

# Assembly instruction DrainMaster V-Series

**Technical data**  
**Installation**



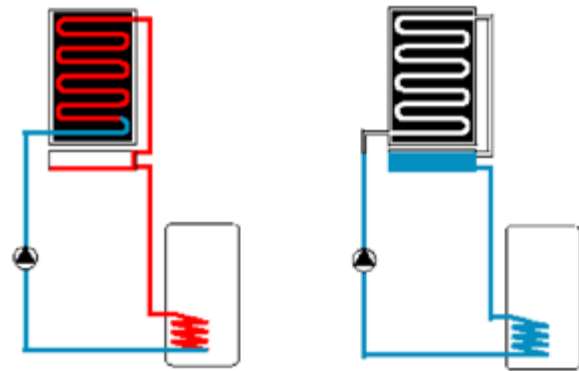
# General safety instructions

**It is essential to read through this instruction carefully prior to the assembly and initial operation.**

Any installation activities have to be executed by authorised professional staff. Please pay increased attention to:

- the conditions on site
- the local regulations
- the recognized rules of engineering (especially DIN 4757 Part 1 and 3)
- the proper state of the existing roof construction
- the safety rules concerning roof works
- the safety regulations for safety equipment
- the assembly instructions for components given by your supplier
- the safety instructions of VDE and DVGW

Solely the constructor of the installation is responsible for a proper assembly.



**Operation**

**Draining**

## Functioning of the DrainMaster

The patented DrainMaster is an innovative solution for draining solar systems. In doing so, only the collector field as well as the pipes above the DrainMaster will be drained.

In a state of rest, the DrainMaster collects the heat transfer medium. Thereby the installation is unable to overheat and as a result, the heat transfer medium and the system components will be protected. The maintenance charges can be minimised and running the installation becomes safer.

The regulation of the DrainMaster is carried out by the solar controller.

If there is a temperature measured at the collector which differs by  $\Delta T$  from the temperature measured in the tank, the circulating pump activates automatically. The collectors will be filled with the heat transfer medium which had been collected in the DrainMaster and in the course of this, the DrainMaster takes up the air pressed out. The liquid which has been heated inside the collectors circulates and heats the tank.

If  $\Delta T$  will be undershot or if a maximum temperature will be reached in the collector, the circulating pump deactivates, the collectors drain and the liquid will be collected in the DrainMaster.

## Construction of the DrainMaster

The covering of the DrainMaster is a particularly manufactured aluminium profile for the assembly with the collectors even outside of the roof cladding.

Any component which gets in contact with the heat transfer medium is made of stainless steel. Please make sure to not use material in the solar circuit which might damage the stainless steel.

## System requirements

The **collectors** have to be **self-draining**. The piping of the collectors has to enable an entire draining. In the whole solar circuit (flow and backflow), **flap valves must not** be assembled. As the DrainMaster enables a low system pressure, a safety valve of 3 bar is sufficient provided that the overall system height permits it. Flow as well as backflow should be equipped with a syphon as closely as possible at the heat exchanger so that a thermic pipe circulation can be excluded.

Volume DrainMaster V-series

- V 1190 (1190 mm) 7 l
- V 2090 (2090 mm) 12,8 l

Example dimensioning:

Field of six collectors FKA 240V in two rows

Six collectors à 2,65 l  
plus connection line ca. 1 l / m  
= 16,9 l volume collector field

Selection of DrainMasters:

Roof-mounted / bottom support: 1 Basic module V 1190  
3 Extension module V 1190

Roof-integrated 1 Basic module V 2090  
3 Extension module V 1190

Dimensioning

The DrainMaster always has to be able to take the **whole quantity of liquid of the collector field including the connection line** above the DrainMaster.

If there are any insecurities, please contact your specialist retailer.

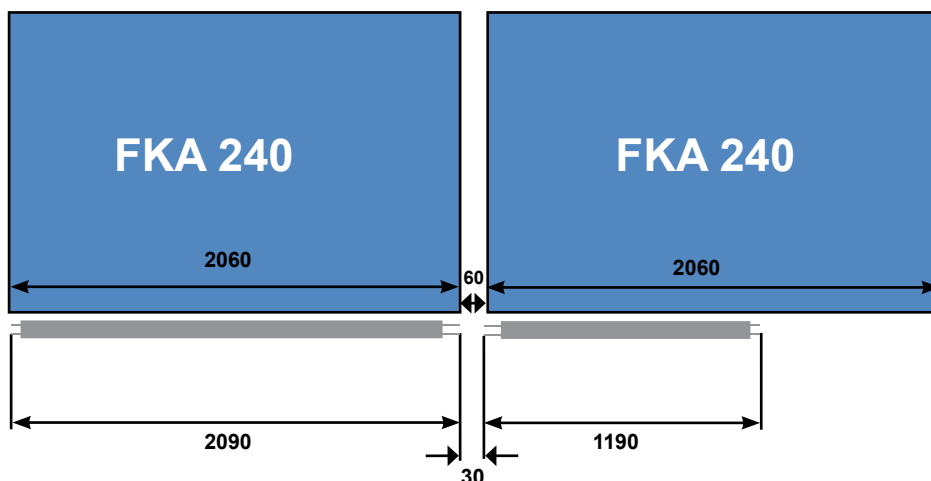
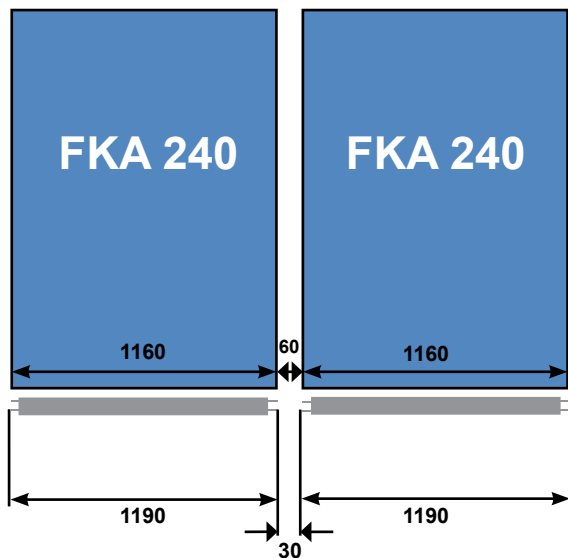
Beside the basic module with a degassing and perfusion zone, extension modules are available for installations with a higher volume.

These extensions increase the usable volume range if the installation is in stagnation.

Grid dimension

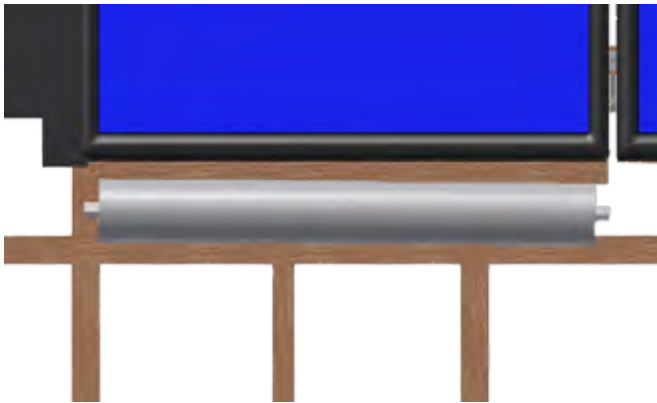
The DrainMaster series had been adjusted to the collector FKA 240. Two different lengths can be offered which refer to the collector types FKA 240 V (2,2 l) and FKA 240 H (2,65 l).

When assembling roof-integrated installations with a sheet metal surrounding, the two DrainMaster versions can be combined by a modular construction.



(Combination is possible for roof-integrated installations.)

# Roof-integrated installation



The DrainMaster is suitable for an assembly directly below the collectors. In doing so, it is necessary to observe that the DrainMaster always has to be assembled below the lowest edge of the collectors, but at least 50 cm higher than the circulating pump and the heat exchanger.

## Alignment of the connections

The DrainMaster has to be adjusted in such a way that the inflow and outflow can be arranged as vertical as possible (turn the DrainMaster so that the connections are perpendicular).

The connection which is marked with the red label is the opening of the DrainMaster on top.

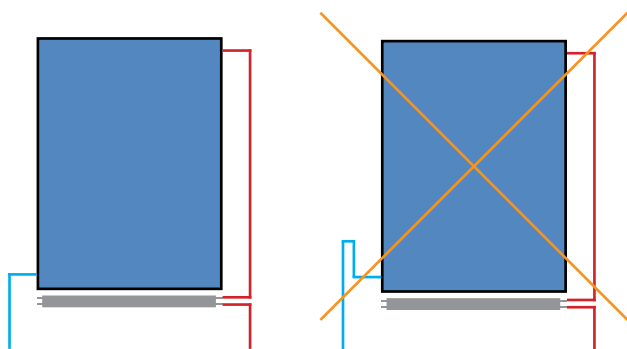
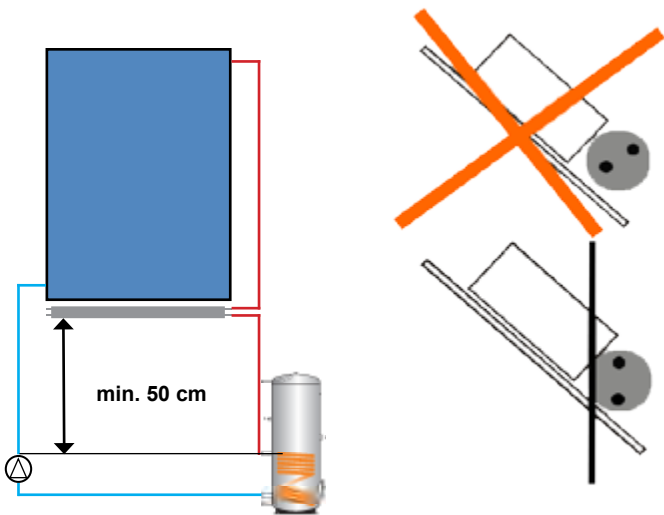
## Connecting pipes

Please pay increased attention that the connecting pipes from the collector field to the DrainMaster do not present any counter inclination (or syphon).

When installing the backflow and the flow above the lowest edge of the collector field (e. g. above the ridge sheet), please pay attention that the backflow (cold side) will be led to the level of the DrainMaster by a syphon and that it will be piped with a pipe diameter up to the highest point in accordance with the table below.

## Number of collectors - wire cross section [mm]

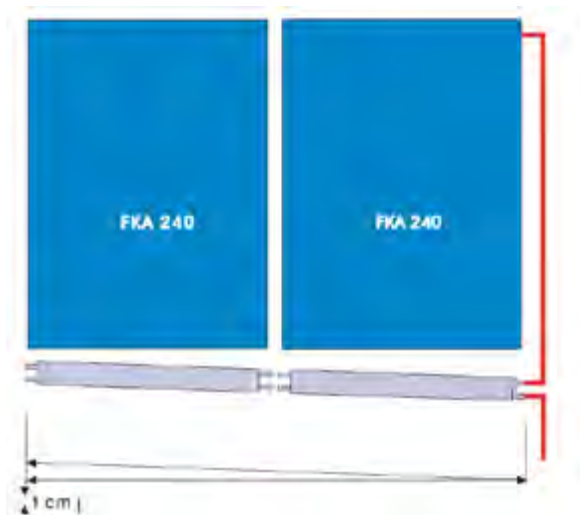
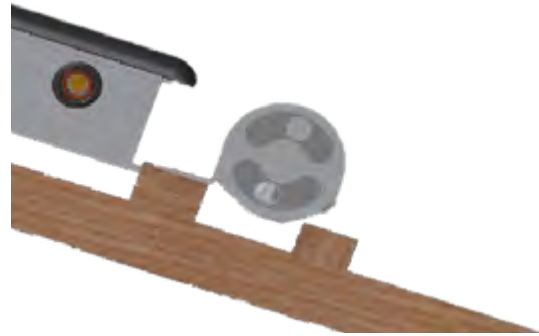
1	12
2	12
3	18
4	20
5	22
6	22



# Roof-integrated installation

## Assembly steps

1. Lie the DrainMaster onto the rafters below the lowest collector row.
2. Afterwards, please insert the mounting brackets (2 per DrainMaster) into the cover of the DrainMaster with a respective distance of 20 cm from the edge.
3. The DrainMaster has to be turned so that the area with the elongated hole rests on the stop lath.
4. Adjust the DrainMaster succinctly with the collector ends and fix it. In doing so, please pay attention that the DrainMaster will be installed with an inclination of 0,1 - 1 %. This means that the connections of flow and backflow are located approx. 1 cm lower than the side on which the extensions will be assembled.
5. Connect the collector field outlet with the DrainMaster inlet (upper screwing, red label).
6. Connect the DrainMaster outlet with the collector flow. Thereto, use the provided cutting ring couplings 90°. Please pay attention that the cutting ring cuts at least 5 mm from the end of the pipe.
7. Close open connectors which lie opposite the connection side with the provided cutting ring sealing plug (when using extension modules at the end of the assembly line).



## Assembly of the extension modules

The assembly of extension modules happens just as the assembly of the basic modules.

The modules will be coupled with the provided compression fittings. It is necessary to observe that **no counter inclination** emerges.

# Roof-mounted installation



The DrainMaster is suitable for an assembly directly below the collectors. In doing so, it is necessary to observe that the DrainMaster always has to be assembled below the lowest edge of the collectors, but at least 50 cm higher than the circulating pump and the heat exchanger.

## Alignment of the connections

The DrainMaster has to be adjusted in such a way that the inflow and outflow can be arranged as vertical as possible (turn the DrainMaster so that the connections are perpendicular).

The connection which is marked with the red label is the opening of the DrainMaster on top.

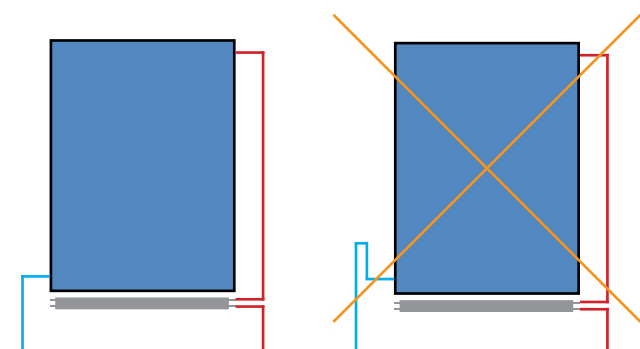
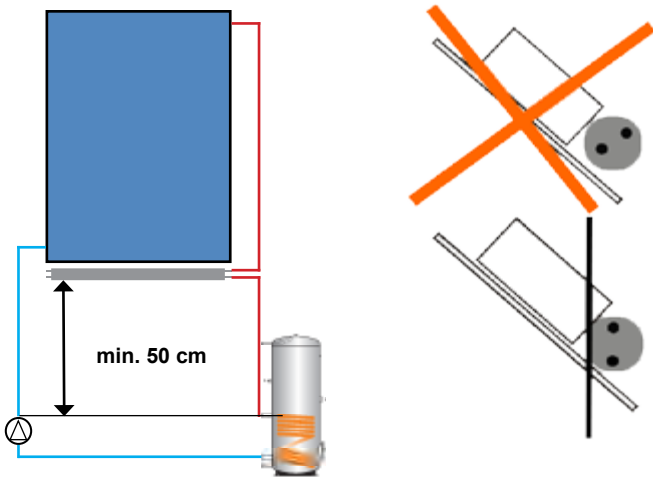
## Connecting pipes

Please pay increased attention that the connecting pipes from the collector field to the DrainMaster do not present any counter inclination (or syphon).

When installing the backflow and the flow above the lowest edge of the collector field (e. g. above the ridge sheet), please pay attention that the backflow (cold side) will be led to the level of the DrainMaster by a syphon and that it will be piped with a pipe diameter up to the highest point in accordance with the table below.

### Number of collectors - wire cross section [mm]

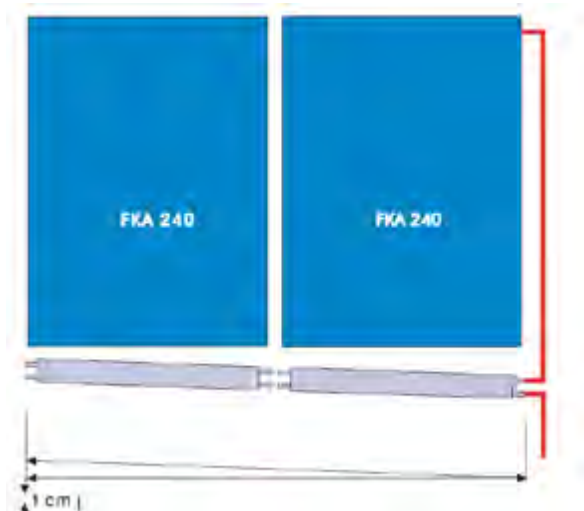
1	12
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# Roof-mounted installation

## Assembly steps

1. The DrainMaster will be installed after the assembly of the aluminium profile at the bottom. It is recommendable to **fix the DrainMaster prior to the assembly of the collectors**.
2. For this purpose, the two provided brackets for each DrainMaster will be inserted into the slots of the cover of the DrainMaster at both ends. The connections have to be aligned vertically. Please pay attention that the DrainMaster has to come to rest with its entry (marked with a red label) at top.
3. Afterwards you have to plug the brackets from below onto the priorly placed wafer-head screws which are located on the profiles and secure it using a nut. The elongated holes now enable a variable relocating of the DrainMaster.
4. Align the DrainMaster succinctly with the collector ends and fasten it. In doing so, please pay attention that the DrainMaster will be installed with an inclination of 0,1 - 1 %. This means that the connections of flow and backflow are located approx. 1 cm lower than the side on which the extensions will be assembled.
5. Connect the collector field outlet with the DrainMaster inlet (upper screwing, red label).
6. Connect the DrainMaster outlet with the collector flow. Thereto, use the provided cutting ring couplings 90 °. Please pay attention that the cutting ring cuts at least 5 mm from the end of the pipe.
7. Close open connectors which lie opposite the connection side with the provided cutting ring sealing plug (when using extension modules at the end of the assembly line).



## Assembly of the extension modules

The assembly of extension modules happens just as the assembly of the basic modules.

The modules will be coupled with the provided compression fittings. It is necessary to observe that **no counter inclination** emerges.

# Installation on bottom supports



The DrainMaster is suitable for an assembly directly below the collectors. In doing so, it is necessary to observe that the DrainMaster always has to be assembled below the lowest edge of the collectors, but at least 50 cm higher than the circulating pump and the heat exchanger.

## Alignment of the connections

The DrainMaster has to be adjusted in such a way that the inflow and outflow can be arranged as vertical as possible (turn the DrainMaster so that the connections are perpendicular).

The connection which is marked with the red label is the opening of the DrainMaster on top.

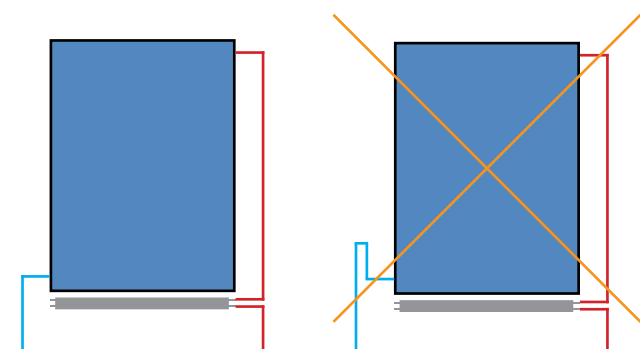
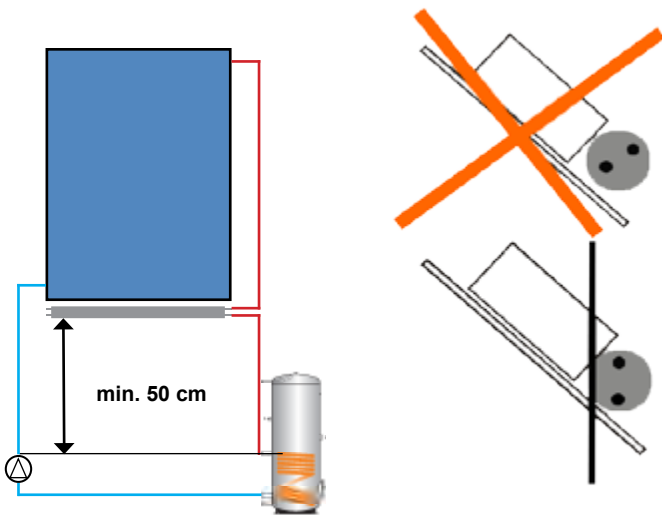
## Connecting pipes

Please pay increased attention that the connecting pipes from the collector field to the DrainMaster do not present any counter inclination (or syphon).

When installing the backflow and the flow above the lowest edge of the collector field (e. g. above the ridge sheet), please pay attention that the backflow (cold side) will be led to the level of the DrainMaster by a syphon and that it will be piped with a pipe diameter up to the highest point in accordance with the table below.

## Number of collectors - wire cross section [mm]

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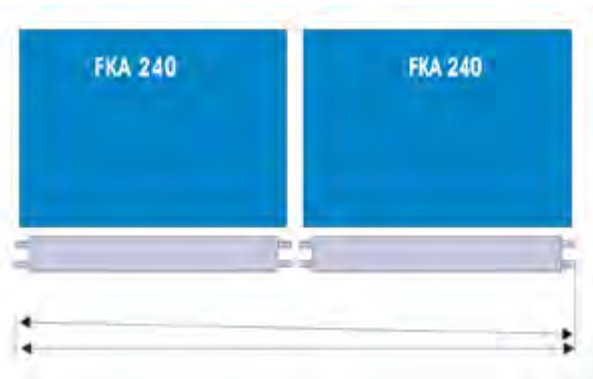
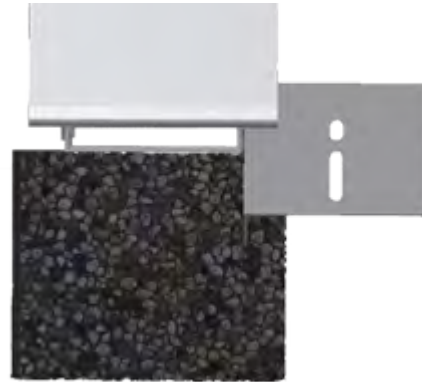




# Installation on bottom supports

## Assembly steps

1. The DrainMaster has to be mounted **after** the assembly of the bottom supports but **prior** to fixing the collectors.
2. Thereto, two assembly brackets are needed for each DrainMaster. In order to fix the bottom supports, the lower screws which are at the front of the consoles have to be loosen and afterwards be fixed with the brackets. The small elongated hole of the brackets has to be the one which is up.
3. The upper elongated hole serves for an additional fixation of the collectors with a onefold rail clip.
4. Afterwards, the brackets for the DrainMaster have to be inserted into the provided rail at the cover of the DrainMaster (2 pieces for each DrainMaster). They then have to be moved so that they come to rest above the assembly brackets and have to be fixed with a screw. When installing the first DrainMaster, they necessarily have to be fixed at the very top in the elongated holes and accordingly be adapted for the following ones.
5. Align the DrainMaster succinctly with the collector ends and fasten it. In doing so, please pay attention that the DrainMaster will be installed with an inclination of 0,1 - 1 %. This means that the connections of flow and backflow are located approx. 1 cm lower than the side on which the extensions will be assembled.
6. Connect the collector field outlet with the DrainMaster inlet (upper screwing, red label).
7. Connect the DrainMaster outlet with the collector flow. Thereto, use the provided cutting ring couplings 90 °. Please pay attention that the cutting ring cuts at least 5 mm from the end of the pipe.
8. Close open connectors which lie opposite the connection side with the provided cutting ring sealing plug (when using extension modules at the end of the assembly line).



## Assembly of the extension modules

The assembly of extension modules happens just as the assembly of the basic modules.

The modules will be coupled with the provided compression fittings. It is necessary to observe that **no counter inclination** emerges.

# Filling of the system

## Attention!

When filling the installation, the solar fluid must not be warmer than 25 °C!

The circulating pump must not be working while filling.

## Filling under cloudy skies

The prepressure of the installation is calculated as follows:

Prepressure in bar = static height in meter / 10 + 0,2

## Filling in sunshine

The prepressure of the installation depends on the temperature of the collector during the filling.

Rule of thumb for the prepressure:

Prepressure in bar = static height in meter / 10 + 0,2 + figure stated below:

For collector temperature of approx. 50 °C + 0,1 bar

For collector temperature of approx. 100 °C + 0,2 bar

For collector temperature of approx. 150 °C + 0,3 bar

For collector temperature of approx. 200 °C + 0,4 bar

## Installation with level indicator

1. Close the shut-off valve in the collector back flow (pressure-side of the pump).

2. Open the filling and draining valve of the safety device.

3. Connect the filling pump at the filling and draining valve at the suction side of the pump. Fill the installation slowly until the probe presents the maximum filling level (when using special controllers, the report „maximum filling level reached“ is going to be shown).

4. Close filling and draining valve and open the shut-off valve (pressure-side of the pump).

5. Slowly fill in the liquid until the probe presents the maximum filling level once again (when using special controllers, the report „maximum filling level reached“ is going to be shown).

6. Now you have to drain the following quantity of liquid:

Quantity A: 0,17 l for each liter of liquid content in the DrainMaster (for 10 l liquid content in the DrainMaster = 1,7 l)

Quantity B: 0,04 times installation content (for 30 l installation content = 1,2 l)

Total draining quantity = quantity A + quantity B (example 1,7 l + 1,2 l = 2,9 l)

7. Close the shut-off valve at the pressure-side of the pump again and fill in quantity A. By doing so the necessary prepressure of the installation can be reached.

8. Now the report of the controller should disappear or the collector temperature should appear. If an error report or the report „filling level reached“ is shown, the installation is overfilled and has to be drained until the report disappears.

9. Open the shut-off valve, close the filling and draining valve and switch on the pump. Check the functionality of the installation and switch over to an automatic operation.

## Installation without level indicator

1. Close the shut-off valve in the collector back flow (pressure-side of the pump).

2. Loosen the upper connection at the DrainMaster.

3. Open the filling and draining valve, connect the filling pump and slowly fill the installation until the DrainMaster is completely filled with liquid.

4. Close filling and draining valve and open the shut-off valve (pressure-side of the pump).

5. Slowly refill the liquid until the DrainMaster is completely completely filled.

6. Now you have to drain the following quantity of liquid:

Quantity A: 0,17 l for each liter of liquid content in the DrainMaster (for 10 l liquid content in the DrainMaster = 1,7 l)

Quantity B: 0,04 times installation content (for 30 l installation content = 1,2 l)

Total draining quantity = quantity A + quantity B (example 1,7 l + 1,2 l = 2,9 l)

7. Tighten the upper connection at the DrainMaster.
8. Close the shut-off valve at the pressure-side of the pump again and fill in quantity A. By doing so the necessary prepressure of the installation can be reached.
9. Open the shut-off valves, close the filling and draining valve and switch on the pump. Check the functionality of the installation and switch over to an automatic operation.

## Frost resistance

We recommend operating the installation with an antifreeze mixture.

In case of damages due to frost, we do not assume no liability.

## General information

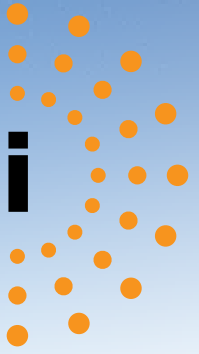
A solar plant should be maintained every year. In doing so, the functionality of all components should be examined, especially the heat transfer medium has to be checked for its quantity and state. When installing a DrainMaster into an already existing installation, it is necessary to pay attention that the heat transfer medium (if it is still all right) can only be refilled with the same type. We recommend to entirely exchange the old medium.

## Fault diagnosis

Identified disorder	Possible cause	Problem solving
Wrong / no temperature indicator	Probe defect	Exchange of the probe by a specialist
	Wrong filling	Repetition of the filling process
Pump is working / no circulation of the medium	Air in the pump	Repetition of the process, venting of the pump
System pressure is too high	Wrong dimensioning	Reexamination of the volume calculation
Installation does not drain	Non-return valves are probably still existing	Removal or blocking of the non-return valves
Installation drains badly or very slowly	Collectors are not piped properly	Examination of the piping considering the draining aspect
	DrainMaster is not assembled properly	Check of the permitted assembly arrangements

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**sti**



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