–weishaupt–

manual

Installation and operating instructions

Solar controller WRSol 1.0

83**258**02 - 1/2008

Conformity Certification to ISO/IEC Guide 22

4800000001

Manufacturer: **Max Weishaupt GmbH**

Address: **Max-Weishaupt-Straße**
D-88475 Schwendi

Product: Solar controller

WRSol 1.0
WRSol 2.0

The product described above conforms to:

Document No. DIN EN 60730-1, -2-9
DIN EN 61000-6-1, -6-3

In accordance with the directives

LVD 2006 / 95 / EC
EMC 2004 / 108 / EC

this product is labelled as follows

CE

Schwendi, 09.07.2008

ppa. Dr. Lück

ppa. Denkinger

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Commissioning log of adjustable parameters
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Your information pack

- You are holding the **operating instructions** of the solar controller.
  Please read these operating instructions carefully. They will help you to fully utilise all functions of the solar controller and to operate your solar installation to its optimum.

- These instructions should be kept with the solar controller.

Explanation of notes and symbols

This symbol is used to mark instructions, which, if not followed, could result in death or serious injury.

This symbol is used to mark instructions, which, if not followed, could result in damage to, or the destruction of the equipment and environmental damage.

Permissible application

The controller is an electronic unit intended for use with hydraulic switching in accordance with manufacturer specifications.
Any other application is not permitted.

Dangers when using the equipment

Weishaupt products are manufactured in accordance with the relevant existing standards and guidelines and the recognised safety laws. However, improper use of the equipment could endanger life of the user or a third party, or result in damage to the plant.

To avoid unnecessary danger, the Weishaupt solar controller (WRSol) should only be used

- for its intended purpose

- in a technically safe, fault free condition

- in compliance with all the information in the installation and operating instructions

Faults, which could affect the safe operation, should be rectified immediately.

Personnel training

Only competent personnel may work on the appliance. Competent personnel according to this operating manual are persons who are familiar with the installation, mounting, setting and commissioning of the product and have the necessary qualifications such as:-

- Training, instruction or authorisation to switch electrical circuits and electrical devices on and off, to earth them and to mark them in accordance with the safety standards.

Informal safety measures

- Observe all information given in the operating instructions.
- Also observe the instructions given in the installation and operating instructions of the collectors.
- In addition to the installation and operating instructions, local codes of practice should also be adhered to. Special attention should be paid to the relevant installation and safety guidelines given.
- All safety and danger notices should be kept in a legible condition.
- Ask the installer to instruct you in the use of the solar controller.

Electrical safety

- Before starting work - isolate plant and protect against reactivation, check voltage is isolated, the unit is earthed, and protected from adjacent equipment that might still be under voltage!
- Work on the electrical supply should be carried out by a qualified electrician.
- Electrical components should be checked during servicing. Loose connections and heat damaged cables should be dealt with immediately.
- Should it be necessary to carry out work on live parts, country specific safety regulations must be observed. A second person should be present to switch off the mains supply in an emergency.

Alterations to the construction of the equipment

- No alterations to the equipment are to be made without the approval of the manufacturer.
  All conversions require written confirmation from Max Weishaupt GmbH.
- Any parts not in perfect working order should be replaced immediately.
- No additional components may be fitted, which have not been tested for use with the equipment.
- Use only -weishaupt- replacement and connection parts.

Settings

- Only settings as stipulated in these operating instructions are permissible. Incorrect settings can damage the solar system.

Guarantee and liability

Weishaupt will not accept liability or meet any guarantee claims for personal injury or damage to property arising as a result of one or more of the causes below:

- Failure to use the equipment as intended.
- Improper assembly, commissioning, operating or servicing of the equipment.
- Failure to follow the information in the installation and operating instructions.
- Alterations made to the construction of the equipment.
- Fitting additional components not tested or approved for use with the equipment.
- Alterations made to the equipment.
- Improperly executed repairs.
- Acts of God.
- Damage caused by continued use despite the occurrence of a fault.
- Use of non-original -weishaupt- spare parts.

2 About the Weishaupt solar controller WRSol 1.0

The Weishaupt solar controller (WRSol) allows easy control of your solar system.

Some characteristics of the WRSol:

- Easy interrogation of **information** about the solar system.
- **Temperature setpoint default**s for DHW and frost protection.
- Easy **reset** to previously set values or to factory settings.
- Recording possible with WRSol recording software.
- Speed controlled solar and/or solid fuel boiler pump.

The WRSol can be used as differential controller for:
- Solar DHW storage tank
- Solar calorifier
- Return temperature maintenance
- Swimming pool
- Solid fuel

Easy operation

Three levels are available to you:

- The **standard display,** in which up to three selected values can be displayed.
- The **selection menu level**, for the selection of one of seven menus from where the sub-menu level can be accessed.
- The **sub-menu level,** where settings for additional solar, return temperature increase, swimming pool and solid fuel functions can be set.

2.1 What does the solar controller do

If programmed correctly, the controller, in conjunction with the relevant hydraulic switching, will ensure that the solar energy available is used correctly and that the need for additional heat exchangers is largely avoided.

General operation of the system is possible once the available hydraulic variation (system type) has been entered. The parameters, control and safety function relevant for the system type selected are preset automatically. This allow immediate operation.

With the potential free contact (MFA output terminals 5 and 6) a fault can be reset, and a burner interlock (exchanger interlock) or a request (exchanger release) can be initiated.

Note: On system variations 15 and 20 the potential free contact (MFA output) acts only as fault output.
Setting on `Multi funct. output :`
9 or 10.

2.2 What you have to observe

Do not switch off the controller
Switching off the controller can damage the solar system, if the system is filled with water. (Frost protection no longer guaranteed).
The controller should only be shut down for the duration of service and repair work.

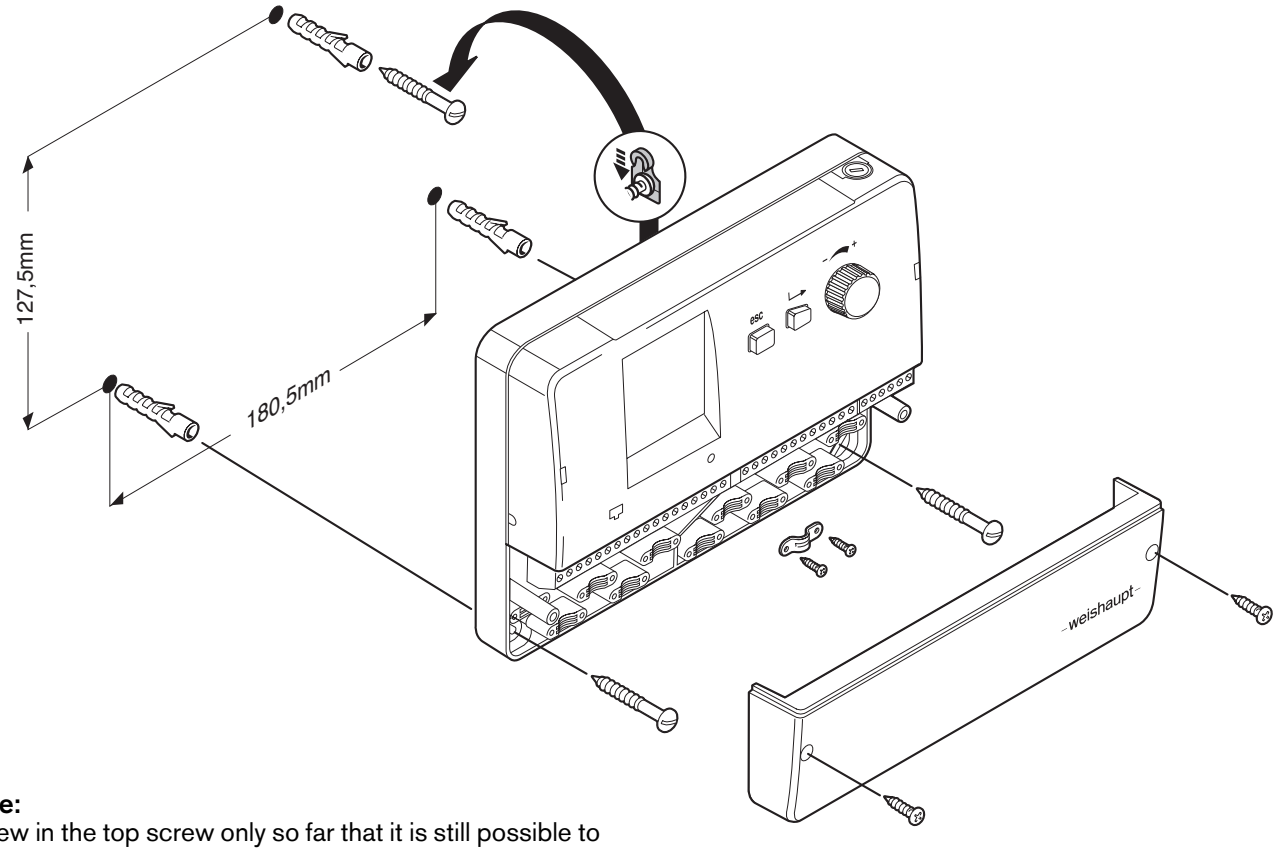
Note: These operating instructions are valid **only** for solar controller type WRSol 1.0 (see name plate).

3.1 Included in delivery

Included in delivery are:
- Controller WRSol 1.0
- Mounting parts for wall mounting
- Traction relief clamps incl. screws
- Collector sensors STF 225
  (4 m, blue cable, -w- No. 660 229)
- Immersion sensor STF 222.2
  (2.5 m, grey cable, -w- No. 660 228)
- Operating instructions WRSol 1.0

Note: The sensors supplied are designed as immersion sensors.
If site conditions require contact sensors, these can be ordered under order No. 660 302.
Contact sensors cannot be used as collector sensors.

3.2 Wall mounted installation



Note:
Screw in the top screw only so far that it is still possible to hook in the controller.

3.3 Commissioning

The WRSol 1.0 is constructed in such a way, that the function of the controller and the type of setting parameters can be set by selecting the relevant hydraulic variation.
Only the selection menus and setting parameters required for the hydraulic variation selected will then be displayed.

All other parameters are blanked out.

Procedure:

1. Select hydraulic variation required.
   ⇨ Ch. 4

2. Carry out electrical connection in accordance with the hydraulic variation selected.
   ⇨ Ch. 3.4

3. Program the controller, if necessary, start with language selection.
   ⇨ Ch. 6.7

4. The the hydraulic variation selected under item one in the controller.
   ⇨ Ch. 6.3

5. Activate overheat protection (recommendation).
   ⇨ Ch. 6.5

6. Select all temperatures and values and check their plausibility.
   ⇨ Ch. 6.2

7. Test and check all outputs in type of operation `Manual` (the pump start of the solar pumps is not possible above collector temperatures of 130°C, not even in manual operation).
   ⇨ Ch. 6.4; Ch. 7.8

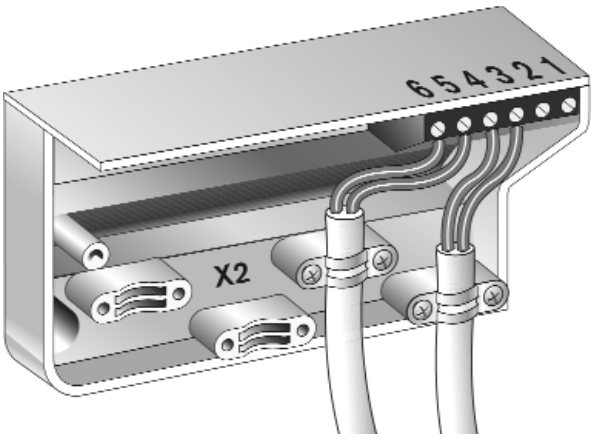
8. The controller is reset to type of operation `Auto`.
   ⇨ Ch. 6.1

9. Complete commissioning log in appendix.

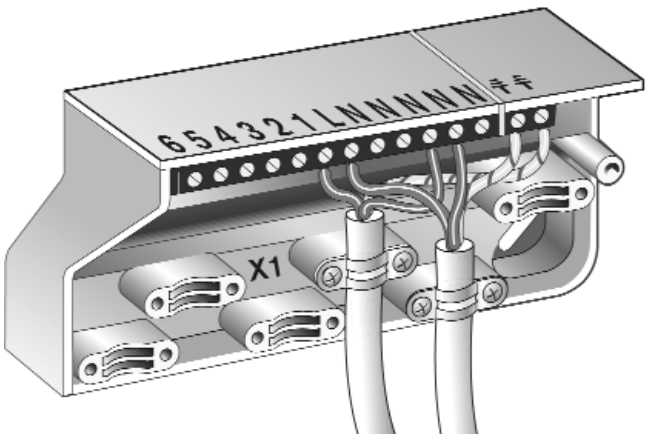
10. Show customer the operation and functions of the controller.

3.4 Electrical connection

Terminal rail left (sensor)



Terminal rail right (outputs / voltage supply)



Connection

- ➪ Remove terminal rail cover.
- ➪ Connect
  - sensor lines,
  - MFA output,
  - pump or change-over valve,
  - voltage supply

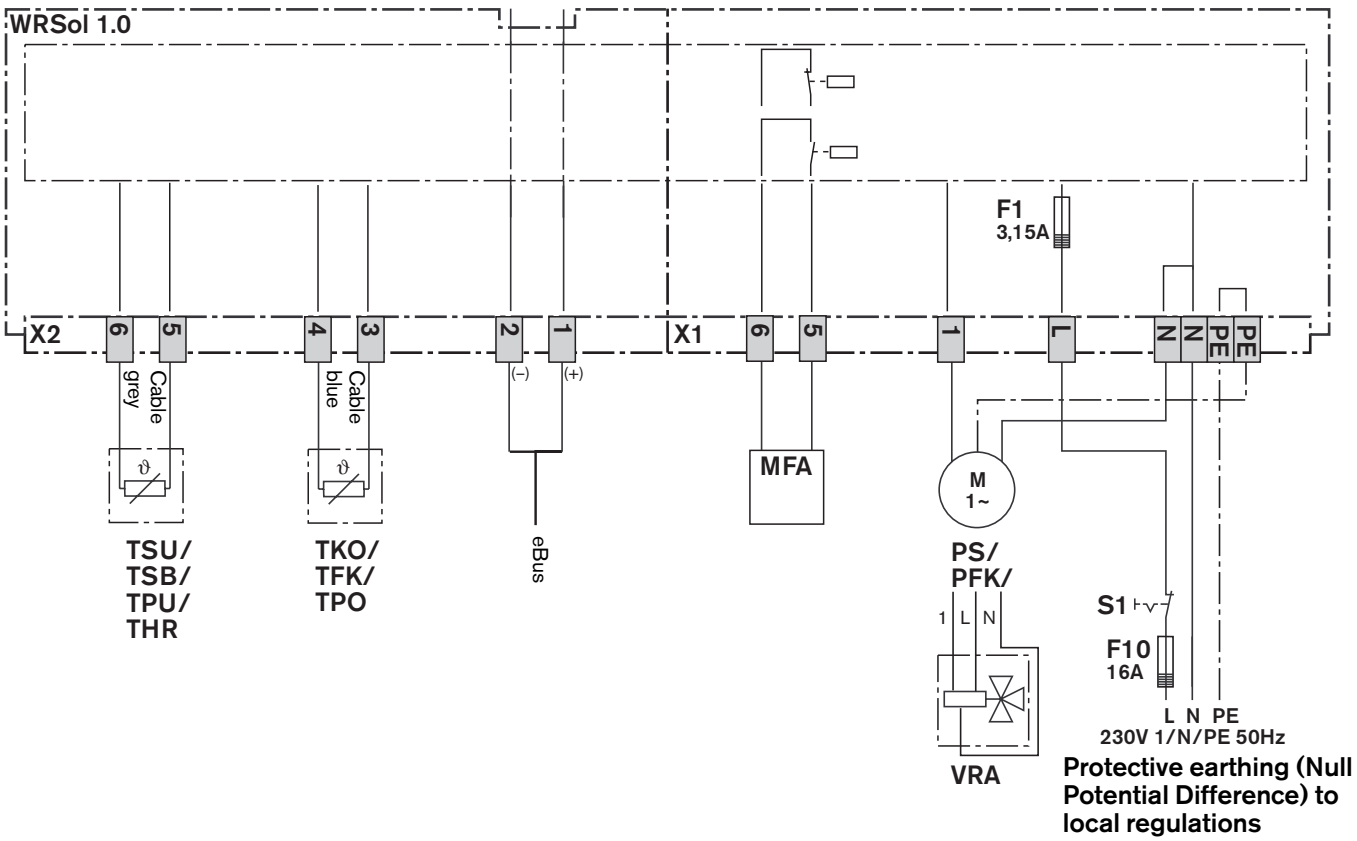
  according to the hydraulic variation installed (Ch. 4).
- ➪ Secure all connected cables with the traction reliefs supplied.
- ➪ Apply voltage, if fault message appears check sensor connection, if necessary adjust hydraulic variation.
- ➪ Refit terminal rail cover once the relevant cable cut-outs have been opened, use screws (traction relief) supplied.

Improper installation or repair attempts can cause life-threatening conditions through electric shock. The installation must only be carried out by an electrician with the relevant qualifications.
The unit and accessories must not be opened. Repairs must only be carried out by the manufacturer.

Voltage surge protection

The sensors connected do not require voltage surge protection.
The flow and return of the solar system must be earthed.

Wiring diagram WRSol 1.0



Legend

TFK Temperature sensor solid fuel boiler (STF 225 -w- 660 229)
THR Temperature sensor heating circuit return (STF 222.2 -w- 660 228)
TKO Temperature sensor collector (STF 225 -w- 660 229)
TPO Temperature sensor calorifier top (STF 225 -w- 660 229)
TPU Temperature sensor calorifier bottom (STF 222.2 -w- 660 228)
TSB Temperature sensor swimming pool (STF 222.2 -w- 660 228)
TSU Temperature sensor storage tank top (STF 222.2 -w- 660 228)
F1 Internal unit fuse 3.15A slow
F10 Pre-fusing max. 16A
S1 **Emergency** switch
PS Pump solar
PFK Pump solid fuel boiler
VRA Valve return temperature increase
MFA Multi-function output (potential free)

Note: The output 1 (PS, PFK and VRA) must have a max. loading of 1 amp. Circuits with higher voltage consumption must be driven by auxiliary relay.

If an auxiliary relay or valve for return temperature increase is connected to output 1 (PS, PFK and VRA), parameter `PS Speed Minimum` must be set to 100%. Additionally, an RFI Suppressor circuit must be connected parallel to terminal 1/N (-w- 701 890).

The internal unit fuse (F1) protects only the outputs. The controller cannot be de-energised via F1.

Input and output assignment of individual hydraulic variations

Hydraulic variation	Sensor terminals				Outputs				
	1/2	3/4	5/6		1/N	2	3	4	5/6
1	eBUS	TKO	TSU		PS	–	–	–	MFA
12	eBUS	TKO	TPU		PS	–	–	–	MFA
15	eBUS	TPO	THR		VRA	–	–	–	MFA
20	eBUS	TKO	TSB		PS	–	–	–	MFA
48	eBUS	TFK	TPU		PFK	–	–	–	MFA

ATTENTION

The following hydraulic variations are simplified schematic drawings, therefore not all components (gravity break, flow meter etc.) are included in the drawing.

4.1 Variation 1

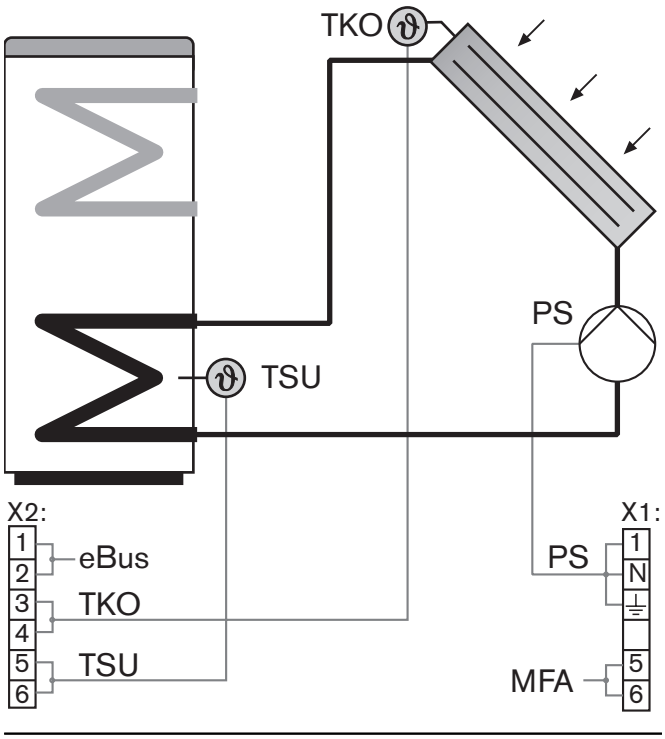
Storage tank with collector and back-up heating influence

The WRSol 1.0 determines the temperature differential between the collector sensor (TKO) and the reference sensor (TSU).

As soon as the temperature differential is greater than the value set (**Storage Diff. On**), the solar pump is switched on and the tank is topped up, until the switch off condition (**Storage Diff. Off**) or the maximum temperature of the storage tank has been reached.

Depending on the average pump speed and the minimum storage tank temperature, the external heat exchanger can be blocked via the potential free Multi-funct. Output (MFA).
In addition an 18 hour block can be activated.

Possible settings MFA output:
0, 1, 2, 7, 8, 9, 10, 11, 12



4.2 Variation 12

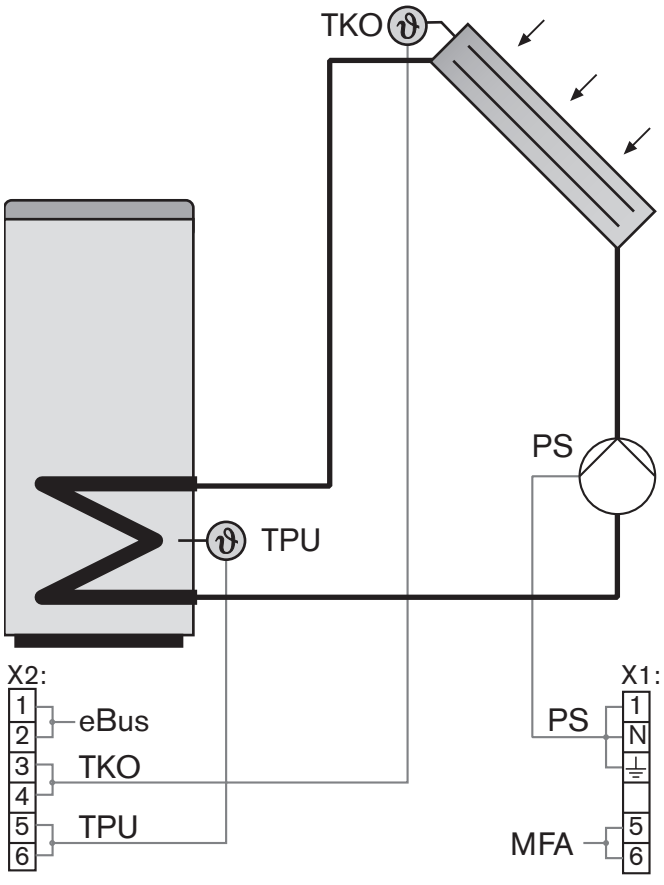
Calorifier tank with collector and back-up heating influence

The WRSol 1.0 determines the temperature differential between the collector sensor (TKO) and the reference sensor (TPU).

As soon as the temperature differential is greater than the value set (**Calorifier Diff. On**), the solar pump is switched on and the tank is topped up, until the switch off condition (**Calorifier Diff. Off**) or the maximum temperature of the storage tank has been reached.

Depending on the average pump speed and the minimum storage tank temperature, the external heat exchanger can be blocked via the potential free Multi-funct. Output (MFA).

Possible settings MFA output:
0, 5, 6, 7, 8, 9, 10, 11, 12



4.3 Variation 15

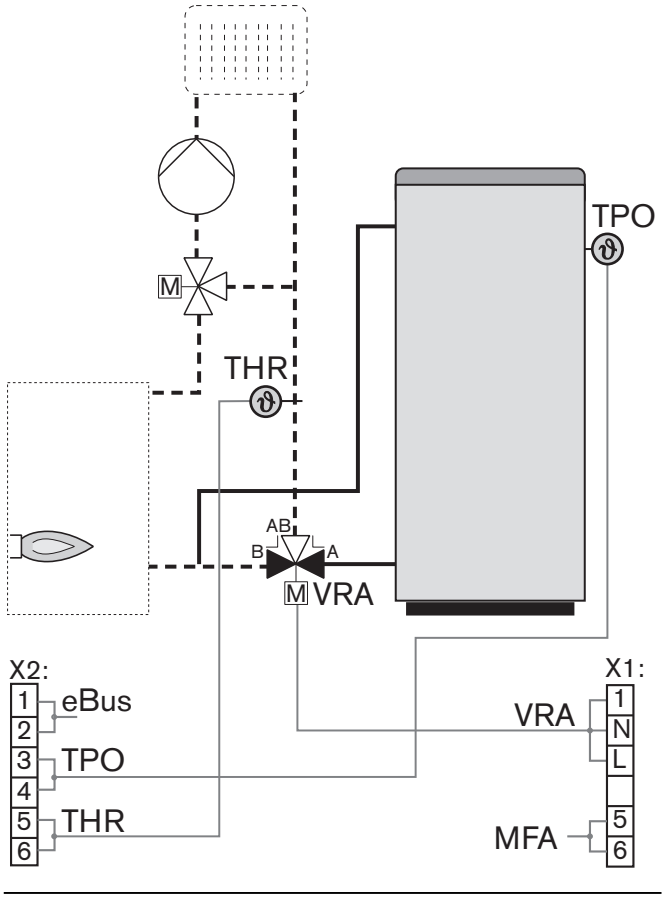
Return temperature increase

The WRSol 1.0 determines the temperature differential between the calorifier sensor (TPO) and the return flow sensor (THR).

As soon as the temperature differential is greater than the value set (**Return flow Diff. On**), the three way valve (VRA) is activated (AB–B) and the available energy from the calorifier is utilised.
If the temperature differential (**Return flow Diff. Off**) falls below the value set, the three way valve (VRA) is de-energised.

Possible settings MFA output:
0, 9, 10, 11, 12

Note: An RFI suppressor must be connected parallel to terminal 1/N on the 3 way change-over valve.
-w- Best.-No. 701 890



4.4 Variation 20

Swimming pool with collector and heat exchanger

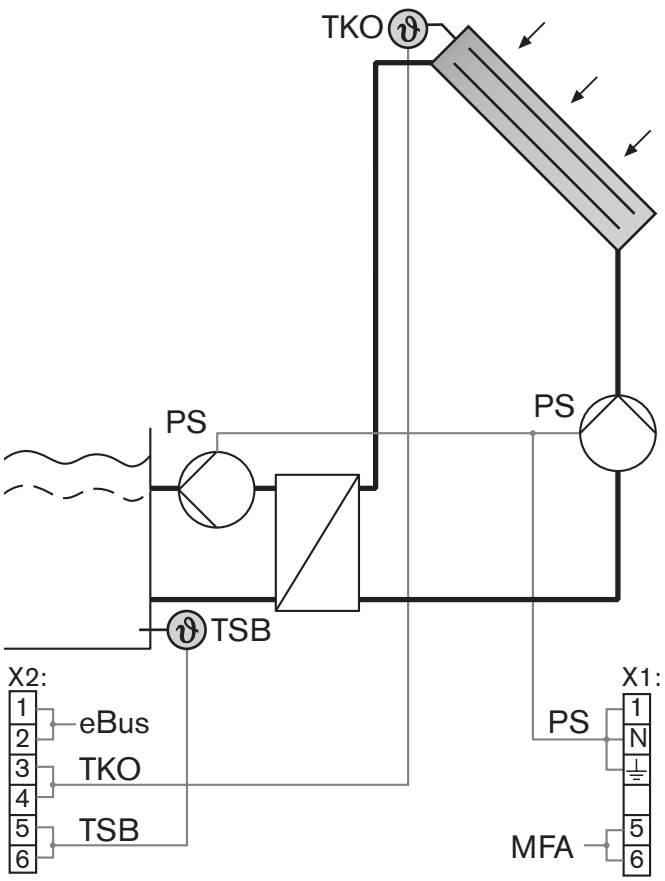
The WRSol 1.0 determines the temperature differential between the collector sensor (TKO) and the reference sensor (TSB).

As soon as the temperature differential is greater than the value set (**Swimming pool Diff. On**), the solar pump is switched on and the swimming pool is topped up by the heat exchanger, until the switch off condition (**Swimming pool Diff. Off**) or the swimming pool setpoint temperature has been reached.

ATTENTION

When connecting both pumps to connection (PS) please observe that both pumps together must not consume more than 1 A voltage, otherwise an auxiliary relay must be installed and the minimum load of the solar pump must be set to 100% (**PS Speed Minimum**).

Possible settings MFA output:
0, 9, 10



4.5 Variation 48

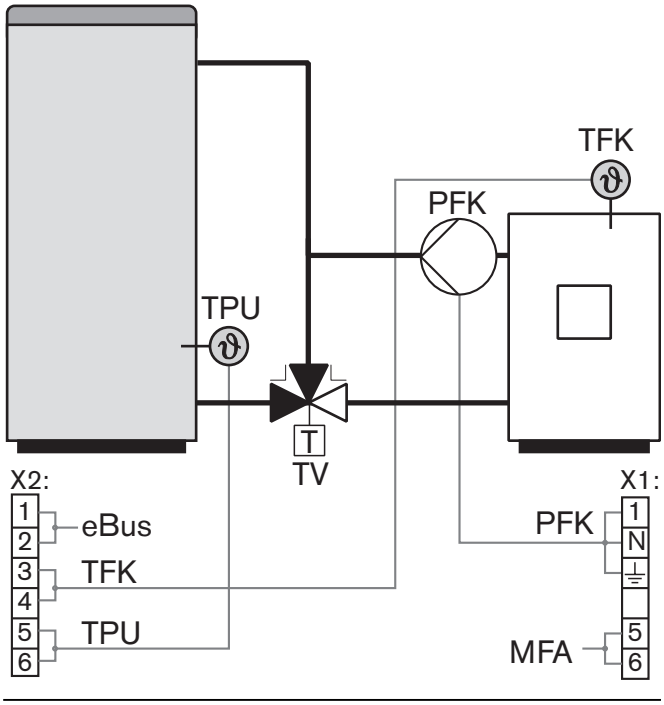
Storage tank supply by solid fuel burner

The WRSol 1.0 compares the solid fuel boiler temperature (TKF) with the reference sensor (TPU).
If the temperature differential determined is greater than the value set (**Solid fuel. Diff. On**) the pump is switched on, if the default minimum temperature (**Solid fuel. Temp. Minimum**) is achieved at the same time.

Once the switch off condition **Solid fuel. Diff. Off** has been reached, the pump is switched off.

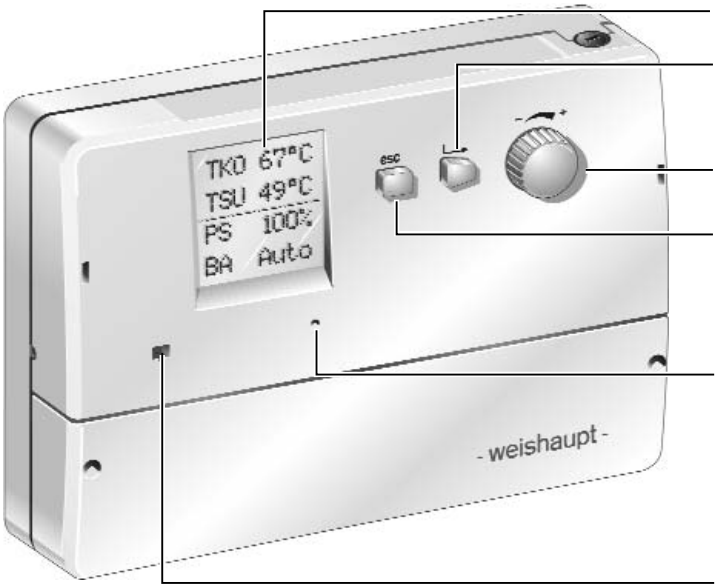
If the solid fuel boiler temperature (TFK) exceeds the **Calorifier Temp. setpoint** and if the calorifier temperature is greater than **Calorifier Temp. setpoint** minus **Diff. Calorifier Minimum**, an interlock or a release signal is generated on the potential free Multi-funct. output MFA.

Possible settings MFA output:
0, 5, 6, 7, 8, 9, 10, 11, 12



5 Operation

5.1 Display and operating elements



LCD display

Enter button
Pressing this button confirms entries and changes.

Dial knob

Escape button
Return to the main display. This key is used to exit settings. Any unsaved entries will be lost. Return by one level at a time.

Reset
By pressing the Reset button, the processor is re-started with the previously set values.
It is not possible to start the factory presettings.
Factory presettings can only be reset under `Select options` with `Set factory presettings`.

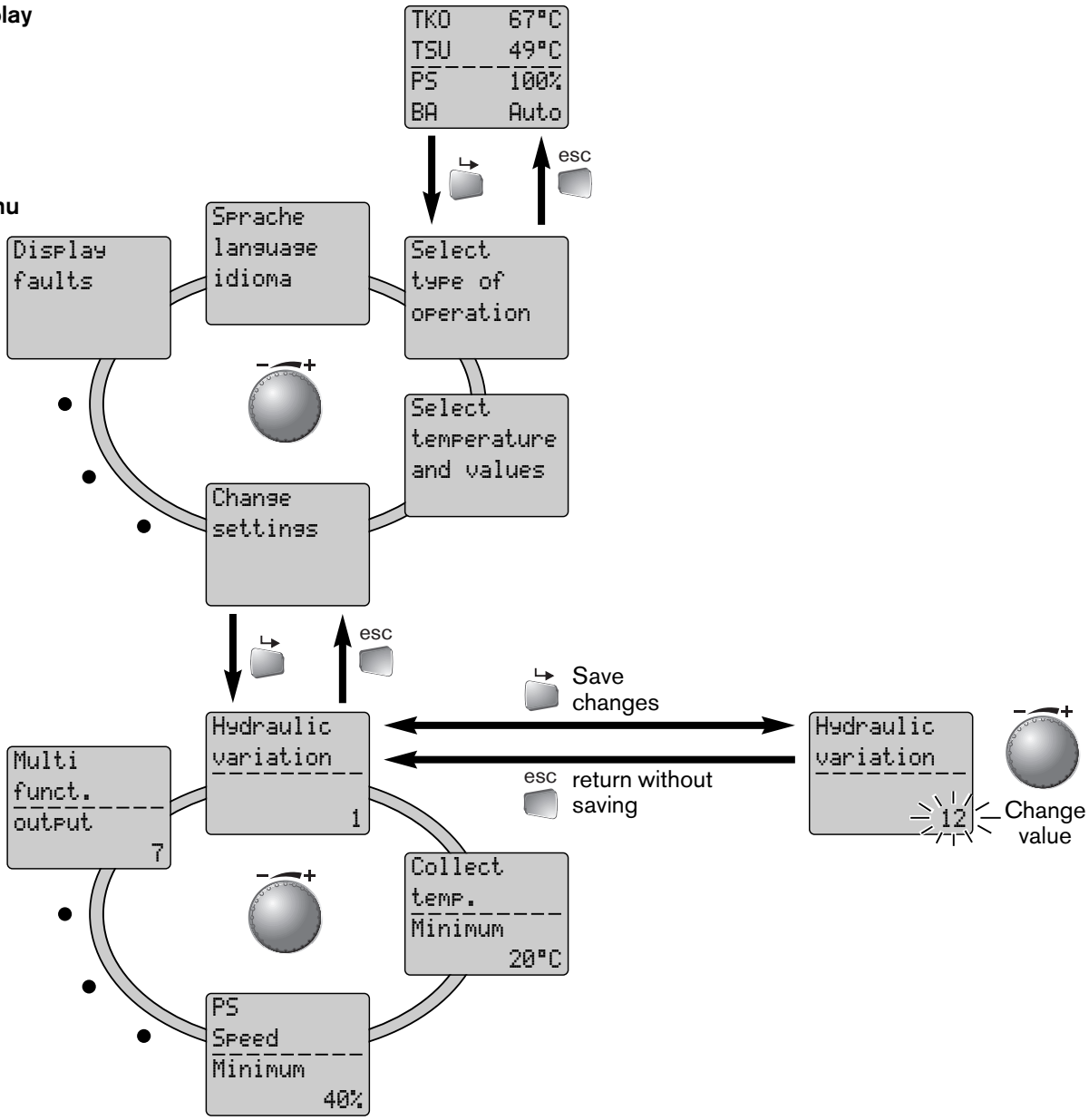
eBus plug socket

5.2 Navigation / Menu structure (change hydraulic variation)

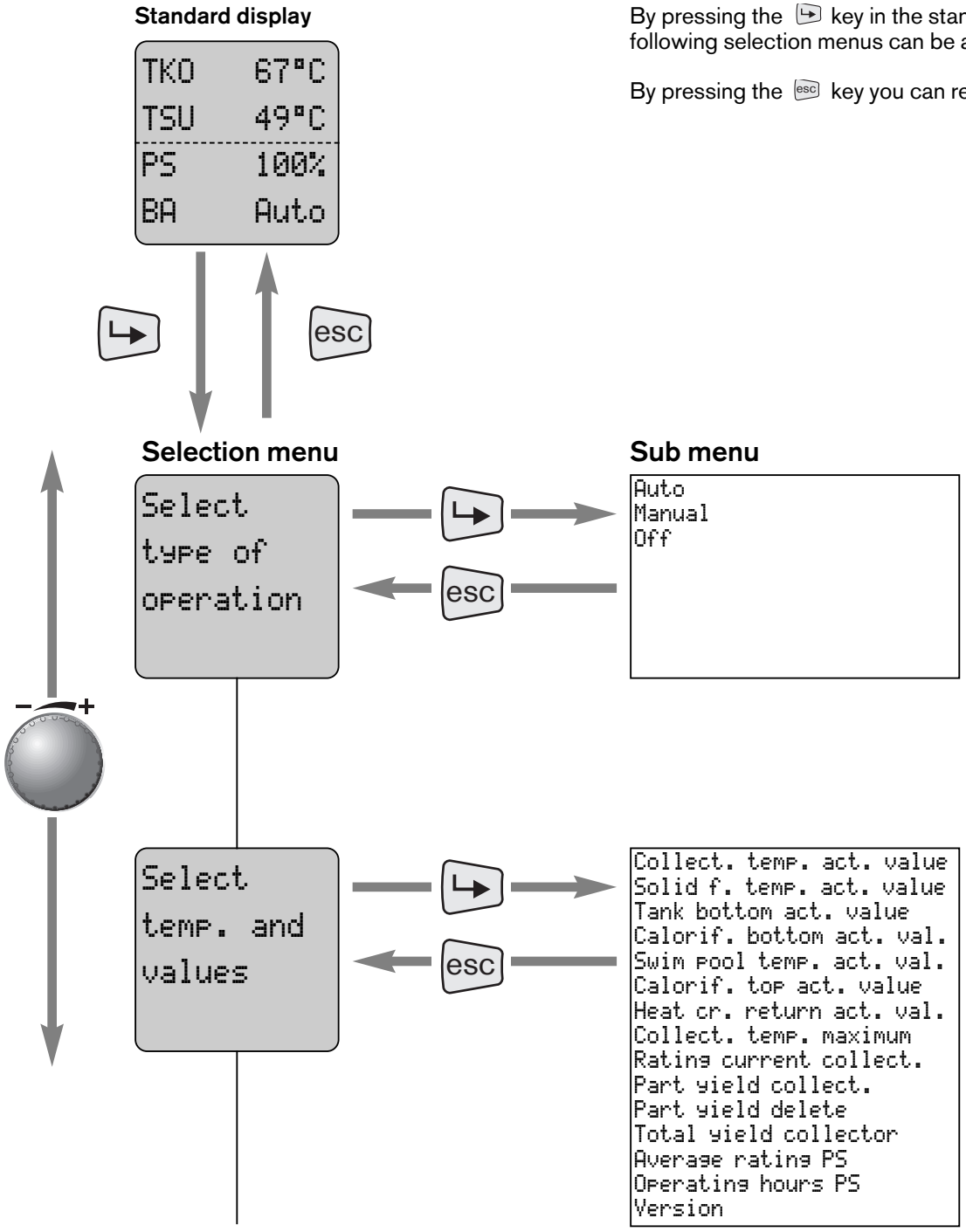
Standard display

Selection menu

Sub menu

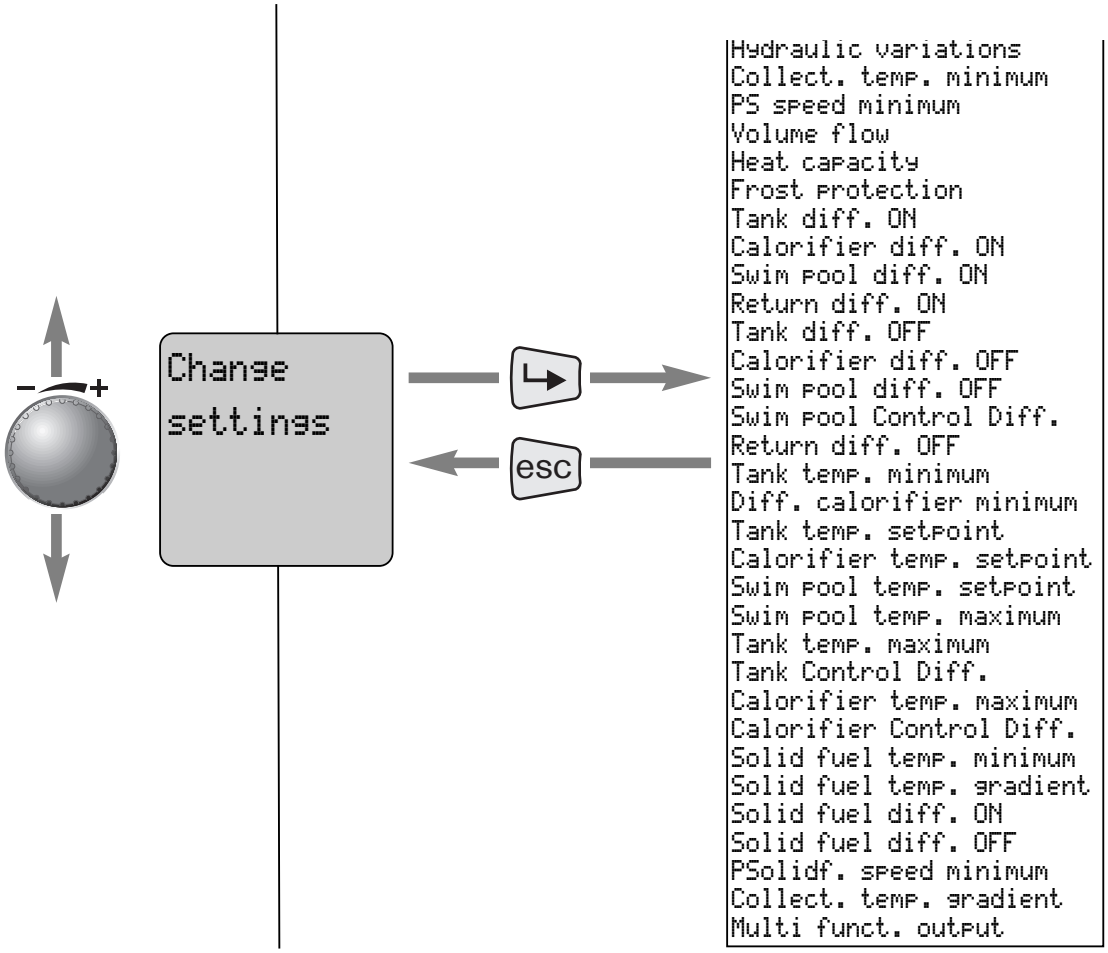


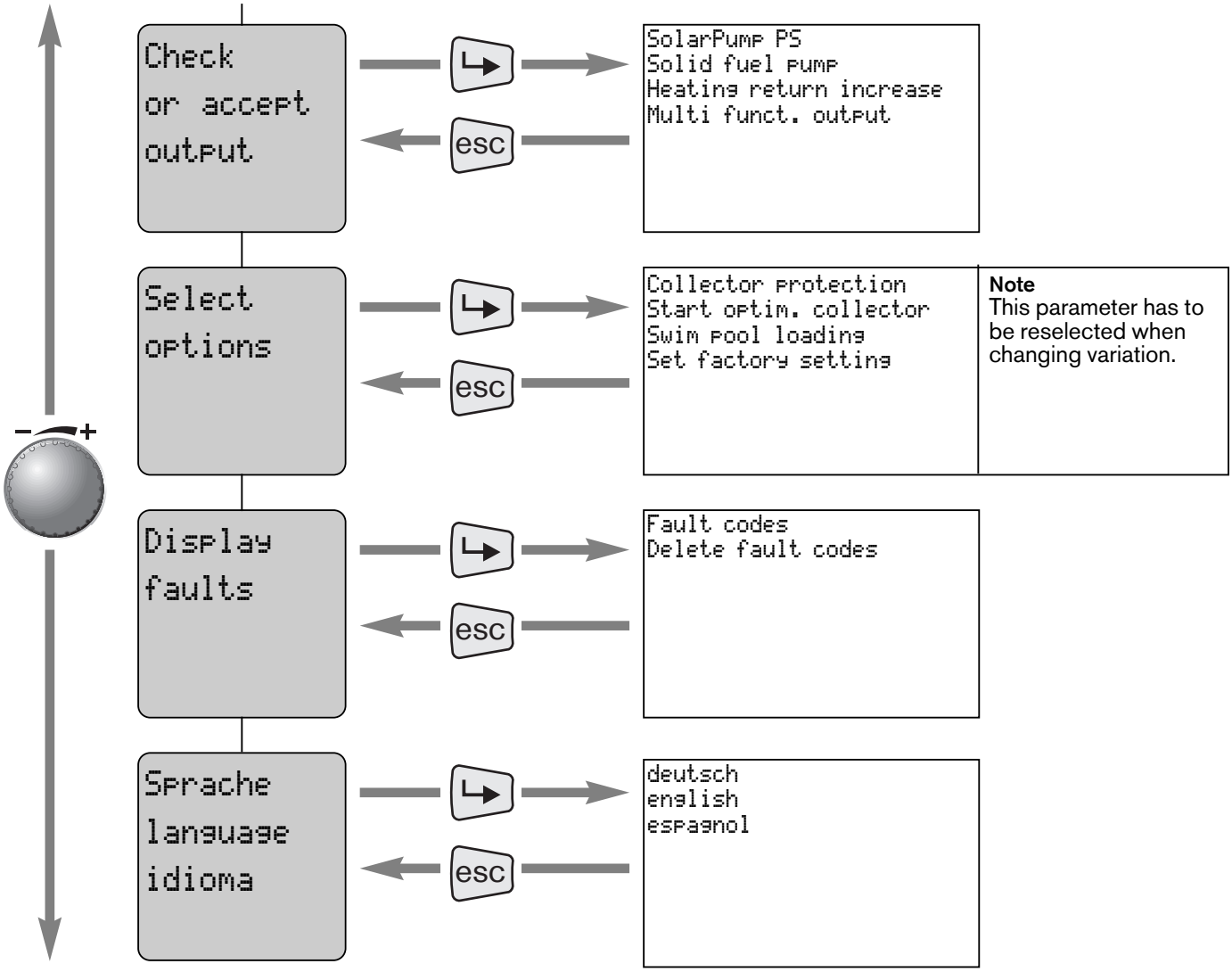
5.3 Where do I find what…



By pressing the ↳ key in the standard menu the following selection menus can be accessed.

By pressing the esc key you can return to the base menu.


Change
settings
esc
Hydraulic variations
Collect. temp. minimum
PS speed minimum
Volume flow
Heat capacity
Frost protection
Tank diff. ON
Calorifier diff. ON
Swim pool diff. ON
Return diff. ON
Tank diff. OFF
Calorifier diff. OFF
Swim pool diff. OFF
Swim pool Control Diff.
Return diff. OFF
Tank temp. minimum
Diff. calorifier minimum
Tank temp. setpoint
Calorifier temp. setpoint
Swim pool temp. setpoint
Swim pool temp. maximum
Tank temp. maximum
Tank Control Diff.
Calorifier temp. maximum
Calorifier Control Diff.
Solid fuel temp. minimum
Solid fuel temp. gradient
Solid fuel diff. ON
Solid fuel diff. OFF
PSolidf. speed minimum
Collect. temp. gradient
Multi funct. output



Note: **Only those parameters, switch conditions and values are shown, which are required for the hydraulic variation selected. Only these can be selected.**

5.4 Display

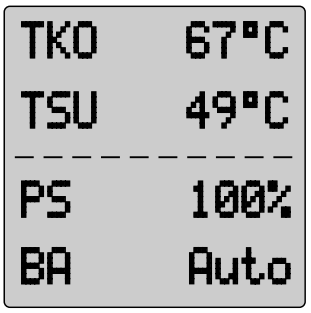
Standard value
The standard display is recognised by its 4 lines with a dotted line in the centre of the display.

In the first three lines of the display, three temperatures, values or switch conditions of the outputs are displayed. The fourth line contains the operation selection switch. If the operation selection switch is set to manual, an arrow flashes to the right and left of **BA Manual**, to indicate an incorrect operating condition.

If another display has been set, the controller automatically returns to the standard display after a *time out* of eight minutes.

Operator defined standard display
The standard display can be set with certain values from the selection groups **Select temp. + values** and **Test or take over outputs**.
New values are entered on line three of the display and the display is pushed up by one line. The value in the first line is therefore lost.

Standard display

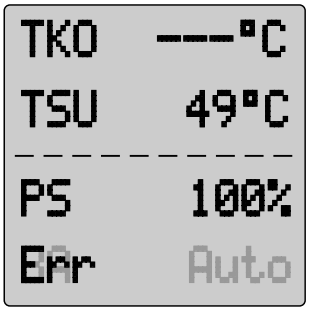


Line 1-3 Display for temperatures, values or switch conditions

Display of type of operation

If an error message is present, line **BA Auto** flashes alternating with **Err** .

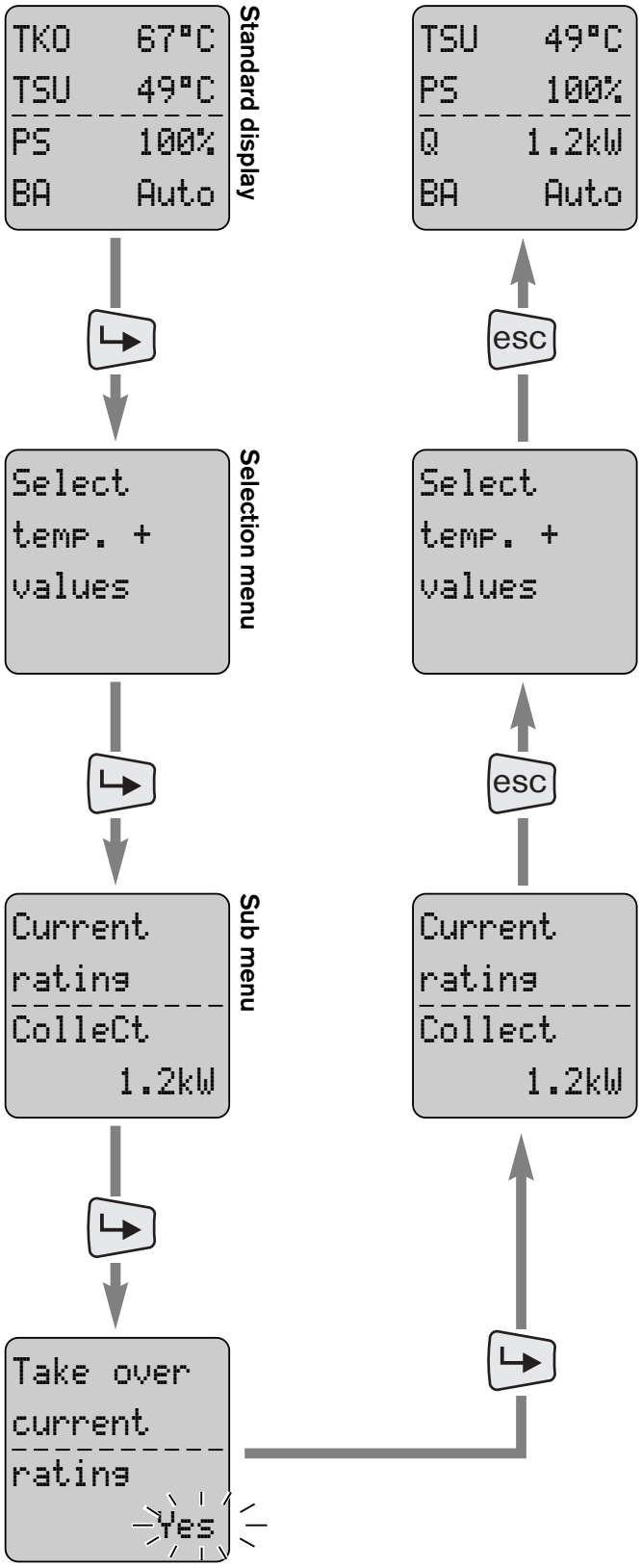
Error message



Display of type of operation

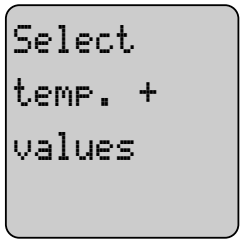
Note: The error code can be viewed in Ch. 6.6.

Changing the standard display



Selection menu
A selection menu only has text and no dotted line. The sub menu is reached by pressing the ↵ , pressing esc means exit, any changes not saved are lost.

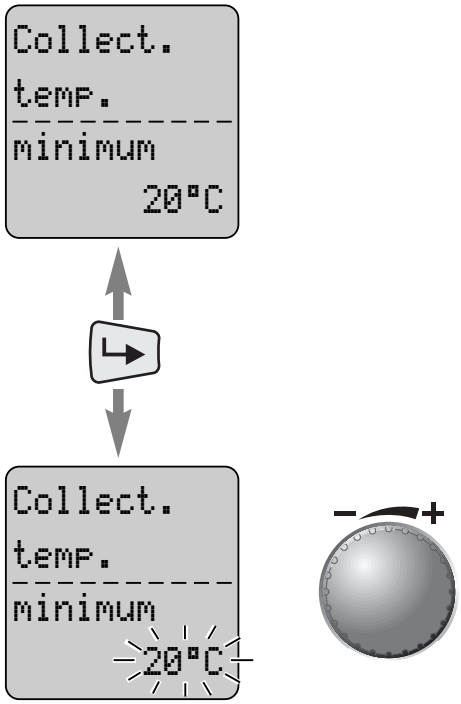
Selection menu



Sub menu
A sub menu has a dotted line in the centre of the display.

By pressing the ↵ the selected parameter for taking over into the standard display can be selected, or made adjustable. The adjustable value flashes.
The change has to be confirmed by pressing the ↵ key to save the new value. If the esc key is pressed the previous value is re-entered.

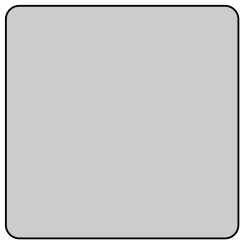
Sub menu



Display does not show standard display
If the display shows the display to the right when voltage is applied, the display is not started correctly. Pressing the reset key re-initialises the display and the standard display is shown.

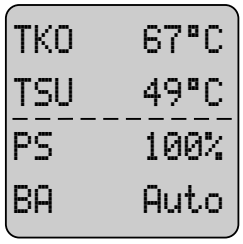
If the standard display does not appear after repeated initialisation the controller should be replaced.

Display not initialised

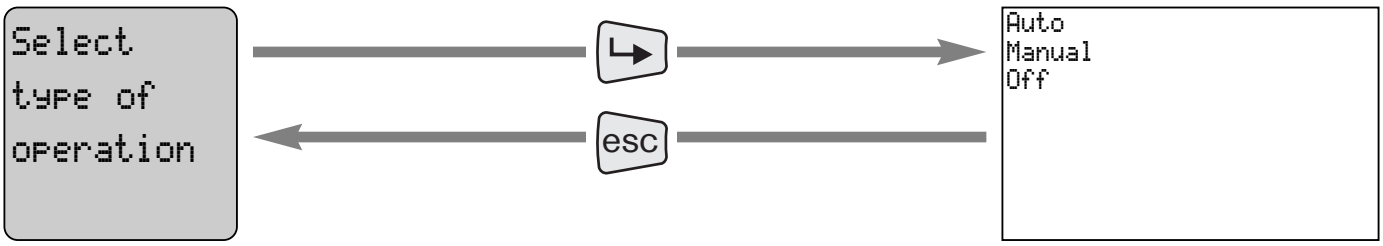


Resetting the display
The display and all parameter are reset to the factory settings by activating the factory presettings in menu Select options.

Standard display



6.1 Select type of operation



Use:
The function of the solar controller can be stipulated using selection menu point **Select type of operation**.

Auto
Automatic operation to the criteria set. From an energy point of view the best type of operation.

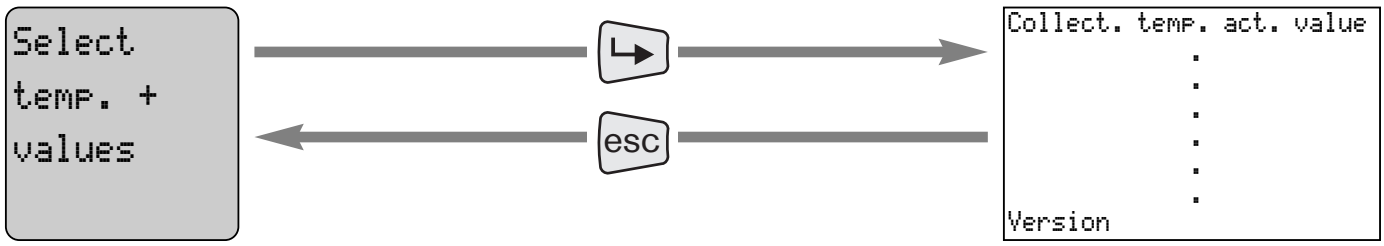
Manual
Use for hydraulic commissioning and adjustment of the solar system.
Output 1 is driven with 100%.
In manual operation, all outputs can be switched on and off, or the speed control can be matched in 10 % steps using Test **or take over outputs**.

Off
The system is now switched off in accordance with the software. The controller continues to carry voltage. Interrupt the voltage supply to the controller prior to carrying out service or repair work.

ATTENTION

No frost protection
In types of operation **Manual** and **Off** the frost protection function is not longer active.

6.2 Select temperatures and values

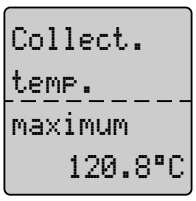


Use:
In this selection menu, temperatures and values can be selected and taken over for the standard display (see Ch. 5.4).

Note: The values, which will be displayed or hidden in the menu, depend on the **Hydraulic variation** currently set under **Change settings**.

ColleCt. temp. act value 77.4°C	Current temperature at collector Variation: 1, 12, 20	Sensor : TKO
Solid fuel temp. act value 59.0°C	Current solid fuel boiler temperature Variation: 48	Sensor : TFK
Tank bottom act value 52.2°C	Current DHW temperature in solar storage tank Variation: 1	Sensor : TSU
Calorifier bottom Act. value 49.9°C	Actual water temperature in calorifier “bottom” Variation: 12, 48	Sensor : TPU
Swim pool temp. act value 23.7°C	Current DHW temperature in swimming pool Variation: 20	Sensor : TSB
Calorifier top act value 45.0°C	Current DHW temperature in calorifier “top” Variation: 15	Sensor : TPO
Heat circ. return act value 30.2°C	Current heating circuit return temperature Variation: 15	Sensor : THR

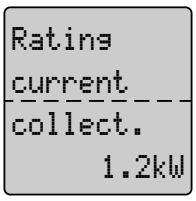
Select temperatures and values continued



Value indicator which shows the highest daily collector temperature.

Variation: 1, 12, 20

Reset : Automatic after internal 24 hour countdown and when pressing reset.



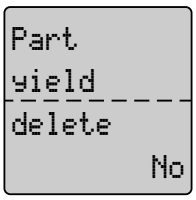
Current rating of collector in kW

Variation: 1, 12,20

Summation of collector yield in kWh since last reset.

Variation: 1, 12, 20

Reset : by **Part yield delete**



Reset summarised collector yield

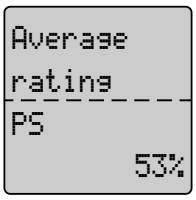
Variation: 1, 12, 20

Press ↵ key to delete and select Yes with dial knob, than re-confirm with ↵ key.

Summation of collector yield in MWh since controller commissioning.

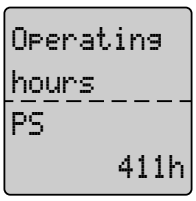
Variation: 1, 12, 20

Note: This value cannot be reset.



Average pump speed during the operating phase, is used as one of the guide sizes for the control of the MFA outputs.

Variation: 1, 12, 20



Operating hours of solar pump since initial commissioning.

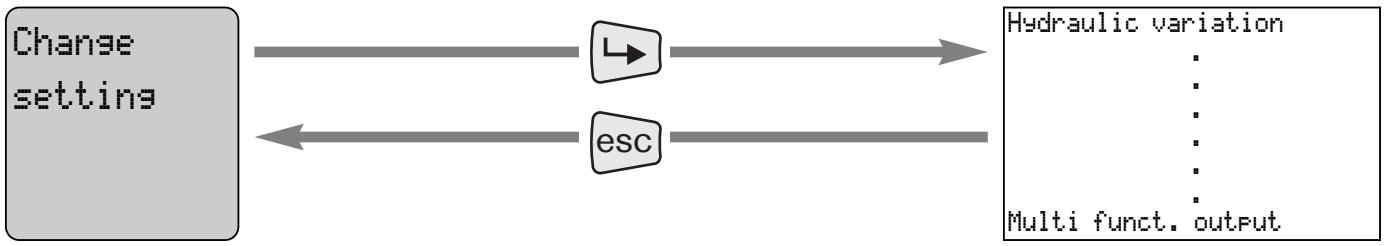
Variation: 1, 12, 20

Note: This value cannot be reset

Display of Software Version

Variation: 1, 12, 15, 20, 48

6.3 Change setting



Use:
This selection menu is used to carry out site specific settings (preferably by a heating engineer).

Note: Only the settings stored for the hydraulic variation selected are displayed in the menu. Settings without function in the selected variation are not shown.

Hydraulic variation
1

Selection of the system procedure required. Depending on variation the relevant displays are generated. Hydraulic variations see Ch. 4

Variation: 1, 12, 15, 20, 48

Presetting: 1

Note: If the variation is changed, all setting parameters must be checked and adjusted if necessary.

Collect. temp.
minimum
20.0°C

Minimum collector temperature which must be achieved before the solar pump is switched on.

Variation: 1, 12, 20

Setting range: 0°C…70°C

Presetting: 20°C

PS speed
minimum
40%

Lowest limit value of modulation range of solar pump.

Variation: 1, 12, 20

Setting range: 10%…100%

Presetting: 40%

(A minimum of 30% should be maintained, otherwise the gravity breaks of the hydraulic assembly will close)

Volume flow
1.5l/m

Set value or taken value at the track regulating valve, at 100% pump rating (see Ch. 7.8).

Variation: 1, 12, 20

Setting range: 0.1…500.0 l/m (litre/minute)

Presetting: 1.5 l/m

Heat capacity
kJ/lK
3.73

The factor depends on the type and mixing ratio of the heat transfer fluid

This factor is used to calculate the energy yield.

Variation: 1, 12, 20

Setting range: 0.01…10.0 kJ/lK

Presetting: 3.73 kJ/lK (at 50°C)

Frost protection
-20.0°C

The solar pump switches on when the collector sensor value has reached the set value.
The pump switches off when the value is exceeded by 3 K (hysteresis).

Hysteresis: 3 K (cannot be altered)

Variation: 1, 12,20

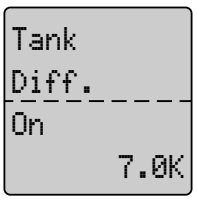
Setting range: −50°C…−41°C ; frost protect. deact.
−40°C…+20°C ; frost protect. active

Presetting: −50°C

Attention: With variation 20 frost protection should not be set below 5°C or if suitable collector fluid is used, frost protection should be deactivated to protect the heat exchanger.

Note: If the sensor is interrupted, the pump is driven with PS Speed Minimum if frost protection temperature is set to > −40°C.

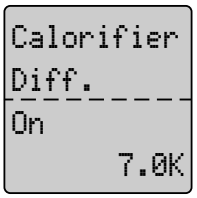
Change setting continued



Temperature differential between collector sensor (TKO) and storage tank sensor (TSU) as switch on criteria for the solar pump.

Setting range: 0 K…40 K
Presetting: 7.0 K

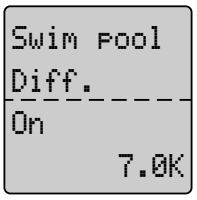
Variation: 1



Temperature differential between collector sensor (TKO) and calorifier sensor (TPU) as switch on criteria for the solar pump.

Setting range: 0 K…40 K
Presetting: 7.0 K

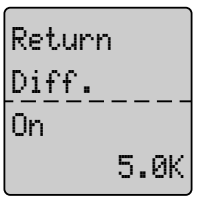
Variation: 12



Temperature differential between collector sensor (TKO) and swimming pool sensor (TSB) as switch on criteria for solar pump.

Setting range: 0 K…40 K
Presetting: 7.0 K

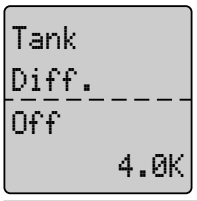
Variation: 20



Temperature differential between return sensor (THR) and calorifier sensor “top” (TPO), at which the three way valve (VRA) is energised.

Setting range: 0 K…40 K
Presetting: 5.0 K

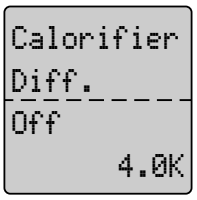
Variation: 15



Temperature differential between collector sensor (TKO) and storage tank sensor (TSU) as switch off criteria for the solar pump.

Setting range: 0 K…40 K
Presetting: 4.0 K

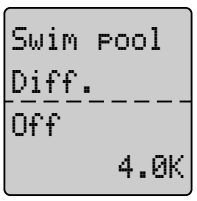
Variation: 1



Temperature differential between collector sensor (TKO) and calorifier sensor (TPU) as switch off criteria for the solar pump.

Setting range: 0 K…40 K
Presetting: 4.0 K

Variation: 12



Temperature differential between collector sensor (TKO) and swim pool sensor (TSB) as switch off criteria for the solar pump.

Setting range: 0 K…40 K
Presetting: 4.0 K

Variation: 20

The pump speed control tries to keep the collector temperature higher than the temperature at the sensor TSB by the control differential set

Setting range: 0 K…40 K
Presetting: 15 K

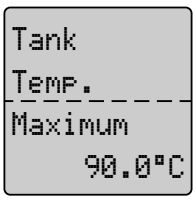
Variation: 20

Note: **Diff. OFF** is a size which can be used to factor ratings losses.

Change setting continued

Return Diff. Off 2.0K	Temperature differential between return sensor (THR) and calorifier sensor "top" (TPO), at which the three way valve (VRA) is de-energised. Variation: 15	Setting range: Presetting:	0 K…40 K 2.0 K
Tank Temp. Minimum 40.0°C	Release level for external heating appliance via MFA contact. Variation: 1	Setting range: Pre-setting:	0°C…70°C 40°C
Diff. calorifier Minimum 15.0K	When the average pump speed reaches 50% the calorifier Temp. Setpoint is reduced by this amount. Example: 60°C – 15K = 45°C When the calorifier actual temperature reaches the reduced value (45°C), the MFA contact is activated.	Variation: 12 Setting rnage: Presetting:	0K…40K 15K
Tank temp. Setpoint 55.0°C	Switch signal level for external heating appliance (18hrs.), only possible on hot water storage tank . Variation: 1	Setting range: Presetting:	0°C…70°C 55°C
Calorifier temp. Setpoint 70.0°C	Switch signal level for external heating appliance or for calorifier load pump. Variation: 12,48	Setting range: Presetting:	0°C…90°C 70°C
Swim pool temp. Setpoint 30°C	Swimming pool temp. setpoint initiates the shutdown of swimming pool loading. Variation: 20	Setting range: Presetting:	0°C…90°C 30°C
Swim pool Temp. Maximum 35°C	Maximum achievable swimming pool temperature. The solar pump is switched off once this temperature is reached, if the passive collector protection is switched off (setting collector protection: 0, 2 or 4). Variation: 20	Setting range: Presetting:	20°C…95°C 35°C
Swim pool Temp. Protection 40.0°C	Maximum achievable swimming pool temperature. The solar pump is switched off once this temperature is reached, even if the passive collector protection is switched on (setting collector protection: 1, 3 or 5).	Variation: 20 Setting range: Presetting:	20°C…95°C 40°C

Change setting continued



Maximum achievable tank temperature. The solar pump is switched off once this temperature is reached, if the passive collector protection is switched off (setting collector protection: 0, 2 or 4).

Variation: 1

Setting range: 20°C…95°C

Presetting: 90°C

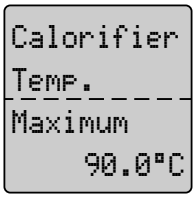
Depending on the hardness of the hot water it may be necessary to reduce the temperature to prevent excessive scaling of the water heater.

The pump speed control tries to keep the collector temperature higher than the temperature at the sensor TSU by the control differential set (⇨ Ch. 7.5).

Variation: 1

Setting range: 0K…40K

Presetting: 15K

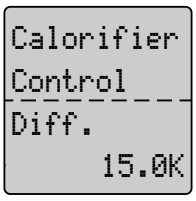


Maximum achievable calorifier temperature. The solar pump is switched off once this temperature is reached, if the passive collector protection is switched off (setting collector protection: 0, 2 or 4).

Variation: 12

Setting range: 20°C…95°C

Presetting: 90°C

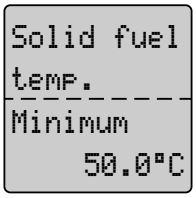


The pump speed control tries to keep the collector temperature higher than the temperature at the sensor TPU by the control differential set (⇨ Ch. 7.5).

Variation: 12

Setting rnage: 0K…40K

Presetting: 15K

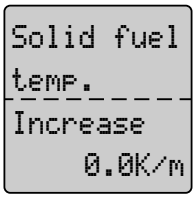


Minimum solid fuel temperature, at which the solid fuel pump is released with the minimum speed set.

Variation: 48

Setting range: 20°C…90°C

Presetting: 50°C



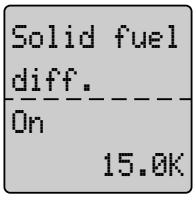
If the solid fuel temperature increases by the value set within 3 minutes, before the Solid fuel temp minimum has been reached, the solid fuel pump starts with the minimum speed.

Variation: 48

Setting range: 0…40K/min

Presetting: 0 K/min

Note: In conjunction with a thermal return temperature increase of the wood boiler this value may vary

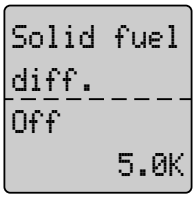


Temperature differential between solid fuel boiler sensor (TFK) and calorifier sensor (TPU) as additional switch on criteria of the feeder pump.

Variation: 48

Setting range: 0 K…40 K

Presetting: 15 K



Temperature differential between solid fuel boiler sensor (TFK) and calorifier sensor (TPU) as switch off criteria of the feeder pump.

Variation: 48

Setting range: 0 K…40 K

Presetting: 5 K

Change setting continued

PSolid f.
speed
Minimum
30%

Lower limit value of modulation range of feeder pump.

Variation: 48

Setting range: 10%…100%

Presetting: 30%

Collector
Temp.
Increase
1.5K/m

If the temperature at collector sensor (TKO) increases by this value or more and if the option "Start optimisation collect." has been activated, the solar pump starts, even if there is no temperature overload between TKO and the reference sensor (⇨ Ch. 7.9).

Variation: 1, 12, 20

Setting range: 0.0…10K/Min.

Presetting: 1.5 K/Min

Multi
funct.
output
8

The function of the potential free multi function relay output on terminal 5/6 can be defined as follows.

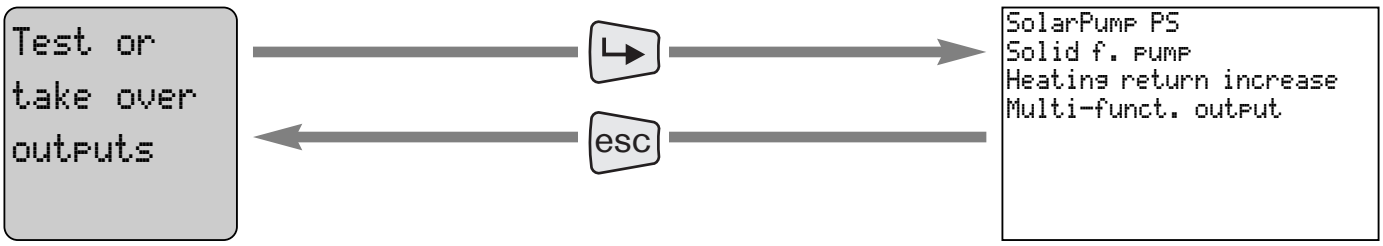
The table describes the required function, when the output is activated, that means when the relay contact is closed.

Setting range: 1…8: Heat exchanger release /lockout (⇨ Ch. 7.2)
9…10: Lockout signalling (⇨ Ch. 7.3)
11…12: High temperature relief (⇨ Ch. 7.1)

Presetting: 8

Setting value	Heat exchanger Interlock / Release **Storage tank loading**	Heat exchanger Interlock / Release **Calorifier loading**	Other functions
0			
1	Interlock		
2	Release		
3			
4			
5		Interlock	
6		Release	
7	Interlock	Interlock	
8	Release	Release	
9			Lockout
10			No lockout
11			High temperature relief
12			High temperature relief inverse

6.4 Test outputs



Use
Here, you can check the current switch condition of the outputs.

Switch the outputs on and off to check their function. If necessary, the degree of modulation can be altered in steps of 10%. To do this the controller must be set to **Manual** operation (⇨ Ch. 6.1).

Note: As long as the display is flashing, the value has not been taken over and will revert to the previous setting when exiting by pressing the esc key. Press ↵ key to save, take over and execute the value.
The outputs remain in the selected switch conditions even once the sub menu has been exited and alter only when changed again or if a different type of operation is selected (⇨ Ch. 6.1).

Solar pump
PS 100%

Current speed of solar pump depending on collector temperature.
Output: 1/N

In **Manual** operation the pump is driven at 100% speed.

Variation: 1, 12, 20

Solid fuel pump
100%

Current speed of solid fuel boiler circuit pump depending on solid fuel temperature or calorifier temperature.
Output: 1/N (PFK)

In **Manual** operation the pump is driven at 100% speed.

Variation: 48

Heating return
increase Off

Switch condition of output (1/N) (VRA):
Off = 0 Volt
On = 230 Volt

In **Manual** operation, the valve is not activated.

Variation: 15

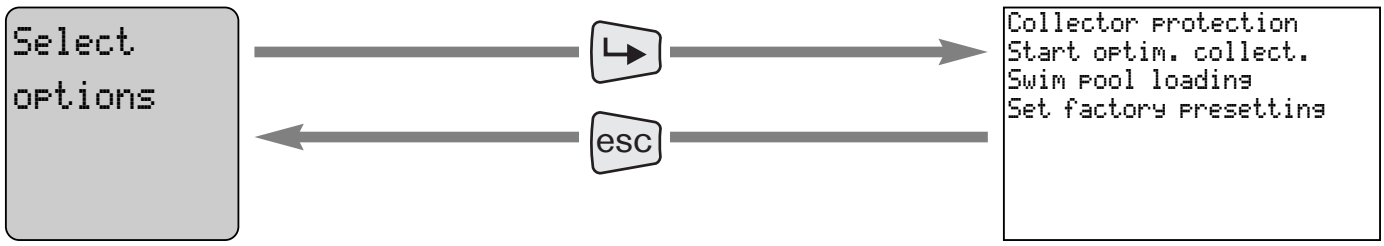
Multi funct.
output Off

Current condition of MFA:
0: • Heat exchanger release
• no lockout
• High temperature relief not active
1: • Heat exchanger interlock
• Lockout
• High temperature relief active

In **Manual** operation the output is set to '0'.

Variation: 1, 12, 15, 20, 48

6.5 Select options



Use:
Independent of the hydraulic variation used, additional function and be activated or blocked (only by a heating engineer).
If functions have been activated, the values can be checked in the selection menu **Select temp. a. values** and if additional settings are required these can be adjusted in **Change settings**.

Note: If the hydraulic variation is changed, parameter Overheat protection has to be re-selected.

Collect. protection
0

Protective function of the thermal fluid. (⇨ Ch. 7.1)

Variation: 1, 12, 20

Setting range: 0 ... 5

Presetting: 0

DANGER

The setting 1, 3 or 5 must not be made in conjunction with a tank or calorifier, who's permissible maximum temperature lies below 95°C. The setting is also not permitted, if the DHW pipework has not been equipped with scald protection.

Start optim. collect.
No

Activation of start optimisation function, whereby it is possible that the solar pump starts as soon as a temperature increase occurs, even if the actual start temperature has not yet been achieved (⇨ Ch. 7.10).

Variation: 1, 12, 20

Presetting: No

Swim pool loading
Yes

Activation or deactivation of the swimming pool function. For example, this can be used to deactivate the swimming pool function during Winter.

Variation: 20

Presetting: Yes

Set factory presetting
No

Resets the controller to the factory presettings.

Yes: Reset to factory presettings (after pressing the Enter key the display returns to **No** after approx. 5 to 10 seconds and the function has been executed)

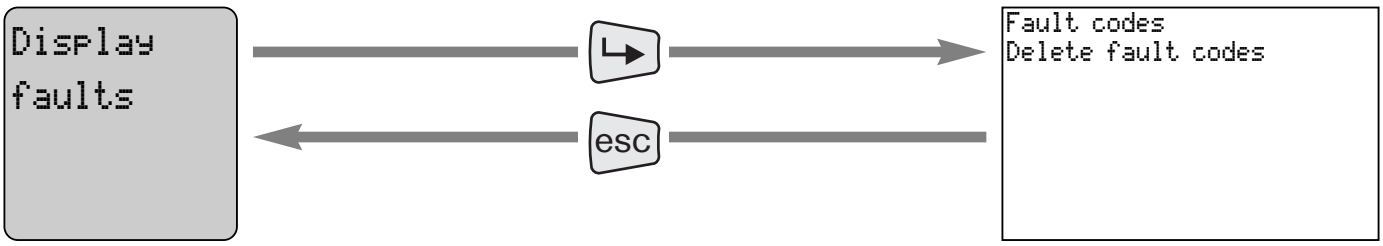
No: No reset to factory presettings

Variation: 1, 12, 15, 20, 48

Presetting: No

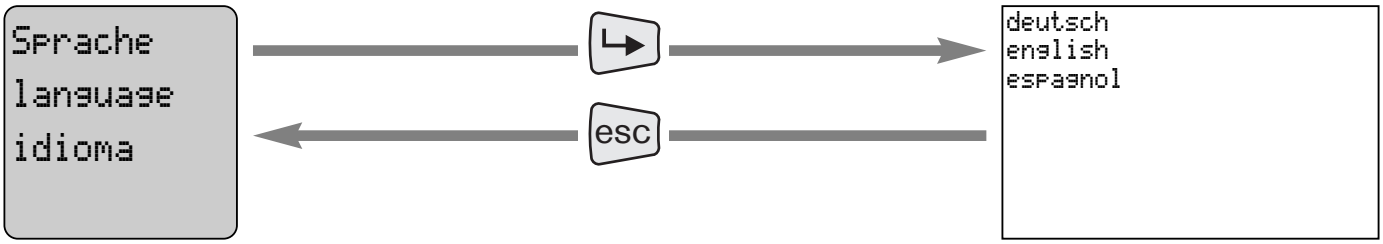
Note: All parameters are set to the values of variation 1 and the display is returned to its factory settings.

6.6 Display faults



Use:
Here, a fault which has occurred can be called up as a number code.
The faults listed in Chapter 8 reset automatically once the cause has been rectified.
One exception is fault 1, this remains saved within the controller and can only be reset using **Delete fault codes**.

6.7 Language selection



Use:
Here, one of three languages can be selected.

7.1 Collector protection

In addition to the basic function of the controller it is possible to further protect the system against overheating via a passive and or active protection function. In the basic function (setting 0) the solar pump is switched off if the "Tank Temp. Maximum" or "Calorifier Temp. Maximum" is exceeded. The pump is also switched off if the collector temperature exceeds 120°C. The pump switches on again once the collector has cooled to 80°C.

1. **Passive protection:**
   If the collector temperature increases to above 80°C and if the tank or calorifier temperature is above "...Temp. Maximum" the solar pump is operated at 100%. The tank or calorifier is now loaded up to a max. of 95°C, independent of the setting "...Temp. Maximum". Switch off again occurs if the collector temperature exceeds 120°C or the switch off condition "...Diff. Off" has been achieved. Switch on occurs at 80°C collector temperature, or when the tank/calorifier temperature drops to 92°C, without the collector temperature exceeding 120°C.

2. **Active protection:**
   The following two active protection functions are possible:

   2.1 Release cooling function as soon as the collector protection temperature and the "Tank Temp. Maximum" or "Calorifier Temp. Maximum" has been reached.

   2.2 Release cooling function as soon as the "Tank Temp. Maximum" or "Calorifier Temp. Maximum" has been reached.

   Once the cooling function has been released, and if the collector temperature falls 8K below the lower tank or calorifier temperature, the solar pump is started and the tank/calorifier is discharged. Discharge is stopped as soon as the collector temperature drops to 4K above the tank/calorifier temperature or if it drops 15 K below the max. tank/calorifier temperature.

The setting 1, 3 or 5 must not be made in conjunction with a tank or calorifier, who's permissible maximum temperature lies below 95°C. The setting is also not permitted, if the DHW pipework has not been equipped with scald protection.

Setting	Passive protection	Active protection (cooling function)	
	to 1.	to 2.1	to 2.2
0			
1	X		
2		X	
3	X	X	
4			X
5	X		X

If the cooling function is not required, setting 0 or 1 should be selected.

3. High temperature relief: cooling via MFA
This function allows cooling of the tank or calorifier during the day via an additional cooling circuit. To do this, a pump for example would need to be fitted to the MFA output which would discharge the excess energy.

If the temperature at sensor TSO exceeds the "Tank Temp. Maximum" or at sensor TPU exceeds the "Calorifier Temp. Maximum" the MFA output is activated.

Setting:
Multi funct. output 11: Relay contact of MFA output on terminal 5/6 is closed, when the cooling function is activated.
Multi funct. output 12: Inverse activation

To stop the solar pump from switching off when the Tank or Calorifier Temp. Maximum is reached, the overheat protection must be set to setting 1, 3 or 5 under options for this function.

7.2 Energy management via the MFA output

The multi-function output (potential free contact, terminal 5/6) must be selected site specific.

With storage tank operation (DHW), reference sensor TSU

- With good solar yield (**average rating PS** above 50%) and storage tank temperature greater than **Tank temp. minimum** burner interlock is activated. If the requirements are no longer met, the interlock is deactivated.
- With very good solar yield (**average rating PS** above 80%) the burner interlock is activated for 18 hours once the **Tank temp. setpoint** has been achieved.

  If the storage tank temperature fall below its minimum temperature (**Tank temp. minimum**) by 3K the interlock is deactivated and the 18 hours are reset.

With calorifier operation, reference sensor TPU

- With good solar yield (**average rating PS** above 50%) the **Calorifier temp. setpoint** is reduced by **Diff. calorifier minimum**.
  If the actual temperature of the calorifier reaches this reduced value the interlock is activated.
  If the actual calorifier temperature falls below the reduced value or if the **Average rating PS** falls to below 50% the interlock is deactivated.

Setting value	Heat exchanger Interlock / Release Tank loading	Special temp. level Heat exchanger for Legionella function	Heat exchanger Interlock / Release Calorifier loading	Additional functions
0				
1	Interlock			
2	Release			
3		Interlock		
4		Release		
5			Interlock	
6			Release	
7	Interlock		Interlock	
8	Release		Release	
9				Lockout
10				No lockout
11				High temperature relief
12				High temperature relief inverse

The table describes the required functions with the relay contact closed.
In conjunction with **WTC-WCM** control and connection to H1 or H2 with parameter setting “Heating circuit release” or “DHW release” the even setting values are required.

In conjunction with **WTU-WRS** control and connection to H1 with parameter setting “Boiler interlock” the odd setting values are required.

7.3 Lockout signalling

By connecting an optical or audible signalling device to the MFA output it is possible to clearly and recognisably indicate a lockout of the system. The MFA output is a potential free contact which can be integrated into systems supplied by others (such as BMS systems).

For this function, the setting “Multi funct. output” must be set to 9. With this setting the internal relay contact closes if lockout occurs. With setting 10 the inverse function is carried out, that means the relay contact opens if a lockout occurs.

Variation: 1…48

7.4 Pump standby protection

To avoid seizing of the actuators fitted, output terminal X1:1 is activated for approx. 35 seconds every 24 hours.

7.5 Reference value of pump speed control in conjunction with collectors

The controller is equipped with speed control which is used to drive the pump via direct drive shaft.
This operation depends on the following factors:

- A prefixed increase of 10 K is added to the temperature at the reference sensor (TSU, TPU or TSB).
  The speed control now aims to control the collector temperature (TKO) to this value.

Reference value for the speed control:

- Sensor TSU 15K Increase
  Setting “Tank Control Diff.”
- Sensor TPU 15K Increase
  Setting “Calorifier Control Diff.”
- Sensor TSB 15K Increase
  Setting “Swim pool Control Diff.”

Example: (with tank)

The target collector temperature is calculated from:

	Increase set:	15K	
+	actual tank temperature:	40°C	(TSU)
=	collector setpoint temperature:	55°C	(TKO)

- If the actual collector temperature falls towards the target collector temperature the speed control is modulated within the given limits.

Note: Due to the direct drive shaft a pulsating volume flow is created in the modulation range, which can be noticeable through noise and/or vibration of flexible lines.

The switch on and switch off conditions for the pump can be adjusted (see Ch. 6.3).
If the collector temperature exceeds the storage tank temperature by + 7K (Tank diff. On) whilst still maintaining the factory presetting the pump is switched on, if the collector temperature does not achieve the value of the “Storage tank temperature + 4K” (Tank diff. Off) the pump is switched off.

7.6 Pump control in conjunction with a solid fuel boiler

The controller is equipped with speed control which drives the pump by direct drive shaft.

Switch on conditions

1.) The solid fuel boiler must have reached its minimum temperature.

SolidF temp. actual value ≥ SolidF temp. minimum

2.) If the boiler temperature reaches the calorifier temperature (TPU) plus the **SolidF diff. On**, the pump runs at the lowest speed.
Prerequisite: Condition 1 has been met

Note:
If function **SolidF temp. Increase** is activated (value > 0), the pump already runs at a temperature increase of 3K/min. at the smallest rating, even if the boiler minimum temperature has not yet been achieved and the **SolidF diff. Off** has not been maintained.
The function **SolidF temp. Increase** should only be activated in conjunction with a thermal return flow increase.

SolidF temp. actual value = Tank bottom actual value + SolidF diff. On
⇨ Pump runs at lowest speed

3.) When the boiler temperature reaches the calorifier temperature plus half the value of the **SolidF diff. On** plus **SolidF diff. Off**, speed control is released.
Prerequisite: Condition 1 has been met

Note:
If the actual boiler temperature falls towards the target boiler temperature the speed control is modulated within the given limit. Below this limit the pump runs at the lowest rating.
Due to the direct drive shaft a pulsating volume flow is created in the modulation range, which can be noticeable through noise and/or vibration of flexible lines.

$$\text{SolidF temp. act. value} \geq \text{Tank bottom act. value} + \frac{\text{SolidF diff. ON} + \text{SolidF diff. Off}}{2}$$

⇨ Pump is driven speed controlled

Switch off conditions

1.) The Solid temp. minimum falls by the switch differential of 3K.

SolidF temp. act. value ≤ SolidF temp. minimum – Switch differential (3 K)
⇨ Pump off

or

2.) If the actual boiler temperature falls below the actual calorifier temperature (TPU) plus the **SolidF diff. Off** the pump switches off.

SolidF temp. act. value < Tank bottom act. value + SolidF diff. Off
⇨ Pump off

7.7 Solid fuel boiler functions

The solar controller has three different solid fuel boiler functions.

1. **Solid fuel boiler minimum temperature**
   To release solid fuel boiler operation, this temperature must be exceeded. The limit value SolidF. temp. minimum is allocated with a switch hysteresis of -5K.

   Example:
   SolidF.temp. minimum = 30°C
   Released at 30°C; disabled at 25°C

2. **Solid fuel boiler function without thermal return flow increase via controller**
   The release of the boiler circuit pump PFK occurs when the temperature differential between the solid fuel boiler sensor (TFK) and the calorifier sensor (TPU) is greater than the SolidF. diff. On set. The boiler circuit pump PFK is switched off, when the temperature differential between the solid fuel boiler sensor (TFK) and the calorifier sensor (TPU) is less than the SolidF. diff. Off set. The speed control attempts to maintain a minimum load temperature. The setpoint is made up to the formula on the right.

   Formula:
   Minimum load temperature =
   TPU + $^1/_2$ x (Diff. On + Diff. Off)

3. **Solid fuel boiler function with thermal return flow increase**
   The boiler circuit pump PFK be be released due to the temperature increase rate at the solid fuel boiler sensor (TFK).
   If the temperature increase is greater than the SolidF temp. increase set, the boiler circuit pump (PFK) is switched on for at least 10 minutes irrespective of the SolidF. temp. minimum and the temperature differential between TPU and TFK.
   The pump switches off, if the temperature differential between TFK and TPU is less than the SolidF diff. Off.

   The speed control attempts to maintain a minimum load temperature.
   The setpoint is made up to the following formula.

   Formula:
   Minimum load temperature =
   Calorifier temperature setpoint + $^1/_2$ x (Diff. On + Diff. Off)

7.8 Manual operation

- In selection menu, **Select type of operation** set the selection to **Manual**.
- All outputs are activated to the factory presetting (see Ch. 6.4).
- In sub-menu **Test or take over outputs** the outputs can be switched on or off and the speed control can be altered in 10% steps.

Note: In manual operation the volume flow of the system at 100% pump rating can be set. The volume flow to be set can be found in the installation and operating instructions of the collector.

7.9 Calculation of energy yield

This solar controller contains a function for calculating the energy yield on the basis of the temperature differential between the collector temperature (TKO) and the reference sensor (TSU, TPU, TSB) via the throughput quantity (volume flow).

After setting the volume flow, at a pump rating of 100%, via the throughput limiter the scale value should be read off and entered into parameter **volume flow** in selection group **Change settings**.
If a different heat transfer fluid is used the heat capacity at 20°C (**Heat capacity.**) should be adjusted.

Note: The calculation of energy yield to a limited degree is in accordance with subsidy guidelines.

Heat capacity at 50°C:

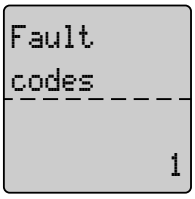
-weishaupt- Solar thermal fluid Tyfocor L (45% Propylene Glycol)	3.73 kJ/lK
Water	4.19 kJ/lK

7.10 Start optimisation function

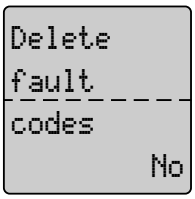
This function can be activated if the collector sensor insufficiently recognises the collector temperature. A delayed recognition of the temperature increase can thus be partly compensated. If the switch on condition for the solar pump has not yet been achieved, but the temperature at the collector sensor increases by more than the value Collect. Temp. Increase" set, the solar pump runs at minimum speed for 2 minutes. If the switch on condition is achieved during this time, the pump continues to run, otherwise it switches off again. If the pump has switched off a renewed start attempt will be made after a minimum of 10 minutes, if the temperature continues to increase. If the "Collector Temp. Minimum" is not maintained, the solar pump cannot start.

Variation: 1, 12, 20

8.1 Fault messages (fault display)



The faults recognised by the controller are displayed with a fault code and can be assigned or rectified here.

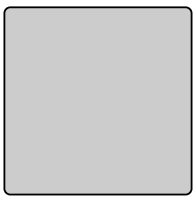


The fault code display is reset by confirming with `Yes`.

Code	Description	Cause	Rectification
1	ΔT between TKO and TSU or TPU longer than 15min. >80K	Pump defective	Repair, or if necessary replace pump
		Micro fuse defective	Replace fuse, rectify fault
		Air in system	Vent system
		Sensor defective	Replace sensor
Note:	After 15 minutes the solar pump is switched off. If the temperature differential is not maintained, the solar pump switches on again. The fault message remains saved and can be reset via `Delete fault codes`.		
4	Collector sensor TKO has short or open circuit	Sensor or cable short or open circuit	Check installation, if necessary replace sensor
Note:	The solar pump switches off, if the frost protection function is not active. Otherwise the pump runs at minimum speed. Once the cause of the fault has been rectified, the fault message is automatically reset.		
6	Tank sensor bottom TSU has short or open circuit	Sensor or cable short or open circuit	Check installation, if necessary replace sensor
Note:	The solar pump switches off. Once the cause of the fault has been rectified, the fault message is automatically reset.		
7	Calorifier sensor bottom TPU has short or open circuit	Sensor or cable short or open circuit	Check installation, if necessary replace sensor
Note:	The solar pump switches off. Once the cause of the fault has been rectified, the fault message is automatically reset.		
10	Swim pool sensor bottom TSB has short or open circuit	Sensor or cable short or open circuit	Check installation, if necessary replace sensor
Note:	The solar pump switches off. Once the cause of the fault has been rectified, the fault message is automatically reset.		

Code	Description	Cause	Rectification
11	Solid fuel boiler sensor bottom TFK has short or open circuit	Sensor or cable short or open circuit	Check installation, if necessary replace sensor
Note:	The solid fuel pump is driven at maximum speed (100%). Once the cause of the fault has been rectified, the fault message is automatically reset.		
13	The calorifier sensor top TPO has short or open circuit	Sensor or cable short or open circuit	Check installation, if necessary replace sensor
Note:	The three way valve is de-energised and returns to its start position. Once the cause of the fault has been rectified, the fault message is automatically reset.		
15	The heating circuit return sensor THR has short or open circuit	Sensor or cable short or open circuit	Check installation, if necessary replace sensor
Note:	The three way valve is de-energised and returns to its start position. Once the cause of the fault has been rectified, the fault message is automatically reset.		

8.2 Displays



Undefined condition
Once reset the controller restarts.
If the controller does not restart after a reset it should be replaced.

(⇨ Ch. 5.4)

8.3 Cause and rectification of lockouts

Observation	Cause	Rectification
Solar pump does not switch off	The current consumption of the load is insufficient	Select different relay (higher current consumption)
		Use RFI suppressor
	Frost protection temperature set too high	Check and if necessary adjust parameter

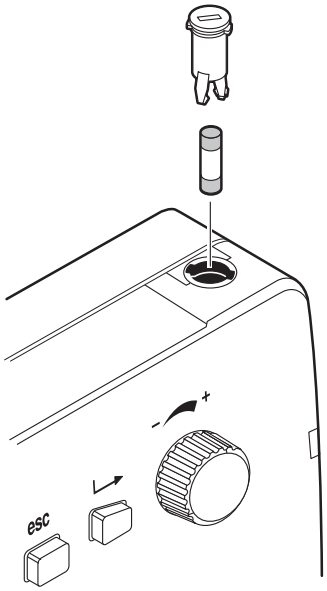
9.1 Electrical data

Mains voltage 230 V ± 10%
Mains frequency 50-60 Hz
Consumption 7 VA
Voltage meas. circuit 12 V, insulated 4 KV
Breaking capacity outputs:
Electronic outputs ~230 V, 1 A, 50 Hz
Minimum current 20-40 mA
Mechanical outputs ~230 V, 6 (2) A, 50 Hz
External unit fuse 16 A
Internal unit fuse 3.15 A slow
Type of protection IP40 to EN 60529
Protection Class II to EN 607300 if installed correctly

Cables
Sensor cable length, cross section max. 100m, 0.75 mm^2

eBus 2 core Bus
Bus cable length, cross section max. 100m, 0.75 mm^2

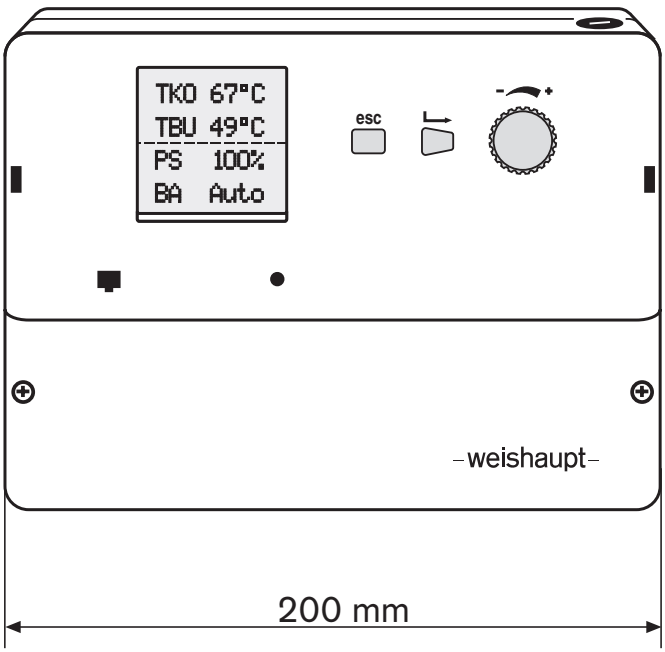
Micro fuse 3.15 A slow

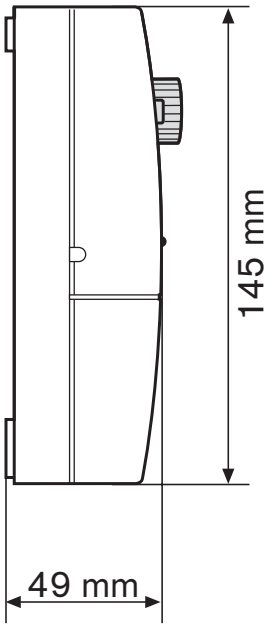


9.2 Permissible ambient conditions

Temperature	Humidity	Requirements to EMC	Low voltage
During operation 0°C…50°C Transport/storage -20°C…+60°C	at 25°C no dew point	Guideline 89/336/EEC EN 50081-1 EN 50082-1	Guideline 73/23/EEC EN 60335

9.3 Dimensions





9.4 Temperature sensor data

Sensor element NTC 5000 Ω at 25°C

Sensor	Measuring range	Measurement accuracy	Ambient temperature	Cable material	Cable length	Order number
Immersion sensor STF 225	-10…240°C	0…70°C ± 0.5K	-50…250°C	Silicone (blue)	4m	660 229
Immersion sensor STF 222.2	-10…130°C	0…50°C ± 0.5K 0…70°C ± 0.8K	-50…90°C	PVC (grey)	2.5m	660 228
Surface contact sensor ZVF 210 (Accessory)	-10…130°C	0…50°C ± 0.5K 0…70°C ± 0.8K	-50…90°C	PVC (grey)	2.5m	660 302

9.4.1 Sensor characteristics

Sensor characteristic curve
(Resistance values without self-heating)
The Weishaupt controller system offers the possibility of displaying the correct connection of all sensors and the respectively measured temperature. To check the sensors and simulation of relevant sensor temperatures, value pairs for all units used (sensor temperature/resistance value) are listed in the following table.

NTC sensor (blue cable)	ϑ °C	R Ω	ϑ °C	R Ω	ϑ °C	R Ω
Collector sensor: TKO	-40	112k	60	1.45k	160	115
	-35	84.1k	65	1.24k	165	105
Solid fuel sensor: TFK	-30	63.6k	70	1.06k	170	95
	-25	48.6k	75	914	175	86
Calorifier sensor (top): TPO	-20	37.4k	80	789	180	79
	-15	29.1k	85	684	185	72
	-10	22.8k	90	595	190	66
	-5	18.0k	95	520	195	60
as immersion sensor	0	14.3k	100	455	200	55
Order No.: 660 262	5	11.4k	105	400	205	51
	10	9.21k	110	353	210	47
	15	7.47k	115	312	215	43
	20	6.10k	120	276	220	40
	25	5.00k	125	246	225	37
	30	4.13k	130	219	230	34
	35	3.42k	135	196	235	31
	40	2.86k	140	175	240	29
	45	2.40k	145	157	245	27
	50	2.02k	150	142		
	55	1.71k	155	128		

NTC sensor (grey cable)	ϑ °C	R Ω	ϑ °C	R Ω	ϑ °C	R Ω
Ref. sensor: TSU, TPU, THR, TSB	-20	48.5k	10	9.95k	60	1.24k
	-18	43.5k	12	9.05k	65	1.04k
	-16	38.6k	14	8.23k	70	880
as immersion sensor	-14	34.5k	16	7.50k	75	740
Order No.: 660 228	-12	30.9k	18	6.84k	80	630
	-10	27.7k	20	6.25k	85	540
	-8	24.8k	22	5.71k	90	390
as contact sensor	-6	22.3k	24	5.23k	100	340
Order No.: 660 302	-4	20.1k	26	4.79k	105	290
	-2	18.1k	30	4.03k	110	260
	0	16.3k	35	3.27k	120	200
	2	14.5k	40	2.66k	130	150
	4	13.3k	45	2.18k	140	120
	6	12.1k	50	1.80k		
	8	11.0k	55	1.49k		

A Appendix

Contents

- Checklist
- Commissioning log

Checklist

- ❑ Carry out wiring of controller to the variation selected.
- ❑ Supply connection made to wiring schematic (only with Emergency/Off switch and pre-fusing).
- ❑ Are the sensors connected displayed.
- ❑ Check plausibility of temperatures and values.
- ❑ Is the pump driven (pos. in manual operation).

Commissioning log of adjustable parameters 'Change settings' (please complete)

Parameter	Setting range	Presetting	Set to
Hydraulic variation Variation	1, 12, 15, 20, 48	1	[_____]
Collect. temp. minimum	0°C…70°C	20°C	[_____]
PS Speed minimum	10%…100%	40%	[_____]
Volume flow	0.1 l/m…500.0 l/m	1.5 l/m	[_____]
Heat capacity	0.01 kJ/lK…10.0 kj/lK	3.73 kJ/lK	[_____]
Frost protection	-50°C…+20°C	-20°C	[_____]
Tank diff. ON	0 K … 40 K	7 K	[_____]
Calorifier diff. ON	0 K … 40 K	7 K	[_____]
Swim pool diff. ON	0 K … 40 K	7 K	[_____]
Return diff. ON	0 K … 40 K	5 K	[_____]
Tank diff. OFF	0 K … 40 K	4 K	[_____]
Calorifier diff. OFF	0 K … 40 K	4 K	[_____]
Swim pool diff. OFF	0 K … 40 K	4 K	[_____]
Swim pool control diff.	0 K … 40 K	15 K	[_____]
Return diff. OFF	0 K … 40 K	2 K	[_____]
Tank temp. minimum	0°C … 70°C	40°C	[_____]
Diff. calorifier minimum	0 K … 40 K	15 K	[_____]
Tank temp. setpoint	0°C … 70°C	55°C	[_____]
Calorifier temp. setpoint	0°C … 70°C	70°C	[_____]
Swim pool temp. setpoint	0°C …40°C	30°C	[_____]
Swim pool temp. protection	20°C … 95°C	40°C	[_____]
Swim pool temp. maximum	20°C … 95°C	35°C	[_____]
Tank temp. maximum	20°C … 90°C	90°C	[_____]
Tank control diff.	0 K … 40 K	15 K	[_____]
Calorifier temp. maximum	20°C … 90°C	90°C	[_____]
Calorifier control diff.	0 K … 40 K	15 K	[_____]
Solid fuel temp. minimum	20°C … 90°C	50°C	[_____]
Solid fuel temp. increase	0 K/min … 40 K/min	0 K/min	[_____]
Solid fuel diff. ON	0 K … 40 K	15 K	[_____]
Solid fuel diff. OFF	0 K … 40 K	5 K	[_____]
PSolidF. speed minimum	10% … 100%	30%	[_____]
Collect temp. increase	0,0 … 10 K/Min	35°C	[_____]
Multi funct. output	0 … 12	8	[_____]

Commissioning log of adjustable parameters ‘Options’ (please complete)

Parameter	Setting range	Presetting	Set to
Collector protection	0 ... 5	0	[_____]
Start optimisation collect.	yes / no	no	[_____]
Swim pool loading	yes / no	yes	[_____]
Set factory presetting	yes / no	no	[_____]

–weishaupt–

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Product		Description	Performance
	**W-Burners**	The compact series, proven millions of times over: Economical, reliable, fully automatic. Gas, oil and dual fuel burners for domestic and commercial applications. The purflam burner gives almost soot-free combustion of oil with greatly reduced NO_x emissions.	Up to 570 kW
	**Monarch and industrial burners**	The legendary industrial burner: Tried and tested, long lived, clear construction. Gas, oil and dual fuel burners for district heat provision.	Up to 10,900 kW
	**multiflam® burners**	Innovative Weishaupt technology for large burners: Minimal emission values particularly at ratings over one megawatt. Oil, gas and dual fuel burners with patented fuel distribution system.	Up to 12,000 kW
	**WK industrial burners**	Modular powerhouses: Adaptable, robust, powerful. Oil, gas and dual fuel burners for industrial plant.	Up to 18,000 kW
	**Thermo Unit**	The Thermo Unit heating systems from cast iron or steel: Modern, economic, reliable. For environmentally friendly heating. Fuel: Gas or oil as desired.	Up to 55 kW
	**Thermo Condens**	The innovative condensing boilers with the SCOT system: Efficient, low in emissions, versatile. Ideal for domestic heating. Floor standing gas condensing boiler with ratings of up to 1200 kW(cascade), for higher heat demands.	Up to 1,200 kW
	**Heat pumps**	The heat pump programme offers solutions for utilisation of heat from air, soil and ground water. The systems are suitable for refurbishment or new builds.	Up to 130 kW
	**Solar systems**	Free energy from the sun: Perfectly coordinated components, innovative, proven. Pleasantly shaped flat roof collectors to support heating and of domestic water	
	**Water heater / energy reservoir**	The attractive domestic water heating range includes classic water heaters which are supplied through a heating system and energy reservoirs which can be fed through solar systems.	
	**Control technology / building management**	From control panels to complete building management systems – at Weishaupt you can find the entire spectrum of modern control technology. Future oriented, economical and flexible.	