

# SOLAR ACCESSORIES

## SOLAR EXPANSION TANK (SOLAR-AUSDEHNUNGSGEFÄSS) SAG



### Product description SAG

SAG tanks are used in solar heating systems to keep system pressure constant. Before starting up the system, adjust the tanks to align with system pressure.

After delivery (as soon as the SAG has been filled with 5 bar), the tank should be installed as soon as possible. Storing any SAG at a pressure of more than 4 bar for an extended period is not recommended. Transporting tanks filled with 200 litres at a pressure over 4 bar for long distances is not recommended! Tanks are available for solar systems with areas of 6 to 200 m<sup>2</sup>. SAG tanks are mounted in either a hanging or standing position, depending on size. Tank connection couplings and a variety of mountings and corrugated connecting hoses are available as accessories.

### General information

Max. supply system forward flow temperature	120°C
Min. operating temperature (with appropriate anti-freeze)	-10°C
Max. continuous operating temperature at the membrane	70 °C for DIN version, 99 °C for non-DIN versions
Max. operating pressure	10 bar
Proportion of glycol in water	Max. 50%
Membrane	Butyl or EPDM, cannot be replaced, in accordance with DIN 4807 from the SAG-50 half membrane at tank centre to the SAG-33 full membrane on the flange above the connection
Gas chamber	Nitrogen (fluid group 2 in accordance with RL97/23/EU)
Water chamber	Powder-coated steel plate
Colour	Red
Inner coating	None
Type of connection	Male
Initial pressure on delivery	5 bar
Protective caps	On connection and valve

## MAINTENANCE AND DISASSEMBLY OF SOLAR EXPANSION TANK SAG

### Maintenance

Yearly maintenance is required. External check: Is there visible damage (e.g. corrosion) on the SAG? When in doubt, call SAG service for large tanks and exchange small tanks. Membrane check: actuate the nitrogen valve; if water leaks out, replace the SAG.

### Water quality check

Requirements for closed heating and cooling circuits must be met.

### Pressure setting

Run the system at a constant temperature and monitor it.

1. If the pressure in the SAG is > 4 bar, shut off the water side. Then reduce the pressure at the gas valve to 4 bar.
2. Empty the tank on the water side and set initial pressure  $p_0$  (see start up for gas filling valve) and, if a gas pressure gauge is installed, check it for leak tightness. When performing maintenance on the gas filling valve, also empty the tank on the gas side. Set fill pressure  $p_f$  (see start up information); set final pressure (see start up information).
3. The SAG is now ready for operation.

### Disassembly

Depressurise the SAG before checking or disassembling either the tank or parts that are under pressure.

1. If the pressure in the SAG is > 4 bar, shut off the water side. Then reduce the pressure at the gas valve to 4 bar.
2. Empty the tank on the water side
3. Depressurise the tank on the gas side using the gas valve. Refill (see start up information). If these instructions are not followed, the membrane can be destroyed.

### Check before start up

Always follow the respective national regulations for operating pressurised devices. In Germany follow § 14 of the Ordinance on Industrial Safety [Betriebssicherheitsverordnung] and in particular, § 14 (3) no. 6.

### Time periods for performing required checks

The SAG is classified under Diagram 2 in Appendix II of Directive 97/23/EU and the recommended maximum time periods for performing required checks (in Germany, § 15 of the Ordinance on Industrial Safety is taken into consideration): This applies when the SAG assembly, operation and maintenance instructions are strictly observed and when operating the tank with pressure and forward flow temperature fluctuations is comparable to weather-compensating operation. External checks: not required under § 15 (6); internal checks:

- **Within the maximum period in accordance with § 15 (5) for 'SAG N, S, F' appropriate measures in terms of replacement must be taken (e.g. measurement of wall thickness and comparison with design specifications, which can be requested from the manufacturer) or**
- **Within the maximum period in accordance with § 15 (5) for 'SAG A, E, G' with bladder membrane, documentation of annual maintenance work.**

Rigidity test: Maximum period in accordance with § 15 (5) and, if applicable, in connection with § 15 (10). The operator must set the actual periods based on an analysis of technical safety and in consideration of actual operating conditions, experience with operating methods and filling material(s) and in accordance with the applicable national regulations for operating pressurised devices.

## SAFETY INFORMATION FOR SOLAR EXPANSION TANKS, SAG

### General safety information

SAG membrane-pressure expansion tanks are pressurised devices. A membrane separates the tank into a water chamber and a gas chamber with a pressure buffer. The conformity declaration in the appendix confirms compliance with Directive 97/23/EU. The scope of the assembly group can be found in the conformity declaration. The technical specifications selected for compliance with the basic safety requirements in Appendix I of Directive 97/23/EU can be found on the type plate or the conformity declaration.

### Assembly, operation, check before start up, recurring checks

in accordance with national regulations; in Germany, in accordance with the Ordinance on Industrial Safety. Accordingly, assembly and operation are to be carried out according to state-of-the-art methods by technical specialists and specially trained staff.

The operator is to arrange for the required checks before start up and after significant modifications to the system as well as the recurring checks in accordance with the requirements of the Ordinance on Industrial Safety. See the "Inspections" section for the recommended times for performing required checks. Only SAG tanks without visible external damage on the pressure hull may be installed and operated.

### Modifications to SAG tanks

e.g. welding or mechanical reshaping are not permitted. When replacing parts, only original parts from the manufacturer may be used.

### Complying with parameters

Information regarding the manufacturer, year of manufacture and manufacturer number as well as specifications can be found on the type plate. Appropriate technical safety measures must be taken to ensure that operating values do not exceed or fall below the specified maximum and minimum operation parameters (pressure, temperature).

Measures must be taken to ensure that the permissible operating overpressure on both the water and gas sides is not exceeded during operation or during filling on the gas side. The initial pressure  $p$  may never exceed the permissible operating overpressure. When filling the tank, an inert gas, e.g. nitrogen, must be used.

### Corrosion, incrustation

SAG tanks are made of steel, coated on the outside and rough on the inside. Wear allowance (addition material for corrosion allowance) is not included. The tank may only be used in atmospherically closed systems with water that is not corrosive and does not contain aggressive chemicals or poisons. During operation, ensure that the entry of oxygen into the entire heating and cooling water system by way of permeation, refill water, etc. is minimised. Water treatment systems must be designed, installed and operated according to state-of-the-art technology and methods.

### Heat protection

The operator must post a warning sign near the SAG in case of risk or harm to persons due to excessive surface temperatures in hot water systems.

### Installation location

The installation location must have sufficient load bearing capacity to accommodate the weight of the SAG when it is completely filled with water. A drain must be provided for drainage water; if required, the addition of cold water must be provided for (see also the "Assembly" section). The tank may not be installed in areas prone to earthquakes.

Not following these instructions, and in particular, the safety instructions, can cause the SAG to be damaged or destroyed, can place people at risk and can affect its ability to function properly. If these instructions are not followed, all warranty and liability claims are excluded.

### Calculating the initial pressure

Never exceed the permissible operating pressure (see type plate). The tank can burst. If the initial pressure and the system filling pressure are not correctly set, the SAG function cannot be guaranteed. Set initial pressure  $p_0$  at the gas valve to the minimum system operating pressure.

- If necessary, reset the factory-set initial pressure  $p_0$  to the required value (minimum system operating pressure); if the pressure at the gas valve is too high, release some gas; if the pressure is too low, add gas, e.g. from the nitrogen tank.
- Enter the new initial pressure  $p_0$  on the type plate.
- Calculating initial pressure  $p_0$

1. Recommended
2. Vapourising pressure for hot water systems  $>100\text{ °C}$
3. Circulation pump differential pressure, **only taken into account if the SAG is installed on the pressure side of the circulation pump.**  
 $p_0 \geq 1\text{ bar}$  (recommended even for lower calculated values)

$$p_0 [\text{bar}] = \frac{H [\text{m}]}{10} + 0.2 \text{ bar}^{1)} + p_0^{2)} + \Delta p_p^{3)}$$

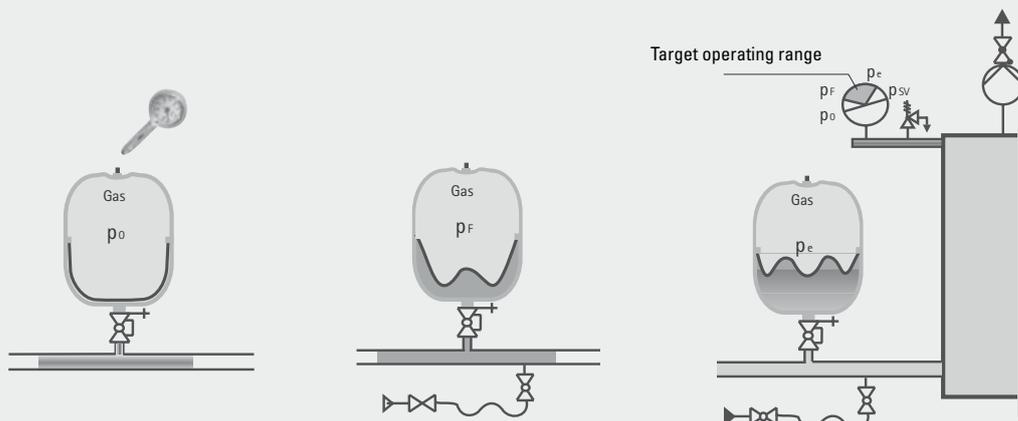
Open the shut-off valve carefully, vent the expansion line carefully and close the drain. Raise filling pressure  $p_f$  by filling from the water side. Caution: when filling from drinking water mains, national regulations for drinking water protection must be observed; in Germany, the safety instructions in DIN 1988 Part 4.

$$p_f [\text{bar}] \geq p_0 + 0.3 \text{ bar}$$

After venting, fill to final pressure  $p_e$  from the water side (e.g. heating system)

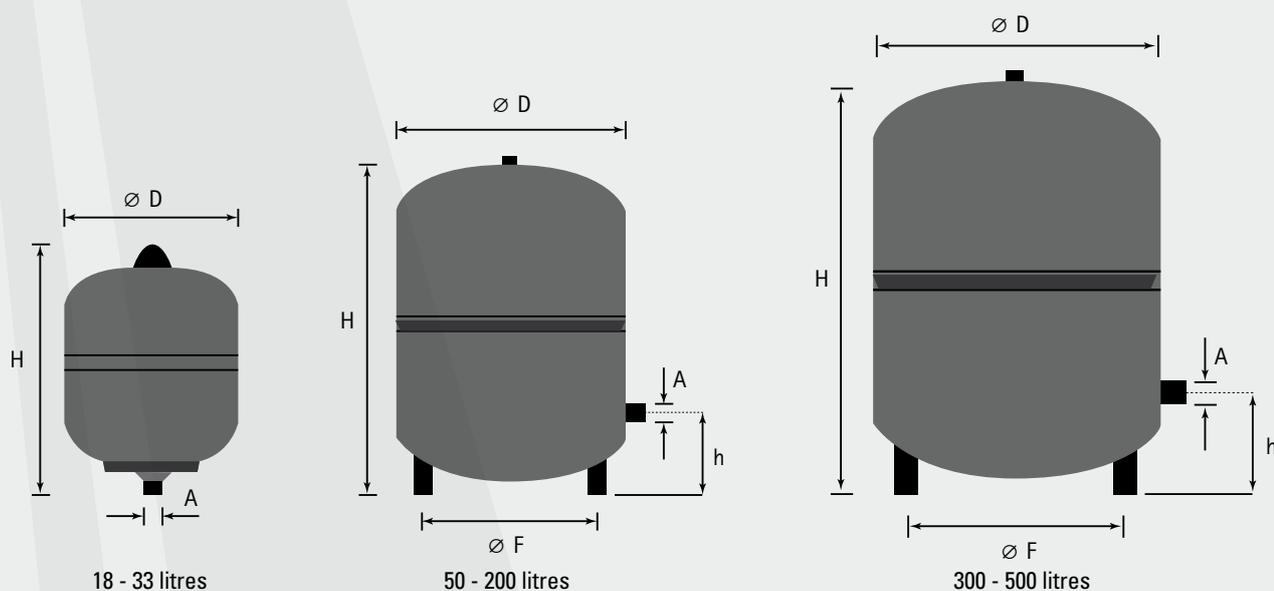
- Run the system at max. forward flow temperature (thermal degassing)
- Shut off the circulation pump; vent the system again
- Add water until attaining final pressure  $p_e$

$$p_e [\text{bar}] \leq p_{sv} - 0.5 \text{ bar}$$



# SOLAR ACCESSORIES

## SOLAR EXPANSION TANK



### Specifications

Type	SAG 12R	SAG 18R	SAG 25R	SAG 33R	SAG 50R
Item no.	1510733	1510040	1510041	1510042	1510334
Max. collector area	4 m <sup>2</sup>	6 m <sup>2</sup>	10 m <sup>2</sup>	15 m <sup>2</sup>	20 m <sup>2</sup>
Contents	12 l	18 l	25 l	33 l	50 l
Connecting size	G 3/4" with KlingerSIL flat seal				R 3/4"
Ø D	280 mm	280 mm	280 mm	354 mm	409 mm
H	300 mm	374 mm	496 mm	455 mm	469 mm
h					158 mm
Weight	2.5 kg	3.2 kg	4.5 kg	6.3 kg	9.5 kg
Installation type	Hanging, connection pointing upwards				Upright

Type	SAG 80R	SAG 100R	SAG 140R	SAG 200R	SAG 300R	SAG 500R
Item no.	1510044	1510045	1510046	1510047	1510049	1510051
Max. collector area	30 m <sup>2</sup>	40 m <sup>2</sup>	50 m <sup>2</sup>	70 m <sup>2</sup>	125 m <sup>2</sup>	200 m <sup>2</sup>
Contents	80 l	100 l	140 l	200 l	300 l	500 l
Connecting size	R 1"					
Ø D	480 mm	480 mm	480 mm	634 mm	634 mm	740 mm
H	538 mm	644 mm	941 mm	758 mm	1092 mm	1321 mm
h	166 mm	166 mm	210 mm	205 mm	235 mm	245 mm
Weight	14.6 kg	15.5 kg	17.4 kg	35.6 kg	47.0 kg	72.0 kg
Installation type	Upright					