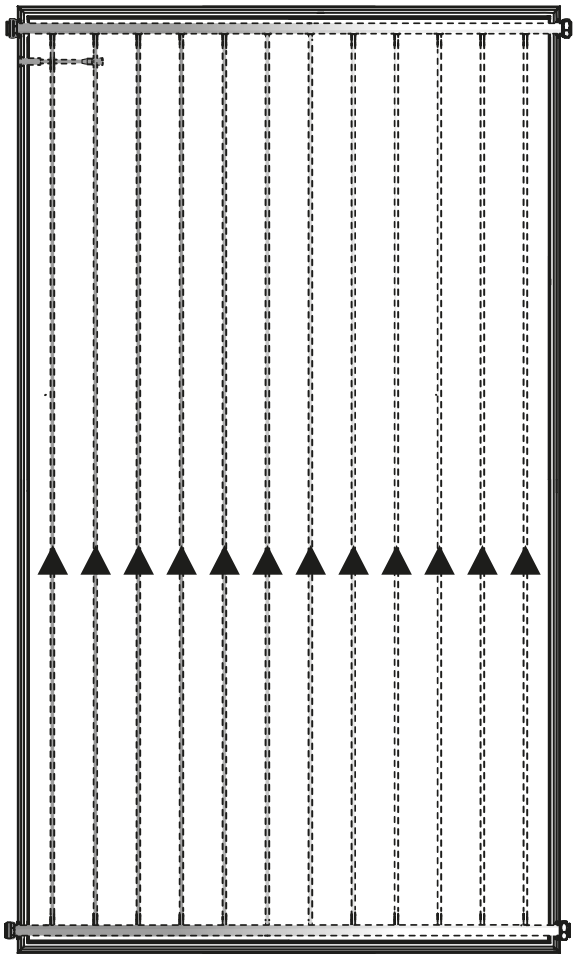
Technical Sheet

SCF-25/4B

Solar collectors



Flat solar collector SCF-25/4B

flat solar collector for forced circulation

high efficiency ensured by the aluminium absorber with highly selective surface

sealing between glass and frame with sealing material, without seal

ultrasonic welded copper pipes

stagnation temperature 200°C

total surface area 2.30 m²

40-mm glass wool insulation

vertical or horizontal installation possible

possibility to connect up to 10 collectors in series vertically, up to 6 collectors horizontally

wide range of accessories to facilitate installation

reduced assembly time thanks to simple and reliable fastening systems

solar collectors conforming to UNI-EN 12975 standards and Solar Keymark certification

5-year warranty

The flat solar collector SCF-25/4B has four connections and is made up of an aluminium structure on which a one-piece aluminium capturing plate is fixed, with a highly selective finish carried out by means of a vacuum treatment called "TiNOX", which ensures very high collector performance.
The capturing plate is ultrasonic-welded on 12 copper tubes for the conduction of the heat transfer fluid.
In the vertical arrangement, the glycol flows from the bottom to the top, in parallel in the 12 copper tubes.
Each panel is protected by tempered solar glass with a low iron oxide content and a high energy transmission coefficient.
The insulation is made of glass wool and 4 cm thick, and is located at the bottom.
The temperature probe is placed in a special copper pocket.
The mounting system is simple and, if installation is carried out correctly, it guarantees effective and long-lasting operation.

Flat solar collector SCF-25/4B

Technical data sheet

Description	Unit	SCF-25/4B
AG gross surface	m^2	2.30
Aa opening surface	m^2	2.15
Effective absorber surface	m^2	2.14
Qcol energy (50°C) **	kWh_t/year	1055
Qcol energy (75°C) **	kWh_t/year	638
Specific productivity **	kWh_t/m^2 year	458.70
M-F connections	Ø	1”
Empty weight	kg	44
Liquid content	litres	1.70
Recommended flow rate per m^2 of panel (*)	l/h	30
Type of glass - Thickness - Class		safety glass with anti-reflective surface - 3.2 mm - U1
Absorption (α)	%	95
Emissions (ε)	%	4
Maximum allowed pressure	bar	10
Stagnation temperature	°C	200
Maximum number of panels that can be connected in series	n°	10 vertical / 6 horizontal

* Capacity per m^2 min-max: 20-200 l/h.
** Data from report for Würzburg.

Influence of wind and snow on collectors

The maximum allowable load for wind and snow (possibly combined) on the collector surface is 1500 Pa (corresponding to the wind speed of 175 km/h).
To determine the maximum wind speed consider:

- building height;
- solar system site;
- exposure and topography (area/buildings).

The maximum snow load depends on the region and the altitude of the area.

Wind speed, km/h	Inclination angle of solar collectors	Mass in kg, distributed over the different support points, to secure a collector from wind lifting
100	30°-45°	135
130	30°-45°	255
150	30°-45°	355

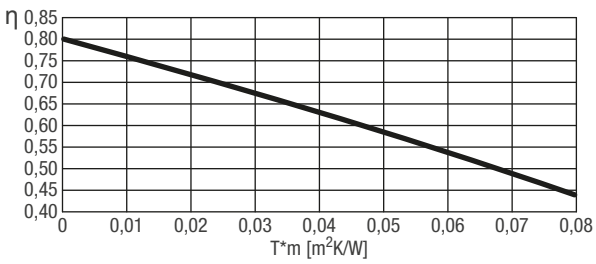
The indicated values are valid both for vertical and horizontal installation.

Connection pipe diameter with specific flow rate of 30 litres/m^2h

Total surface area (m^2)	2 - 4	6 - 12	14 - 20
Copper diameter (mm)	10 - 12	14	18
Steel diameter	3/8" - 1/2"	1/2”	3/4"

Efficiency curves

Optical efficiency at absorber (η_0)	Coefficients of heat loss of the absorber a1 W/(m^2K)	a2 W/(m^2K^2)	IAM (50°)	Collector efficiency % (η_{col})
0.802 (1)	4.28 (1)	0.0064 (1)	0.95 (1)	62.0 (2)

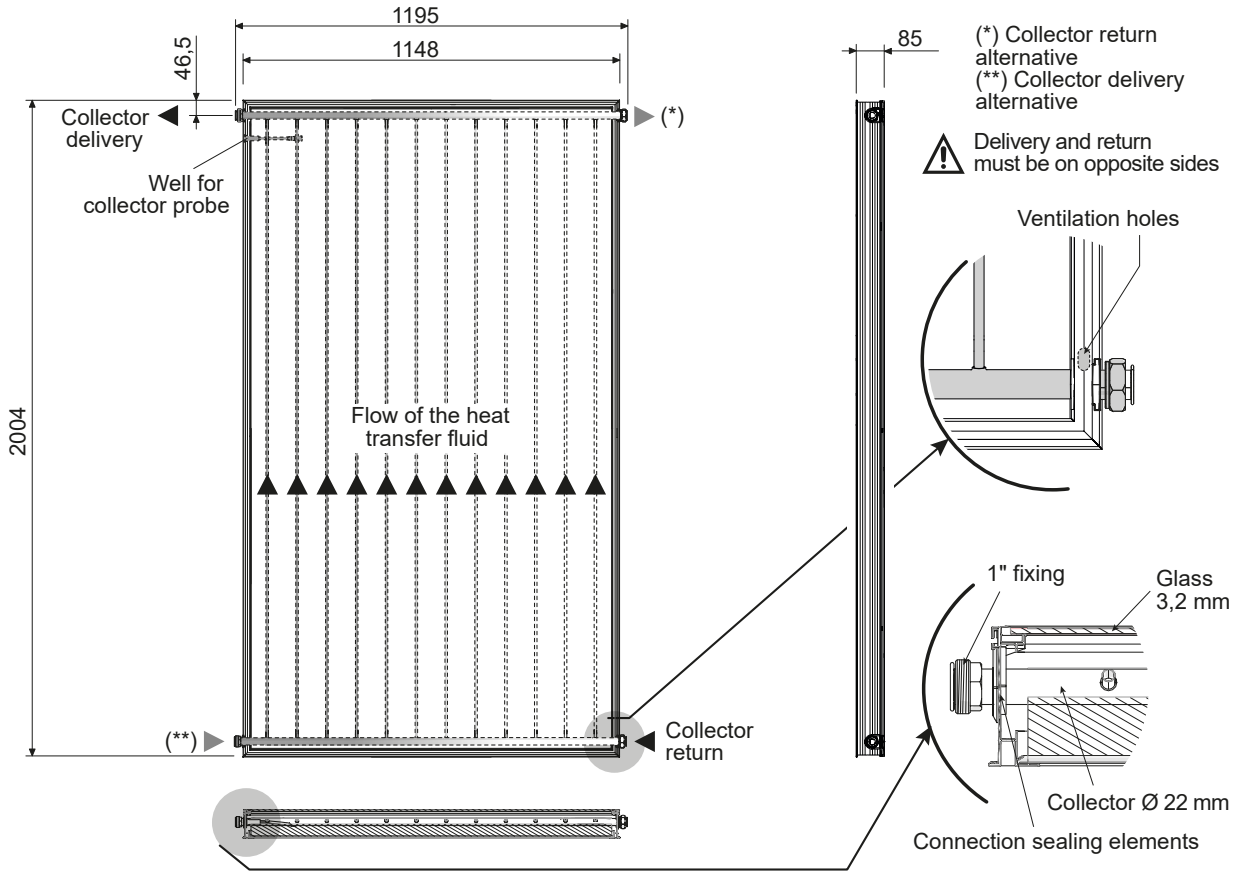


(1) Value referred to the opening area. Test according to ISO 9806 referred to mix of water and 33.3% glycol, flow rate 160 litres/h and direct exposure G = 800 W/m^2.
$T_m = (T_{IN\ collector} + T_{OUT\ collector}) / 2$
$T^*_m = (T_m - T_{ambient}) / G$

(2) Calculated with a temperature difference of 40 K between the solar collector and the surrounding ambient air, with a global solar radiation, referred to the opening area, of 1000 W/m^2.

Flat solar collector SCF-25/4B

Overall dimensions and structural parts



Flat solar collector SCF-25/4B

Hydraulic connections

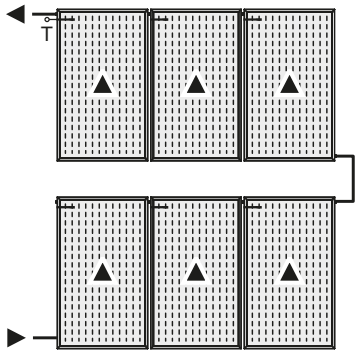
Vertical configuration

Collectors are connected with each other so that the heat transfer fluid crosses them in parallel. Connection with the heat exchange circuit towards the exchanger must be made on the side of probe socket (T) of the last collector of the series (see figure). The positioning of the socket on the collector allows the maximum transfer of heat accumulated in the panels.
It is also possible to connect more than one line of solar collectors, both in series (provided that the number of solar collectors does not exceed 10 units per each series) and in parallel. In any case the circuit must be hydraulically balanced (see the following example diagrams).

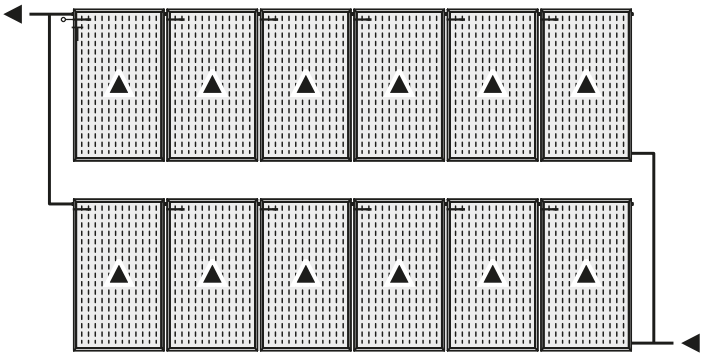
Horizontal configuration

Collectors are connected with each other so that the heat transfer fluid crosses them in series. Connection with the heat exchange circuit towards the exchanger must be made on the side of probe socket (T) of the last collector of the series (see figure). It is also possible to connect more than one line of solar collectors, both in series (provided that the number of solar collectors does not exceed 6 units per each series) and in parallel. In any case the circuit must be hydraulically balanced (see the following example diagrams). Connection between collectors must be carried out only using the junction connector (including the proper insulation) supplied separately. This connector is used as expansion joint between collectors.

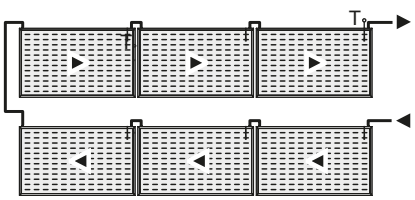
Two lines in series
Vertical configuration



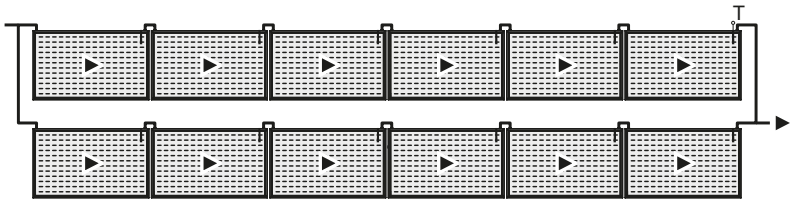
Two lines in parallel
Vertical configuration



Horizontal configuration

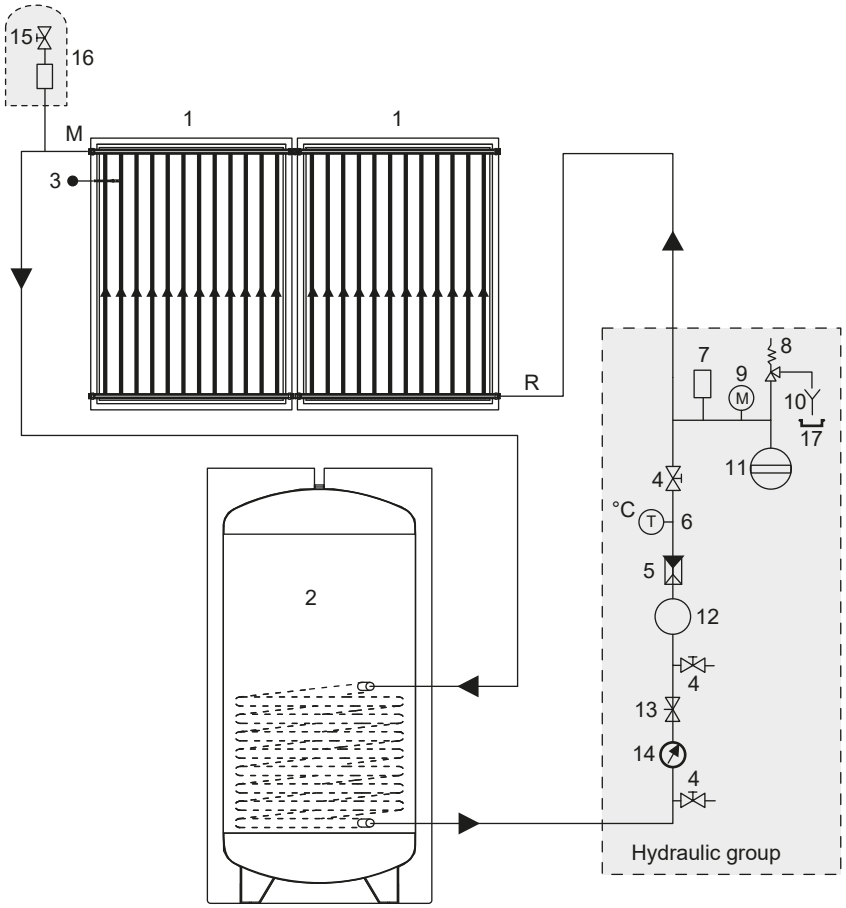


Horizontal configuration



Flat solar collector SCF-25/4B

Source water system

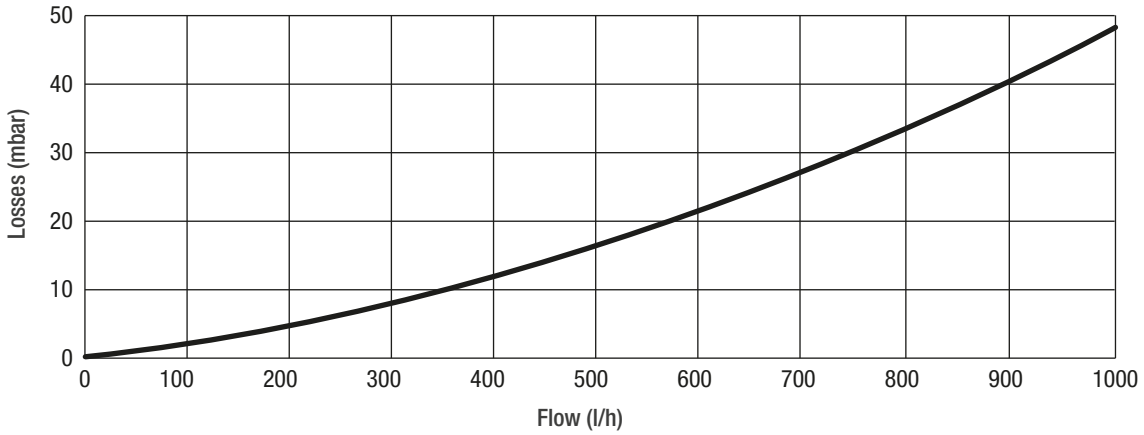


1. Solar collector
2. Heater
3. Collector probe
4. Shut-off valves
5. Non-return valve
6. Thermometer
7. Breather valve
8. Safety valve
9. Pressure gauge
10. Discharge
11. Expansion vessel
12. Circulation pump
13. Flow regulator
14. Flowmeter
15. Drain cock
16. Manual air vent (accessory)
17. Heat transfer fluid recovery

M Collector delivery
R Collector return

Solar collector pressure drop

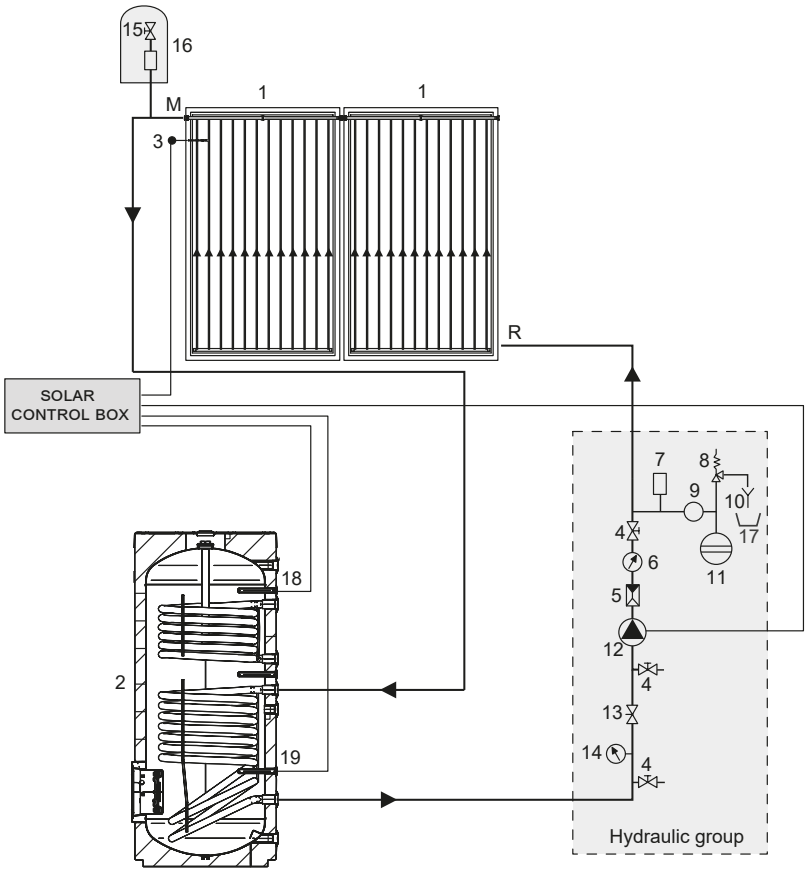
No-frost mixture / water 33.3% / 66.7% and temperature of the heat transfer fluid = 20°C.



Flat solar collector SCF-25/4B

Positioning the probes

The temperature sensor must be mounted in the pocket closest to the collector delivery pipe. Ensure optimal contact between probe and pocket. Only materials with adequate high temperature resistance (up to 250°C per sensor element, cables, seal materials, insulation) may be used for sensor mounting.



1. Solar collector
2. Heater
3. Collector probe
4. Shut-off valves
5. Non-return valve
6. Thermometer
7. Breather valve
8. Safety valve
9. Pressure gauge
10. Discharge
11. Expansion vessel
12. Circulation pump
13. Flow regulator
14. Flowmeter
15. Drain cock
16. Manual air vent (accessory)
17. Heat transfer fluid recovery
18. Upper heater probe
19. Lower heater probe

M Collector delivery
R Collector return

Installation

Instructions for installation

Installation may only be carried out by qualified personnel. Only the material included in the scope of supply may be used. The frame and its connections to the masonry parts must be checked by a structural engineer according to the circumstances on site.

Static features

Only install on sufficiently strong roof surfaces or frames. The strength of the roof or frame must be checked on site by a structural engineer before installing the collectors. In this process, the suitability of the frame for the sealing of screw connections for the fastening of the collectors must be checked. The entire frame must be checked by a structural engineer in accordance with the regulations in force, especially in areas with heavy snowfall or in areas exposed to strong winds. All the characteristics of the installation site (gusts of wind, formation of vortexes, etc.), which can lead to increased loads on the structures, must therefore be taken into account.

Lightning protection

Solar circuit metal ducts must be connected through a (yellow-green) conductor of at least 16 mm^2 Cu (H07 V-U or R) to the potential compensation main bar. If a lightning rod is already installed, collectors can be integrated in the existing system. If this is not the case, it is possible to carry out earthing with a buried earth cable. The earth duct must be laid outside the house. Furthermore, the earth cable must be connected to the compensation bar through a duct having the same diameter.

Connections

Collectors must be connected in series through connectors and seals. If hoses as connection elements are not provided, it is necessary to provide connection ducts with suitable devices for compensation of deformations caused by temperature inversions (expansion joints, hoses). When tightening the fitting with pliers or wrench it is necessary to hold the other fitting with a second wrench in order not to damage the absorber.

All the pipes in the hydraulic circuit must be insulated in accordance with the regulations in force. Insulators must be protected against weather and attacks by animals.

Collector inclination / Overview

The collector is suitable for a minimum inclination of 15°, up to a maximum of 75°. All collector connections as well as the ventilation and vent holes must be protected against impurities such as dust deposits, etc. In systems in which the summer load is predominant (production of domestic hot water) aim the collector from east to west with a variable inclination from 20 to 60°. The ideal direction is southwards, with inclination equal to the latitude of the location -10°. If the load is mainly in winter (systems that integrate domestic hot water production and room heating), aim the solar collector to the South (South-East, South-West) with an inclination greater than 35°. The ideal direction is southwards, with inclination equal to the latitude of the location +10°.

Flushing and filling

For safety reasons, filling should only be carried out when there is no sunlight. In areas subject to frost it is necessary to use a 40% glycol solution for flat collectors.
The antifreeze must be mixed with water before filling.
If the system is flushed before filling the antifreeze, pay attention to any water deposits in the collector that may freeze.

Vent

Venting must be carried out:
- At the time of commissioning (after filling).
- If necessary, e.g. in the event of a fault.

Carefully make sure that the system is completely vented.
Risk of burns with liquid in the collectors.
Only operate the breather valve if the temperature of the heat transfer fluid is below 60°C.

Check of the heat transfer fluid

The heat transfer fluid must be checked every 2 years to verify its antifreeze characteristics and its pH value.
Check the antifreeze with the suitable instrument - refractometer or hydrometer- (nominal value approx. -30°C): if the limit value of -26°C is exceeded, replace or top up the antifreeze.
Check the pH value with litmus paper (nominal value approx. 7.5): if the measured value is below the limit value of 7, we recommend replacing the mixture.

Water+glycol pre-mixing

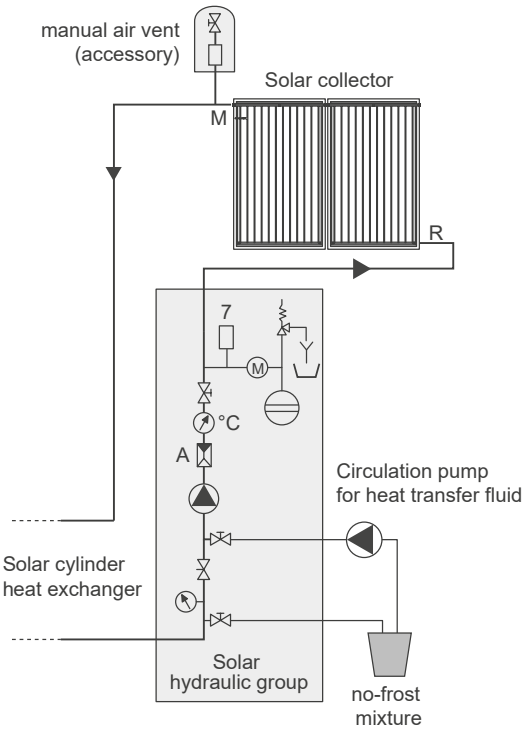
The glycol is supplied separately in standard packages and must be mixed with water in a container before filling the system (for example 40% glycol and 60% water allow a resistance to frost up to -21°C).
- The propylene glycol supplied is specifically designed for solar applications as it retains its characteristics in the range of -32 ÷ 180°C. It is also non-toxic, biodegradable and biocompatible.
- Do not fill pure glycol into the system and then add water.
- Do not use manual or automatic filling systems.
- If the chlorine content is very high, distilled water must be used for the mixture.

Antifreeze	Temperature	Density
50%	-32°C	1.045 kg/dm^3
40%	-21°C	1.037 kg/dm^3
30%	-13°C	1.029 kg/dm^3

System filling

1. Open the non-return valve (A).
2. Open the air vent at the highest point (see figure) and keep it open throughout the filling operation.
3. Open the breather valve (7).
4. Circulate the heat transfer fluid with an external pump until all air bubbles are eliminated. Close the manual degasser valve.
5. Briefly increase the system pressure to 4 bar.
6. Start up the system for about 20 minutes.
7. Repeat the air bleeding operation from point 2 until the system is completely de-aerated.
8. Set the system pressure to 3 bar.
9. Close the non-return valve (A) and the air vents previously opened to prevent any evaporation of the heat transfer fluid.

Do not fill the system with strong sunlight and collectors at high temperature.
Make sure that the air bubbles are completely eliminated by also using the vent on the hydraulic unit.



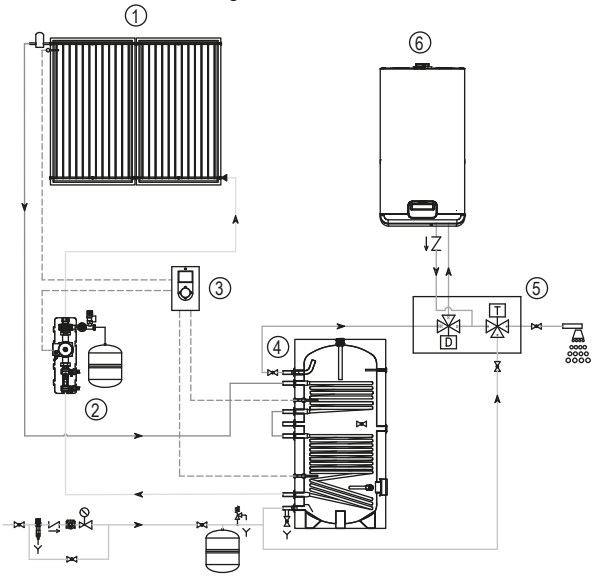
Flat solar collector SCF-25/4B

Table for choosing the solar composition

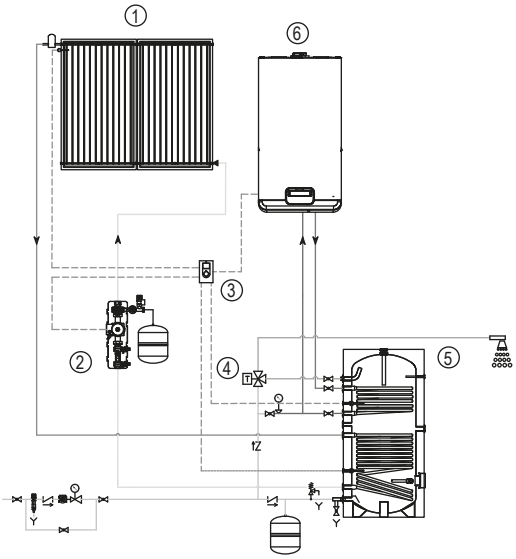
Coverage of DHW needs							
				FORCED CIRCULATION SOLUTION			
USE	APPLICATION	NO. OF PERSONS	NO. OF SOLAR COLLECTORS	ACCUMULATION CAPACITY	SYSTEM	LAYOUT	BOILER TYPE
				litres			
individually controlled domestic hot water	heating	2-3	1 SCF-25/4B	200	SCF-25/4B 200/1	1-2	instantaneous/ heating only
		4-5	2 SCF-25/4B	300	SCF-25/4B 300/2	1-2	instantaneous/ heating only
		5-6	3 SCF-25/4B	430	SCF-25/4B 400/3	1-2	heating only

The content of the following table is purely indicative and is not a substitute for planning by a qualified technician.

SYSTEM DIAGRAM 1
with condensing combined boiler



SYSTEM DIAGRAM 2
with condensing 'heating only' boiler



Basic layouts purely for illustrative purposes

1. Flat solar collectors
2. Return-only solar hydraulic group
3. EVOSOL solar control box
4. DHW double-coil heater
5. DHW diverting/mixing valve
6. Combined condensing boiler

1. Flat solar collectors
2. Return-only solar hydraulic group
3. EVOSOL solar control box
4. DHW mixing valve
5. DHW double-coil heater
6. Condensing 'heating only' boiler

27018640 - EN - Rev.00 05/2021

SCAN AND DISCOVER

SCF-25/4B

Trading Address:
Via Risorgimento, 23/A
23900 LECCO (LC) Italy
Tel. +39 0341 277111
Fax +39 0341 277263

www.berettaheating.com

Beretta