



Installation and Operating Manual

Expansion module

6 inputs, 3 outputs

This operating manual is part of the product.

- ▶ Read operating manual carefully before use,
- ▶ Keep for the complete service life of the product,
- ▶ Pass it on to all subsequent owners or users of the product.



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Product details

EU Declaration of Conformity

"The design and operating characteristics of this product meet the relevant European guidelines. Its conformity has been proven. Contact your dealer for more information."

1 Safety

1.1 Designated use

The expansion module (referred to in the following as the control unit) is an independently mounted, electronic temperature control unit for panel mounting and may only be used to expand solar thermal control units or heating circuit controls within the permitted ambient conditions (see Chapter 13 “Technical Data”).

The control unit may not be operated in the following environments:

- Outdoors
- In damp spaces
- In spaces where highly flammable gas mixtures can arise
- In spaces where hazards can arise due to the operation of electrical and electronic components

1.2 Installation/startup hazards

WARNING

The control unit is in no way a replacement for safety devices.

Measures for protection against frost, scalding, excess temperatures, excess pressures, etc. should be provided on-site where necessary.

► **Installation may only be carried out by a qualified technician and any local regulations.**

The following hazards exist when installing/starting up the control unit and during operation (where there have been installation errors):

- Risk of death by electrocution
- Risk of fire due to short circuit
- Reduced fire safety of building due to incorrect cable routing
- Damage to control unit and connected devices if there are prohibited ambient conditions, power supply, connection of non-permitted, faulty devices or devices outside the device specification as well as incorrect assembly or installation.

NOTE

Observe the controller's type plate.

All safety regulations for working with mains electricity apply. Only qualified electricians may perform any work that requires the control unit to be opened (e.g. electrical connection).

- When routing cables, care should be taken that structural measures related to fire safety are not impaired.
- Ensure that the permitted ambient conditions at the installation site are not exceeded (see Chapter 13, “Technical Data”).
- Ensure that the prescribed degree of protection is met.
- Signs and markings attached by the factory may not be changed, removed or made unrecognisable.
- Before connecting the device, ensure the power supply corresponds to the values specified on the type plate.
- Ensure that devices connected to the control unit correspond to the technical data of the control unit.
- Secure the device against being started up unintentionally.
- All work on an open control unit must only be performed when the mains have been disconnected.
- Protect the control unit against overload and short circuit.

1.3 Identifying faults

- ▶ Regularly check status LEDs on slave devices and the display screen on master device.
- ▶ Localise cause of fault as applicable (see Chapter 10.1, "Causes of Errors").
- ▶ If it can be determined that safe operation can no longer be guaranteed (e.g. where there is visible damage), ensure the device is immediately disconnected from the mains.
- ▶ Allow a qualified technician to rectify the fault.

1.4 Disposal

- ▶ Dispose of the control unit in accordance with regional regulations.

1.5 Disclaimer

The manufacturer cannot monitor the adherence of the user to this manual or the conditions and methods employed in installing, operating, using and maintaining the control unit. Improper installation can lead to damage to property and can subsequently endanger people.

The manufacturer therefore assumes no responsibility or liability for losses, damage or costs that arise from faulty installation, faulty performance of installation work, improper operation and incorrect use and maintenance or that are in any way connected with such circumstances.

Likewise, the manufacturer does not assume any responsibility for patent infringements or the violation of the rights of third parties that result from the use of the control unit.

The manufacturer reserves the right, without prior notification, to implement changes as regards the product, technical data or the installation and operating manual.

2 Housing Overview

Address switch for TPC 1 bus slave devices

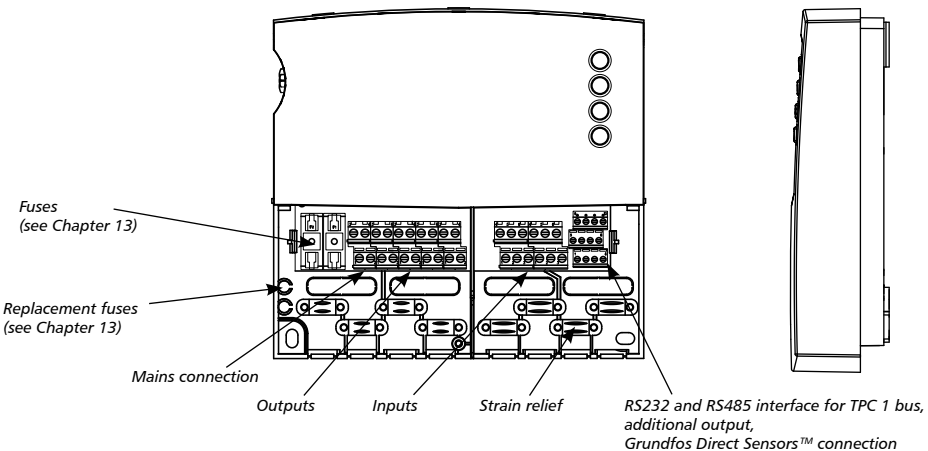
The following addresses can be assigned:

- Address 1
Switch set to top position
- Address 2
Switch set to middle position
- Address 3
Switch set to bottom position



Meaning of Status LEDs

LED	Colour	Status	Meaning
⓪	Green	Lit	Power supply ok, device ready for operation.
⓪	Green	Flashing	Power supply ok, device not ready for operation as installation assistant has not been completed.
R1	Yellow	Lit	Status R1: Output is switched on.
R2	Yellow	Lit	Status R2: Output is switched on.
R3	Yellow	Lit	Status R3: Output is switched on.
R1, R2, R3	Yellow	Flashing	Error (e.g. system error, defective sensor, etc.)



3 Notes on this Manual

3.1 Applicability

This manual describes the installation, startup, operation, repair and disassembly of an expansion module for solar thermal control units or heating circuit controls. The corresponding installation manuals from the respective manufacturers should be followed for other components such as sensors, pumps and valves.

3.2 Users

The installation, startup, repair and disassembly of the control unit may only be performed by a qualified technician. Before startup, the control unit must be professionally assembled and installed by a technician in accordance with the relevant regional and national regulations and the directives and safety instructions of this installation and operating manual. The technician must be familiar with this operating manual.

The control unit is maintenance-free.

Only use the control unit after you have thoroughly read and understood this operating manual and the safety instructions. Follow all safety instructions and consult a technician in cases of doubt.

This device is not intended for people (including children) with physical, sensory or mental impairment or people without sufficient experience and knowledge. An exception is if they have been trained in the use of the device and supervised at first by a person responsible for their safety. Supervise children to ensure they do not play with the device.

3.3 Explanation of symbols




3.3.1 Structure of warnings

SIGNAL WORD

Type, source and consequences of danger

- Measures to avoid the danger.

3.3.2 Hazard levels in warnings

Hazard level	Probability of occurrence	Consequences of non-observance
 DANGER	Immediate danger	Death, severe injury
 WARNING	Possible danger	Death, severe injury
 CAUTION	Possible danger	Minor injury
CAUTION	Possible danger	Property damage

3.3.3 Notes

NOTE

Note on how to make work easier or safer.

- Measure for making work easier or safer.

3.3.4 Other symbols and labels

Symbol	Meaning
✓	Required for an action
▶	Call-to-action
⇒	Result of an action
•	Itemisation
△▽:	Press the "up/down arrow" buttons to scroll
▽:	Press the "down arrow" button to browse in the menu or adjust a value
△:	Press the "up arrow" button to browse in the menu or adjust a value
SET:	Press the "SET" button to confirm or activate a value
ESC:	Press the "ESC" button to cancel

4 Installation

4.1 Opening/closing the housing

DANGER

Risk of death by electrocution

- ▶ Before opening the housing, disconnect the control unit from the power supply.
- ▶ Ensure the power supply cannot be switched on again unintentionally.
- ▶ Do not damage housing.
- ▶ Only switch power supply back on after closing the housing.

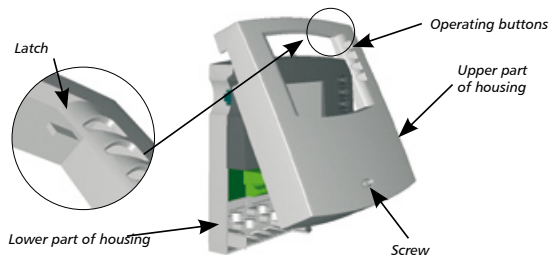
The upper part of the housing is connected by two latches with the lower part of the housing and is secured with a screw.

4.1.1 Opening the housing

- ▶ Loosen screw and remove upper part of the housing from above.

4.1.2 Closing the housing

- ▶ Tilt the upper part of the housing and place it on the lower part of the housing. In the process, insert the latches into the cut-outs of the lower part of the housing.
- ▶ Push the upper part of the housing downwards into place and insert the operating buttons into the cut-outs provided.
- ▶ Firmly close housing with screw.



4.2 Assembly



⚠ WARNING

Danger of electrocution and fire if assembled in a damp environment

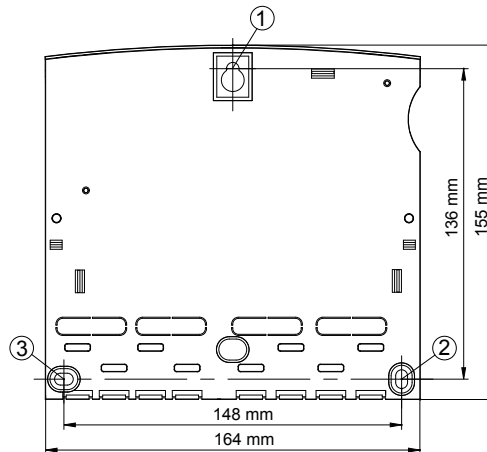
- ▶ Only assemble control unit in an area where is a sufficient degree of protection (see Chapter 13, "Technical Data").



⚠ CAUTION

Danger of injury and damage to housing when drilling.

- ▶ Do not use the housing as a drilling template.
- ▶ Choose a suitable installation location.
- ▶ Drill the upper mounting hole.
- ▶ Screw in the screw.
- ▶ Remove the upper part of the housing.
- ▶ Hang housing on cut-out ①.
- ▶ Mark lower mounting holes ②, ③.
- ▶ Remove the housing again.
- ▶ Drill the lower mounting holes.
- ▶ Hang housing again on cut-out ①.
- ▶ Screw housing into the lower mounting holes ② and ③.
- ▶ Install the upper part of the housing.



4.3 Electrical connection

DANGER

Risk of death by electrocution

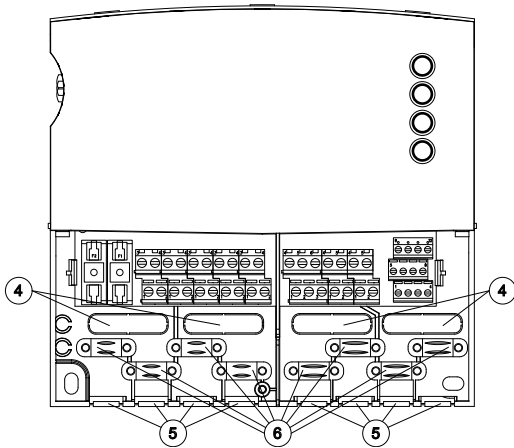
- ▶ Before opening the housing, disconnect the control unit from the power supply.
- ▶ All applicable legal and local provisions and regulations of the responsible power company must be observed.

NOTE

The device must be connected to the mains in accordance with the design requirements using a shockproof connector or, in the case of fixed electrical installation, using a separating unit for full separation.

4.3.1 Preparing the cable bushing

The cable bushing can be fed according to installation through the housing rear panel from behind ④ or through the housing base from below ⑤.



Feeding cables through from behind:

- ▶ Break off plastic covers ④ from the rear panel of the housing with a suitable tool.

WARNING

Danger of electrocution and fire from loose cables

- ▶ Provide external strain relief for cables.

Feeding cables through from underneath:

- ▶ Cut into plastic covers ⑤ from the left and right with a suitable tool and break off of housing.
- ▶ Secure cables in position ⑥ with supplied plastic links.



4.3.2 Connecting cables

- ▶ If intended or required for pumps/valves, connect grounding conductor to the control unit's grounding conductor connection terminals. The following points should be noted here:
 - Ensure the grounding conductor is also connected on the mains supply side to the control unit.
 - Only use one connection cable (up to 2.5mm²) with each terminal.
- ▶ The built-in strain relief is suitable for a sheath outer diameter of 7 mm to 11 mm.
- ▶ The screw terminals are approved for the connection of cables as follows:
 - Solid (rigid): $\leq 2.5 \text{ mm}^2$
 - Finely stranded (with conductor end sleeves): $\leq 1.5 \text{ mm}^2$
- ▶ Only use the original temperature sensor type (Pt1000) approved for the control unit.
- ▶ Note the following points:
 - The polarity of the temperature sensor contacts is irrelevant.
 - Route sensor cables separately from mains cables (minimum distance: 100 mm).
 - If inductive effects are expected from power cables, overhead wires, transformer stations, radio devices, television devices, amateur radio stations, microwave devices, etc., use shielded sensor cables.
 - The sensor cables can be extended up to a length of 100 m
- ▶ To lengthen the sensor cables, select from the following cable cross sections:
 - 0.75 mm² up to 50 m long
 - 1.5 mm² up to 100 m long
- ▶ Connect cables as per terminal connection diagram (see Chapter 4.5 and 4.6).

4.4 Disassembly



DANGER

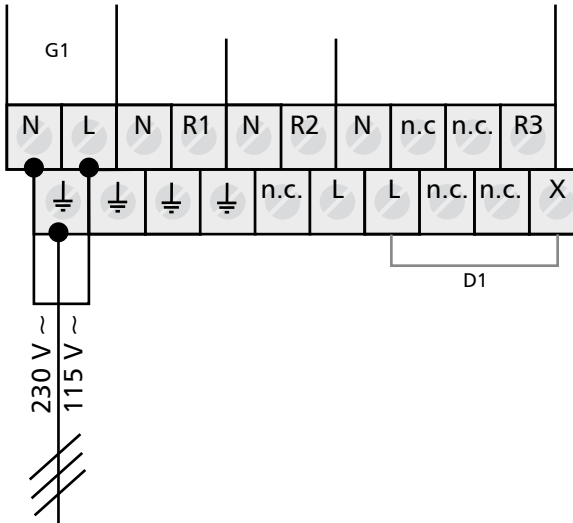
Risk of death by electrocution

- ▶ Disconnect control unit from power supply before disassembly.
- ▶ Disassemble control unit in the reverse order of assembly.

4.5 Terminal connection diagram

4.5.1 Mains connection

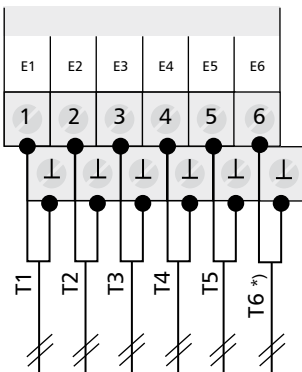
- Read the type of voltage supply from the type plate on the housing
- Grounding conductor must be connected
- At the minimum, use electrical cables of type H05 VV...(NYM...)



G1: Mains
 N: Neutral conductor
 L: Phase
 ↓: Grounding conductor
 D1: Wire jumper

4.5.2 Connection of inputs

- Inputs 1 – 5: for temperature sensor Pt1000
- Input 6: for temperature sensor Pt1000 or pulse generator for measuring volume flow (heat quantity counting)



E1: Input 1
 E2: Input 2
 E3: Input 3
 E4: Input 4
 E5: Input 5
 E6: Input 6
 T6 *): T6 or pulse generator

Inputs 1 – 5: Temperature measurement

Inputs



T1...T5

Temperature sensor Pt1000
(polarity not important)

Input 6: Temperature and pulse measurement

Temperature
measurement



T6

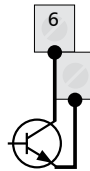
Pt1000 temperature sensor
(polarity not important)

Pulse measurement
via Reed relay



Standard:
Volume flow measurement
(polarity not important)

Pulse measurement
via open collector



Special case:
Volume flow measurement
(Observe polarity,
pulse signals up to max.
600 Hz)

4.5.3 Connection of outputs R1, R2 and R3

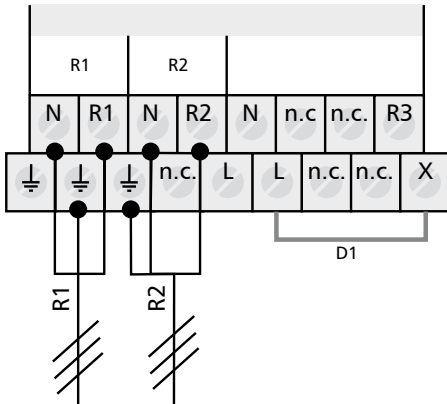
Outputs R1 and R2:

- Semi-conductor relay (Triac), also suitable for RPM control, see type plate for max. switching current

CAUTION

Avoiding damage and malfunctions

- ▶ When connecting an external relay or contactor or when connecting a pump with its own electronic RPM control, the RPM control of the control unit output must be deactivated (see Chapter 7.3, "RPM control parameter").

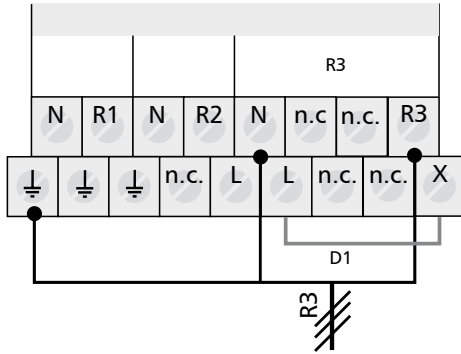


N: Neutral conductor
 ±: Grounding conductor
 R1: Output 1
 R2: Output 2
 D1: Wire jumper

N: Neutral conductor
 ⚡: Grounding conductor
 R3: Switched phase
 D1: Wire jumper

Output R3: Switch output or floating output

- Switch output 230 V~ (115 V~ optional) using electromechanical relay; see type plate for max. switching current; wire jumper must be connected.



- Floating output using electromechanical relay; wire jumper must be removed.

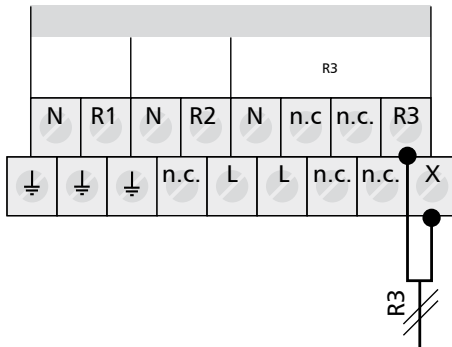
⚠ DANGER

Risk of death by electrocution

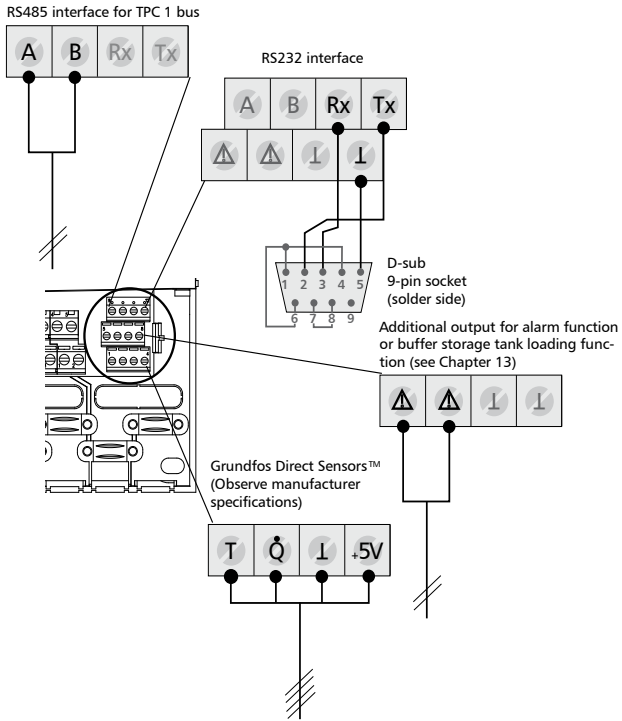
- ▶ When using as floating output, ensure that no connections can come into contact with mains voltage.



N: Neutral conductor
 ⚡: Grounding conductor
 R3: Switched phase
 D1: Wire jumper



4.5.4 RS232, RS485 for TPC 1 bus, additional output and Grundfos Direct Sensors™ input



- A: RS485 A
- B: RS485 B
- Rx: RS232 Rx
- Tx: RS232 Tx
- ▲: Additional output
- ▼: Ground signal
- T: Grundfos Direct Sensors™ temperature
- Q: Grundfos Direct Sensors™ flow
- +5V: Grundfos Direct Sensors™ supply

4.6 Connection to the TPC 1 bus

4.6.1 TPC 1 bus

General information on the TPC 1 bus

If required (e.g. if several expansion modules are intended to be controlled), the control unit offers the possibility of expanding the range of functions. For this purpose, additional devices are connected to the control unit via the TPC 1 bus. The connected devices can exchange data over the TPC 1 bus and their control can be optimally customised in this way to the overall system.

The TPC 1 bus is based on an RS485 interface and is designed according to the master/slave principle. All devices on the TPC 1 bus are operated using a single device, the master. The current measured values and operating states of all bus stations can be queried centrally using the control unit display on the master device.

Design

A TPC 1 bus network consists of **one** master and up to 21 slaves. The master is the only device to have a display and keys which can be used to centrally operate all other TPC 1 bus stations.

The slaves are subdivided into device types such as the following:

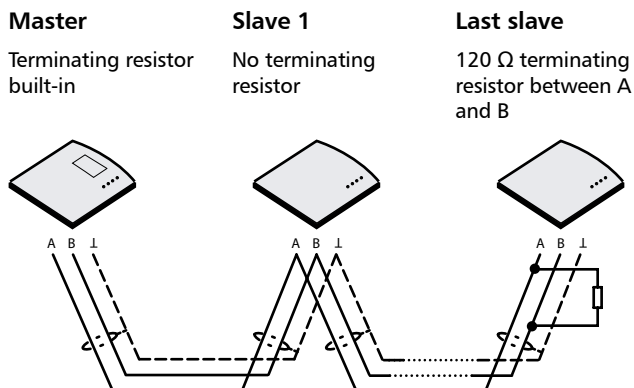
- Heating circuit control
- Expansion module

A maximum of three devices of the same device type can be connected to the TPC 1 bus and addressed explicitly.

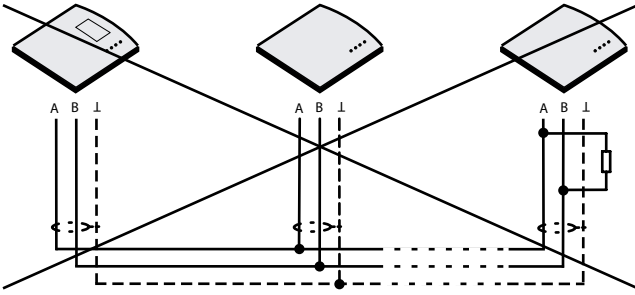
All bus stations are connected with each other in sequence via a two-core, shielded bus cable. The cable always starts from the master.

The beginning and end of the bus cable have to be terminated with a terminating resistor. The terminating resistor has already been integrated into the master at the factory. A terminating resistor and further information on the TPC 1 bus are attached to the slaves. Branch lines from the bus cable to the devices must be avoided.

The following diagram illustrates the design:

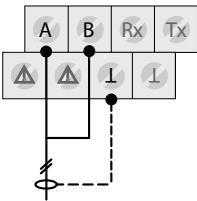


Do not use branch lines.



Connection

- Terminals A and B to two-core bus cable.
- Signal ground must be connected to shielding.
- Cable requirements (e.g. Li2YCY):
 - Two-core, cabled in pairs, shielded
 - Min. cross section of 0.22 mm²
 - Max. cable length of 100 m



Addressing slave devices

The explicit addressing of slaves takes place using the sliding switch on the side of the device. The switch has three positions.

Position	Address
Top	1
Middle	2
Bottom	3

When addressing, the following points should be noted:

- The addressing of devices of the same type must always begin with the lowest address (top switch position).
The first device is therefore assigned address 1, the second gets address 2, etc.
- The same address may never be set for devices of the same type.

NOTE

The sliding switch on the master is also used for selecting the operating modes (see Chapter 6, "Operating Modes").



4.7 Starting up devices on the TPC 1 bus

Switch on power supply for the individual devices. The order in which they are switched on is irrelevant.

- The master of course initiates communication with all devices connected to the TPC 1 bus.
No communication settings are needed.
- The slaves automatically use the settings from the master for date, time and language.
- The permanent, automatic device recognition enables additional devices to be seamlessly integrated into the TPC 1 bus later.

The installation of new devices is completed during initial startup wizard (see Chapter 5, "Initial Startup"). The settings needed for operation are set here.

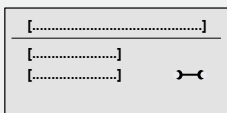
NOTE

If a bus station is not recognised, check cabling and address of bus station. Device recognition can take several minutes. The TPC 1 bus can be run if software 2.x and above is on the bus master.

4.8 Operating the expansion module using the master

After connecting slave devices to the master, the additional "Device selection" display becomes available (see Chapter 7, "Settings").

Every connected device can be selected in the device selection list and operated from the master.



Sample display:

Device selection
Solar contr.
Expansion 1

Device selection

✓ *Status display is shown.*

► **ESC:** Press to access device selection.

⇒ *Device selection is shown on the screen.*

The connected devices are automatically added to the list of devices. Devices that are not fully ready for operation (e.g. initial startup has not been completed as yet or an error has been identified) are identified with the symbol of a spanner.

NOTE

Newly connected slaves are added to the list of TPC 1 bus devices within one minute.

► Check the cabling and, if applicable, the terminating resistor, the address and software version of the bus master if a new device has not been recognised (see Chapter 4.6, "Connection to the TPC 1 bus").

► $\triangle \nabla$: Select the device to be operated.

► **SET:** Press this button.

⇒ *You are now operating the selected device.*

Proceed with the initial startup in Chapter 5.

4.9 Removing devices from the TPC 1 bus

Disassemble the device as described in Chapter 4.4.

Only devices that are no longer recognised by the bus master can be removed from the device list. These are identified with a spanner.

- ✓ *Status display is shown.*
- ▶ **ESC:** Press to access device selection.
- ▶ $\triangle \nabla$: Select device to be removed.
- ▶ **SET:** Press to remove device from the list.
- ▶ **SET:** Press to confirm your entry.
 - ⇒ *The device was removed from the list.*

5 Initial Startup

In order to start up a newly connected control unit, several basic settings first need to be made.

The initial startup wizard ensures that all necessary information required for the control unit's operation is requested.

- ✓ *Select the control unit from device selection list (see Chapter 4.8, "Operating expansion module using the master").*
- ▶ **SET:** Press this button.
 - ⇒ *The display "Perform initial startup for this device now?" is shown.*
- ▶ **SET:** Press this button.
 - ⇒ *The display for selection of functions is shown (see Chapter 7.1.1, "Accessing functions").*

6 Operating Modes

The operating modes "OFF", "Automatic" and "Manual" are available. The selection of the relevant operating mode occurs with the aid of the sliding switch on the side of the master device. The selected operating mode is adopted by all devices present on the bus.

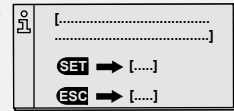
6.1 "OFF" operating mode

- ▶ In order to switch all devices present on the bus to "OFF", the operating switch on the master device must be slid to the bottom position.
- ▶ **ESC:** Press to access device selection.
 - ⇒ *Device selection is shown on the screen.*
- ▶ $\triangle \nabla$: Select control unit.
- ▶ **SET:** Confirm.
 - ⇒ *A display is shown with "OFF", control unit name, version of control unit software and number of selected system. The display has a red back-light.*
- ▶ **ESC:** Back to device selection.

All outputs (R1, R2, R3) are switched off in the "OFF" operating mode.

NOTE

The "OFF" switch position is the manufacturer delivery default.



[No response!
Remove device?]

[yes]

[no]



Sample display
[Expansion x]



[Solar control switch
setting]

6.2 "Automatic" operating mode

CAUTION

Damage to pump due to dry run

The control unit may only be set to "Automatic" if the system has been filled.



[Solar control switch setting]

- ▶ In order to switch outputs to "Automatic", slide the operating switch on the master device to the middle position.

⇒ *The status display is shown on the screen.*

This operating mode is the automatic mode of the control unit and must be set for automatic operation.

NOTE

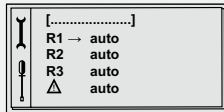
- ▶ The operating switch should always be on "Automatic" during normal system operation.

6.3 "Manual" operating mode

CAUTION

Damage to pump due to dry run

The control unit may only be set to "Manual" if the system has been filled.



Sample display
[Expansion x]



[Solar control switch setting]

During the initial startup or a function test, the outputs of the control unit can be switched on manually.

- ▶ In order to switch outputs on manually, slide the operating switch on the master device to the top position.
 - ⇒ *The display has a red back-light and a settings window is shown.*
- ▶ **ESC:** Press this button.
 - ⇒ *Device selection is shown on the display (see Chapter 4.8).*
- ▶ $\Delta \nabla$: Select output.
- ▶ **SET:** Switch selected output to "on", "off", or "auto".

NOTE

on: Output is always switched on without reference to safety limiters and temperatures.

off: Output is always switched off.

auto: Output is switched on or off depending on temperatures and settings.

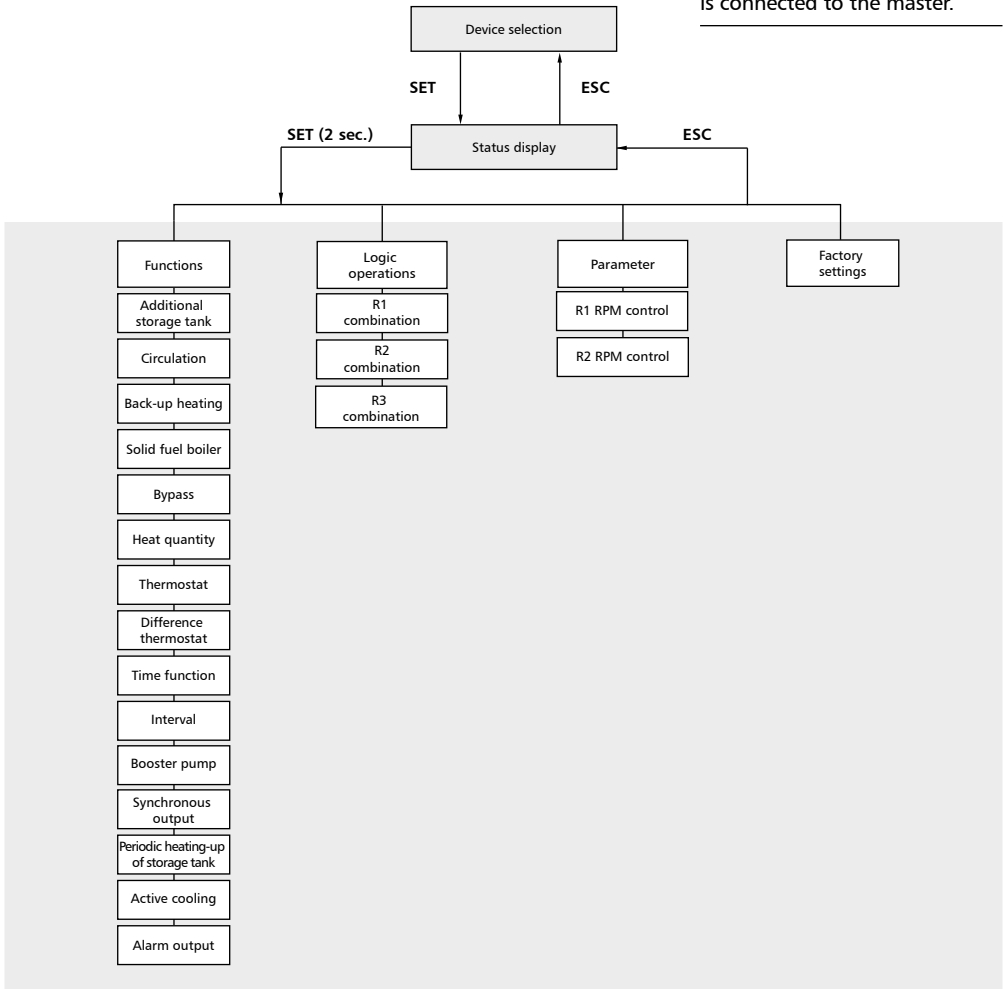
- ▶ **ESC:** Close settings window.
 - ⇒ *The current measured values can now also be queried for checking.*
- ▶ $\Delta \nabla$: Query measured values.
- ▶ **SET:** Reopen settings window.

7 Settings

Menu overview

NOTE

The device selection display is only available if at least one slave is connected to the master.





Display: 3
[Functions]

7.1 Functions

The “Functions” submenu is used to select and configure individual control unit functions.

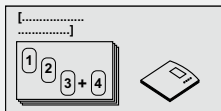
The following functions can be accessed:

- Additional storage tank
- Circulation
- Back-up heating
- Solid fuel boiler
- Bypass
- Heat quantity
- Thermostat
- Difference thermostat
- Time function
- Interval
- Booster pump
- Synchronous output
- Periodic heating-up of storage tank
- Active cooling
- Alarm output

An overview of factory settings and the possible setting ranges can be found in the table in Chapter 13.3, “Parameter values for functions”.

7.1.1 Accessing functions

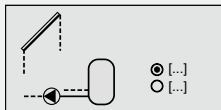
Before you make settings within a function, you must perform the following steps:



[Additional storage tank]

7.1.2 Selection function

- ▶ **SET:** Press for approx. 2 sec.
- ▶ $\triangle \nabla$: Select “Functions” menu item.
- ▶ **SET:** Open “Functions” submenu.
- ▶ $\triangle \nabla$: Select output.



[off]
[on]

7.1.3 Activating/deactivating functions

- ▶ **SET:** Press this button.
⇒ *The display for activating (on) or deactivating (off) the function is shown.*
- ▶ **SET:** Press for approx. 2 sec.
⇒ *The function is activated or deactivated.*

NOTE

If a function cannot be activated, an information window is shown (see Chapter 11, “Information windows”).

7.1.4 Changing settings values

- ✓ *Function display is selected.*
- ▶ **SET:** Press this button.
⇒ *Settings value flashes.*
- ▶ $\triangle \nabla$: Set value.
- ▶ **SET:** Press this button.
⇒ *Value is confirmed.*

NOTE

If a setting is not confirmed within 60 sec with SET, the newly set value is discarded and the change settings mode is exited. The control unit likewise returns to the display level after 60 sec if no value is changed.

In order to be able to start fast access, press and hold the button \triangle or ∇ .

7.1.5 Selecting outputs

- ▶ ∇ : Press this button.
 - ⇒ *The display for setting output is shown.*
- ▶ **SET**: Press this button.
 - ⇒ *Output (?) flashes.*
- ▶ $\triangle\nabla$: Select output.
- ▶ **SET**: Confirm.

NOTE

R? denotes an output that has not been selected yet. Only those outputs can be selected that have not been needed as yet by the relevant system. An output can be simultaneously assigned two functions. This is indicated by an information window. Where there is a double assignment, a switch-on logic must also be stipulated.

7.1.6 Selecting outputs if double assignment is indicated

- ▶ **SET**: Press this button.
 - ⇒ *An information window is shown on the display.*
- ▶ **SET**: Press this button.
 - ⇒ *Information windows for both functions using the same output are displayed.*
- ▶ **SET**: Press this button.
- ▶ $\triangle\nabla$: Select the function that is to be used for the output.
- ▶ **SET**: Confirmed.
- ▶ **ESC**: Press this button.
 - ⇒ *Function display is shown.*

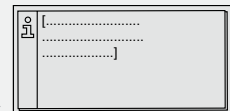
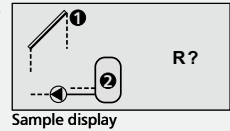
7.1.7 Setting RPM control

NOTE

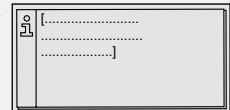
RPM control is only possible if output R1 or R2 has been selected. If two functions are using the same output, RPM control can only be activated for one of the two functions. If RPM control is already activated for this output, this is indicated by a message window.

- ▶ **SET**: Press this button.
 - ⇒ *RPM control is activated.*
- ▶ ∇ : Press this button.

According to the function selected, two types of RPM control can be chosen from.

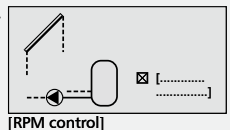


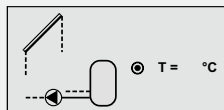
is being used twice!
Logic necessary!
SET -> ok
ESC -> go back



Sample display:
R1 is being used
by:

- Thermostat 2
- Diff. Thermostat 3





[RPM control]

Type 1 – “Target temperature loading”

- ▶ **SET:** Press this button.
 - ⇒ *The target temperature value (e.g. $T=60^{\circ}\text{C}$) flashes on the display.*
- ▶ $\Delta\nabla$: Set target temperature.
- ▶ **SET:** Confirm.
 - ⇒ *Settings have been saved.*

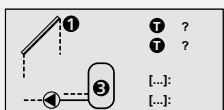
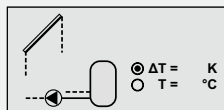
Type 2 – “Target temperature or difference temperature loading”

Select from loading strategy for difference or target temperature control.

- ▶ **SET:** Press for approx. 2 sec.
 - ⇒ *Select either difference (dT) or target temperature control (T).*

Set difference or target temperature value

- ▶ **SET:** Press this button.
 - ⇒ *The difference temperature value (e.g. $dT=8\text{ K}$) flashes on the display.*
- ▶ $\Delta\nabla$: Set difference temperature value.
- ▶ **SET:** Confirm.
 - ⇒ *The target temperature value (e.g. $T=60^{\circ}\text{C}$) flashes on the display.*
- ▶ $\Delta\nabla$: Set target temperature.
- ▶ **SET:** Confirm.
 - ⇒ *Settings have been saved.*



Sample display

Which device should provide sensor value?

- Solar control
- Expansion 1
- Expansion 2

Solar control
Which sensor?

- > T1
- > T2

.....

7.1.8 Selecting inputs

NOTE

All inputs on devices operated on the TPC 1 bus are available.

- ▶ **SET:** Press this button.
 - ⇒ *Sensor (?) flashes.*
- ▶ $\Delta\nabla$: Select device.
 - ⇒ *The display “Which device should deliver sensor value?” is shown.*
- ▶ $\Delta\nabla$: Select device.
- ▶ **SET:** Confirm.
 - ⇒ *The display “Which sensor?” is shown.*
- ▶ $\Delta\nabla$: Select sensor.
- ▶ **SET:** Confirm.

NOTE

T? denotes an input that has not been selected yet. Inputs can receive double assignments. This is indicated by an information window.

7.1.9 Exiting the menu

- ▶ **ESC:** Press this button.

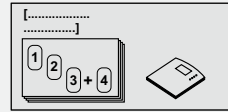
7.1.10 Additional storage tank funktion

NOTE

This function can only be selected if a solar control unit is in the bus.

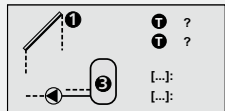
In addition to the solar control unit's multi-tank systems, this function enables the inclusion of an additional storage tank in the system. The additional storage tank is always loaded last.

- ✓ "Functions" submenu selected, see "Selecting functions", (Chapter 7.1.2).
- ✓ Heat quantity activated, see "Activating functions" (Chapter 7.1.3).
- ▶ ▽: Press this button.
 - ⇒ The display for setting output is shown, see "Selecting outputs" (Chapter 7.1.5).
- ▶ ▽: Press this button.
 - ⇒ The display for setting sensors is shown, see "Selecting inputs" (Chapter 7.1.8).
 - ⇒ Then set switch-on and switch-off temperature, see "Changing settings values" (Chapter 7.1.4).
- ▶ ▽: Press this button.
 - ⇒ The display for setting max./min. collector temperatures is shown, see "Changing settings values" (Chapter 7.1.4).
- ▶ ▽: Press this button.
 - ⇒ The display for setting max. storage tank temperatures is shown, see "Changing settings values" (Chapter 7.1.4).
- ▶ ▽: Press this button.
 - ⇒ The display for setting RPM control is shown, see "Setting RPM control" (Chapter 7.1.7, type 2)



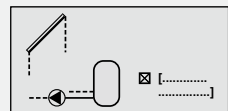
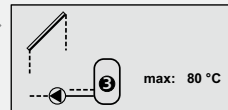
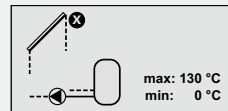
Display: 1.1

[Additional storage tank]

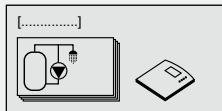


[on]

[off]



[Speed controlled]



Display: 1.2
[Circulation]

7.1.11 Circulation function

A circulation pump can be controlled dependent on time, temperature or pulse. These control types can also be combined with one another.

Time control: Time switch with 3 time windows.

Temperature control: If the temperature in the circulation return falls below the "on" value, the pump is switched on until the temperature reaches the "off" value.

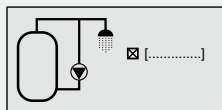
NOTE

In order to avoid measurement errors due to the heat conduction of the tube, a minimum distances of 1.50 m to the tank should be adhered to when installing the circulation sensor.

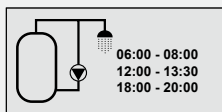
Pulse control: If the circulation function is requested via a pulse (e.g. by a flow switch), the pump runs for the set circulation duration. No renewed requests are then accepted for the set wait time.

Activating time control

- ✓ "Functions" submenu selected, see "Selecting functions", (Chapter 7.1.2).
- ✓ Circulation activated, see "Activating functions" (Chapter 7.1.3).
- ✓ Outputs selected, see "Selecting outputs" (Chapter 7.1.5).
- ▶ ▽: Press this button.
 - ⇒ "Time-controlled" display is shown.
- ▶ **SET:** Press this button.
 - ⇒ Time control is activated.
- ▶ ▽: Press this button.
 - ⇒ The display for setting time period is shown.
- ▶ **SET:** Press this button.
 - ⇒ The time flashes on the display.
- ▶ △▽: Set time period.
- ▶ **SET:** Confirm value and go to next value.
 - ⇒ Settings have been saved.



[Time-controlled]



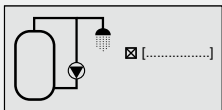
[Temperature-controlled]

NOTE

As the switch-on time must always occur before the switch-off time, the switch-off value is shifted accordingly if the switch-on value is changed. It is not possible to change the switch-off value to be less than the switch-on value.

Activating temperature control

- ✓ "Functions" submenu selected, see "Selecting functions", (Chapter 7.1.2).
- ✓ Circulation activated, see "Activating functions" (Chapter 7.1.3).
- ✓ Outputs selected, see "Selecting outputs" (Chapter 7.1.5).
- ▶ ▽: Press this button.
 - ⇒ "Temperature-controlled" display is shown.
- ▶ **SET:** Press this button.
 - ⇒ Temperature control is activated.
- ▶ ▽: Press this button.



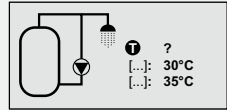
[Temperature-controlled]

⇒ The display for setting temperature input and the “on” and “off” value is shown.

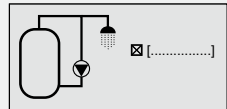
- ▶ **SET:** Press this button.
 - ⇒ “T” (temperature input for circulation line) flashes on the display.
- ▶ $\triangle \nabla$: Select input (see “Selecting inputs”, Chapter 7.1.8).
 - ⇒ After confirmation of temperature sensor, the “on” value flashes.
- ▶ $\triangle \nabla$: Set “on” value.
- ▶ **SET:** Confirm.
 - ⇒ After confirmation of “on” value, the “off” value flashes.
- ▶ $\triangle \nabla$: Set “off” value.
- ▶ **SET:** Confirm and finish.
 - ⇒ Settings have been saved.

Activating pulse control

- ✓ “Functions” submenu selected, see “Selecting functions”, (Chapter 7.1.2).
- ✓ Circulation activated, see “Activating functions” (Chapter 7.1.3).
- ✓ Outputs selected, see “Selecting outputs” (Chapter 7.1.5).
- ▶ ∇ : Press this button.
 - ⇒ “Pulse-controlled” display is shown.
- ▶ **SET:** Press this button.
 - ⇒ Pulse control is activated.
- ▶ ∇ : Press this button.
 - ⇒ The display for setting pulse input and circulation and wait times is shown.
- ▶ **SET:** Press this button.
 - ⇒ Pulse input flashes.
- ▶ $\triangle \nabla$: Select input (see “Selecting inputs”, Chapter 7.1.8).
 - ⇒ After confirmation of input, circulation duration flashes.
- ▶ $\triangle \nabla$: Set circulation duration.
- ▶ **SET:** Confirm.
 - ⇒ After confirmation of circulation duration, wait time flashes.
- ▶ $\triangle \nabla$: Set wait time.
- ▶ **SET:** Confirm wait time and finish.
 - ⇒ Settings have been saved.
- ▶ **ESC:** Exit circulation submenu.



[on]
[off]



[Pulse-controlled]

Input:	?
Circulation:	2 min.
Wait time:	10 min.



Display: 1.3

[Back-up heating]

7.1.12 Back-up heating function

This function enables an output to be thermostatically controlled for the additional heating of the solar tank using an oil or gas burner. This function can also be time-limited by using a time control.

There are two types of back-up heating: standard back-up heating and solar-optimised back-up heating.

NOTE

The type "solar-optimised back-up heating" is only available in connection with a master solar control unit and cannot be used with a master heating circuit control.

Standard back-up heating: This back-up heating type enables a switch-on and switch-off temperature threshold to be set and for this to then also be connected with a time switch..

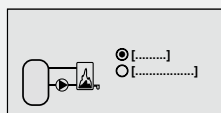
Solar-optimised back-up heating: Identical settings options as with standard back-up heating. In addition, back-up heating can be disabled while the solar pump is running.

Time control: Time switch with 3 time windows.

Temperature control: If the temperature in the upper area of the tank falls below the "on" value, the output is switched on until the temperature reaches the "off" value.

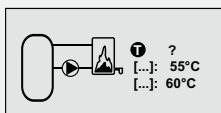
Programming and setting the function

- ✓ "Functions" submenu selected, see "Selecting functions", (Chapter 7.1.2).
- ✓ Back-up heating activated, see "Activating functions" (Chapter 7.1.3).
- ✓ Outputs selected, see "Selecting outputs" (Chapter 7.1.5).
- ✓ You are now prompted to choose either the type "standard back-up heating" or "solar-optimised back-up heating".



[Standard]

[Solar-optimised]



[on]

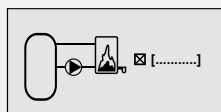
[off]

Standard back-up heating:

- ▶ ▽: Press this button.
 - ⇒ The display for setting temperature input and the "on" and "off" value is shown.
- ▶ **SET:** Press this button.
 - ⇒ "T" (temperature input for tank) flashes on the display.
- ▶ ▽▽: Select input (see "Selecting inputs", Chapter 7.1.8).
 - ⇒ After confirmation of temperature sensor, the "on" value flashes.
- ▶ ▽▽: Set "on" value.
- ▶ **SET:** Confirm.
 - ⇒ After confirmation of "on" value, the "off" value flashes.
- ▶ ▽▽: Set "off" value.
- ▶ **SET:** Confirm.
 - ⇒ Settings have been saved.

Activating time control

- ▶ ▽: Press this button.
 - ⇒ The display "Time-controlled" is shown.
- ▶ **SET:** Press this button.
 - ⇒ Time control is activated.
- ▶ ▽: Press this button.



[Time-controlled]

- ⇒ *The display for setting time period is shown.*
- ▶ **SET:** Press this button.
 - ⇒ *Time value flashes.*
- ▶ $\triangle \nabla$: Set time value.
- ▶ **SET:** Confirm value and go to next value.
 - ⇒ *Settings have been saved.*

NOTE

As the switch-on time must always occur before the switch-off time, the switch-off value is shifted accordingly if the switch-on value is changed. It is not possible to change the switch-off value to be less than the switch-on value.

Solar-optimised back-up heating

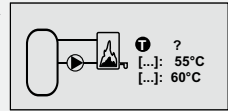
- ▶ ∇ : Press this button.
 - ⇒ *The display for setting temperature input and the "on" and "off" value is shown.*
- ▶ **SET:** Press this button.
 - ⇒ *"T" (temperature input for tank) flashes on the display.*
- ▶ $\triangle \nabla$: Select input (see "Selecting inputs", Chapter 7.1.8).
 - ⇒ *After confirmation of temperature sensor, the "on" value flashes.*
- ▶ $\triangle \nabla$: Set "on" value.
- ▶ **SET:** Confirm.
 - ⇒ *After confirmation of "on" value, the "off" value flashes.*
- ▶ $\triangle \nabla$: Set "off" value.
- ▶ **SET:** Confirm.
 - ⇒ *Settings have been saved.*
- ▶ ∇ : Press this button.
 - ⇒ *"Back-up heating disabled during solar operation" display is shown.*
- ▶ **SET:** Press this button.
 - ⇒ *The display display "Back-up heating disabled during solar operation" is activated.*

Activating time control

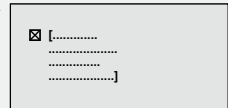
- ▶ ∇ : Press this button.
 - ⇒ *"Time-controlled" display is shown.*
- ▶ **SET:** Press this button.
 - ⇒ *Time control is activated.*
- ▶ ∇ : Press this button.
 - ⇒ *The display for setting time period is shown.*
- ▶ **SET:** Press this button.
 - ⇒ *Time value flashes.*
- ▶ $\triangle \nabla$: Set time value.
- ▶ **SET:** Confirm value and go to next value.
 - ⇒ *Settings have been saved.*

NOTE

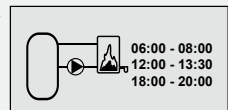
As the switch-on time must always occur before the switch-off time, the switch-off value is shifted accordingly if the switch-on value is changed. It is not possible to change the switch-off value to be less than the switch-on value.



[on]
[off]



[Back-up heating disabled during solar operation]





Display: 1.4

[Solid fuel boiler]

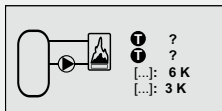
7.1.13 Solid fuel boiler function

This function enables a pump to be controlled for heating a tank using a solid fuel boiler.

The pump is switched on if the temperature difference between the solid fuel boiler and tank exceeds the "on" value, the solid fuel boiler temperature is above the "min" value and the tank temperature is below the "max" value. The pump runs until the temperature difference is below the "off" value, the solid fuel boiler temperature falls below the "min" value or the tank temperature reaches the "max" value.

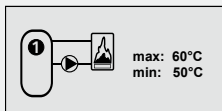
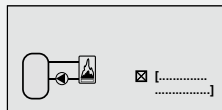
Programming and setting the function

- ✓ "Functions" submenu selected, see "Selecting functions", (Chapter 7.1.2).
- ✓ Back-up heating activated, see "Activating functions" (Chapter 7.1.3).
- ✓ Select output, see "Selecting outputs" (Chapter 7.1.5).
- ▶ ▽: Press this button.
 - ⇒ The inputs and on and off temperatures are shown on the display.
- ✓ Input selected, (see "Selecting inputs", Chapter 7.1.8).
- ▶ ▽: Press this button.
 - ⇒ The "on" value flashes on the display.
- ▶ △▽: Set "on" value.
- ▶ **SET**: Confirm.
 - ⇒ After confirmation of "on" value, the "off" value flashes.
- ▶ △▽: Set "off" value.
- ▶ **SET**: Confirm.
 - ⇒ Settings have been saved.

[on]
[off]

Program temperature limits for solid fuel boiler and tank

- ▶ ▽: Press this button.
 - ⇒ The display for setting temperature limits for tank and solid fuel boiler is shown.
- ▶ **SET**: Press this button.
 - ⇒ "Max" (maximum temperature value for tank) flashes on the display.
- ▶ △▽: Set "max" value.
- ▶ **SET**: Confirm.
 - ⇒ "min" (minimum temperature value for solid fuel boiler) flashes on display.
- ▶ △▽: Set "min" value.
- ▶ **SET**: Confirm.
 - ⇒ Settings have been saved.

[RPM
control]

RPM control

- ⇒ The display for setting RPM control is shown, see "Setting RPM control" (Chapter 7.1.7, type 1).

7.1.14 Bypass function

This function enables a bypass in the solar circuit to be switched on or off using a switch valve. As a result, primarily large solar energy systems have the collector circuit initially warmed with a large volume of heat transfer fluid before the tank is switched on.

To that end, the temperature before the valve in the solar circuit is monitored.

The tank remains disconnected from the solar circuit due to the bypass until the solar circuit temperature has reached at least 15°C and the solar circuit temperature is warmer than the lower tank temperature. Only at this point is the tank then connected to the solar circuit. If the solar circuit temperature falls to 10°C or if the solar circuit temperature is below that of the tank, a bypass is again switched on and the tank is no longer loaded.

The switch-on/switch-off values are explicitly saved in the control unit.

NOTE

In a disconnected state, the switch value must be set in such a way that the tank is not loaded.

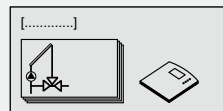
Setting input for solar circuit temperature and output for bypass

- ✓ "Functions" submenu selected, see "Selecting functions", (Chapter 7.1.2).
- ✓ Bypass activated, see "Activating functions" (Chapter 7.1.3).
- ✓ Select output, see "Selecting outputs" (Chapter 7.1.5).
- ✓ Select input, see "Selecting inputs" (Chapter 7.1.8).

CAUTION

There is a danger of frost damage to the external heat exchanger with solar energy systems that have long pipelines in the frost area.

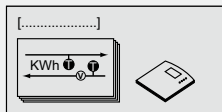
- ▶ Use bypass valve with a drive that has a switch time of less than 45 seconds.



Display: 1.5

[Bypass]





Display: 1.6

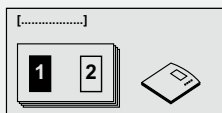
[Heat quantity]

7.1.15 Heat quantity function

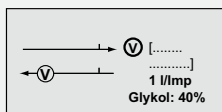
The control unit has two heat quantity counter functions. By selecting a heat quantity counter, output measurement can be switched on or off. In this way, for example, the heat quantity fed into the tank by the solar energy system can be measured. The temperatures for both supply and return and the flow volume of the solar energy system must be measured here. The flow can be read using a volume flow transmitter or a Grundfos Direct Sensors™. As the heat quantity is dependent on the proportion of glycol in the fluid, this is taken into account in the calculation. Using these values the control unit calculates the heat quantity and indicates this on the display. The first settings to be specified are the method of determining volume flow and, depending on this, the flow volume / pulse or the Grundfos Direct Sensors™ type

NOTE

When using the Grundfos Direct Sensors™, note the manufacturer's technical data.



[Heat quantity]



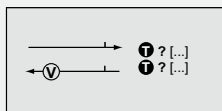
[Pulse generator]

Setting flow calculation and proportion of glycol

- ✓ "Functions" submenu selected, see "Selecting functions", (Chapter 7.1.2).
- ✓ Select a heat quantity counter ($\Delta \nabla$) and confirm with **SET**.
- ✓ Heat quantity activated, see "Activating functions" (Chapter 7.1.3).
- ▶ ∇ : Press this button.
 - ⇒ The display for setting method of flow calculation and proportion of glycol is shown.
- ▶ **SET**: Press this button.
 - ⇒ The method of flow calculation flashes on the display.
- ▶ $\Delta \nabla$: Select either "Pulse generator" or use of a "Grundfos Direct Sensors™".
- ▶ **SET**: Confirm.
 - ⇒ The pulse value (if "Pulse generator" is selected) or sensor type (if "Direct Sensor" is selected) flashes on the display.
- ▶ $\Delta \nabla$: Enter value or type for selected flow sensor.
 - In case of "Pulse generator", see "Parameter values for functions" (Chapter 13.3).
 - In case of "Direct Sensor", select the sensor type.
- ▶ **SET**: Confirm value.
 - ⇒ "Proportion of glycol" flashes on display.
- ▶ $\Delta \nabla$: Set value.
- ▶ **SET**: Confirm.
 - ⇒ Settings have been saved.

Assign inputs for temperature sensors

- ▶ ∇ : Press this button.
 - ⇒ The display for setting temperature inputs is shown.
- ▶ **SET**: Press this button.
 - ⇒ "T" (input for supply temperature) flashes on the display.
- ▶ $\Delta \nabla$: Select input (see "Selecting inputs", Chapter 7.1.8).
 - ⇒ "T" (input for return temperature) flashes on the display.
- ▶ $\Delta \nabla$: Select input (see "Selecting inputs", Chapter 7.1.8).
- ▶ **SET**: Confirm.

[hot]
[cool]

7.1.16 Thermostat function

The control unit has three thermostats that can be selected. This function enables an output of the control unit to be controlled depending on a pre-selected temperature range. According to the temperature setting, the thermostat function can be activated either when a temperature is fallen below (heat) or exceeded (cool).

Programming and setting the function

- ✓ "Functions" submenu selected, see "Selecting functions", (Chapter 7.1.2).
- ✓ Select a thermostat ($\Delta \nabla$) and confirm with **SET**.
- ✓ Thermostat activated, see "Activating functions" (Chapter 7.1.3).
- ✓ Select output, see "Selecting outputs" (Chapter 7.1.5).
- ✓ Select input, see "Selecting inputs" (Chapter 7.1.8).
 - ⇒ The "on" value flashes on the display.
- ▶ $\Delta \nabla$: Set "on" value.
- ▶ **SET**: Confirm.
 - ⇒ After confirmation of "on" value, the "off" value flashes.
- ▶ $\Delta \nabla$: Set "off" value.
- ▶ **SET**: Confirm.
 - ⇒ Settings have been saved.

NOTE

The "on" and "off" values may not be the same as the thermostat will otherwise remain inactive.

Activating time control

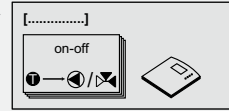
- ▶ ∇ : Press this button.
 - ⇒ "Time-controlled" display is shown.
- ▶ **SET**: Press this button.
 - ⇒ Time control is activated.
- ▶ ∇ : Press this button.
 - ⇒ The display for setting time period is shown.
- ▶ **SET**: Press this button.
 - ⇒ Time value flashes.
- ▶ $\Delta \nabla$: Set time value.
- ▶ **SET**: Confirm value and go to next value.
 - ⇒ Settings have been saved.

NOTE

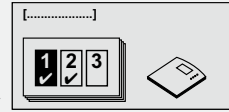
As the switch-on time must always occur before the switch-off time, the switch-off value is shifted accordingly if the switch-on value is changed. It is not possible to change the switch-off value to be less than the switch-on value.

RPM control

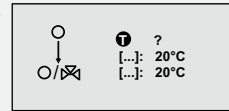
- ⇒ The display for setting RPM control is shown, see "Setting RPM control" (Chapter 7.1.7, type 1)



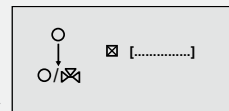
Display: 1.7
[Thermostat]



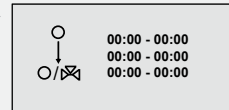
[Thermostat]



[on]
[off]



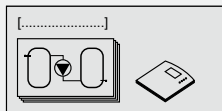
[Time-controlled]



[RPM control]



[RPM control]



Display: 1.8

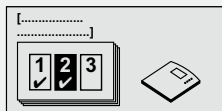
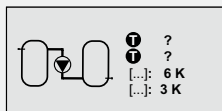
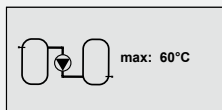
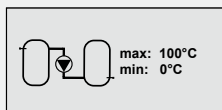
[Difference Thermostat]

7.1.17 Difference thermostat function

The control unit has three difference thermostats that can be selected. This function enables an output of the control unit to be controlled depending on a pre-selected temperature difference.

If the temperature difference climbs above the pre-selected "on" value, the output is switched on until the temperature difference falls below the "off" value. For functional optimisation, the unloading of the heat source can be limited to a certain temperature range and the loading of the heat target can be limited to a maximum value.

In addition, there is the option to place a time limit on the difference thermostat function.

[Difference
Thermostat][on]
[off]

Setting inputs and switch values

- ✓ "Functions" submenu selected, see "Selecting functions", (Chapter 7.1.2).
- ✓ Select a thermostat ($\Delta\nabla$) and confirm with **SET**.
- ✓ Difference thermostat activated, see "Activating functions" (Chapter 7.1.3).
- ✓ Select output, see "Selecting outputs" (Chapter 7.1.5).
- ✓ Input selected, (see "Selecting inputs", Chapter 7.1.8).
 - ⇒ After confirmation of input for heat source and heat target, the "on" value flashes.
- ▶ $\Delta\nabla$: Set "on" value.
- ▶ **SET**: Confirm.
 - ⇒ After confirmation of "on" value, the "off" value flashes.
- ▶ $\Delta\nabla$: Set "off" value.
- ▶ **SET**: Confirm.
 - ⇒ Settings have been saved.

Setting limit values for heat source

- ▶ ∇ : Press this button.
 - ⇒ The display for setting limit values (max, min) of heat source is shown.
- ▶ **SET**: Press this button.
 - ⇒ "max" (maximum value for heat source) flashes on display.
- ▶ $\Delta\nabla$: Set maximum value.
- ▶ **SET**: Confirm.
 - ⇒ After confirmation of maximum value, "min" (minimum value of heat source) flashes.
- ▶ $\Delta\nabla$: Set minimum value.
- ▶ **SET**: Confirm.
 - ⇒ Settings have been saved.

Setting limit values for heat target

- ▶ ∇ : Press this button.
 - ⇒ The display for setting limit value of heat target is shown.
- ▶ **SET**: Press this button.
 - ⇒ "max" (maximum value for heat target) flashes on display.
- ▶ $\Delta\nabla$: Set maximum value.
- ▶ **SET**: Confirm.

Activating time control

- ▶ ▽: Press this button.
⇒ "Time-controlled" display is shown.
- ▶ **SET**: Press this button.
⇒ Time control is activated.
- ▶ ▽: Press this button.
⇒ Display for setting time period is shown.
- ▶ **SET**: Press this button.
⇒ The time value flashes on the display.
- ▶ △▽: Set time value.
- ▶ **SET**: Confirm value and go to next value.
⇒ Settings have been saved.

NOTE

As the switch-on time must always occur before the switch-off time, the switch-off value is shifted accordingly if the switch-on value is changed. It is not possible to change the switch-off value to be less than the switch-on value.

RPM control

- ⇒ Display for setting RPM control is shown, see "Setting RPM control" (Chapter 7.1.7, type 2)

7.1.18 Time function

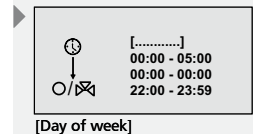
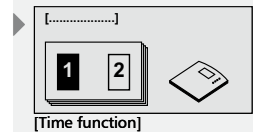
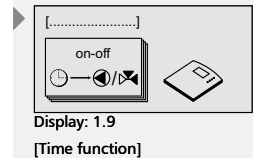
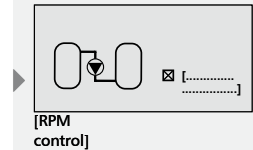
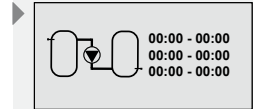
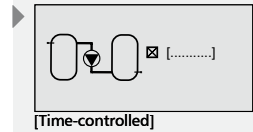
The control unit has two time functions. This function enables an output of the control unit to be switched on or off depending on the day of the week and depending on a pre-selected switch time.

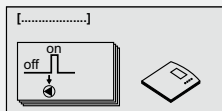
Setting time window

- ✓ "Functions" submenu selected, see "Selecting functions", (Chapter 7.1.2).
- ✓ Select a thermostat (△▽) and confirm with **SET**.
- ✓ Time function activated, see "Activating functions" (Chapter 7.1.3).
- ✓ Select output, see "Selecting outputs" (Chapter 7.1.5).
- ▶ △▽: Select day of week.
- ▶ **SET**: Press this button.
⇒ Value for time flashes.
- ▶ △▽: Select times.
- ▶ **SET**: Press to move to next input field.
- ▶ **ESC**: Press to return again to selection of day of week.
- ▶ **SET**: Confirm.
⇒ Settings have been saved.

NOTE

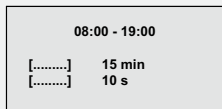
As the switch-on time must always occur before the switch-off time, the switch-off value is shifted accordingly if the switch-on value is changed. It is not possible to change the switch-off value to be less than the switch-on value.





Display: 1.10

[Interval]



[Interval]

[Test]

7.1.19 Interval function

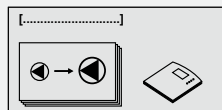
This function enables an output to be switched on regularly for a short time. In addition, a time limit can be placed on this function.

Setting interval function

- ✓ "Functions" submenu selected, see "Selecting functions", (Chapter 7.1.2).
- ✓ Interval activated, see "Activating functions" (Chapter 7.1.3).
- ✓ Select output, see "Selecting outputs" (Chapter 7.1.5).
- ▶ ▽: Press this button.
 - ⇒ Display for setting a time window, the interval and test time are displayed.
- ▶ **SET**: Press this button.
 - ⇒ Start time of time window flashes on the display.
- ▶ △▽: Set start time.
- ▶ **SET**: Confirm value and go to next value.
 - ⇒ After confirmation of time window, the "interval" duration (time between tests) flashes.
- ▶ △▽: Set interval duration.
- ▶ **SET**: Confirm.
 - ⇒ After confirmation of "interval" duration, the "test" duration (activation duration of pump) flashes.
- ▶ △▽: Set duration of test.
- ▶ **SET**: Confirm.
 - ⇒ Settings have been saved.

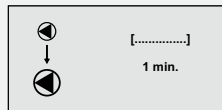
NOTE

As the switch-on time must always occur before the switch-off time, the switch-off value is shifted accordingly if the switch-on value is changed. It is not possible to change the switch-off value to be less than the switch-on value.



Display: 1.11

[Booster pump]



[Duration of boost]

7.1.20 Booster pump function

An output can be switched on in parallel to another reference output for an adjustable time period.

Setting booster function

- ✓ "Functions" submenu selected, see "Selecting functions", (Chapter 7.1.2).
 - ✓ Booster activated, see "Activating functions" (Chapter 7.1.3).
 - ✓ Select reference output, see "Selecting outputs" (Chapter 7.1.5).
- The reference output specifies when the corresponding output is switched on. If the reference output is switched on, the corresponding output likewise switches on for the set time period.
- ✓ Select output, see "Selecting outputs" (Chapter 7.1.5).
 - ▶ ▽: Press this button.
 - ⇒ The display for setting the booster duration is shown.
 - ▶ **SET**: Press this button.
 - ⇒ Duration of boost flashes on the display.
 - ▶ △▽: Set duration of boost.
 - ▶ **SET**: Confirm.
 - ⇒ Settings have been saved.

7.1.21 Synchronous output function

The control unit has two synchronous output functions. This function enables an output to be switched on or off synchronously or inversely depending on another reference output.

Setting synchronous output

- ✓ "Functions" submenu selected, see "Selecting functions", (Chapter 7.1.2).
- ✓ Select a synchronous output ($\Delta \nabla$) and confirm with **SET**.
- ✓ Synchronous output activated, see "Activating functions" (Chapter 7.1.3).
- ✓ Select reference output, see "Selecting outputs" (Chapter 7.1.5).

The reference output specifies when the corresponding output is switched on. If the reference output is switched on, the corresponding output likewise switches on.

- ✓ Select output, see "Selecting outputs" (Chapter 7.1.5).
- ▶ ∇ : Press this button.
 - ⇒ The display for activating "Invert output" is shown.
- ▶ **SET**: Press this button.
 - ⇒ "Invert output" compared to reference output is activated.

7.1.22 Periodic heating-up of storage tank function

The periodic heating-up of storage tank function is a precautionary measure to ensure drinking water is hygienic. To this end, the control unit monitors the temperature in the tank. If the set temperature level has not been reached within the last 24 hours, the tank contents are circulated at the set time by a pump. This should ensure the entire tank contents are heated up by means of back-up heating. The back-up heating can be requested by the second output selected. If the control of the heating system has its own corresponding function, the back-up heating can occur independently. Where independent back-up heating occurs, it should be ensured that the corresponding function of the heating system is activated and runs synchronously with periodic heating-up of storage tank.

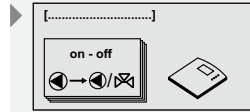
NOTE

There is a risk to health if the periodic heating-up of the storage tank is not working correctly. Check function manually with thermostat upon startup.

CAUTION

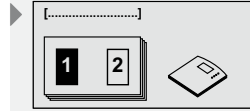
Danger of scalding due to hot water temperatures of over 60°C

- Only perform periodic heating-up of storage tank outside of normal operating times.
- Inform residents of time period when function is active.

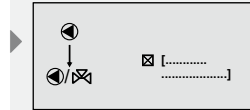


Display: 1.12

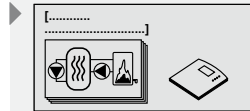
[Synchronous output]



[Synchronous output]



[Invert output]



Display: 1.13

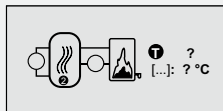
[Periodic heating-up of storage tank]



Activating periodic heating-up of storage tank function

- ✓ "Functions" submenu selected, see "Selecting functions", (Chapter 7.1.2).
- ✓ Periodic heating-up of storage tank function activated, see "Activating functions", (Chapter 7.1.3)
- ✓ Select output, see "Selecting outputs" (Chapter 7.1.5).

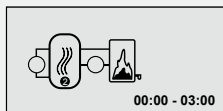
You can choose between the free outputs. If back-up heating is activated, this output is pre-assigned.



[Set value]

- ▶ ▽: Press this button.
 - ⇒ The display for setting temperature input and temperature required to prevent Legionella is displayed.
- ▶ **SET**: Press this button.
 - ⇒ "T" (temperature inputs for upper tank and lower tank) flashes on the display.

- ▶ △▽: Select inputs.
- ▶ **SET**: Confirm.
 - ⇒ The temperature value of tank heating for the tank flashes.
- ▶ △▽: Set temperature value of tank heating for tank.
- ▶ **SET**: Confirm.



- ▶ ▽: Press this button.
 - ⇒ The display for selecting start and end time appears.
- ▶ **SET**: Confirm.
 - ⇒ Hour value of start time flashes.
- ▶ △▽: Set hour value of start time.
- ▶ **SET**: Confirm.
 - ⇒ Minute value of start time flashes.
- ▶ △▽: Set minute value of start time.
- ▶ **SET**: Confirm.
 - ⇒ Hour value of end time flashes.
- ▶ △▽: Set hour value of start time.
- ▶ **SET**: Confirm.
 - ⇒ Minute value of end time flashes.
- ▶ △▽: Set minute value of end time.
- ▶ **SET**: Confirm.

NOTE

The duration of periodic heating-up of storage tank can be set between 1 hour and 3 hours 59 minutes. It is not possible to program across a day change (12 midnight).

The set time window must match the back-up heating time window.

7.1.23 Active cooling function

This function enables excess heat, for example, to be released into the environment when using an external cooler.

- ✓ "Functions" submenu selected, see "Selecting functions", (Chapter 7.1.2).
- ✓ Active cooling function activated, see "Activating functions", (Chapter 7.1.3).
- ✓ Select output, see "Selecting outputs" (Chapter 7.1.5).

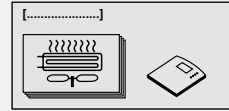
You can choose from the free outputs which output is to be activated in addition.

- ✓ Select input, see "Selecting inputs" (Chapter 7.1.8).
 - ⇒ The switch-on temperature flashes on the display.
- ▶ $\Delta \nabla$: Set temperature.
- ▶ **SET**: Confirm.
 - ⇒ The switch-off temperature flashes on the display.
- ▶ $\Delta \nabla$: Set temperature.
- ▶ **SET**: Confirm.
 - ⇒ Display for setting maximum temperature is shown.
- ▶ **SET**: Press this button.
 - ⇒ The temperature flashes on the display.
- ▶ $\Delta \nabla$: Set temperature.
- ▶ **SET**: Confirm.
 - ⇒ The display for setting time window is shown.
- ▶ **SET**: Press this button.
 - ⇒ The time flashes on the display.
- ▶ $\Delta \nabla$: Set time.
- ▶ **SET**: Confirm.

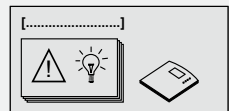
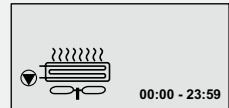
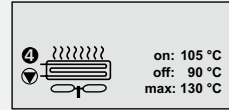
7.1.24 Alarm output function

The alarm output is always activated if the control unit recognises a selected error (sensor error, time failure, system error, connection error, periodic heating-up of storage tank). Connection of alarm output (see Chapter 4.5.4).

- ✓ "Functions" submenu selected, see "Selecting functions", (Chapter 7.1.2).
- ✓ Alarm output function activated, see "Activating functions" (Chapter 7.1.3).
- ✓ Select output, see "Selecting outputs" (Chapter 7.1.5).
- ▶ ∇ : Press this button.
 - ⇒ The display for error selection is shown.
- ▶ $\Delta \nabla$: Select error even.
- ▶ **SET**: Confirm.
 - ⇒ Selected errors are highlighted.



Display: 1.14
[Active cooling]



Display: 1.15
[Alarm output]

Alarm if:

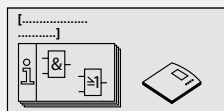
- Sensor error
- Int. clock error
- Error TPC 1 bus

Alarm if:

- Error at addit. storage tank
- Error at period. heating

Definition of errors

Error event	Description
Sensor error	Short circuit in sensor cable, break in sensor cable or no sensor connected (see Chapter 11, "Information windows").
Int. clock error	Master time has to be reset, e.g. after extended power failure.
TPC 1 bus	Bus can no longer be recognised, an expansion box can no longer be reached.
Error at addit. storage tank	Volume flow error in solar circuit (see Chapter 11, "Information windows").
Periodic heating-up of storage tank	Set temperature was not reached within prescribed time period (see Chapter 11, "Information windows").



Display: 2
[Logic operations]

7.2 Logic operations

The device's scope of functions can be increased considerably with the aid of logic operations. Here, two identical or two different functions that are to access the same output can be combined with each other using logical AND/OR.

Creating combinations

NOTE

If no logic operations were selected, this is indicated by a message window.

- ▶ $\triangle \nabla$: Use of output is selected.
- ▶ **SET**: Press this button.
⇒ *The display for selection is shown.*
- ▶ $\triangle \nabla$: Select switch-on condition.
- ▶ **SET**: Confirm.
⇒ *Settings have been saved.*

7.3 RPM control parameters

The control unit is assigned factory settings that mean it can be used for most applications without changing these values.

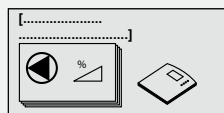
The RPM control parameter for outputs R1 and R2 can be set or activated here. If no output with RPM control was selected, this is indicated by a message window.

The following outputs can be accessed and adjusted.

- RPM control R1
- RPM control R2

Setting RPM control

- ▶ $\triangle \nabla$: Select RPM control.
- ▶ **SET**: Press this button.
⇒ *Value for min. speed flashes.*
- ▶ $\triangle \nabla$: Set minimum RPM.
- ▶ **SET**: Confirm.
⇒ *Settings have been saved.*



Display: 3
[Parameters speed control]

Activating and deactivating RPM control

- ▶ **SET:** Press for approx. 2 sec.
⇒ Choose either “yes” or “no” for RPM control.
- ▶ **SET:** Confirm.

7.4 Factory settings

Reset to factory settings

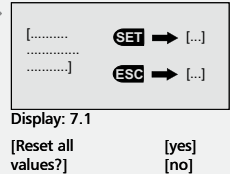
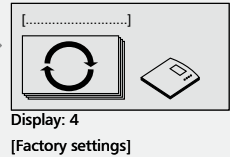
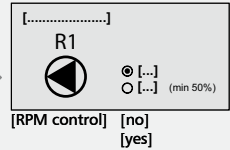
- ▶ **SET:** Press for approx. 2 sec.
- ▶ $\Delta \nabla$: Select “Factory settings” menu item.
- ▶ **SET:** Press this button.
⇒ “Reset all values” is shown.
- ▶ **SET:** Press this button.
⇒ All values are reset to factory settings. The control unit performs a restart. The control unit must now be reconfigured, see “Initial startup” (Chapter 5).

NOTE

When resetting the control unit to “Factory settings”, all settings are reset to the values when the control unit was delivered.

The following values are retained:

- max / min values of temperature sensors
- Operating hours of outputs
- max. heat capacity
- Heat quantities






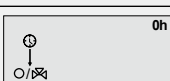

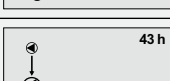
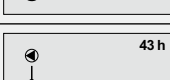

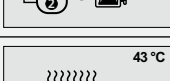



8 Symbols and status display

8.1 Symbol display

During automatic operation, the display shows the selected functions as a status display. Using the operating buttons Δ and ∇ , values and statuses, for example, of individual sensors and runtimes of pumps can be queried from the individual outputs.

Depending on the additionally activated functions, further function-specific data can be displayed.

Symbol	Explanation
	Additional storage tank function
	Circulation function
	Back-up heating function
	Solid fuel boiler function

Symbol	Explanation
 22 °C	Bypass function
 22 °C	Thermostat function CAUTION: up to three thermostats can be used. An extra display with the numbering is shown.
 43 °C	Difference thermostat function CAUTION: up to three difference thermostats can be used. An extra display with the numbering is shown.
 0h	Time function CAUTION: up to two time functions can be used. An extra display with the numbering is shown.
 43 h	Interval function
 43 h	Booster function
 43 h	Synchronous output function
 43 °C	Periodic heating-up of storage tank function
 43 °C	Active cooling function
 54 °C	Heat quantity function CAUTION: up to two heat volume counters permitted. The numbering is also displayed.
Alarm output OK	Alarm output function
?	Bus station sensor can no longer be reached
	Short circuit in sensor cable
	Break in sensor cable

8.2 Status display

The status display shows measured values, runtimes and statuses of outputs.

Switching the display screen

- ▶ $\triangle \nabla$: Press this button.
 - ⇒ *The following values and displays appear on the screen in sequence:*
- Temperature sensors of calibrated system and associated current temperature values.
- Outputs and associated runtimes.
- Functions and their additional measured values.
 - ⇒ *The functions additionally set up are shown.*

8.3 Min/max display of temperature sensor

Display of min./max. values

- ▶ $\triangle \nabla$: Select temperature sensor.
- ▶ **SET**: Open information window.
 - ⇒ *Min./max. values are shown.*

Resetting min./max. values

- ▶ **SET**: Press for 2 sec.
 - ⇒ *Min./max. values are reset to current temperature.*

NOTE

The minimum and maximum values of connected temperature sensors are always saved and can be accessed.

The saved values can be reset at any time.

8.4 Operating hours display for pumps and switch valves

Display of operating hours

- ▶ $\triangle \nabla$: Select pump/valve.
- ▶ **SET**: Open information window.
 - ⇒ *Operating hours counter is shown.*

Resetting operating hours

- ✓ *Operating hours opened.*
- ▶ **SET**: Press for ca. 2 sec.
 - ⇒ *Delta value (Δ) is reset to zero.*

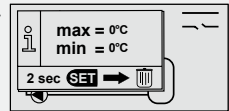
NOTE

The operating hours of outputs are always saved.

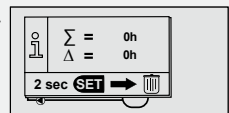
There are total operating hours (Σ) and delta operating hours (Δ). Total operating hours cannot be reset. Delta operating hours can be reset to zero at any time.



Sample display



Sample display



Sample display

9 Service

Update of control unit software

The control unit is programmed at the factory with the control unit software current as of the manufacture date. An update is usually not necessary.

However, if you would like to use a newer version of the control unit software or if an update is advisable for technical reasons, you can transfer new control unit software onto the control unit via the RS232 interface.

Contact your dealer for more information.

10 Troubleshooting

The control unit is a quality product and was designed for many years of ongoing use. However, if an error does occur, the cause of the error often does not lie with the control unit, but rather in the peripheral system elements. The following description of some causes of errors is intended to help the installer and operator in localising the error in order to repair the system as quickly as possible and to avoid unnecessary costs. Of course, not all possible causes of errors can be listed here. However, here you can find the most common causes of errors, which make up the majority of possible errors. Consult your vendor after you have determined that one of the malfunctions described has not occurred. For further information, see Chapter 12, "Warranty".

DANGER

Risk of death by electrocution

- ▶ All work on an open control unit may only be performed by a technician.
 - ▶ Before opening the housing, disconnect the control unit from the power supply.
-



10.1 Causes of errors

NOTE

Errors signalled by LEDs are indicated on the respective bus device.

The display screens of the error messages described appear on the display of the bus master.

Control unit not functioning:

Error	Additional condition	Possible cause	Procedure
Control unit not functioning.	Green LED (LED ϕ) not lit.	Control unit voltage supply interrupted.	Check mains cable. Check fuse in control unit. (Replacement fuse in housing) Check power supply fuse.

Pump

Error	Additional condition	Possible cause	Procedure
Pump not running even though switch-on condition has been met.	Pump symbol rotating on display.	Pump voltage supply interrupted.	Check pump mains cable.
		Pump is stuck.	Check fuse in control unit (Replacement fuse in housing)
		Pumpe is defective.	Make pump work, replace if necessary.
	Pump symbol not rotating on display.	Maximum tank temperature has been reached.	Not an error.
		Priority test is being performed.	
		Output is being used multiple times	
Pump symbol not rotating on display, display lit red, tool symbol flashing on display.	Operating switch set to "manual" and pump output is set to "off".	Set operating switch to "automatic".	
Pump symbol is not rotating on display, display flashing red. R1, R2, R3 of slave device are flashing yellow.	Short circuit or break in temperature sensor	Query current values on the control unit for all connected temperature sensors.	
		Check defective sensor and/or sensor cable.	
Pump running even though switch-on condition has not been met.	Pump symbol rotating on display.	Pump kick.	Not an error.
		Output is being used multiple times.	
	Symbol rotating, display backlit in red, tool symbol can be seen on display.	Operating switch set to "manual" and pump output is set to "on".	Set operating switch to "automatic".

Pump is running, switch-on condition has been met, but there is nevertheless no heat transfer (no "fluid circulation").	Pump symbol rotating on display.	Air in solar/water circuit.	Check solar/water circuit for air.
		Shut-off valve closed.	Check shut-off valve.
		Solar/water circuit lime-encrusted/dirty.	Rinse/clean solar/water circuit.
Pump exhibiting cycle behaviour.		Temperature difference too small.	Adjust minimum speed in parameters menu.
		Temperature sensor incorrectly positioned.	Check temperature sensor.
		Flow too strong.	Adjust temperature difference of function.

10.2 Pt1000 temperature sensor values

A sensor defect can be checked with an ohmmeter. For this the sensor must be disconnected, its resistance measured and then compared with the following table. Minor deviations are permitted.

Temperature [°C]	-30	-20	-10	0	10	20	30	40	50	60	70
Resistance [Ω]	882	922	961	1000	1039	1078	1117	1155	1194	1232	1271

Temperature [°C]	80	90	100	110	120	130	140	150	160	170	180
Resistance [Ω]	1309	1347	1385	1423	1461	1498	1536	1573	1611	1648	1685

11 Information Windows

The following information windows appear as soon as a function's settings are incomplete, the activation of a function is not possible, errors occur in the system or certain functions are currently active.

Display screen	Description	Measures
Info: conflicting settings	The internal settings check has identified conflicts within the function.	Check function's time settings. Check sensor inputs and/or temperature settings.
Activation not possible. Settings are incomplete!	An activation of the function is not possible as the associated settings are incomplete. Function was deactivated.	Check and update settings.
Hygiene flushing circulation	System is performing a hygiene flushing of the circulation line.	Not an error.
Fault detected in sensor or sensor cable	A sensor error has been identified.	Pinpoint and check relevant sensor(s) in status menu.
Sensor cable interrupted or no sensor connected!	Sensor cable is broken, incorrectly connected or sensor may be defective.	Check connection and/or sensor cable. If necessary, check sensor and sensor cable with ohmmeter.
Short circuit in sensor cable!	Sensor cable has short-circuited or sensor may be defective.	Check connection and/or sensor cable. If necessary, check sensor and sensor cable with ohmmeter.
Attention: RΔ is a potential-free contact for max. 42 V, max. 2 A	This output is not designed for mains voltage. Max. 42 V and max. 2 A may be connected.	Note the technical data.
Error at additional storage tank	Temperature difference between collector and tank is too large despite running pump. -> volume flow too weak.	Check hydraulics, pump, valves, shut-offs of solar circuit. If applicable, ventilate system, open shut-off valves, rinse blockages away.
Periodic heating-up of storage tank is active.	The periodic heating-up of storage tank function is active.	Not an error.
Bus line interrupted to the following device.	A bus station can no longer be reached.	Check bus cable and device.
System stopped due to priority test.	The solar circuit is stopped as the control unit is performing a priority test. This test checks whether, instead of the lower priority tank, the higher priority tank could also be loaded. This test can take several minutes as the collector field has to heat up accordingly.	Not an error.
Function is only available in combination with a solar controller.	A solar control unit is required for this function.	Not an error.
is being used twice! Logic necessary! SET -> ok ESC -> go back	Two functions are using the same output. In order to define the control of the output, a logic has to be entered.	Select logic.

R1 is being used by: → Thermostat 1 → Difference Thermostat 2	R1 is being used by the listed functions.	Not an error.
Periodical heating temperature not reached. Check heating source!	While the periodic heating-up of storage tank was active, the tank was not heated to the set temperature.	Check time and set temperature of heating with the control unit settings.
The current functions do not require any output settings.	No output was selected that has a RPM control or an output that is being used by two functions.	Not an error.
Speed ctrl already def. by link. func.	A function is already using this output and is defining the RPM control.	If applicable, check settings.
Back-up heating disabled during solar operation	Solar-optimised back-up heating was selected.	If applicable, check settings.
Activation not possible. All outputs are occupied!	An activation of the function is not possible as all outputs are already in use.	If the other functions should be retained, this function must be cancelled.
Pumps running due to blockage protection.	In order to protect pumps against mechanically jamming, all pumps are switched on briefly once a day.	Not an error.
No function has been selected. Press SET for 2 sec. to open the settings menu.	The installation routine was exited without selecting a function.	Not an error.
Solar control heats a first-priority storage tank	An additional storage tank has been selected. This cannot be loaded due to the loading of a higher priority tank by the solar control unit.	Not an error.
Output is blocked by function.	The output is not controlled as another function is blocking this.	If necessary, check combination of functions.
Output is controlled by function.	The output is controlled by another function.	If necessary, check combination of functions.
No logic operations selected.	No output is used by several functions. For this reason, no logic operations are necessary.	Not an error.
No RPM control selected.	No output with RPM control has been selected. For this reason, RPM control cannot be set.	Not an error.
Error identified on a bus station.	An error was detected on a bus station. In order to rectify this, switch to bus station concerned.	Switch to device selection using ESC, then select device with flashing spanner. Then check status display for error messages and, if applicable, rectify.
No response! Remove device?	A device previously registered can no longer be reached via the bus.	Check bus connection and addressing of relevant bus station. If device was removed from bus, confirm this information window with SET.

Perform initial startup for this device now?	Initial startup has not been performed yet for this device.	Perform initial startup.
Bus connection interrupted to following device.	A device previously registered can no longer be reached via the bus.	Check bus connection and addressing of relevant bus station.

12 Warranty

The customer has a 2 year warranty on this product in accordance with legal regulations.

The vendor will rectify all manufacturing and material defects that appear in the product during the warranty period and which impair the ability of the product to function. Natural wear and tear does not represent a defect. No warranty is provided for third-party defects or defects due to lack of professional assembly or startup, incorrect or careless handling, inappropriate transport, excessive use, unsuitable operating materials, inadequate construction work, unsuitable installation site, improper use or inappropriate operation or use. A warranty is only provided if the defect is immediately reported upon discovery. The complaint should be directed to the vendor.

The vendor must be informed before a warranty claim is processed. For processing, an exact description of the error along with the invoice/delivery note must be enclosed with the device.

The warranty is fulfilled in line with vendor's choice of either repairs or replacement delivery. If repairs or replacement delivery are not possible or do not occur within a reasonable timeframe despite the customer setting a grace period in writing, the reduction in value caused by the defects will be reimbursed or, if this is not sufficient in view of the interests of the end customer, the agreement will be cancelled.

Further claims against the vendor arising from this warranty obligation, in particular claims for damages due to loss of earnings, compensation for loss of use and indirect damage, are excluded insofar as they do not fall under compulsory legal liability.

13 Technical Data

Temperature difference control unit	
Rated voltage (system voltage)	230 V~, 50 Hz [115 V~, 60 Hz optional] (see type plate)
Own consumption	≤ 2 W
Inputs	6 T1 - T5: Temperature measurement (Pt1000) T6: Temperature measurement (Pt1000) or pulse measurement
Further inputs	1 x Grundfos Direct Sensors™ input (flow and temperature)
Outputs	3 R1 and R2: Triac output for RPM control, max. switching current 1.1 A~ R3: Relay switch output, max. switching current 3.47 A~
Further outputs	1 x additional output(Δ - Δ: -), floating contact for SELV max. 42 V, max. 2 A
Interfaces	RS232 and RS485 for TPC 1 bus
Degree of protection	IP 20 / DIN 40050
Protection class	I
Permitted ambient temperature	0 up to +45°C
Display	4 LEDs for status display
Dimensions L x W x H [mm]	170 x 170 x 46
Software class	A
Mode of operation	Type 1.B, 1.Y
Fastening type for fixed connection cables	Type X
Recommended transport conditions	Not specified
Degree of pollution	2
Temperature of ball pressure test	850°C
Excess voltage category	Class II (2500 V)

13.1 Performance data

Output	Capacity	Fuse
R1	250 W (230 V~) / 125 W (115 V~)	Internal fuse: 2.5 A slow-acting, 250 V or T 2.5 A H 250 V (Littelfuse: 21502.5)
R2	250 W (230 V~) / 125 W (115 V~)	
R3	800 W (230 V~) / 400 W (115 V~)	Internal fuse: 4 A slow-acting, 250 V or T 4 A H 250 V (Littelfuse: 215004)



⚠ DANGER

Risk of death by electrocution

Fuses may only be changed after power has been disconnected and be performed by a trained technician.

13.2 Parameter settings

Pump RPM control R1 and R2:

Factory setting	Adjustable up to min.	Adjustable up to max.	Description
50%	30%	100%	Where there is active RPM control, the capacity on the R1 or R2 output of the control unit is controlled by means of full wave packet control, depending on the measured temperature values and control unit settings. If RPM control is deactivated, the R1 or R2 output of the control unit is at full capacity, see Chapter 7.3

13.3 Parameter values for functions

Additional storage tank:

Factory setting	Adjustable up to min.	Adjustable up to max.	Note
Switch-on temperature difference:			
8 K	Switch-off temperature +5 K	50 K	
Switch-off temperature difference:			
4 K	0 K	Switch-on temperature -2 K	
Minimum collector temperature:			
0°C	0°C	Max. collector temperature -20 K	
Maximum collector temperature:			
130°C	Min. collector temperature +20 K	180°C	
Maximum storage tank temperature:			
60°C	0°C	95°C	
Loading strategy			
Target temperature:			
60°C	0°C	95°C	
Difference loading:			
8 K	2 K	50 K	

Circulation:

Factory setting	Adjustable up to min.	Adjustable up to max.	Note
Time-controlled			
Time window:			
–	00.00	23.59	It is not possible to program across a day change (12 midnight).
Temperature-controlled			
Switch-on temperature:			
30°C	0°C	Switch-off temperature -2 K	
Switch-off temperature:			
35°C	Switch-on temperature +2 K	95°C	
Pulse-controlled			
Circulation time:			
2 min	1 min	99 min	
Wait time:			
10 min	0 min	99 min	

Back-up heating:

Factory setting	Adjustable up to min.	Adjustable up to max.	Note
Switch-on temperature:			
55°C	0°C	Switch-off temperature -2 K	
Switch-off temperature:			
60°C	Switch-on temperature +2 K	95°C	
Time-controlled			
–	00.00	23.59	It is not possible to program across a day change (12 midnight).

Solid fuel boiler:

Factory setting	Adjustable up to min.	Adjustable up to max.	Note
Switch-on temperature difference:			
6 K	Switch-off temperature difference +2 K	20 K	
Switch-off temperature difference:			
3 K	0 K	Switch-on temperature difference -2 K	
Maximum temperature for heat target :			
60°C	0°C	150°C	
Minimum temperature of heat source:			
50°C	30°C	95°C	
Loading strategy			
Target temperature:			
60°C	30°C	150°C	

Bypass:

Factory setting	Adjustable up to min.	Adjustable up to max.	Note
Switch-on temperature:			
10°C	-	-	
Switch-off temperature:			
15°C	-	-	

Heat quantity:

Factory setting	Adjustable up to min.	Adjustable up to max.	Note
Pulse value for flow measurement with pulse generator:			
1 l/pulse	25 l/pulse, 10 l/pulse, 1 l/pulse, 10 pulse/l, 20 pulse/l, 50 pulse/l, 100 pulse/l, 200 pulse/l, 300 pulse/l, 400 pulse/l, 500 pulse/l, 600 pulse/l, 700 pulse/l, 800 pulse/l, 900 pulse/l, 1000 pulse/l		
Flow measurement with Grundfos sensor type (Grundfos Direct Sensors™):			
–	VFS 1 - 12, VFS 1 - 20, VFS 2 - 40, VFS 5 - 100, VFS 10 - 200		
Maximum measurement:			
–	9999 MWh		
Glycol content:			
0%	0%	60%	

Thermostat:

Factory setting	Adjustable up to min.	Adjustable up to max.	Note
Switch-on temperature:			
20°C	0°C	180°C	The switch-on and switch-off values can be set independently of each other.
Switch-off temperature:			
20°C	0°C	180°C	
Time-controlled			
–	00.00	23.59	It is not possible to program across a day change (12 midnight).
Speed-controlled			
Target temperature:			
50°C	0°C	150°C	

Difference thermostat:

Factory setting	Adjustable up to min.	Adjustable up to max.	Note
Switch-on temperature difference:			
6 K	Switch-off temperature difference +2 K	80 K	
Switch-off temperature difference:			
3 K	0 K	Switch-on temperature difference -2 K	
Maximum temperature of heat source:			
100°C	Minimum temperature for source +2 K.	180°C	
Minimum temperature of heat source:			
0°C	0°C	Maximum temperature of source -2 K.	
Temperature limit of heat target:			
60°C	0°C	95°C	
Time-controlled			
–	00.00	23.59	It is not possible to program across a day change (12 midnight).

Loading strategy:			
Target temperature:			
50°C	0°C	150°C	
Difference loading:			
8 K	0 K	50 K	

Time function:

Factory setting	Adjustable up to min.	Adjustable up to max.	Note
Time-controlled:			
–	00.00	23.59	It is not possible to program across a day change (12 midnight).

Interval:

Factory setting	Adjustable up to min.	Adjustable up to max.	Note
Interval time:			
15 min.	1 min.	99 min.	
Test time:			
5 sec.	3 sec.	99 sec.	
Time-controlled:			
–	00.00	23.59	It is not possible to program across a day change (12 midnight).

Booster pump:

Factory setting	Adjustable up to min.	Adjustable up to max.	Note
Part time			
1 min.	1 min.	99 min.	

Periodic heating-up of storage tank:

Factory setting	Adjustable up to min.	Adjustable up to max.	Note
Daily heating set temperature:			
60°C	60°C	75°C	Tank is heated once a day to set temperature.
–	00.00	23.59	The duration of periodic heating-up of storage tank can be set between 1 hour and 3 hours 59 minutes. It is not possible to program across a day change (12 midnight).

Active cooling:

Factory setting	Adjustable up to min.	Adjustable up to max.	Note
Switch-on temperature difference:			
100°C	Switch-off temperature difference: +2 K	150°C	
Switch-off temperature difference:			
90°C	0°C	Switch-on temperature difference: -2 K	
Maximum temperature:			
130°C	0°C	180°C	

14 Notes



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