ASSEMBLY INSTRUCTION

SOLBOX

STI GMBH

SOLARE KOMPETENZ
AUS SACHSEN

sti-solar.de

Table of contents

Content	Page
Technical data	**3**
Structure of the SolBox	**4**
Installation scheme	**7**
Assembly of the SolBox	**8**
Hydraulic connection collector field	**9**
Filling of the SolBox	**10**
Initial operation of the SolBox	**11**
Fast operation	**16**
SolBox extension	**17**
Connection of the SolBox with the extension module	**19**
Capacities	**21**
Initial operation	**23**
Scheme of the installation	**24**
Notes	**26**

Technical data

SolBox	Specifications
Collector field size	up to 25 m²
Control unit	TDC
High-efficiency pump	for discharge heads up to 11 m, optionally expandable up to bis 22 m,
	according to the standard EU Norm 2015
Solar station	comprising a rinsing and filling unit DN 20 and a safety valve 6 bar including
Manometer	a maximum operating pressure 6 bar
Weight	ca. 23 kg (without liquid) // ca. 65 kg (with liquid)
Capacity	40 l
Insulation	50 mm according to the latest standard DIN EN13501-1
Power connection	230 V
Material	Container steel, untreated // not suitable for drinking water

Structure of the SolBox

Connections on top

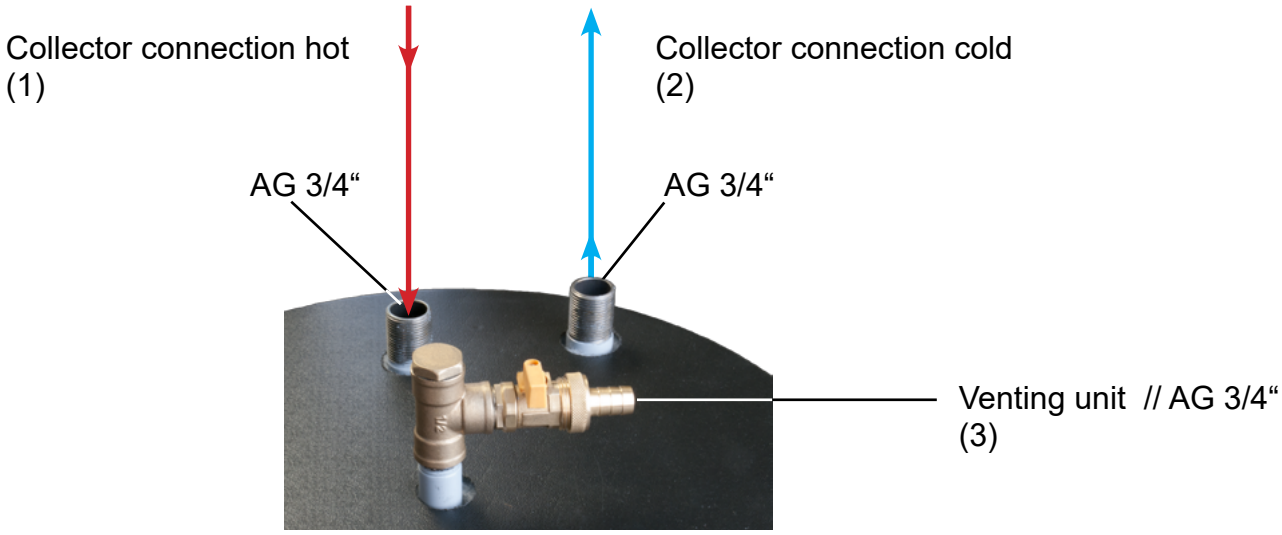


Illustration 1

Controller

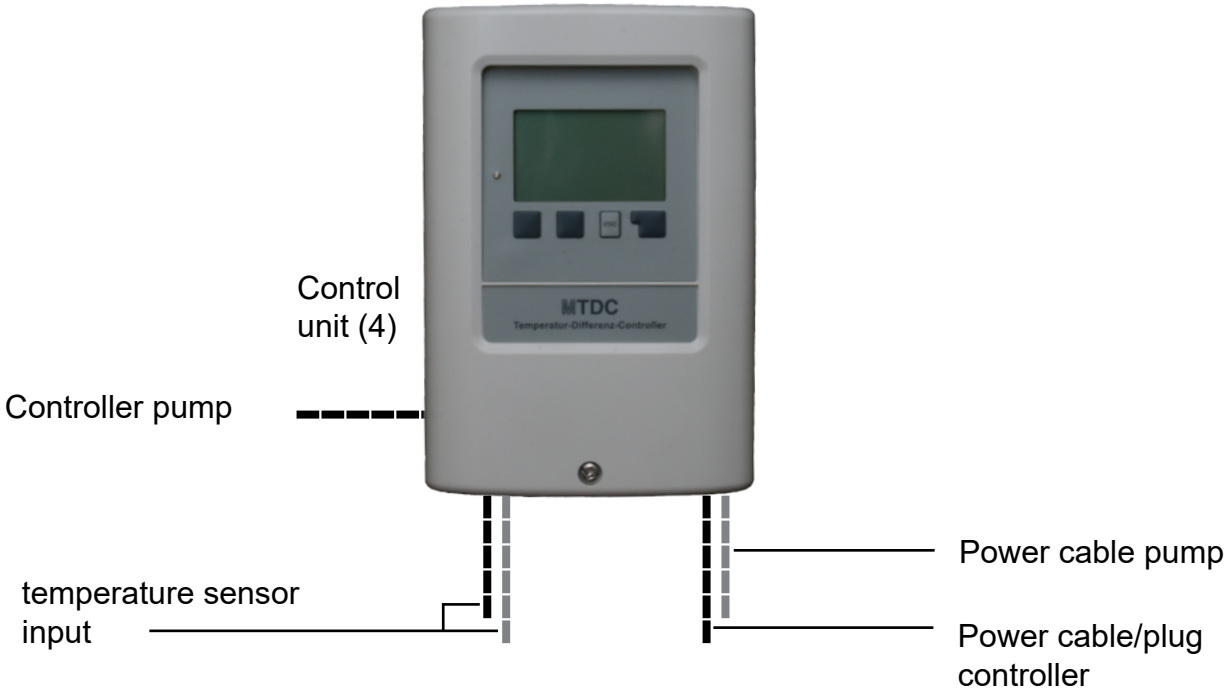


Illustration 2

Structure of the SolBox

Connections at the bottom

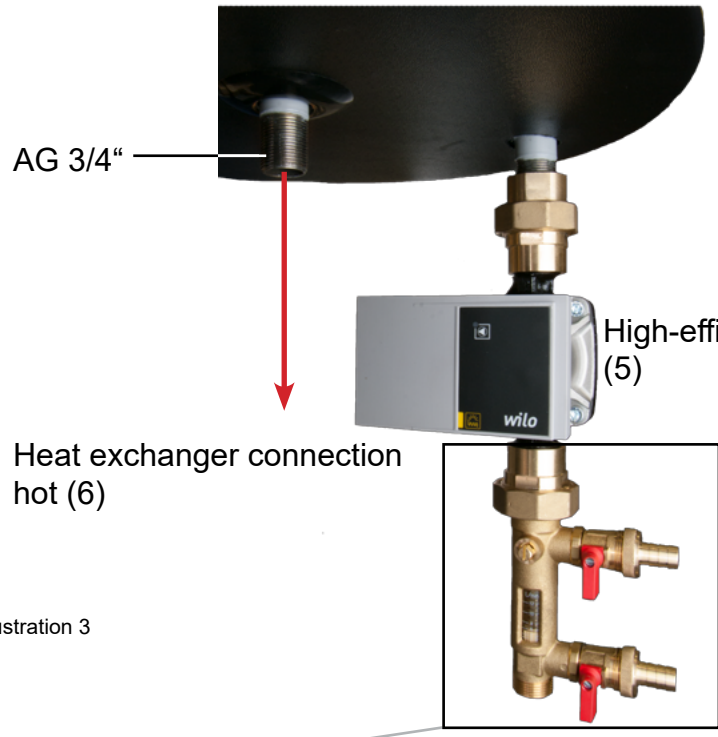


Illustration 3

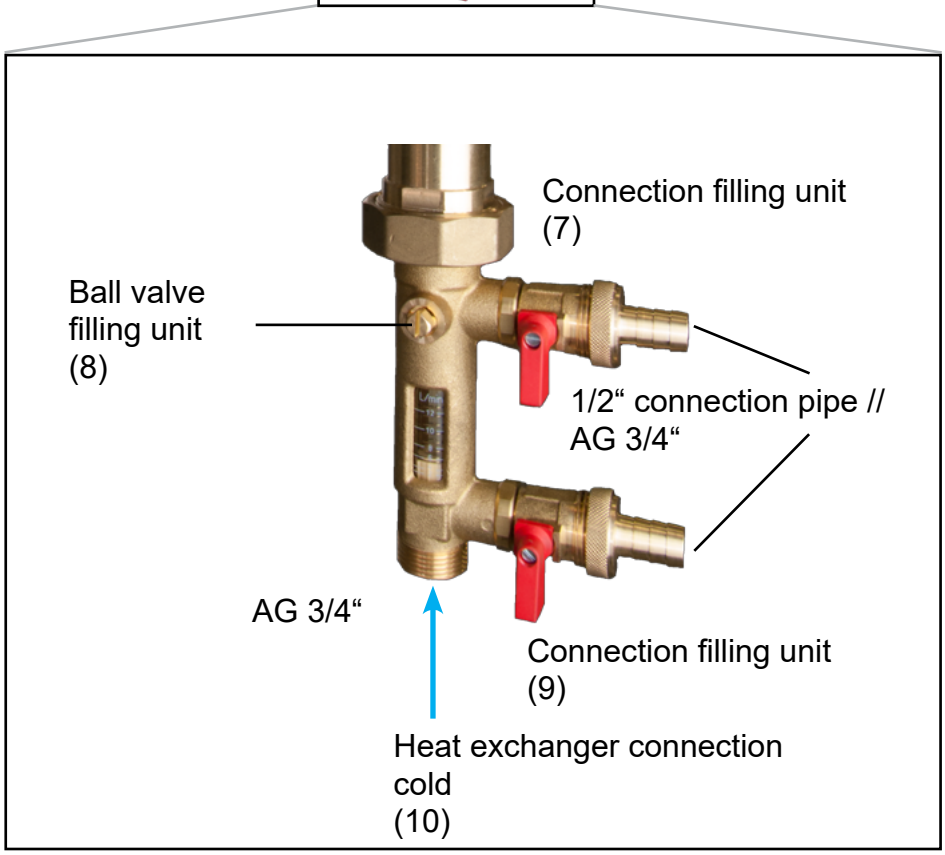


Illustration 4

Technical data

Connections at the bottom

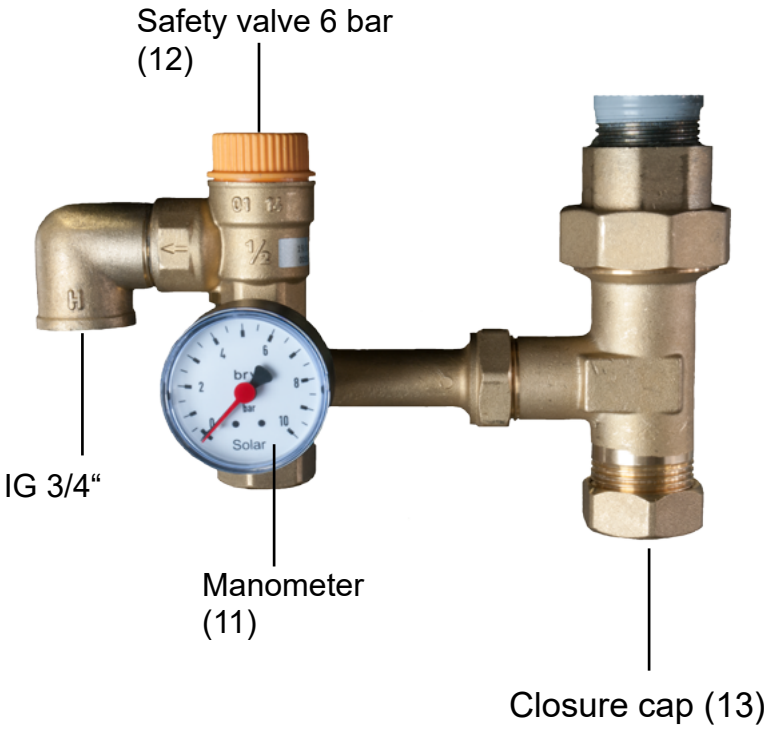


Illustration 5

Installation scheme

Installation scheme

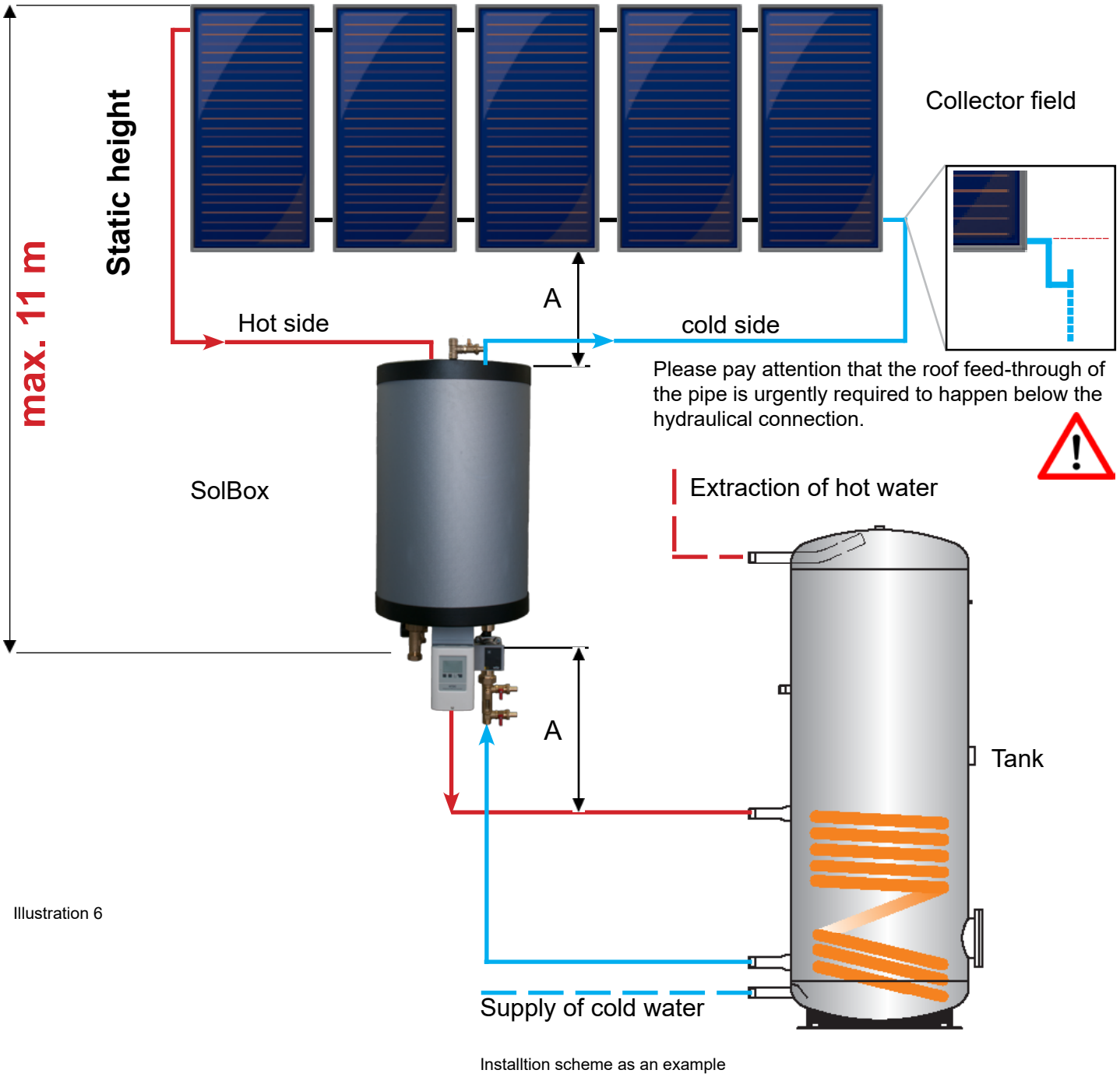


Illustration 6

Installtion scheme as an example

When assembling the SolBox, please note the distance which results from measure A:
- *bottom edge of the collector // upper edge of the SolBox* - minimum distance of 100 mm
- *center pump SolBox // connection of the uppermost solar heat exchanger* - minimum distance of 100 mm

Assembly of the SolBox

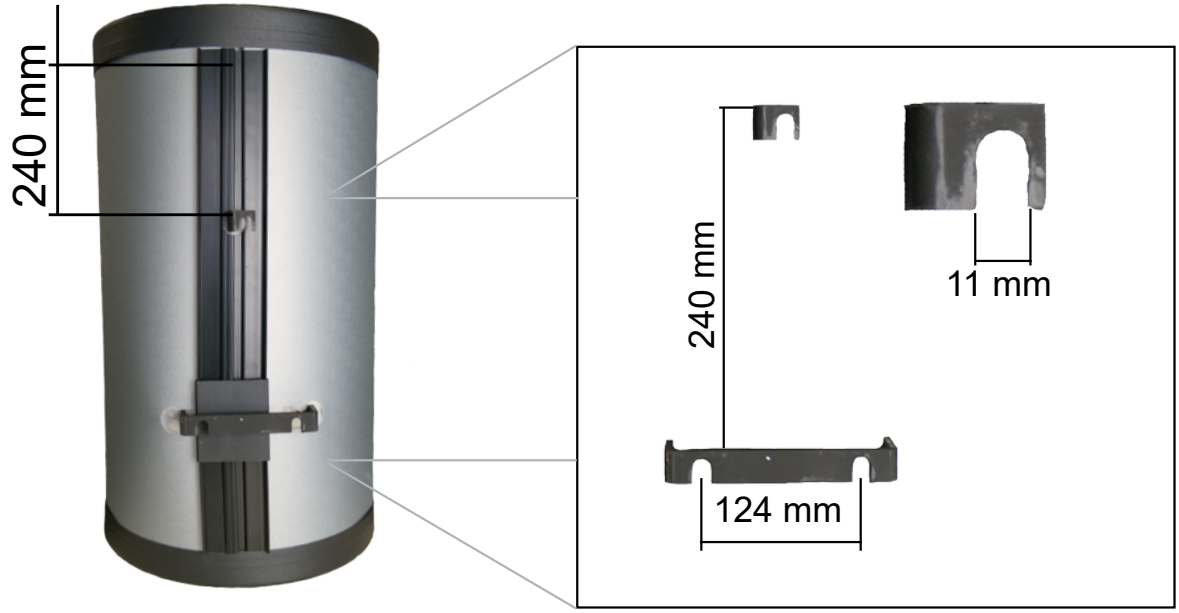


Illustration 8

notice total weight of 65 kg

The assembly of the SolBox happens at the three fixing points at the back.
Prior to the beginning of the assemly it is necessary to inspect the sustainability of the building ground by the customer. Subsequently, dimensions and style of the fixtures have to be adjusted and to be provided by the customer.
After placing of the fixtures, the SolBox has to be hooked in the fixing points and needs to be secured.

Now install further pipelines in the solar systems. Pay attention to the accurate connection of the pipelines upon the collectors - see illustration 6.

Connect the pipelines comming from the collectors with the designated connections (1) and (2) at the SolBox - see illustration 1.
Please pay attention that the pipelines have to be installed with downgrade from the collectors towards the SolBox.

Connect the SolBox with the heat exchanger in the storage tank. For this purpose use the connections (6) and (10).

Please pay attention that the pipelines have to be installed with downgrade from the SolBox to the heat exchanger in the storage tank.

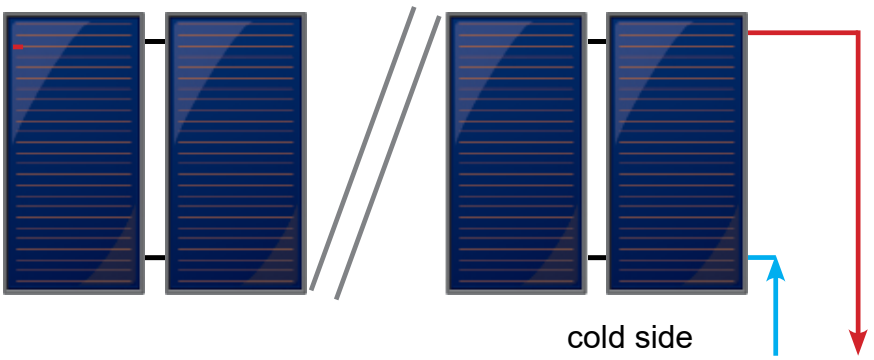
Apply the prewired sensor at designated place at the storage tank and secure it - see illustration 2.

Install further sensors and wire these with the solar controller - see assembly instruction solar controller.

Plug in the power plug of the solar controller - see illustration 2.

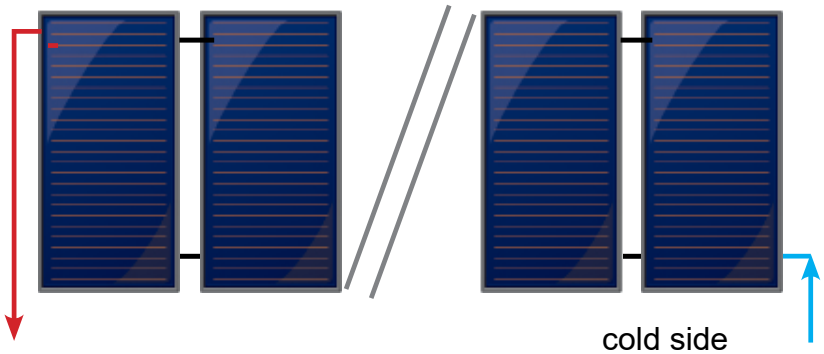
Hydraulic connection collector field

1 - 6 collectors [1]



1 - 15 collectors [1, 2]

hot side



Multi-row collector fields [1, 2]

hot side

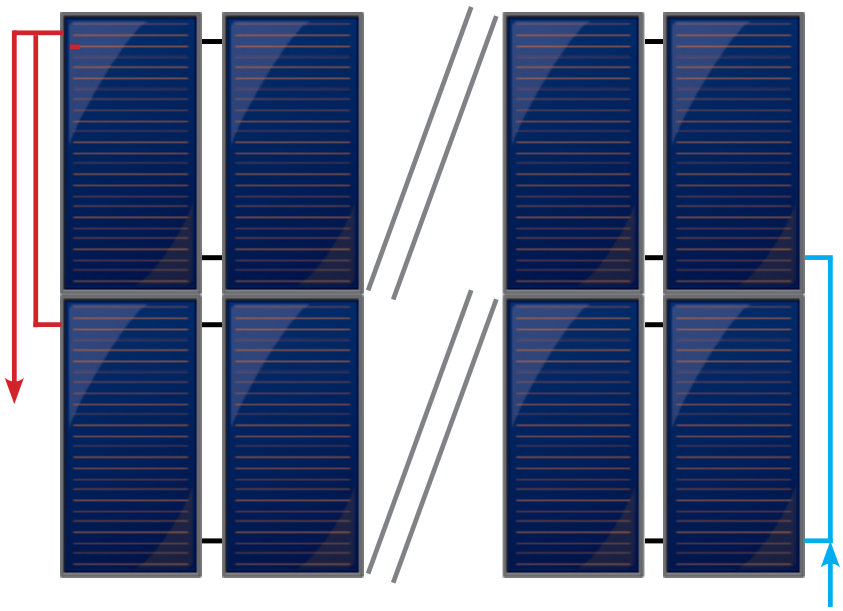


Illustration 7

For the combination with the SolBox, only self-draining collectors can be used. If you should have any questions, please contact your supplier!

1) Only applies for collectors of the STI GmbH.
2) Please consider the size of the collector field! For collector fields of more than 30 m², please ask for the extension of the SolBoxn with your supplier.

Filling of the SolBox

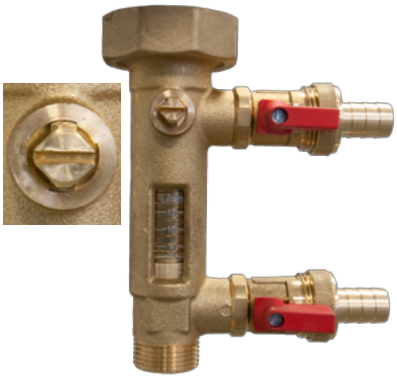
General

Now fill the system with a suitable glycol-water mixture via the filling unit on the SolBox using a filling station.

First determine the filling quantity using the table on page 22.

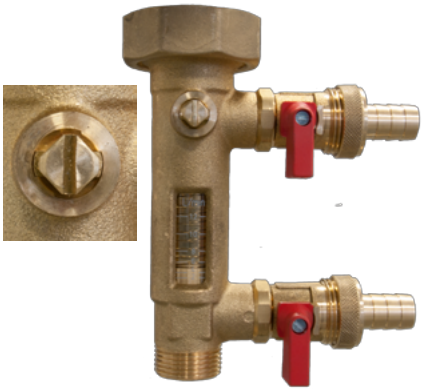
Filling quantity = collector content + content pipes + content heat exchanger + content SolBox

Ball valve filling unit (8)



Connection filling unit (7)

Connection filling unit (9)



Filling of the installation **Operation of the installation**

Illustration 9

Volumes

- The volume of the collectors is shown in the table on page 21.

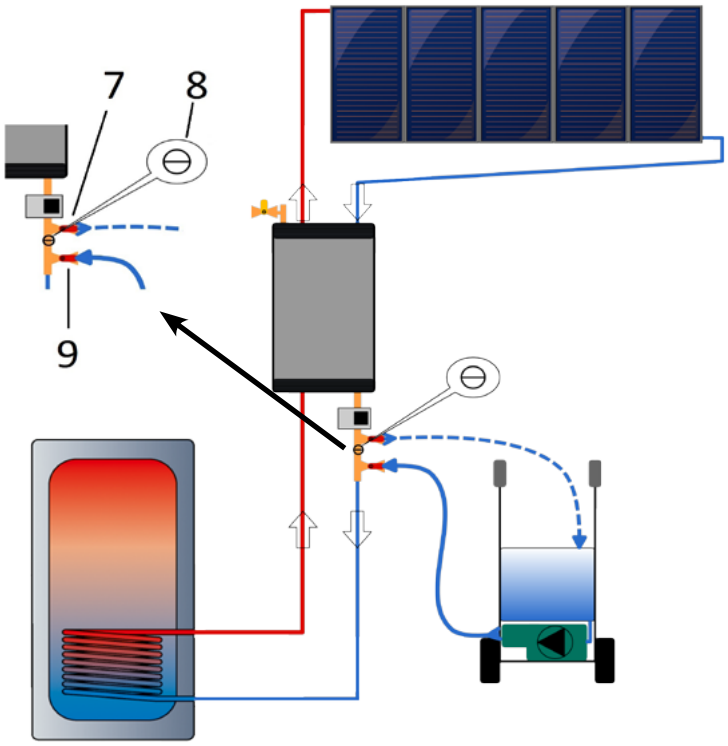
- Refer to tables 4 and 5 on page 22 or the manufacturer’s specifications for the volume of the lines.

- The volume of the heat exchanger can be taken from the information on the storage tank, the fresh water station or the external plate heat exchanger.

- The SolBox has a volume of **40** l. When filling, make sure that the glycol-water mixture is pumped into the system at room temperature (**15° - 25°C**).

Initial operation of the SolBox

Step 1: Filling of the installation

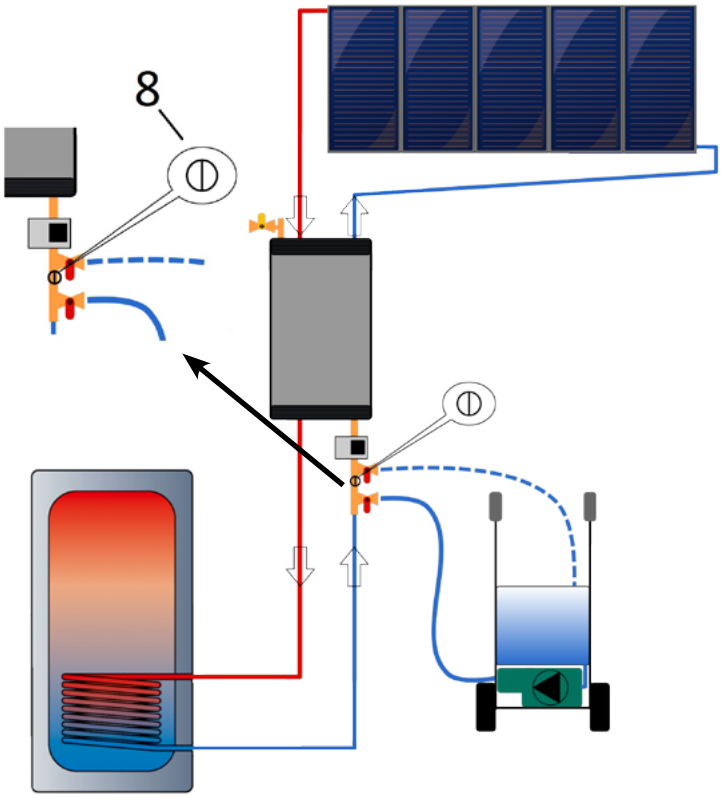


Now connect a hose, which pumps the glycol-water mixture from the filling station into the system, to the connection (9). The ball valve at connection (9) is opened - see figure 4 // 10.

The tap (8) is closed - see figure 4 // 10.

A hose is also connected to connection (7). This leads back into the container of the filling station. The ball valve on connection (7) is opened - see figure 4 // 10.

Now pump the glycol-water mixture with the filling station into the system until liquid emerges at connection (7). Switch off the filling station and close the ball valves at connection (7) and (9).

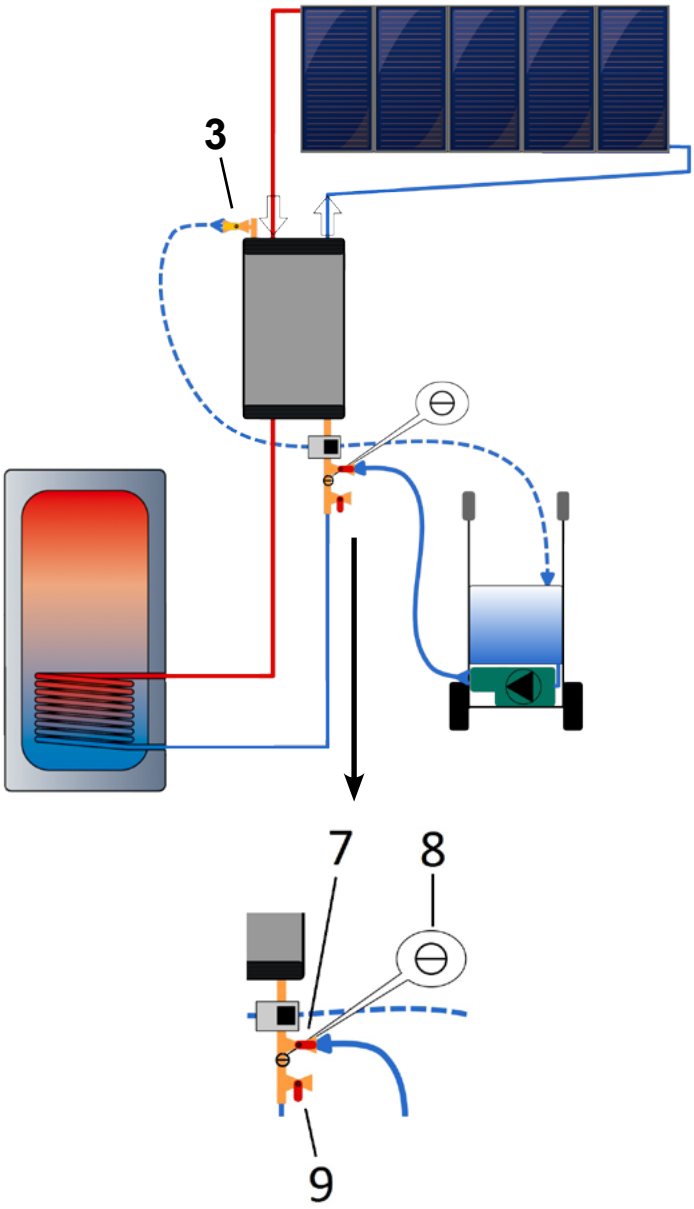


Now open the tap (8) and let the system run in manual mode for approx. 15 minutes - see installation instructions for the controller - in order to trap any air pockets from the system in the SolBox.

Initial operation of the SolBox

Step 2: Venting the system

Now partially empty the system to obtain the necessary air volume in the system.



Now connect a hose to the breather unit (3) - see figure 1. The hose leads back into the container of the filling station. The ball valve on the breather unit (3) is opened.

Connect a hose, which pumps the glycol-water mixture from the filling station into the system, to the connection (7). The ball valve at connection (7) is opened - see figure 4 // 9. The valves (8) and (9) are closed.

Now pump the glycol-water mixture into the system again using the filling station until glycol-water mixture emerges at the bleeding unit. The system is now filled.

Initial operation of the SolBox

Step 3: Partial emptying of the system

First, determine the draining volume by using the overview below.

Draining volume = collector content + volume collection pipe + expansion volume

Volumes

The volume of the collectors - see Table 1 on page 22.

If the collectors are installed in several rows one above the other, lateral collecting lines are installed for hydraulic connection of the collector row.

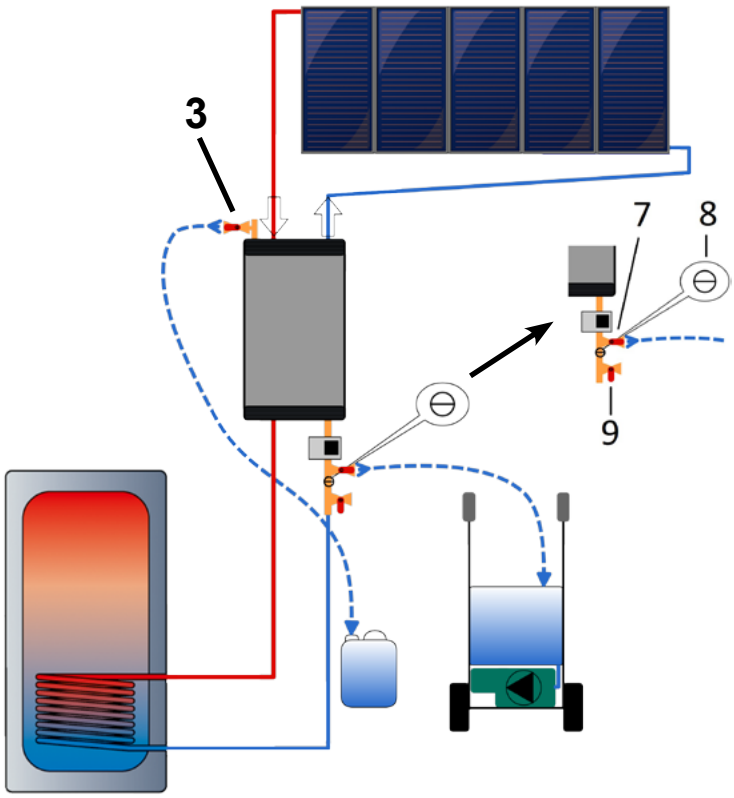
A collecting pipe set (2 collecting pipes) contains 2 l of liquid.

In addition to the volume of the collectors, the expansion of the liquid when the temperature rises must also be taken into account. Depending on the system content of the solar system, expansion volume must therefore be drained - see Table 3.

Sample calculation:

6 collectors 240 H, two rows,
Collection pipe set
Filling quantity: 80 l

Volume collectors:	16 l
Volume collection pipe:	2 l
Volume expansion:	6 l
Total:	**24 l**



After the emptying volume has been determined, drain the exact volume from the system.

To do this, connect a hose to the breather unit (3) - see Figure 1 - which leads into a collecting vessel. The ball valve on the breather unit (3) is opened.
Continue to connect a hose to the filling unit (7) - see Figure 4 // 10 - which also leads into the collecting vessel.
The ball valve (7) is opened. The valves (8) and (9) remain closed.
Now drain the exact volume from the system according to the previous determination!

After the emptying volume has been drained, the ball valve on the venting unit (3) and on the filling unit (7) is closed.

Initial operation of the SolBox

Step 4: Enhancement of the pressure

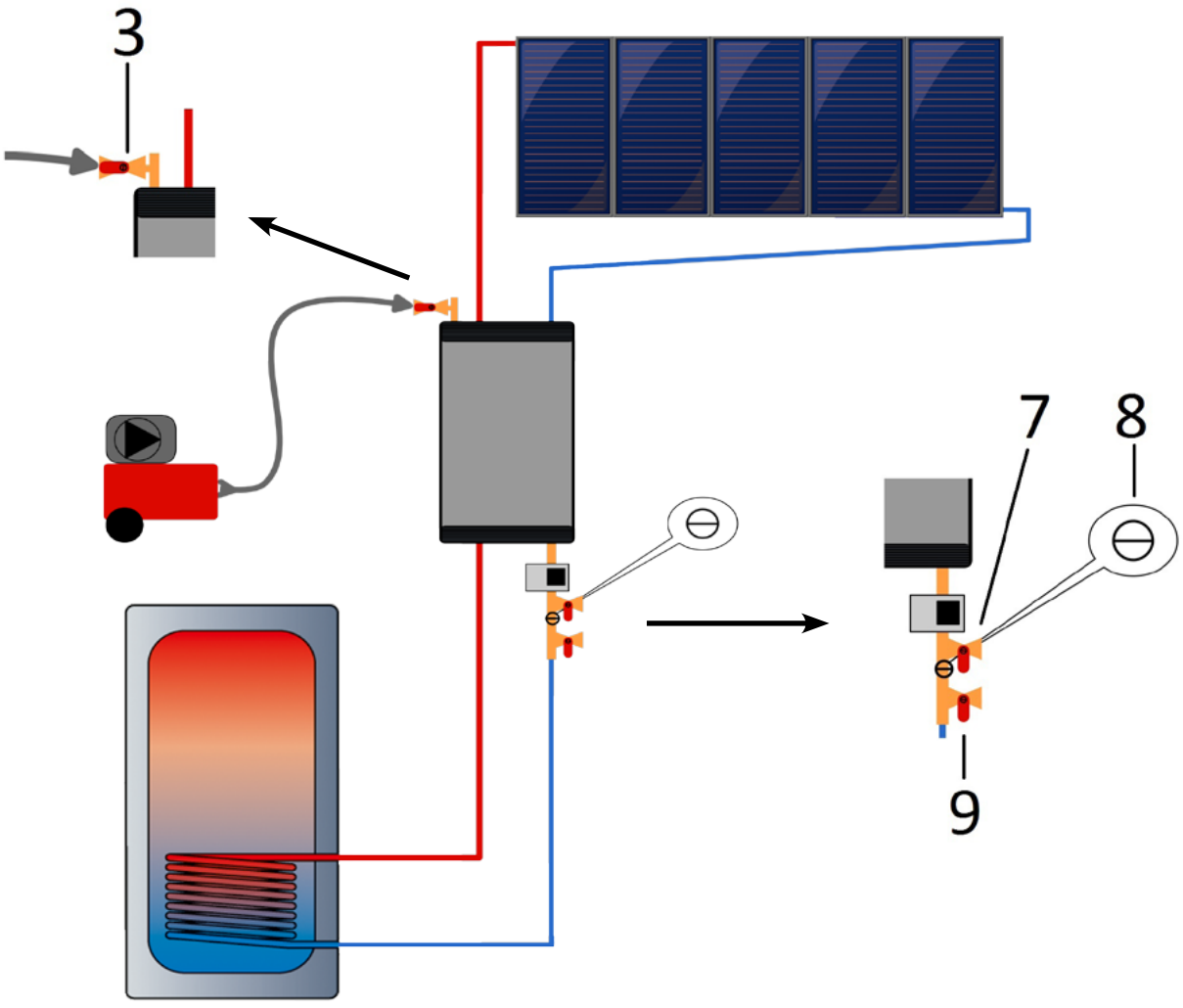
To prevent a negative pressure within the system it is recommended to run the system with approx. 0.5 bar pressure (above system pressure from static height).

Option I - Enhancement of the pressure with compressor

- Connect a compressor with the venting unit (3) and open the ball valve - see illustration 1.

- Increase the pressure about 0.5 bar (to be read off at the manometer).

- Pay attention that the pre-pressure in the compressor is situated higher than the installation pressure. Otherwise solar fluid may pour into the compressor.



Initial operation of the SolBox

Option II - Enhancement of the pressure through additional draining and filling

For that, first determine the installation volume by the overview below.

installation volume = filling vol. - draining vol.

- In dependency to the installation volume now a defined volume is released from the system - see table 2.

- Connect a pipe with the venting unit (3) - see illustration 1. The pipe leads back to the container of the filling station. Now the ball valve at the venting unit (3) needs to be opened.

- Further, connect a pipe with the filling station (7) that leads to the container as well.

- Now the ball valve (7) needs to be opened. The ball valves (8) and (9) stay closed.

- Next release the exact colume according to previous determination from the system!

- After releasing the draining volume, the ball valve at the venting unit (3) needs to be closed.

- Now pump the drained fluid back into the system by connection (7) of the filling station. Close the ball valve of the filling station (7).

Important: Please note that the fluid in the installation needs to be able to circulate free in any direction. No automatic barrier systems may be installed in the whole solar system.

Fast operation

This fast operation is only for expert installers who are familiar with the setup and functioning of drain back systems.

The following instruction gives a description of a fast and easy way to take the system into operation.

Assembly and installation
Assemble the system and install all pipelines - see “Installation scheme” at page 7.

Specification of draining volume
Calculate or specify the draining volume - see “Initial operation of the SolBox” at page 11.

Filling and venting
Fill and vent the system completely through the filling station - see “Draining volume” at page 13.

Release of draining volume
Release the calculated or specified draining volume from the installation - see “Draining volume” at page 13.

Testing the system pressure
Test the pressure of the installation. When filling the installation in a warm condition, a low pressure may occur after cooling down of the solar circle. To compensate this, open the ball valve at the venting unit (3) shortly and even up the occured low pressure.

SolBox extension

Technical data

SolBox extension	Specifications
Collector field size	up to 50 m² (in connection with the SolBox)
Measures	diameter: 400 mm, height: 800 mm
Weight	ca. 23 kg (without liquid) // ca. 65 kg (with liquid)
Capacity	40 l
Insulation	50 mm according to the latest DIN EN13501-1
Material	container made of steel, untreated // not suitable for drinking water

Assembly SolBox extension module

Assembly SolBox extension module

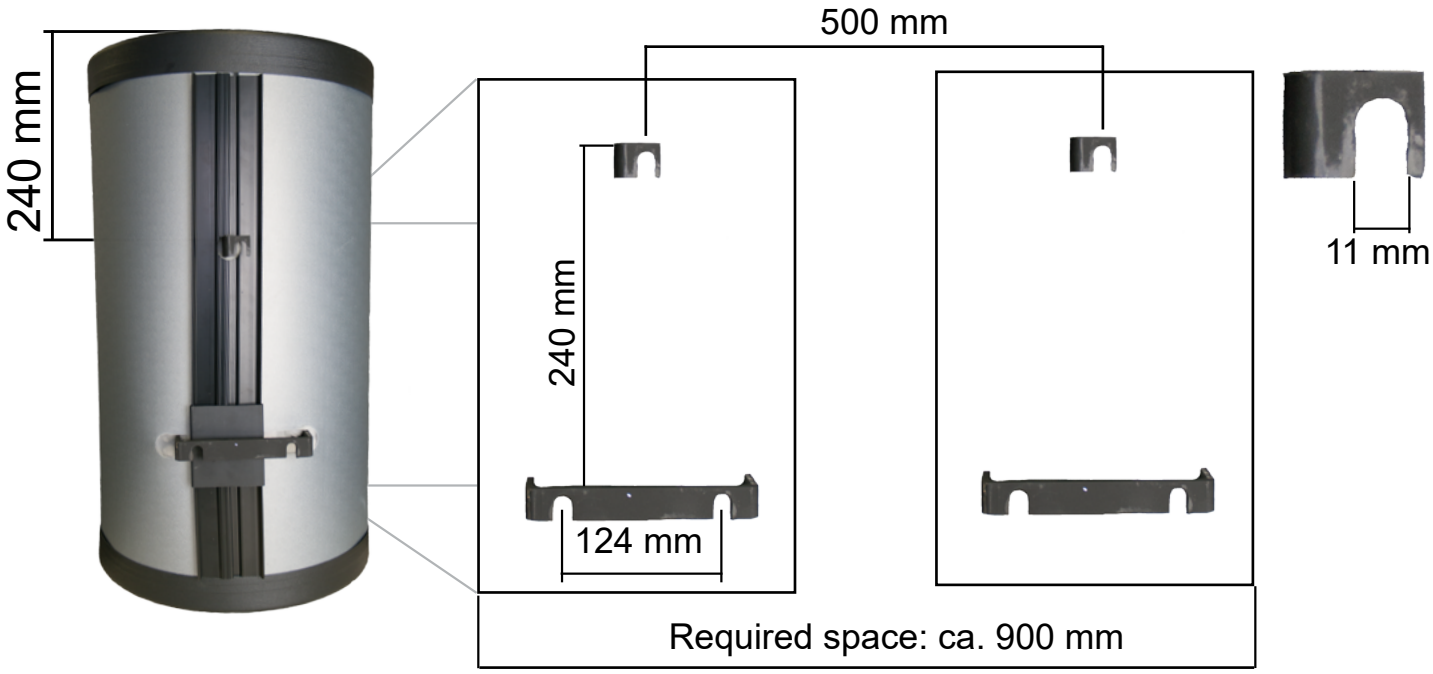


Illustration 10

Please pay attention to the overall weight of 65 kg.

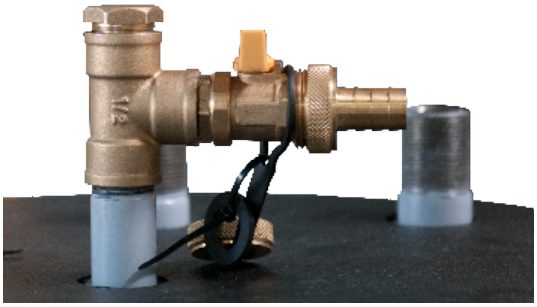
The assembly of the SolBox extension module takes place at the three fixation points at the back of the module. Prior to starting the assembly, it is necessary to check the building site for its load capacity.

Dimension and type of the fastening material have to be adjusted hereon and will be effected by the customer.

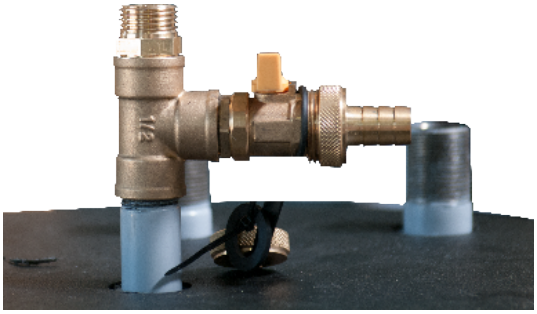
For a proper functionality, the extension module has to be assembled at the same level as the SolBox.

After placing the fastening material, the SolBox will be hooked into the fixtation points and fixed there.

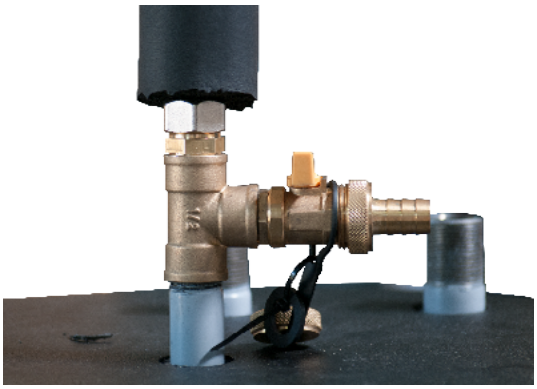
Connection of the SolBox with the extension module



Remove the drain plug at the venting unit of the SolBox and install it into the lateral outflow of the upper T-piece of the SolBox.

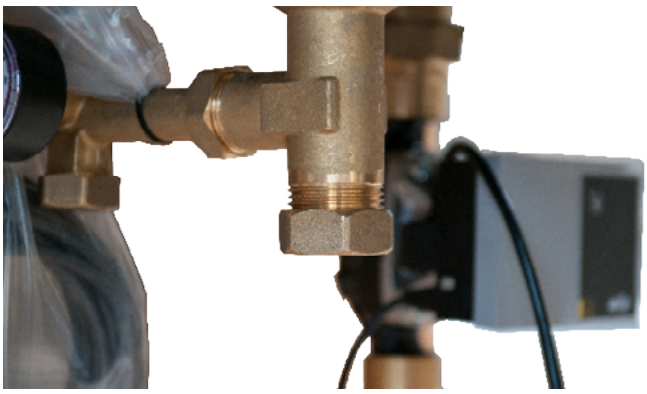


Install the double connection 1/2“ into the T-piece of the venting unit of the SolBox.

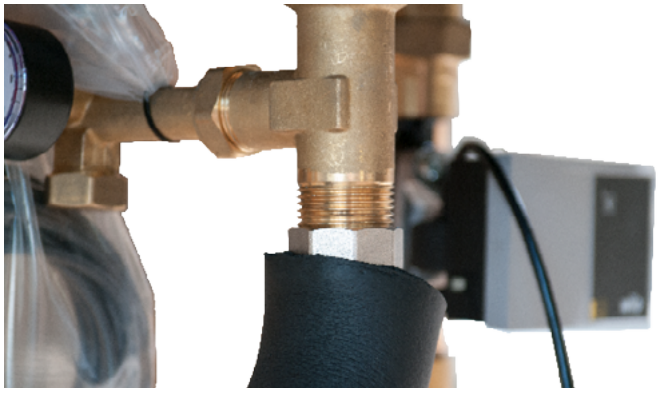


Install the stainless steel corrugated pipe DN15 at the venting unit of the Solbox and connect it with the upper T-piece of the SolBox extension module.

Connection of the SolBox with the extension module



Remove the end cap at the bottom of the SolBox.



Install the stainless steel corrugated pipe DN20 at the bottom of the SolBox and connect it with the bottom of the SolBox extension module.

Capacities

Collector capacity for collector types FKA and FKF

Collector capacity	200 V	240 V	270 V	200 H	240 H	270 H
1 collector	2 l	2 l	2 l	2 l	3 l	3 l
2 collectors	4 l	4 l	5 l	5 l	5 l	6 l
3 collectors	6 l	7 l	7 l	7 l	8 l	9 l
4 collectors	8 l	9 l	10 l	9 l	11 l	12 l
5 collectors	10 l	11 l	12 l	11 l	14 l	15 l
6 collectors	12 l	13 l	14 l	14 l	16 l	18 l
7 collectors	14 l	15 l	17 l	16 l	19 l	21 l
8 collectors	16 l	17 l	19 l	18 l	22 l	25 l
9 collectors	18 l	20 l	21 l	20 l	24 l	28 l
10 collectors	20 l	22 l	24 l	23 l	27 l	31 l
11 collectors (probably extension SolBox)	22 l	24 l	26 l	25 l	30 l	34 l
12 collectors (probably extension SolBox)	24 l	26 l	29 l	27 l	33 l	37 l
13 collectors (probably extension SolBox)	26 l	28 l	31 l	29 l	35 l	40 l
14 collectors (probably extension SolBox)	29 l	30 l	33 l	32 l	38 l	43 l
15 collectors (probably extension SolBox)	31 l	33 l	36 l	34 l	41 l	46 l
16 collectors (probably extension SolBox)	33 l	35 l	38 l	36 l	43 l	49 l
17 collectors (probably extension SolBox)	35 l	37 l	40 l	38 l	46 l	52 l
18 collectors (probably extension SolBox)	37 l	39 l	43 l	41 l	49 l	55 l
19 collectors (probably extension SolBox)	39 l	41 l	45 l	43 l	52 l	58 l
20 collectors (probably extension SolBox)	41 l	43 l	48 l	45 l	54 l	61 l
21 collectors (probably extension SolBox)	43 l	46 l	50 l	48 l	57 l	64 l
22 collectors (probably extension SolBox)	45 l	48 l	52 l	50 l	60 l	
23 collectors (probably extension SolBox)	47 l	50 l	55 l	52 l	62 l	
24 collectors (probably extension SolBox)	49 l	52 l	57 l	54 l		
25 collectors (probably extension SolBox)	51 l	54 l	60 l	57 l		
26 collectors (probably extension SolBox)	53 l	56 l	62 l	59 l		
27 collectors (probably extension SolBox)	55 l	59 l	64 l	61 l		

Table 1

When assembling collectors with full aluminium absorber, the figures mentioned in the table have to be reduced by 0,3 l per collector.

Capacities

Draining volume for pressure boosting

Filling quantity	Draining volume
bis 20 l	10 l
21 l bis 40 l	20 l
41 l bis 60 l	30 l
61 l bis 80 l	40 l
81 l bis 100 l	50 l

Table 2

Leitungsvolumen

Copper pipe	
Dimension	**Volume (l/m)**
15 x 1	0,13
18 x 1	0,20
22 x 1	0,31
28 x 1	0,53
35 x 1,5	0,80
42 x 1,5	1,19
54 x 2	1,96

Table 3

Stainless steel corrugated pipe	
Dimension	**Volume (l/m)**
DN 16	0,24
DN 18	0,27
DN 20	0,37
DN 25	0,66
DN 32	1,00
DN 40	1,42
DN 50	2,33

Table 4

Extension volume

Filling quantity	Extension volume
bis 50 l	3 l
51 l bis 100 l	6 l
101 l bis 150 l	9 l
151 l bis 200 l	12 l

Table 5

The volume l/m for the stainless steel corrugated pipe may vary.
Please pay attention to the information of the manufacturer!

LTDC – Default settings of the SolBox

Settings

4. - Settings:
4.1. - TminS1 30°C
4.4. - dTon 6K
4.4. - dToff 4K
4.5. - Tmax tank 60°C

5.1.2. - System protection: Tmax collector 120°C

6. - Special functions

6.2. - Pump menu
6.2.1. - Type of pump: PWM
6.3. - Speed control R1 / R2
6.3.1. - Modes: R1 M1
6.3.2. - Purging time: 300 seconds
6.3.3. - Sweep time: 5 minutes
6.3.5. - min. speed: 50%
6.3.6. - Setpoint: dT 10°C

Initial operation

After the installation of the system components, the filling of the system with fluid, the venting, and the adjusting of the installation pressure, the installation is prepared for initial operation.

For initial operation use the factory-adjuted solar controller. Please take further information for the process of initial operation from the attached manual of the controller.

Report for the initial operation

Builder	
Collector type	
Number of collectors	
Collector expanse	
Type of tank	
Storage volume	
Primary heat source	
Heat transfer medium	
Frost protection	
Height of installation	
Content of installation	
Pipe length F + BF	
Pipe dimension	
Date of initial operation	
Executing company	

Scheme of the installation

Notes

Notes

Signature Service Engineer

Company Stamp

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