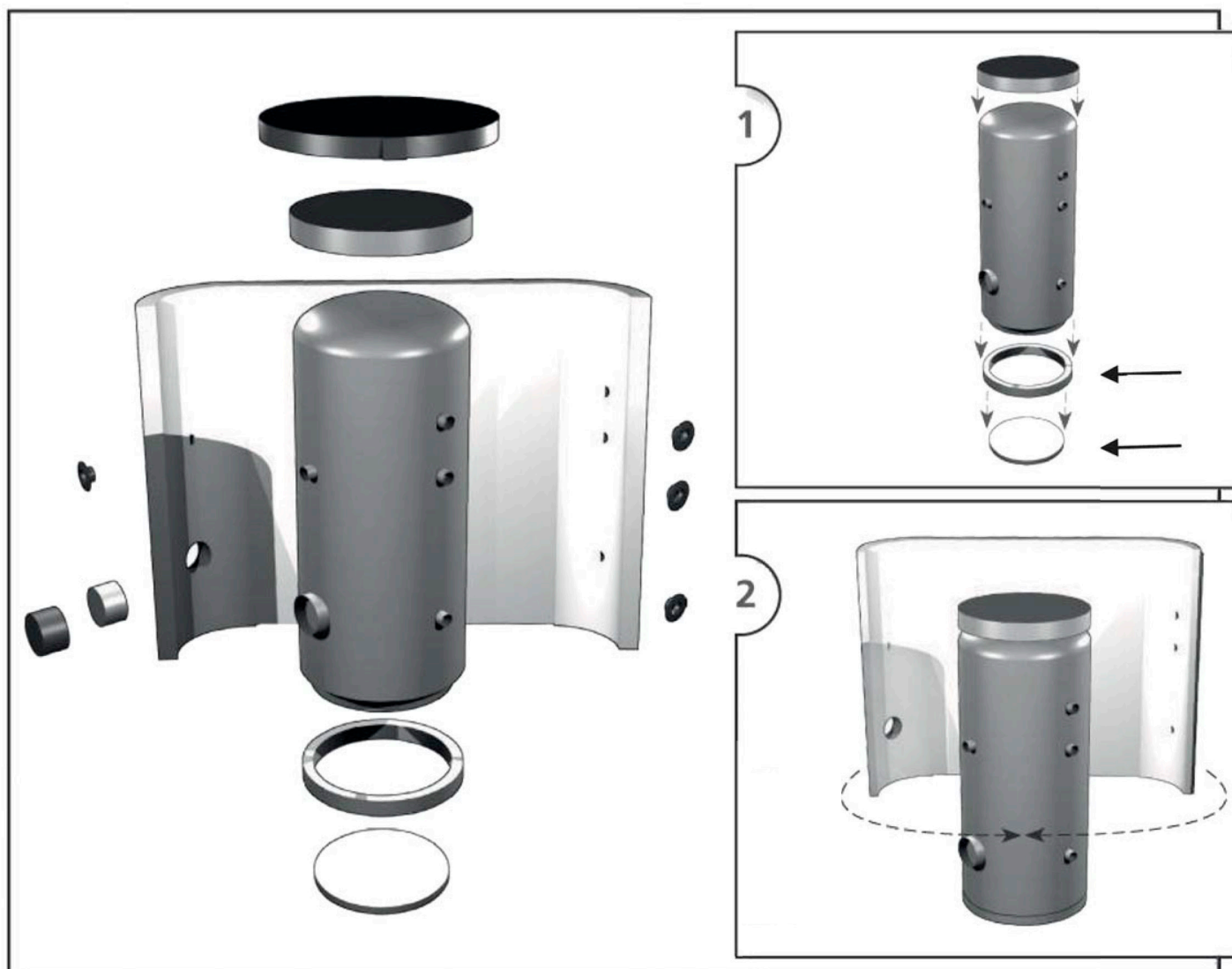
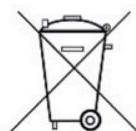
1. Fix the tank following installation instructions.
2. Wrap the insulation around the tank carefully. Check that the insulation adheres to its body perfectly. This can be reached by rubbing and patting the insulation by hand from its center evenly in both directions until the insulation adheres to the tank's surface completely and no bubbles are left.
3. Use the holes for connections as a rest during the insulation installation.
4. At least one person presses the insulation to the tank, pulling both ends together. The other person closes the insulation lock from the side.
5. Put on the upper insulation and cover
6. Push on the covering plastic rosettes depending on the size of connections, fit the elements against unintentional lock release.
7. Finish the tank installation in compliance with the respective instructions and valid standards and rules.

### Warranty on insulation

- Warranty shall become null and void if:
  - the procedure described in the Installation Manual was not respected,
  - the product was used for other purposes than intended.
- Warranty does not cover:
  - usual wear and tear,
  - damage caused by fire, water, electricity or a natural disaster,
  - defects caused by failure to use the product in compliance with its intended purpose, by improper use and insufficient maintenance,
  - defects caused by mechanical damage to the product,
  - defects caused by tampering or incompetent repair.



+ 20.0° C  
+ 68.0° F



## **8 - Maintenance**

If the tank is fitted with a heating element, disconnect it from the mains first. Clean the exterior of the tank with a soft cloth and a mild detergent. Never use abrasive cleaners or solvents.  
Check all connections for leaks.

## **9 - Disposal**

Packaging shall be disposed of in compliance with the valid rules. When the product reaches the end of its life, it shall not be disposed of as household waste. It shall be dropped off at a Local Waste Recycling Center. Insulation shall be recycled as plastic and the steel vessel as scrap iron.

## **10 - Warranty**

This product is covered by warranty under conditions specified in this Manual and the respective Warranty Certificate. The Warranty Certificate is an integral part of supply of this Thermal Store.