Solarthermieanlagen für Yachten, Wohnmobile und Ferienhäuser

Dieses Handbuch in der Version 4.01. beschreibt das aktuelle Produktrelease; Änderungen, die dem technischen Fortschritt dienen, sind ausdrücklich vorbehalten und werden ohne Ankündigung vorgenommen.

Solar thermal systems for yachts, motor homes and cottages

This manual in version 4.01. describes the current product release; any changes in the interest of technical progress are expressly reserved, and will be made without notice.
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Introduction

Thank you for purchasing our solar thermal system and thus confidence in us. This manual describes the installation and the use of our solar thermal systems for yachts, RVs and vacation homes. Please read before installing and commissioning all chapters carefully. Proper installation of this system is only possible by technically savvy users who are familiar with hot water installations and have the necessary tools. If you have any doubts or uncertainties, please contact us necessarily before. Subsequent recognition of consequential damages due to improper installation is not possible. In particular, you should be aware of the warnings indicated as such, especially with regard to the handling of hot-water pipes and the handling of stainless steel parts.

Safety information

Please observe the following safety instructions:

This symbol indicates special hazards.

This symbol indicates special know electrical hazards.

Please install or operate the system only if you have read and understood all versions of this manual completely. Operating errors or incorrect installations can have serious consequences, which may not be covered by warranty service and / or insured by our product liability.
Checking the delivery

Please compare the delivery note with the delivered items and check the entire shipment, which consists of several packages, necessarily immediately for damage and completeness.

For external damage to document the nature of the damage with the supplier (parcel service, transportation), and reported to us immediately the damage. Damaged parts must be replaced and must not be installed. Missing items must be reported immediately. Please dispose of any packaging, before the system was not properly installed.

Basics of solar thermal installations

With modern solar thermal collectors can now also be in northern latitudes, high efficiency and, consequently, high operating temperature conditions. The sun shines during the day with a power of about 1 kW per square meter. In conjunction with an efficiency of about 80% can be achieved about 800 W peak power with our collectors. Since the collector but on moving objects probably can never be perfectly aligned with the sun, we expect the benefits of 500 W. However, even here, and certainly in the Mediterranean or the Caribbean, will result in some pretty high temperatures. The entire system can therefore not only water or liquid solar heat, but also bring to a boil. Here, the resulting steam to be hotter than 100 ° C.

Furthermore caused by the expansion of the operating medium (usually water), higher pressures in the lines, which must be derived by appropriate measures. The entire installation is therefore safe pressure build what in particular requires the correct and absolutely tight connection of all valves, pipes and fittings. Here must be used with a suitable sealing tape. The individual system components are checked for leaks before handling. Furthermore, it must, if not already present in the on-board installation, a pressure regulator and a pressure equalization tank will be installed.

The installation of high-temperature systems and in particular the installation of stainless steel fittings may only be carried out by skilled craftsmen and installers. Our systems are designed exclusively for use in the private sector. If you want to use our facilities for commercial purposes, the installation must be by a specialist or be carried forward. The jamming and so-called "seizure" of stainless steel connections due to improper installation is not a guarantee.

The solar lines are connected already ordered according to your system at the collector. Please separate neither the connections nor the hose connections at the
The glass surface of the collector is not suitable for entering. The collector must always be inclined in operating mode. The temperatures of the absorber, and thus the water therein, or the heat transfer fluid used can reach well over 100 °C.
Solar pump

- Electronically controlled ball-motor pump, CE certified, voltage range 8-24 V, with integrated reverse polarity and overheating protection and suppression equipment against harmful interference
- The installation may occur only in the three orientations shown; the assembly with the motor housing top is inadmissible
- The preferred mounting orientation is characterized
- The electrical connection to the control electronics by means of the appended lines, which can be renewed indefinitely in accordance with the diameter
- Power 0.25 to 1.9 A @ 12 V; 0.25 to 1.5 A @ 24 V (corresponding to a maximum of 24 W or 36 W)
- Red cable is positive
- In case of temperature, the pump switches off

! The pump must never be used in a dry state in operation, otherwise the bearing may be damaged. The pump must be installed in the inflow to the collector. Please do not adjust the speed controller on the pump motor.

Control electronics

- Differential temperature control with 2 external sensors, 12-15 V DC, reverse polarity protection, 60 mA (corresponding to 1 W max.)
- The sensor cable must not be extended beyond 15 m total length
- Connection to the electrical system only safe power switch, fuse 3 A (pump and electronics)
- The difference in temperature control compares the collector temperature with the boiler temperature
- Sensor 1 is to be connected at the collector, this the sensor wires to the magnetic contact the deck passage connect (polarity does not matter)
- Sensor 2 is on the boiler output (hot water outlet, are usually referred to above and red) to install (via hose clamp attached directly to the output tube)
- After the system is continuously checked whether a minimum collector temperature is reached (= sunshine), and this temperature is greater than the boiler output temperature
- In the presence of both conditions, the solar pump is switched
- The pump can also be turned on by hand (manual control)
The three LEDs indicate the operating status of the controller. Here the importance of the indicators:

- **green LED**: operating voltage on
- **yellow LED**: status display of the sensors
- **red LED**: temperature difference, pump

The control electronics are not waterproof and therefore must remain installed in a protective housing. During operation, the housing must always be closed. A left open for insertion in a dry environment is problematic, however, the housing should not be closed if there might be in moist air. Humidity can be seen getting on a fogged from the inside housing. Remedied by a sheet of kitchen roll, which is removed after one day. The ambient temperature must not exceed, allowing for installation in the engine room should be avoided 40 °C.
### Explanation of Controls and Indicators

<table>
<thead>
<tr>
<th>Switching condition</th>
<th>LED-display</th>
<th>troubleshooting</th>
</tr>
</thead>
<tbody>
<tr>
<td>collector temperature is too low</td>
<td>yellow flashes</td>
<td>align the collector to the sun</td>
</tr>
<tr>
<td>reached collector minimum temperature</td>
<td>yellow off</td>
<td></td>
</tr>
<tr>
<td>temperature difference is too small, that is, Hot water hot enough or collector not hot enough</td>
<td>red flashes</td>
<td>pump only starts when boiler water is colder</td>
</tr>
<tr>
<td>temperature difference is large enough, but collector is not hot enough</td>
<td>red off, yellow flashes</td>
<td>align the collector to the sun</td>
</tr>
<tr>
<td>temperature difference is large enough collector hot plant in operation</td>
<td>red on, yellow off</td>
<td></td>
</tr>
<tr>
<td>operating voltage is applied</td>
<td>green on</td>
<td></td>
</tr>
<tr>
<td>press the key &gt; 0.5 sec, manual control</td>
<td>yellow on, red on, pump on</td>
<td></td>
</tr>
<tr>
<td>Press the key again 0.5 sec</td>
<td>yellow on, red off, pump off</td>
<td></td>
</tr>
<tr>
<td>Press the key again 0.5 sec</td>
<td>yellow off, automatic mode</td>
<td></td>
</tr>
</tbody>
</table>
Optional heat exchanger for additional heating

It is possible to include a heat exchanger as additional heating to the hot water circuit. This can then be used to heat the interior by activating the fan, the heat produced. These heat exchangers are mounted at a suitable location and to the 12 V connected circuit.

- Heat output: 1.8 kW
- Air flow: 120 m³ / h
- Voltage: 12 V / 24 V
- Power consumption: 8.4 W
- Size: 210 x 210 x 125
- Weight: 1.2 kg
Installation on yachts

Yachts usually have the potable water circuit shown below:

With the solar thermal system the potable water circuit is heated directly in the simplest variant. There are also variants for heating the cooling water or boiler with two separate circuits, which are described separately and offer. For this purpose, electrically controlled valves are necessary, so these systems are offered only after having regard to the specific yacht type.
Here is the block diagram of a simple water heating:

The feed water for the solar pump can also be taken directly to the sink or in the pantry, so that one obtains a continuous hot water circuit in the ship.

Before installing a suitable mounting place to look for is the the unhindered erection of the collector allows for one, but disabled for no other necessary paths on board. Suitable roofs of catamarans, yachts roofs of the decline and quarterdeck of the center cockpit yachts.
Then hang up the collector and specify the possible screw points for the hinges. Make sure that the frame can be erected in the operating position. This also the main boom can be attached to the side to avoid shadows and disability during folding up.

Using the collector packaging can be a simple drilling template to be made. These replace the frame and mark the drill holes of the hinges with a screw or the like. Then the final stencil can be used for pre-drilling.

Thereafter, the respective three screw holes may be drilled for the hinges. Here, pay attention to correct pre-drilling and countersinking, the sealing should be done with Sikaflex or similar sealant. If feasible, screws can be used with lock nuts (as you approach comes from behind the holes).

Measures necessary for the use of movable hoses must can be laid without kinks. On the deck passage, make sure that the solar lines can be installed without major detours to the hot water boiler inside the yacht.
When placing the deck passage and attachment of these we can help you with advice and deed. Please contact us in advance before the holes are drilled.
The deck passage must be professionally sealed; this Sikaflex or similar, salt water and UV resistant sealing material shall be used. The hose connections must be sealed very carefully. Before the plate is screwed, the tightness of the system check.

For all seals and screw the supplied Loctite sealing material is to be used - to create several layers around the thread before it is screwed.

Please follow the return from the collector. Always to the input of Deckverschraubung, situated on the magnetic contact So you can install the connectors properly again later.
COOL WATER VORLAUF

HOT WATER RÜCKLAUF
Installation of solar hose connections

Please follow these instructions step by step to ensure the safe operation of the equipment:

• First, after installing the collector on a horizontally module, the flexible hoses screw (90 degree angle). In this route the wires to the outside so that when setting up Do not kink the cables.
• Then insert the probe into the solar module and secure it with the rubber seal cap located on the line.
• The ends of the hoses are put through a SCANSTRUT-deck passage or connected to the optional deck passage; taking care over enough length to move the lines. The fabric cover can be reduced or turned inside any (inside). It can be washed with mild detergent in the machine and serves primarily to protect the insulation against birds that eat away like this.
• The SCANSTRUT-performing summarizes both cables without insulation that needs to be interrupted at this point. The Isolierpad can best be handled in the cooled state (just before in freezer or refrigerator at least place).
• After the deck passage corrugated pipes are connected. For this purpose, first the pipes must be cut to the correct length. Then make the end connections. You will receive either the lengths on a roll and can adjust (taking care over sufficiently large bending radii) so the lines themselves in the correct length, or we will deliver pre-assembled cables (if we know the dimensions before).
• Then replace the nut, insert the retaining ring into the first notch from the end, squeeze and after hanging up the press Help (disc) Screw a pipe socket, aligning the corrugated tube straight down. By the screwing together of the compound results in a seal, the top layer of the corrugated tube is pressed flat. This must be checked!
• If the sealing surface was prepared using the coupling sleeves with loctite sealing tape and sealing rings and connect the corrugated pipes to the adapters of the hoses or the deck passage. Again, pay attention to solid, tight joints.
• After the end of the corrugated pipe insulation thread (20 m). This is most easily done with washing up liquid, which greatly facilitates the threading in conjunction with the included Teflon. One can also use a cable needle threader, thread or 3 m pieces individually. Pull the insulation by using the screw to the deck passage.
• Once the pipes laid, were cut to length and screwed, leak testing can begin (see manual).
• The solar collector sensor must be connected to port 1.
Installation on motorhomes and caravans

The entire system must be securely attached to the vehicle roof; all fittings should be carefully sealed. Since the roofs of mobile homes and travel trailers are mostly very thin, large-area shims must be used to distribute the loads occurring.

The collector may only move to a complete stop of the vehicle and be used. Before each journey, ensure that the collector is completely in the horizontal position (rest position) is folded and locked there.

Installation on vacation and residential buildings

Our systems are suitable for water heating and additional heating in small cottages. Multiple panels can be connected to a system to provide larger homes. Under certain circumstances, bauamtliche insurance and legal requirements must be observed, so that these installations are specialist companies reserved. In any case, water-and wind-resistant roof penetrations shall be installed which are not part of our delivery due to their different designs. The panels meet all requirements and are approved in accordance with our pumps are also available in 230 V versions. In any case, pressure control and speed limiter and expansion tanks must be installed in residential installations. Solar panels should be possible facing south and depending on position at an angle of 45 to 60 degrees installed. The equipment must be connected so that they can be emptied by gravity in the winter. Therefore, the connections shall be installed only from the side, a portrait installation is not permitted. When operating with solar liquids (water-glycol mixture) temperatures may produce more than 200 ° C; this is to ensure adequate contact and fire protection.

We supply for all planned permanent installations the necessary solar lines as isolated double pipe with integrated sensor cable to measure. Note when measuring the lengths necessary that these lines can be installed only in large bending radii and thus must be interpreted accordingly longer. Just use for measuring or garden water hose that is laid without kinks, and can then be measured.
Installation of optional auxiliary heaters

An optional heat exchanger with hot air blowers may be used for additional heating. In particular, in the transition period (spring and autumn), but also in winter in southern regions (Mediterranean), the sunlight of the day can also be used for heating. Furthermore, the heat exchanger can also be operated with warmed water (boiler or by machine). To do this, connect the red positive cable to the switch and then to a suitable fuse (it may have the same security as are used for the solar thermal system, also pressure water pump or the like) to; the black negative cable to ground. The heat exchanger is either integrated in the hot water or cooling water circuit of the machine. Even at about 40 °C water temperature, it works effectively. By switching on the fan, the heater is put into operation.

The fan should be installed because of the operational noise as possible in the base area to ensure the ventilation of the whole room. An air supply from the rear must be ensured; this rich air inlets or ventilation grilles in the area of the heat exchanger.

Although the electrical power consumption of the heat exchanger is very low, the leads must be protected. This suffices to 2 amp fuse in the positive wire or the connector of the fan on board water pump, solar electronics and interior lighting.
Electrical wiring

The control electronics are waterproof installed in a protective housing, but still a reasonably dry location should be chosen, but which is accessible and visible (for adjustments are required and control). The cables may be extended if compliance with the cross-sections, the sensor cables must not be longer than 15 m but each sensor to be. Long cable lengths can be shortened. The sensor 1 is connected to the collector or the magnetic contact on the deck passage, in this case the polarity does not matter. The sensor 2 is installed at the hot water outlet of the boiler using a hose clamp directly on the hot water outlet pipe (always on top, usually in red). So it can detect the temperature of the hot water. Thereafter, the control electronics is connected via a separate switch and a 2.5 amp fuse on the 12 V electrical system. After checking all the connections, the green LED is lit after turning on the power board. Our cables are always marked with red for positive and black or blue for negative.

Here is the assignment of the connections and their labeling:

- **NO**: switch contact, pump plus, red
- **NC**: switching valve connection
- **C**: Plus cable bridge cable 12 V ~
- **-1+**: sensor connections for solar collector or deck passage, regardless of polarity
- **-2+**: Sensor connections for boiler sensor, regardless of polarity
- **12V~**: Board power connector +12 V and ground, bridge to C, pump mass black

Do not start with an empty pump, because it must not run dry. But the pump can be unscrewed to check the function. Therefore also remove the impeller.

The cable connections shall be made only when switched off battery master switch. The basic rules of electrical wiring to protect the power circuits must be observed.
Here the schematic:
Commissioning

After the system has been properly installed and vented, a pressure test is performed first. For yachts and motor homes with direct heating of potable water, turn to the onboard pressure water pump, and vent all the hot and cold water pipes. For this, all outlets may turn up until no more air comes out. Then close all the faucets and wait to see if the pump irregularly short turns on again. This indicates that pressure losses due to leaks. At the latest during heating of the system, these are then also by water leakage visible.

If everything seems tight, bring the collector in the operating position. Make sure that the solar lines do not kink. When sunlight should after turning on the power, the solar pump after a few minutes automatically go into operation. If it does not turn on, proceed as described in the Troubleshooting section.

The time until complete heating of the drinking water is dependent upon several factors:

- size of the boiler
- initial temperature of the boiler
- intensity of sunshine power
- orientation of the collector
- removal of hot water during warm-up
- use the optional auxiliary heater

Winterizing the system

In all areas subject to freezing the entire system must be eingewintert. To do this, use the same antifreeze as when winterizing your drinking water system. Systems with heating of the motor cycle, plants for winter operation on rooftops and systems with a separate boiler circuit are operated with antifreeze or solar fluid (glycol-water mixture) and are at the correct filling and setting frost.

There are basically two ways to winterizing the system:

Separating the collector

To do this, turn the water pressure pump your board supply, disconnect the solar lines from the deck passage and let the collector when erected completely phased out. The solar cables to the deck entry must be flushed with antifreeze. To this may be connected with a connecting piece, and then the entire board electrical system are as before eingewintert; let to the solar pump in manual control mode for a few minutes. After turning off all pumps open the connection to the deck passage and
see if antifreeze has arrived. After all lines as usual, empty and close the deck passage with the covers.

An installed expansion tank must be either emptied or filled with defroster.

Maintaining the collector connection

In this variant, all collector lines must be sufficiently filled with antifreeze. These solar pump and rinse collector for several minutes with antifreeze.

In both variants, it must be ensured that the collector and the solar lines were flushed with sufficient properly mixed antifreeze and then emptied possible.
Care and Maintenance

The entire system requires no maintenance other than regular checks for leaks of all ports and connections. The tube cover can be removed and washed with a standard mild detergent at 30 °C in the machine. The solar glass should be rinsed with fresh water regularly to avoid buildup.

Installation of the expansion vessel

Please follow these instructions step by step to ensure the safe operation of the equipment:
The expansion vessel attached to a suitable point with the mounted valve up and connect with the short reinforced hose and appropriate seals on the water cycle. The manufacturer recommends that vessels up to 25 liters a suspended installation, but also standing work the system and is easier to maintain.

- The cap valve shall be operated with an Allen wrench SW6. Open the valve fully to operate, to turn up with the Allen wrench counterclockwise fully to the left until it stops.
- Against unintentional closing, a sealing wire can be used.
- The drain valve must always be closed, it serves to drain in winter (to the vessel must be reversed). Alternatively, you can fill it with glycol mixture / antifreeze or upright mount.
- The expansion tank should be installed in boiler close with the included 4-distribution (a branch collector return, a branch cold water pipe, a feeder to the boiler, a branch to the expansion vessel).

Installation of the collector connection (if they are leaking or were open)

Please follow these instructions step by step to ensure the safe operation of the equipment:

the collector on the bottom to hang up, or attach even better in the hinges, storing horizontally.
• Remove the collector frame by the 4 Allen screws are removed on the long sides. Caution - the spacers are then loose and could fall overboard!
• Remove the frame up and this necessarily remember or mark the circulation direction.
• The collector is connected with the so-called cutting ring fittings on the piping system. These can easily be removed with a wrench, plus the angular part with a pipe wrench or large key ("English") hold.
• Then move the loosened nut completely towards the collector and make sure that the cutting ring is seated on the copper pipe.
• The elbow press firmly towards the collector and tighten the nut again. That this visible white lubricant is not Remove Anti-Seize seizure of the screw-please!
• The union nut not over tighten, just as far as it goes without violence. Then the copper tube should be reattached securely and tightly to the elbow.
• The frame can stay away until the leak test. Any leaks show up immediately by water leakage, if the connected system is connected to the pressure water pump, the board supply. You can also take a conventional water hose, check connection over ½ inch Gardena connection and complete the other output tightness.
• Slowly and evenly tighten to reattaching the frame, put this back and the 4 Allen screws with the washers. (Not on the glass) button and align these with reference to the holes given on the frame.

Troubleshooting

System will not turn on

This is to check first if the proper voltage is applied (green LED illuminated). Then the system with manual control switch (push button> 0.5 sec, red and yellow LED on). Now the pump is running (and one very slight vibration should be noted when touching the pump, or quietly pumping noise is heard). If the pump does not turn on, check the wiring. Then screw the pump (turn off before pressure water pump, including vessel hold), and check for ease of the impeller.

In case of problems, the system can be switched on permanently by turning the two controllers. The control is done via the power switch of yacht, motor home or house. The controls are preset by us, the position should be marked before. Depending on the installation and ambient conditions or location of the system, a change of control setting may be necessary.

<table>
<thead>
<tr>
<th>Display and state</th>
<th>controller position</th>
</tr>
</thead>
<tbody>
<tr>
<td>yellow flashes, sun shines on the collector, system will not turn on</td>
<td>for setting a lower switch-on provide controller 1 to the left, until the yellow LED goes out</td>
</tr>
<tr>
<td>red flashes, yellow off, collector heat by sunshine</td>
<td>boiler water is still warm enough or warmer than the collector temperature, for varying the differential temperature controller 2 turn to the left until red lights permanently, pump switches</td>
</tr>
</tbody>
</table>

In all other cases with the appropriate meter or voltage tester to check the application of the voltage to the pump.

**No water circulation detectable**

This problem occurs with wrinkles in the tube system or air in the system. For this purpose, the collector upright in the operating position, and the hot water heater to warm (if it a 230 V heater or a machine coupling has). Then the pump in manual control mode switch or set both controls to the left until it is running, and check after a few minutes, whether hot water flows through the collector. If this is not the case, check that connections again for leaks, and repeat the test. Remove any hose kinks before.

**Water is not warm**

First check whether the pump is turned on, the water circulates and no air in the system. The collector must be correct aligned with the sun and brought into working position. After a few minutes of sunshine the water in the circuit should be clearly felt warm. It is best to check the on the deck passage, where the flow is warm. If you also notice any warming must be a problem with the water circulation. Call us for accurate fault location:

Office: +49 33203 71501  
Skype: tomlogisch
Warranty

We take on the entire system and all accessories supplied by us a two-year warranty for exclusive private use. For commercial use, the warranty is reduced to one year, calculated in each case from the date of purchase of the plant.

Under this warranty we provide for defective or improperly functioning parts of the system as part of our discretion, replace or repair them. Requirement is the submission to our office in Kleinmachnow to assertion of warranty. Please call us to call or send us an email:

Office: +49 33203 71501
Skype: tomlogisch
eMail: info@tomlogisch.com

Please don’t send us any systems or parts without notice or unfree!