

# easy-Anlagenplaner

## User Guide

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## 1 About the easy-Anlagenplaner

The easy-Anlagenplaner is used for the hydraulic and safety engineering of solar systems with AkoTec tube collectors. All components necessary for operation, from the pump to the pipeline can be designed.

The easy-Anlagenplaner can only be run on Windows operating systems.

Due to the complexity of solar systems, only the following systems can be calculated with the easy-Anlagenplaner:

- up to 50m<sup>2</sup> collector area
- up to 10 parallel fields
- installations connected to Tichelmann only

For all other systems, please contact us directly.

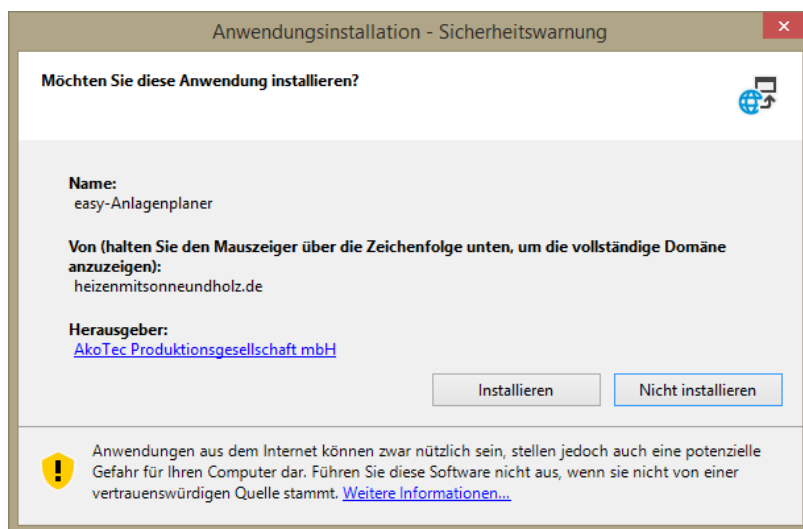
### 1.1 Update

The easy-Anlagenplaner does not update itself automatically. Please visit [akotec.eu](http://akotec.eu) regularly to work always with the latest version. Before reinstalling, please uninstall the old easy system planner via the control panel, category "Programs".

## 2 First steps

### 2.1 Installation

If you received the installation files as a zip archive, unpack all files onto your PC. If you have the easy system planner from an external drive, network or USB stick, first copy all installation files to your PC. Run setup.exe from the installation folder. A security warning will come up, click Install.



### 2.2 Calculating the first system

After the application is started, a standard system is created, in which only the most important data is required. Values that can be changed are framed.

**Tip:** By hovering with the mouse pointer on the individual elements, instructions and explanations for the operation of the program appear.

After entering all required data, the program automatically calculates the system. Any hints for the calculation are given in the lower info window.

Inputs are accepted by the program when the Enter key is pressed, the mouse is clicked on the system layout or in another input box. In the case of incorrect entries, a red frame appears around the corresponding input window.

#### Collector field

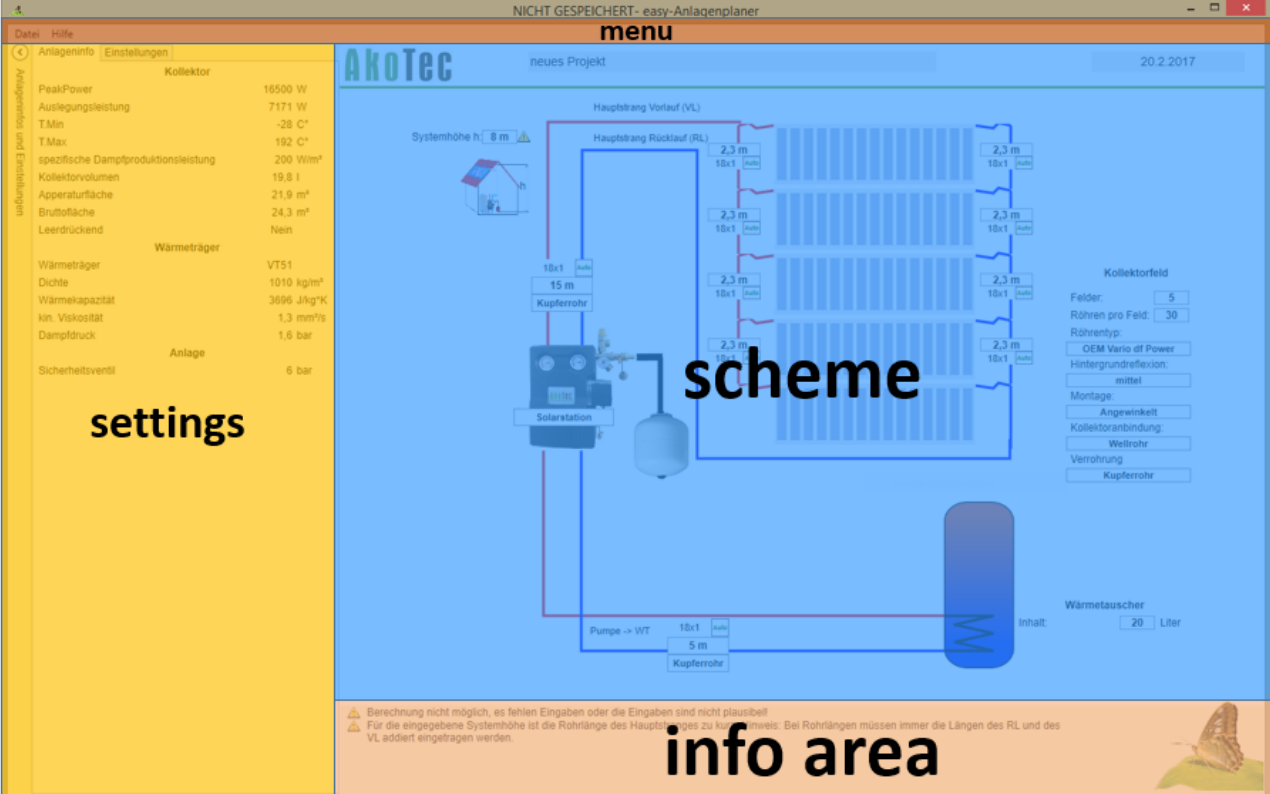
Fields:

Tubes per field:

If you are finished with the layout of the system, you can save the system or print a report.

## 3 Detailed operation

### 3.1 Interface



#### 3.1.1 Menu bar

Here the usual things can be done:

- New
- Open
- Save
- Save as
- Send inquiry
- User Guide
- Print
- Close

#### 3.1.2 Scheme

Here the most important inputs are made and the results are displayed. Depending on the input, the schema will be adapted accordingly.

### 3.1.3 Calculation Info

Here, any information notifications are displayed. These are, for example:

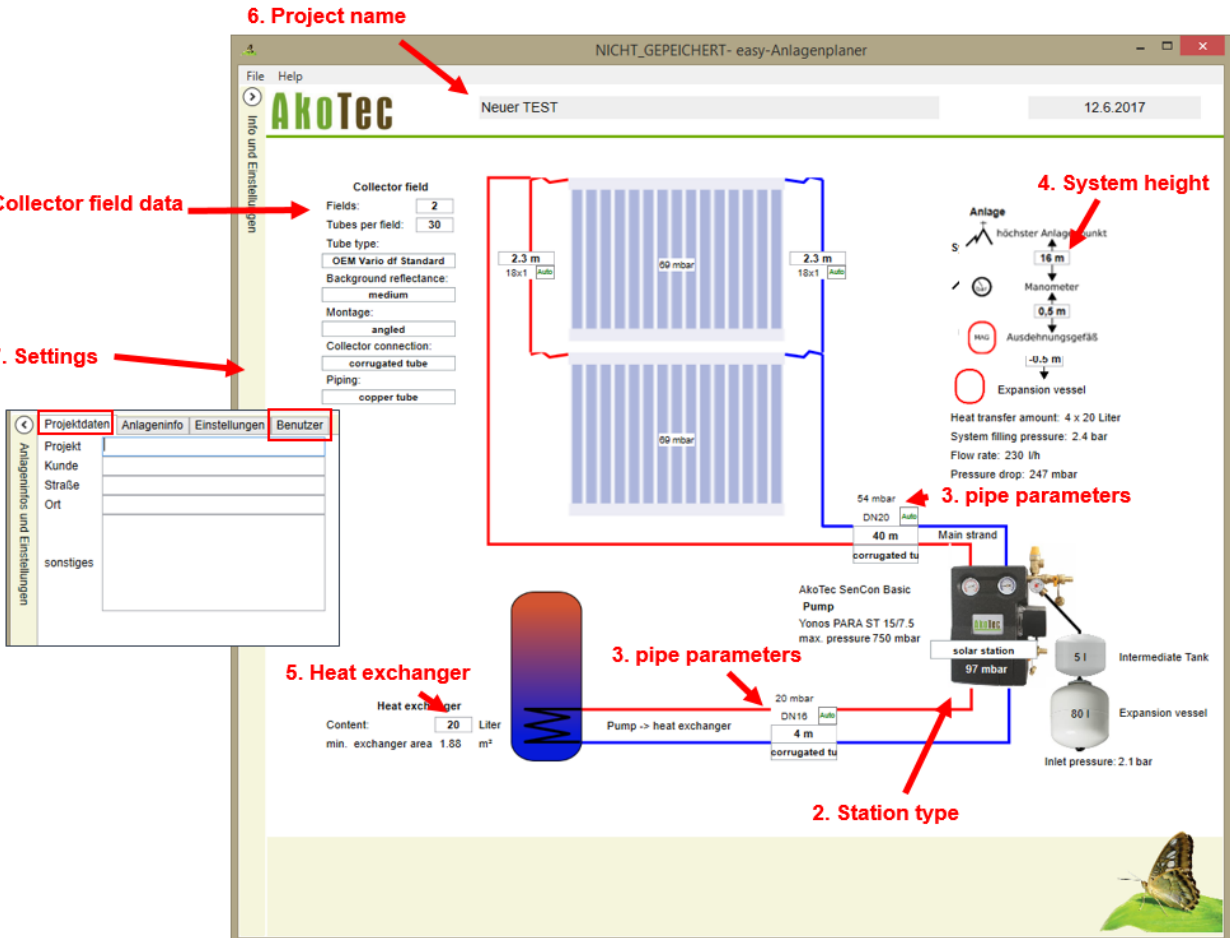
- Pump is to small
- Fluid velocities too large
- Plant for design with the easy-plant planner too large
- ...

If the calculation window is empty, the calculation is Ok!

### 3.1.4 Settings

Here, special system parameters can be viewed and adjustments made to the calculation parameters. You can also enter information about the project and the user. These are required for offer creation and report expressions. This area can be opened and closed by clicking on the green bar at the left edge.

## 3.2 Entries



The screenshot displays the 'easy-Anlagenplaner' software interface for a solar system design. The main window shows a schematic of a solar collector field connected to a pump, solar station, and expansion vessel. The interface includes a menu bar, a toolbar, and a sidebar with tabs for 'Projekt', 'Anlageninfo', 'Einstellungen', and 'Benutzer'. The main area is divided into several sections:

- 1. Collector field data:** A sidebar on the left contains settings for the collector field, including 'Fields: 2', 'Tubes per field: 30', 'Tube type: OEM Vario df Standard', 'Background reflectance: medium', 'Montage: angled', 'Collector connection: corrugated tube', and 'Piping: copper tube'.
- 2. Station type:** A dropdown menu is set to 'solar station'.
- 3. Pipe parameters:** Various pipe segments are labeled with their diameters and lengths, such as 'DN20', '40 m', 'DN16', and '4 m'.
- 4. System height:** A vertical diagram on the right shows the system's elevation, including the 'höchster Anlagepunkt' at 16 m, a 'Manometer' at 0.5 m, and an 'Ausdehnungsgefäß' at -0.5 m.
- 5. Heat exchanger:** A heat exchanger is shown with a 'Content: 20 Liter' and a 'min. exchanger area 1.88 m²'.
- 6. Project name:** The project name 'Neuer TEST' is displayed at the top.
- 7. Settings:** A sidebar on the left contains tabs for 'Projekt', 'Anlageninfo', 'Einstellungen', and 'Benutzer'.

Additional components shown include a 'Pump', 'solar station', 'Intermediate Tank', and 'Expansion vessel'. The interface also displays system parameters such as 'Heat transfer amount: 4 x 20 Liter', 'System filling pressure: 2.4 bar', 'Flow rate: 230 l/h', and 'Pressure drop: 247 mbar'.

### 3.3 Collector field data

#### Fields

In order to realize larger installations, it is necessary to connect same sized collectors parallel. The total number of tubes is then obtained by multiplying the number of tubes per field by the number of parallel fields.

**Attention:** Manual settings for the collector field piping (pipe lengths and pipe dimensions) are overwritten when the field number is changed.

#### Number of tubes entered per field

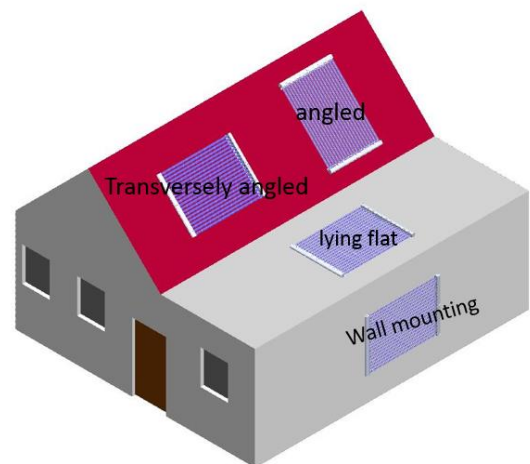
Because of the increasing pressure loss at a critical number of tubes, parallel fields have to be used.

#### Background reflectance:

- High → with a mirror behind the collector
- Medium → white, grey or bright background
- None → dark background

#### Mounting:

- Angled (whenever the collector is mounted diagonally, for example, a saddle roof with a vertical tube direction or free-standing)
- Flat (flat mounting on flat roofs)
- Wall mounting (horizontal tube orientation on walls)
- transversely angled (horizontal alignment of tubes on saddle roofs)



#### Collector connection:

- Corrugated pipe (DN16 corrugated pipe)
- Copper tube (18 mm copper tube)

#### Piping:

In the case of several parallel fields, it is also possible to select how the piping between the individual collectors is to be implemented.

- Corrugated tube
- Copper tube
- Steel tube

#### 3.3.1 Pump Station

- Solar station (when using a buffer tank with solar coil)
- AkoTec smart-e-manager
- Transfer station (When using a buffer tank without integrated heat exchanger)

#### 3.3.2 Pipe Parameters

The pipe parameters can be chosen between the materials corrugated, copper and steel pipes. The dimension is calculated by the program. If you want to specify the dimension, you can switch the pipe diameter from Auto  auf Manuel . To select the dimension depending on the pipe type itself.

#### Main pipe

The material and the length of the main pipe must be entered here. The heat and return pipe length must be added from the solar station to the first T-Piece at the collector field. For example, if you use 10 m twin pipe, you have to enter 20 m.

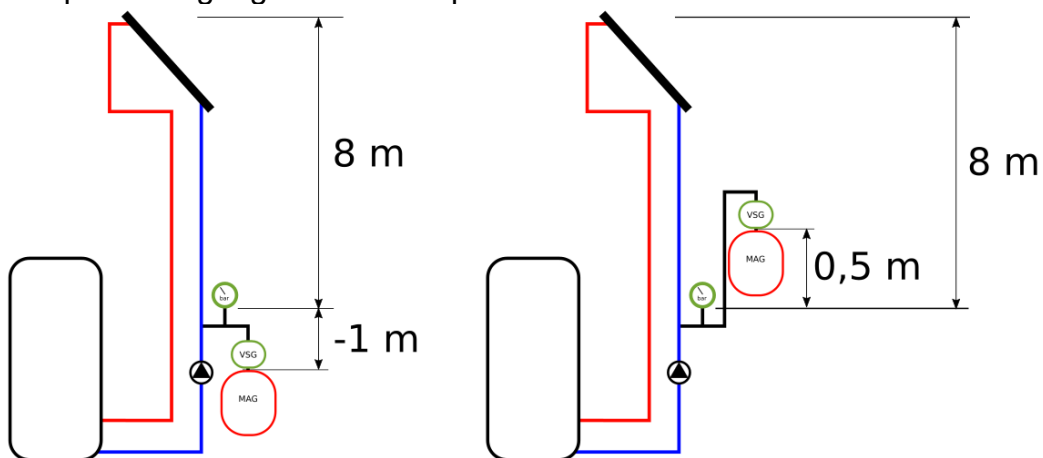
### **pump → heat exchanger**

As in the case of the main pipe, the added forward and return length as well as the material must also be entered here.

**Attention:** If the smart-e manager or a transfer station is selected, this is omitted.

### 3.3.3 System height

Here, the difference in height from the manometer to the highest point of the solar system and the difference in height from the expansion vessel (MAG) to the manometer must be entered. The pressure gauge is the zero point.



A negative height, e.g. The expansion vessel is mounted below the manometer. A positive height means the mounting of the expansion vessel above (figure to the right) of the manometer.

### 3.3.4 Heat exchanger

#### **Content**

The volume of the fluid is to be entered here. Please refer to the relevant data sheet for details.

**Attention:** If a transfer station is selected, this is omitted.

### 3.3.5 Project name

The project name or other comments can be entered here.

### 3.3.6 User an project data

The project data and user information can be entered here. The data is printed on the report.

### 3.3.7 Expert settings

To make changes to the basic settings, the Expert checkbox under Settings must be activated. This should only be carried out by qualified persons.

**Attention:** If the expert mode is deactivated, all settings are reset to the default values.

### **Heat transfer fluid**

Here VT 51 or water can be used as heat carrier.

**Attention:** In regions where frost occurs and a permanent power supply cannot be ensured, frost damage can occur in the system during water operation.

### **Irradiation**

The irradiation on which the system is designed can be defined here. Lower design radiation leads to smaller pipe diameters and smaller system components. In the case of actual higher irradiation, this leads to higher spreads.

### **Safety valve**

Nominal pressure of safety valve.

### **Prevent steam up to**

The required system pressure is selected to be so high that there is no formation of steam up to this temperature.

### **Choose station**

Depending on the station type selected, a specific station can be set here. The program looks in this case only if this is sufficient and does not change it independently.

### **Set intermediate**

Here, the pre-filled volume of the intermediate tank can be set manually.

### **Factor single resistors**

This value is used to multiply the pressure loss of the entire pipeline in order to take the pressure loss of fittings into account. This value can be reduced with long straight pipes.

### **Return temperature collector**

The liquid data are calculated for this temperature.

### **Spreading (delta T)**

Describes the temperature difference between the flow and return of the solar system. Together with the design temperature, the design performance of the collector is also calculated.

### **Min and Max flow rate**

Within these limits the pipe dimensions are selected by the program. Higher speeds lead to smaller lines and higher pressure loss.

### **Dpz0 Pressure surcharge for reading uncertainty**

This pressure surcharge takes into account inaccurate pressure gauges. This pressure surcharge can be reduced with a very accurate pressure gauge.

### **Dpz1 Pressure surcharge for gas losses**

This pressure surcharge takes gas losses into account and provides an additional reserve for liquid losses due to leaks or maintenance.



### 3.3.8 Creating a report

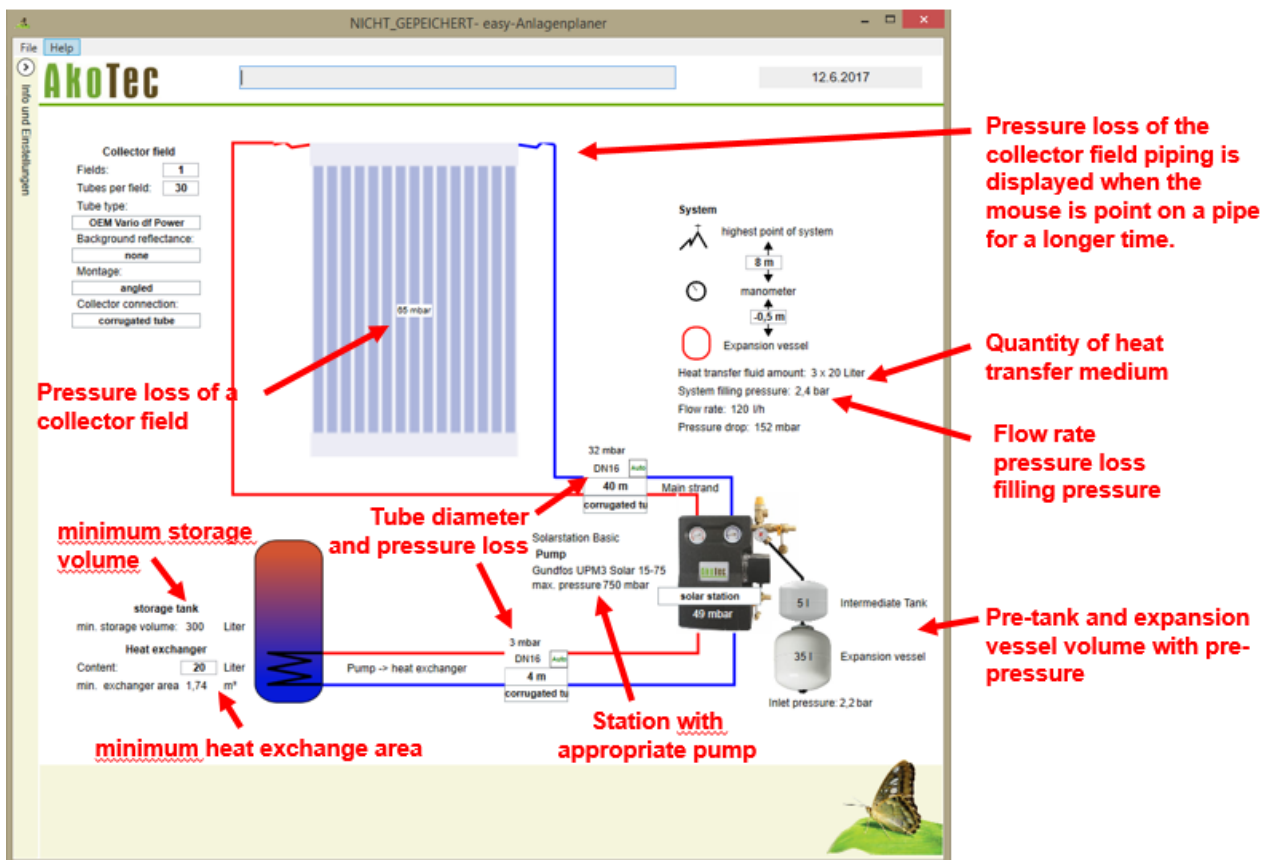
To create a report you should fill in the user details and the project description.

Under Settings, a detailed printout can be activated. The plant values are also printed under Settings with the inputs and results. If you have activated the expert mode, a detailed printout of the program is always carried out.

**Note:** To generate a report as a PDF is an additional program, such as The *Foxit PhantomPDF Printer* or a similar program is necessary.

## 4 Results

All important results are displayed directly in the scheme.



**Note:** Especially in the case of long pipelines, it may be useful to adjust the dimensions of the pipeline manually. A very high pressure loss can occur during long main strand lines.

**Attention:** A yellow exclamation point behind pipes means that the fluid velocity in the corresponding pipe is over 1 m / s.

### 4.1 System info

The system values calculated during the calculation can be viewed under the tab "System info".

#### 4.1.1 Collector

##### PeakPower

Maximum power of the system under optimal conditions

**Design Capacity**

Power at the set operating point (depending on irradiation, collector temperature, outside temperature and angle correction factor)

**T.Min and T.Max**

Minimum and maximum temperatures occurring in the system. Dependent on collector type and heat transfer medium.

**Specific steam production capacity**

Depending on the type of installation and type of collector, different steam production services are produced.

**Collector volume**

Collector content

**Aperture area**

The collector area relevant to energy production, to which the efficiency is also related.

**Gross area**

Total area of the collector

**Pushing empty**

Is set to Yes if the collector is wall or flat mounted. This affects the size of the Pre- and expansion vessel

**4.1.2 Expansion Vessel****Water seal**

Heat carrier fluid which is used to protect the expansion vessel after filling in the vessel.

**Max. steam volume**

The maximum steam volume that can occur during stagnation and must be absorbed by the expansion vessel.

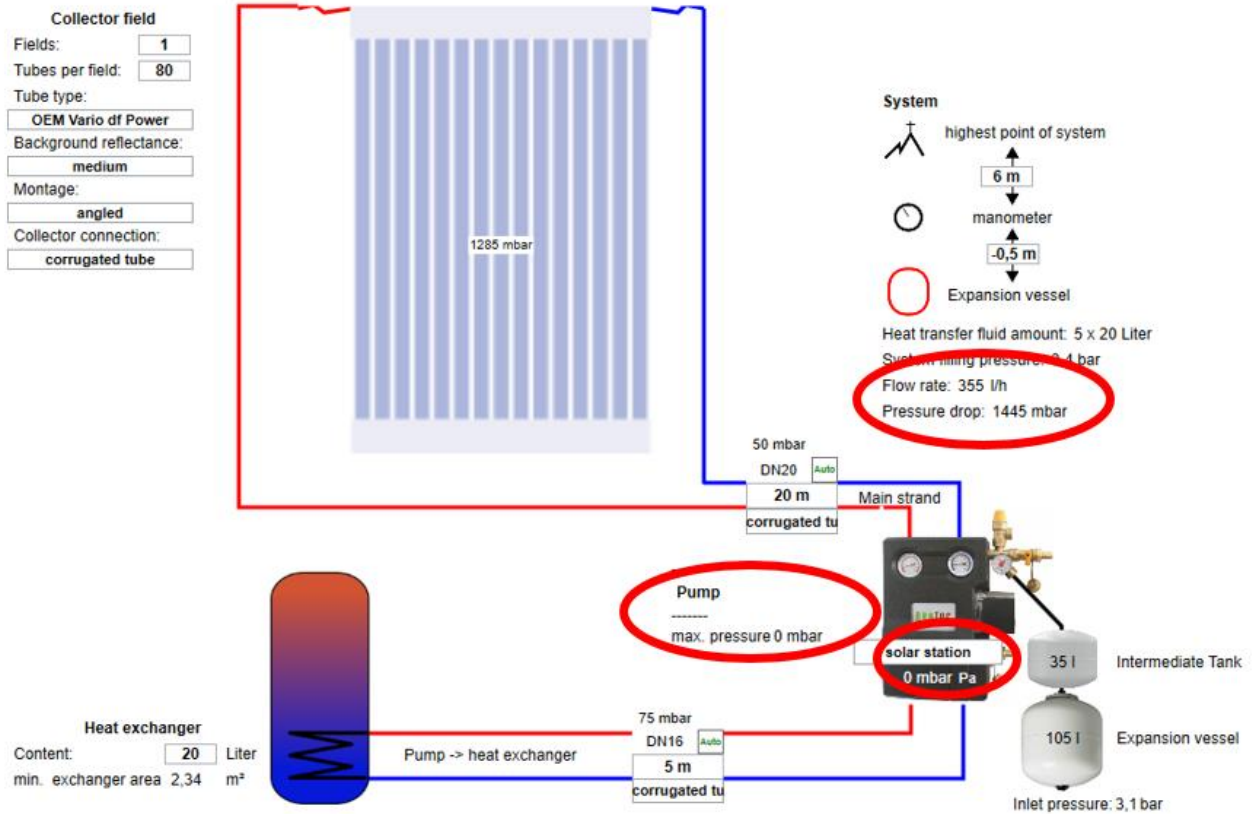
**Volume reserve**

The residual volume available in the expansion vessel during stagnation.

**4.2 Results if no pump is stored in system**

The following figure shows a system to which no suitable pump is stored in the system. Nevertheless, an arbitrary pump can be selected by means of the plant volume flow and the system pressure loss.

**Attention:** In this case the pressure loss of the solar station and the components installed therein, e.g. Gravity brakes, are not included. These pressure losses must also be taken into consideration in the case of independent pump selection.



### 4.3 Interrupted collector fields in series

In the case of separate collector fields in series, the system can be imaged in a sufficiently precise manner if the collectors are indicated as a collector and the length of the connecting line is applied to the main strand length.

