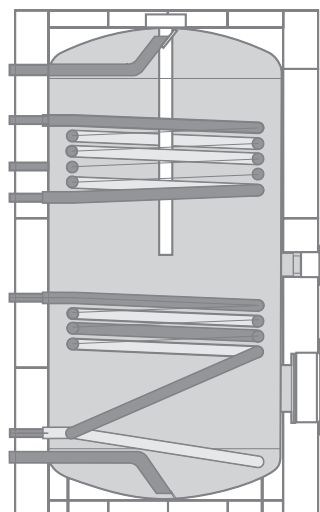


Solar storage tank Type S

for domestic water heating

INSTALLATION AND OPERATION GUIDE



Contents

The solar storage tank

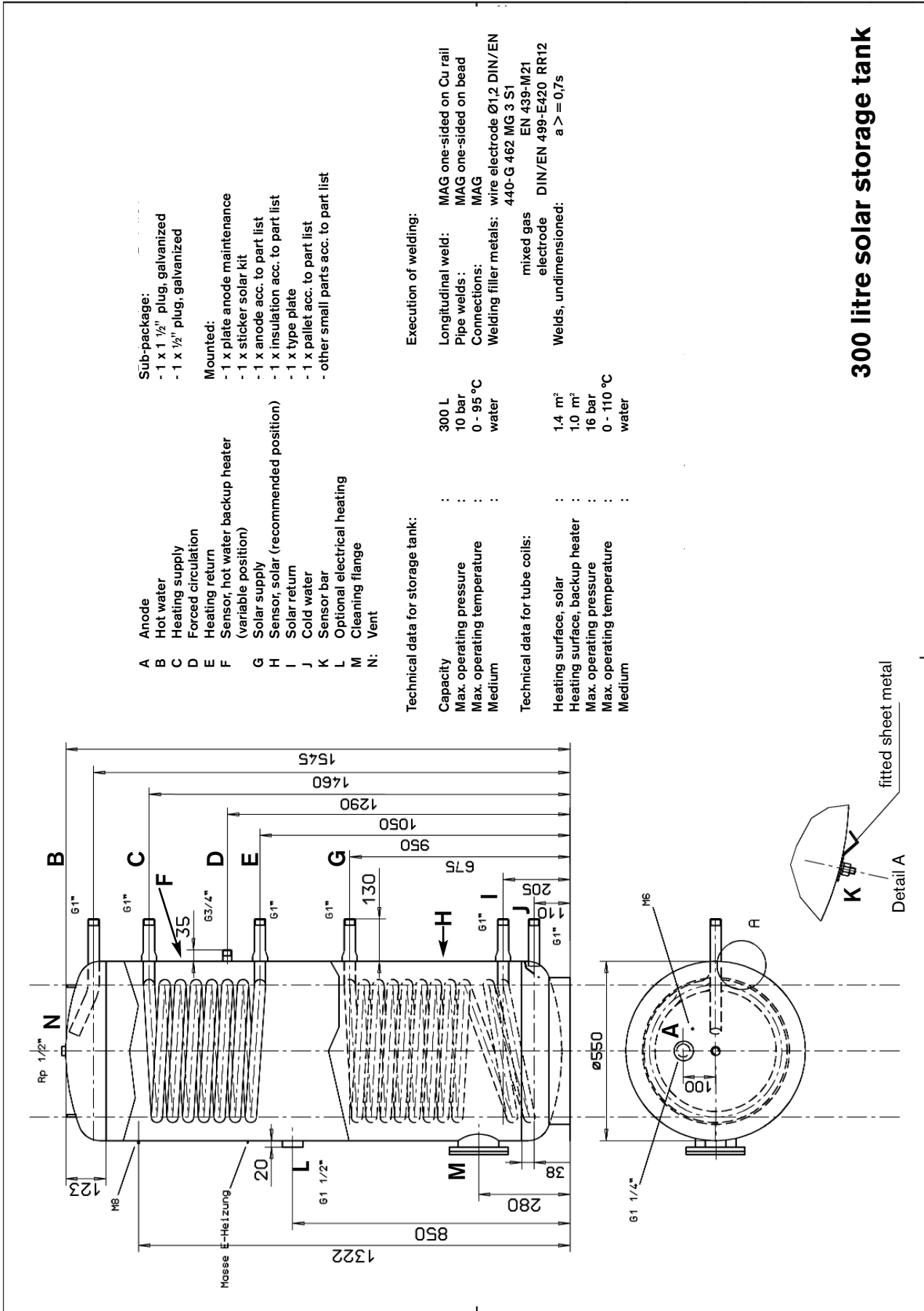
1.1.	300 litre domestic water storage tank	4
1.2	300 litre domestic water storage tank (low-height model)	6
2.	400 litre domestic water storage tank	8
3.	500 litre domestic water storage tank	10
4.	Installation of the storage tank	12
5.	Installation of the domestic water mixer	12
6.	Solar storage tanks S-300, S-400, S-500	13
7.	Connection of the solar storage tank	13
8.	Connection of the forced hot water circulation	15
9.	Installation of an electrical immersion heater	17
10.	Corrosion protection for the storage tank	17
11.	Maintenance	18

The solar storage tank

1.1. 300 litre domestic water storage tank

Type:	S-300
Capacity:	300 L
Material:	steel, enamelled, acc. to German Industry Norm DIN 4753, outside primed
Heat exchangers:	tube heat exchangers, solar 1.4 m ² , backup heater 1.0 m ²
Corrosion protection:	magnesium sacrificial anode on top of tank
Connections:	Backup heater: 1" external thread, flat sealing joint screw, hot and cold water: 1" external thread, flat sealing joint screw, solar supply and return: 1" external thread, flat sealing joint screw
Forced circulation:	3/4" external thread, flat sealing joint screw, has to be locked with plug
Connection for electrical backup heater:	1 1/2" socket with internal thread, laterally, has to be closed with plug
Insulation:	polyurethane foam 100 mm replaceable, inspection tap, replaceable lid 100 mm, bottom 50 mm, U value: 0.037 W/mK
Performance figure NL:	up to 2.0 depending on temperature sensor position on clamping bar
Dimensions with insulation:	1.65 m x 0.75 m
Diameter without insulation:	0.55 m
Tilt height:	1.62 m (without insulation)
Total weight:	app. 160 kg, insulation incl.
Warranty:	2 years according to the Terms and Conditions of PHÖNIX SonnenWärme AG

(subject to technical modifications)



Sub-package:
 - 1 x 1 1/2" plug, galvanized
 - 1 x 1/2" plug, galvanized

Mounted:
 - 1 x plate anode maintenance
 - 1 x sticker solar kit
 - 1 x anode acc. to part list
 - 1 x insulation acc. to part list
 - 1 x type plate
 - 1 x pallet acc. to part list
 - other small parts acc. to part list

- A Anode
- B Hot water
- C Heating supply
- D Forced circulation
- E Heating return
- F Sensor, hot water backup heater (variable position)
- G Solar supply
- H Sensor, solar (recommended position)
- I Solar return
- J Cold water
- K Sensor bar
- L Optional electrical heating
- M Cleaning flange
- N: Vent

Technical data for storage tank:

Capacity	:	300 L
Max. operating pressure	:	10 bar
Max. operating temperature	:	0 - 95 °C
Medium	:	water
Technical data for tube coils:		
Heating surface, solar	:	1.4 m ²
Heating surface, backup heater	:	1.0 m ²
Max. operating pressure	:	16 bar
Max. operating temperature	:	0 - 110 °C
Medium	:	water

Execution of welding:

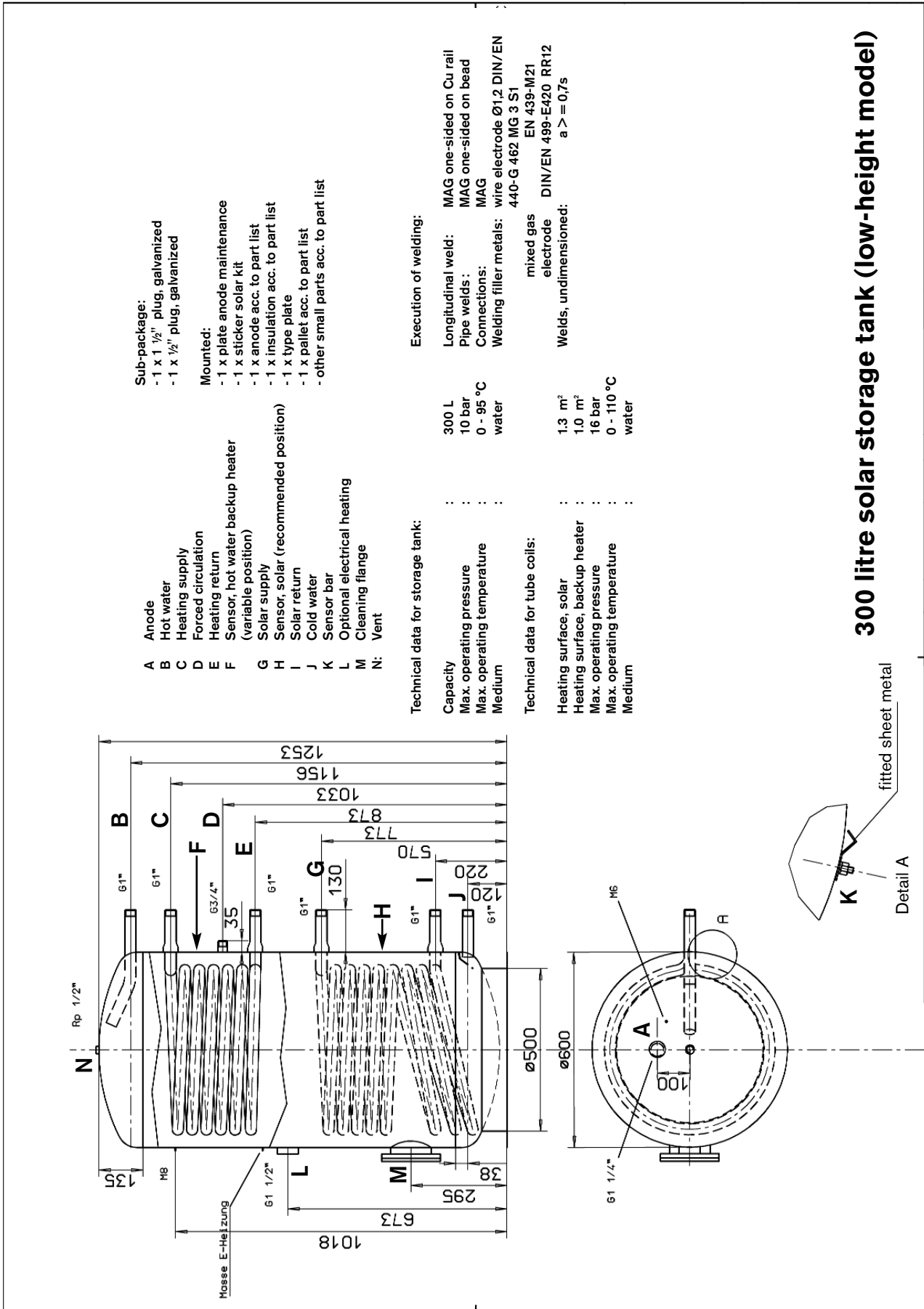
Longitudinal weld: MAG one-sided on Cu rail
Pipe welds: MAG one-sided on bead
Connections: MAG
Welding filler metals: wire electrode Ø1,2 DIN/EN 440-G 462 MG 3 S1
 mixed gas
 electrode EN 439-M21
 DIN/EN 499-E420 RR12
 a >= 0,7s
Welds, undimensioned:

300 litre solar storage tank

1.2. 300 litre domestic water storage tank (low-height model, e.g. for under-roof central heating)

Type:	S-300/2
Capacity:	300 L
Material:	steel, enamelled, acc. to German Industry Norm DIN 4753, outside primed
Heat exchangers:	tube heat exchangers: solar 1.3 m ² , backup heater 1.0 m ²
Corrosion protection:	magnesium sacrificial anode on top of tank
Connections:	Backup heater: 1" external thread, flat sealing joint screw, hot and cold water: 1" external thread, flat sealing joint screw, solar supply and return: 1" external thread, flat sealing joint screw
Forced circulation:	3/4" external thread, flat sealing joint screw, has to be locked with plug
Connection for electrical backup heater:	1 1/2" socket with internal thread, laterally, has to be closed with plug
Insulation:	polyurethane foam 100 mm replaceable, inspection tap, replaceable lid 100 mm, bottom 50 mm, U value: 0.037 W/mK
Performance figure NL:	up to 2.0 depending on temperature sensor position on clamping bar
Dimensions with insulation:	1.36 m x 0.80 m
Diameter without insulation:	0.60 m
Tilt height:	1.32 m (without insulation)
Total weight:	app. 160 kg, insulation incl.
Warranty:	2 years according to the Terms and Conditions of PHÖNIX SonnenWärme AG

(subject to technical modifications)



- Sub-package:**
- 1 x 1/2" plug, galvanized
 - 1 x 1/2" plug, galvanized
- Mounted:**
- 1 x plate anode maintenance
 - 1 x sticker solar kit
 - 1 x anode acc. to part list
 - 1 x insulation acc. to part list
 - 1 x type plate
 - 1 x pallet acc. to part list
 - other small parts acc. to part list

- A: Anode
- B: Hot water
- C: Heating supply
- D: Forced circulation
- E: Heating return
- F: Sensor, hot water backup heater (variable position)
- G: Solar supply
- H: Sensor, solar (recommended position)
- I: Solar return
- J: Cold water
- K: Sensor bar
- L: Optional electrical heating
- M: Cleaning flange
- N: Vent

Technical data for storage tank:

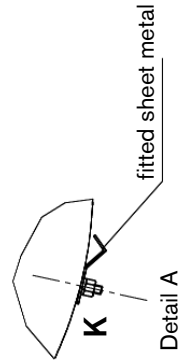
Capacity	:	300 L
Max. operating pressure	:	10 bar
Max. operating temperature	:	0 - 95 °C
Medium	:	water

Technical data for tube coils:		
Heating surface, solar	:	1.3 m ²
Heating surface, backup heater	:	1.0 m ²
Max. operating pressure	:	16 bar
Max. operating temperature	:	0 - 110 °C
Medium	:	water

Execution of welding:

Longitudinal weld:	MAG one-sided on Cu rail
Pipe welds:	MAG one-sided on bead
Connections:	MAG
Welding filler metals:	wire electrode Ø1,2 DIN/EN 440-G 462 MG 3 S1
	mixed gas EN 439-M21
	electrode DIN/EN 499-E420 RR12
	a >= 0,7s

300 litre solar storage tank (low-height model)



2. 400 litre domestic water storage tank

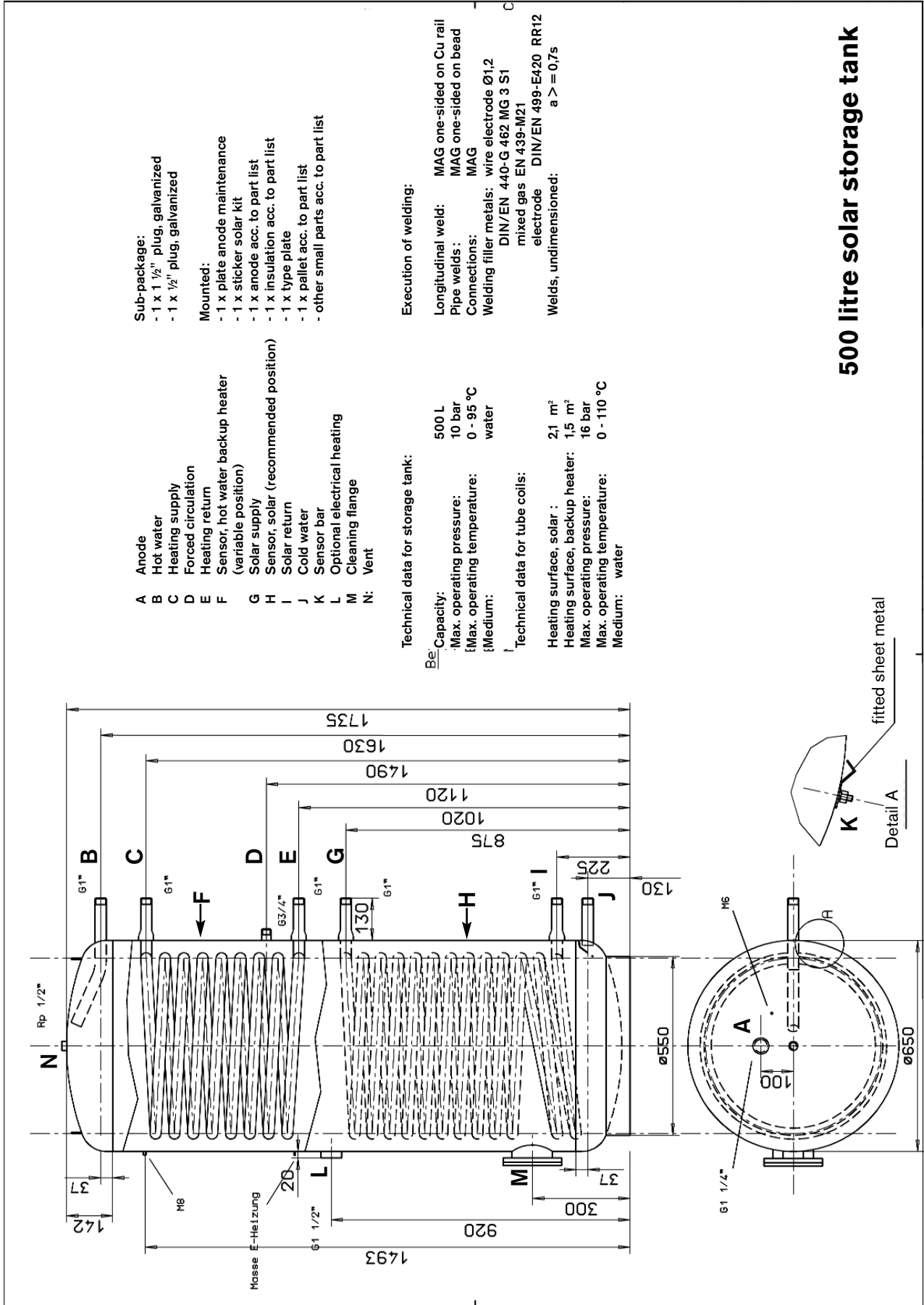
Type:	S-400
Capacity:	400 L
Material:	steel, enamelled, acc. to German Industry Norm DIN 4753, outside primed
Heat exchangers:	tube heat exchangers: solar 1.7 m ² , backup heater 1.2 m ²
Corrosion protection:	magnesium sacrificial anode on top of tank
Connections:	Backup heater: 1" external thread, flat sealing joint screw, hot and cold water: 1" external thread, flat sealing joint screw, solar supply and return: 1" external thread, flat sealing joint screw
Forced circulation:	3/4" external thread, flat sealing joint screw, has to be locked with plug
Connection for electrical backup heater:	1 1/2" socket with internal thread, laterally, has to be closed with plug
Insulation:	polyurethane foam 100 mm replaceable, inspection tap, replaceable lid 100 mm, bottom 50 mm, U value: 0.037 W/mK
Performance figure NL:	up to 2.2 depending on temperature sensor position on clamping bar
Dimensions with insulation:	1.75 m x 0.80 m
Diameter without insulation:	0.60 m
Tilt height:	1.69 m (without insulation)
Total weight:	app. 186 kg, insulation incl.
Warranty:	2 years according to the Terms and Conditions of PHÖNIX SonnenWärme AG

(subject to technical modifications)

3. 500 litre domestic water storage tank

Type:	S-500
Capacity:	500 L
Material:	steel, enamelled, acc. to German Industry Norm DIN 4753, outside primed
Heat exchangers:	tube heat exchangers: solar 2.1 m ² , backup heater 1.5 m ²
Corrosion protection:	magnesium sacrificial anode on top of tank
Connections:	Backup heater: 1" external thread, flat sealing joint screw, hot and cold water: 1" external thread, flat sealing joint screw, solar supply and return: 1" external thread, flat sealing joint screw
Forced circulation:	3/4" external thread, flat sealing joint screw, has to be locked with plug
Connection for electrical backup heater:	1 1/2" socket with internal thread, laterally, has to be closed with plug
Insulation:	polyurethane foam 100 mm replaceable, inspection tap, replaceable lid 100 mm, bottom 50 mm, U value: 0.037 W/mK
Performance figure NL:	up to 2.8 depending on temperature sensor position on clamping bar
Dimensions with insulation:	1.84 m x 0.85 m
Diameter without insulation:	0.65 m
Tilt height:	1.80 m (without insulation)
Total weight:	app. 237 kg, insulation incl.
Warranty:	2 years according to the Terms and Conditions of PHÖNIX SonnenWärme AG

(subject to technical modifications)



500 litre solar storage tank

4. Installation of the storage tank

Handling of the tank

There are three to four persons needed to move the storage tank. Furthermore, you need transport belts and, if necessary, a trolley.

Avoid strong shocks in order to not damage the tank enamel lining or the connections. Make sure that the tank fits through door openings and narrow spaces. Take into consideration the dimensions of the tank when it

is tilted. If necessary, remove the tank insulation. Remove the storage tank lid and open the insulation (lateral clamping rail). You can reinstall the insulation on the tank once it is in place or after finished the piping.

It is recommended to transport the tank in a vertical position. Fasten the tank with two belts (e.g. to the pallet).

Placement and setup of the tank



The storage tank should only be installed in a frost-protected room. Choose a storage tank location that is as close as possible to the hot water tap connections. Turn the connection bar in such a way that the pipes can be connected easily to the solar circuit and the other ports.

If you install the tank in the attic, make sure that the load-carrying capacity of the ceiling is not exceeded. (Take into consideration the weight of the tank filled with water.) If required, spread the weight over a larger area by putting timber beams under the tank. If required, consult a statical engineer.



Prior to filling/commissioning, make sure that all the threaded connections and plugs are tight. If required, retighten. Do not forget to check as well the plug on the sleeve of the electrical immersion heater (180° displaced to the other connections)! This plug might not be pre-mounted but fastened separately to the storage tank or on the transport pallet.

5. Installation of the domestic water mixer

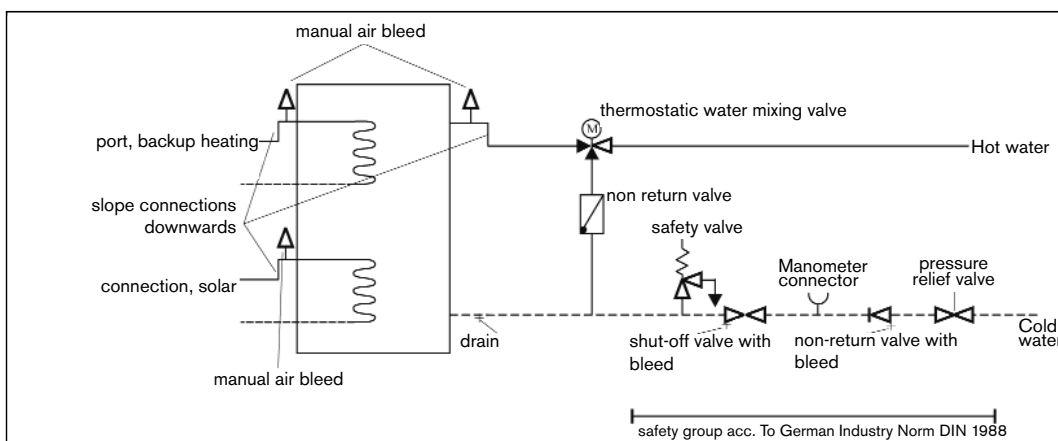
The water mixing valve is an important safety device in the hot water circuit. To prevent scalding, install the thermostatic three-way mixing valve at the storage tank outlet. Set the valve by turning the temperature adjustment screw on the valve cap. The water temperature at the water tap connection must be set to about 45 °C.

Further tips:

In order to prevent heat losses due to gravity circulation, slope the connections directly on the storage tank downwards. Furthermore, install a non-return flap in the cold water line towards the water mixing valve.



The owner must make sure that the cold water port is equipped with a safety group conform to the German Industry Norm DIN 1988.



6. Solar storage tanks S-300, S-400, S-500

Your solar storage tank is a high-quality domestic water storage tank made of steel. It is enamelled on the inside (according to the German Industry Norm DIN 4753) and primed on the outside. The storage tank contains two tube heat exchangers which transfer the heat from the collectors or the water heater to the domestic water.

On the outside of the storage tank, a sensor

bar is provided for a flexible mounting of the tank temperature sensors.

In order to reduce heat losses, the whole storage tank is insulated with a 100 mm polyurethane foam. To make sure that the thermal stratification in the tank will not be destroyed when the tank is drained, the cold water inlet is oriented downwards and the hot water outlet upwards.

7. Connection of the solar storage tank

All storage tank outlets are designed for flat sealing ports permitting the installation of a flat sealing connection with insert and cap nut (available as optional accessories). The connections to the heat exchanger can also be sealed with hemp and Neofermit.



Since solar collectors can generate extremely high temperatures, never use Teflon tape!



All domestic water connections (hot and cold water as well as forced circulation) must be connected to the domestic water system by means of flat sealing joint screws. Connections sealed with hemp might make the enamel close to the ports chip off, causing corrosion on the tube unions. Such damages are not covered by the warranty.

For the filling and draining of the storage tank, a KFE valve (ball, filling and emptying valve, not included in delivery) must be provided

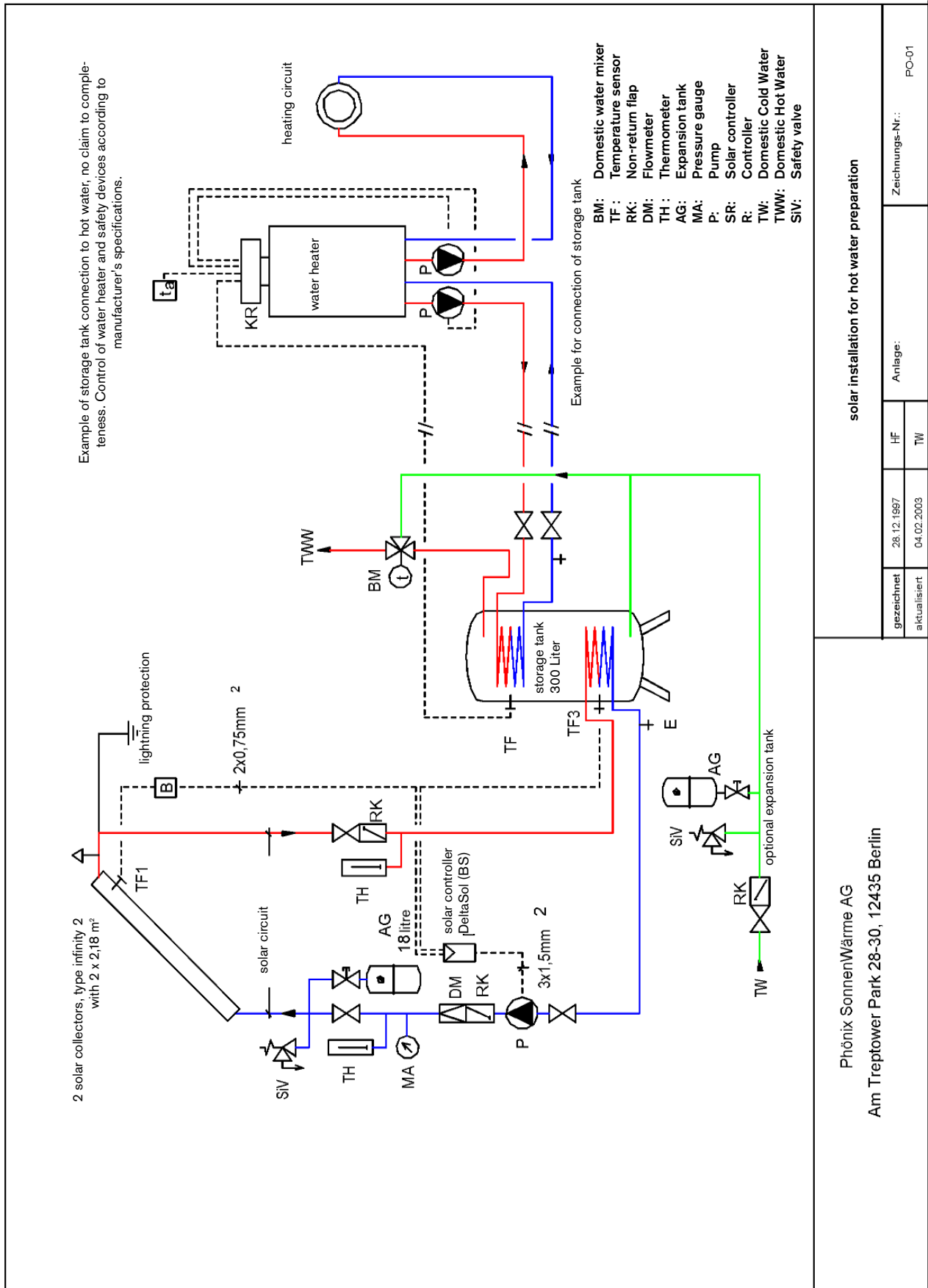
on the cold water supply, at the lowest point of the tank. This valve must be placed downstream from the safety group at your water supply. This will allow a nearly complete emptying of the storage tank without dismantling.

Make sure to insulate all the storage tank pipe connections in order to prevent important thermal losses.

The piping of the backup heater as well as the hot water port and, if required, the forced circulation should be fully insulated (according to the German Decree for the Installation of Heating Systems).



Never mount pipes made of steel downstream from copper pipes. Otherwise, the steel pipes will corrode. This means that, if the hot water pipes are made of steel, the cold water pipes must not be made of copper.



solar installation for hot water preparation

Phönix SonnenWärme AG
Am Treptower Park 28-30, 12435 Berlin

gezeichnet	28.12.1997	HF	Anlage:	PO-01
aktualisiert	04.02.2003	TW		
Zeichnungs-Nr.:				

8. Connection of the forced hot water circulation

The main advantage offered by forced circulation is a more comfortable hot water supply. The downside lies in increased heat losses and higher energy demands. Moreover, forced circulation might destroy the intended stratification in the solar storage tank. To the extent possible, avoid forced circulation in solar installations.

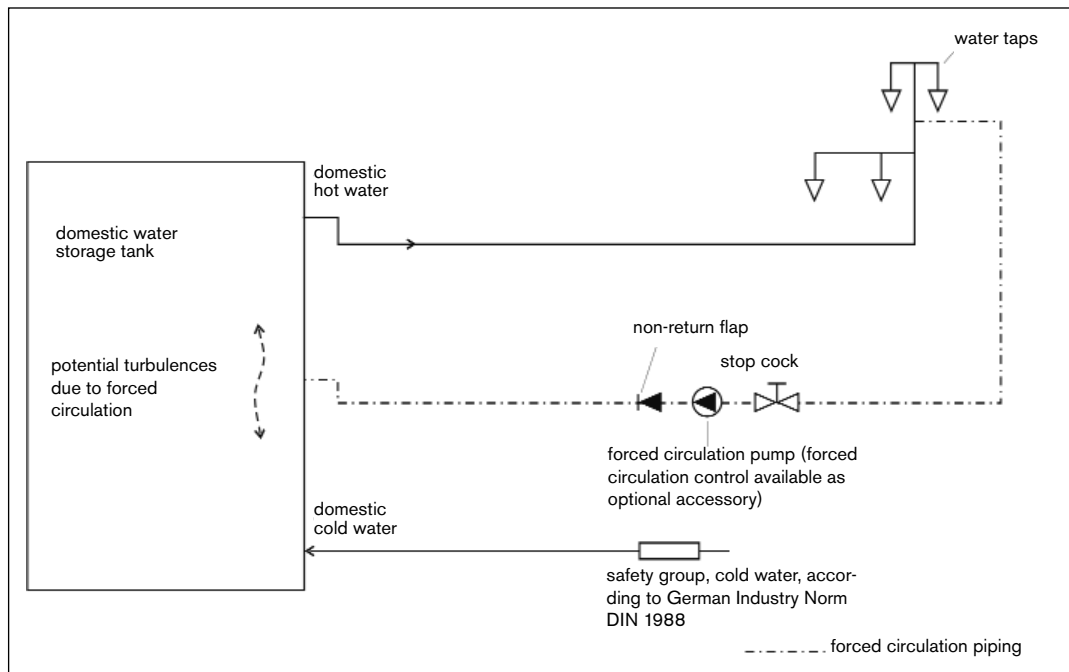
If this is not possible, make sure that the forced circulation pump is controlled in an intelligent way (control for forced circulation is

available as optional accessory). The aim of the forced circulation control is to considerably reduce pump running times, resulting in a lower energy consumption of the pump and reduced heat losses in the pipes. Moreover, short running times reduce the water backflow into the tank and thus efficiently prevent potential turbulences in the tank.

The storage tank is delivered with a forced circulation pipe connection (closed at delivery).

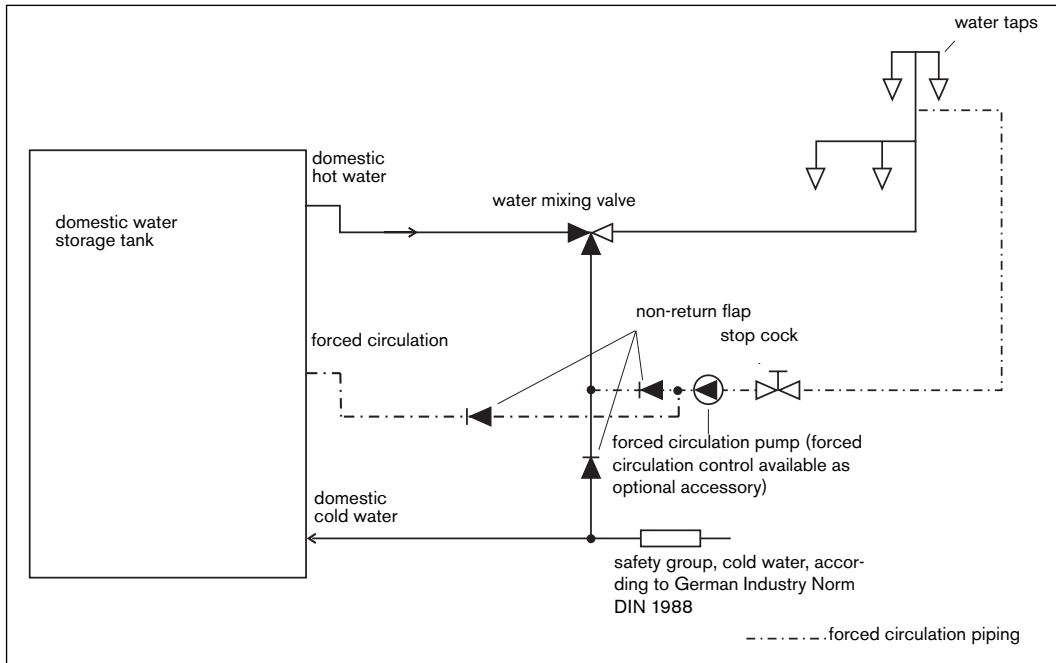
Connection option A (without water mixer)

The following illustration shows a forced circulation connection scheme (without use of the supplied water mixer). In this case, set the maximum tank temperature on the solar controller to 60°C. If the water mixer is installed (recommended option), the connection of the forced circulation will be based on option B.



Connection option B (with water mixer)

The following illustration shows a forced circulation connection scheme (with use of the supplied water mixer). The forced circulation piping must be connected, as shown, to both the cold water supply of the water mixer and the circulation port of the storage tank.



If the circulation control is not set optimally or incorrectly, the solar yield might be considerably reduced. Therefore, it is strongly recommended to not equip combination storage tanks with forced circulation.

If you need to install a forced circulation, ask your solar consultant or your solar system technician for advice to make sure to choose an appropriate control.

9. Installation of an electrical immersion heater

S-300, S-400, S-500

If it is not feasible to install an oil or gas boiler as additional heating, the solar storage tanks S-300, S-400 and S-500 can be equipped with an electrical immersion heater (available as accessory). This heater will be mounted on a lateral bracket (1 1/2"IG).

If necessary, first remove the plug from the sleeve before installing the heater. There must be no water in the storage tank. Depending on the quantity of hot water needed, immersion heaters with different heating capacities can be installed.

The installation and the first commissioning of the heater must be done by a specialist. Consult the enclosed operation guide!



Scale deposits cause premature failures in tubular heaters. Therefore, appropriate measures for water treatment must be taken, otherwise, the heater must be descaled at regular intervals. Damages due to scale deposits are not covered by the warranty.

The immersion heater should be equipped with a temperature controller and a temperature limiting device.

10. Corrosion protection for the storage tank



The warranty is only valid for heaters suitably protected against corrosion.

S-300, S-400, S-500

The solar storage tanks are enamelled according to the German Industry Norm and thus optimally protected against internal corrosion. Manufacturing-induced defects in the enamel lining (according to the German Industry Norm DIN 4753T3, max. 7 cm²/m² are acceptable) would cause the uncovered steel to corrode if no additional anti-corrosion measures were taken. In order to prevent such a corrosion, each domestic water storage tank is equipped with a so called "sacrificial anode" made of magnesium which will be consumed, thus efficiently protecting the tank against corrosion. Tanks with a capacity greater than 750 litres are equipped with a built-in impressed current anode.

The outside of the tank is covered by a light protective coating. Due to high temperatures during enameling, slag might form on the surface. This slag does not shorten the tank life span. Occasional rust films, likewise, do not pose a problem.

If, however, the enamel lining on the inside is extensively damaged, corrosion might occur rapidly. However, such chipping will only occur if the tank is handled improperly (e.g.

in case of a collision with a fork-lift, or when the storage tank is carried into cave, etc.). Claims must be filed prior to commissioning (if the warranty claim is valid).



The anode should be inspected once a year. For more details, see section 11 - Maintenance.

Optionally, the tanks can be equipped with an impressed current anode (built-in in tanks with a capacity greater than 750 litres). In this case, the magnesium anode must be removed from the tank (after having emptied the tank) and be replaced by the impressed current anode (available as optional accessory). Please consult the manufacturer's installation and operation guide!



For easy removal of the magnesium anode, keep a minimum distance of one metre between the upper edge of the storage tank and the ceiling of the room where the tank is located.

11. Maintenance

Magnesium anodes in enamelled tanks must be inspected at least once a year. If required, the anode must be replaced.

Since the magnesium anodes in PHÖNIX solar storage tanks are isolated, the following functional inspections can be performed:

- **Measurement of the protective current between the anode and the storage tank**

Remove the lug from the anode. Connect an ammeter. If the protective current flowing between the anode and the tank is greater than 0,3 mA, the anode has not yet been consumed. If the protective current is lower than 0,3 mA, a visual inspection of the anode must be performed and, if required, the anode be replaced. Please follow the instructions (below) for a visual inspection.

- **Visual inspection of the anode**

Prior to the removal of the anode, the tank must be depressurized. If required, drain as much water from the tank as necessary to make sure that no water will run out of the tank when the anode is removed. If the anode diameter is only a third of the original diameter (= 33 mm), the anode must be replaced. If the anode is not replaced, make sure to reuse the original sealing.



Do not use hemp. This would disturb the electrical connection between the anode head and the tank, and the tank would no longer be protected against corrosion. Any resulting damages would not be covered by the warranty.

An in-built impressed current anode has a practically unlimited life span. Make sure the pilot light is working. When the green LED is on, corrosion protection is ensured. If the red LED is on, there is a problem which must be investigated. Consult the operation guide for the impressed current anode! Magnesium and impressed current anodes only function correctly when the storage tank is filled.

Fill in the enclosed owner's record. This record is the key to all warranty services. Every two years, the inside of the storage tank must be cleaned and the storage tank be inspected. Wipe the outside of the tank with a damp cloth. Do not use abrasive or corrosive cleaning agents.

If there is a risk of freezing in the room where the storage tank is located, operate in freeze protection mode or completely empty the storage tank. Vent the safety valve regularly (once or twice a month) in compliance with the German Industry Norm DIN 4753.

We recommend that you have the system serviced annually by an authorized craftsman.

For security reasons, during heating, water must be allowed to drain through the vent. The vent must never be blocked or restricted in any way.

If the storage tank is equipped with an immersion heater, this heater must be serviced as well. For more maintenance information, please consult the operation guide for the immersion heater.

PHÖNIX SonnenWärme AG
Ostendstraße 1
12459 Berlin

Fax: 030/530007-17

info@sonnenwaermeag.de
www.sonnenwaermeag.de