TECHNISCHE ALTERNATIVE

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ESR32

SIMPLE SOLAR CONTROL UNIT

Programmes
Operation
Installation

Manual Version 1.02

English

Diese Anleitung ist im Internet auch in anderen Sprachen unter www.ta.co.at verfügbar.

This instruction manual is available in English at www.ta.co.at

Ce manuel d’instructions est disponible en langue française sur le site Internet www.ta.co.at

Questo manuale d’istruzioni è disponibile in italiano sul sito Internet www.ta.co.at

Estas instrucciones de funcionamiento están disponibles en español, en Internet www.ta.co.at.

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Safety requirements

All installation and wiring work on the controller must only be carried out in a zero volt state. The opening, connection and commissioning of the device may only be carried out by competent personnel. While doing so, they must observe all local safety requirements.

This device is state of the art and meets all necessary safety regulations. It may only be used in accordance with the technical data and the safety requirements and regulations listed below. When using the device, also observe the statutory and safety regulations apposite to the particular use. Any other use will automatically void all warranty rights.

- The device must only be installed in a **dry** interior room.
- It must be possible to isolate the controller from the mains using an omnipolar isolating facility (plug/socket or 2-pole isolator).
- Before starting installation or wiring work, the controller must be completely isolated from the mains and protected against reconnection. Never interchange the safety low voltage connections (e.g. sensor connections) with the 230 V connections. Destruction and life threatening voltages at the device and the connected sensors may occur.
- Solar thermal systems can become very hot. Consequently there is a risk of burns. Proceed with caution when fitting temperature sensors.
- For safety reasons, the outputs should only be left in manual mode when testing. In this operating mode, no maximum temperatures or sensor functions are monitored.
- Safe operation is no longer possible if the controller or connected equipment exhibits visual damage, no longer functions or has been stored for lengthy periods in unsuitable conditions. If this is the case, disable the controller and equipment and secure against unintentional use.

Maintenance

If treated and used correctly, the device will not require any maintenance. Use a cloth moistened with mild alcohol (such as methylated spirits) to clean. Never use corrosive cleaning agents or solvents such as chloroethylene or trichloroethylene.
No components relevant to long term accuracy are subject to loading if the device is used correctly. Consequently long term drift is extremely low. The device therefore cannot be calibrated. Thus applying any compensation is impossible.
The design characteristics of the device must not be changed during repairs. Spare parts must correspond to the original spare parts and must be used in accordance with the build version.

Disposal

• Devices no longer in use or beyond a state of repair must be disposed of in an environmentally responsible manner by an authorised collection point. They mus never be treated as ordinary household waste.

• We can undertake the environmentally responsible disposal of devices sold by the Technischen Alternative company upon request.

• Packaging material must be disposed of in an environmentally responsible manner.

• Incorrect disposal may result in considerable damage to the environment, as many of the materials used require professional handling.

Generally applicable rules

For the proper use of this device

The manufacturer's warranty does not cover any indirect damage to the unit if the technician installing the unit does not equip it with any additional electromagnetic modules (thermostat, possibly in combination with a one-way valve) to protect the device from damage as a result of malfunction under the following circumstances:

- Swimming pool system: If used with a high-performance collector and heat-sensitive components (such as plastic lines), the supply line must have an excess temperature thermostat with all of the necessary self-closing valves (closed when without current). The controller's pump output may provide these currents, if needed. As such, all heat-sensitive parts would be protected from overheating if the system was idle, even if steam was to form due to stagnation. This technique is mandatory, especially in systems with heat exchangers, as a failure of the secondary pump might cause great damage to the plastic tubes.
- Conventional solar power systems with an external heat exchanger: in such systems, the secondary heat transfer medium is usually pure water. If the pump runs at temperatures below the freezing point because of controller malfunction, the heat exchanger and other components may suffer frost damages. In this case, a thermostat must be installed on the supply line of the secondary side after the heat exchanger to automatically stop the primary pump when the temperature falls below 5°C, regardless of the controller's output.
- When used for floor and wall heating: A safety thermostat must be used, just as with conventional heating controllers. The heat circuit pump must be shut down if overheating occurs, regardless of the controller's output, to prevent indirect damage from excess temperatures.

Solar systems - tips for idle systems (stagnation):

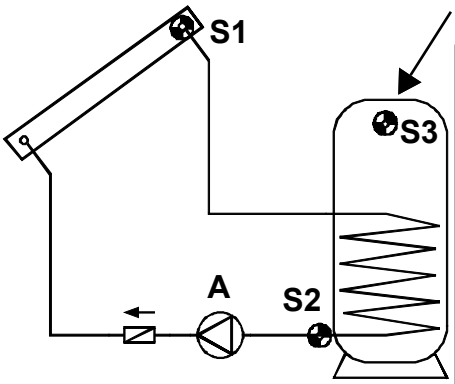
Generally, stagnation is not problematic and cannot be ruled out if there is a power outage, for instance. In the summertime, the controller's storage limit may switch off the system repeatedly. Every system must thus be intrinsically safe. If the expansion container is properly designed, this is ensured. Tests have shown that the heat transfer medium (anti-freeze) is under less stress during stagnation than when it is just below the steam phase.

Data sheets of collector manufacturers list idle temperatures above 200°C. However, these temperatures generally only occur during operation with dry steam, i.e. if the heat exchange medium has completely turned to steam in the collector, or if the collector has been completely emptied due to steam. The damp steam then dries quickly and is no longer able to conduct heat. Hence, it can be assumed that these high temperature cannot occur at the measuring point of the collector sensor (when installed in the collector tube as usual), as the remaining thermal line would cool down the temperature via the metal connections between the absorber and the sensor.

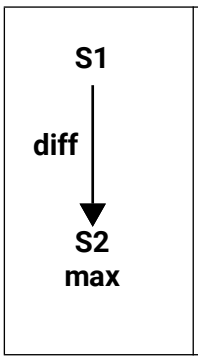
Hydraulic diagrams

Programmes 0-1 – Solar thermal system

Programme 0 – factory setting



S3 for programme 1



Required settings:

max. . . .limit cylinder **S2**
max2. . .see programmes **1**
diff . . . .collector **S1** - cylinder **S2**

The solar pump **A** runs when **S1** has a temperature of **diff1** higher than **S2** and **S2** has not exceeded the threshold **max**.

In addition, the pump's protective function takes effect: During a standstill, steam can occur in the system. When automatically switched on again, the pump does not have the required pressure in the steam phase to lift the fluid level to the collector's supply line (highest point in the system). This represents a considerable load on the pump. The collector's excess temperature shut-down function can be used to block the pump whenever a certain temperature has been reached at the collector's sensor until a second threshold, which can also be set, is fallen short of again. The settings can be changed in the menu **MEN**, sub-menu SYS PF/CET (collector excess temperature).

Programme 1

With this program, the solar thermal system has an **additional** cylinder temperature limit **max2** via sensor **S3**. There is no guarantee that the actual storage temperature will lead to a cut-off in time, especially if the reference sensor **S2** is installed at the return outlet for the heat exchanger.

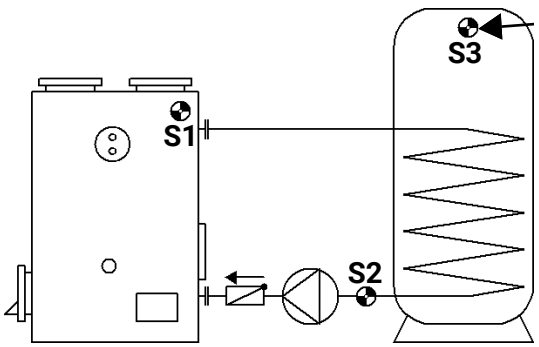
Note:

In both programs, the special system condition "Collector - excess temperature reached" is indicated in the menu ⚠**Status** with the notice **CETOFF** for **C**ollector **E**xcess **T**emperature **Off**.

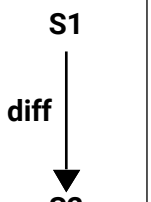
Some countries only offer subsidies for the installation of solar thermal systems if the control units have a function check to detect a sensor defect and a lack of circulation. In the menu command **F CHCK**, the mechanic can activate this function check for the ESR32. This is possible for both programs and is disabled ex works. For details, see "Status display **Stat"**.

Programmes 4-7 – Loading pump control

Programme 4



S3 for programmes 5 and 7



Required settings:

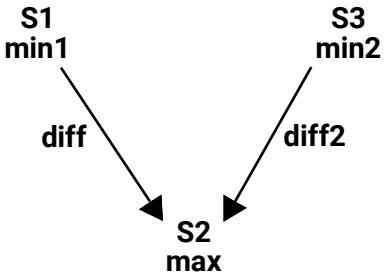
max . . . limit cylinder **S2**
max2 . . see programme **5**
min1 . . . switch-on temp. boiler **S1**
min2 . . . see programme **7**
diff . . . . boiler **S1** - cylinder **S2**

The loading pump **A** runs when **S1** has exceeded the threshold **min1**, the temperature of **S1** is **diff1** higher than **S2**, and **S2** has not yet crossed the threshold **max1**.

Programme 5

The loading pump function has an additional storage limiter **max2** via sensor **S3**.

Programme 7



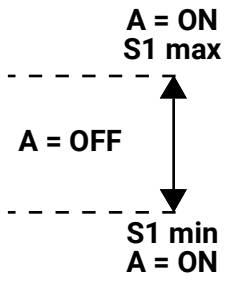
Required settings:

max . . . limit cylinder **S2**
min1 . . switch-on temp. generator **S1**
min2 . . switch-on temp. generator **S3**
diff . . . . generator **S1** - cylinder **S2**
diff2 . . . generator **S1** - cylinder **S2**

The loading pump function has an additional threshold **min2** via sensor **S3** and temperature difference **diff2** between **S3** and **S2**. Hence, the system can be switched off via two energy generators (**S1** and/or **S3**).

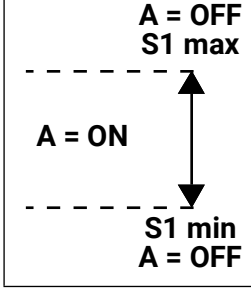
Programme 8, 9 – Air flap control for an earth collector

Programme 8

	***Required settings:*** **max**. . . .upper switch-on threshold **S1** **min** . . . .lower switch-on threshold **S1**

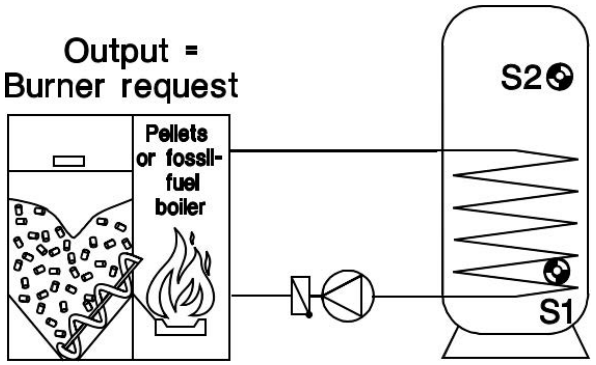
The output switches, when **S1** > **max1** or < **min1**. An air/water heat pump thus has a flap for the air-flow from the earth collector above the outside ambient temperature **max1** (regeneration) and below the outside ambient temperature **min1** (heating). **S2** and **S3** have no function.

Programme 9

	***Required settings:*** **max**. . . .upper limit **S1** **min** . . . .lower limit **S1**

The output switches when **S1** < **max** and > **min**. Hence, while program 8 switches above and below a temperature window, program 9 switches within a temperature window.

Programme 12 – Burner request via holding circuit

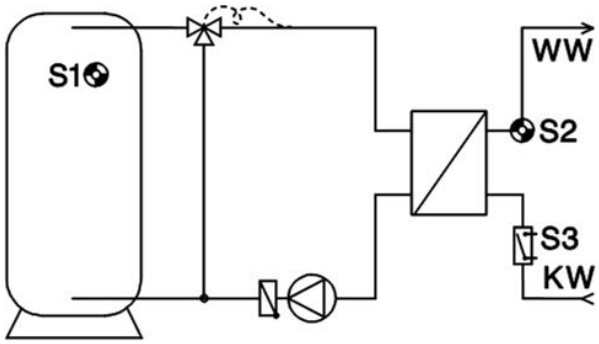


Required settings:

max🡻 . . . . limit **S1**
min🡹 . . . . switch-on threshold **S2**

The output switches on when **S2 < min**🡹 and only switches off when **S1 > max**🡻. In other words, boiler requirement when **S2** falls short of **min**🡹 in the upper storage area and switch-off when **S1** exceeds **max**🡻 in the lower part of the tank. The output terminal is not potential-free.

Programmes 16, 17 – Preparation of domestic hot water



Required settings:

DVA. . . . . desired value for absolute value control **S2**
SWD . . . . . desired value for differential control **S1–S2**

Programme **16** without flow switch **S3**
Programme **17** with flow switch **S3**

Generally applicable for programmes 16 and 17:

No thermostat function or differential switching function is activated. Calling one of these two programs the measuring speed of the input S2 is automatically increased from AV 1.0 to AV 0.4 (see in the menu MEN under SENSOR).

Abs. value control..... AC I 2	Desired value..... DVA 48°C		
Differential control.... DC N12	Desired value.....DVD 7,0 K		
Event control EC .....ER - -			
Proportional part ..... PRO 3	Integral part .....INT 1	Differential part..... DIF 4	
Minimum speed..... MIN 0	Maximum speed ..... MAX 30	Delay time..... ALV 0	

In addition, the set values for the desired hot water temperature (**DVA**) and the mixing difference (**DVD**) is put down in the parameter menu to provide the user with quick access.

Programme 16

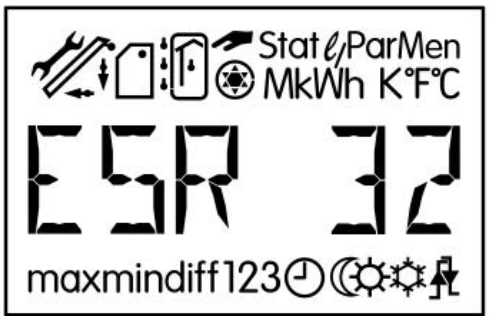
By using the speed control the heat exchange outlet can be kept permanently at a constant temperature via the **ultra-fast sensor S2** (separate accessory **MSP60** or **MSP130**). Low stand-by losses may occur. A flow switch S3 is not necessary.

Programme 17

The speed control is only activated, if the **volume flow switch S3** (non-standard accessory **STS01DC**) indicates a flow. Very few stand-by losses may occur. The program sets sensor **S3** to **DIG**.

Operation

The large display contains all of the icons for all of the important information and a field for plain text. Navigation with the co-ordination keys is adapted to the display structure.

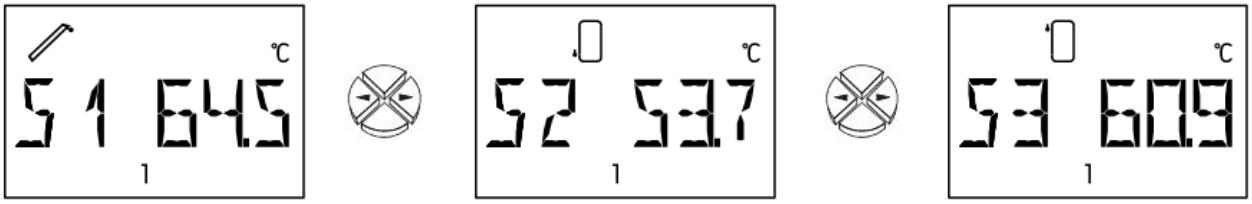


⇦⇨ = Navigation keys to select the display and change parameters.

⇩ = Enter a menu, release a value to change using the navigation keys

⇧ = Return to the last menu level selected, exit the setting of parameters for a value.

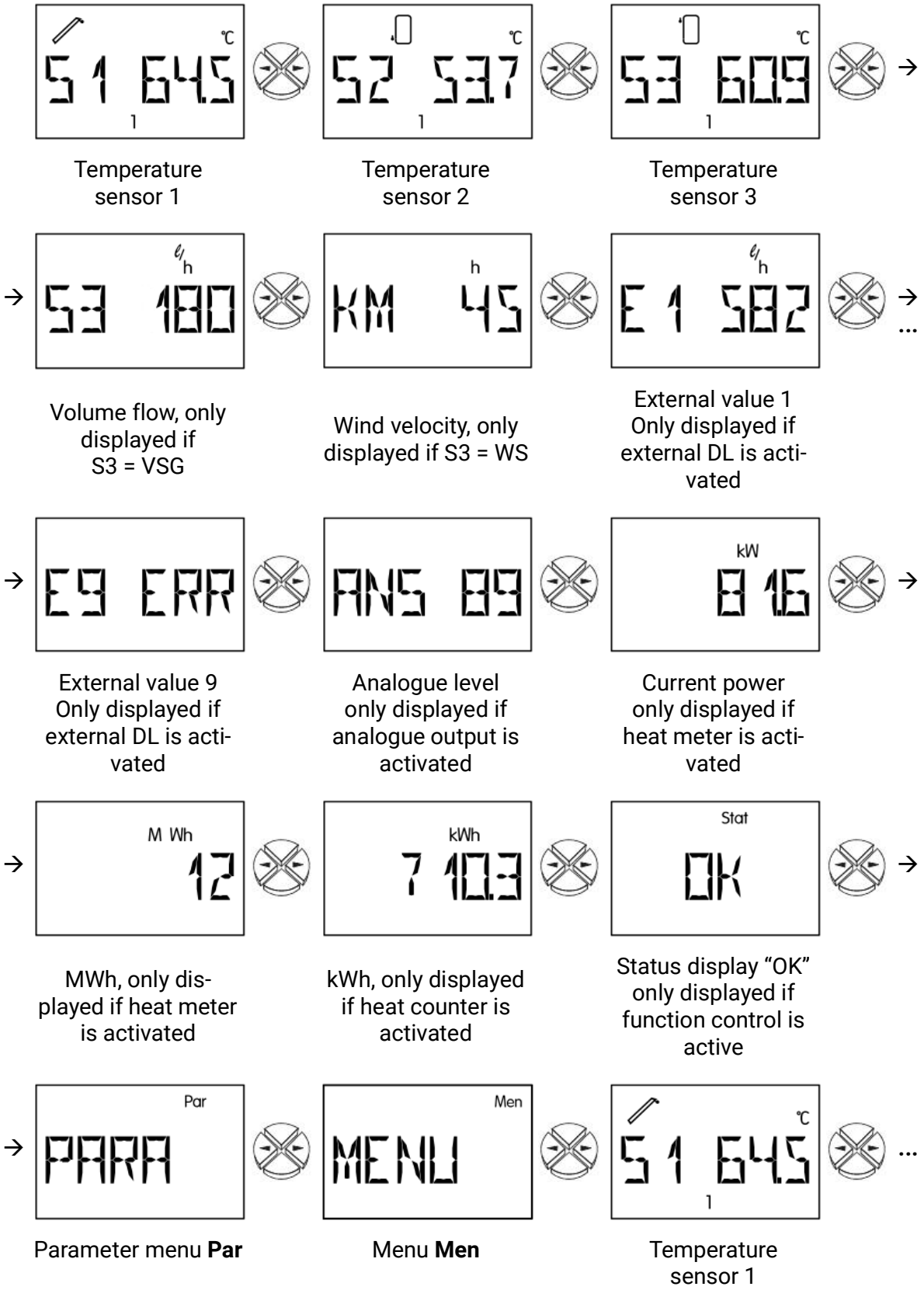
In normal operation, the left/right arrows ⇦⇨ are the navigation keys to select the desired display, such as collector or storage tank temperature. Each time a key is pressed, another icon appears with the respective temperature.



The relevant symbol is always displayed above the text line for information (in the example T1 = collector temperature). During parameterisation, all notes appear below the text line.

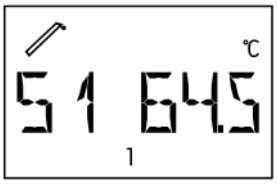
An active output (pump running) is indicated by a rotating pump symbol.

The main menu

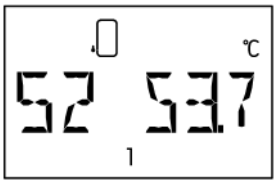


S1 to **S3** displays the value measured at the sensor. The display (unit) depends on the settings of the sensor type.

Further sensor display types:



Insolation in W/m²
(insolation sensor)



Digital status 1 = ON
(digital input)

If in the **SENSOR** menu (main menu **ENTER/Men**) one sensor is set to **OFF**, then the value display of this sensor is displayed in the main level.

S3 Volume flow, shows the flow rate of the volume flow encoder in litres per hour

KM Wind velocity in km/h, if **S3** is a wind sensor **WIS01**.

E1 to E9 Displays the values from external sensors which are read via the data link. Only activated inputs are displayed.
ERR means that no valid value has been read. In this case the external value is set to 0.

ANL Analogue level, indicates the current analogue level of the 0-10V output. This menu item is only displayed if a control output has been activated.

Display range:	0	= output voltage = 0V or 0% (PWM)
	100	= output voltage = 10V or 100% (PWM)

kW The current output of the heat counter indicated in kW.

MWh Megawatt hours, indicates the megawatt hours of the heat meter.

kWh Kilowatt-hours, indicates the kilowatt-hours of the heat counter. Once 1000 kWh is reached, the meter resets to 0 and the MWh are increased by 1.

Menu items kW, MWh, kWh are only displayed if the heat quantity counter has been activated.

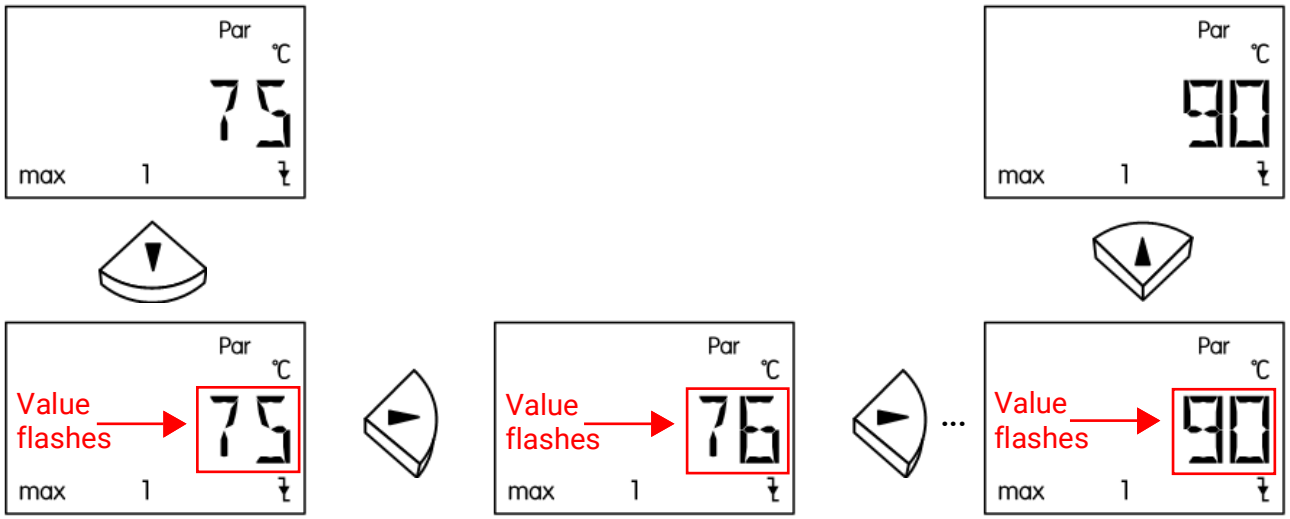
Stat: Display of the system's status. Depending on the program selected, various system statuses are monitored. If any problems have occurred, this menu contains all of the information.

Par: The navigation keys on the parameter level (⇦,⇨) allow you to select the icons under the temperature display and the text line. The parameter selected can now be released for selection with the down key ⇩ (enter). The parameter blinks to indicate release. Press one of the navigation keys to change the value by one increment. Keep the key pressed to keep the value running. The changed value is adopted when the up key ⇧ (return) is pressed. To prevent unintended changes in parameters, entry in Par is only possible using the code 32.

Men: The menu contains basic settings to determine additional functions such as the sensor type, language, the system protection functions, etc. Use the keys for navigation and to make changes as usual. The dialogue is only set up via the text line. As the settings in the menu change the basic features of the control unit, entry is only possible with a code that only the technician knows.

The factory settings of the parameters and menu functions can be restored at any time using the down key (entry) when plugging the unit in. If this occurs, **WELOAD** will appear in the display for three seconds.

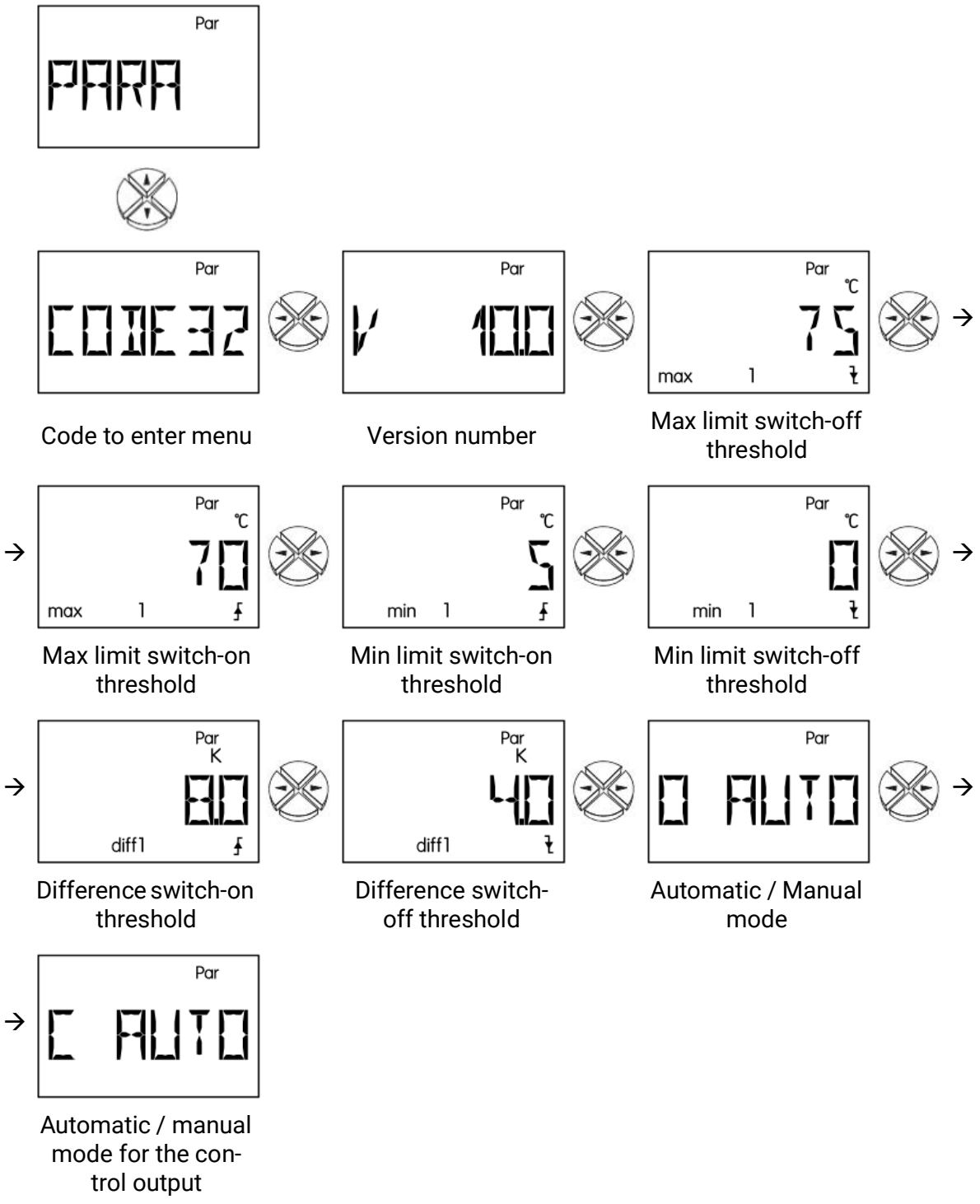
Changing a value (parameter)



If a value is to be changed, press the down arrow key. This value will then blink and can be set to the desired value with the navigation keys.

Use the arrow key up to save the value.

Parameter menu PAR



Code number CODE

The other menu items of the parameter menu are only displayed after input of the correct code number (code number 32).

Software version V

Software version of the device – cannot be changed and must be stated when contacting technical support.

Set values (max, min, diff)

The device does not have any switching differentials (difference between temperatures to switch on or off); rather, all of the threshold values are divided into switch-on and switch-off values. In addition, some programs have several similar thresholds such as **max1**, **max2**. To make a distinction, the index for max is also displayed in the same line.

CAUTION: When setting the parameter, the computer always limits the threshold value (such as max1 on) when it approaches a certain temperature of the second threshold (such as max1 off) to prevent negative hysteresis. If a threshold cannot be changed any longer, the second threshold has to be changed first..

max↓ When this temperature has been reached, the output is blocked.

max↑ The output blocked at max↓ is released again when this temperature has been reached. **max** generally serves to limit storage. Recommendation: The switch-off point should be some 3-5K higher than the switch-on point in the storage area and some 1-2K higher than in the pool area. The software does not allow for differences less than 1K.
Setting range: -30 to +149°C in increments of 1°C (for both thresholds, but max↓ has to be at least 1K greater than max↑)

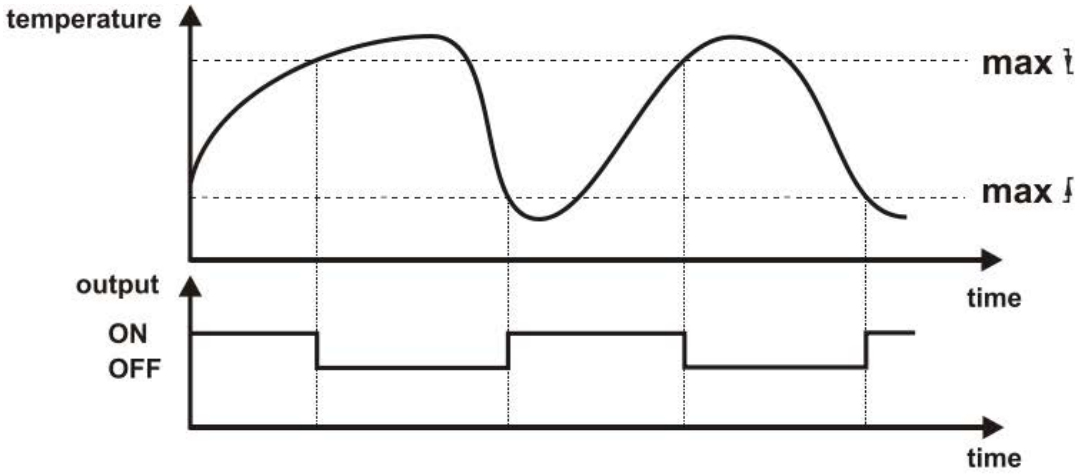
min↑ When this temperature has been reached at the sensor, the output is enabled.

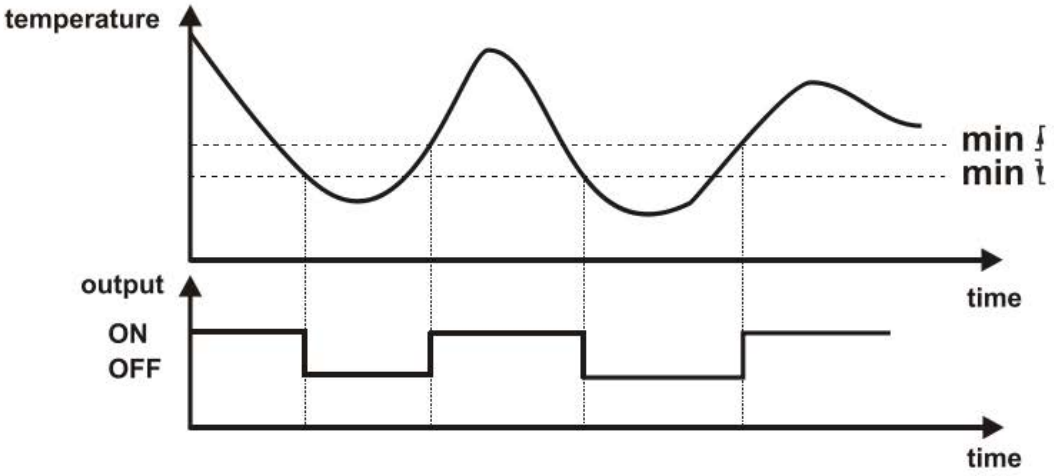
min↓ The output previously released via min↑ is blocked again when this temperature has been reached. **min** generally protects the boilers from soot. Recommendation: The switch-on point should be some 3-5K higher than the switch-off point. The software does not allow for differences less than 1K.
Setting range: -30 to +149°C in increments of 1°C (for both thresholds, but min↑ has to be at least 1K greater than min↓)

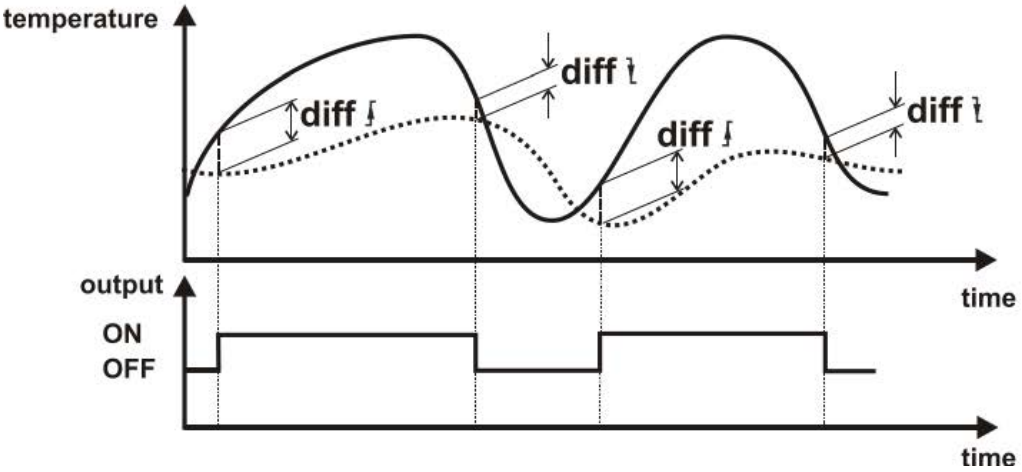
diff↑ If the temperature difference between the two set sensors surpasses this value, the output is released. For most programs, **diff** is the basic function (differential controller) of the system. Recommendation: For solar applications, diff↑ should be set to around 7-10K. Slightly lower values suffice for the loading pump program.

diff↓ The output previously released when diff↑ was reached is blocked again when this temperature difference is reached. Recommendation: diff↓ should be set to around 3-5K. Although the software allows for a minimum difference of 0.1K between the switch-on and switch-off points, no value less than 2K can be entered for sensor and measurement tolerance.
Setting range: 0.0 to 9.9K in increments of 0.1K
10 to 98K in increments of 1K (for both thresholds, but diff↑ has to be at least 0.1K / 1K greater than diff↓)

Schematic representation of setting values







Automatic / manual mode

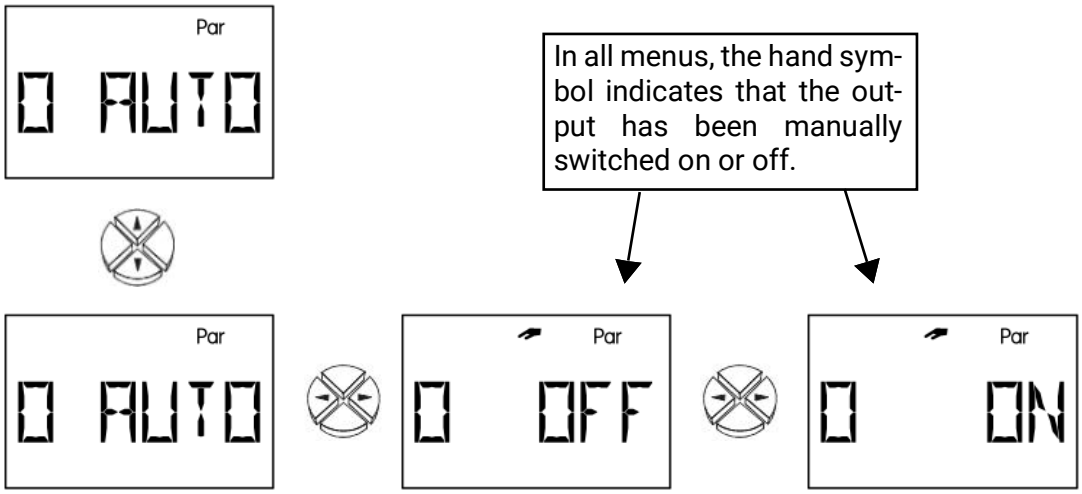
O AUTO

The output is set to automatic mode and can be switched for test purposes to manual mode (**O ON**, **O OFF**). When the manual mode has been selected, an icon appears under the text line.

Settings: **AUTO** the output switches according to the program diagram

ON the output switches off

OFF the output switches on



Automatic mode | Manual OFF | Manual ON

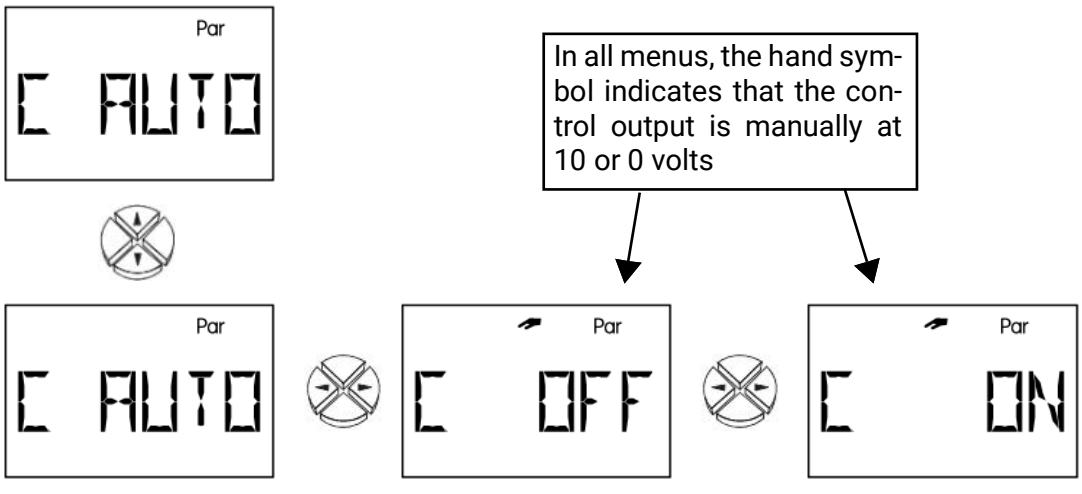
C AUTO

The control output is set to automatic mode and can be switched for test purposes to manual mode (**C ON**, **C OFF**). When the manual mode has been selected, an icon appears at the top. **If the hand symbol is displayed, the control function is deactivated.**

Settings: **AUTO** the control output delivers a control voltage between 0 and 10 volts dependent on the settings in the COP menu.

OFF the control voltage is always 0 volts

ON the control voltage is always 10 volts

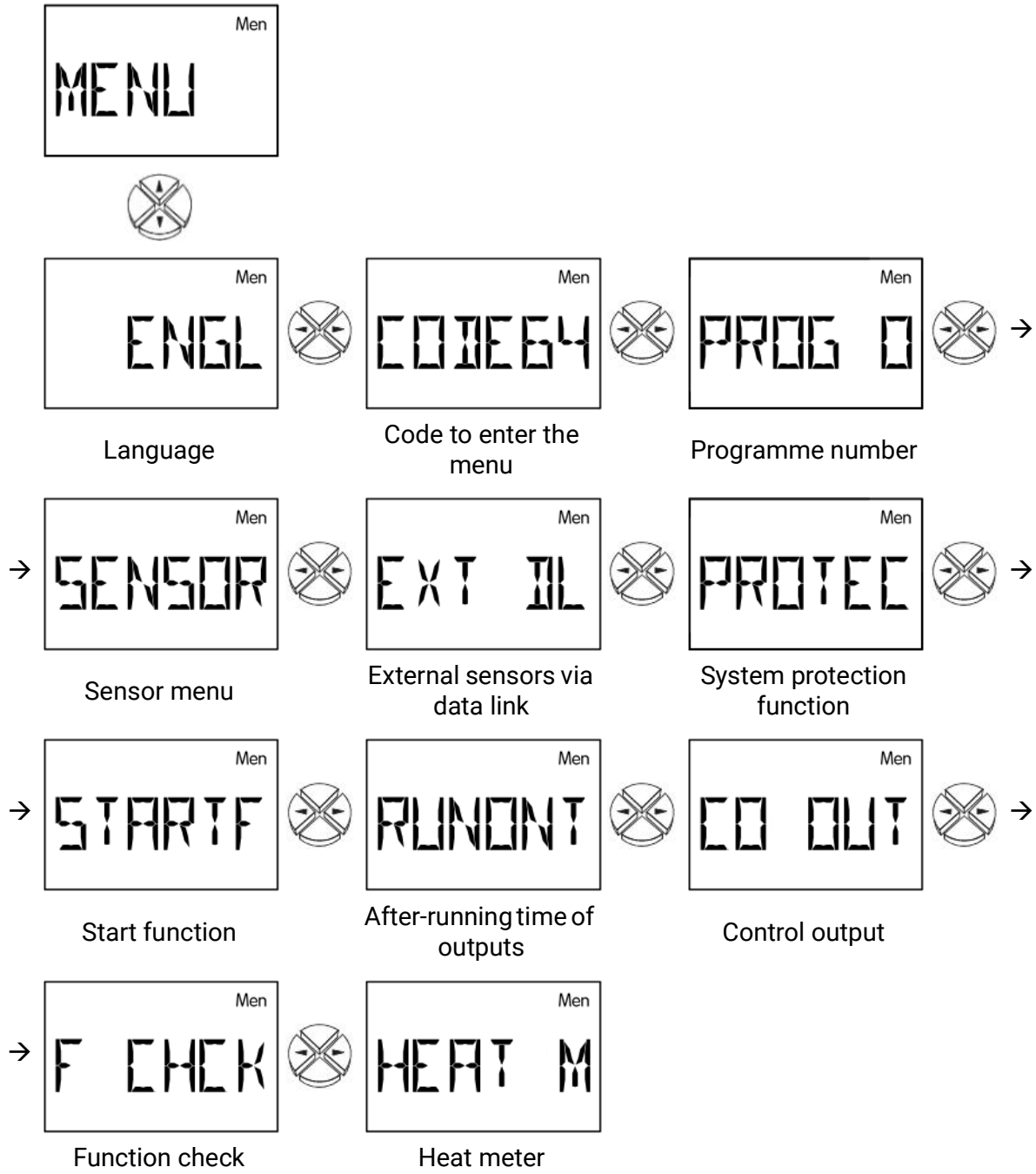


Automatic operation | Manual 0 volts | Manual 10 volts

Menu MEN

The menu contains basic settings to specify additional functions such as sensor type, function check, etc. Navigation and changes are done as usual with the keys ⇨⇧⇩⇦, while the dialogue is only set up in the text line.

As the settings in the menu can change the basic features of the control unit, only a technician who has the code can open this level.



Brief description

ENGL	Language selection: The entire menu can be switched to the desired user language even before the code is provided. The following languages are available: German (**DEUT**), English (**ENGL**).
CODE	Code number for entering the menu. The rest of the menu items are only displayed once the correct code number is entered.
PROG	Selection of the appropriate program according to the selected diagram. For a solar thermal system, that would be the number 0.
SENSOR	Sensor menu: indication of the type of sensor or a fixed temperature for an input that is not used.
EXT DL	External sensor values from the data link.
PROTEC	System **protec**tive functions: switch off the solar thermal system when a critical collector temperature has been reached; anti-freeze function for the collector.
STARTF	**Start f**unction: start help for solar thermal systems.
RUNONT	**Run-on t**ime: can be set for the output.
CO OUT	**Co**ntrol **out**put (0-10V / PWM) As analogue output (0-10V): output of a voltage between 0 and 10V. As fixed value of 5V. As PWM (pulse width modulation): output of a frequency. The duty cycle (ON / OFF) conforms to the control signal. Error message (switch-over from 0V to 10V or inversely from 10V to 0V)
F CHCK	**F**unction **ch**e**ck**: activates a monitoring function to detect various errors and critical situations.
HEAT M	Heat meter – activate and make settings

Language ENGL

Language selection: The entire menu can be switched to the desired user language even before the code is provided. The available languages are German (**DEUT**) and English (**ENGL**).

Code number CODE

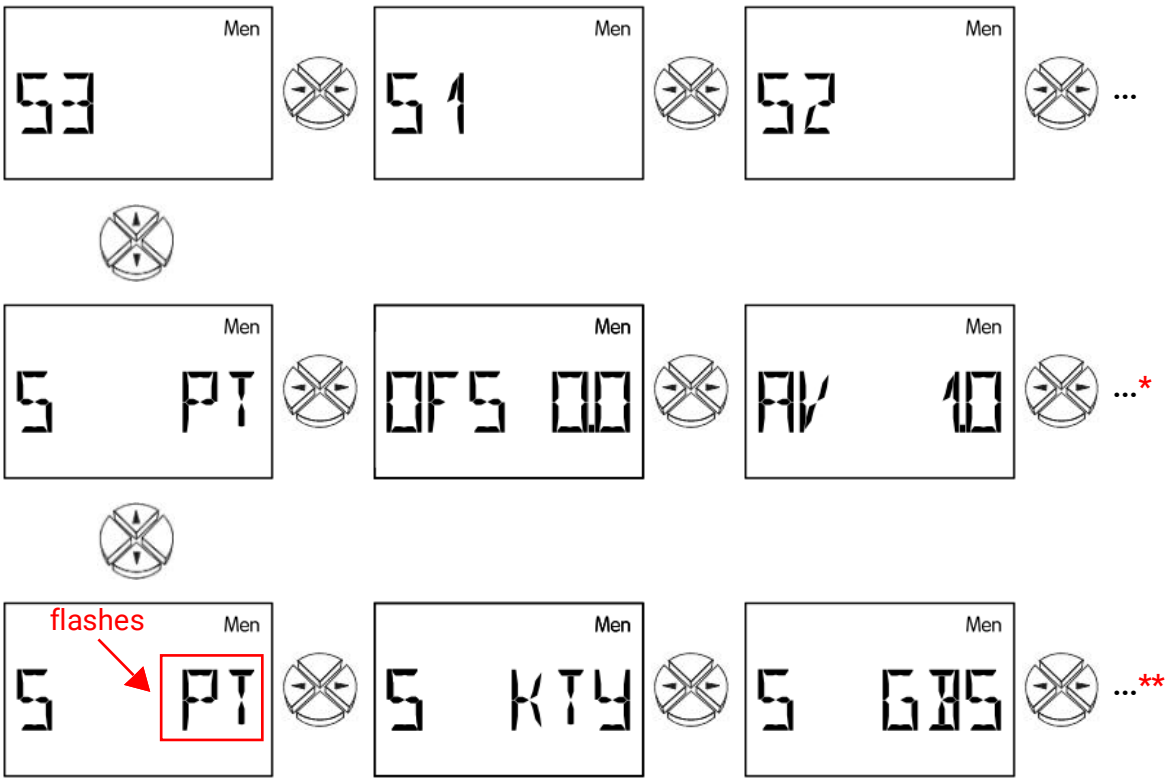
The additional menu items are only displayed after the correct **code** number (code number **64**) has been entered.

Programme number PROG

Selection of the appropriate program according to the selected diagram. For a solar thermal system, that would be the number 0.

Sensor menu SENSOR

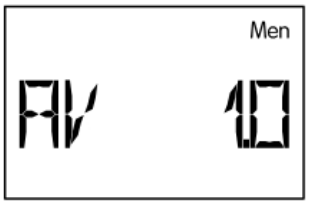
Sensor S3 has been used as example for the sensor settings, since this sensor has the most setting options.



* Settings regarding the sensor's behaviour follow:

OFS Set up an offset for sensor correction. The sensor is correct by the entered value (negative input possible).

AV Set the number of seconds during which an average should be calculated.



Example: AV 1.0 creates an average of 1.0 seconds

For simple measurements, 1.0-2.0 should be selected. A large average slows the system down and is only recommended for the sensors for the heat counter.

The measurement of the ultra fast sensor for the preparation of hot water also requires a fast evaluation of the signal. Hence, the creation of the average of the sensor should be reduced to 0.3 to 0.5 although fluctuations will then occur in the display.

No averaging is possible for the volume flow encoder VSG.

Setting range: 0.0 to 6.0 seconds in increments of 0.1 seconds

0.0 no average

SYM One of the icons displayed above can be assigned to each sensor. Each icon is available three times, which is displayed in the bottom line by the index (1, 2 or 3). Contrary to the above graphic each symbol appears three times with a different index before switching to the next. **Symbol allocation has no influence on the control function.**

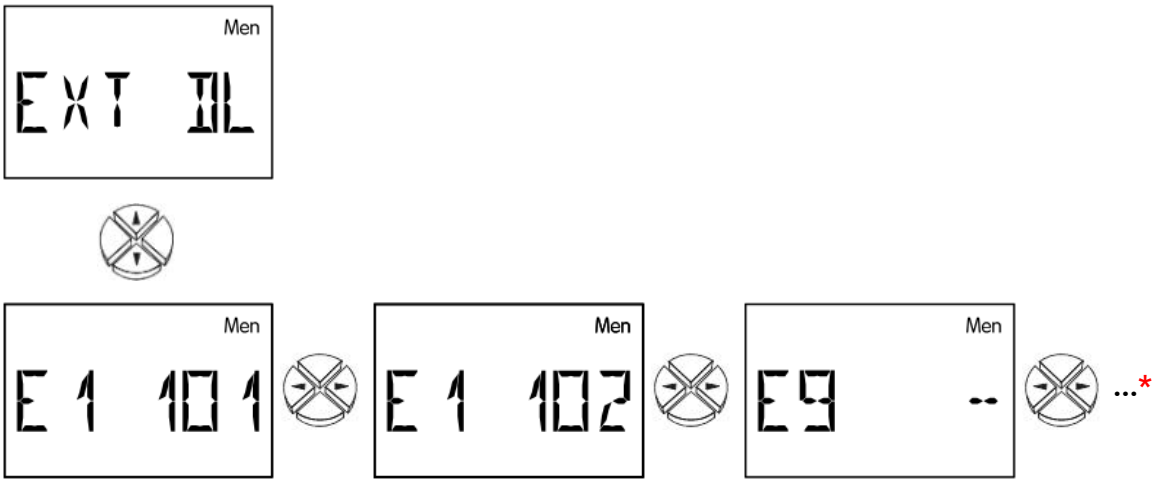
**** Sensor type**

Solar collectors reach standstill temperatures of 200 to 300°C. No value above 200°C is expected due to the sensor installation point and physical properties (dry steam does not conduct heat well, for instance). The standard PT1000 series sensors can be permanently exposed to 250°C and briefly to 300°C. KTY sensors are designed for brief use at 200°C. The **SENSOR** menu enables changing over of the individual sensor inputs between PT1000 and KTY types.

As default factory setting all inputs are set to PT1000 type.

PT, KTY	Temperature sensors
GBS	Insolation sensor GBS - non-standard accessory (can be used for the start function and solar priority function)
FIX	Fixed value: Use this adjustable temperature for control rather than the measurement. After confirming the choice "**FIX**", the fixed value can be adjusted to the left.
SL	**S**ensor **l**ink: Instead of this sensor, use the measurement of another sensor. After confirming the choice "**SL**", the assigned sensor ban be adjusted to the left, including external DL sensors.
DIG	**Dig**ital input such as when a volume flow switch is used.
OFF	The sensor is not displayed on the main level. The sensor value is set to 0°C.
VSG	Volume flow encoder: Only on input 3 to read-in the signals from a volume flow encoder After confirming the choice **"VSG"**, the scaling in LPI (litre per pulse) can be defined on the left.
WS	Wind sensor: **Only connected to input S3**, to read in the pulses of the wind sensor **WIS01** from Technische Alternative (1Hz per 20km/h).

External sensors EXT DL



Electronic sensors for temperature, pressure, humidity, differential pressure, etc. are also available in the **DL** version. In this case, the supply and signal transmission takes place via the **DL bus.**

Up to 9 values from external sensors can be read via the data link.

E1 = -- The external value 1 is deactivated and faded out in the main level.

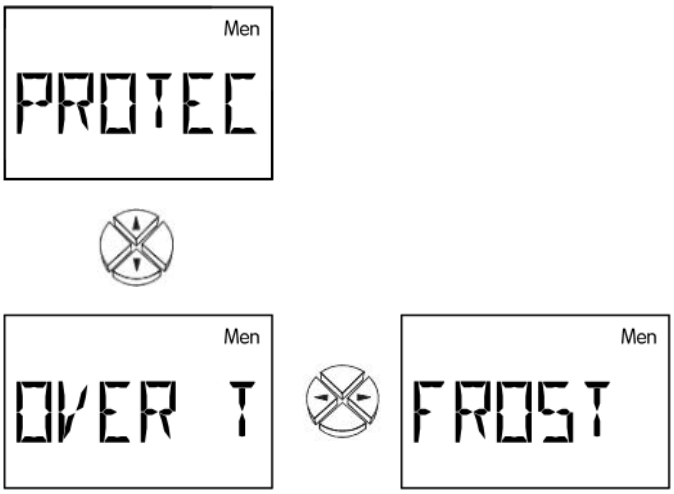
E1 = 101 The **first** number indicates the main address of the external sensor. This can be set to between 1 and 8 on the sensor according to its operating instructions.
The **latter two** numbers indicates the sub-address of the sensor. Since external sensors can transmit numerous values the value required from the sensor is defined via the index.

The setting of the address and index can be taken from the respective data sheets.

Due to the relatively high power requirement, the "**bus load**" must be considered:

The controller ESR32 delivers the maximum bus load 100%. For example, the electronic sensor FTS4-50**DL** has a bus load of 25%, therefore up to a max. 4 FTS4-50**DL** can be connected to the DL bus. The bus loads of the electronic sensors are listed in the technical data of the respective sensors.

System protection functions



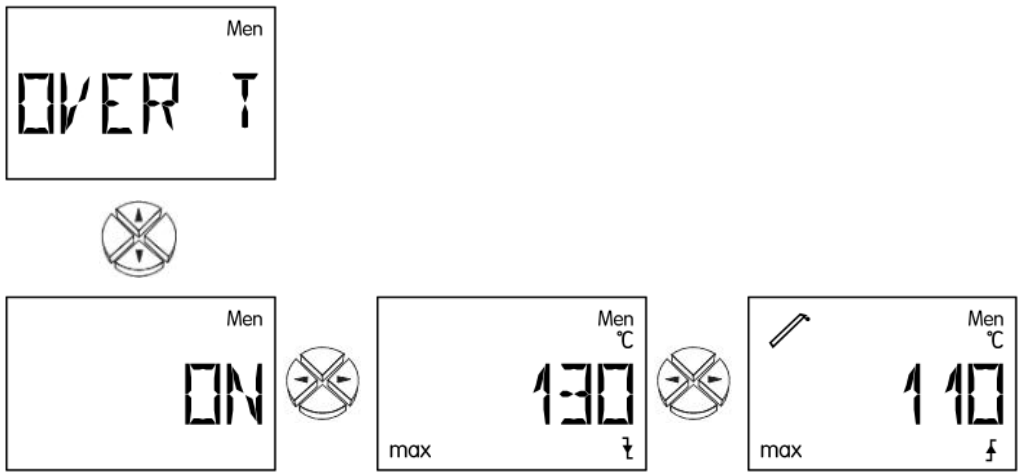
Collector excess temperature limiter

Frost protection

Collector excess temperature limit OVER T

Steam builds up when the system is not circulating. When it automatically switches on again, the pump does not have the pressure to lift the fluid level above the highest point in the system (collector feed line). If there is no circulation, the load on the pump is enormous. This function allows the pump to be blocked above a set collector temperature threshold (**max ↓**) until a second set threshold (**max ↑**) is fallen short of.

If the control output is allocated to the output, the analogue level for pump standstill is issued at the control output if collector excess temperature shutdown is active.



ON/OFF

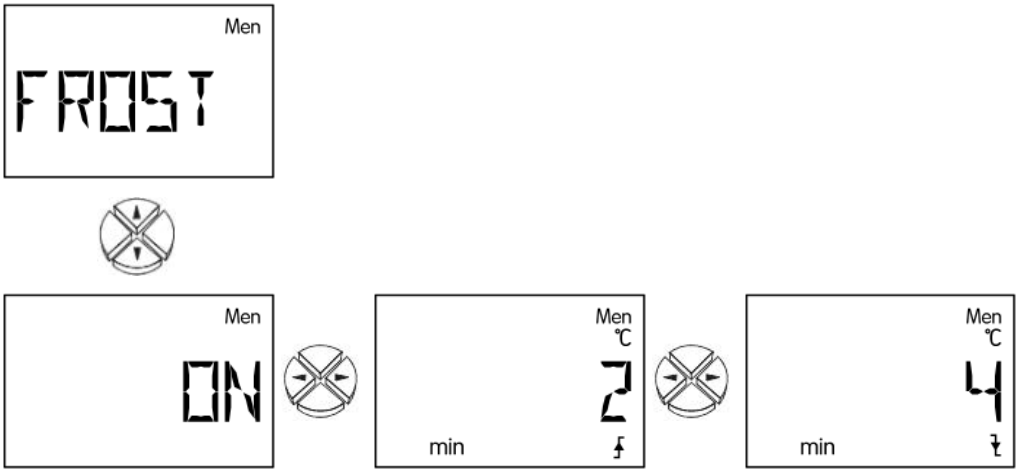
Shut-down threshold

Switch-on threshold

ON / OFF	Collector excess temperature limit ON/OFF
max ↓	Temperature above which the outputs set are to be blocked. Setting range: 0°C to 200°C in increments of 1°C
max ↑	Temperature above which the outputs set are to be released. Setting range: 0°C to 199°C in increments of 1°C

Collector frost protection FROST

This function is disabled ex works and is only necessary for solar power systems that run without antifreeze: In the south, the energy from the solar tank suffices to keep the collector at a minimum temperature for the few hours below freezing. At **min ↑** of 2°C on the collector sensor, the settings in the chart release the solar pump and block it again at **min ↓** of 4°C.



ON/OFF | Switch-on threshold | Shut-down threshold

ON / OFF Collector frost protection ON/OFF

min ↑ Temperature above which the outputs set are to be switched on.
Setting range: -20°C to 29°C in increments of 1°C

min ↓ Temperature above which the outputs set are to be switched off.
Setting range: -20°C to 30°C in increments of 1°C

NOTICE: If the frost protection function is activated and an error occurs at the collector sensor (short circuit, interruption), the set output is switched on at the top of every hour for 2 minutes.

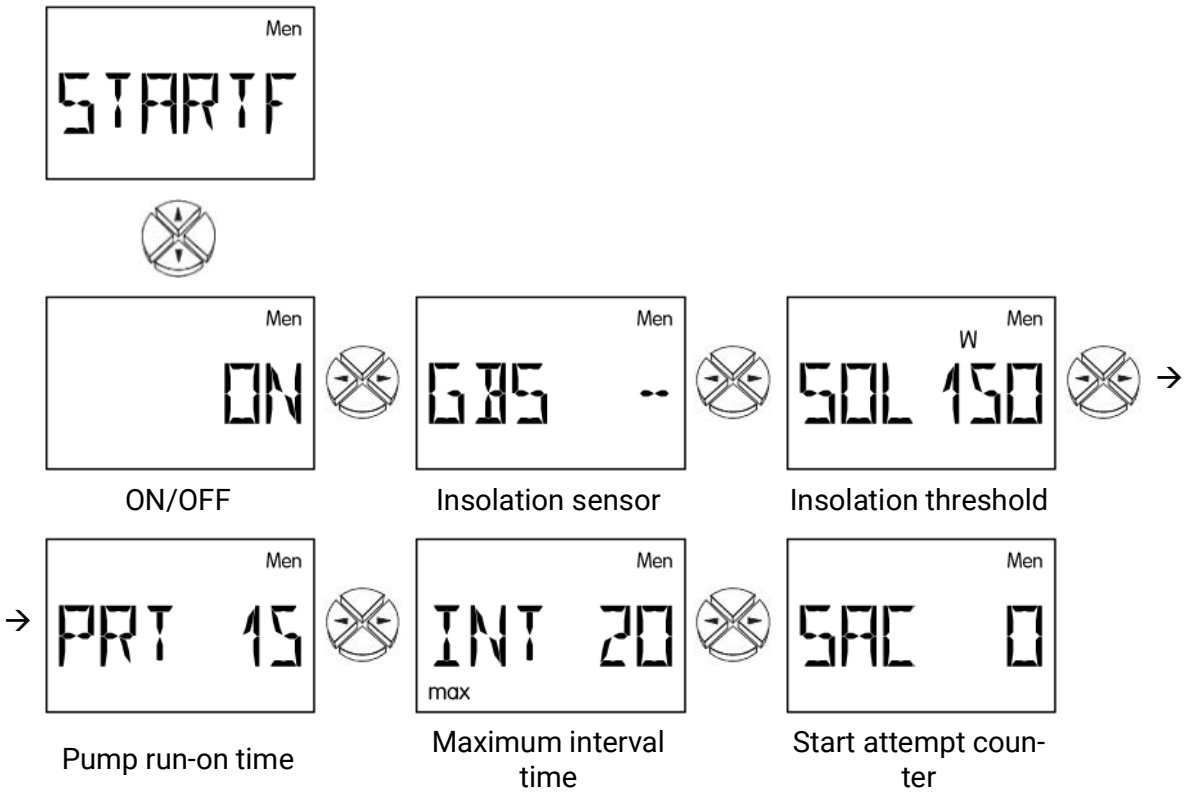
Start function STARTF

(ideal for tube collectors)

Solar thermal systems sometimes start too late in the morning when the collector sensor does not come into contact with the warm heat transfer medium in time. Flat collector fields or **vacuum tubes with forced circulation** often lack sufficient gravity pull.

The start function tries to release a rinsing interval while constantly monitoring the collector temperature. If the control output is allocated to the output, the analogue level for the maximum speed is additionally issued at the control output. The computer first determines the current weather based on constant measurements of the collector temperature. It then calculates the best time for a brief rinsing interval to maintain the temperature for normal operation.

When the radiation sensor is used, the solar radiation is used for the calculation of the start function (insolation sensor **GBS 01** - non-standard accessory). The start function is disabled ex works and only useful with solar thermal systems. When activated, the following flow diagram applies:



ON / OFF Start function ON/OFF

GBS Indicates a sensor input if a radiation sensor is used. If no radiation sensor is used, the average temperature (long-term mean regardless of the weather) is calculated.

Setting range:	S1 to S3	Input of radiation sensor
	E1 to E9	value of the external sensor
	GBS –	no radiation sensor

SOL In**sol**ation threshold in W/m^2, above which rinsing is allowed. Without a radiation sensor, the computer calculates the necessary temperature increase for the long-term mean that launches rinsing from this value.
Setting range: 0 to 990W/m^2 in increments of 10W/m^2

PRT **P**ump **r**un-**t**ime (rinsing time) in seconds. During this time, the pump should have pumped roughly half of the content of the collector's heat transfer medium past the collector sensor.
Setting range: 0 to 99s in increments of 1s

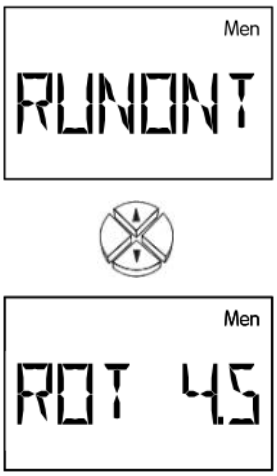
INT (max) Maximum allowable interval between two rinses. This time is automatically reduced according to the temperature increase after rinsing.
Setting range: 0 to 99min in increments of 1min

SAC **S**tart **a**ttempt **c**ounter. The system is automatically reset for a start attempt if the last start attempt was more than four hours ago.

Run-on time

During the start phase, the pumps may repeatedly switch on and off for a long time, especially with solar and heating systems with long hydraulic system lines. This response can be reduced by using a speed control or increasing the pump after-run time.

If the control output is allocated to the output **and no** absolute value control, differential control or event control is activated, the analogue level for the maximum speed is additionally issued at the control output.

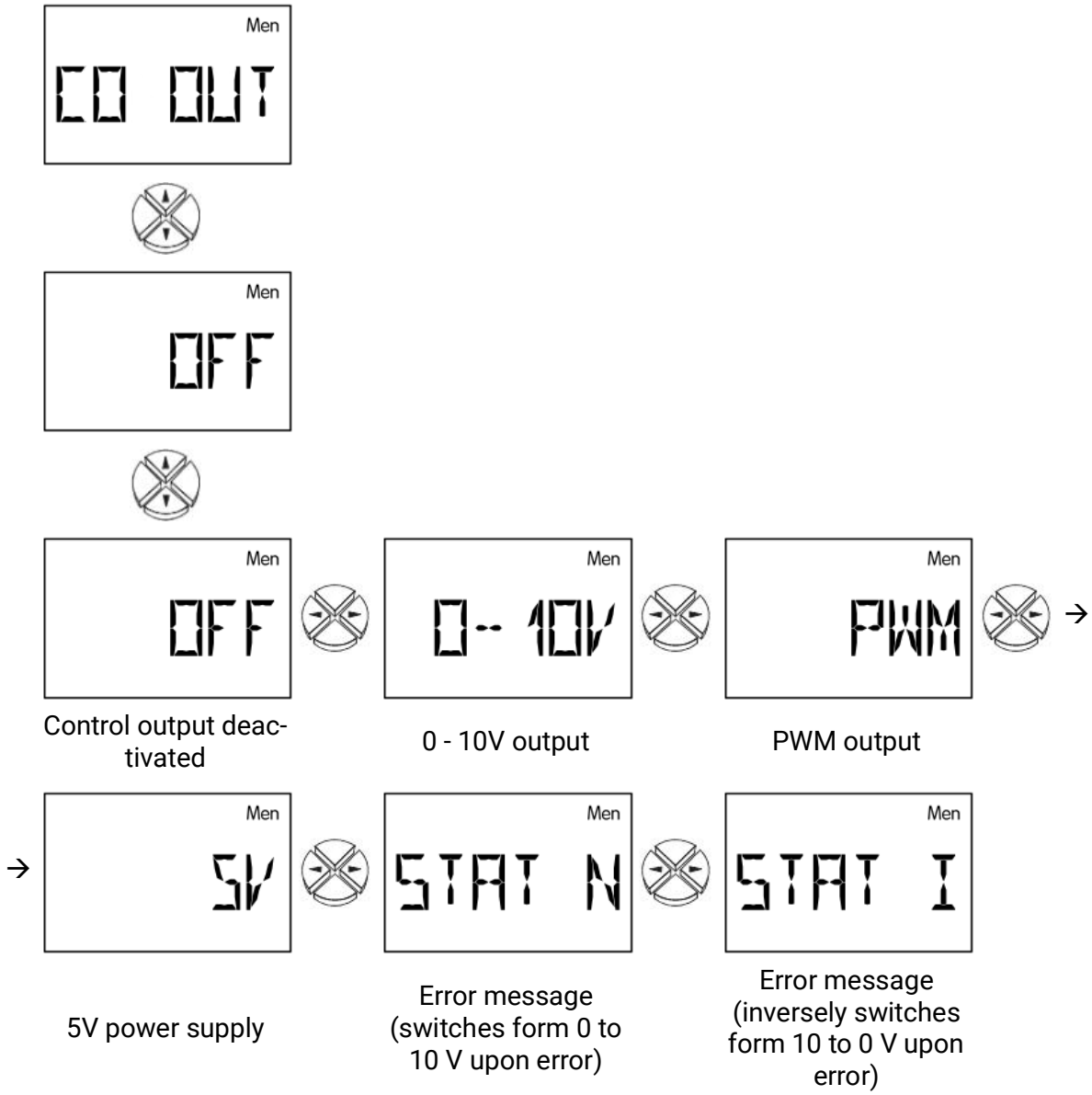


Run-on time

ROT 4.5 Run-on time of the output set to 4.5 minutes
Setting range: 0 (no after-running time) to 9 minutes in increments of 10 sec

Control output CO OUT (0-10V or PWM)

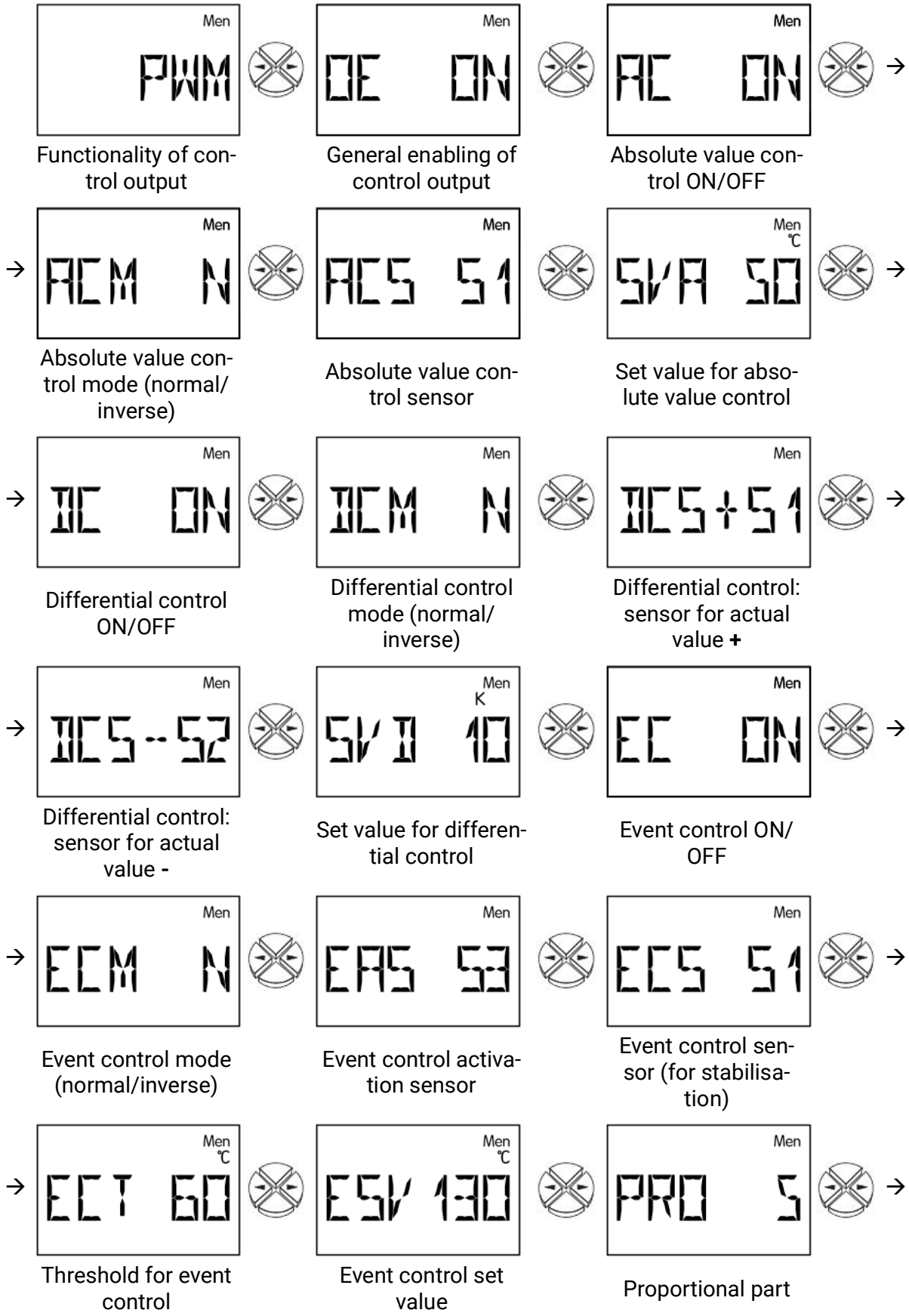
Different functions of the control output:

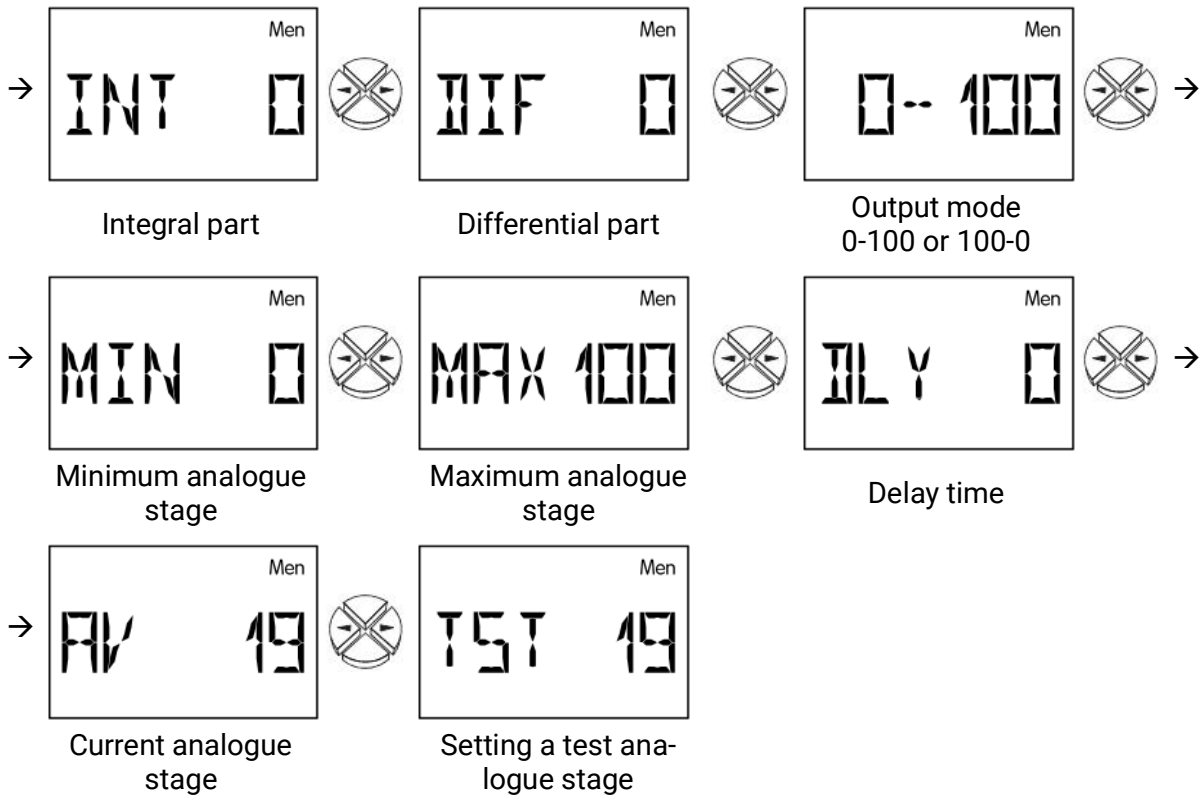


OFF	Control output deactivated; output = 0V
0-10V	PID-controller; output= 0-10V in 0.1V increments
PWM	PID-controller; output = duty cycle 0-100% in 1% increments
5V	Power supply; output = 5V
STAT N / STAT I	If function control is activated and an error message is displayed in the status display **Stat** (sensor open circuit **IR**, -short circuit **SC** or circulation error **CIRC.ER**) the output with the setting **STAT N** is switched over from 0 to 10 V (for **STAT I**: inversely from10V to 0V). Upon collector excess temperature switch-off **CETOFF**, the control output does not switchover. Subsequently, an auxiliary relay can be connected to the control output, which forwards the error message to a signalling device (e.g. warning lamp or audible alarm).

The following settings are only possible in **0-10V** and **PWM** modes

Warning! The values in the following description are by way of example only; they must, in all cases, be matched to the system!



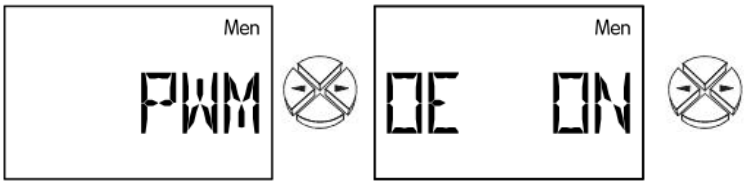


In this menu the parameters for the control output are specified.

As analogue output it can put out a voltage of 0 to10V in 0.1V increments.

As PWM a digital signal with a frequency of 500 Hz (level approx.10 V) and a variable duty cycle from 0 to 100% is created.

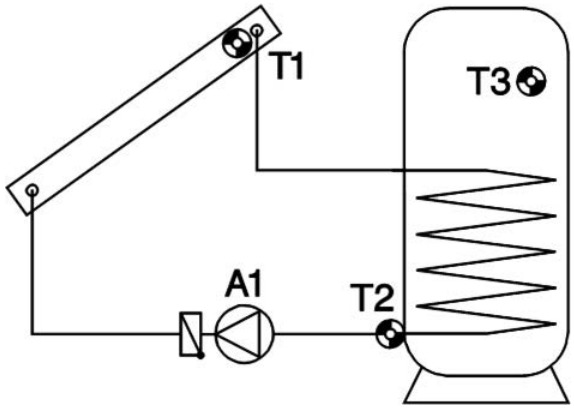
The control output is factory set to PWM and linked to output 1. It can be enabled by the assigned output in the active state. If the control output (0-10 V or PWM) is activated and speed control is set, the analogue level is displayed in the basic menu after the measured values under “ANS”.



General enabling of control output

The pump speed control can be used to change the delivered quantity – i.e. the volume flow – via the control output. This provides constant levels of (differential) temperatures in the system

This simple solar diagram will now be used to show the possibilities of this process:



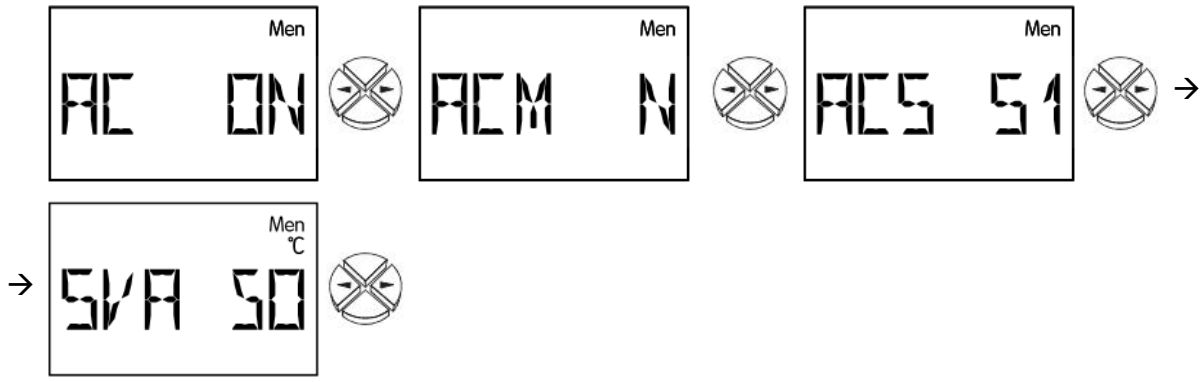
Absolute value control

= maintaining a sensor

S1 can be kept at one temperature (such as 50°C) very well by using the speed control. If the solar radiation is reduced, S1 becomes colder. The control unit then lowers the speed and hence the flow rate. However, that causes the warm-up time of the heat transfer medium in the collector to increase, thus increasing S1 again.

A constant return (S2) may make sense as an alternative in various systems (such as boiler feeds). Inverse control characteristics are necessary for this. If S2 increases, the heat exchanger does not provide enough energy to the tank. The flow rate will then be reduced. The longer dwell time in the exchanger cools the heat transfer medium more, thus reducing S2. It does not make sense to keep S3 constant as the variation in the flow rate does not directly affect S3; hence, no regulator circuit will result.

Example:



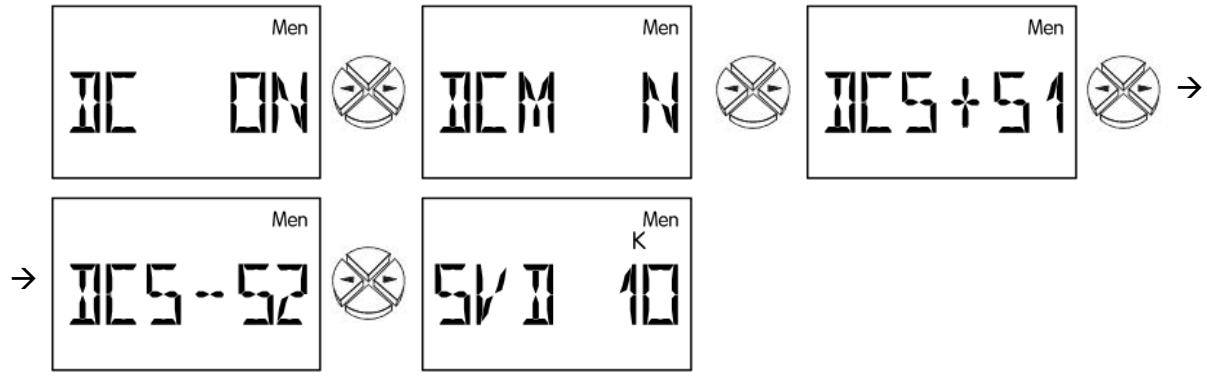
AC ON	General enable of absolute value control
ACM N **ACM I**	**A**bsolute value control in normal operation, with sensor S1 being kept constant. **Normal operation N** means that the speed increases as temperatures do and is valid for all applications to keep a “feed sensor” constant (collector, boiler, etc.) **Inverse operation I** means that the speed decreases as temperatures drop and is necessary to maintain a return or control the temperature of a heat exchange outlet via a primary circulating pump (such as hygienic hot water). If the temperature at the heat exchanger’s outlet is too high, too much energy yield enters the heat exchanger, thus reducing the speed and hence the input.
ACS S1	Absolute value control sensor: according to the example, sensor **S1** is maintained.
SVA 50	The desired value for absolute value control is 50°C. In the example, S1 is thus kept at 50°C.

Differential control

= maintaining the difference between two sensors' temperatures

Keeping the temperature difference constant between S1 and S2, for instance, allow for "shifting" operation of the collector. If S1 drops due to lower irradiation, the difference between S1 and S2 thus drops. The control unit then lowers the speed, which increases the dwell time of the medium in the collector and hence the difference between S1 and S2.

Example:



DC ON	General enabling of the differential control
DCM N/I	Differential control mode normal/inverted
DCS+S1 **DCS-S2**	Differential control sensors **+** and **-** According to the example, differential control is active between sensors **S1** and **S2.**
SVD 10	The set value of differential control is **10 K**. According to the example, therefore, the temperature differential between S1 and S2 is kept at a constant 10 K. **Caution**: SWD must always be greater than the stop differential of the basic function. With a smaller SWD the basic function blocks the release of the pump before the speed control has reached the set value.

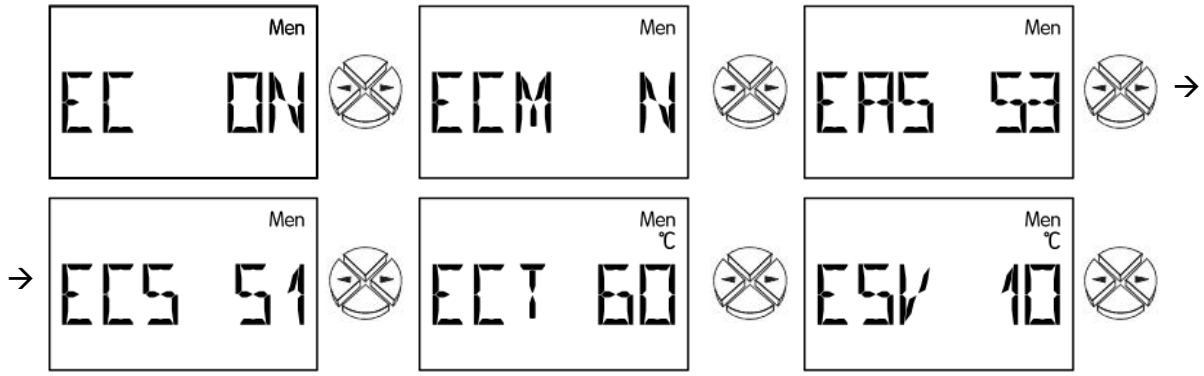
If the absolute value control (maintaining a sensor) and the differential control (maintaining the difference between two sensors) are both active, the slower of the two speeds counts.

Ereignisregelung

= If a set temperature event occurs, the speed control starts, thus keeping a sensor constant.

If, for instance, S3 reaches 60°C (activation threshold), the collector should be kept at a certain temperature. Maintaining a sensor then works as with absolute value control.

Example:



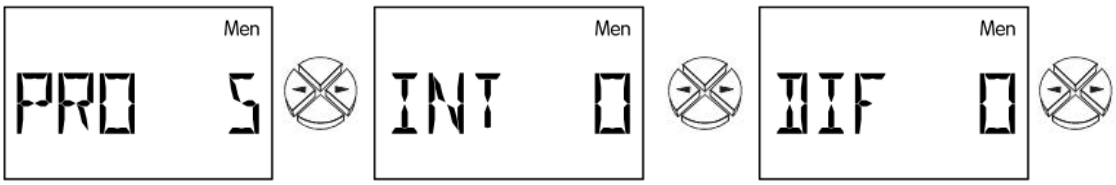
EC ON	General enabling of the event control
ECM N/I	Event control in normal mode or inverted mode
EAS S3	Event control activation sensor: the sensor, on which the temperature event must occur
ECS S1	Event control sensor: the sensor, which is maintained at constant temperature when the temperature event occurs
ECT 60	The threshold of the event control is **60**°C. Above a temperature of 60°C on **S3**, speed control is activated.
ESV 10	The desired value of the event control is **10**°C. When the temperature event occurs, S1 is maintained at a constant 10°C.

The event control “overwrites” the speed results from other control methods. A set event can thus block the control of absolute values or differences.

In the **example**, keeping the collector temperature at 50°C with the absolute value control is blocked when the tank has already reached 60°C at the top = the fast provision of hot water is complete and is now to be continued with full volume flow (and hence a lower temperature but slightly better efficiency). To do so, a value that value automatically requires full speed (such as S1 = 10°C) has to be entered as the new desired temperature in the event control.

Stability

The speed control has a PID controller. It ensures an exact and fast adjustment of the actual value to the set point. **In applications such as solar power systems or feed pumps, the following parameters should be left in factory settings**. With a few exceptions, the system will run stably. These two values have to be balanced, however, especially for hygienic hot water from the external heat exchanger. In addition, in this case the use of an ultra-fast sensor (non-standard accessory) is recommended at the hot water outlet.



Set value = desired value, actual value = temperature measured

PRO 5 Proportional part of the PID controller 5. It represents the reinforcement of the deviation between the desired and the actual value. The speed is changed by one increment for each 0.5K of deviation from the desired value. A large number leads to a more stable system but also to more deviation from the predefined temperature.

INT 5 Integral part of the PID controller 5. It periodically adjusts the speed relative to the deviation remaining from the proportional part. For each 1K of deviation from the desired value, the speed changes one increment every 5 seconds. A large number provides a more stable system, but it then takes longer to reach the desired value.

DIF 5 Differential part of the PID controller 5. The faster a deviation occurs between the desired and the current value, the greater the short-term overreaction will be to provide the fastest compensation possible. If the desired value deviates at a rate of 0.5K per second, the speed is changed by one increment. Large numbers provide a more stable system, but it then takes longer to reach the desired value.

The parameters PRO, INT, and DIF can also be determined in a test:

Assume that the pump is running in automatic mode in a unit that is ready for operation with appropriate temperatures. With INT and DIF set to zero (= switched off), PRO is reduced every 30 seconds starting at 9 until the system is unstable. In other words, the pump speed changes rhythmically and can be read in the menu with the command ACT. Every proportional part that becomes unstable is noted as P_{krit} just as the duration of the oscillation (= time between the two highest speeds) is noted as t_{krit}. The following formulas can be used to determine the correct parameters.

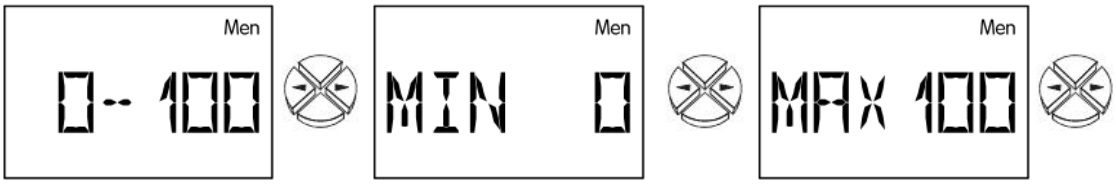
$$PRO = 1{,}6 \times P_{krit} \qquad INT = \frac{PRO \times t_{krit}}{20} \qquad DIF = \frac{PRO \times 8}{t_{krit}}$$

A typical result of **hygienic service water** with the ultra-fast sensor is PRO = 8, INT = 9, DIF = 3. For reasons not entirely understood, the setting PRO = 3, INT = 1, DIF = 4 has proven practical. Probably, the control unit is so unstable that it oscillates very quickly and appears to be balanced due to the system's and the fluid's inertia.

Output mode, output limits

Depending on the pump version, the control mode of the pump can be normal (0 – 100 “solar mode“) or inverse (100 – 0, “heating mode“). There can also be specific requirements for the limits of the control range. These can be found in the information of the pump manufacturer.

The following parameters define the control mode and the lower and upper limits of the output analogue value:

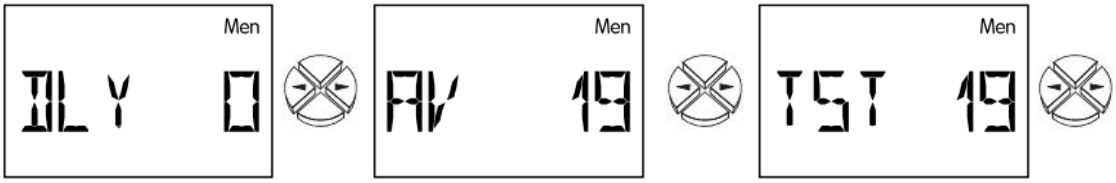


0-100 Output mode setting:
0-100 corresponds to 0->10V or 0->100% PWM
100-0 corresponds to 10->0V or 100->0% PWM (inverted).

MIN Lower speed limit

MAX Upper speed limit

Delay time, Control commands



DLY If the control output is activated by an assigned output, then the speed control is deactivated for the specified period and the value for the maximum speed is output. The control output is only controlled after this time has elapsed

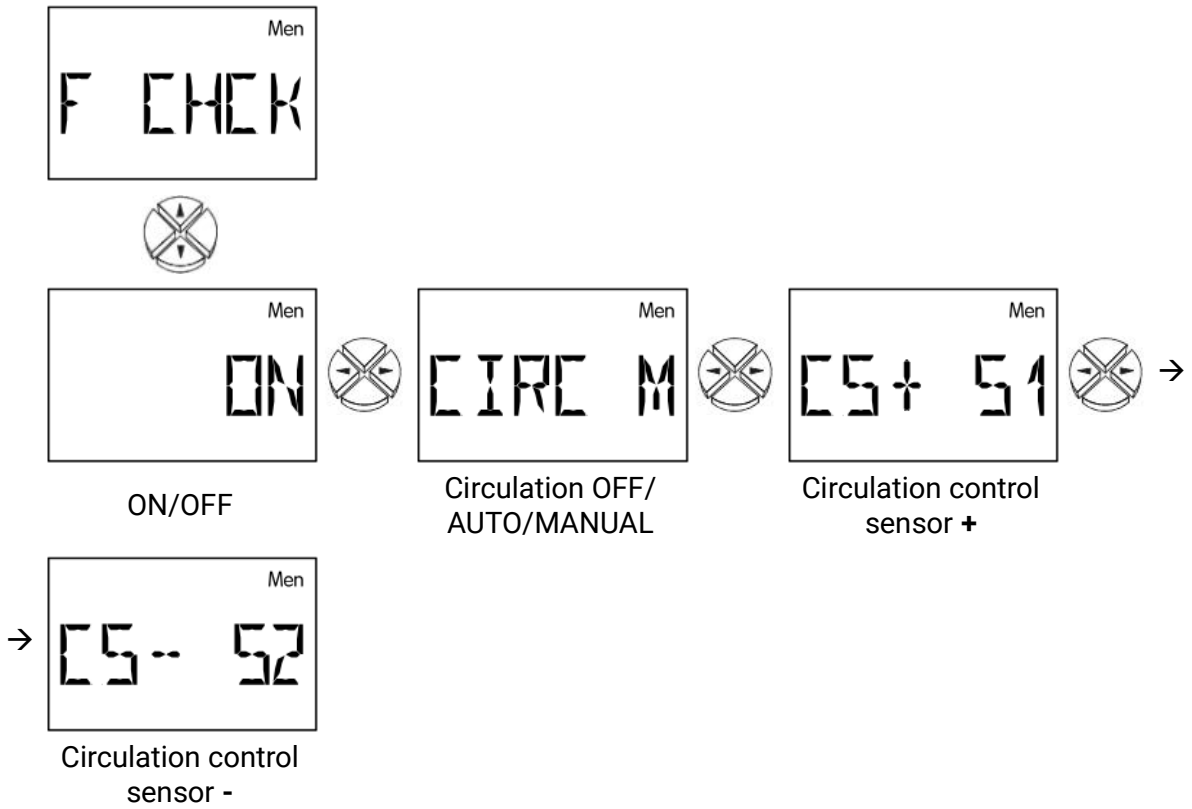
The following commands provide a test of the system and allow you to monitor the current speed:

AV 19 The pump is currently running at stage **19** (actual value).

TST 19 The speed stage **19** is currently being tested. Calling TST automatically switches to manual mode. As soon as the value blinks via the key ⇩ (= entry), the pump runs at the speed displayed.

Function check F CHCK

Some countries only offer subsidies for the installation of solar thermal systems if the control units have a function check to detect a sensor defect and a lack of circulation. In the menu command F CHCK, the mechanic can activate this function check for the ESR32. This function check is disabled ex works.



ON/OFF

Circulation OFF/ AUTO/MANUAL

Circulation control sensor **+**

Circulation control sensor **-**

ON/OFF Select/disable the function check.
The function check mainly makes sense for the monitoring of solar power systems. The following system statuses and sensors are monitored:
An interruption / short circuit of the sensors.

CIRC Enabling of the circulation check
Circulation problems - if the output is active and the temperature difference between two the sensors is greater than 60K for at least 30 minutes, an error message is output (if activated).

Settings:

CIRC -- = circulation check is disabled
CIRC A = The circulation is controlled according to the schematic (solar circuit only).
CIRC M = Circulation control can be set manually.

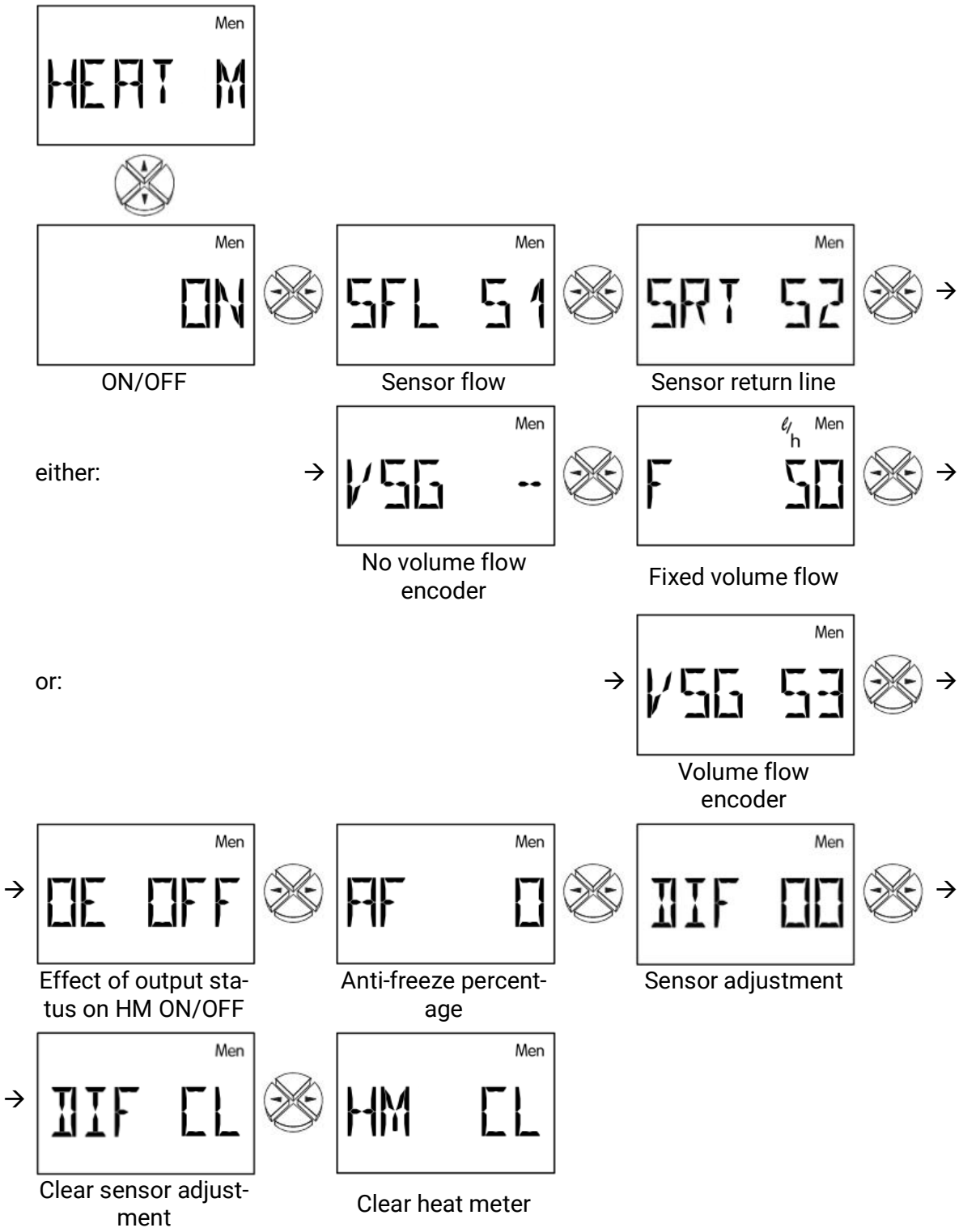
The following menu items are only displayed if the circulation checks have been set to “manual”.

CS+ S1
CS- S2 Example: if the output is active and sensor **S1** has been 60K greater than sensor S2 for at least 30 minutes, a circulation error is displayed.

The error messages are entered in the menu **Stat**. If **Stat** is blinking, a malfunction or special system status has been detected (see “The status display **Stat**”).

If the control output is set to “**STAT N**” or “**STAT I**” and the function control is activated, then if an error occurs, the control output is switched over. Subsequently an auxiliary relay can be used to forward this error message to a signalling device.

Heat meter



The heat meter is deactivated by default. A heat meter requires three points of information:

Flow temperature, return temperature, flow rate

In solar thermal systems, the correct installation of sensors (see sensor installation - collector sensor on the supply line's collecting tube, tank sensor on the outlet of the return line) automatically leads to correct measurements of the required temperatures, though the losses in the supply line will be included in the heat quantity.

ON / OFF Enable/disable heat meter

SFL Sensor input for flow temperature

Setting range:	S1 to S3	Input of the flow sensor
	E1 to E9	Value from external sensor via DL

SRT Sensor input for return temperature

Setting range:	S1 to S3	Input of the return sensor
	E1 to E9	Value from external sensor via DL

VSG Sensor input for volume flow encoder
The pulse encoder VSG can only be connected to input S3. For this purpose, the following settings must be made in the SENSOR menu:

S3 VSG	Volume flow sensor with pulse encoder
LPI	Litres per pulse
Setting range:	VSG S3 = volume flow encoder at input 3
	VSG E1 to E9 = Value from external sensor via DL-Bus
	VSG -- = no volume flow encoder = fixed volume flow. For the calculation of the heat amount, the set volume flow is only used if the set output is active

F Volume flow in litres per hour. If no volume flow encoder has been set, a fixed volume flow can be preset in this menu. If a set output is not active, the volume flow is assumed to be 0 litres/hour.
As activated speed control can produce constant changes in volume flow, this method is not suited to use with speed control.
Setting range: 0 to 20000 litres/hour in increments of 10 litres/hour

OE Set whether or not the output should be regarded for heat metering.
ON: Heat metering only occurs when output is active

AF Percentage of antifreeze in the heat transfer medium. An average has been calculated from the product specifications of major manufacturers; this average is used in the table of mixing ratios. This method generally produces an additional maximum error of one percent.
Setting range: 0 to 100% in increments of 1%

DIF Current temperature **dif**ference between the flow and return sensor (Maximum display ±8.5 K; an arrow is displayed above this). If both sensors are immersed in one bath for test reasons (with both thus measuring the same temperatures), the device should display "**DIF 0**". Sensor and measurement equipment tolerance may, however, lead to a displayed difference under DIF. If this display is set to zero, the device saves the difference as a correction factor and then calculates the heat amount adjusted by the natural measurement error. This menu item thus provides a way to calibrate to system. The display may only be set to zero (i.e. changed) if both sensors have the same measurement conditions (same bath). In addition, the temperature of the test medium should be around 40-60°C.

DIF CL Difference clear: clear the temperature difference between flow and return sensors (as described above).

HM CL Clear heat quantity counter. The cumulative amount of heat can be reset with the ⇩ key (= enter).

If the heat counter has been activated, the following are displayed in the basic menu:

- the current output in kW
- the amount of heat in MWh and kWh
- of the volume flow in litres/hour

IMPORTANT: If an error (short circuit, interruption) occurs at one of the two set sensors (supply sensor, return sensor) for the heat meter, the current output is set at 0, i.e. no heat is metered.

NOTICE: As the internal storage (EEPROM) has only a limited number of write cycles, the totalled heat meter is saved only once per hour. For this reason, it is possible that a power failure can result in loss of the heat-quantity data for one hour.

Tips on accuracy:

A heat counter can only be as exact as its sensors and equipment. In the range from 10°C to 90°C the standard solar control sensors (PT1000) have an accuracy of approximately +/- 0.5K. For KTY sensors the equivalent figure is +/- 1K. The unit's measurement equipment is accurate down to +/- 0.5K according to laboratory measurements. PT1000 sensors may be more accurate, but they have a weaker signal that increases the error. In addition, the proper installation of the sensors is crucial and can increase error considerably if installed improperly.

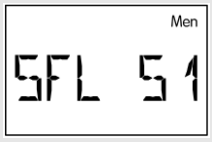
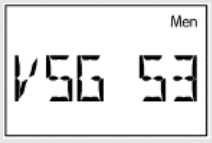
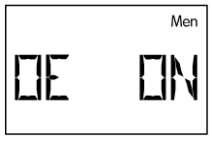
If all of the tolerances cumulate in a worst-case scenario, the error would be 40% (KTY) at a typical temperature difference of 10 K! However, normally the error should be below 10% as the equipment error affects all of the input channels the same, and the sensors are from the same production batch. The tolerances thus cancel each other out somewhat. In general, the greater the differential temperature, the smaller the error. The measurement results should always been seen just as guide values in all respects. The adjustment due to measurement differences (see **DIF**:) leads to a measurement error in standard applications of around 5%.

Step by step setup of the heat meter

You have the option of using 2 different volume flow encoders:

- the pulse encoder VSG and
- the FTS-DL, which is connected to the data link.

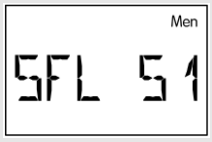
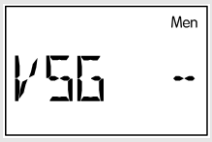
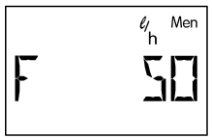
If you do not use a volume flow encoder, then you can only set a fixed volume flow.
In the following, the necessary settings are displayed step by step..

VSG (pulse encoder)		
1		The VSG (pulse encoder) can only be connected to input 3, hence: menu “SENSOR”, sensor setting S3 to “S3 VSG”
2		Checking and possible alteration of the LPP value (litre per impulse)
3		Access to menu “HEAT M”, setting to “ON”
4		Setting of the flow sensor in the SFL display, in the example shown, sensor S1
5		Setting of the return sensor in the SRT display, in the example shown, sensor S2
6		Entry of “S3” in the VSG display as the VSG is the sensor S3
7		Specification of the output
8		Indication of the antifreeze percentage AF
9		Possible sensor compensation as per the operating manual

FTS-DL

Example: fitting in the return, use of an external sensor for the flow line which is connected to the FTS4-50DL

1		The FTS4-50DL is connected to the data link (external sensor), hence: menu “EXT DL”, setting of the volume flow encoder on the display of the external sensor “E1“: 101 (address 1, index 01)
2		Setting the sensor temperature of the FTS4-50DL for the return: menu “EXT DL”, on the display „E2“: 102 (address 1, index 02)
3		If an external temperature sensor is connected for the pre-run on the FTS4-50DL: menu “EXT DL”, in the display “E3”: 103, PT1000 sensor (address 1, index 03) is used
4		Access to menu “HEAT M”, setting to “ON”
5		Setting of the pre-run sensor in the “SFL” display, if, as shown in the example, external sensor: E3 (see step 3), otherwise specification of the corresponding pre-run sensor S1 - S3
6		Setting of the return sensor in the “SRT” display, by using the temperature sensor on the FTS4-50DL: E2 (see point 2), otherwise specification of the corresponding return sensor S1 - S3
7		Display VSG: entry VSG E1, i.e. the volume flow encoder is external sensor E1 (see point 1)
8	  	Specification of the allocated output OP, of the antifreeze percentage and sensor compensation

No volume flow encoder		
1		Access to menu “HEAT M”, setting to "ON"
2		Setting of the pre-run sensor in the SFL display, in the example shown, sensor S1
3		Setting of the return sensor in the SRT display, in the example shown, sensor S2
4		Entry of “--” in the VSG display, as no volume flow encoder is being used
5		Entry of the fixed volume flow in litres/hour
6	  	Specification of the allocated output OP, of the antifreeze percentage and sensor compensation

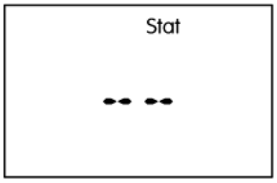
Status display Stat

The status display provides information in special system situations and problems. It is mostly intended for use with solar thermal systems, but can also be useful with other diagrams. The status display can then only operate if an active function check is set off via defective sensors S1 or S2. For solar applications, a distinction has to be made between three status areas:

- Function check and collector excess temperature are not active = no system response is analysed. Only a bar appears in the display in **Stat**.
- Collector excess temperature is active = the excess temperature that occurs during system standstill only leads to the display CETOFF (the collector's excess-temperature cut-off is active) during this time under Stat.
- Function check is active = monitoring of interruption (**IR**) and short circuit (**SC**) of the solar sensors and circulation problems. If this outlet is active and the differential temperature between collector S1 and tank S2 is greater than 60K for more than 30 minutes, the error message **CIRCER** (circulation error) is output. This status (**Stat** blinks) is maintained even after the error has been remedied and has to be cleared in the status menu using the command **CLEAR**.

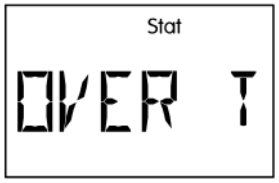
In **Stat,** the display will read **OK** when the monitoring function is activated and the system's operation is correct. If there is anything unusual, **Stat** blinks regardless of the display position.

Function check disabled



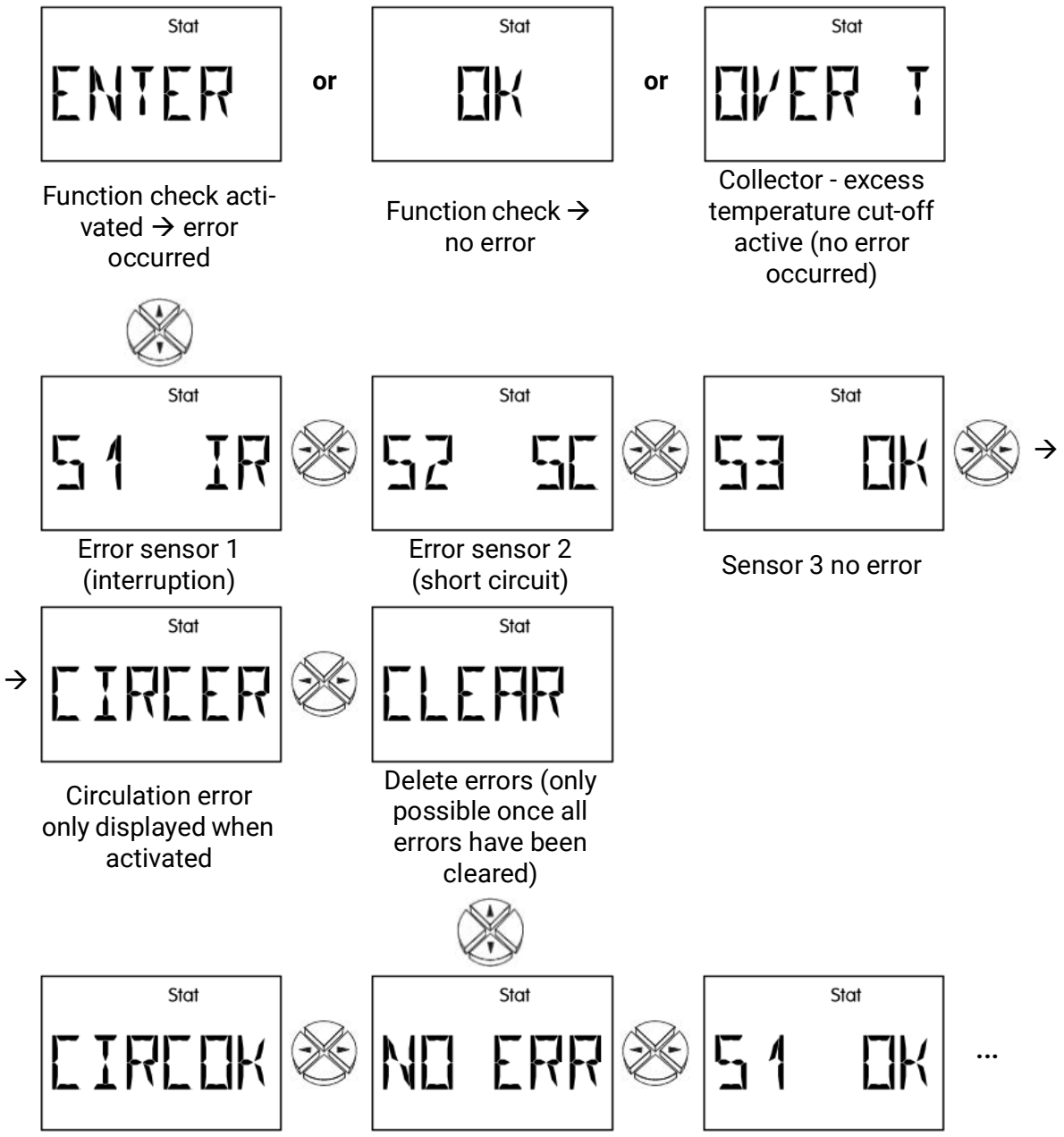
Function check disabled

or:



Collector - excess temperature cut-off is active

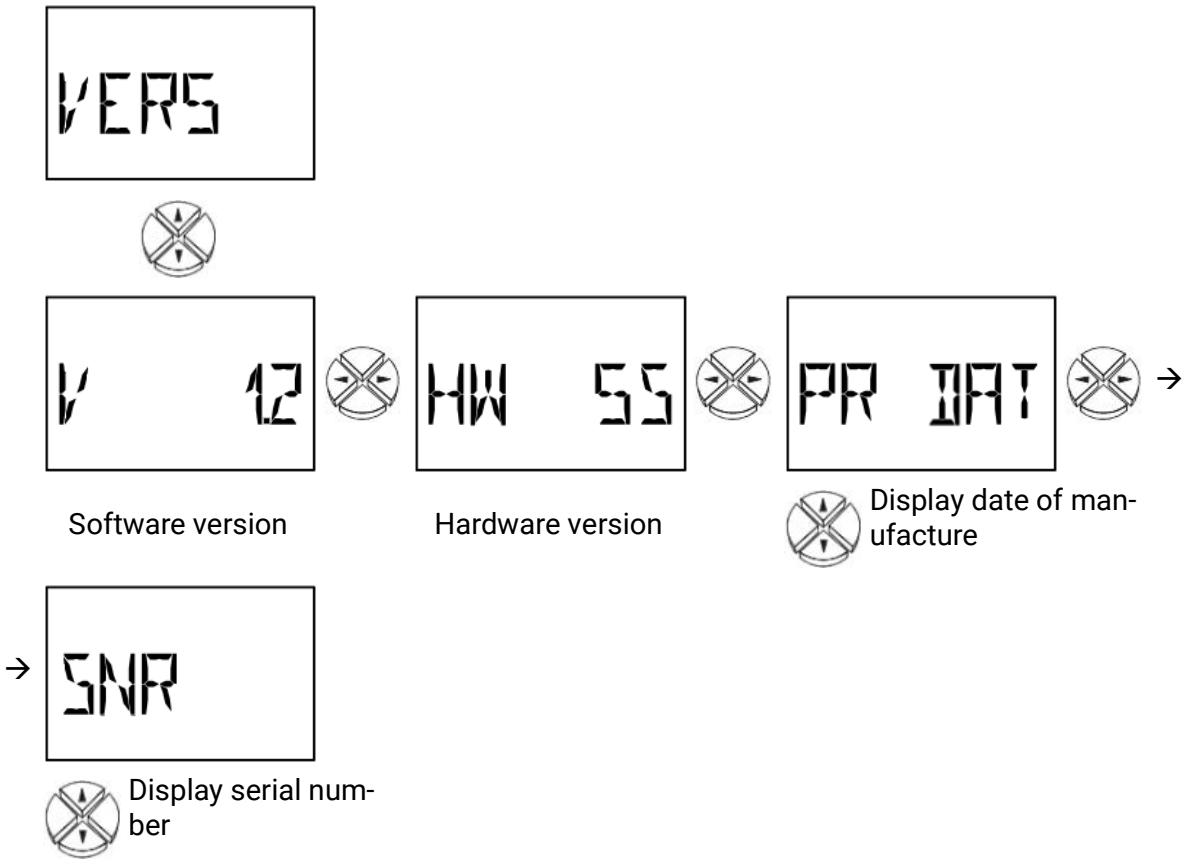
Function check activated



Version display VERS

The version menu displays device-related information, namely:

- Software version
- Hardware version
- Date of manufacture
- Serial number



Installation instructions

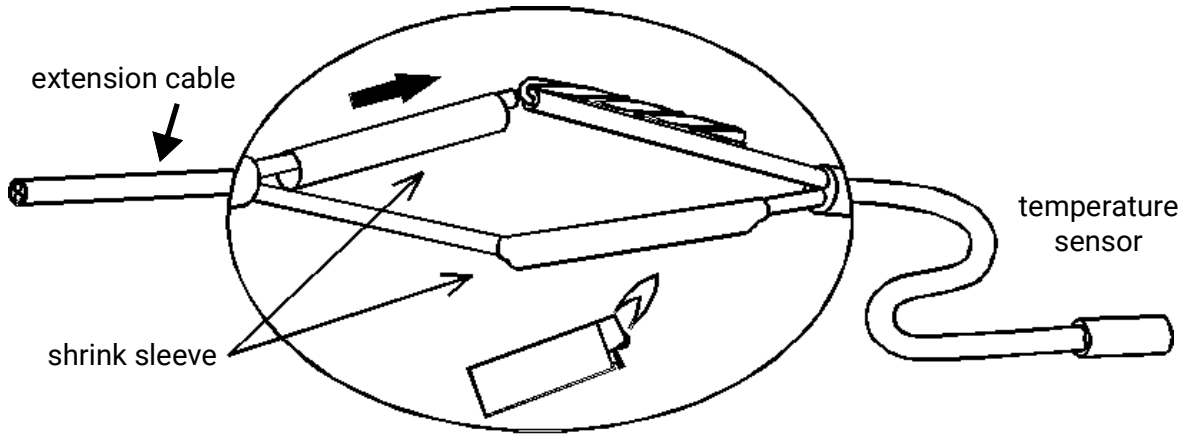
Sensor installation

The sensors must be properly arranged and installed for the system to function correctly.

- **Collector sensor**: Either insert the sensor in a pipe directly soldered or riveted to the absorber and extending out of the collector casing or screw the sensor onto a T piece on the end of the supply line's collecting tube using an immersion sleeve. No water may be allowed to enter the immersion sleeve (danger of freezing).
- **DHW tank sensor**: The sensor should be used with an immersion sleeve just above the outlet for the exchanger's return line if heat exchangers with ribbed tubes are used and with a T piece on the outlet of the exchanger's feed line if integrated non-ribbed tubes are used. It should not be installed below the respective register or heat exchanger in any case.
- **Boiler sensor** (boiler flow): This sensor is either screwed into the boiler using an immersion sleeve or at a short distance from the boiler on the supply line.
- **Pool sensor** (swimming pool): Install directly at the outlet from the pool on the suction line as an attached sensor (see attached sensor). Installation using an immersion sleeve is not recommended due to the possibility of condensation within the sleeve.
- **Attached sensor:** Attach to the line using pipe or hose clamps. Make sure the material used is proper (corrosion, temperature resistance, etc.). Then, the sensor has to be well insulated so that the pipe temperature is measured exactly and the ambient temperature does not influence the measurement.
- **Warm water sensor**: to produce warm water using an external heat exchanger a rapid reaction to changes in water quantity is absolutely critical. For this purpose the ultra-fast warm water sensor (special accessory) must be installed directly to the heat-exchanger output using T-shaped connector and installation kit.

Sensor lines

All of the sensor lines with a cross-section of 0.5mm2 can be extended up to 50m. With this length of line and a Pt1000 temperature sensor, the measurement error is approx. +1K. Longer lines or a lower measurement error require an appropriately larger cross-section. The sensor and the probe can be connected by putting the heat-shrinkable sleeve truncated to 4 cm over a wire and twisting the bare ends. If one of the wire ends is tinned then the connection must be made through soldering. Then the heat-shrinkable sleeve is put over the bare, twisted ends and carefully heated (such as with a lighter) until it has wrapped the connection tightly.



In order to prevent measurement fluctuations, the sensor cables must not be subject to negative external influences to ensure fault-free signal transmission. When using non-screened cables, sensor cables and 230V network cables must be laid in separate cable channels and at a minimum distance of 5 cm.

Installing the device

WARNING! Always pull the mains plug before opening the casing! Only work on the inside of the control system when it is without voltage.

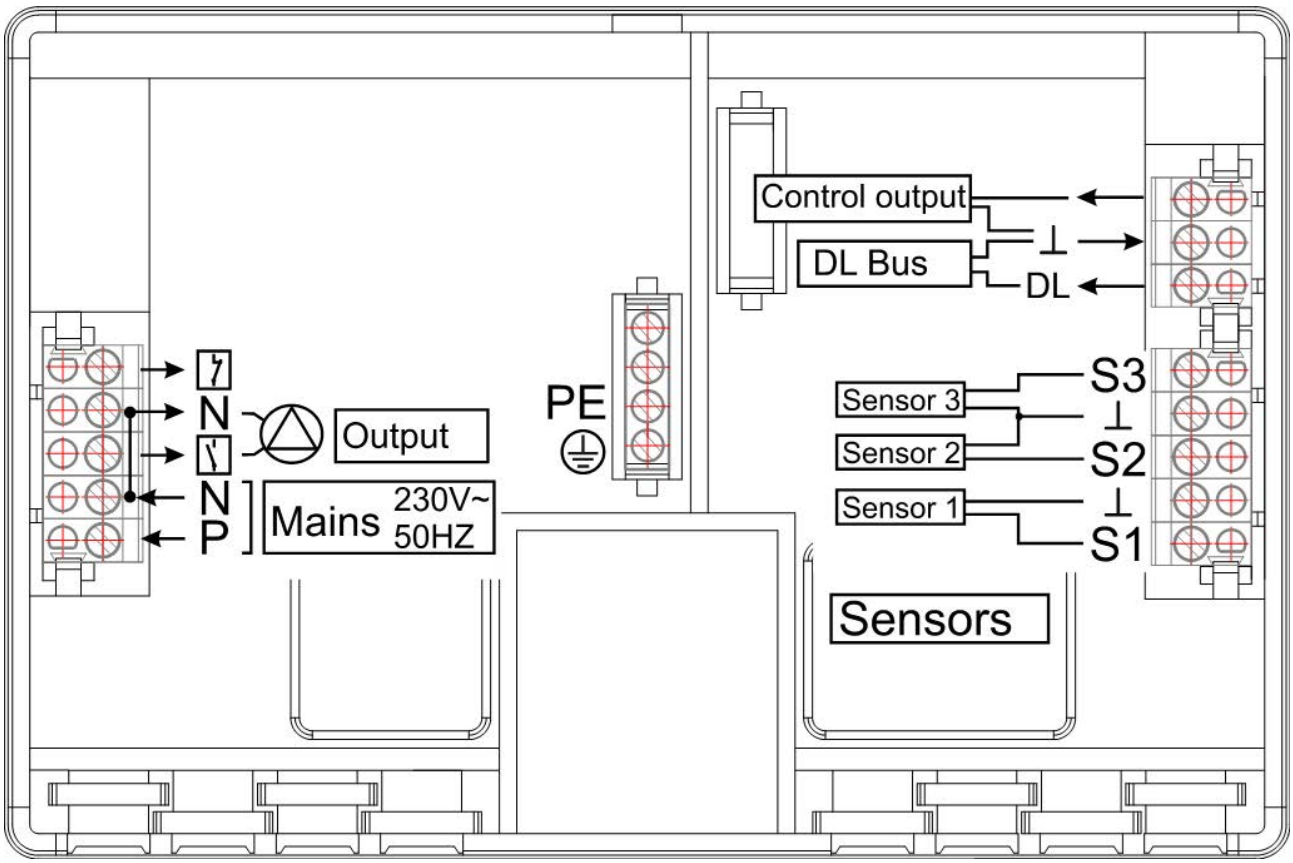
Loosen the screw on the top of the casing and remove the lid. The electronics for the control unit is in the lid. Contact pins provide a connection to the clamps in the lower part of the casing when the lid is put on again. The body of the casing can be screwed to the wall (with the cable ducts facing down) through the two holes using the fastening materials provided.

Electrical connection

Caution: Only a trained electrician may provide the electrical connection in compliance with local guidelines. The sensor lines must not be laid in the same cable channel as the supply voltage. The maximum output load amounts to 2.5A. If filter pumps are directly connected, their rating plate must be minded. The appropriate strip terminal **PE** must be used for all protective conductors.

Note: The system has to be grounded properly and furnished with surge arresters to protect it from damage due to lightening. Sensor failures due to storms and static electricity are usually the result of faulty construction.

The sensor masses are internally connected and can be exchanged as needed.



Special terminals

Control output (0 – 10V / PWM)

This output is intended for the speed control of electronic pumps, for control of burner performance (0 - 10V or PWM) or for switching the auxiliary relay HIREL-STAG. It can be operated via respective menu functions parallel to the output.

Sensor input S3

As transducer in the menu SENSOR, all of the 3 inputs can work as digital inputs. Unlike the other inputs, input S3 has the special ability of being able to detect quick signal changes, such as those from volume flow encoders (type VSG).

The data line (DL-Bus)

The bi-directional data link (DL-Bus) was developed for the ESR/UVR series and is only compatible with products of the Technische Alternative company. Any cable with a cross section of 0.75 mm² can be used for the data link (e.g. twin-strand) having a max. length of 30 m. For longer cables, we recommend the use of shielded cable.

External sensors

Reading the values from external sensors with DL connector.

Tips on troubleshooting

In general, all of the settings in the menus Par and Men and the terminal should first be checked if there is a malfunction.

Malfunction, but “realistic” temperature values:

- Check program number.
- Check the switch-on and switch-off thresholds and the set differential temperatures. Have the thermostat and differential thresholds already been reached?
- Were the settings in the sub-menus (**Men**) changed?
- Can the output be switched on and off in manual mode? If an endurance run and standstill lead to the appropriate reaction at the output, the unit is certainly in order.
- Are all of the sensors connected with the right terminals? Heat up the sensor using a lighter and control from the display.

Incorrect display of temperature(s):

- Displayed values such as -999 if a sensor short-circuits or 999 if there is an interruption do not necessarily mean a material or terminal error. Are the right sensor types (KTY or PT1000) selected in the menu Men under SENSOR?

  The factory settings set all inputs to PT (1000).
- The sensor can also be checked without a measuring instrument by replacing the presumably defective sensor on the strip terminal with one that works and checking the display. The resistance measured by an ohmmeter should have the following value depending on the temperature:

Temp.	**0**	**10**	**20**	**25**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
PT1000 [Ω]	1000	1039	1078	1097	1117	1115	1194	1232	1271	1309	1347	1385
KTY (2kΩ) [Ω]	1630	1772	1922	2000	2080	2245	2417	2597	2785	2980	3182	3392

The settings of the parameters and menu functions ex works can be restored any time by pressing the down arrow (enter) while plugging the machine in. The sign that appears for three seconds on the display is WELOAD for load factory settings.

If the system is not in operation although supply voltage is connected, the 3.15A quick-blowing fuse that protects the control system and the output should be checked and exchanged if necessary.

As the programs are constantly being revised and improved, there may be a difference in the numbering of the sensor, pumps, and program than indicated in old documents. Only the enclosed manual (identical serial number) applies for the equipment supplied. The program version for the manual must correspond to the equipment version.

If the control system is found to be malfunctioning despite the checks described above, please contact your retailer or the manufacturer directly. The cause of the error can only be determined if the hydraulic diagram of the system in question is provided in addition to the description of the error.

Information on the Eco-design Directive 2009/125/EC

Product	Class[1,2]	Energy efficiency[3]	Standby max. [W]	Typ. power consumption [W][4]	Max. power consumption [W][4]
ESR32	1	1	1,3	1,03 / 1,27	1,3 / 1,6

[1] Definitions according to Official Journal of the European Union C 207 dated 03/07/2014

[2] The classification applied is based on optimum utilisation and correct application of the products. The actual applicable class may differ from the classification applied.

[3] Contribution of the temperature controller to seasonal central heating efficiency in percent, rounded to one decimal place

[4] No output active = standby / all outputs and the display active

Technical data

Power supply	230V~ 50-60 Hz
Power input	max. 1,6 W
Fuse	3.15 A fast-acting (device + output)
Supply cable	3 x 1mm² H05VV-F conforming to EN 60730-1
Case	Plastic: ABS, flame resistance: Class V0 to UL94 Norm
Protection rating	II – safety insulated ⧈
Protection class	IP40
Dimensions (W/H/D)	152x101x48 mm
Weight	210 g
Allowed ambient temperature	0 bis 45° C
Inputs	3 inputs – optional for temperature sensor (KTY (2 kΩ), PT1000), radiation sensor; as digital input or as impulse input for volume flow encoder (ONLY input 3)
Control output	0-10V / 20mA switchable to PWM (10V / 500 Hz), supply +5 V DC / 10 mA or connection of the auxiliary relay HIREL-STAG
Output	1 relay output
Rated current load	max. 2.5 A ohmic inductive cos phi 0.6
Temperature differential	adjustable from 0 to 99°C
Temperature thresholds	adjustable from -30 to +150°C
Temperature display	PT1000: -50 to 250°C, KTY: -50 to 150°C
Resolution	from -40 to 99.9°C in 0.1°C increments; from 100 in 1°C increments
Accuracy	typ. +-0,3%

Subject to technical modifications as well as typographical and printing errors. This manual is only valid for devices with the corresponding firmware version. Our products are subject to constant technical advancement and further development. We therefore reserve the right to make changes without prior notice.

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EU Declaration of conformity

Document- No. / Date: TA17003 / 02.02.2017
Manufacturer: Technische Alternative RT GmbH
Address: A-3872 Amaliendorf, Langestraße 124

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Product name: ESR32-R
Product brand: Technische Alternative RT GmbH
Product description: Simple solar control unit

The object of the declaration described above is in conformity with Directives:

2014/35/EU Low voltage standard
2014/30/EU (11/09/2018) Electromagnetic compatibility
2011/65/EU (01/10/2022) RoHS Restriction of the use of certain hazardous substances
2009/125/EC (04/12/2012) Eco-design directive

Employed standards:

EN 60730-1:2021-06	Automatic electrical controls for household and similar use – Part 1: General requirements
EN IEC 61000-6-3:2022-06	Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments
EN IEC 61000-6-2:2019-11	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments
EN IEC 63000:2019-05	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Position of CE - label: On packaging, manual and type label

CE

Issuer: Technische Alternative RT GmbH
A-3872 Amaliendorf, Langestraße 124

This declaration is submitted by

Dipl.-Ing. Andreas Schneider, General manager,
02.02.2017

This declaration certifies the agreement with the named standards, contains however no warranty of characteristics.
The security advices of included product documents are to be considered.

Warranty conditions

Note: The following warranty conditions do not in any way limit the legal right to warranty, but rather expand your rights as a consumer.

1. The company Technische Alternative RT GmbH provides a one-year warranty from the date of purchase for all the devices and parts which it sells. Defects must be reported immediately upon detection and within the guarantee period. Technical support knows the correct solution for nearly all problems. In this respect, contacting us immediately will help to avoid unnecessary expense or effort in troubleshooting.

2. The warranty includes the free of charge repair (but not the cost of on site troubleshooting, removal, refitting and shipping) of operational and material defects which impair operation. In the event that a repair is not, for reasons of cost, worthwhile according to the assessment of the Technische Alternative company, the goods will be replaced.

3. Not included is damage resulting from the effects of over-voltage or abnormal ambient conditions. Likewise, no warranty liability can be accepted if the device defect is due to: transport damage for which we are not responsible, incorrect installation and assembly, incorrect use, disregard of operating and installation instructions or incorrect maintenance.

4. The warranty claim will expire, if repairs or actions are carried out by persons who are not authorised to do so or have not been so authorised by us or if our devices are operated with spare, supplementary or accessory parts which are not considered to be original parts.

5. The defective parts must be sent to our factory with an enclosed copy of the proof of purchase and a precise description of the defect. Processing is accelerated if an RMA number is applied for via our home page www.ta.co.at. A prior clarification of the defect with our technical support is necessary.

6. Services provided under warranty result neither in an extension of the warranty period nor in a resetting of the warranty period. The warranty period for fitted parts ends with the warranty period of the whole device.

7. Extended or other claims, especially those for compensation for damage other than to the device itself are, insofar as a liability is not legally required, excluded.

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