UVR16x2
FREELY PROGRAMMABLE UNIVERSAL CONTROLLER

Programming:
General information

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Principles

This manual is designed as a guide to programming **directly on the device**, but also provides important information about the elements required for programming with the **TAPPS 2** programming software (functions, inputs and outputs, etc.).

Programming with **TAPPS 2** is always recommended. It enables the programmer to draw (= program) all program operations in the form of a graphical flow chart and to define parameters for them accordingly.

Nevertheless it is important to know how to use the "programming mechanisms" on the device itself in order to be able to make changes on site.

Example with TAPPS2:
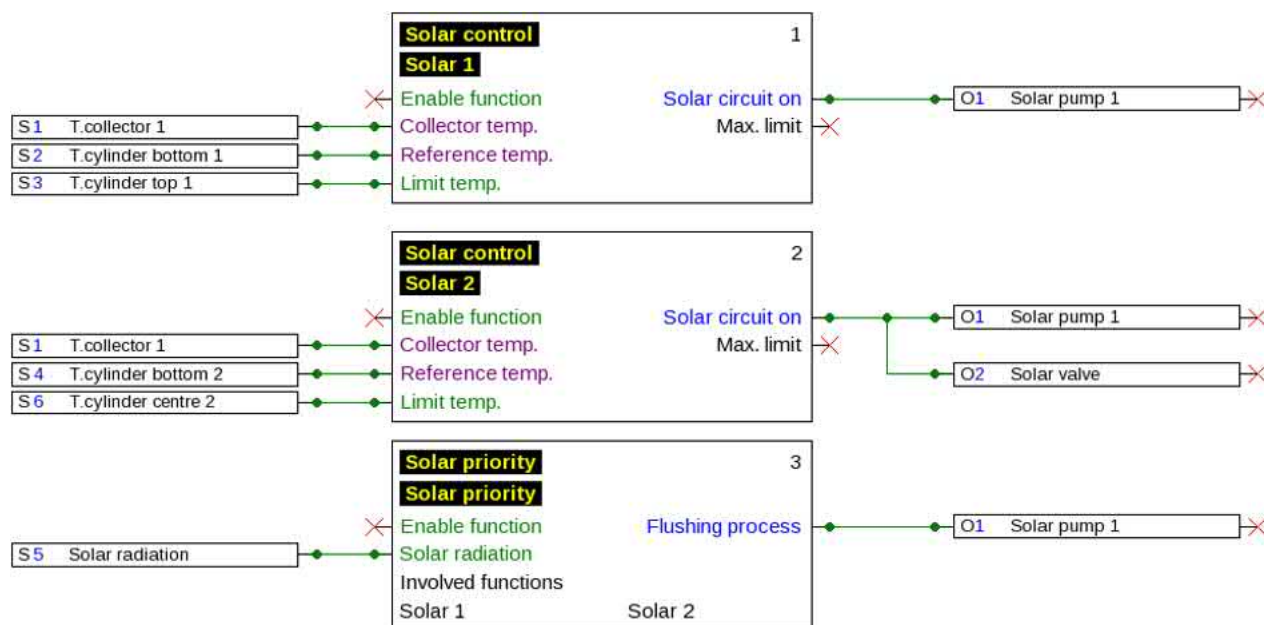
Planning basics

To ensure efficient programming, the following order must be observed:

1	A prerequisite for programming and defining parameters is an **accurate hydraulic scheme.**
2	Using that scheme, you **must** define **what should be controlled and how**.
3	Based on the required control functions, you must define the **sensor positions** and draw them on the scheme.
4	In the next step, all sensors and outputs are assigned the required **input and output numbers**. As all the sensor inputs and outputs have different characteristics, it is not possible to simply number them consecutively. The input and output numbers must therefore be assigned as instructed in this manual.
5	After that, the functions are selected and their parameters are programmed.

Designations

All elements can be designated by selecting a predefined designation from various designation groups or from the user defined designations.

You can also assign a number from 1 to 16 to every designation.

In the "**General settings**" menu, all user defined designations from the **technician** or **expert** level can be created, changed or deleted globally.
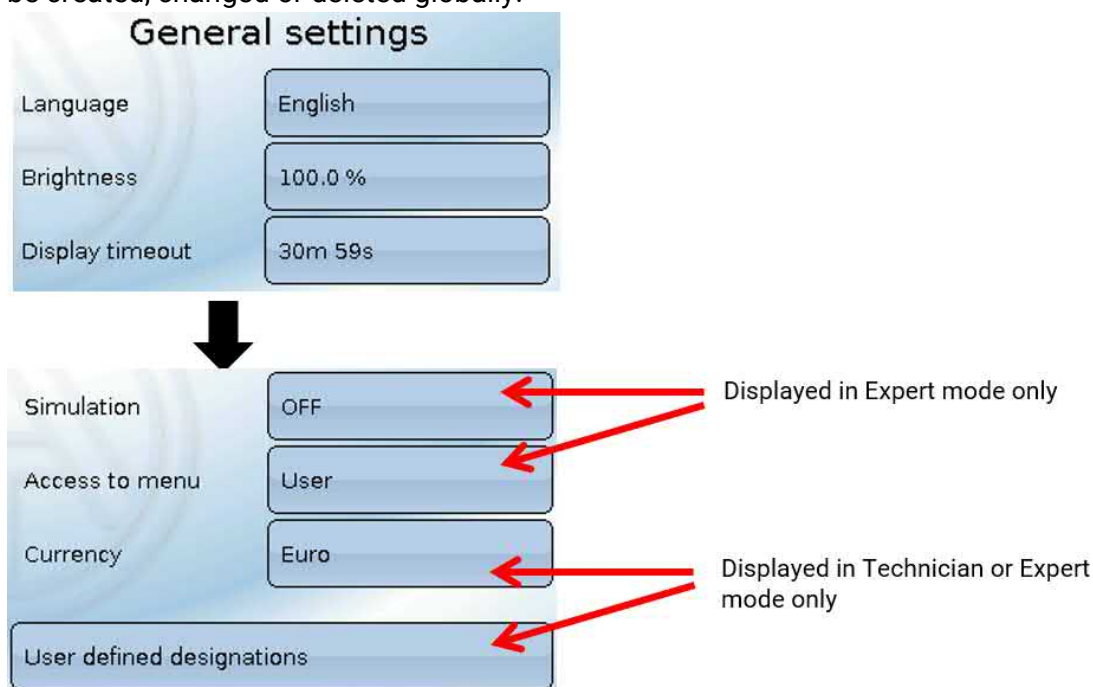
View with designations defined previously
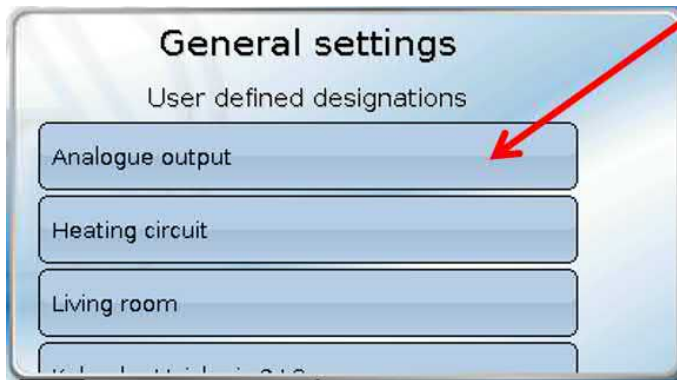
An alphanumeric keyboard is provided for changing a designation or creating a new one.
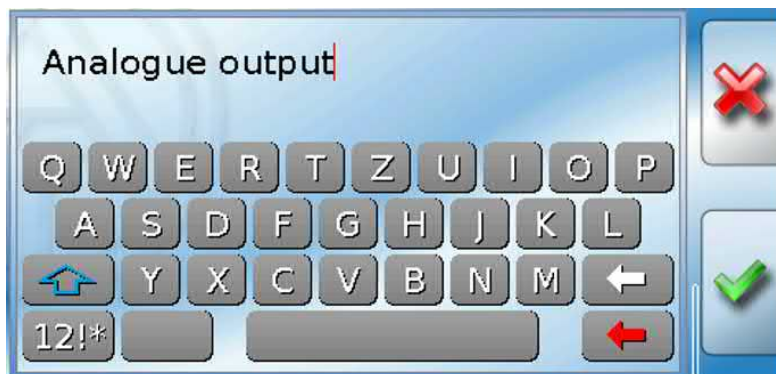
Up to 100 different designations can be defined by the user. The maximum number of characters per designation is **24**.

Designations defined previously are available for all elements (inputs, outputs, functions, fixed values, bus inputs and outputs).

General information on programming parameters

for inputs, outputs, fixed values, functions, default settings, and CAN and DL inputs and outputs.

Every entry must be finished by selecting ✅ .

If you want to discard your entries, select ❌ .

Example:
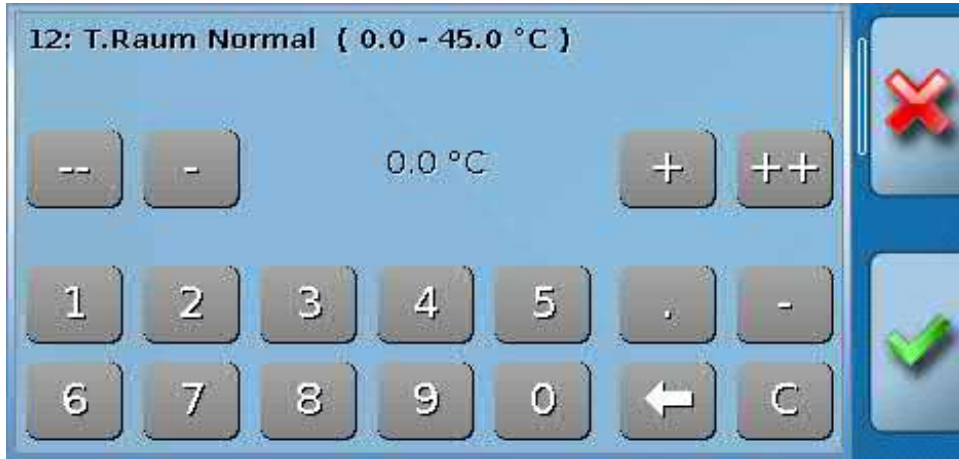
Entering numeric values

A keypad is displayed for entering numeric values.
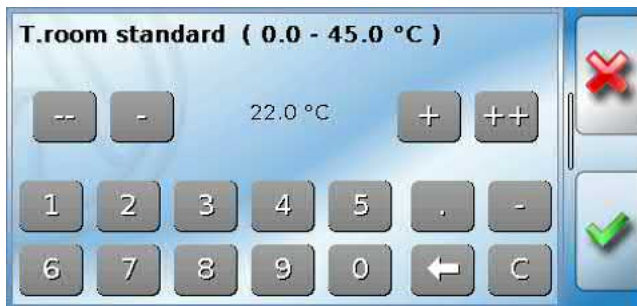
The current value is shown (example: 22.0 °C).

The top line shows the entry range (example: 0.0 – 45.0 °C).

You can make entries using either the correction keys (**--**, **-**, **+**, **++**) or the numeric keys. The correction keys "**-**" and "**+**" change the value of the first digit to the left of the decimal point; the keys "**--**" and "**++**" change the value of the second digit (the tens).

The arrow key ⬅ shortens the value by one digit place; the key C sets the value to zero. Finish your entry with ✅, discard it with ❌.

When in a submenu, select the ⊞ button to return to the main menu.

Date / time / location

The "**Date**" and "**Time**" are shown in the status line at top right.

Tapping that status field takes you to the menu for the date, time and location details.

The system value parameters are displayed first.

- **Time zone** – 01:00 means the time zone "**UTC + 1 hour**". **UTC** stands for "Universal Time Coordinated", also known as GMT (= Greenwich Mean Time).
- **Automatic time change** – If "**Yes**", the time will switch over automatically to summertime according to the specifications of the European Union.
- **Summertime** – "**Yes**" if summertime is active. Can only be changed if the "Automatic time change" is set to "No".
- **Date** – The current date (dd.mm.yy).
- **Time** – The current time
- **GPS latitude** – Geographical latitude according to GPS (= global positioning system)
- **GPS longitude** – Geographical longitude according to GPS

The values for geographical latitude and longitude are used to determine the location-specific solar data. That data can be used in functions (e.g. shading function).

The factory default settings for the GPS data are for the location of Technische Alternative in Amaliendorf, Austria.

Next, the location-specific solar data is displayed.
Example:

Sunrise	06:22
Sunset	17:56
Solar altitude	37.1 °
Direction of the sun	177.5 °

- **Sunrise** - Time
- **Sunset** - Time
- **Solar altitude** – Specified in ° as measured from the geometric horizon (0°), zenith = 90°
- **Direction of the sun** – Specified in ° as measured from the north (0°)
  North = 0°
  East = 90°
  South = 180°
  West = 270°

Power reserve

In the event of power failure, the controller has a power reserve for about 3 days for the time and date.

Value summary

This menu item shows the current values for **inputs** 1 – 16, the **DL inputs** and the analogue and digital **CAN inputs**.

The various values are displayed by tapping the group required.

Example: Inputs

Inputs

The controller has **16 inputs** for analogue signals (measurements), digital signals (ON/OFF) or pulses.
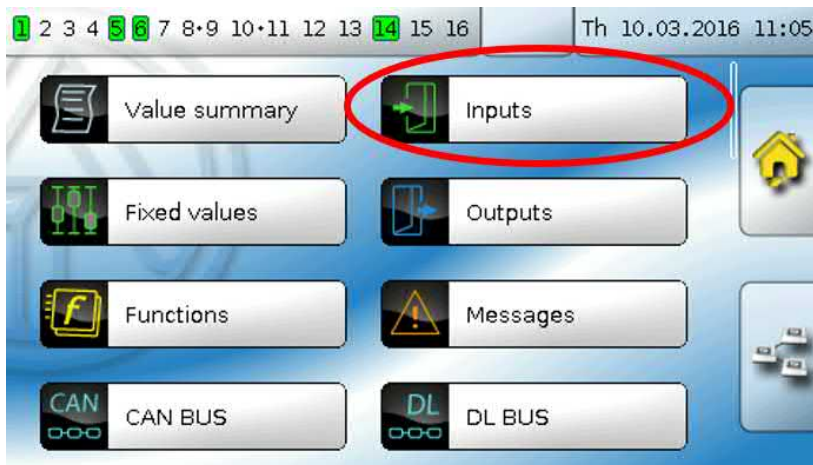
When this item is selected in the main menu, the inputs are displayed together with their designation and their current measurement or status.

Example of a programmed system; input 1 is still unused**:**

Programming the parameters

Sensor type and measure variable

Once the required input is selected, the sensor type can be defined.

First, you must specify the basic type of input signal.

- **Digital**
- **Analogue**
- **Pulse**

Digital

Select the **measured variable**:

- **Off / On**
- **No / Yesa**
- **Off / On (inverse)**
- **No / Yes (inverse)**

Analogue

Select the **measured variable**:

- **Temperature**
- Select the sensor type: **KTY** (**2 kΩ/25°C** = formerly Technische Alternative's standard type), **PT 1000** (= current standard type), room sensors: **RAS**, **RASPT**, **THEL** thermocouple, **KTY** (**1 kΩ/25°C**)**, PT 100, PT 500, Ni1000**, **Ni1000 TK5000**
- **Solar radiation** (sensor type: **GBS01**)
- **Voltage** (inputs 1-6 and 9-16: **max. 3.3 V**, inputs 7 and 8: **max. 10V**)
- **Current** (input 8 only: 4-20mA DC)
- **Resistance**
- **Humidity** (sensor type: **RFS**)
- **Rain** (sensor type: **RES**)

Also select the **process variable**

for the measured variables **Voltage, Current (input 8 only), Resistance:**

- **Dimensionless**
- **Dimensionless (.1)**
- **Performance factor**
- **Dimensionless (.5)**
- **Temperature °C**
- **Global radiation**
- **CO$_2$ content ppm**
- **Percent**

- **Absolute humidity**
- **Pressure bar, mbar, Pascal**
- **Litre**
- **Cubic metre**
- **Flow rate (l/min, l/h, l/d, m^3/min, m^3/h, m^3/d)**
- **Output**
- **Voltage**

- **Amperage mA**
- **Amperage A**
- **Resistance**
- **Speed km/h**
- **Speed m/s**
- **Degree (angle)**
- **Weight (kg, t)**
- **Length (mm, cm, m)**

Then you must use scaling to define the value range.
Example Voltage/Global radiation

0.00 V equates to 0 W/m², 10.00 V yields 1500 W/m².

Pulse input

Inputs **15 and 16** can capture pulses with **max. 20 Hz** and a pulse duration of at least **25 ms** (**S0** pulses).

Inputs **1 – 14** can capture pulses with **max. 10 Hz** and a pulse duration of at least **50 ms**.

Select the measured variable

Wind speed

A quotient must be entered for the "**Wind speed**" measured variable. This is the signal frequency at **1 km/h**.

Example: The **WIS01** wind sensor issues one pulse (=1Hz) per second at a wind speed of 20 km/h. Therefore the frequency at 1 km/h equals 0.05 Hz.

Setting range: 0,01 – 1,00 Hz

Flow rate

A quotient must be entered for the "**Flow rate**" measured variable. This is the flow rate in litres per pulse.

Setting range: 0.1 – 100.0 l/pulse

Pulse

This measured variable is used as the input variable for the "**Meter/Counter**" function, as a pulse counter with "Pulses" as its unit.

User defined

For the "**User defined**" measured variable, both the quotient **and** the unit must be entered.

Setting range for quotient: 0.00001 – 1000.00000 units/pulse (5 decimal places)

Units: l, kW, km, m, mm, m³.

For l, mm and m³ the unit of time must be selected as well. For km and m the units of time are predefined and cannot be changed.

Example: For the "Energy meter" function, the unit "kW" can be used. In the example above, 0.00125 kWh/pulse was selected, which equates to 800 pulses /kWh.

Designation

Enter the input designation by selecting a predefined designation from various designation groups or from the user defined designations.

Sensor type Analogue / Temperature:

- **General**
- **Generator**
- **Consumer**
- **Line**
- **Climate**
- **User** (user defined designations)

You can also assign a number from 1 to 16 to every designation.

Sensor correction

The option of sensor correction is available for the measured variables Temperature, Solar radiation, Humidity and Rain. The corrected value is utilized for all calculations and displays.

Example: Pt1000 temperature sensor

Sensor	PT 1000
Sensor correction	0.2 K

Average

Average	1.0s

This setting refers to the average of the measurements **over time**.

Averaging over 0.3 seconds leads to extremely rapid reactions on the part of the display and the unit. However, this can be expected to cause fluctuations of the value.

A large average value leads to inertia and is only recommended for sensors for the heat meter.

For simple measuring tasks, around 1 - 3 seconds should be selected. For hygienic domestic hot water heating with the ultra-fast sensor, 0.3 - 0.5 seconds should be selected.

Sensor check for analogue sensors

When "**Sensor check**" is active (setting: "**Yes**"), a short circuit or a lead break will **automatically** generate an error message: A **warning symbol** is displayed in the upper status line, and the defective sensor is shown with a red border around it in the "**Inputs**" menu.

Example:

Short-circuit of sensor 1 Standard value

Sensor error

When "**Sensor check**" is active, **Sensor error** is available as an input variable for functions: status "**No**" for a sensor that is working correctly and "**Yes**" for a defect (short circuit or lead break). This allows the controller to react to the failure of a sensor, for example.

In System values / General, a sensor error for **all** inputs is available.

If the **Standard** thresholds are selected, a short circuit will be indicated if the value falls below the lower **measurement limit** and a lead break will be indicated if the value exceeds the upper **measurement limit**.

The **Standard** values for temperature sensors are -9999.9 °C for a short circuit and 9999.9 °C for a lead break. Those values are utilised in the internal calculations in the event of an error.

By selecting the thresholds and values appropriately, a fixed value can be specified for the controller in the event of sensor failure, in order to allow a function to continue operating in emergency mode.

Example: If the temperature value falls below the threshold of -40 °C (= "Threshold value"), a value of 0.0 °C (= "Output value") is issued and displayed for that sensor (fixed hysteresis: 1.0 °C). At the same time the "Sensor error' status is set to "**Yes**".

The short circuit threshold must be defined below the lead break threshold.

Example: Sensor 12 has fallen below -40 °C, so 0 °C is issued as the measurement, and a sensor error is displayed at the same time.

Assignment of the possible sensor types to the inputs

	PT1000, KTY (2kΩ), KTY (1kΩ), PT100, PT500, Ni1000, Ni1000TK5000, NTC	Digital (ON/OFF)	THEL, GBS01, RFS, RES01	Voltage 0 – 3,3 V DC	Voltage 0 – 10V DC	Current 4 – 20 mA	Resistance 1 – 100 kOhm	Pulses max 10 Hz	Pulses (S0) max. 20 Hz
Inputs 1 - 6	x	x	x	x			x	x	
Input 7	x	x	x	x	x		x	x	
Input 8	x	x	x	x	x	x	x	x	
Inputs 9 - 14	x	x	x	x			x	x	
Input 15	x	x	x	x			x	x	x
Input 16	x	x	x	x			x	x	x

In the case of **voltage measurements** on inputs 1-6 and 9-16 (max. 3.3V), note that the internal resistance of the **voltage source** must not exceed 100 ohms otherwise the accuracy will be less than that specified in the technical data.

Voltage measurements on inputs 7 and 8: The controller's input impedance is 30 kΩ. Make sure that the voltage never exceeds 10.5 V as this would have an extremely negative effect on the other inputs.

Resistance measurement: If the process variable is set to "Dimensionless", measurement is only possible up to 30 kΩ. If the process variable is set to "Resistance" and the resistances being measured are >15 kΩ, the averaging time should be increased as the values will fluctuate slightly.

Resistance table for various sensor types

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
KTY (1kΩ)	[Ω]	815	886	961	1000	1040	1122	1209	1299	1392	1490	1591	1696
PT100	[Ω]	100	104	108	110	112	116	119	123	127	131	135	139
PT500	[Ω]	500	520	539	549	558	578	597	616	635	654	674	693
Ni1000	[Ω]	1000	1056	1112	1141	1171	1230	1291	1353	1417	1483	1549	1618
Ni1000 TK5000	[Ω]	1000	1045	1091	1114	1138	1186	1235	1285	1337	1390	1444	1500

The standard type used by Technische Alternative is **PT1000**.

KTY (2 kΩ) was the factory-fitted standard type until 2010/2011.

PT100, PT500: As these sensors are more susceptible to external interference, their sensor leads must be **screened** and the **Average time** should be increased. Nevertheless the accuracy specified in the technical data for PT1000 sensors **cannot be guaranteed**.

NTC sensors

Sensor	NTC
R25	1.00 kΩ
Beta	1000

For evaluating the NTC sensors, the R25 value and the beta value must be specified.

The nominal resistance R25 is always based on 25 °C.

The beta value refers to the characteristic of an NTC sensor in relation to 2 resistance values.

Beta is a material constant and can be calculated from the manufacturer's resistance table using the following formula:

$$B = \frac{\ln \frac{R1_{(NT)}}{R2_{(HT)}}}{\frac{1}{T1_{(NT)}} - \frac{1}{T2_{(HT)}}}$$

As the beta value is not a constant over the total temperature curve, the anticipated limits of the measuring range must be determined (e.g. for a cylinder sensor from +10 °C to +100 °C or for an outside sensor from -20 °C to +40 °C).

All temperatures in the formula must be given as **absolute temperatures in K** (Kelvin) (e.g. +20 °C = 273.15 K + 20 K = 293.15 K)

ln	Natural logarithm
$R1_{(NT)}$	Resistance at the minimum temperature of the temperature range
$R2_{(HT)}$	Resistance at the maximum temperature of the temperature range
$T1_{(NT)}$	Minimum temperature of the temperature range
$T2_{(HAT)}$	Maximum temperature of the temperature range

PTC sensors

Sensor	PTC
R25	1.00 kΩ
Alpha (x10^-3)	7.95000
Beta (x10^-6)	19.50000

The R25 value is also required for the evaluation of PTC sensors. The nominal resistance R25 is based on 25 °C.

In addition, the **Alpha (x10^-3)** and **Beta (x10^-6)** values are required. The **Alpha** and **Beta** values are normally taken from the PTC sensor datasheet and entered after applying the adjacent formula.

To calculate the **Alpha** and **Beta** values, any two resistance values and their associated temperatures are selected according to the resistance table of the respective PTC sensor.

R_1 ... Resistance value 1 (Ohm)	T_1 ... Temperature at resistance R_1 (°C)	$\Delta T_1 = T_1 - 25$ °C
R_2 ... Resistance value 2 (Ohm)	T_2 ... Temperature at resistance R_2 (°C)	$\Delta T_2 = T_2 - 25$ °C

Beta should be calculated first, as that value is necessary to calculate **Alpha**.

$$B = \frac{R_2 - R25}{\Delta T_2 \times R25 \times (\Delta T_2 - \Delta T_1)} + \frac{R_1 - R25}{\Delta T_1 \times R25 \times (\Delta T_1 - \Delta T_2)}$$

$$A = \frac{R_1 - R25}{R25 \times \Delta T_1} - \Delta T_1 \times B$$

Outputs

The controller has **16 outputs**.
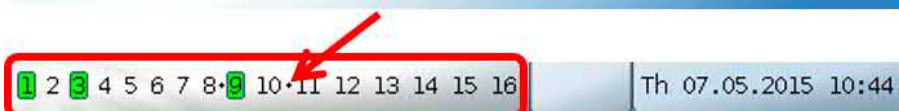
Tapping the outputs display in the upper status line takes you to the "**Outputs**" menu. Undefined outputs are hidden.

When selected, the outputs are displayed together with their designation and their current status (see chapter "Display on screen").

Example:

Programming the parameters ⚙

Nach Auswahl des gewünschten Ausgangs erfolgt die Festlegung des Ausgangstyps.
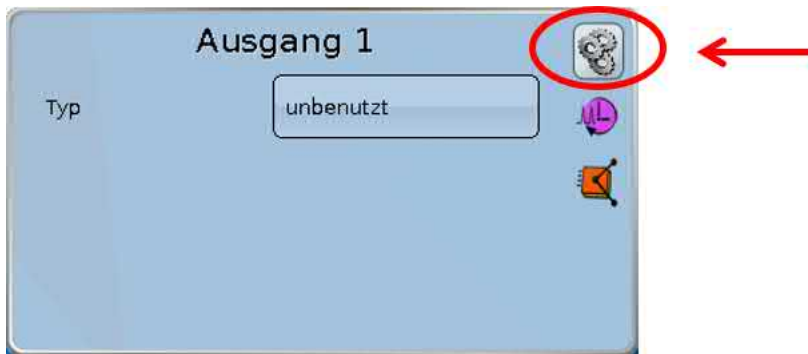
First, you must specify the basic output type.

Output type

The following different output types exist, although they are not available for selection for all outputs:

- **Switching output**
- **Output pair**
- **0 - 10 V**
- **PWM**

Outputs 1/2, 3/4, 6/7, 8/9, 10/11, 12/13 and 14/15 as an <u>output pair</u>

These outputs can be used as single switching outputs or as an **output pair** together with the following **switching output** (e.g. to control a mixer drive).

Caution!
The output pairs 1/2 and 6/7 must only be used in the relay version of the UVR16x2.

The output pairs **1/2**, **3/4**, **6/7**, **8/9** and **10/11** are available as standard. The output pairs **12/13** and **14/15** require the use of auxiliary relays (relay modules).

Runtime

The mixer runtime must be entered for every **output pair**.
If a mixer runtime of 0 is entered, the output pair will not be utilised.

Laufzeitbegrenzung

When the runtime limit is active, output pair control is terminated if the remaining runtime of 20 minutes has counted down to 0. The remaining runtime is reloaded if the output pair is switched to manual mode, is switched by a message (to dominant ON or OFF), changes its direction of control, or if enabling is switched from OFF to ON.

If the runtime limit is deactivated, the remaining runtime only counts down to 10 seconds and output pair control is not terminated.

Output pairs are shown in the status line with a "**+**" between the output numbers.
Example: Outputs **8+9** and **10+11** have been programmed as output pairs
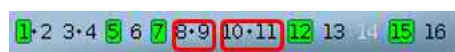
If two different functions act on the two outputs in the output pair simultaneously, the output with the lower number ("OPEN" command) will be activated.

Exception: the "**Message**" function – if the simultaneous command comes from this function, the output with the higher number ("CLOSE" command) will be activated.

All switching outputs

Delay	0s
Run-on	0s

A start delay and a run-on time can be defined for all **switching** outputs.

All outputs

Manual mode can be restricted to certain **user groups** (User, Technician, Expert) for all outputs.

Manual mode can be changed by	User

Outputs 12 to 16 as analogue outputs

unused

Switching output

Output pair

0-10V

PWM

These outputs provide a voltage between 0 and 10 V, e.g. for output-dependent control of burners (burner modulation) or speed control of electronic pumps.

The output can be issued either as a voltage (**0 – 10 V**) or as a **PWM** signal.

They can be controlled by the PID function, or by other functions. The "**Scaling**" provides the option of matching the **analogue value** of the source (with or without decimal place) to the control range of the device being controlled.

In **PWM** (pulse width modulation) mode, a square wave signal is created with a voltage level of about **10 V** and a frequency of **1 kHz** with a variable duty factor (0 - 100 %).

If multiple functions (analogue values) act simultaneously on one analogue output, the higher value is output.

For cases where an analogue output is activated by a **digital command**, an output voltage of 0.00 V and 10.00 V (or 0.0 % – 100.0 % for PWM) can be defined. Digital commands are **dominant** over links with an analogue value.

The activation of the analogue output via "**Dominant off**" and "**Digital on**" is possible by means of the following digital signals:

Dominant Aus 5.00 V	Digital Ein 10.00 V
Example: Output value 5,00V	**Example**: Output value 10.00 V
Dominant off (from messages)	Dominant on (from messages)
Manual Off	Manual On
	Digital on
	Anti-blocking protection

Outputs status of the analogue outputs
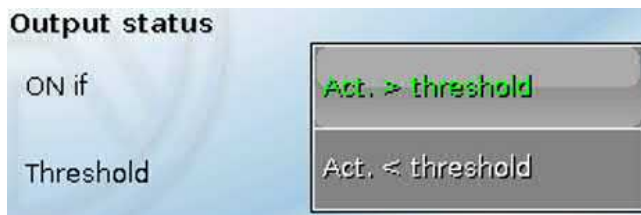
For the **output status** you can define whether the **ON** status should be issued above or below an adjustable **threshold**.

Example: If the analogue output is over 3.00 V, the output status switches from OFF to ON.
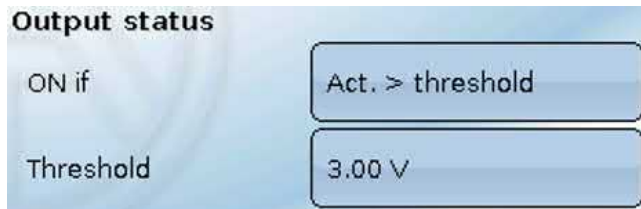
Depending on the technical attributes of the pump being controlled, it may thus be possible to set the output status to be ON only when the pump is actually running.

If you want an analogue output (A12 – A16) to be switched **together with** a switching output, it can only be done by means of appropriate programming.

Example: As soon as the output status of the analogue output switches to ON, that ON command is forwarded to the switching output via the logic function.
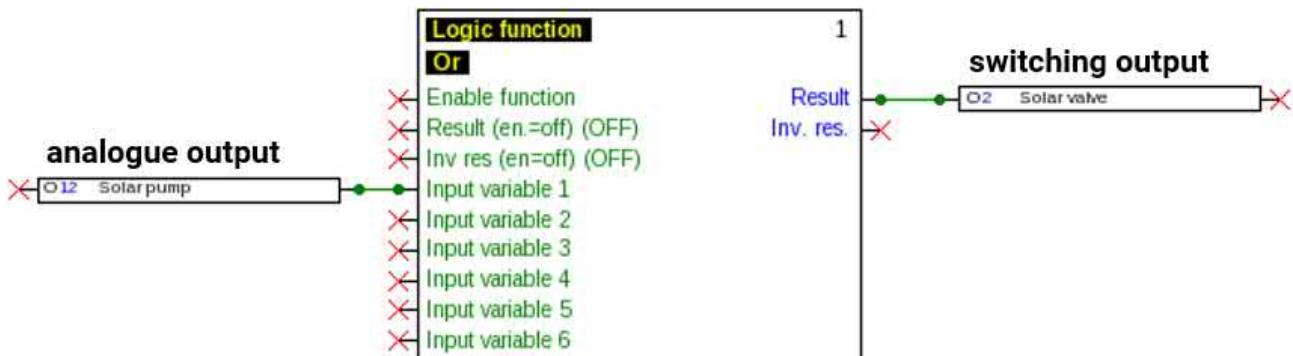
Display in the Outputs menu

The display in the menu shows the operating state of the analogue output. The output status can be changed by selecting it.

- **Auto**: Output issued according to the source and scaling
- **Manual**: Adjustable value
- **Manual/OFF**: Output issued according to "Dominant off" setting
- **Manual/ON**: Output issued according to "Digital on" setting

Examples of different scalings

Correcting variable of PID function: Mode 0-10 V, correcting variable 0 should correspond to 0 V, correcting variable 100 should correspond to 10 V:

Temperature value, e.g. from an analogue function: Mode PWM, the temperature 0 °C should correspond to 0 %, 100.0 °C should correspond to 100 %:

The temperature is transferred in 1/10 °C **without the decimal point**.

Burner output, e.g. from the functions DHW demand or Maintenance: Mode 0-10 V, burner output of 0.0 % should correspond to 0 V, 100.0 % should correspond to 10 V:

The percentage is transferred in 1/10 % **without the decimal point**.

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Designation

Enter the output designation by selecting a predefined designation from various designation groups or from the user defined designations.

- **General**
- **Climate**
- **User** (user defined designations)

You can also assign a number from 1 to 16 to every designation.

Overview of outputs

		Switching output N/O relay	Switching output N/O + N/C relay	Switching output Potential-free N/O * N/C realy	Output pair for mixer, etc.	0-10V or PWM
Output	**1**	x[1]			x	
	2	x[1]			x	
	3	x			x	
	4		x		x	
	5			x		
	6	x[1]			x	
	7	x[1]			x	
	8	x			x	
	9	x			x	
	10	x			x	
	11		x		x	
	12			x[2]	x[2]	x
	13			x[2]	x[2]	x
	14			x[2]	x[2]	x
	15			x[2]	x[2]	x
	16			x[2]		x

[1] Triac outputs with triac version (UVR16x2-D)

[2] Switching outputs and output pairs 12 – 16 only possible with additional PCBs

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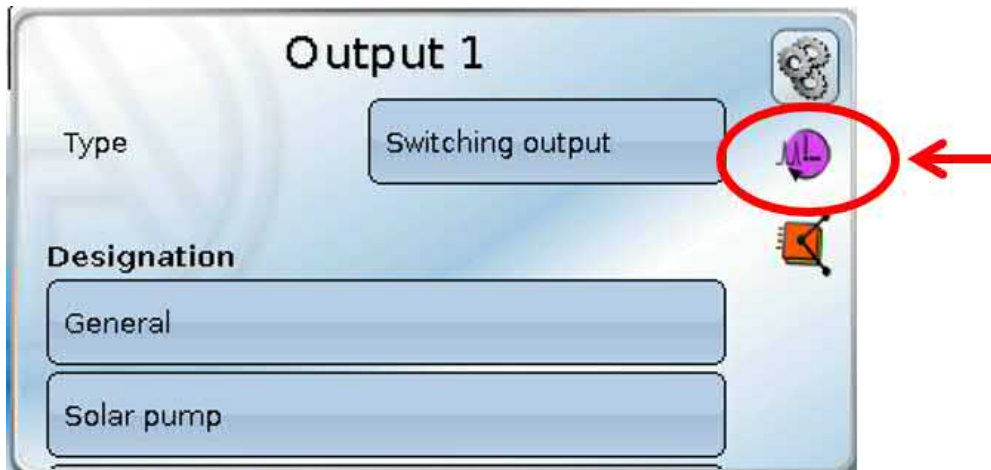
Output meter

Selecting this icon allows you to see the hours run and pulses (times switched on) **for every output**.

Example: For output 1, the meter reading since 11/02/2016 can be viewed.
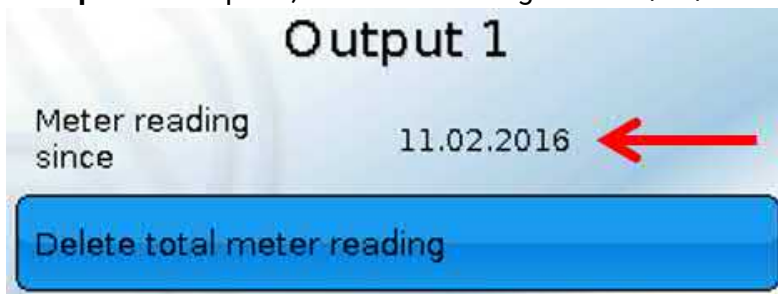
If you tap the button, you will be asked whether you want to delete the **total** meter readings and the "**Previous day**" readings for the hours run meter **and** the pulse counter. The "**Today**" and "**Last run**" and "**Current run**" readings will not be deleted.

Answer by tapping either the tick ✔ (= Yes) or the cross ✖ (= No).

After the deletion, the current date will be displayed.
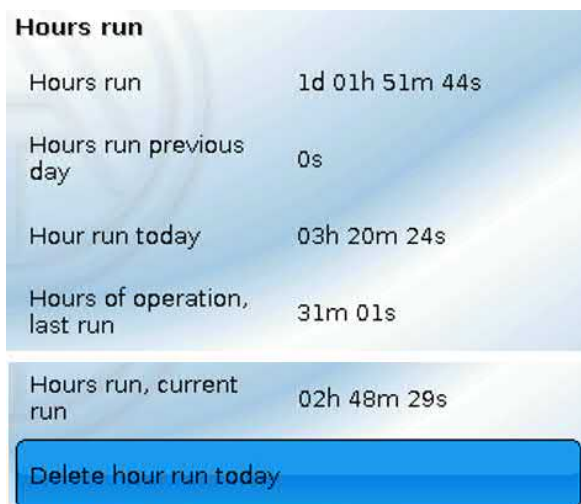
The meter shows the total hours run, the hours run the previous day and today, and the previous runtime and the current runtime.

If you tap the button, you will be asked whether you want to delete the hours run counted **today**. This will **not** delete the "**Last run**" and "**Current run**".

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Below the hours run, the pulses (how many times switched on) can be viewed.

The meter shows the total number of pulses (times switched on), the number of pulses on the previous day and the number today.

If you tap the button, you will be asked whether you want to delete the pulses counted **today**.

- **CAUTION:** The meter readings are saved to the internal memory every hour. Therefore, in the event of a power failure, no more than 1 hour of metering can be lost.
- When loading function data, you will be asked whether you want to apply the saved meter readings (see manual "Programming Part 1: General information").

Meter reset

If you tap a "**Delete**" button, you will be asked whether you want to delete the total meter readings or today's meter reading.

Answer the confirmation prompt by tapping either the tick ☑ (= Yes) or the cross ☒ (= No).

After the deletion of the total meter readings, the current date will be displayed.

Display of links
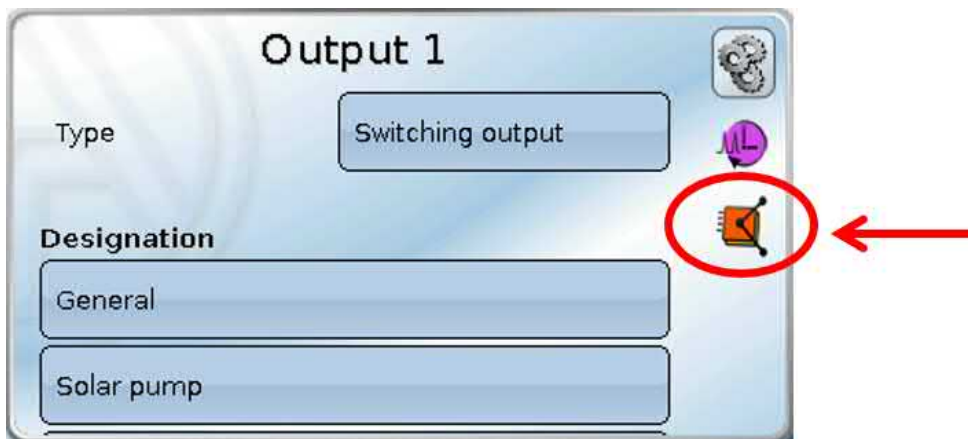
When you select this icon, the output's links to the functions will be displayed.

Example:
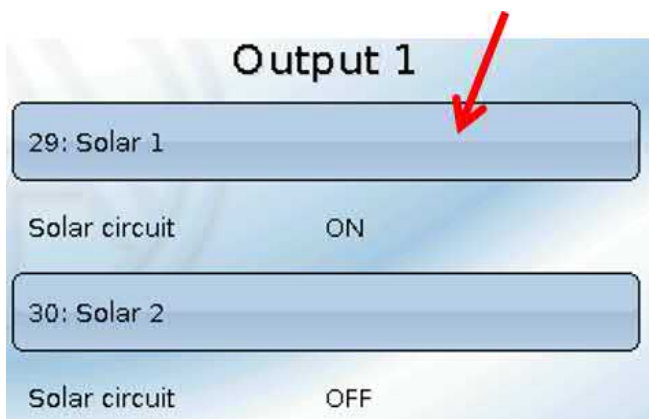
In this example, output 1 is controlled by two functions, and it has just been switched on by function 29 (Solar1).

Tapping a function takes you **directly** to the menu for that function.

Blocking protection

Circulating pumps which do not run for a long period (e.g. heating circuit pump during the summer) often encounter start-up problems as a result of corrosion. This problem can be avoided by starting the pump periodically for 30 seconds.

Analogue outputs (12-16) are activated with the rotational speed set under **Output value, digital/manual mode.** This setting must be performed separately for each analogue output.

The **Blocking protection** menu item added after output 16 allows you to specify a time and all the outputs to receive blocking protection.

Example:

The outputs selected in the **Output assignment** will be switched on for 30 seconds on Tuesday and Friday at 4:30 p.m. if the output has not been active since the last controller start or since blocking protection was last initiated.
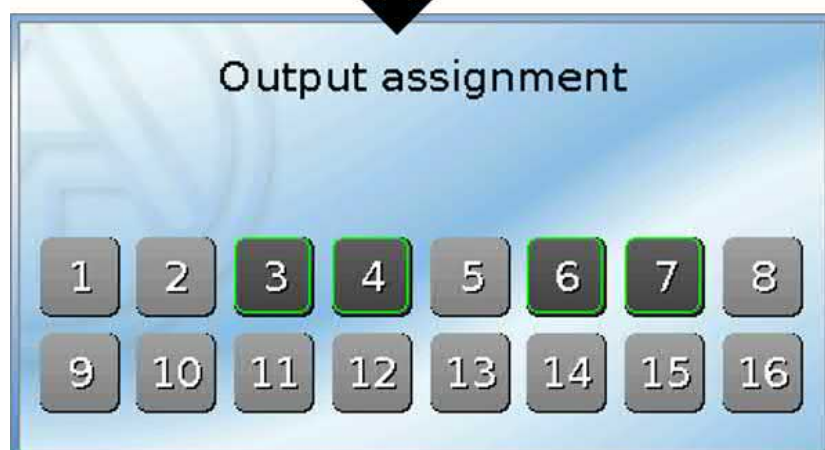
The outputs 3, 4, 6 and 7 were selected.

The controller does not switch on all the outputs at the same time, but instead begins with one output, switches to the next after 30 seconds, and so on.

Display on screen

Example of a system already programmed**:**

Outputs 1, 4 and 5 are switched on

Outputs 3 and 4 are in manual mode
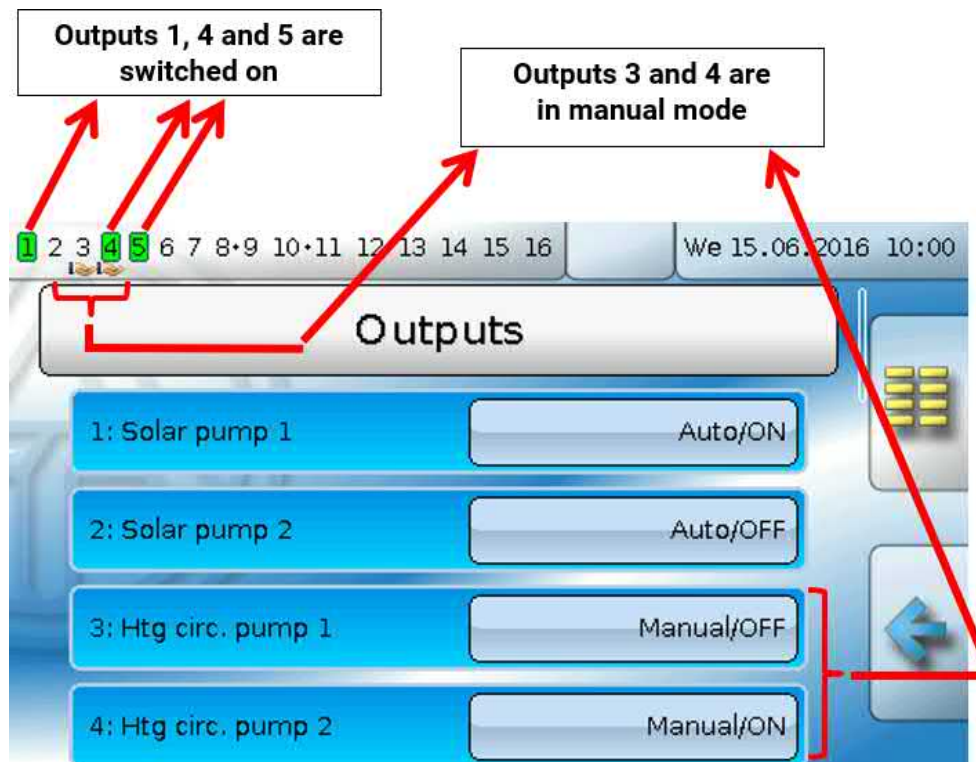
The **switched-on** outputs are highlighted in **green**.

Outputs in **manual mode** are marked with a **hand symbol** under the output number.

Example: Outputs switched dominant (by the "Message" function):

Output 2 has been switched to dominant on (red border)

Output 5 has been switched to dominant off (red border)

Indicates that a message is active.
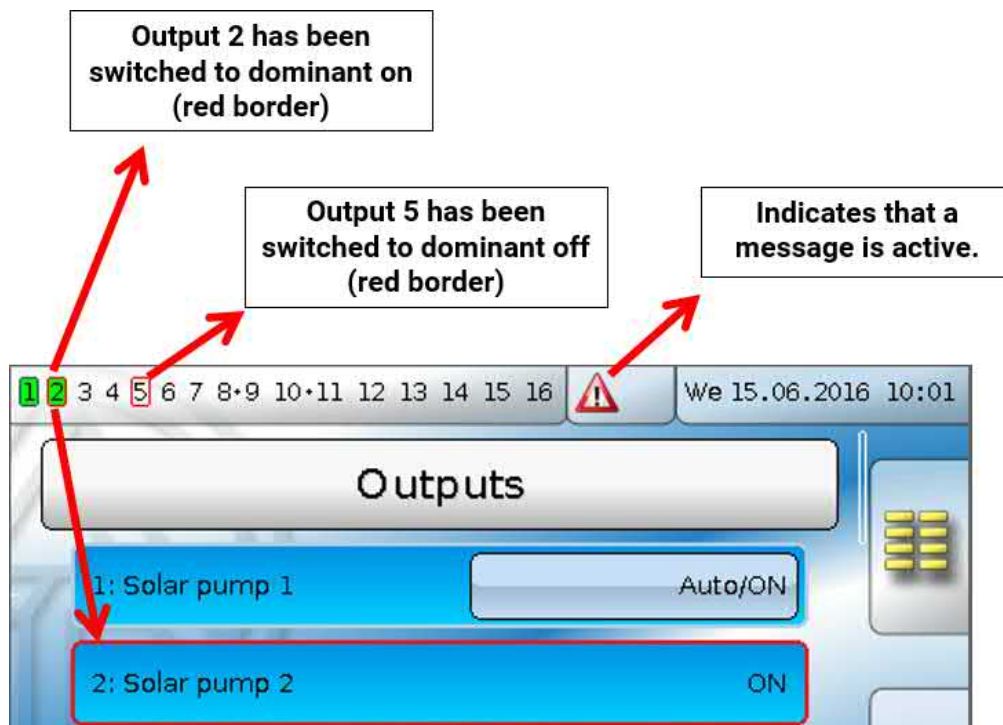
Fixed values

In this menu you can define up to **64 fixed values**, which can be used as input variables for functions, for example.

When this item is selected in the main menu, the fixed values already defined are displayed together with their designation and their current value or status.

Example:

Programming the parameters

Example: Fixed value 1

Fixed value type

Once the required fixed value is selected, the fixed value type can be defined.

- **Digital**
- **Analogue**
- **Pulse**

Digital

Select the **measured variable**:

- **Off / On**
- **No / Yes**

Select whether the status can be changed via a selection box or simply by a click.

Changing a digital fixed value

Tapping a button with a **light background** allows you to change the fixed value either via a **selection box** or by **tapping** ("Click"). If the status does not appear on a light background, that status cannot be changed from the logged-in user level.

Example: Changeover from **ON** to **OFF** via a selection box
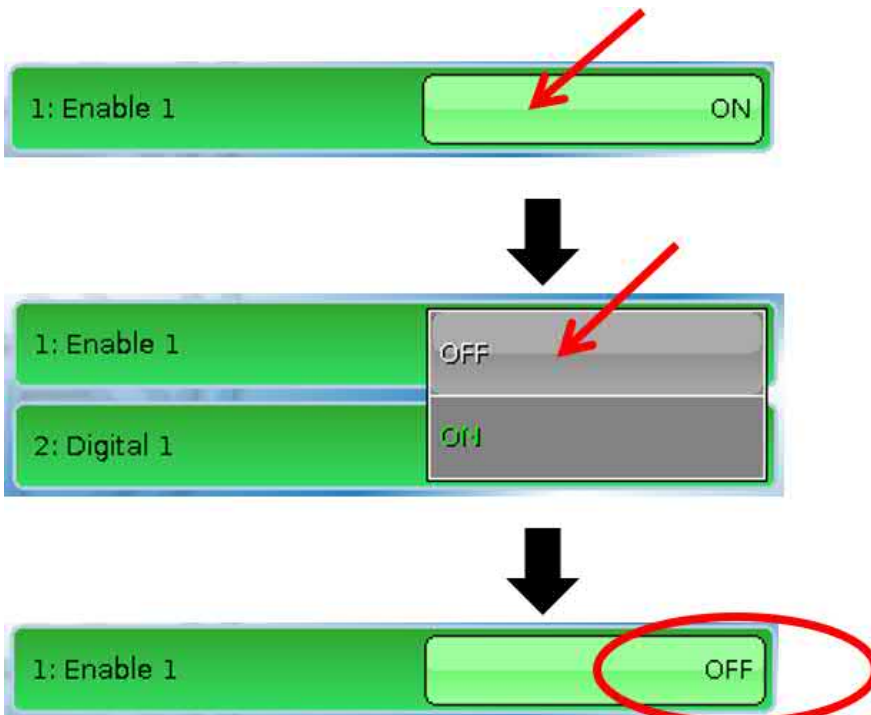
Analogue

Select from a wide range of function quantities
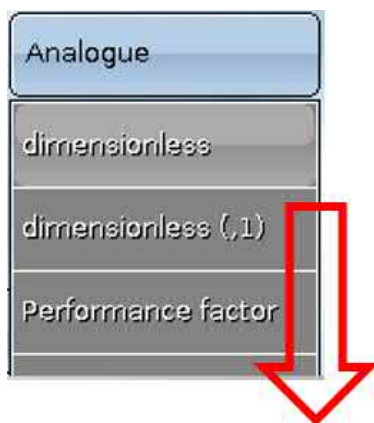
For fixed values, the function quantity "Time" (shown as: 00:00) is also available.

After assigning the **designation**, you must define the permitted limits and the current fixed value. The value can be adjusted in the menu within those limits.

Example:

Changing an analogue fixed value

Tapping a button with a **light background** allows you to change the fixed value via a keypad. If the value does not appear on a light background, that status cannot be changed from the logged-in user level.

Example:

Pulse

A fixed value of this type allows short **pulses** to be generated by tapping it in the menu "Fixed values".
Example:

A pulse can also be triggered in the menu of the fixed value by tapping.

Function quantity

Select the **function quantity**: When activated, either an ON pulse (from OFF to ON) or an OFF pulse (from ON to OFF) will be generated, depending on the selection made here.

Designation

Enter the fixed value designation by selecting a predefined designation or one of the user defined designations.

You can also assign a number from 1 to 16 to every designation.

Restriction of change authority

For **all** fixed values, you can set the user level from which the fixed value can be changed:

Messages

This menu item displays activated messages.

Example: Message 21 is active.
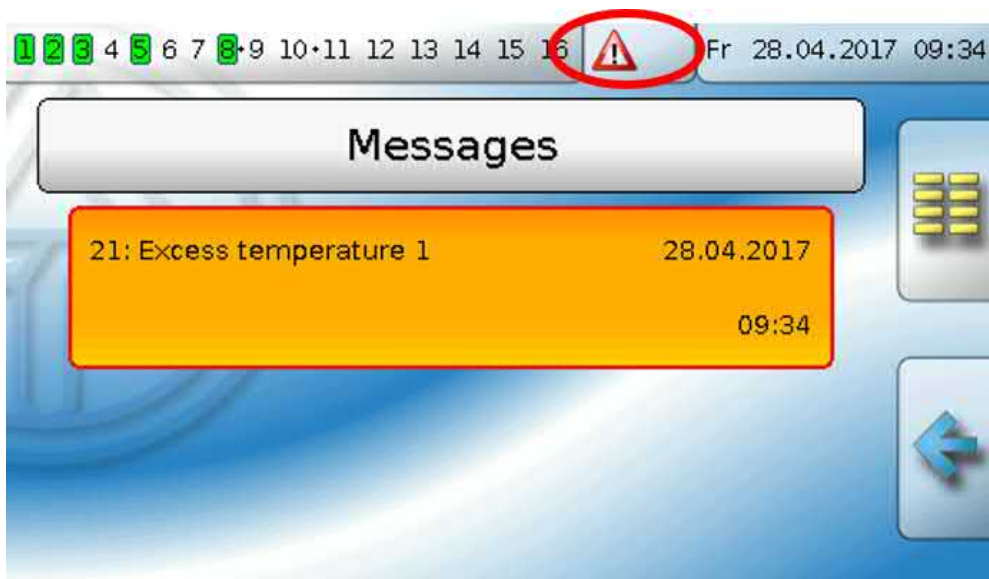
If there is at least one active message, a warning symbol will appear in the upper status line.

If the message has been hidden, the pop-up window for the message can be displayed by tapping the warning symbol.

More detailed information about the messages is provided in the manual **Programming / Part 2: Functions, Message chapter**.

CAN-Bus

The CAN network allows communication between CAN bus devices. When analogue or digital values are sent via CAN **outputs**, other CAN bus devices can utilise those values as CAN **inputs**.

This menu contains all of the information and settings needed to set up a CANopen network. Up to 62 CAN bus devices can be operated in one network.

Every CAN bus device must be given its own node number in the network.

The **cable topology** of a CAN bus network is described in the installation instructions.
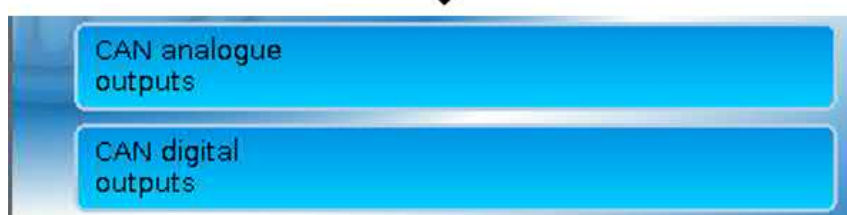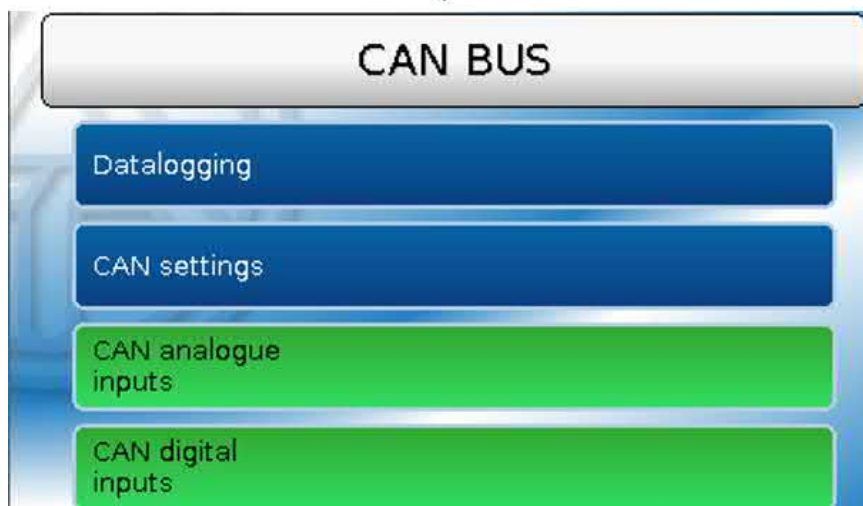
Datalogging

This menu is not visible in the User mode.

In this menu, the settings for datalogging are defined via CAN bus or on the SD card of the controller for analogue and digital values.

Datalogging Settings

Here, you can define whether the logging values are stored on the SD card for the controller and if so, at what intervals.

The logged daily log files are stored in the LOG/year folder. Logging only takes place when the SD card is inserted.

If the memory available on the SD card falls below 50 MB, the oldest daily log files will be automatically deleted. The logged values can be read out using **Winsol** software on the SD card (see **Winsol** manual).

Datalogging Analogue / Digital

The settings apply to both datalogging on the SD card for the controller and for CAN datalogging with the C.M.I.

Each controller can issue a maximum of 64 digital and 64 analogue values that are defined in this sub-menu.

The sources for the logged values can be inputs, outputs, function output variables, fixed values, system values, and DL and CAN bus inputs.

Note: Digital inputs must be defined within the range of **digital** values.
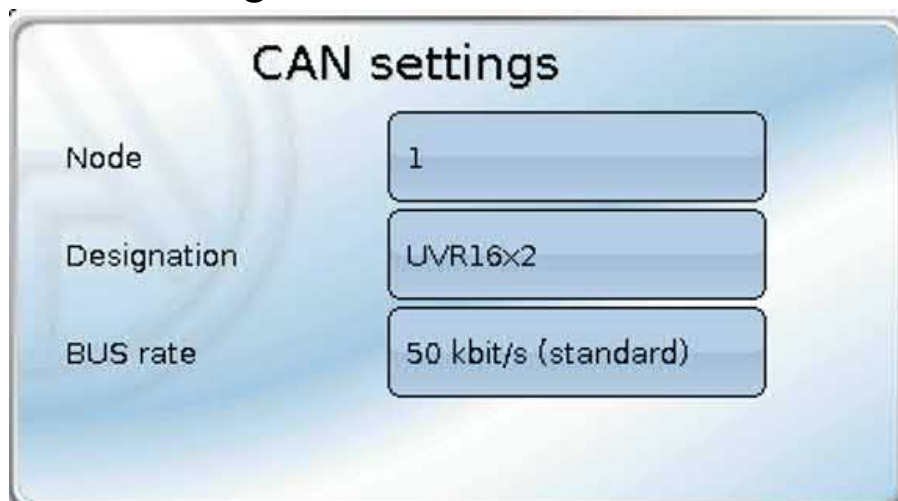
Any number of counter functions (but a maximum of 64 analogue values) can be logged. Like all other analogue values, the counter values to be logged are entered into the "Analogue datalogging" list.

CAN datalogging requires at least version 1.25 on the C.M.I. datalogger and a Winsol version of at least 2.06.

CAN datalogging is only possible with the C.M.I. datalogger. In contrast to data recording via the DL bus, the data to be logged via the CAN-bus can be freely selected. There is no constant data output. When requested by a C.M.I., the controller saves the current values to a logging buffer and locks it to prevent it from being overwritten (when requests are received from another C.M.I.) until the data is read out and the logging buffer has been enabled again.

The settings required on the C.M.I. for datalogging via CAN bus are described in the C.M.I.'s online help.

CAN settings

Node

Define a **unique** CAN node number for the device (setting range: 1 – 62). The device with node number 1 provides the time stamp for all other CAN bus devices.

Designation

Every controller can be given its own designation.

Bus rate

The standard bus rate of the CAN network is **50 kbit/s** (50 kBd), which is specified for most CAN bus devices.

> **Important:** <u>All</u> devices in the CAN bus network must have the <u>same</u> transfer rate in order to be able to communicate with each other.

The bus rate can be set to between 5 and 500 kbit/s, with lower bus rates allowing longer cable networks.

Bus rate [kbit/s]	Maximum permissible total bus length [m]
5	10.000
10	5.000
20	2.500
50 (standard)	1.000
125	400
250	200
500	100

In the event of a total reset from the "Data admin" menu, the settings for the node number and bus rate are retained.

CAN analogue inputs

Up to 64 CAN analogue inputs can be programmed. They are defined by specifying the **transmission** node number and the number of the **transmission** node's CAN output.
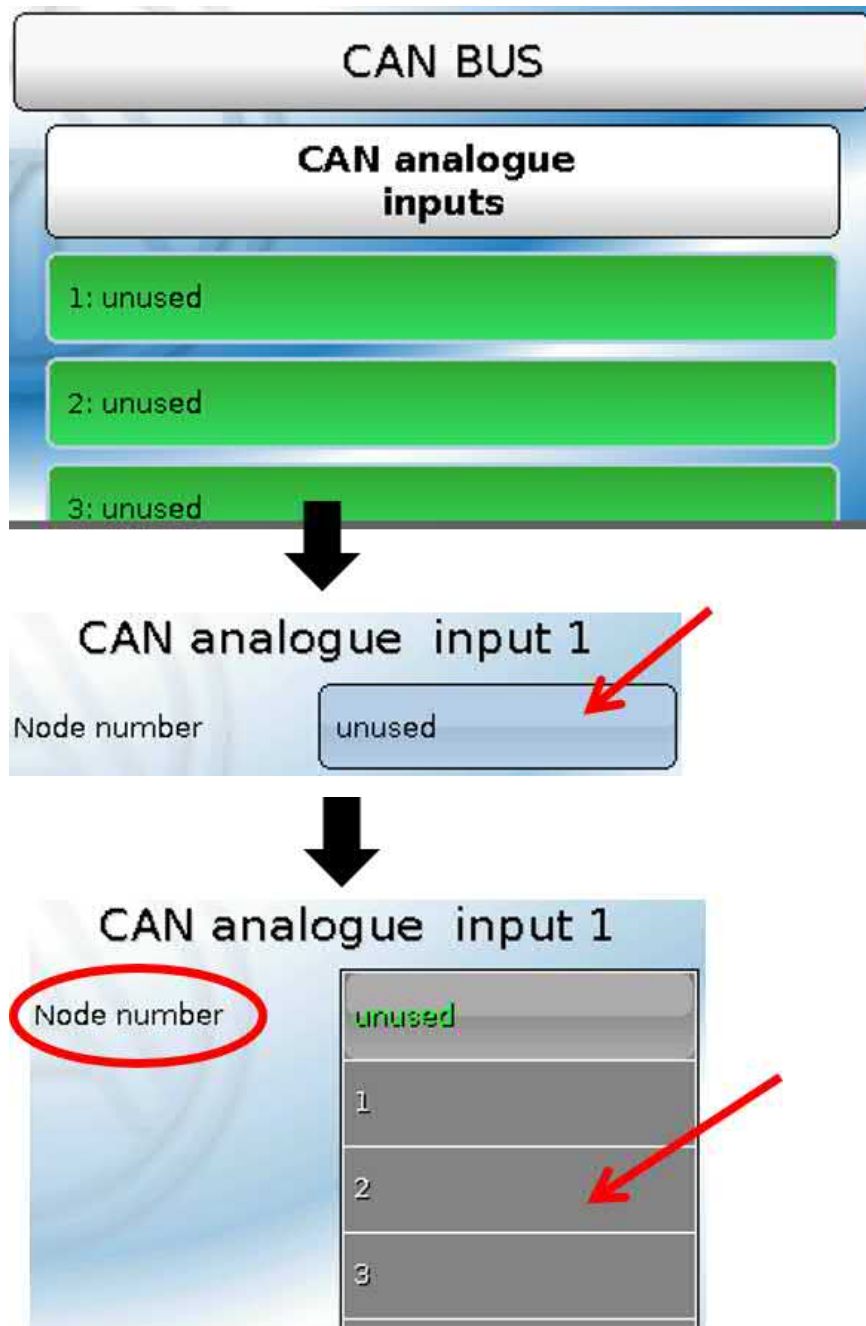
Node number

After the node number of the **transmission node** is entered, the other settings can be specified. The number of a CAN analogue output is taken from the device with that node number and applied here.

Example: On CAN analogue **input** 1, the output number applied is that of CAN analogue **output** 1 **from** the device with node number 2.

Designation

Every CAN input can be given its own designation. The designation can be selected from various designation groups or can be user defined, as for the other controller inputs.

Example:

Designation

Temperature actual value

T.collector

1

CAN bus timeout

Definition the timeout time for the CAN input (minimum value: 5 minutes).

CAN BUS timeout   5m

As long as the information continues to be read from the CAN bus, the **network error** for the CAN input will be "**No**".

If the value has not been updated for longer than the set timeout, the **network error** changes from "No" to "**Yes**". You can then define whether the controller should issue the last value transmitted or a definable substitute value (only when the measured variable is set to **User**).

The **network error** can be selected as the source of a function input variable, which allows the controller to react appropriately to a failure of the CAN bus or transmission node.

In **System values** / General, a network error for **all** CAN inputs is available.

Sensor check

If you set "Sensor check" to "**Yes**", the **sensor error** of the sensor supplying the CAN input is available as an input variable for a function.

Sensor check   Yes

Measure variable

If "Measured variable" is set to "**Automatic**", the unit of measurement specified by the transmission node will be applied in the controller.

Measured variable   Automatic

If you select "**User**", you can select a unit of your own, a sensor correction and, if sensor check is active, a monitoring function.

Measured variable   Automatic   User

Every CAN input is assigned its own unit, which can differ from the unit used by the transmission node. A range of units is available to choose from.

Unit   Temperature °C

This setting is only displayed if "Measured variable" is set to "**User**".

Value at timeout

This setting is only displayed if "Measured variable" is set to "**User**".

If the timeout time is exceeded, you can define here whether the controller should issue the last value transmitted ("Unchanged") or a definable substitute value.

Sensor correction

This setting is only displayed if "Measured variable" is set to "**User**".

The value of the CAN input can be corrected by applying a fixed value.

Sensor error

This setting is only displayed if **sensor check is active and** "Measured variable" is set to "**User**".

When "**Sensor check**" is active, the **sensor error** of a CAN input is available as an input variable for functions: status "**No**" for a sensor that is working correctly and "**Yes**" for a defect (short circuit or lead break). This allows the controller to react to the failure of a sensor, for example.

If the **Standard** thresholds are selected, a short circuit will be indicated if the value falls below the **measurement limit** and a lead break will be indicated if the value exceeds the **measurement limit**.

The **Standard** values for temperature sensors are -9999.9 °C for a short circuit and 9999.9 °C for a lead break. Those values are utilised in the internal calculations in the event of an error.

By selecting the thresholds and values for short circuit and lead break appropriately, a fixed value can be specified for the controller in the event of sensor failure at the transmission node, in order to allow a function to continue operating in emergency mode (fixed hysteresis: 1.0 °C).

The short circuit threshold must be defined below the lead break threshold.

In **System values** / General, a sensor error for **all** inputs, CAN inputs and DL inputs is available.

CAN digital inputs

Up to 64 CAN digital inputs can be programmed. They are defined by specifying the **transmission** node number and the number of the **transmission** node's CAN output.

Their parameters are programmed in almost exactly the same way as for the CAN analogue inputs.

Under **Measured variable / User** the **Display** for the CAN digital input can be changed from **Off / On** to **No / Yes** and you can define whether the controller should issue the last status transmitted ("Unchanged") or a definable substitute status when the timeout time is exceeded.

CAN analogue outputs

Up to 32 CAN analogue outputs can be programmed. They are defined by specifying the **source** in the controller.
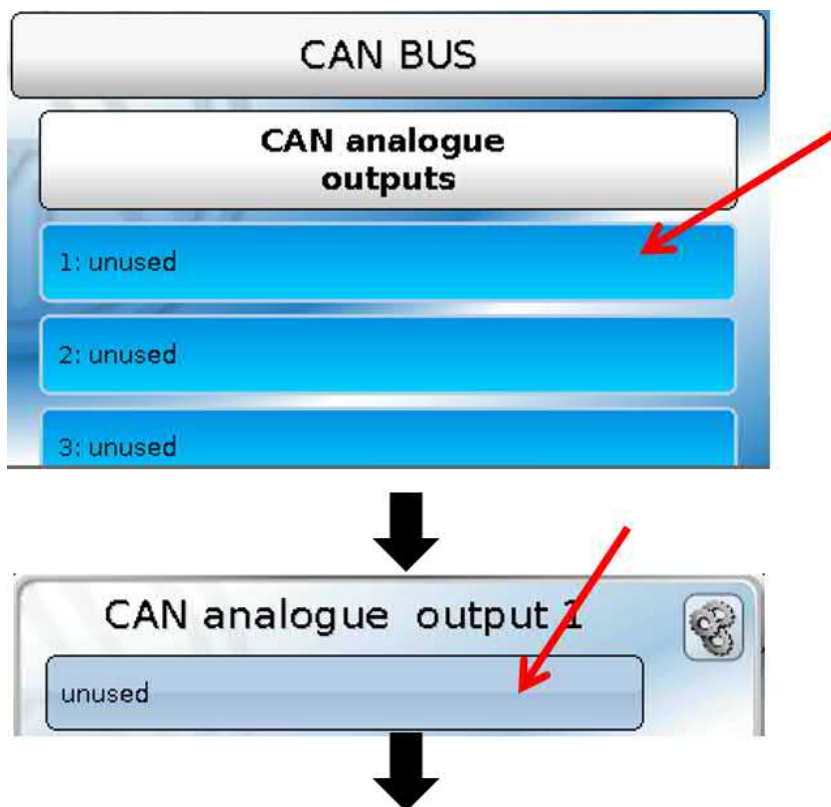
Specify the source in the controller which supplies the value for the CAN output.

- **Inputs**
- **Outputs**
- **Functions**
- **Fixed values**
- **System values**
- **DL bus**

Example: Source, Input 1

Designation and transmission condition

Every CAN analogue output can be given its own designation. The designation can be selected from various designation groups or can be user defined, as for the inputs.

Example:

Transmission condition

Exmaple:

If change > 1.0 K	If the current value has changed by more than 1.0 K compared to the last transmitted value, a new transmission is made. The unit used by the source is applied to the output value (minimum setting: 0.1 K).
Blocking time 10 s	If the value changes by more than 1.0 K within 10 seconds of the last transmission, the value is nevertheless only transmitted again after 10 seconds (minimum setting: 1 sec.).
Interval time 5 m	The value is transmitted every 5 minutes even if it has not changed by more than 1.0 K since the last transmission (minimum setting: 1 minute).

CAN digital outputs

Up to 32 CAN digital outputs can be programmed. They are defined by specifying the **source** in the controller.

Their parameters are programmed in exactly the same way as for the CAN analogue outputs except for the transmission conditions.

Designation and transmission condition

Every CAN digital output can be given its own designation. The designation can be selected from various designation groups or can be user defined, as for the inputs.

Example:

Designation

Output general

Heat pump demand

1

Transmission cindition

Example:

Transmission condition

If change   Yes

Blocking time   10s

Interval time   5m

If change Yes/No	Transmission of the value if a status change occurs
Blocking time 10 s	If the value changes within 10 seconds of the last transmission, the value is nevertheless only transmitted again after 10 seconds (minimum setting: 1 sec.).
Interval time 5 m	The value is transmitted every 5 minutes even if it has not changed since the last transmission (minimum setting: 1 minute).

Active CAN nodes

Tapping the button displays the active CAN nodes in the CAN bus network. "**Status**" displays the controller's CAN bus status. Following a controller start the status changes automatically, according to a predefined process, from **init.** → **preop**(erational) → **operat**(ional). Only then is it possible to communicate with other CAN bus devices.

This view shows an RSM610 with node number 32 in the CAN bus network.

Tapping a CAN bus device of the X2 series takes you to the menu of the device.

Other CAN bus devices and the C.M.I. will be displayed, but it is not possible to access their menus.

To return to the menu of your own controller, tap the controller in this overview.

DL bus

The DL bus acts as a bus cable for various sensors and/or for datalogging by C.M.I. or D-LOGG.
The DL bus is a bidirectional data link and is only compatible with products from Technische Alternative. The DL bus network operates independently of the CAN bus network.

This menu contains all of the information and settings needed to set up a DL bus network.
The **cable topology** of a DL bus network is described in the controller's installation instructions.

DL settings

You can use this button to activate or deactivate data **output** for **datalogging** via the DL bus and for display on the **RAS-PLUS** room sensor. The C.M.I. can be used for **DL datalogging**. Only the input and output values and the 2 heat meters are included in the data output; the values of the network inputs are not included

DL input

Sensor values from DL bus sensors are transferred via a DL input.

Up to 32 DL inputs can be programmed.

Example: Programming the parameters of DL input 1
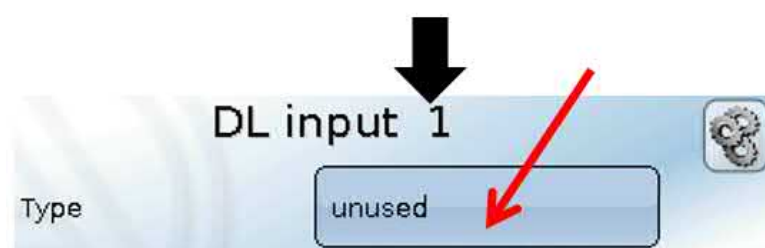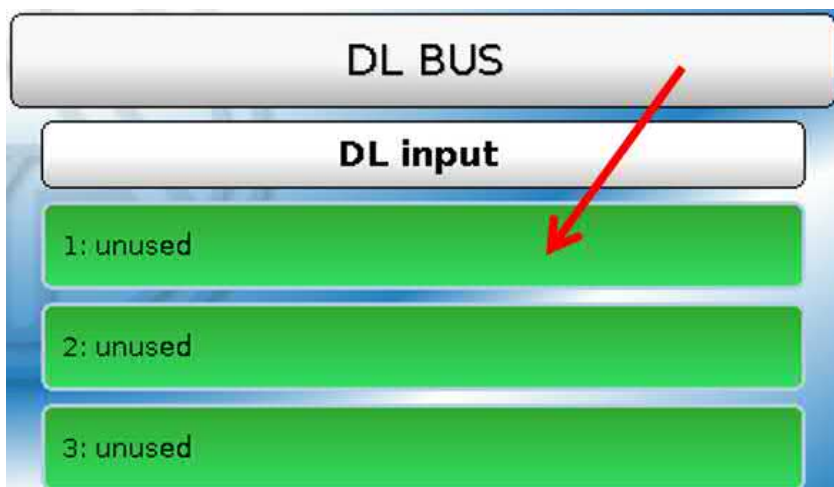
Select: Analogue or digital
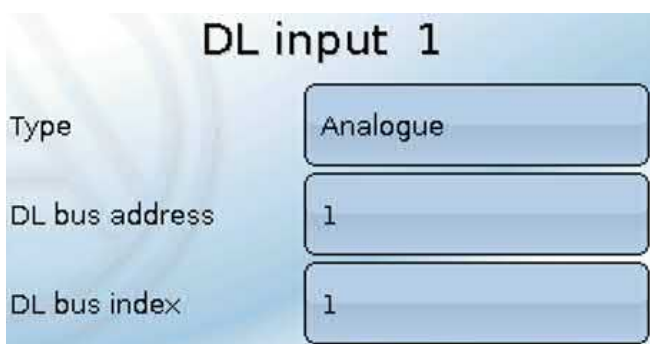
DL bus address and DL bus index

Every DL sensor must have its own **DL bus address**. Setting the address of a DL sensor is described in the sensor's datasheet.

Most DL sensors can measure various different values (e.g. flow rate and temperatures). Every value measured must be given its own **index** number. The applicable index number can be found in the DL sensor's datasheet.

Designation

Every DL input can be given its own designation. The designation can be selected from various designation groups or can be user defined, as for the other controller inputs.

Example:

Designation

Temperature actual value

T.solar flow

1

DL bus timeout

As long as the information continues to be read from the DL bus, the **network error** for the DL input will be "**No**".

If the controller scans the DL sensor value three times and no value is transmitted, the **network error** changes from "**No**" to "**Yes**". You can then define whether the controller should issue the last value transmitted or a definable substitute value (only when the measured variable is set to **User**).

The **network error** can also be selected as the source of a function input variable, which allows the controller to react appropriately to a failure of the DL bus or DL sensor.

In System values / General, a network error for **all** DL inputs is available.

Sensor check

Sensor check   Yes

If you set "Sensor check" to "**Yes**", the **sensor error** of the sensor supplying the DL input is available as an input variable for a function

Measured variable

Messgröße   Automatisch

If "Measured variable" is set to "**Automatic**", the unit of measurement specified by the DL sensor will be applied in the controller.

If you select "**User**", you can select a unit of your own, a sensor correction and, if sensor check is active, a monitoring function.

Measured variable   Automatic

                         User

Every DL input is assigned a **unit**, which can differ from the unit used by the DL sensor. A wide range of units is available to choose from.

Einheit   Temperatur °C

This setting is only displayed if "Measured variable" is set to "**User**".

Value at timeout

This setting is only displayed if "Measured variable" is set to "**User**".

If a timeout is set, you can define here whether the controller should issue the last value transmitted ("Unchanged") or a definable substitute value.

| Value at timeout | Unchanged | | Value at timeout | User defined |
| Sensor correction | User defined | | Output value | 0.0 °C |

Sensor correction

This setting is only displayed if "Measured variable" is set to "**User**".

The value of the DL input can be corrected by applying a fixed differential value.

Sensor correction	0.0 K

Sensor error

Short circuit threshold	Standard
Short circuit value	Standard
Lead break threshold	Standard
Lead break value	Standard

Short circuit threshold	Standard
	User defined
Short circuit value	

Short circuit threshold	User defined
Threshold value	0.0 °C

This setting is only displayed if **sensor check is active** and "Measured variable" is set to "**User**".

When "**Sensor check**" is active, the **sensor error** of a DL input is available as an input variable for functions: status "**No**" for a sensor that is working correctly and "**Yes**" for a defect (short circuit or lead break). This allows the controller to react to the failure of a sensor, for example.

If the **Standard** thresholds are selected, a short circuit will be indicated if the value falls below the **measurement limit** and a lead break will be indicated if the value exceeds the **measurement limit**.

The **Standard** values for temperature sensors are -9999.9 °C for a short circuit and 9999.9 °C for a lead break. Those values are utilised in the internal calculations in the event of an error.

By selecting the thresholds and values for short circuit and lead break appropriately, a fixed value can be specified for the controller in the event of sensor failure at the transmission node, in order to allow a function to continue operating in emergency mode (fixed hysteresis: 1.0 °C).

The short circuit threshold must be defined below the lead break threshold.

In System values / General, a sensor error for **all** inputs, CAN inputs and DL inputs is available.

DL digital inputs

The DL bus is configured for the transfer of digital values as well as analogue. However, there is not yet any use for this at present.

The parameters are programmed in almost exactly the same way as for the DL analogue inputs.

Under **Measured variable / User** the **Display** for the DL digital input can be changed to **No / Yes**.

Bus load of DL sensors

A 2-pole cable provides **both** the power supply and the signal transfer for DL sensors. An additional power supply by means of an external power supply unit (such as with the CAN bus) is not possible.

As the DL sensors have a relatively high power demand, the "**bus load**" must be considered:

The UVR16x2 controller supplies **100 %** of the bus load. The bus loads of the DL sensors are listed in the technical data of each DL sensor.

Example: The DL sensor FTS4-50DL has a bus load of **25 %**. Consequently up to four FTS4-50DL sensors can be connected to the DL bus.

DL output

Analogue and digital values can be transmitted to the DL bus network via a DL output. For example, a **digital command** to activate an O2-DL O_2 sensor can be output.

Example: Programming the parameters of DL output 1
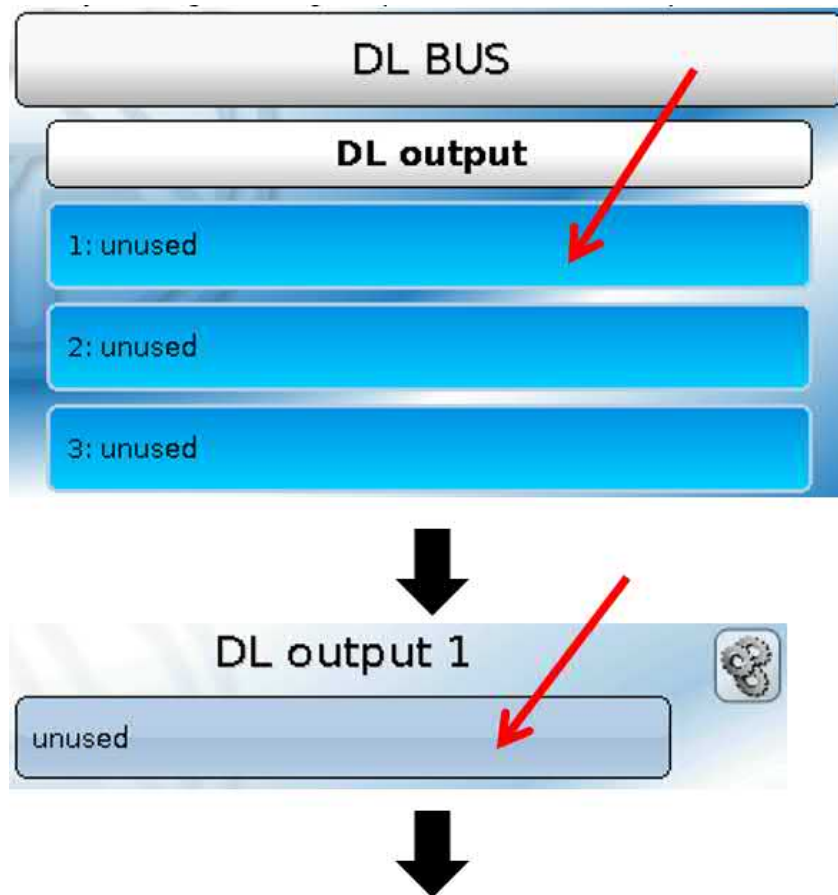
Specify the source in the controller which supplies the value for the DL output.

- **Inputs**
- **Outputs**
- **Functions**
- **Fixed values**
- **System values**
- **CAN bus analogue**
- **CAN bus digital**

Beispiel: Digitalwert, Quelle Ergebnis Logik-Funktion
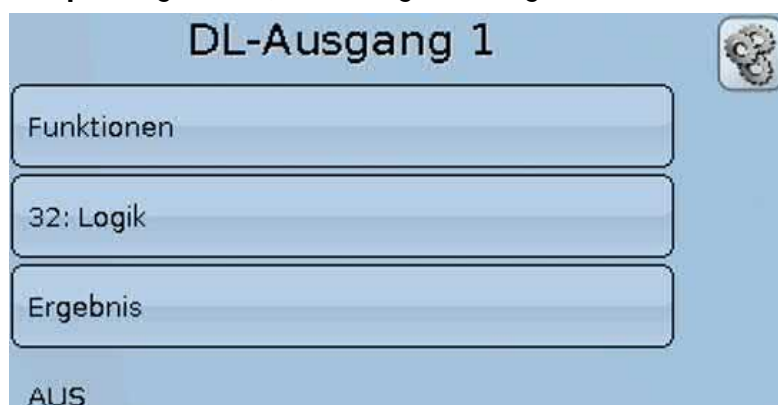
Designation and destination address

Specify the designation and the destination address of the DL sensor to be activated.

For the activation of the O_2 sensor, the index has no effect and can be ignored.

Examples:

General settings
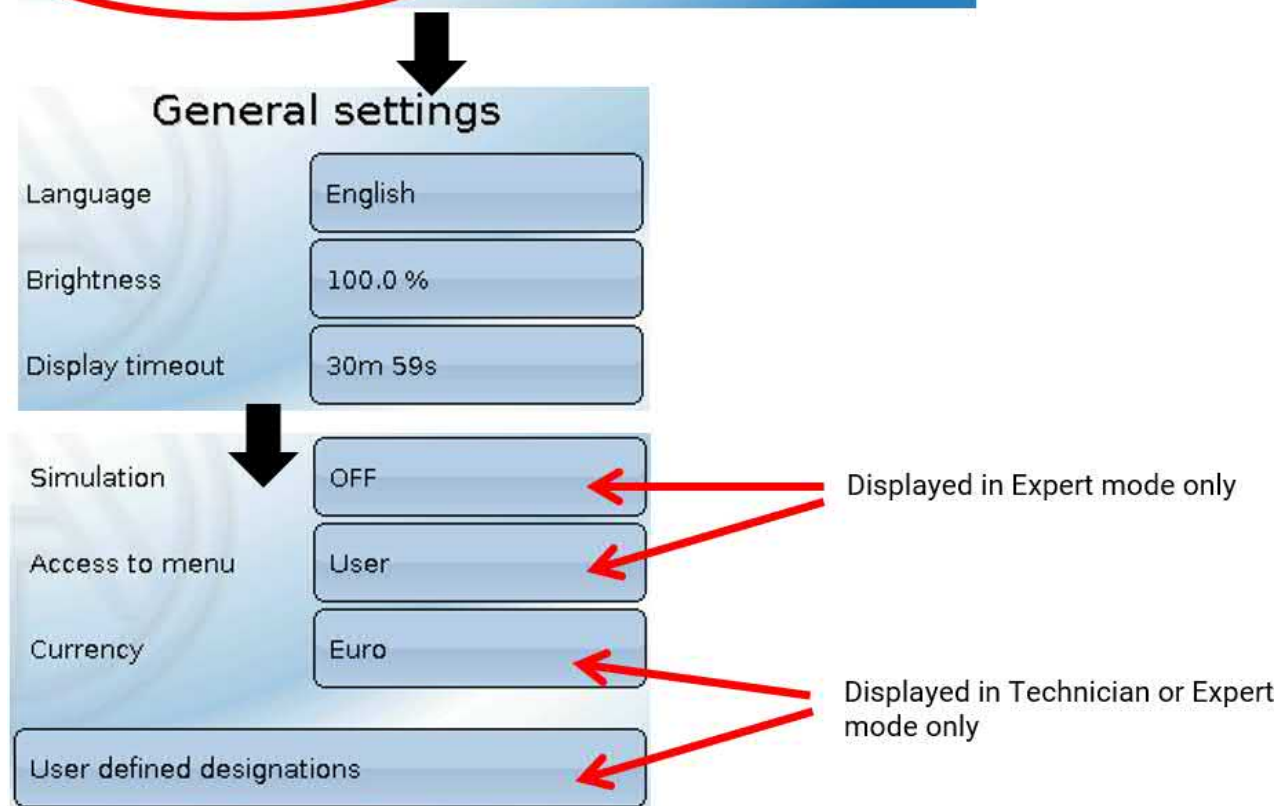
This menu allows settings to be made which then take effect for all other menus and displays.

Language

Select the display language

Brightness

Select the brightness of the display to match the surroundings (setting range: 5.0 – 100.0%)

Display timeout

The display will be switched off if the user does not do anything for the period of time set here. Tapping the touch screen surface re-activates the display (setting range: 5 seconds to 30 minutes).

Simulation

Option of activating the simulation mode (only possible in Expert mode):

- No averaging of the outside temperature in heating circuit control, cooling circuit control and individual room control.
- Analogue function, Filter mode: Parameter "Filter time" is set to 0.
- Analogue function, Ramp mode: Parameter "Interval time" is set to 0.
- The averaging time is also deactivated for all inputs.

Select from: **OFF**

Analogue – Simulation with the EWS16x2 development set

CAN SIM board–Simulation with SIM-BOARD-USB-UVR16x2 for simulation in a system

The simulation mode is ended automatically when you exit the Expert level.

Currency

Select the currency for yield metering.

Access to menu

Definition of the user levels from which access to the **main menu** is permitted.

If only **technicians** or **experts** are permitted to access the menu, then the relevant **password** must be entered when selecting the main menu from the start page of the function overview (button).

When the controller is **restarted**, either the **function overview** (if loaded) or, in the case of restricted access, the **keyboard** for the password is displayed.

User defined designations

In this menu, you can enter, change or delete user defined designations **for all elements of the controller**. This menu can only be selected from within the Technician or Expert level.

View with designations defined previously
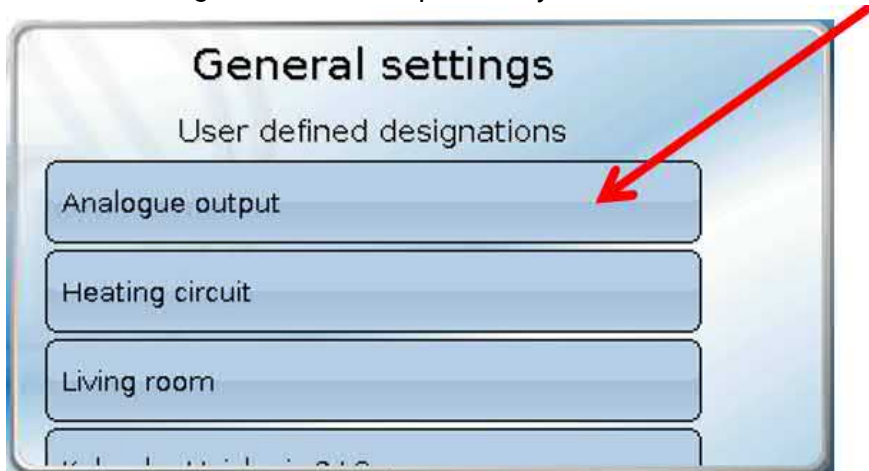
An alphanumeric keyboard is provided for changing a designation or creating a new one.
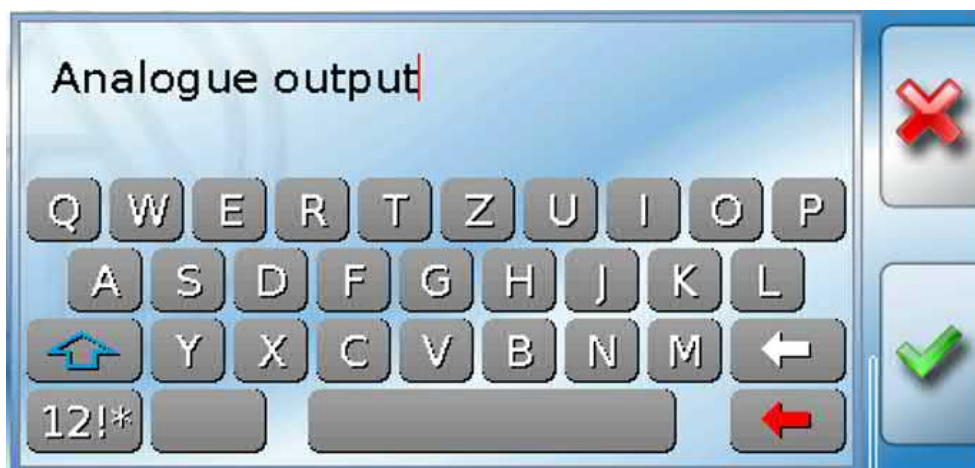
Up to 100 different designations can be defined by the user. The maximum number of characters per designation is **24**.

Designations defined previously are available for all elements (inputs, outputs, functions, fixed values, bus inputs and outputs).

User

Current user

Select whether the user is an **Expert**, **Technician** or **User**.

To enter the Technician or Expert level a **password** must be entered, which can be set by the programmer.

When function data is loaded from the Expert or Technician level, the controller returns to the User level and applies the programmed passwords.

When the controller is started, the controller is always in the User level.

Changing the password

No passwords are set in the delivered condition.

An **Expert** can change the passwords for Technician and Expert. A **Technician** can only change the Technician password.

There are no restrictions regarding the length of the password or the type of characters that can be used.

To change a password, you must first enter the old password.

List of permitted actions

User level	Displays and permitted actions
User	• **Function overview** with options for control • **Access to main menu** only if enabled for "**User**" in the "General settings" • Summary of values • **Inputs**: display only, no access to the parameters • **Outputs**: changes to the output status of the outputs enabled for User, display of hours run, no access to the parameters • **Fixed values**: changes to the value or status of the fixed values enabled for User, no access to the parameters • **Functions**: display of the **function status,** no access to the parameters • **Messages**: display of active messages, hiding and deleting messages • **CAN and DL bus**: no access to the parameters • **General settings**: language, brightness and display timeout can be altered • **User**: change of user (with password entry) • **System values**: setting the date, time, location data, display of System values
Technician	## All of the above plus: • **Access to main menu** only if enabled for **Technician** or **User** in the "General settings" • Changes to the parameters for • **inputs** (except for type and measured variable), no creation of new ones • Changes to the parameters for • **outputs** (except for type; status only if enabled for User or Technician), no creation of new ones • Changes to the parameters for • **fixed values** (except for type and measured variable; value and status only if enabled for User or Technician), no creation of new ones • **General settings**: Changes to **user defined designations** and creation of new ones, selecting the currency • **Functions**: changes to user defined input variables and parameters; output variables are visible • All settings in the • **CAN** and **DL bus** menus • **Data administration** actions
Expert	**All** actions and **all** displays are accessible.

Automatic changeover

Normally, the controller automatically switches back to **user mode** 30 minutes **after login** as an expert or technician.

For programming or test purposes, this automatic changeover can be switched off. To do so, an expert selects "Change expert password", first enters the old password, then enters **nothing** (not "0" either) and confirms this with the tick.

The same can be done for the Technician password.

When new programming is loaded, the controller returns to the User level and the Expert password set by the programmer will apply.

Version and serial number

This menu item displays the operating system version (firmware).

The display then shows the **serial number,** internal production data and the names of the current function data and function overview.

The serial number is also visible on the controller's rating plate (upper side panel).
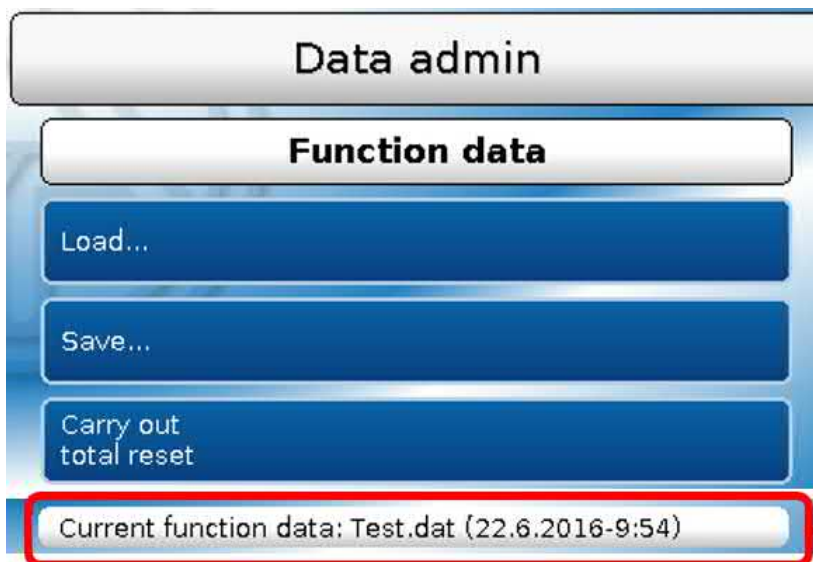
Data administration

Can only be operated in technician or expert mode

You can perform the following actions in this menu:

- Save, load or delete function data
- Load firmware
- Load or delete a function overview
- Display the status of the data transfer
- Restart the controller

Function data

Display the current function data with the time of loading

Load…

Function data can be loaded from the SD card onto the controller or other X2 devices. Multiple function data can be saved to the SD card.

The data transfer is only possible after a **technician** or **expert password** has been entered for the target device.

After selecting the function data required (*.dat file), you will be prompted to specify how the meter readings and the heat meter's calibration values should be treated.

You can choose from the following actions:

| Retain	The meter readings and calibration values in the controller will be applied. **Example of use**: After programming is changed using TAPPS2
Reset	The meter readings and calibration values will be reset **to zero**.
Load function data	The meter readings and calibration values applied will be taken from the function data being loaded onto the controller. **Example of use**: Replacement of a controller. The function data is taken from the old controller and its meter readings are to be loaded onto the new controller.

Tapping ✔ loads the new function data; ✖ cancels the action.

If function data is loaded onto the controller, a **_Backup.dat** file is created on the SD card with the old function data.

Once the function data is loaded, the controller returns to the User level.

Deleting, renaming and sending saved files

In order to rename or delete saved files, tap the plus symbol. The following options then appear for selection:
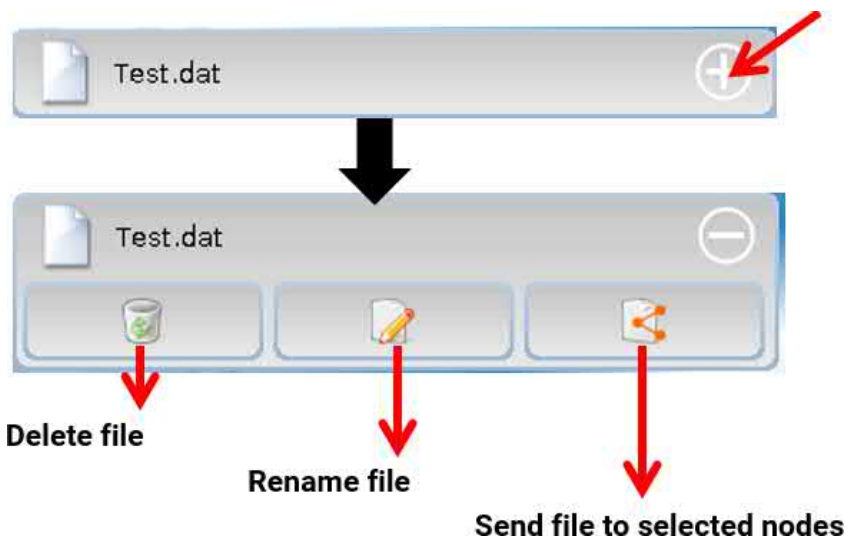
Return from this selection by tapping the icon again.

Delete file

A confirmation prompt appears, which you can confirm by tapping ✅ .

Tapping ❌ cancels the action.

Rename file

The file name can be changed using a keyboard (Umlauts are not possible). The file name must be no longer than 63 characters with no dots or accents.

Send file to selected nodes

This allows you to send function data to other CAN bus subscribers with X2 technology (e.g. RSM610, CANEZ2, CAN-I/O45).
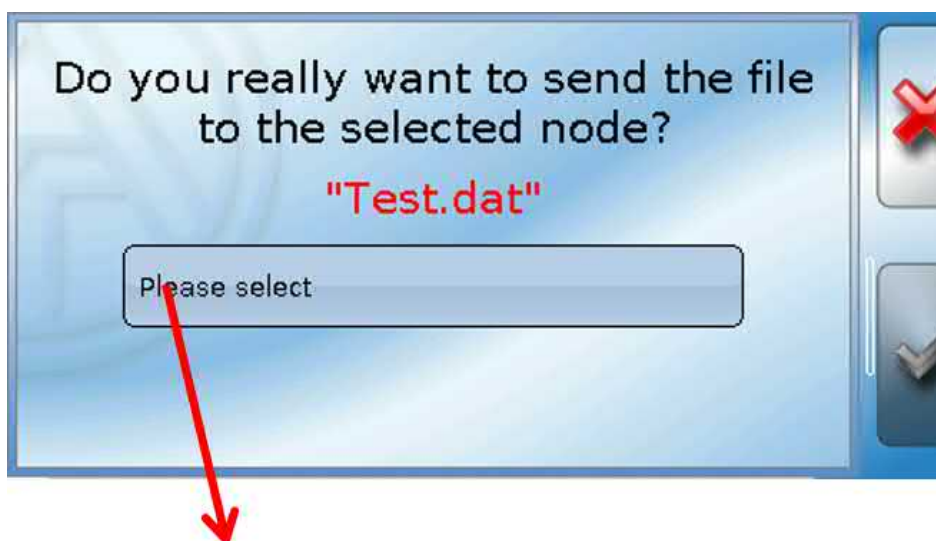
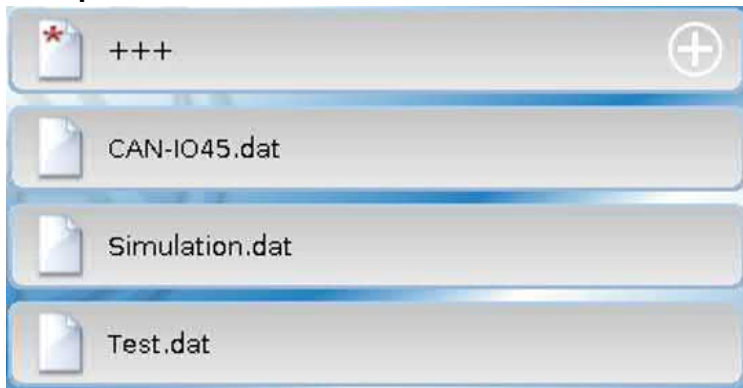Select the **node number** and then tap ✅ .

Save...

The current function data can be saved to the **SD card**.
You can give the function data a name of your own. More than one set of function data can be saved.
Example:

In this example there are already several sets of function data saved on the SD card.

If you want to save the function data under a **new** name, tap on the button. You can then enter a new name and save the file (umlauts cannot be entered). The file name must be no longer than 63 characters with no dots or accents.
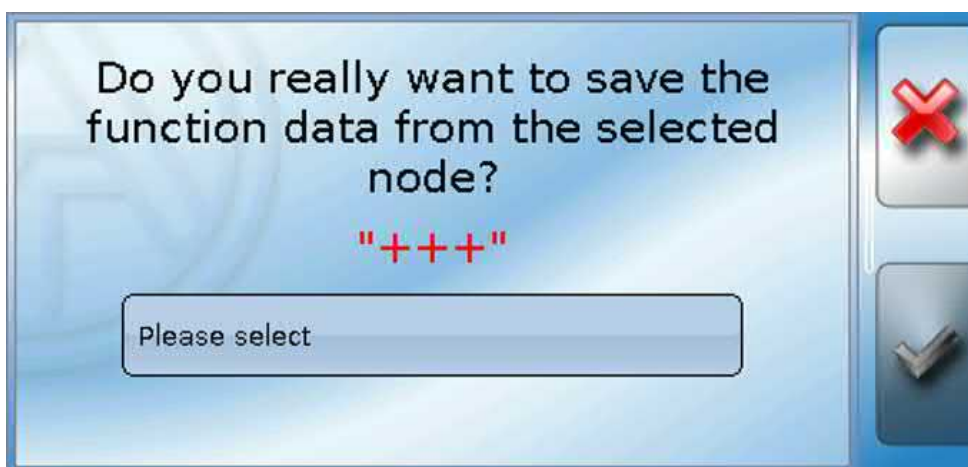

Tap the plus symbol to load function data from a different X2 device onto the controller SD card.
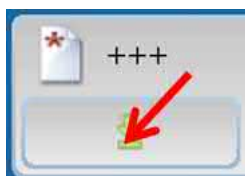
When the button expands, tap on the green arrow.

Now a node query appears and it is possible to enter a new file name.

Firmware Load...

Firmware (= operating system, file ***.bin**) can be loaded from the SD card onto the controller or other x2 devices (Except: other UVR16x2) on the CAN bus. More than one operating system version may be saved on the SD card.

The data transfer is only possible after a **technician** or **expert password** has been entered for the target device.
As when loading function data, the saved firmware files can be deleted, renamed or loaded onto other x2 devices.
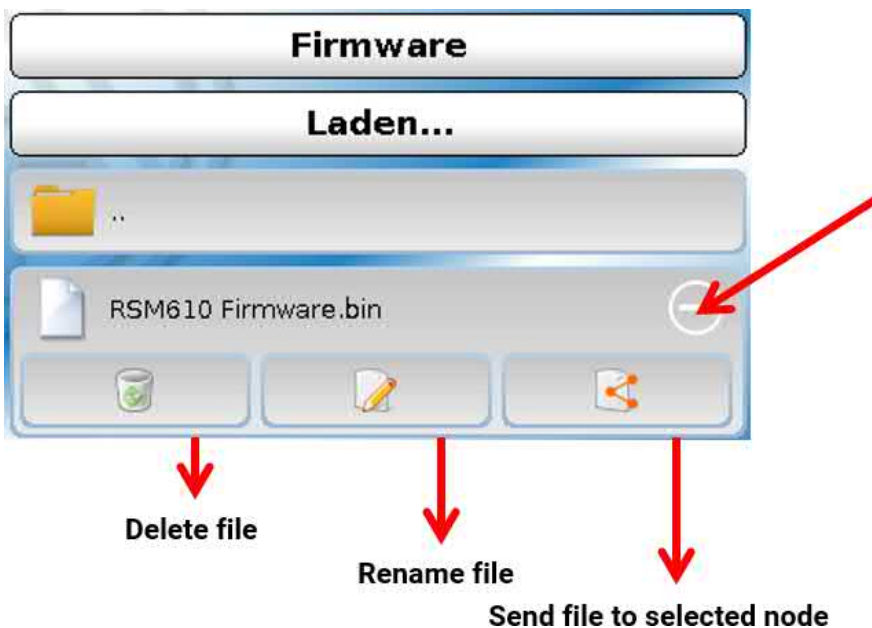
Return from this selection by tapping the icon again.

Function overview Load.../Delete...

The function overview (*.x2d file, **TA-Designer minimum version: 1.15**) can be loaded onto the device from the SD card or deleted in the device. Multiple files can be saved to the SD card.

When you select the file a confirmation prompt will appear, as the function overview currently on the device will be overwritten.

"**Delete...**" deletes the function overview saved on the device. When you select the file a confirmation prompt will appear.
Answer the confirmation prompt by tapping either ✔ (= Yes) or ✘ (= No).

Status

This indicates whether a data administration transfer of data from the SD card to the controller or vice versa was successful or not.

This status display does not apply to data transfers **from** another controller, a C.M.I. or a CAN monitor.

Total reset

A total reset can only be carried out from the Technician or Expert level and requires confirmation when prompted.

A **total reset** deletes the function modules, the parameter settings of all inputs and outputs, bus inputs and outputs, fixed values and system values.

The settings for the CAN node number and the CAN bus rate are retained.

After tapping the screen you will be asked to confirm that you want a total reset to be carried out.

Answer by tapping either ![yes] (= Yes) or ![no] (= No).

A total reset can also be carried out by pressing the **user interface when the TA logo is displayed** as the controller is starting up. At the end of the five seconds for starting calibration, a confirmation prompt appears.

Here you can select the required procedure or go to the controller's main menu by tapping ![no] .

If a total reset is carried out, a **_Backup.dat** file is created on the SD card with the old function data.

Restart

At the end of the "Data admin" menu, there is an option to restart the controller following a confirmation prompt, without disconnecting the controller from the network.

Reset

Pressing the reset button on the front of the controller **briefly** (with a narrow-tip pen) and releasing it **before** the beep ends will restart the controller (= reset).

Loading the firmware with the factory settings

In special cases, it may be necessary to restore the controller's **firmware** to its condition when delivered from the factory. A total reset is carried out at the same time.

Pressing the reset button on the front of the controller (with a narrow-tip pen) **when switching it on** will start the loading of the original firmware at the time of delivery.

The button must be pressed until the beep stops.
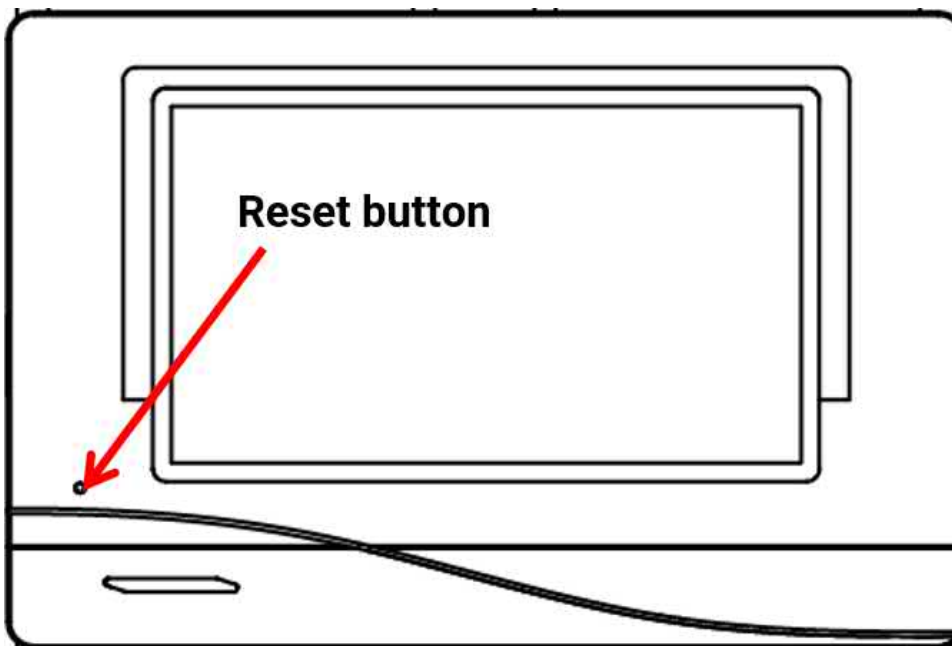
Total reset

When the Technische Alternative logo appears after the controller is started up, touch the screen until the following display appears. The "Perform total reset" button resets the controller; the red cross at the bottom right cancels the process.
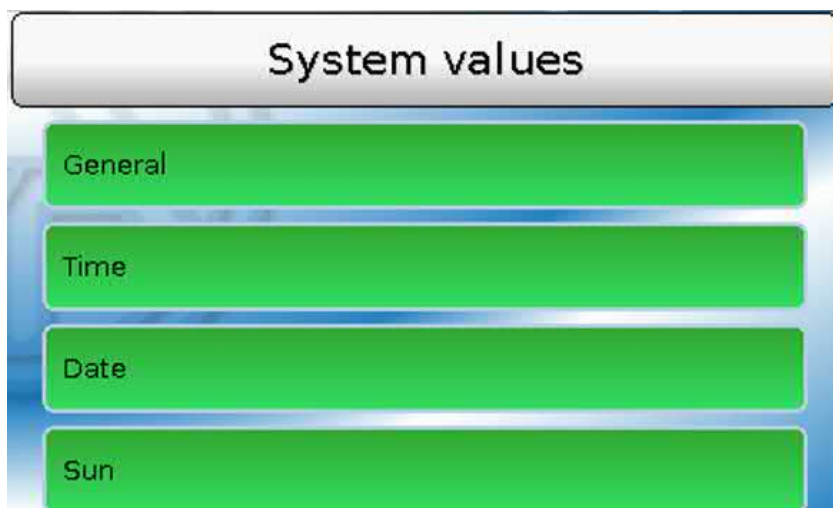

Changelog

Every change in the controller is recorded with the exact date and time in the **CHANGE.LOG** file on the controller SD card and can therefore be traced.

System values

This menu displays the status of system values that are available for selection as the **source** for function input variables and CAN and DL outputs.

The system values are divided into **4 groups**:

General system values

When programmed accordingly, these system values allow monitoring of the controller system.

- **Controller start**
- **Sensor error inputs**
- **Sensor error CAN**

- **Sensor error DL**
- **Network error CAN**
- **Network error DL**

Controller start generates a 20 second pulse 40 seconds after the device is switched on or reset, and is used for monitoring the controller starts (e.g. after power failures) in the datalogging feature. The interval time in datalogging should be set to 10 seconds for these starts.

The **sensor errors** and **network errors** are global digital values (No/Yes) which are not connected to the error status of a specific sensor or network input.

If any one of the sensors or network inputs has an error, the status of the corresponding group changes from **No** to **Yes**.

Time system values

- **Second** (seconds of the current time)
- **Minute** (minutes of the current time)
- **Hour** (hour of the current time)
- **Second pulse**
- **Minute pulse**
- **Hour pulse**
- **Summertime** (digital value OFF/ON)
- **Time** (hh:mm)

Date system values

- **Day**
- **Month**
- **Year** (without the century)
- **Day of the week** (starting with Monday)
- **Calendar week**
- **Day of the year**
- **Day pulse**
- **Month pulse**
- **Year pulse**
- **Week pulse**

The pulse values generate a single pulse per time unit.

Sun system values

Systemwerte „Sonne"

- **Sunrise** (time)
- **Sunset** (time)
- **Minutes until sunrise** (on the same day, does not go beyond midnight)
- **Minutes since sunrise**
- **Minutes until sunset**
- **Minutes since sunset** (on the same day, does not go beyond midnight)
- **Solar altitude** (see Shading function)
- **Direction of the sun** (see Shading function)
- **Solar altitude > 0°** (digital value yes/no)
- **High sun** (time)

Function overview

The function overview will only be displayed with controller version V1.04 or higher.

Programming of the function overview is done using the "**TA-Designer**" software and is described in that software's help file.

If multiple UVR16x2 controllers or X2 devices in the system are linked by CAN BUS, values from these other devices can be displayed as well.
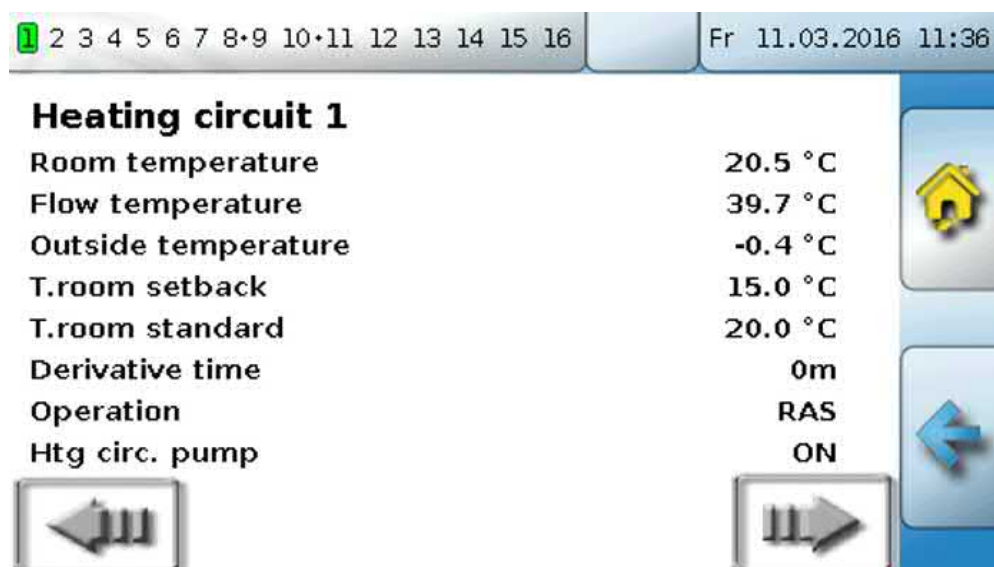
Tapping the "Home" icon ⌂ opens the function overview. This overview is designed to provide the user with a simple way of controlling and monitoring the system.

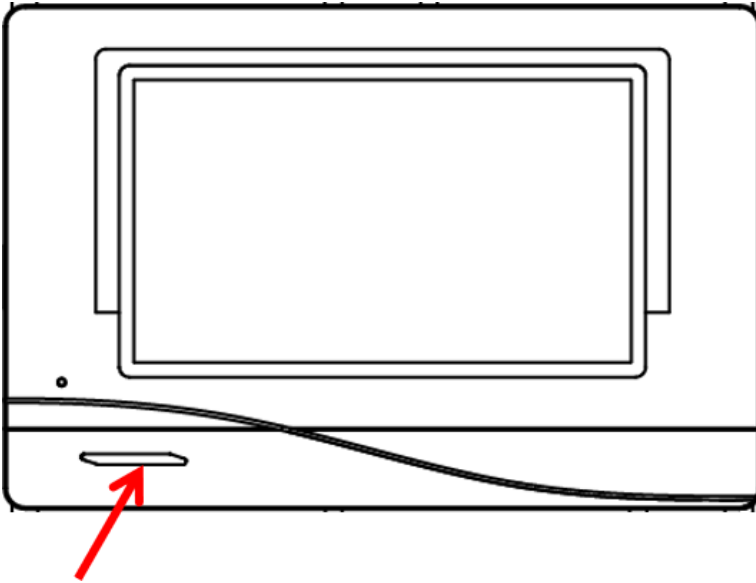The function overview can be displayed with the aid of graphics or simply as a table.

Examples:
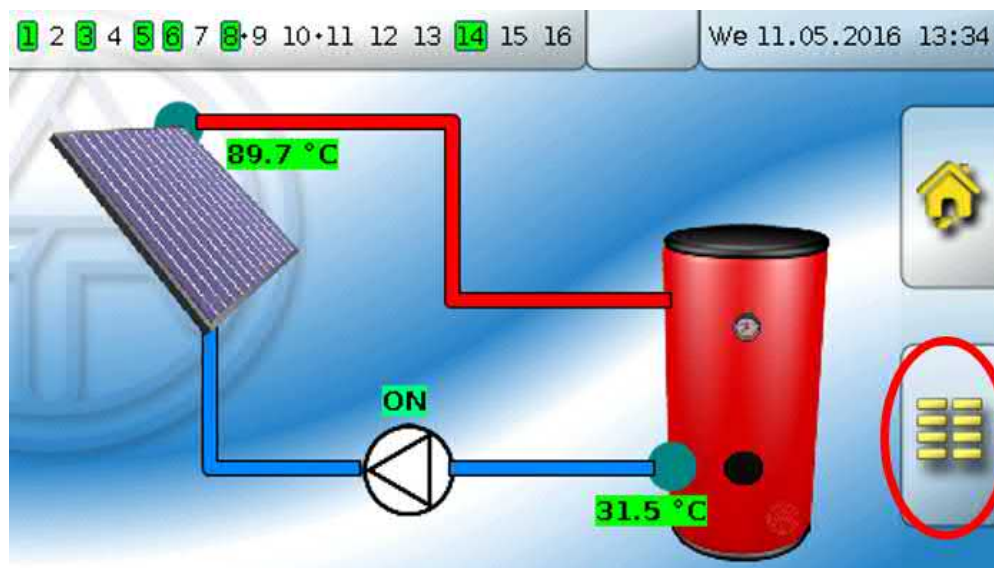
Selecting this button **on the start page** takes you back to the controller menu.

LED indicator light

The indicator light can indicate a variety of statuses by means of three colours.

Indications at controller start

Indicator light	Erklärung
Steady red light	The controller is booting up (= start routine after switching on, resetting or updating) **or**
Steady orange light	Hardware is initialising after booting up
Flashing green light	After hardware initialisation, the controller waits about 30 seconds to receive all the information necessary for a function (sensor values, network inputs)
Steady green light	Normal operation of the controller

An active **message** can be displayed by a change in the LED indicator light. This can be set in the **Parameter menu** of the "**Message**" function.

Technical Data UVR16x2-R (relay version)

All inputs	Temperature sensors of type PT1000, KTY (2 kΩ/25 °C), KTY (1 kΩ/25 °C), PT100, PT500, Ni1000, Ni1000TK5000 and room sensors RAS or RASPT, radiation sensor GBS01, thermocouple THEL, humidity sensor RFS, rain sensor RES01, pulses **max. 10 Hz** (e.g. for flow rate transducer VSG), voltage **up to 3.3 V DC**, resistance (1-100 kΩ), and as a digital input
Input 7	Also voltage 0-10 V DC
Input 8	Also current loop 4-20 mA DC, voltage 0-10 V DC
Input 15, 16	Also pulse input **up to 20 Hz**, for flow rate transducer VSG or S0 signals, for example
Outputs 1 - 4, 6 - 11	Relay outputs, partially with N/C and N/O contacts
Output 5	Relay changeover contact – **potential-free**
Outputs 12 - 16	Analogue outputs 0 - 10 V (max. 20 mA) or PWM (10 V/1 kHz) in 1000 stages each (= 0.01 V or 0.1 % per stage) or extension option as switching outputs with auxiliary relay modules
Output 16	Additional attribute: stabilised voltage output for supply of external sensors
Max. breaking capacity	Relay outputs: 230 V / 3 A each
Max. bus load (DL bus)	100%
CAN bus	Standard data rate 50 kbit/s, adjustable from 5 to 500 kbit/s
12V / 24V DC	Power supply for external devices, max. 6 W **in total**
Differential temperatures	With separate start and stop differential
Threshold values	With separate start and stop differential or fixed hysteresis
Temperature measuring range	PT100, PT500, PT1000: -200 °C to +850 °C with a resolution of 0.1 K All other temperature sensors: -49.9 °C to +249.9 °C with a resolution of 0.1 K
Temperature accuracy	Typ. 0.4 K, max. ±1 K within a range of 0 - 100 °C **for PT1000 sensors**
Accuracy of resistance measurement	Max. 1.6 % at 100 kΩ (measured variable: resistance, process variable: resistance)
Voltage accuracy	Typ.1 %, max. 5 % of maximum input measuring range
Output 0-10V accuracy (A12-A15)	Max. -2% to +6%
Connection	1100 - 230 V, 50 - 60 Hz, (outputs A1 – A11 and device are fused jointly with 6.3 A (fast))
Supply cable	3x 1 mm² H05VV-F to EN 60730-1 (cable with standard plug included in the standard sensor pack)
Power consumption	3.0 – 4.5 W, subject to the number of active switching outputs
IP rating	IP40
Protection class	II – double insulated ⧠
Permissible ambient temperature	+5 to +45 °C

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Technical data UVR16x2-D (Triac version)

All inputs	Temperature sensors of type PT1000, KTY (2 kΩ/25 °C), KTY (1 kΩ/25 °C), PT100, PT500, Ni1000, Ni1000TK5000 and room sensors RAS or RASPT, radiation sensor GBS01, thermocouple THEL, humidity sensor RFS, rain sensor RES01, pulses **max. 10 Hz** (e.g. for flow rate transducer VSG), voltage **up to 3.3 V DC**, resistance (1-100 kΩ), and as a digital input
Input 7	Also voltage 0-10 V DC
Input 8	Also current loop 4-20 mA DC, voltage 0-10 V DC
Input 15, 16	Also pulse input **up to 20 Hz**, for flow rate transducer VSG or S0 signals, for example
Output 1, 2, 6, 7	Triac outputs
Outputs 3, 4, 8-11	Relay outputs, partially with N/C and N/O contacts
Output 5	Relay changeover contact – **potential-free**
Outputs 12 - 16	Analogue outputs 0-10 V (max. 20 mA), PWM (10 V/1 kHz) or expansion option as switching outputs with auxiliary relay modules
Max. breaking capacity	Relay outputs: 230 V / 3 A each
Max. bus load (DL bus)	100%
CAN bus	Standard data rate 50 kbit/s, adjustable from 5 to 500 kbit/s
12V / 24V DC	Power supply for external devices, max. 6 W **in total**
Differential temperatures	With separate start and stop differential
Threshold values	With separate start and stop differential or fixed hysteresis
Temperature measuring range	PT100, PT500, PT1000: -200 °C to +850 °C with a resolution of 0.1 K All other temperature sensors: -49.9 °C to +249.9 °C with a resolution of 0.1 K
Temperature accuracy	Typ. 0.4 K, max. ±1 K within a range of 0 - 100 °C **for PT1000 sensors**
Accuracy of resistance measurement	Max. 1.6 % at 100 kΩ (measured variable: resistance, process variable: resistance)
Voltage accuracy	Typ.1 %, max. 5 % of maximum input measuring range
Output 0-10V accuracy (A12-A15)	Max. -2% to +6%
Connection	1100 - 230 V, 50 - 60 Hz, (outputs A1 – A11 and device are fused jointly with 6.3 A (fast))
Supply cable	3x 1 mm² H05VV-F to EN 60730-1 (cable with standard plug included in the standard sensor pack)
Power consumption	3.0 – 4.5 W, subject to the number of active switching outputs
IP rating	IP40
Protection class	II – double insulated ▢
Permissible ambient temperature	+5 to +45 °C

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