UVR1611K-N-D, UVR1611S-N-D

Triac version A4.05 EN

Freely programmable universal controller

Operation
Programming
Installation instructions

en

TECHNISCHE ALTERNATIVE

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Safety requirements

These instructions are intended exclusively for authorised contractors.

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.

Function mode

This unit is a very compact control system that has many applications for solar warm water and heating systems and for pumps and valves used in such systems.
The 16 sensor signals pass through overvoltage protection, a low-pass filter, and the multiplexer before they reach the processor's A/D transformer. An adjustable reference is used to calculate the value of the measurement signal. In addition, the computer periodically checks all of the operator's controls, describes the display, and handles the CAN bus.
Once the temperatures have been calculated and links set, the power driver switches the respective outputs. To prevent a loss of data, the device has nonvolatile memory (EEPROM) and a super capacitor (for around three days) for reserve power.

Planning basics

To ensure efficient programming, the following order has to be observed:

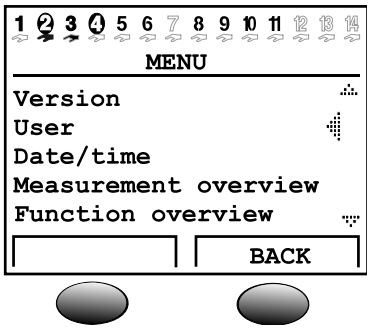
1	The basic condition of writing the desired controller functions and its parameterizing is an **accurate hydraulic diagram**!
2	This diagram **must** show **what** should be regulated and **how**.
3	The **sensor positions** are to be defined according to the desired controller functions and drawn into the diagram.
4	The next step consists in providing all sensors and "consumers" with the desired **input or output numbers**. As all the sensor inputs and outputs have different characteristics, it is not possible to provide consecutive numbers. Therefore, the input and output assignment must be made according to the following description: **Inputs:** All 16 inputs are suitable for standard sensors of the types KTY (2 kΩ) and PT1000 or for digital inputs. In addition, the following inputs have special functions: **S8:** Current loop (4 – 20 mA) or control voltage (0 - 10V=) **S15, S16:** Pulse input, such as for volume flow encoder Signal voltages of **more than** 5 V at the inputs S1 to S7 and S9 to S16 or **more than** 10 V at S8 are **not allowed**. **Outputs (supply voltage side):** **A1:** Speed-adjustable output **(!!!!!!!!!! max. 0.7A !!!!!!!!!!)** with integrated interference filter **A2, 6, 7:** Speed-adjustable outputs for pumps (max. 1A) **A3:** Relay output (closer) for undefined consumers **A4:** Relay output with opener and closer for undefined consumers, preferably for valves without retracting spring. A4 combined with A3 is also suitable for mixer motors. **A5:** Relay output – **potential-free** with opener and closer for burner demand with the legally prescribed distance to the supply voltage. **A8, A9:** Relay outputs (closer) for undefined consumers, preferably together with mixer engines, as only one commonly used neutral conductor clamp is available for both outputs **A10, A11:** Relay outputs (A10 with closer, A11 with opener and closer) for undefined consumers, preferably together with mixer engines, as only one commonly used neutral conductor clamp is available for both outputs **Outputs (protective low voltage side):** **Hirel 1, 2:** Control lines for a relay module for two other relay outputs **A12** and **A13**. **DL (14):** DL bus as bus link for various sensors and/or for data recording via data logger to a PC. This connection is not only able to be used through the parameterization but also to activate an additional relay. **0-10 V / PWM (A15, A16)**: Control output with a standardized voltage level of 0 to 10 V e.g. for boiler modulation. Switchable to PWM (level approx. 10 V, 2 kHz). Referred to as analogue output in the user software.
5	Now the calling of the functions and its parameterizing is effected.

Basic standards

Basic operation

Display

The display consists of four information fields



The top line constantly provides information about the actual output states.

Blank field instead of number 5 = output five has not yet been parameterized

- 5 Output five is active, runs in automatic mode and is temporarily **switched off**
- ⑤ Output five is active, runs in automatic mode and is temporarily **switched on**
- 5 Output five is active, runs in **manual mode** and is temporarily switched off
- ⑤ Output five is active, runs in **manual mode** and is switched on at the moment

The second line is the headline for the following menu and/or parameter lines.

The middle display area is the operative range. Within this range the programming, parameterizing and indicating takes place.

The lowest line exclusively serves to mark the two keys below in order to be able to assign different functions to it.

Keys

The control unit has two keys below the display. They are constantly assigned with the required functions via the display.

x10 – The changeable value changes for 10 steps each per increment of the scroll wheel.

BROWSE – This function allows the direct “switch" from one menu level to the same level of the next menu by means of the scroll wheel

MENU – To switch from the opening image (after starting-up) to the menu

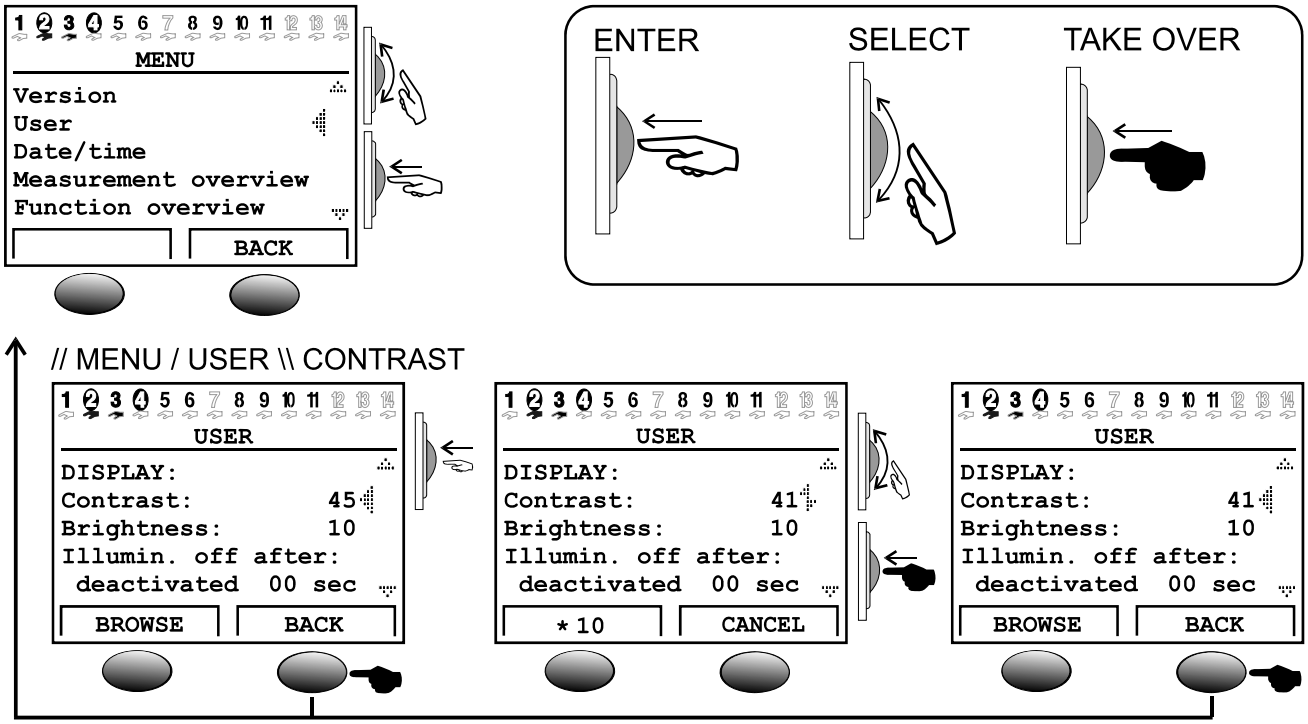
SERVICE – To switch from the function overview (the most important menu for the user) into all other menus

BACK – The PC switches immediately into the next-higher menu level

CANCEL - The current entry or change of a value is stopped

Scroll-wheel

By means of the scroll-wheel, the selected menu can be gone through by the right pointer in the display. Small upward or downward showing arrows symbolize the possibility of further menu lines above or below the visible display range.
If a parameter is to be changed, the pointer must be put in the desired position. Press the wheel to change the background lighting of the scroll wheel frame to orange to indicate programming. Now the value can be adjusted using the wheel (possibly also with "* 10"). You may cancel at any time by pressing CANCEL. Press the wheel again to turn the screen light green and take over the parameter.

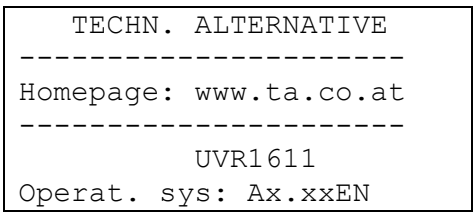


Terms used

Operating system = The software (operating system) of the control unit (e.g.: version A3.28EN) with indicator of the user language
C.M.I. = Control and monitoring interface, web server for data transfer between CAN bus network and LAN network
Bootloader = Accessory equipment for data transfer between control unit and PC (no longer available)
Boot sector = Protected storage area in the processor containing a basic menu for “auto-programming" of the chip (e.g.: B2.00)
CAN-Bus = Data bus for data exchange within the unit family
Function data = Customized programming and parameterizing
Function module / **Function** / **Module** = Available functions (e.g.: solar thermal control), which constitute the control characteristics.
Infrared interface – CAN bus on infrared basis (below the two keys) allowing a slack connection to the Bootloader
Measuring data = Measured values, output states, results of computation such as kW and others

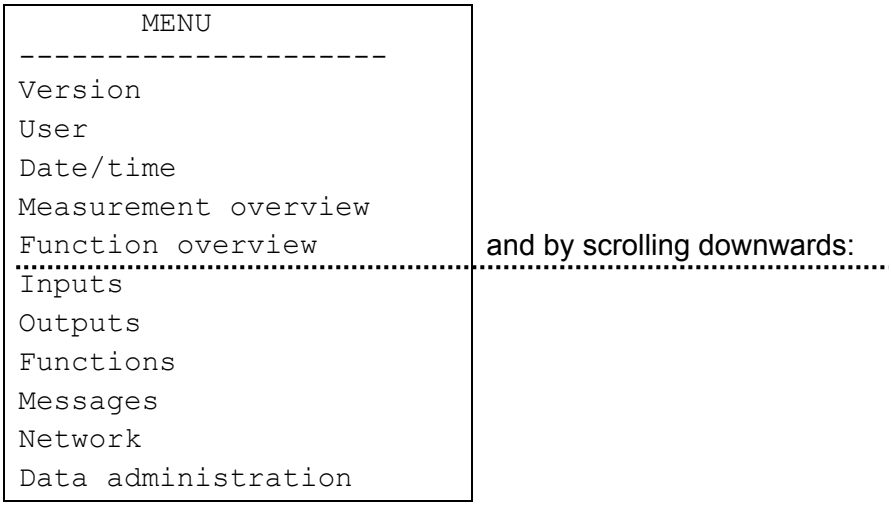
User interface

After starting up, the display indicates this menu.



Operating system: Version number of the software. The latest software (higher number) is available for download under http://www.ta.co.at. It can be transferred to the control unit by means of accessory equipment – the C.M.I..

The key ***MENU*** offers an entrance to the unit menu:



and by scrolling downwards:

Version – shows only the same indication as after the starting up - i.e. the operating system of the unit.

User – This menu permits the adjustment of the control level, the indication contrast and the background lighting as well as the entrance into a so-called “User interface editor”, which allows the creation of an own menu surface.

Date / Time – to set the date and time. It is also possible to switch between normal time and summer time.

Measurement overview – to display all measured values and network inputs in a table.

Function overview – All important information and parameters (e.g.: ambient temperature) of the determined function modules are written by the programmer (specialist) in an editor (“User interface editor”) and displayed here clearly. The computer switches automatically to this overview after a few minutes, since it is the most important control panel for the user.

Inputs - This menu offers an exact overview of all input values. Furthermore, parameters for all inputs are set here. For details, see chapter “Menu Inputs”.

Outputs - for the complete parameterizing and manual operation of all outputs. For details, see chapter “Menu Outputs”.

Functions - This is the menu where all function modules of use are listed. Also, the control tasks and all corresponding parameters are specified here.

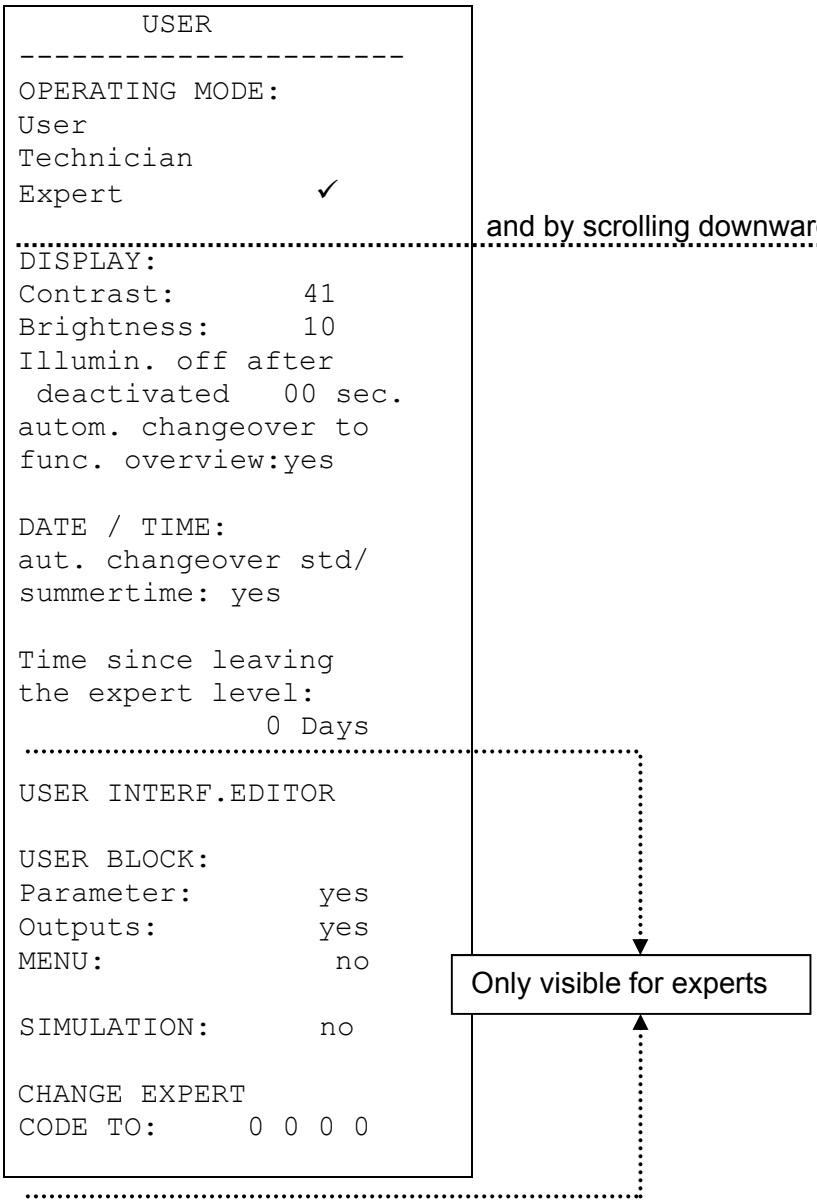
Messages – Events determined by the programmer via this menu can trigger status and error messages as well as an alarm tone.

Network – In this menu, all settings (node number, network in- and outputs, …) concerning the integration of the control unit in a CAN open bus network are defined.

Data administration – This menu contains for the specialist all commands for the data administration and protection as well as for an update of the operating system.

MENU User

Here the following entries are listed:



User - All indication possibilities, but only the most important settings are permitted.

Technician – In addition, all the settings are permitted. Access only possible via a key number. This number can be detected by solving a "little riddle" hidden in the manual.

Expert – In addition, the programming of all functions is possible. The necessary key number is only passed on to trained personnel by email or by telephone.

DISPLAY: **Contrast** – Adaptation of the display contrast to the lighting conditions.

DISPLAY: **Brightness** – The display has a background lighting, which is integrated in the circuit so that it does not need additional energy. The attenuation of the 12V relays to the 5V computer tension in many devices is transformed into heat, but in case of the UVR1611 also into light! Thus disconnecting does not save energy. The intensity of the background lighting is variable and can be switched off after an adjustable time, while no control element is used.

DISPLAY: **Automatic changeover to Function overview**– In the user surface the most important information for the user is listed in an overview of functions. This command can be used to activate an automatic switch when no control element has been used for several minutes.

DATE / TIME: **Automatic changeover standard / summer time** - This command allows the automatic switching between summer and standard time.

Time since leaving the expert level: - A negligent passing on of the expert key number often leads to changing of important parameters and linkages by unauthorized persons. This function allows you to check.

USER INTERFACE EDITOR: Opens an editor menu to program the dialogue (the overview of functions) between control unit and user (only for “expert”).

USER BLOCK: **Parameter** – If set to yes, the user is not allowed to change any of the parameters (exception: function overview, all parameters in the user menu and outputs (MANUAL / AUTO)).

USER BLOCK: **Outputs** – If set to yes, if set to yes, the output conditions can also no longer be changed by the user.

USER BLOCK: **MENU –** if set to yes, user and technician now only have access to the function overview and the user menu (switching using the left key). After logging in as an expert, it is possible, to go to the main menu from the function overview by pressing the "SERVICE" key.

SIMULATION: option to activate the simulation mode (in expert mode only):

- no average determination of the outside temperature in heating circuit control
- inputs defined as PT1000 sensors are measured as KTY
- no evaluation of a room sensor

The simulation mode is ended automatically when closing the expert level.

CHANGE EXPERT CODE TO: - Change the ex-works key number. Without knowledge of this number no read-out of the program (function data) is possible later on.
Under normal conditions, the control unit automatically returns to the user mode two hours after the last key actuation. Since this is unwanted in devices used for programming or test purposes, the key number 0 0 0 0 blocks the resetting.
WARNING: The loss of the selected key number can only be cancelled by resetting to the factory setting – under complete loss of the function data.

MENU Date / time

Here the following entries are listed:

```
        DATE / TIME
  ----------------------
         Thursday
       16. 12. 2010

     Std time: 00 : 00
```

All values can be selected and changed accordingly by means of the scroll-wheel. The date and time function has a power reverse of approximately three days in case of a blackout. The indication of the “Std time“ corresponds to the winter time. The changeover to the summer time is possible manually or automatically (see user menu).

MENU Measurement overview

In this menu, all entries of the measured values are listed in a table:

```
  MEASUREMENT OVERVIEW
----------------------
 1:  60.3 °C  27.6 °C
 3:  49.2 °C  88.4 °C
 5:  29.0 °C  47.5 °C
                 …
                 …
                 …
NETWORK INPUTS:
1:OFF         ON
17: 25.4 °C   10.6 °C
```

In other words, the temperature at sensor 1 is 60.3°C; the one at sensor 2 is 27.6°C, etc.

If there is a network connection to other devices, the analogue values and digital conditions of the defined network inputs are subsequently displayed too.

In the example, network input 1 (=digital input 1) is in the "OFF" state, network input 2 is in the "ON" state, network input 17 (= analogue input 1) is equal to 25.4°C and network input 18 is equal to 10.6°C.

MENU Function overview

All of the function modules offer a wide range of information, measurement values, and parameters that can be viewed via the menu "Functions." To give users a quick overview of the main settings, experts can use the "user interface editor" to display all of the information that users need to see from all the menus. This information later appears in the menu "Function overview." Only the most important information and parameters should be entered in the menu "Function overview," and otherwise the overview would simply be too long. In other words, this menu is by far the most important interface to users.

The following display is an example of the system with one heater circulation, one heat meter and a DHW demand function:

```
HTG.CIRC.1      F: 5
OPERAT.:   RS
           TIME/AUTO
           STANDARD

T.roomSETBACK:  15 °C
T.room STD:     20 °C
            TIME PRG:
----------------------
DHW_DEM         F: 9
DHW TEMP.:
T.DHW ACT:    60,5 °C
----------------------
INPUTS
```

The controller automatically switches from any menu to the function overview when it is switched on or if no operator's control is used for a few minutes, provided that the automatic option has been activated in the user menu (recommended).

Code for Technicians:

In order to enable all of the setting parameters, open the function "User" in the device's basic menu and then select "Technician". Enter the product of 2^6 as the code!

The user interface editor

To keep the dialogue between users and the controller as simple as possible, an overview menu is automatically provided to present the most essential information that users need to know from the wide array of information available. The *FUNCTION OVERVIEW* serves that purpose in this device.
Experts can use the "user interface editor" at any time to create this overview. **The dialogue is complicated in accordance with the scope of information as to cover; the PC user interface TAPPS simplifies it.** We recommend that you use it in any case to provide an easy-to-follow overview of the most important information that users need.
The command can be found under the entry "USER INTERF. EDIT" in the menu *USER.* Once the menu is open, the cursor will be to the left of the display. Press the scroll wheel to open it and then select from the following commands:

S... A source can be entered in the following dialogue for the entry. The first entry from a "source" always begins with this command. The next source command closes the previous one and opens a new one.
A... If the value in the following entry can be changed, users may also make these changes. User area A
B… --- " --- User area B
C… --- " --- User area C
T... If the value in the following entry can be changed, only **technicians** but not users may make these changes.
E... If the value in the following entry can be changed, **experts** may make these changes. Only experts and technicians can see this entry, which is hidden for users.
>... Enter lines. About your current position (line), information is to be entered. The number of lines must be entered.
<... Delete lines. Information in and below your current line is to be deleted. The number of lines must be entered.
-... Empty line that only appears in the editor; and entry can be made here at any point.

User areas A, B, and C are only important if you are using the CAN monitor. For the unit itself, it does not matter whether the entry is made with A, B, or C.

Assumption: A house with three apartments (three heating circuits in one control unit), each of which has its own CAN monitor:
Each of the three parties should only be able to access its own heating circuit; therefore, the first heating circuit is programmed for user area A in the function overview, while the second one is programmed for B and the third one for C. Experts can set the user level (such as A) on the CAN monitor. This ensures that user A only sees that heating circuit on the CAN monitor.

Programming example:

The example in the function overview we will start with is the date, the time (both of which users can change), and the collector temperature. Enter the command ***S*** (source). Now, the display shows:

```
S        User
```

User is a special feature as it does not have anything to do with commands or entries and is the only source information that does not produce a heading. It only serves as an indication of the date and time (summertime, wintertime). Enter ***A*** in the next line after you have entered the source of the information. Now the user can change the value. The current date will immediately be displayed.

```
S     User
A    Fr.  24.04.2009
```

When ***A*** is entered in the next line, the date appears again. It can be set to summertime or wintertime, depending on the date. Now, the current time appears in the function overview next term (such as summertime). Now, the display shows:

```
S     User
A     Fr.  24.04.2009
A    Summertime:
```

Use the command ***S*** to enter the collector temperature, but instead of *User* enter *Input*, and this information is in the input menu:

```
S     User
A     Fr.  24.04.2009
A     Summertime:
S    Input
```

Every time the command ***S*** is entered, the function overview displays a new bar across the width of the display indicating the new function along with a heading (in this example: *input*). ***T*** is in entered in the next line to set the collector temperature. It does not matter whether ***A***, ***E*** or ***T*** is selected for information that cannot be changed, such as collector temperature. In case of doubt (can it really not be changed?), select ***T***.

```
S        User
A        Fr. 24.04.2009
A        Summertime:
S        Input
T        1: T.collector
```

Date
Time
Bar and heading INPUTS
The information (temperature) is always displayed for this purpose.

The function overview should now look as follows:

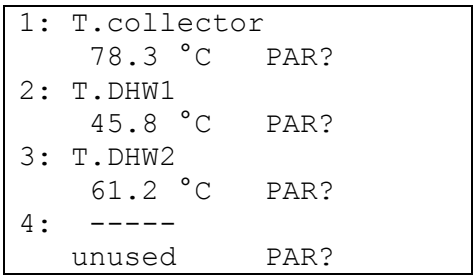
```
Fr.  24. 04. 2009
Summertime: 13:08
--------------------
INPUTS
1:  T.collector
         86.7 °C
```

Tips and tricks

- The commands Delete < and Insert > acquire the inputs of the number of lines.
- The overview is all the more useful for users if the information is provided in a proper sequence. Begin with the functions for maintenance and control of the heater.
- Each source command ***S*** inserts a separation bar in the function overview and the name of the "source" and is used whenever information is to be added for an additional function. In other words, ***S*** is always at the beginning of any function.
- If no new source command is set, the only selection in the subsequent lines concerns information for the previously inserted function.
- Select a device input output to display the respective values automatically (temperature, automatic / manual) in the function overview as headings.
- When entering outputs assigned to mixtures, proceed in descending order (such as makes or 8.9 before 8).
- Entries of INPUT or OUTPUT VARIABLES are admissible and do help users reach this menu directly in the function overview, but do not provide users with any truly valuable information. In other words, they can be confusing and should not be used. In addition,
- With any function is called (via ***S***), the heading of the selected function that allows the user a direct entrance into the function is always automatically entered in the overview. Users can thus reach all the areas of the selected function from the overview.
- All of the entries concerned are automatically deleted when the expert deletes this function in the menu *Functions* or turns it into a different function.
- A set monitoring function of the system from the “messages” module is always entered at the start of the function overview, but only if it is actually active.
- To make sure that the function overview truly provides an overview, you should only enter the most important information.
- Only a few parameters (mainly from the heating circuit control function) should be set by the user. We thus recommend that you use command ***A*** (user may change value) sparingly.
- Parameters that can be changed (set values) cannot be changed in the function overview (nor in the functions themselves) if these set values are transferred from another function via INPUT VARIABLE.
- Users only see "one level up" -- in other words, the information stored with the commands ***A*** (***B***, ***C***) and ***T***. Only experts see the information marked with E (expert), but experts are also not able to change this information.

MENU Inputs

The menu "***Inputs***“ primarily serves as overview over the measured values of the inputs and/or sensors. Furthermore, it allows the expert the parameterizing of all used inputs if employed the following procedure:
The line “*Inputs*” has already been selected and then pressed the scroll-wheel. Hereby the indication example is as follows:



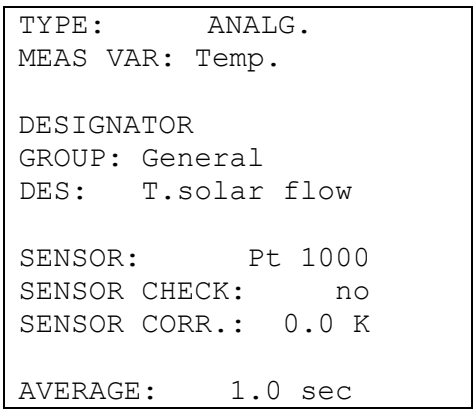
The temperature of the collector is currently 78.3°C etc.

Input 4 has to be set before

In the above indication example the sensor inputs 1 to 3 were already defined by the expert, while the input 4 is not yet fixed. In order to assign e.g. the cylinder sensor *buffer, bottom* to the input 4 the arrow has to be induced to the corresponding entrance into the parameterizing level PAR by means of the scroll-wheel. By pressing the wheel the entrance is effected and the indication "TYPE unused” appears.
First, it has to be determined which basic characteristic (TYPE) the sensor owns. Possible selections:

unused = The input is not used
ANLG. = Temperature, ambient temp., radiation sensors and others
DIGITAL = Direct ON/OFF control input (possible at each input!) from another function or connection of a **potential-free** switch contact between sensor connection and sensor earth (no voltage)
IMPULSE = Volume flow encoder, wind sensor (only for the inputs 15.16)

After having selected the type (according to example *ANALG.*; as it represents the analogue measured variable "temperature") all available parameter lines are faded in.
Indication example:



A temperature sensor has the measured variable *Temp.* which is already faded in. A radiation sensor would need the measured value *Solar rad.*.

Menu Inputs

In the next step the name (designator) *Buffer, bottom* is to be assigned to the input 4. To do so, superset “designator groups” were specified such as *General, Generator, Consumer, Line, Climate* and others. *General* is a group which had to be taken over from old operating systems (< A1.21). Many names out of it are represented also in the other groups. *T.buffer bott* is put down in the group *Consumer*.
When selecting the "designator“, the computer suggests different texts with sequential index up to 9 by scrolling forward. T.buffer bott2). Instead of the “0” the index is faded out (e.g.: T.Buffer.C). In order to proceed quickly from one designator to the next, the key (x10) must be pressed at the same time. According to our example we select *T.Buffer.L.*

Indication example:

```
TYPE:      ANALG.
MEAS.VAR: Temp.

DESIGNATOR
GROUP: Consumer
DES:  T.buffer bott

SENSOR:        Pt 1000
SENSOR CHECK:       no
SENSOR CORR:     0.0 K

AVERAGE:      1.0 sec
```

Under "**SENSOR**“ the sensor type has to be specified. Possible selections are: *RAS* (KTY) or RASPT (Pt1000) for the ambient temperature sensor, *Pt 1000* for the standard temperature sensor and *KTY 10*.

If a short circuit and/or interruption occur, an active "**SENSOR CHECK**" issues **automatically** en error message in the **function overview**.
If "**SENSORCHECK**" is active, the **sensor status** is also available: OFF for a correctly working sensor and ON for a defective sensor (short circuit or circuit interruption). As the **sensor status** can also be set as source of an input variable (see menu “Functions”), it is thereby possible to react accordingly if e.g. the external sensor fails. The sensor status can optionally be selected for individual sensors or for all sensors together ("sensor status 17").

If there is a “**SENSOR CORR**“ such as 0.5K and a measured temperature of 60.0°C, 60.5°C is indicated. This corrected value is then used also internally for all calculations.

“**AVERAGE**“ means the temporal averaging of the measured values. Calculating a mean of 0.3 seconds leads to an extremely rapid reaction of the display and the unit. However, this can be expected to cause fluctuations of the value. A large mean slows everything down and is only recommended for the sensors for the heat meter. For simple measurements, around 1 – 3- sec. should be selected, for the provision of hygienic warm water with the ultra-speed sensor 0.3 – 0.5 sec.

Special abilities of the inputs

The inputs also permit as measured analogue variable *Voltage* including the necessary scaling. By this the determination of the value range is to be effected.
For program reasons, the same configuration options are available with all inputs for the ***voltage*** measurement value.
The following points must therefore be taken into account:

- **Inputs 1-7** and **9-16** can process a maximum ***voltage*** of **5 volts**
- The heat meter function cannot establish the *flow rate* for **inputs 15** and **16** from a voltage signal.
- **Input 8** also allows ***current*** and ***resistance*** as measurement.
- The process values of *voltage*, *current* and *resistance* are processed as dimensionless values (without decimal point).

Example:

```
TYPE:       ANALG.
MEAS.VAR:   Voltage
PROC VAR:   Voltage

DESIGNATOR
GROUP: General
DES: Fill level

SCALING:
 0.00 V    :     0
10.00 V    :   100
AVERAGE:     1.0 sec
```

Specification of the value range using scaling

The calculated voltage rate is averaged over 1 sec.

In addition, the **inputs 15 and 16** are able to detect faster pulses (pulse duration min. of 50 ms, pause of min. 50 ms). Thereby they are suitable as inputs for volume flow encoders.
The parameterizing of a pulse input leads to the following indication:

```
TYPE:       IMPULSE
MEAS.VAR:   Flow rate

DESIGNATOR
GROUP: General
DES: Flow rt sol

QUOTIENT:   0.5 l/Imp
AVERAGE:     1.0 sec
```

Per each 0.5 litres a pulse is received
The calculated flow rate is averaged over 1 sec

When selecting the measured variable *Flow rate*, also the “QUOTIENT” is to be entered. It describes which flow rate creates a pulse. Some of the function modules such as the heat meter have the ability to directly handle these pulses. The control unit calculates at the same time the effective flow rate as number by putting together the received pulses, the quotient and the calculation of a mean. This number is available as information also internally. All functions linked with pulse input decide independently on which pulses or flow rate they want to receive as numerical value.

Menu Inputs

With “TYPE“ *Pulse* and “MEAS.VAR” *Impulse* there is also available a “DIVIDER” at the **inputs 15 and 16**. It indicates how many pulses have to arise at the input, so that a pulse is passed on to the functions. Thus it is possible to realize a slow pulse meter in conjunction with a meter module. (see “Functions”)
That leads to the following indication:

```
TYPE:      IMPULSE
MEAS.VAR:  Impulse

DESIGNATOR
GROUP: General
DES: Flow rt sol

DIVIDER:     10
```

Only each tenth pulse is passed on.

With “TYPE” *pulse* and “MEAS.VAR” *Wind speed* a “QUOTIENT” must also be stated for **inputs 15 and 16**. Here the frequency per one km/h must also be set.
Example: A wind sensor issues one pulse (=1Hz) per second at a wind speed of 20 km/h (= 1Hz). Therefore, the frequency at one km/h is equal to 0.05Hz.

Connection of electronic sensors in version 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**.

Due to the relatively high power requirement, the **"bus load"** must be considered:
The controller UVR 1611 has the maximum bus load, 100%. For example, the electronic sensor FTS4-50**DL** has a bus load of 39%, therefore up to a max. 2 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.
The advantage of this signal transfer lies in the fact that sensor inputs are not necessary, but rather the information (signals) are transferred as a network variable as with the CAN bus (see: MENU network/input variables).

MENU Outputs

The menu *"**Outputs**"* primarily serves for the switching between the automatic and manual mode of the outputs. As in the status line of the outputs (top symbol line on the display) it is not possible to share information concerning the speed stages (if active), this indication was put down in the output menu. The parameterizing of all used outputs is effected by employing the following procedure:
The line "*Outputs*" has already been selected and then pressed the scroll-wheel. Hereby the indication example is as follows:

```
1: Solar pump1
   MAN./ON     PAR?
2: HC pump1
   AUTO/OFF    PAR?
   Speed stage:   0
3: HC mixer1
       AUTO    PAR?
   open:  OFF
4: clse:  OFF
5:    -----
      -----      PAR?
```

Pump solar 1 is switched on in **manual mode.**

Heating circuit pump 1 is switched off in **automatic mode.**

Output A4 together with A3 is configured as a mixer output.
Input 5 has to be set before.

and so on

Hence, the output 1 as solar pump, the output 2 as heating circuit pump and the outputs 3 and 4 as mixer (open/closed) were already determined.
According to the example the outputs 1 and 4 are set to the automatic mode and indicate the current operating state (OFF). If the pointer is placed behind that position, the switching to manual mode on/off is possible (pressing the wheel / selecting the state / pressing the wheel). The current status of the output is immediately shown up in the status line of the outputs. As the speed control function at output 1 is active, the current speed stage is also faded in. This only can be changed in manual mode for experimental purposes.
As seen at the output 5, neither the "Designator" nor the status of the output appears before the parameterizing (similar to the parameterizing of the inputs). Thus, the corresponding symbol would also be missing in the top display line of the output status.
If e.g. the solar pump is to be assigned to the (not yet determined) output 1, the arrow must be induced to the corresponding entrance of the parameterizing level *PAR?* by means of the scroll-wheel. Pressing the wheel causes the entering and the following indication appears:

```
TYPE: unused
```

First, it has to be determined which basic characteristic (TYPE) the output should own. Possible selections:

SWITCH.OUTP = Output only can effect switches (no speed control)
SPEED CTRL = Output is prepared for the speed control

At the outputs 3, 8, 10 and 12 the suggestion MIXER appears instead of the type *SPEED CTRL*, while each first output means "Mixer open" and the next-following (4, 9, 11 and 13) "Mixer closed". In other words, if output 4 is defined as switching output and if output 3 is parameterized afterwards as mixer, output 4 automatically becomes the second mixer output!

Menu Outputs

After selecting the type (such as *SPEED CTRL*, since a solar pump shall run speed-controlled at output 1 later on) all available parameter lines are faded in.

```
OUTPUT STATUS:
TYPE: SPEED CTRL

DESIGNATOR
GROUP: General
DES:       -------

MODE:  Wave packet
DELAY:          0 Sec
RUN-ON:      0 Sec
```

(This line is suppressed in *SWITCH OUTP*)
Rise-delay time
After-running time

In the next step the name (designator) *Solar pump 1* is to be assigned to the output 1. As in the parameterizing of the sensors superset "designator groups" and a sequential index until 9 (e.g. *Solar pump 4*) were specified. Most suggestions like *Solar pump 1* are to be found in *General*. In order to proceed quickly from one designator to the next, the key (x10) must be pressed at the same time.
The waveform can be selected via the parameter "**MODE**" of the speed control. While usual commercial pumps are controlled by wave packets (fast switching on/off of the motor), ventilated motors need a phase control (such as a light dimmer).
NOTICE: The menu allows a choice between wave packet and phase angle however in the standard version the output of waveform "phase angle" is not possible. Special versions on request.
"**DELAY**" permits the setting of an adjustable rise-delay time.
Via "**RUN-ON**" the cutoff-delay time of the output can be determined.

If after the entrance the TYPE *MIXER* has been selected, the following indication appears:

```
OUTPUT STATUS:
TYPE: MIXER

DESIGNATOR
GROUP: General
DES:       -------

RUNTIME:  2.5 min
```

With "**RUN TIME**" the total running time of the mixer motor has to be fixed.
Where there are stability problems in the mixer control circuit, the mixer running time can be increased or reduced to lengthen or shorted the pulses or pauses. This has no influence on the remaining running time, as this is always loaded with 20 minutes upon a direction change or enable.

WARNING:

The factory setting of the total running time of the motor is 0 seconds! Thus the mixer is not controlled. Unfortunately it is not possible for reasons due to the programming technique to preset another value in the factory setting. Therefore this parameter must be entered while setting the mixer output.

The submenu option "**OUTPUT STATUS**" represents a special characteristic. Here a list of all functions and messages (including status) controlling the output is put down. By this it is easier to understand at the system, why a pump is being controlled right now or not. In addition, it is possible to enter the corresponding functions out of the output status in order to check the function status there (see function modules).
If an output is controlled by multiple functions, the output switches ON, if at least one function is active (OR – function)!

The outputs (manual and automatic) are controlled only 30 sec. after the starting up of the control unit.

Particularities of output 14

Output 14 basically serves as a data link (DL-Bus9 but can also be used as a switch output for switching an external relay and can be configured accordingly (*unused / SWITCH.OUTP / DATA LINK*).

Output 14 as data link:

Output 14 serves as a data link (DL bus) for the recording of measured values ("data logging") via C.M.I. or D-LOGG and/or as a bus line for various sensors.

If the control receives data via the network, it is possible to send a second data record with the network input data via DL. In this case the data logger recognises the second data record as a virtual second UVR1611 controller. However this option can only be used if the data logger's second DL input is unused.

```
OUTPUT STATUS:
TYPE:  DATA LINK

DESIGNATOR
GROUP: General
DES: Data link

NETW.INP.=>DL.: no
```

Output 14 as data line / DL-bus

For a “yes” input: Network inputs are output to the DL bus as a second data record

Output 14 as switching output:

When required, output 14 together with an external 12 V / 20 mA relay (laid to ground) can be used as an additional switch output. The relay must be fitted with a suitable free-wheeling diode.
Recording of the measured values with the data logger and capturing sensors via the DL bus link are not possible in this mode.
With device type UVR1611E (special type for control cabinet fitting) output 14 is able to be used **simultaneously** as a switch output and a DL link (DL bus). That is why for this type of device in the setting "**UVR1611E: yes**" the data link can be activated in addition to the switch output. This option may only be activated for type UVR1611E and results in a malfunctioning of the output with other types of devices.

```
OUTPUT STATUS:
TYPE:  SWITCH.OUTP

DESIGNATOR
GROUP: General
DES: HC Pump

DELAY:      0 sec
RUN-ON:     0 sec

UVR1611E: no
NETW.INP.=>DL.: no
```

Output 14 as switch output

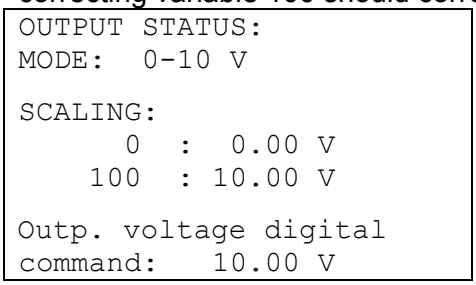
This option may only be activated with type UVR1611E.

Particularities of outputs 15, 16

Output 15, 16 = analogue outputs. These outputs provide a voltage between 0 and 10V for performance control of modern burners (burner modulation). They can be controlled by a PID function module, but also by other functions with an analogue value. The "scaling" offers the possibility of adapting the arithmetic value to the control range of the downstream device.
If several functions act simultaneously on one analogue output, the higher value is output.
By activating the analogue output via a **digital command** (ON), a **dominating** output voltage between 0.00 and 10.00 V can be specified.
Output of the calculated value takes place either as a voltage (0-10 V) or as a PWM signal. In PWM (pulse width modulation), a square wave signal is created with a voltage level of about 10 V and a frequency of 2 kHz with a variable duty cycle (0 - 100%).

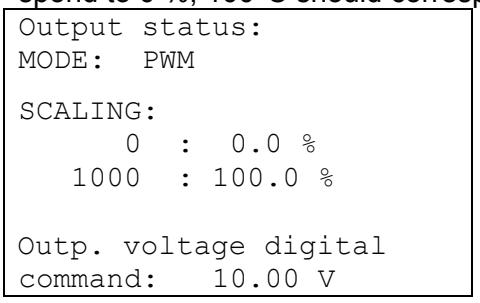
Examples for different scaling:

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



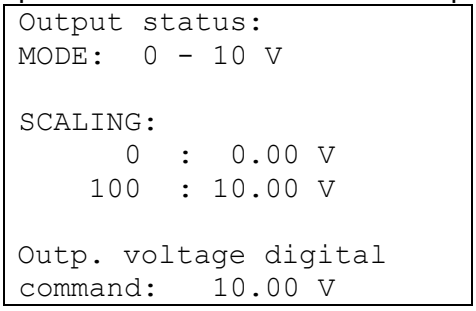
The correcting value is imported without a decimal point

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



The temperature value is imported in 1/10°C **without** a decimal point

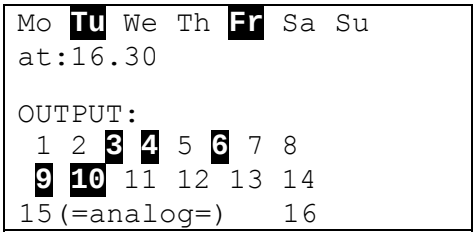
Burner performance, e.g. from the functions DHW demand or maintenance: Mode 0-10V, a burner performance of 0% should correspond to 0 V, 100% should correspond to 10 V:



The percentage value is imported without a decimal point

Anti-Blocking Protection

Circulating pumps, which do not run for longer periods (such as: heating circuit pump during the summer), often have starting problems as a result of inner corrosion. This problem can be easily avoided by activating the pump periodically for 30 seconds.
The menu ***ANTI-BLOCKING PROT*** added after the output 16 permits to indicate the time and the outputs which are to receive this anti-skid control.



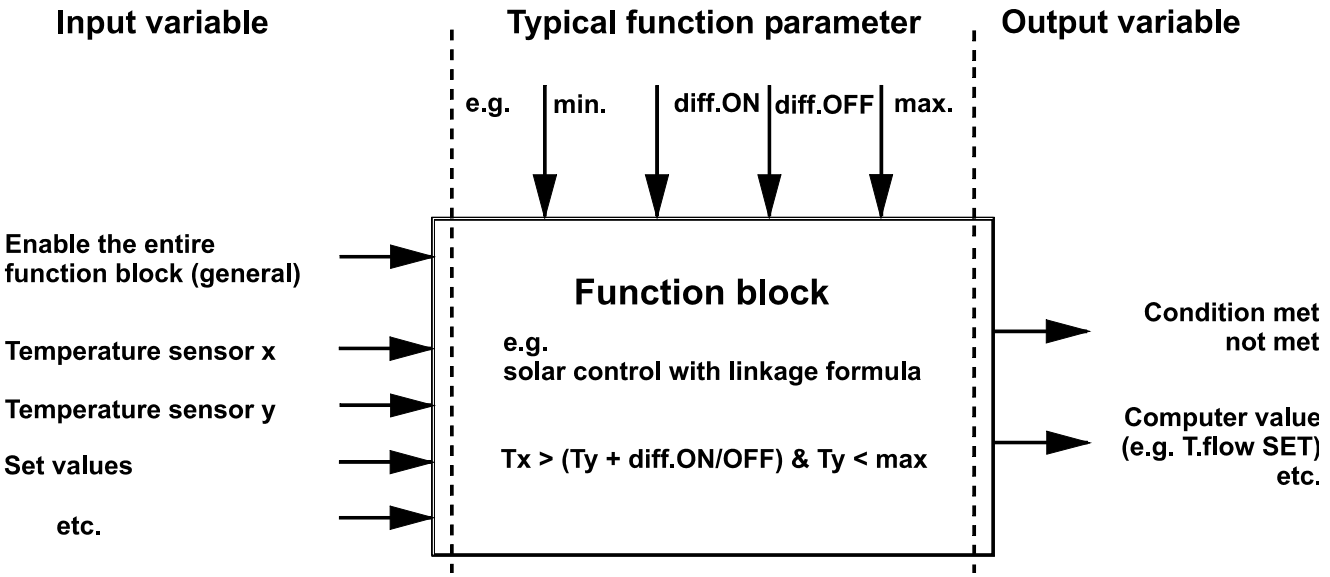
In the example the pumps 3, 4, 6, 9 and 10 are activated for 30 seconds on Tuesday and Friday at 16,30 if the output has not been active since the controller start or the last call of the anti-skid control. However, the computer does not connect all outputs at the same time, but begins with output 3, switches after 30 seconds to output 4 and so on. In order to save energy a switching time is selected when neither the industry nor the typical households are using the mains supply with maximum consumption. In addition, it will be sufficient to set one day per week.

MENU Functions

The basic standards of the function menu

In the menu “Functions“ all linkages concerning the control are to be set and parameterized (therein the control engineering of the entire solar and heating installation is described!). To this end, the unit has a set of function modules which can be registered successively and also several times in the list “Functions”.

Schematic diagram of a function module:



By means of the input variables of the function module the module receives all data necessary for the internal decision. Most of it will be temperature data. In addition, each module has the input variable “*ENABLE*” which means a general permission for processing the task.
Within the function module the decisions and the set values are calculated by means of the data and settings and made available as output variable.
Thus, a function module only can fulfill tasks when connected with the other parts of the system (inputs, outputs, other modules) by its input and output variables.

The following example shows how to set a new function.
Indication example from the menu Functions:

```
5: CHARGING PUMP
   CHRG PUMP1   PAR?
6: NEW FUNCTION
   -----       PAR? ◄
```

The function module already has been assigned to function 5 “Charging pump”.
A new module can be entered.

Employing the following procedure a new function module can be added: Induce the pointer to *PAR?* and press the scroll-wheel. The following text appears in the display:

```
TYPE: HTG CIRC.CTRL
DES.:    -----

Scope of TIME PROG:
Number of prog.:     1
```

At present the computer suggests the module *HTG CIRC.CTRL* as a new function with all its options. Assuming that the module *SOLAR CONTROL* is to be added, press the wheel once again under “TYPE” in order to switch to the selection of a function module. Now, the desired module can be selected by means of the scroll-wheel. By pressing the wheel once again the new module *SOLAR CONTROL* is called.
Indication example:

```
TYPE:  SOLAR CONTROL
DES.:    -----

ADD?              no
```

In the line DES.: a text for the module can be selected (by the usual operation – press / select text / press). Assuming that a solar circuit already exists as function number 1 with the designation ”SOLAR 1” “SOLAR 2” will be selected.
In addition, the question "ADD? *no*” is to be answered with *yes*. The computer has now taken over the module *SOLAR CONTROL* in the list under the number 6 and immediately shows the menu of this function which is now the module solar control SOLAR 2.
Hereby the **indication example** is as follows:

```
DES.:   SOLAR2
FUNCTION STATUS:
INPUT VARIABLE:
OUTPUT VARIABLE:

COLLECTOR TEMP.:
T.coll.ACT:  -----
T.coll.MAX:    130 °C
       .....
```

and so on

Input variables

Input variables serve as link to sensors and also to output variables from other function modules or definable parameters. The collector and the cylinder sensor are the typical input variable of the module *SOLAR CONTROL*. Another typical input variable for the module *HEATING DEM.* is the calculated set temperature of the flow (T.flow SET) of the module *HTG CIRC.CTRL*.
Sometimes also simple parameters can be defined as input variable, when it is reasonable to apply the computation results of a function module (= its output variable) as thermostat threshold in the new block. Like the threshold min of the module *CHARGING PUMP* which is not a function parameter but an input variable.
Each function module has the input variable “Enable …” which represents a general permission of the entire function. This enables a simple interlock and/or enable of the entire module by another one.
Indication example:

```
DES.:   HTG CIRC.2
FUNCTION STATUS:
INPUT VARIABLE:       ◄
OUTPUT VARIABLE:

OPERAT.: TIME/AUTO
```

other text lines by scrolling

Induce the pointer to “INPUT VARIABLE” and press the wheel (in the following designated as “Enter”). Hereby the **indication example** is as follows:

```
HTG CIRC.2

ENABLE HEATING CIRC.:
Source:   User
Status:   ON
```

The line “ENABLE HEATING CIRC.:” represents the general permission of the entire function module. The user has effected the enable (ON) as “(signal) source”.

Instead of ***User*** another source of enable can be selected, such as:

- ***Input*** The must be an input that is set to ***DIGITAL*** during input parameterization.
- ***Output*** In some cases the outputs of the control unit are controlled by multiple modules (such as a common solar pump). Via ***Output*** it is also possible to use a common output as enable control.
- ***NW status*** The enable is effected according to the **status of the network** (See chapter Network/Timeouts). The network status can optionally be selected for individual inputs or for all network inputs together ("network status 33").
- ***Sensor st*** The enable is effected according to the **status of the sensors**. A correctly working sensor has status **OFF** and a defective (circuit interruption or short circuit) **ON**. Thus, for example, failure of the external sensor can be correspondingly reacted to (e.g. for the function "**messages**"). The sensor status can optionally be selected for individual sensors or for all sensors together ("sensor status 17").
- ***Message*** The enable of the function module depends on the status of a ***message***.
- ***Network*** A function module of another device from the CAN network is responsible for the enable of the function *HTG CIRC.2*. (**digital** network input variable).

Any other previously defined function can release the function HTG CIRC.2.

If another function module (also from the network) has been selected as a source, its first output variable (or first network input variable) in the following. **An analogue value** (temperature, computation result) **is not suitable for the enable control**. An enable control only can be a switch, thus a digital value such as the output status of an already registered function module. If a module has several output variables it is possible to choose between these variables.
If the enable is to be made via a digital input, output or another module, it is also possible to select the enable via ***normal*** and/or ***inverse***. Thus, a module also can be enabled by a switch-off status.
Indication example of the input variable “ENABLE PUMP”: of the function module *HTG CIRC.* The heating circuit pump only should run, when the cylinder charging is not active at the moment (cylinder priority) via the function module *CHARGING PUMP*.

```
ENABLE PUMP:
Source:  CHRG PUMP1
1 : Stat.chrg pump
Mode:    invrs.
Status:  ON
```

Enable via the module with that specification
via the output status of the module
via the inverse output status of the module
heating circuit pump is currently enabled

Hence, the enable of the heating circuit pump is controlled by the function module *CHARGING PUMP* with the specification *CHRG PUMP 1*. Since the mode is ***inverse***, the enable is made always when the charging pump is not running. This also happens at the moment, since the status of the enable indicates *ON* (enabled).

By scrolling the next input variables of the module *HTG CIRC.2* appear right after the enables.

```
ROOM TEMPERATURE:
Source:   Input
14 : Temp.room2

FLOW TEMPERATURE:
Source:   Input
11 : THC flow2
    .......
```

etc.

Hence, the module *HTG CIRC.2* needs further input information such as room temperature, flow temperature etc.
Just as the input variable “ENABLE“ also an input of an unit from the CAN-network can be set as source for the temperatures via *network*. By this it is possible to transfer the information of the ambient temperature to multiple control units.

Output variables

They represent the result of a function module. They can be used directly for the switching of hardware output or serve as input variable for another module. If this output variable is to be used directly for the switching of a pump, the assignment can be made in the menu “OUTPUT VARIABLE” of the module. The output variable is always available as input variable for the other modules **with or without** assignment to a real output.
The previous example, the module solar control unit, normally creates an output out of a difference function together with a thermostat function (such as: difference already reached, cylinder temperature limit not yet reached => output variable (= *ON*). This information can now be assigned to a hardware output under ”output variable”.
Indication example (we are already in the menu of the function 6 = SOLAR 1):

```
DES:   SOLAR 1
FUNCTION STATUS:
INPUT VARIABLE:
OUTPUT VARIABLE:      ◄

COLLECTOR TEMP.:
```

Other text lines by scrolling

After entering the menu “OUTPUT VARIABLE” the following menu appears:

```
SOLAR 1

SOLAR CIRC:
Status:   OFF
OUTPUT:
 1 2 3 4 5 6 7 8
 9 10 11 12 13 14
 15 (=analog=) 16
```

The output variable actually shows the status *OFF*, i.e. either the set temperature difference has yet not been reached or the cylinder limit has been exceeded. Now, the variable is to be assigned to the real (hardware) output 1.
To do this, induce the pointer to 1 and make the assignment by the usual operation - / press / darken the 1 / press.
Now, the display shows:

```
SOLAR 1
```

Above the visible range

```
SOLAR CIRC:
Status:   OFF
OUTPUT:
 1◄2 3 4 5 6 7 8
 9 10 11 12 13 14
 15 (=analog=) 16
```

Below the visible range

Hence, the function *SOLAR 1* influences the output 1.

A common pump with valves is often used in solar thermal systems with multiple consumers. Therefore, we assume the following:

Double circuit solar thermal system with common pump and three-way valve
Output 1 = Common pump
Output 3 = Three-way valve

In this example both the output 1 and the output 3 have to be activated in *SOLAR 2* (1 and 3 darkened). Output 1 has already been correctly assigned in the function *SOLAR 1* according to the above example.
Now, the display shows:

```
SOLAR2

SOLAR CIRC:
Status:   OFF
OUTPUT:
 1 2 3◄4 5 6 7 8
9 10 11 12 13 14
15 (=analog=) 16
```

Above the visible range

Below the visible range

Hence, *SOLAR 1* with output 1 (only with pump) would switch the first solar circuit and *SOLAR 2* with output 1 and 3 (pump and valve) the second one.
No matter if all these assignments were made or not, the variable is available for other function modules.
The output variable (switch status pump on/off) from *SOLAR 2* and possibly also from *SOLAR 1* in the example can be assigned as input variable to the module *PID-CONTROL* (speed control). By this the starting of the speed control for the common solar pump can be switched via the input variable “ENABLE”.

The following output variables are available in the heating control unit function:

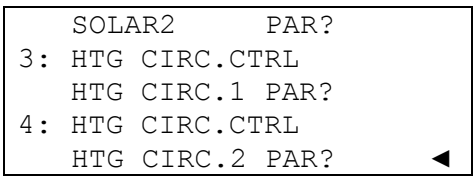
- Set Flow temperature – To further use in the burner demand
- Effective set room temperature – As a set value for the speed control when instead of the mixer the room temperature is only controlled by the module *PID-CONTROL* via the circulating pump.
- Heating circuit pump – Switches the respective hardware output
- Mixer - Assignment to the two hardware outputs *Mixer OPEN / CLOSED*
- Maintenance mode - ON If the maintenance function requires the operation of the heating circuit
- Frost protection mode - ON If the heating circuit runs in frost protection mode

Function parameter

Function parameters are set values which provide the user with the possibility to adapt the ready (i.e. with all preset function modules) control unit to the characteristics of his system.
In the module *SOLAR CONTROL* these are parameters such as switch-on/off difference, maximum limit to the possible sensors. In the module *HEAT.CIRC.CONT* these would be parameters such as heating characteristic, desired room temperature in the heating and lowering mode and others.
In addition, the function parameters of the time windows in some of the modules allow a time-controlled enable and blockage of the module or of parts of the module. There are maximum 5 time programs with each 3 time windows available per function module. Each time program can be assigned separately to undefined days.
As the function parameters are an essential integrated part of a function module, they are explained extensively in the description of the various function modules.

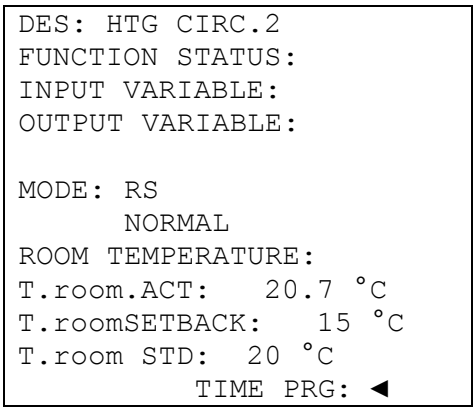
Time programs

They are set up in the same way in almost each function module and thus can be described here in a general way.
Assumption: The module *HTG CIRC.CTRL* has already been defined twice as the function (F3 = HTG CIRC.1, F4 = HTG CIRC.2) with two time programs. We will now define separate time programs for “HTG CIRC.2” on weekdays and the weekend.
In the menu "*FUNCTIONS*" where we are, scroll to the display:



Remaining text from function 2

And after entering into “HTG CIRC.2”:



Other text lines by scrolling

After entering the menu “TIME PRG:” all time programs are listed sequentially with their time windows.
Indication example:

```
Mo Tu We Th Fr Sa Su
05.00 - 07.00  h
12.00 - 22.00  h
00.00 - 00.00  h
```

Time window not used

If the first time program applies to the period from Monday to Friday, these five symbols are darkened after each other. **Indication example**:

```
Mo Tu We Th Fr Sa Su
06.00 - 07.30  h
12.00 - 21.00  h
00.00 - 00.00  h
```

The first time program provides for two heating periods on workdays (Mo-Fr) from 6 a.m. to 07:30 a.m. and then again from 12 noon to 9 p.m.
It is suggested that only one time program be used when the first settings are made for a function module. This can be changed for up to five time programs before the module's entry is injured in the function list by using "add function?" Each module has five entries at the end of the menu to change a number of time windows and programs for a function module already entered.

```
DELETE FUNCTION
CHANGE FUNCTION
INSERT FUNCTION
```

Use “**CHANGE FUNCTION**” to open the following menu for the example above:

```
TYPE: HTG CIRC.CTRL
DES:  HTG CIRC.2

Scope of TIME PROG:
Number of prog.:  1
No. of windows:   3
with set value?   no

CHANGE?          no
```

Here, the number of time programs desired and the number of windows per program can be set again.
The question "with set value? ***no***" means that the same set value for the module is to be used for all time programs (such as desired room temperature during heating periods). The question "with set value? ***yes***" allows you to assign a separate set value to any time window of a time program. In the example used about of *HTG CIRC.CTRL*, it is possible to set a room temperature for each heating period.
As soon as the assignment has been made (such as two programs with three time windows each), the change has to be acknowledged; to do so, scroll to the end of the menu and confirm CHANGE? by pressing *yes*.

Menu Functions

Functions that have already been entered can be deleted at any time. It is recommended that a function be deleted if function data are available from a similar project and the changes that have to be made are minor. To do so, you will find the command "**DELETE FUNCTION**" at the end of the menu in each function module.
The command "**INSERT FUNCTION**" allows you to insert a function module before the one currently selected. This function allows you to add a function module before or after another one in the overview at any time.

Function status

Function modules have a multitude of parameters that influence the output variables accordingly. It is thus not that easy to tell why an output is blocked or cleared any given time. For example, *HEAT.CIRC.CONT* has some 10 function parameters, such as enable, mood, switch-off conditions, that determine whether the heating circuit pump is enabled. The entry "FUNCTION STATUS" at the beginning of every basic menu provides a quick overview of the status.
This submenu lists all of the effective functional elements, with a ✓ to the right indicating that is activated. Each functional element that does not have a check at the end of the line blocks the output variables at that moment.

Indication example:

```
ENABLE HTG CIRC.2      ✓
ENABLE PUMP            ✓
ENABLE MIXER           ✓

HEATING CIRCUIT PUMP:
Status:   OFF
MIXER:
Status:   off
Rem rutime 0.0 Sec

FROST PROT.MODE        ✓

LIMIT T.flowSET :
T.flow: SET < MAX.     ✓
T.flow: SET > MIN.     ✓

SHUTDOWN CONDITIONS:
T.room: ACT < SET
T.flow: SEt > MIN.     ✓
```

The remaining running time of the mixer is reloaded after a direction change or granted enable and always equals 20 minutes independent of the set mixer running time.

In this example, the heating circuit pump is currently blocked (status = OFF) because the specified room temperature has been exceeded (Switching condition *T.room: ACT < SET* is not fulfilled).
In addition to the main functional elements, this submenu also always indicates all of the output variables along with their current output status.

MENU Messages

This module allows messages (error, malfunction, and others) to be triggered by specified events **that last longer than 10 seconds**. Any messages issued are automatically entered in the function overview. In addition, output variables provide switching signals as long as the message is current. A total of eight message lines can be set up, each of which should be understood as an independent module.
As no message lines are preset ex works, "unused PAR?" is displayed on all eight lines when the menu is opened. Open the parameter level to assign variables and set parameters as with all functions. Each message line consists of the following variables:

Input variables:	**Output variables:**
Enable message **Activate message** = Triggering event Delete message = Input to delete the Message	Status message Output (stanard ON) = Single output signal during the message Output (dominant ON) = Overwrites the assignment with an "on" signal Output (dominant OFF) = Overwrites the assignment with an "off" signal Output (Reset fault) = Creates a pulse three seconds long when resetting

Special features:

- Each message line has a deletion input that can be assigned to an acknowledgment key via a **digital input** or that allows for automatic reset with another function. The message can only be deleted by using the scroll wheel with ***User*/OFF**. ***User*/ON** causes the **automatic** deletion of the message, as soon as the cause of the message clears.
- An **acoustic warning signal** can be activated.
- Outputs assigned under the output variables ***Output dominant…*** are set for the output status of the message line regardless of any assignments from other modules or from a current manual mode.
- A separate output variable that generates a pulse lasting three seconds when the message is deleted is available in order to reset external devices (only possible if the message type is "malfunction").
- The line “DELETE MESSAGE” appears in the function overview only if the event is no longer current. If deleted, the message will automatically be removed from the function overview.

Menu Messages

In the **example** below, a compare function as boiler thermostat shall issue the message "excess temperature" to set off an acoustic warning signal when excess temperature is in the boiler (=event), switch on dominantly the heating circuit pump and the cylinder charging pump and switch off the burner demand:

INPUT VARIABLE: OUTPUT VARIABLE:	
MESSAGE TYPE: WARNING	Header selection: MESSAGE, FAULT, WARNING, ERROR A warning is issued
MESSAGE GROUP: Default MESSAGE CAUSE: Excess temp.	What group was the name of the message selected from? General or user-defined (only with TAPPS) What event caused the message to be issued? Excess temperature triggered the message
WARNING TONE yes	As soon as this event occurs, a warning tone is issued

In addition, appears as the message type "FAULT":

Reset fault?	Pass on the scroll wheel to set off a pulse that last three seconds in the output variable "Reset fault"

The respective pump outputs are darkened to show that they are assigned in the output variables under the heading "OUTPUT (dominant ON)." This ensures that the pumps are always reliably switched on when the event occurs. At the same time, assigning this output for the burner demand via "OUTPUT (dominant OFF)" ensures that the burner is switched off in all cases.
In general: If outputs are triggered by means of "dominant" commands (even for other modules that have such options), all control signals from simple assignments are overwritten -- **including manual mode**. If two different dominant signals come into an output at the same time (ON and OFF), the signal "dominant OFF" has priority.
If the event sets off the message as described above, the function overview will begin with:

---------- WARNING TONE OFF: ---------- WARNING Excess tTemp. since: 29,01. at 15:18	
DELETE MESSAGE: ----------	Is not displayed if the event is still current

As soon as the cursor is on "**WARNING TONE OFF**", press the scroll wheel to switch off the acoustic warning signal and delete this line from the display.

Only for the message "**FAULT**": The additional line "reset fault?" sets off a pulse that lasts for three seconds with the scroll wheel in the output variable "Unlock Malfunction" regardless of whether the event to trigger this reaction is still current at this point or not. If this event no longer occurs after the pulse, the entire message is deleted at the same time.

MENU Network

This menu contains all of the information and settings needed to set up a CANopen network.

Entire menu view:

```
Node No.:         1
ENABLE:         ON
Autooperat.:    yes
Status:      operat

OUTPUT VARIABLE:
DIGITAL:
ANALOGUE:
Transmission cond.:

INPUT VARIABLE:
DIGITAL:
ANALG.:
Timeouts:

DATALOGGING

NETWORK NODES:
```

The device has network address 1
Participation in bus communication admissible
Device communicates with other bus participants without master and is active

- **Node No**. - Each device in the network must be allocated its **own** address (node number 1-62)
- **Enable** - Without network release ***ON***, the device cannot send or receive messages; it would thus not be able to take part in communication.
- **Autooperat**. - If the network only consists of devices from the UVR1611- family (UVR1611, CAN monitor, C.M.I., etc.), autooperat. must be set to *yes* (normal case). If there is a master or network manager in the network**,** autooperat. must be set to *no*.
- **Status** – Autooperat. is set to *yes*, the status automatically switches from *init → pre-op(erational) → operat(ional)* after the controller is started according to a preset procedure. Only then is communication possible. If there is a bus master, it will switch the nodes to *operational*.

Output variable

A total of 16 digital and 16 analogue network outputs can be programmed. All of the input and output statuses, output variables for the functions, network status, sensor status, and the status of messages can be used.

```
DIGITAL NETW. OUTPUT
--------------------
OUTPUT  1:
Source: HTG CIRC.1
 2: Pump Status
Status:  ON
Target:        CAN
```

Example: The digital network output 1 has been allocated the status of heating circuit pump 1, the current pump status is "ON"

With input Target "DL" it is possible, to switch specific sensors on or off via the DL bus. More precise instructions are contained in the data sheets for these sensors.

Parameterizing of the analogue output variables takes place in the same way.

Transmission conditions:
This menu determines the conditions for the transmission of output variables.

```
DIGITAL OUTP.:  1..16
with change      yes
Block. time:    10 Sec
Interv tm mtr:   5 Min

ANALG. OUTP.:    1..4
with change    > 30
Block. time:    10 Sec
Interv tm mtr:   5 Min
         …
         …
```

The transmission conditions are divided into five groups:

- digital network outputs 1-16
- analogue network outputs 1-4, 5-8, 9-12, and 13-16

with change yes/no: Transmission of a digital message if status is changed.

with change > 30: If the last analogue value transmitted has been changed by more than 3.0 K, the data are transmitted again (= 30 because numbers are transmitted without a comma).

Block. time 10 sec: If the value is changed within 10 seconds of the last transmission by more than 30 (3,0K), the value is not transmitted anew for another 10 seconds.

Interv tm mtr 5 min.: The value is transmitted every five minutes even if it has not changed by more than 30 (3.0K) since the last transmission.

Input variable

A total of 16 digital and 16 analogue network inputs can be programmed. They are indicated by the **transmission** node number and the number of the network output variable of the **transmission** node.

```
INPUT 1:
NW Node:           2
analg.NW.outp.:    1
Source:          CAN
Value:           234
```

Assumption: The analogue network output 1 on CAN node 2 is assigned to outdoor temperature. Transmission thus does not include the unit or a label. Therefore, the reception node only receives the number 234. Only when linked with a function, such as input variable outdoor temperature in the function module HEATING CIRCUIT is the correct value displayed: 23.4°C.
When the controller is started, the entire analogue network input variables are set to 0 and all of the digital ones to OFF.

Another **example**: input of the volume flow from the electronic volume flow encoder FTS4-50DL via the **data link (DL-Bus)**. Sensor address = 1.

```
INPUT 2:
NW Node:           1
analg.NW.outp.:    1
Source:           DL
Value:           357
```

sensor address
index of the volume flow (see data sheet of respective sensor)

Parameterizing of the digital input variables takes place in the same way.

Timeouts

Timeouts are monitoring functions that can cause reactions in the control strategy, if bus messages are missing (such as a result of a device failure). The timeouts are divided into 8 groups of network inputs:

- Digital network inputs 1-4, 5-8, 9-12 and 13-16
- Analogue network outputs 1-4, 5-8, 9-12, and 13-16

```
DIGITAL INP.:    1...4
Timeout:         60 Min
```

As long as the information is being read from the CAN bus, the **network status** is OFF. If the value has not been updated since the set timeout, the network status changes from ***OFF*** to ***ON***. You can then program the system to react to the failure of a network node or a lack of information. The network status can optionally be selected for individual inputs or for all network inputs together ("network status 33").

Network and network status are also available as sources for input variables in all function modules and messages.

Data logging

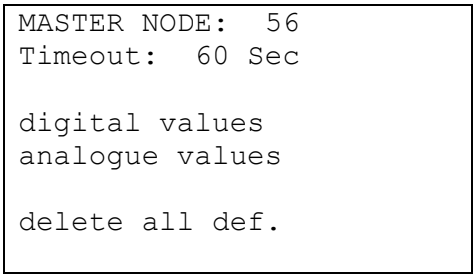
There are 2 data logging possibilities:

Via the data link (DL-bus):
When data logging via the DL-bus, there is a constant data flow from the controller to the C.M.I. or the data converter D-LOGG. The values or states of all inputs, switch outputs and the values of up to two heat meters are specified as a data record. For more information see chapter **Outputs/Special Features of Output 14**.

Via the CAN-bus:
CAN data logging is only possible with the C.M.I.. In contrast to data recording via the DL-bus, the data to be logged via the CAN-bus are freely selectable. Likewise, there is no constant data output. Upon querying of a C.M.I. the controller stores the actual values in a logging buffer and locks this to prevent it from being overwritten (requests received from a second C.M.I.) until the data are read out and the logging buffer has been released again. In the menu **Network/Data Logging** the parameters for data logging are defined via a CAN bus connection.

The essential settings of the C.M.I. for the data logging via CAN bus are described in the online help of the C.M.I..

Menu overview:



WARNING! Settings are immediately deleted without prior security prompt!

Master Node – The controller is allocated a C.M.I. as logging master. The logging command of this master has absolute priority; this means that the logging buffer is **always** updated at the command of the master (even if it was blocked by another C.M.I.) unless the data is being output (sent) to another C.M.I. at that time.

Timeout – The duration of the logging buffer data block has a time limit. Once this time span has expired, the buffer is again released by the controller.

Digital and Analogue Values - Each controller can output a maximum of 26 digital and 32 analogue values using 2 data records that are defined in the menu "**Network/Data Logging**" of the UVR 1611. Each data record comprises 16 analogue and 13 digital values as well as 2 heat meters:

	Digital	Analogue	Heat meter
Data record 1	**1 – 13**	**1 – 16**	**1 – 2**
Data record 2	**14 – 26**	**17 – 32**	**3 – 4**

If, for example, a digital value is to be stored in data record 2, then it must be defined as digital value 14 or higher.

Speed stages of the outputs:

If the speed stages of an output are also to be captured, the digital value must have the same number as the corresponding output, e.g., output 6 must have been allocated digital value 6. If the output is allocated to another digital value, then status output still occurs (ON/OFF), but no speed stage output.

Heat meter:

The output variables of the heat meter function are **automatically bound into data records** according to the sequence in the function list (heat meters 1 and 2 in data record 1, heat meters 3 and 4 in data record 2). The values of the heat meter function cannot be defined as analogue values.

```
   DATALOGGING
-----------------
DIGITAL VALUE 1:
Source:  Output
 1 : Solar pump1
Status:       ON

DIGITAL VALUE 2:
Source:   Output
2 : Solar pump2
Status:       OFF
```

Digital values – in this sub-menu the total 26 digital parameters of the two data records are defined:
Data record 1: digital values 1 - 13
Data record 2: digital values 14 - 26

```
   DATALOGGING
------------------
ANALOGUE VALUE 1:
Source:   Input
 1 : T.collector
Status:    105.6 °C

ANALOGUE VALUE 2:
Source: HTG CIRC.1
 1 : Set flow temp.
Status:     58.2 °C
```

Analogue values – in this sub-menu the total 32 analogue parameters of the two data records are defined:
Data record 1: analogue values 1 - 16
Data record 2: analogue values 17 - 32

Functions of type "Heat meter" cannot be selected as a source. Their parameters are automatically bound into the two data records.

Delete All Def. – is only displayed at expert level. All settings (definitions) in data logging can be deleted by pressing the scroll wheel once. All logging values are in this respect set to *Source: User <unused>*.

CAUTION! Settings are immediately deleted without prior security prompt.

Important instruction re CAN data logging: One controller (version > E3.18) or the C.M.I. must be assigned node number 1 in the CAN network, so that the time stamp of this controller can be accepted by other devices.

Network nodes

```
active NODES:
 1 info?
32 info?        ◄
50 info?
```

All network nodes in the network, with which the controller is linked, are listed here. This means that I/O modules and bus converters can be set from the controller. For CAN monitors, the room temperature (and room humidity for respective version) is displayed.
Setting CAN monitors and accessing other controllers is not possible.

Example CAN-I/O module, node 32:

```
  INFO CAN-NODE 32
Vend.ID: 00 00 00 CB
Pr.Code: 02 00 02 04
Rev.Nr.: 00 01 00 00
Des.:     CAN-I/O 44
Load menu page       ◄
```

- selected node number

Vend.ID: Manufacturer identification number (CB for Technische Alternative GmbH)

Pr.Code: Product code of the selected node (here for a CAN-I/O module)

Rev.Nr.: Revision number

Des.: Node product description

These data are fixed values specified by Technische Alternative GmbH and cannot be changed.

```
        MENU
Version
Function Overview
Inputs
Switching outputs
Analog outputs
Functions
Network
Data Administration
```

Load menu page: This is used to access the menu level of the selected network node. The controller now serves as a display for this device.

MENU Data administration

In this menu the commands concerning the administration and protection of the function data as well as the update of the operating system are listed. The menu items for data transfer are valid only for Bootloader BL-NET. Data transfer via C.M.I. is described in the online manual of the C.M.I.

```
current func. data:
TA FACTORY SETTINGS
Status: original

Save settings as
factory settings
Load factory setting

Create backup copy
Load backup copy

Delete functions
Execute total reset

DATA <=> BOOTLOADER:
Upload data:
CTRLLR => BOOTLD.
Download data:
BOOTLD. => VTRLLR

OPER.SYSTEM<=BOOTLD.:
Download oper.system :
BOOTLD. => CTRLLR
```

Name of the current function data (TAPPS)
if function data have already been changed: modified

(Only appears if a backup copy exists!)

Data administration is valid only for Bootloader BL-NET.

Internal Data administration

Current function data:
TA FACTORY SETTING – The function data with this specification have been transferred to the control unit. **The TA factory setting can be loaded by simultaneously pressing the two input keys and scroll wheel when starting up the controller.**

Status: original – Since transmission, nothing has been changed in the function data.

Save settings as factory setting – The function data of two heating circuits including solar and charging pump system are put down in the unit as factory setting. If proprietary programming has been tested, it uses this command to replace the original setting as a factory setting.

Load factory settings - Call via the following commands in a security query YES / NO. **WARNING:** By this, the own function data will be deleted and replaced by the factory setting (ex works or an own one previously created). Nevertheless, a previously created backup copy (see following commands) is maintained.

Menu Data administration

Create backup copy – The function data can be saved in a backup copy. By this, it is possible to change the program or the parameters without losing the existing function data. If a backup copy has been created, than appears as a further menu option:

Load backup copy – The backup copy is loaded back instead of the current function data and thus overwrites all previous settings and programs – except the factory setting.

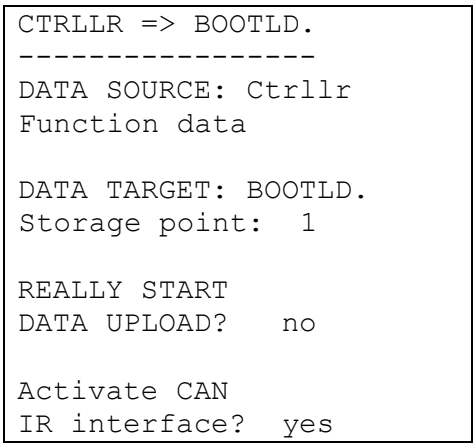
Delete functions – In order to start a new programming all function modules from the function list are deleted.

Execute total reset – This calling causes a complete loss of all entries (function data) except the data record of the factory setting and the backup copy. Besides the function modules it also clears the parameterizing of all in- and outputs.

Data exchange with the PC and/or Bootloader

DATA <=> BOOTLOADER:

Upload data – All function data are transferred via the CAN- Bus or the infrared interface to the Bootloader for the data protection in the PC. Choosing this command leads to the following indication:



Transfer of function data or backup copy

One of 7 storage locations of the Bootloader is assigned.

Starting the upload by ***yes***
and pressing the start key of the Bootloader

Transfer is possible via cable as well as via IR

Notice: Depending on its operating system (update via internet is possible) and starting from boot sector version B1.01 the control unit has up to seven storage locations for function data.

DATA <=> BOOTLOADER:

Download data – By means of the Bootloader the protected function data in the PC are transmitted into the control unit via the CAN Bus or the infrared interface and thus the current programming is overwritten. The call contains similar commands as the upload; however it is possible to choose between several "**data targets**".

BOOTLD. => CTRLLR ---------------- DATA SOURCE: BOOTLD. Storage point: 1	Data are coming from storage location 1 of the Bootloader (from 7 possible storage points)
DATA TARGET: Ctrllr Function data overwrite ? yes	The function data are loaded into the main store
Factory settings overwrite ? no	The function data are not loaded into the factory settings
!!! CAUTION !!! ALL METER READINGS WILL BE LOST!	
REALLY START DATA DOWNLOAD? no	Starting the download by ***yes*** **and** pressing the start key of the Bootloader
Activate CAN IR interface? yes	Transfer is possible via cable as well as via IR

OPER. SYSTEM <= BOOTLD.:

Download Operating System: By its flash technology the unit offers the possibility to replace the own operating system (unit software) by a more current version (purchase from the download area of the address http://www.ta.co.at) by means of the Bootloader.
The application of a new operating system is only advisable, if it contains new **necessary** functions. An update of an operating system always represents a risk (comparable with the flashing of the PC Bios) and requires an examination of all function data as compatibility problems due to new function parts are to be expected!

Since the update of the operating system takes its time, it is advisable to carry out an update of the operating system **ONLY** via the cable wiring! After a missed update via IR the updating is permitted only via the cable wiring.

BOOTLD. => CTRLLR ---------------- **REALLY START OPERAT** **SYSTEM DOWNL.?** no	Start the download by pressing ***yes*** **and** pressing the start key of the Bootloader
RECOMMENDATION: CABLE TIE	
Activate CAN IR interface? yes	Transfer via IR is possible but is not recommended

Installation instructions

Sensor installation

The sensors must be arranged and installed properly for the system to function correctly. To this end, make sure also that they are completely inserted in the immersion sleeves. The threaded cable connections provided serve as a strain relief. The clip-on sensors must be insulated to protect them from being influenced by the ambient temperature. Water must be kept out of the immersion sleeves when used outdoors (**damage from freezing**).
In general, the sensors may not be exposed to moisture (such as condensation water), which might enter the cast resin and damage the sensor. If this happens, heating the sensor to 90°C for an hour might help. When using immersion sleeves in NIRO cylinders (inoxydable) or pools, pay attention to their **non-corrosion properties**.

Collector sensor (red or grey cable with connection box): Insert either in the tube directly soldered or riveted to the absorber and sticking out of the collector's frame or set a t-shaped connector on the outer collector's flow collector tube. Screw an immersion sleeve with an MS (brass) threaded cable connection (= to protect from moisture) into the t-shaped connector and insert the sensor. To protect from lightening, the connection box has an overvoltage protection which is fixed in a parallel way between the sensor and the expansion cable.

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 flow.

Cylinder sensor: The sensor that the solar power system needs should be used with an immersion sleeve for fin coil heat exchangers just above the exchanger or, if integrated bare-tube heat exchangers are used, on the lower third of the exchanger or the exchanger's return line so that the immersion sleeve is inside the exchanger's tube. The sensor that monitors the heating of the cylinder from the boiler is installed at the level of the desired amount of warm water during the heating season. The plastic threaded cable connections provided can be used to provide strain relief. It should not be installed below the respective register or heat exchanger in any case.

Buffer sensor: The sensor that the solar power system needs is installed on the bottom of the cylinder just below the solar heat exchanger using the immersion sleeve provided. The plastic threaded cable connections provided can be used to provide strain relief. It is recommended that the sensor between the middle and the upper third of the buffer cylinder be used together with the immersion sleeve as a reference sensor for the heater's hydraulics or - flush with the cylinder's wall – inserted under the insulation.

Pool sensor (swimming pool): Put a T-shaped connector on the suction line immediately on the line leading from the pool and screw the sensor in with an immersion sleeve. In the process, make sure that the material used is non-corroding. Another option is to put the sensor on the same spot using hose clamps or adhesive tape and to provide thermal insulation for ambient influences.

Clip-on sensor: Use pipe clamps, hose clamps, and the like must be attached to the respective line. Make sure the material used is adequate (corrosion, temperature resistance, etc.). Then, the sensor has to be well insulated so that the tube temperature is measured exactly and the ambient temperature does not influence the measurement.

DHW sensor: When the control system is used in DHW systems with an external heat exchanger and speed-controlled pump, changes in the amount of water have to be **reacted to quickly**. Hence, the DHW sensor has to be put directly on the heat exchanger's outlet. A T-shaped connector should be used to insert the ultrafast sensor (special accessory) in the outlet using an O-ring. The heat exchanger has to be installed upright with the warm water outlet on top.

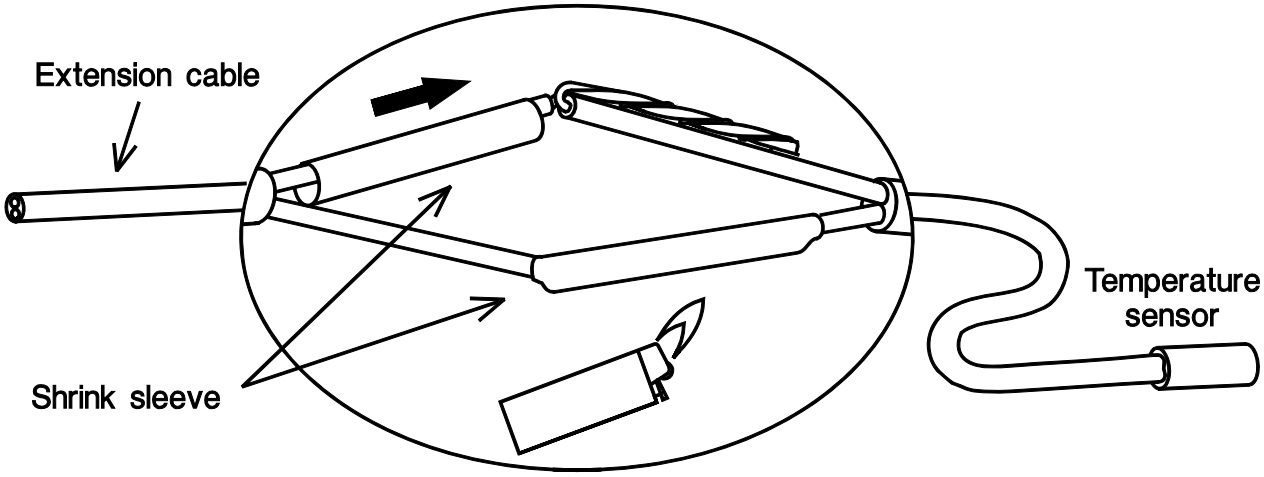
Radiation sensor: To get a measurement according to the collector's position, it should be parallel to the collector. It should thus be screwed onto the metal sheet or next to the collector along an expansion of the assembly rail. To this end, the sensor case has a blind hole that can be opened at any time. The sensor is also available as a wireless sensor.

Room sensor: This sensor is intended for installation in the living room (as a reference room). The room sensor should not be installed near a source of heat or near a window. The sensor is also available as a wireless sensor.

Outdoor temperature sensor: This sensor is installed on the coldest wall side (usually the north) some two meters above ground. Avoid temperature influences from nearby air shafts, open windows, etc.

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. If screened cables are used, the screen must be connected to the sensor earth (GND).

Installing the device

The controller can be used as a surface mounted device or as an integrated device:

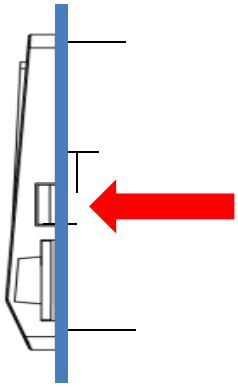
- **Surface mounted controller with mounting base UVR 1611K-N**

  Fix the mounting base to the wall at eye level height (**approximately 1.6 m**) using the fixing materials supplied. Cable entries for the 230 V supply and connection lines are at the bottom; for the LV leads they are at the top.

- **Installation with terminal mounting plate UVR1611S-N**

  This installation method is intended for mounting inside a distribution board.

  The terminal mounting plate can be mounted either by means of four fixing points **or** on a top-hat rail (support rail TS35 to standard EN 50022).

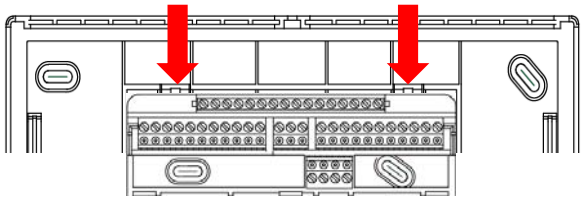


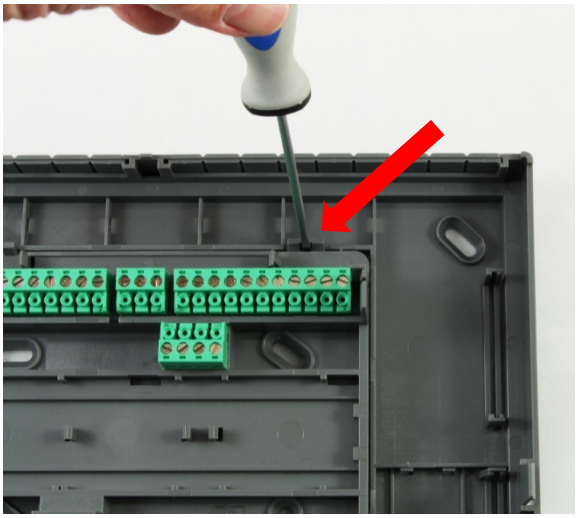
The two lateral locking clamps also enable the controller to be clicked into a **sheet steel front plate**.

Conversion of the version with mounting base to an integrated version

The terminal mounting plate is secured in the lower section of the mounting base.

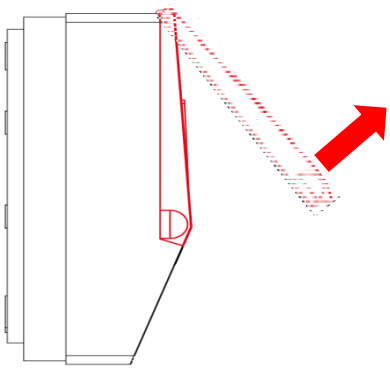
It is removed from the mounting base by undoing both locking clamps using a screwdriver.





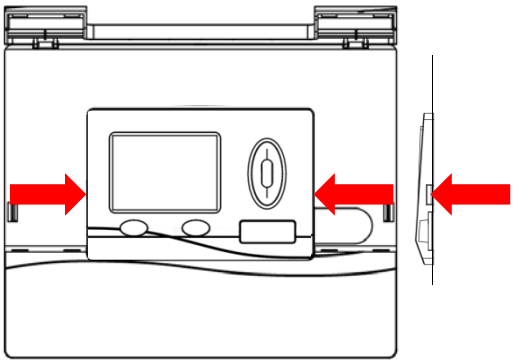
Opening the mounting base

CAUTION Always disconnect the mains plug before opening the mounting base.

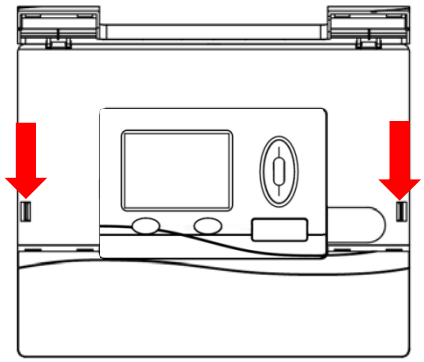


1. Open the top flap.

View with open cover



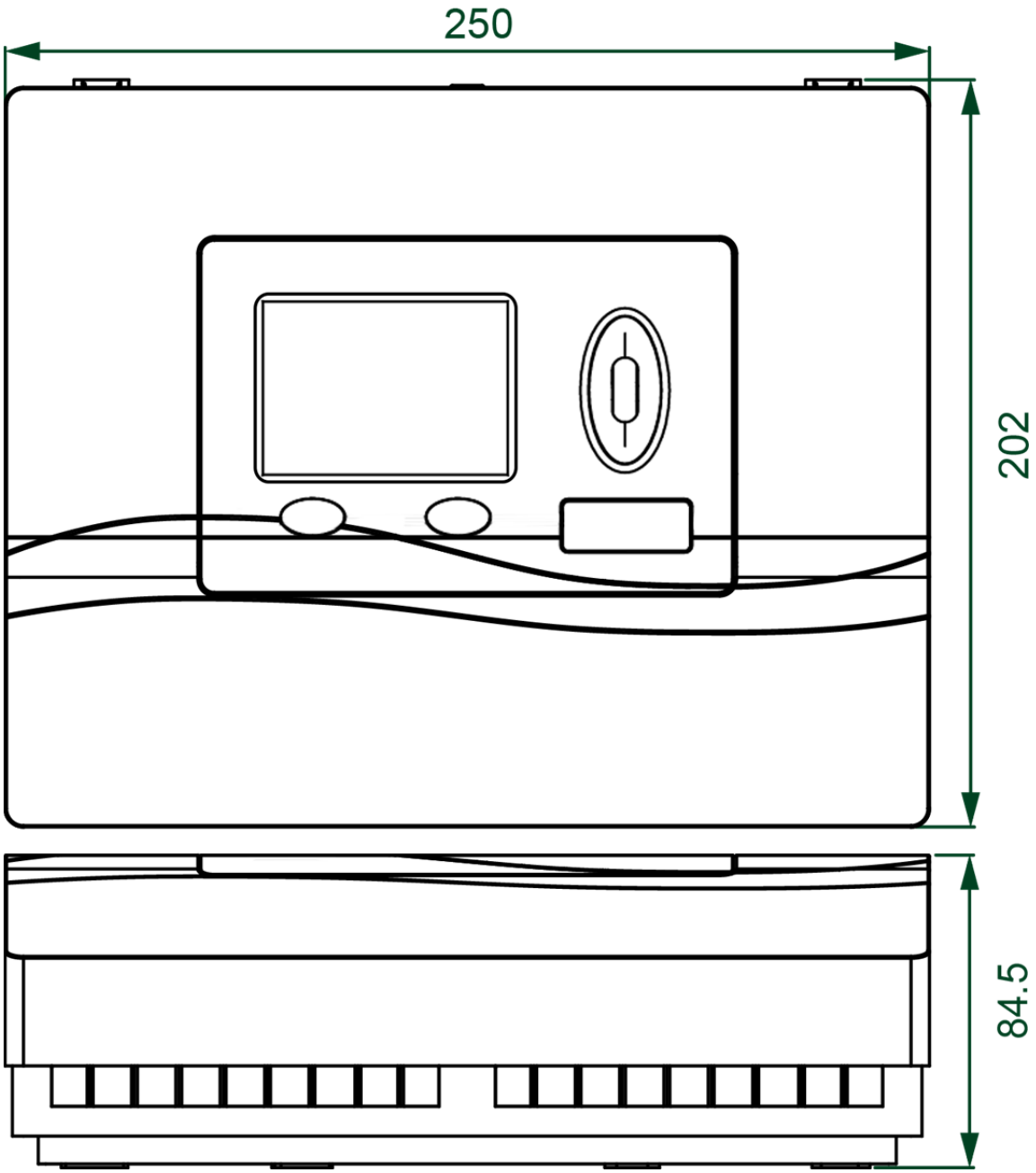
2. With two large screwdrivers, push both locking clamps (arrows in the diagram on the left) and lever the device out of the mounting base.



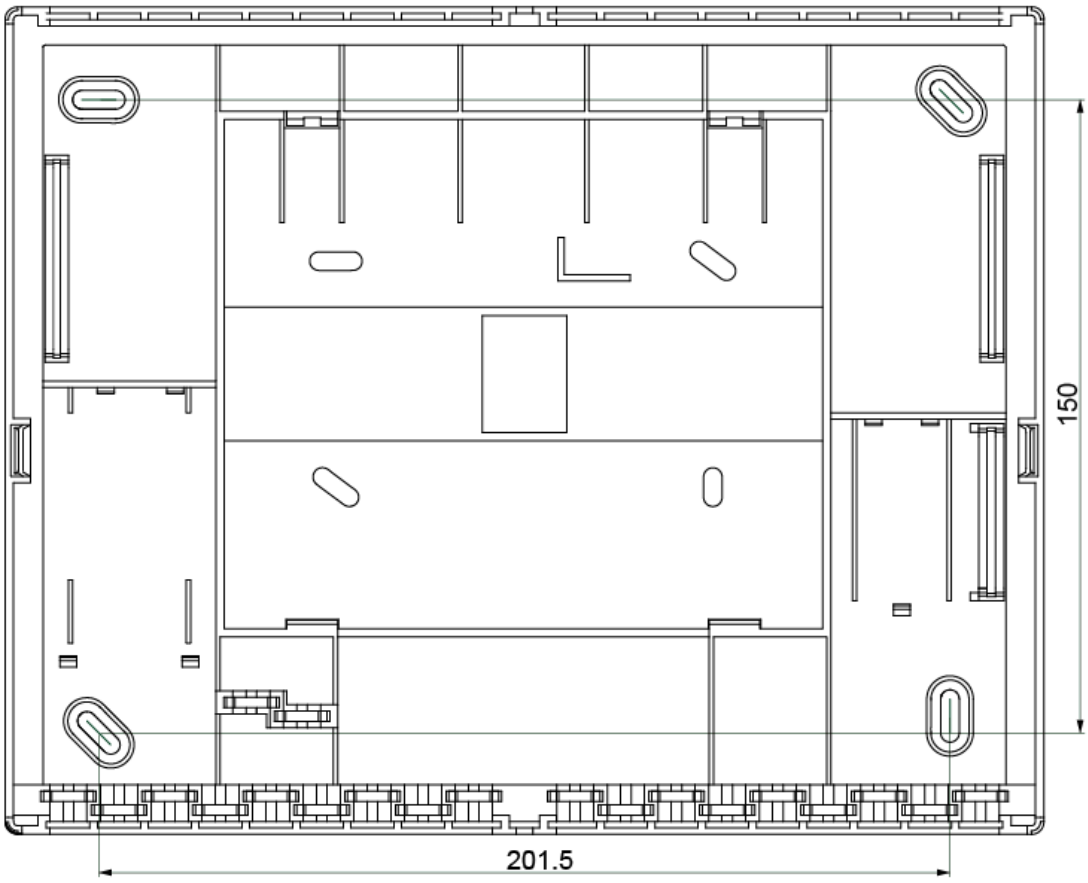
3. After removing the controller, unhook the closures (arrows in the diagram on the left) by pushing them down (using a small screwdriver) and remove the mounting base cover from the lower section.

Dimensioned drawings

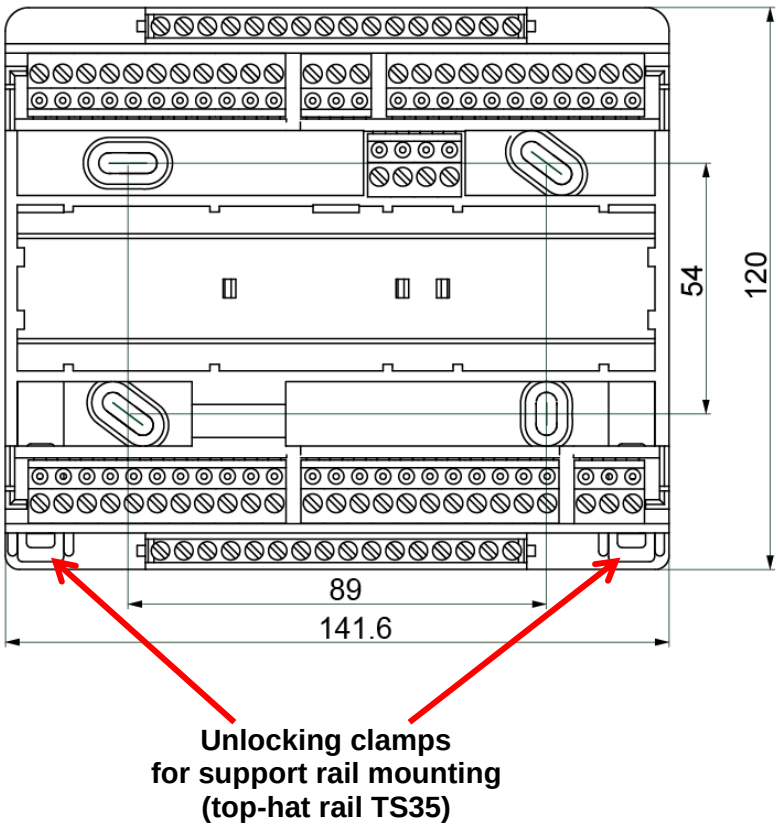
External dimensions, mounting base



Dimensions, mounting base fixings

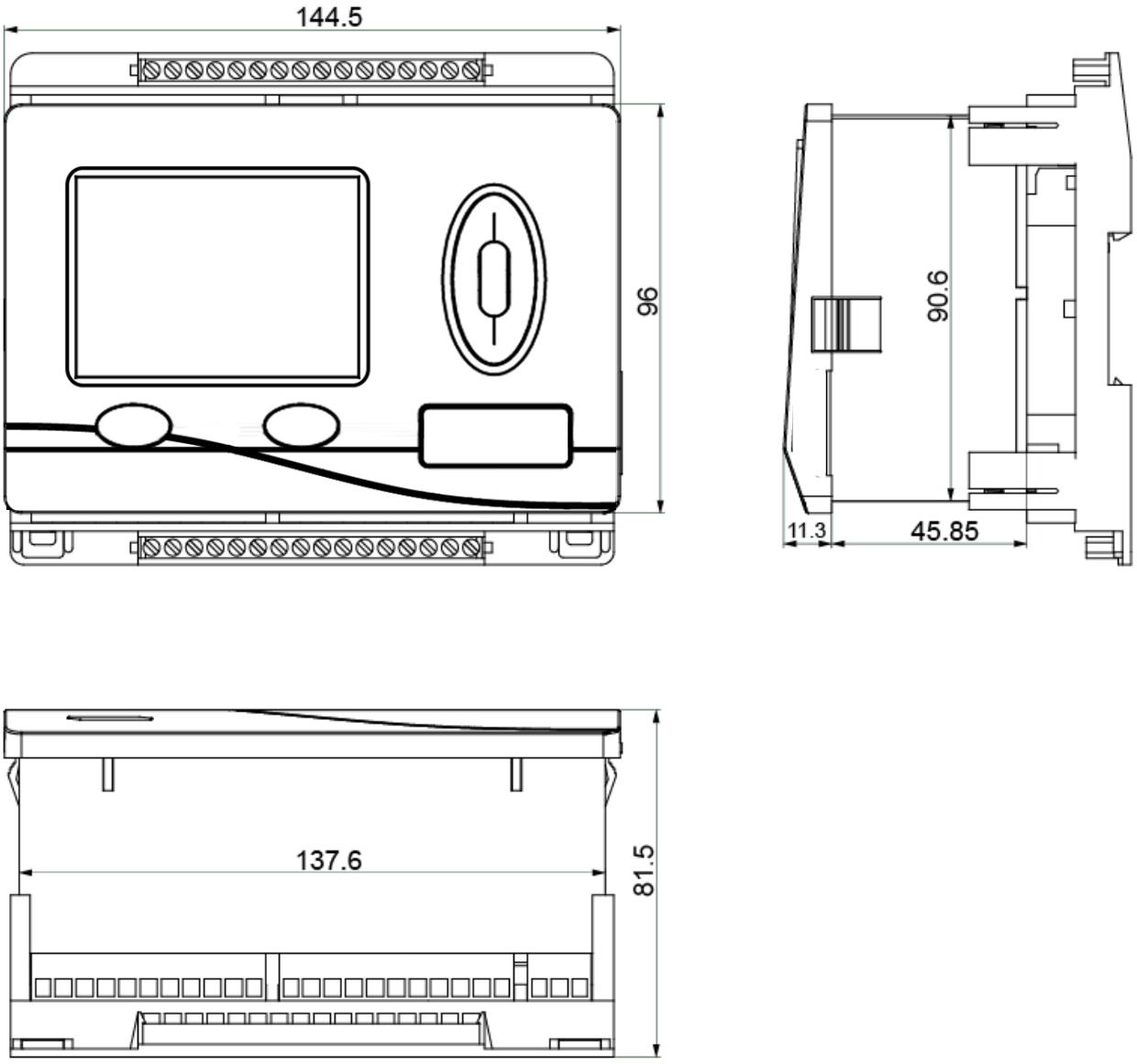


Dimensions, terminal mounting plate



Unlocking clamps
for support rail mounting
(top-hat rail TS35)

Dimensions, controller with terminal mounting plate (=UVR1611S-N)

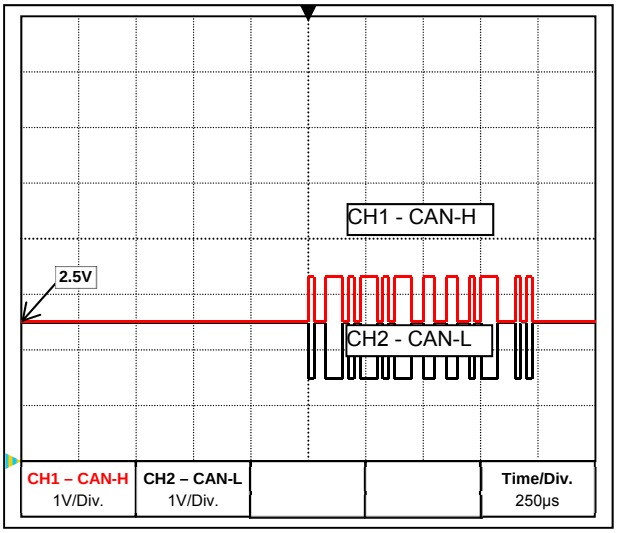


Cut-out dimensions for controller **UVR1611S-N**: 138 x 91 mm, installed depth including terminal mounting plate: 70 mm

CAN BUS network

Guidelines for the topology of a CAN network

Technical principles



CAN-H and CAN-L data signals

The CAN BUS comprises the cables CAN-High, CAN-Low, GND and one +12 V supply cable for BUS components without their own power supply. The combined total load of all devices with 12 V and 24 V supply must not exceed 6 W.

Design CAN networks in a linear fashion and set a terminator at each network termination. This is ensured by the termination of the end devices.

In the case of larger networks (covering several buildings), problems can occur through electromagnetic interference and potential differences.
To avoid or to the greatest extent manage such problems, take the following measures:

- **Cable screening**
  The BUS cable screen must be connected well at every node to provide continuity. For larger networks we recommend including the screen in the equipotential bonding, in line with the examples shown.

- **Equipotential bonding**
  As low an ohm connection as possible to the earth potential is particularly important. Where cables enter buildings, ensure that the cable entries are in the same location where possible and that all are connected to the same equipotential bonding system ($S_{ingle}E_{entry}P_{oint}$ principle). The purpose is to create potentials that are as similar as possible, in order to achieve the smallest possible potential difference to adjacent lines in case one line suffers a voltage surge (lightning strike). Also ensure a corresponding clearance between the cable and lightning protection systems.
  The equipotential bonding also has positive properties to counteract interferences emitted from linked cables.

- **Avoiding earth loops**
  Where a BUS cable is routed between several buildings, ensure that earth loops are avoided. The reason for this is that buildings actually have different potentials compared to the earth potential. An earth loop is created when connecting one cable screen in each building **directly** with the equipotential bonding system. In other words, a current flows from the higher to the lower potential.
  For example, if lightning strikes near one of the buildings, the potential of that building will briefly be raised by several kV.
  In this case, the equalising current flows to earth via the BUS screen and causes an extreme electromagnetic input which can result in the destruction of the BUS components.

Lighting protection

Efficient lighting protection is highly dependent on good building earthing that meets the relevant regulations.
An external lightning protection system offers protection against a **direct** lightning strike.
In order to protect against voltage surges in the 230 V mains supply cable (**indirect** lightning strike), appropriate lightning conductors and surge arresters compliant with local regulations must be fitted in the upstream distribution systems.
In order to protect the individual components of a CAN network against **indirect** lightning strike, we recommend the use of surge arresters specifically developed for BUS systems.

Examples: CAN bus surge arresters CAN-UES from Technische Alternative
Gas discharge arrester for indirect earthing EPCOS N81-A90X

Examples of different network versions

Key to symbols:

… device with its own power supply (UVR16x2, UVR1611K, UVR1611S, UVR1611E)

… device is supplied by the BUS (CAN I/O, CAN-MT, …)

… CAN BUS converter (CAN-BC/C)

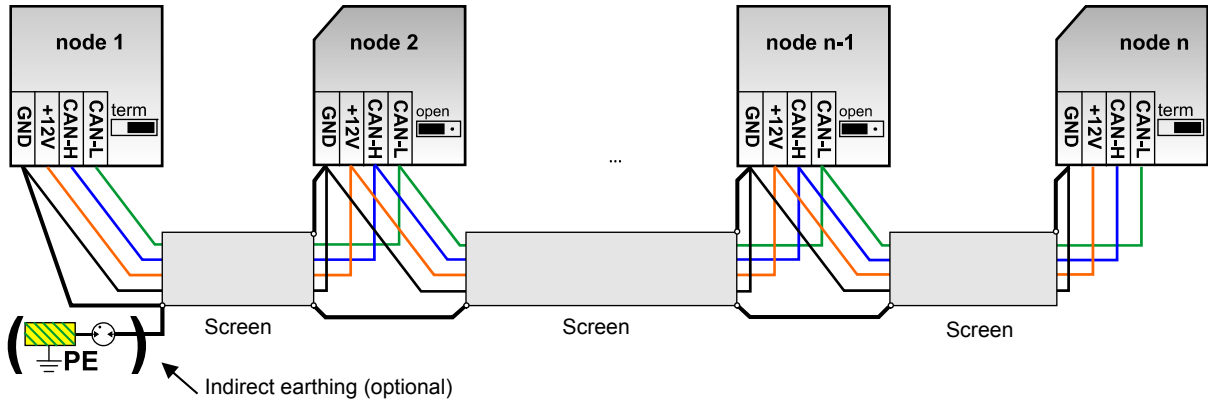
term … terminated (end devices)

open … open termination

… CAN BUS surge arrester

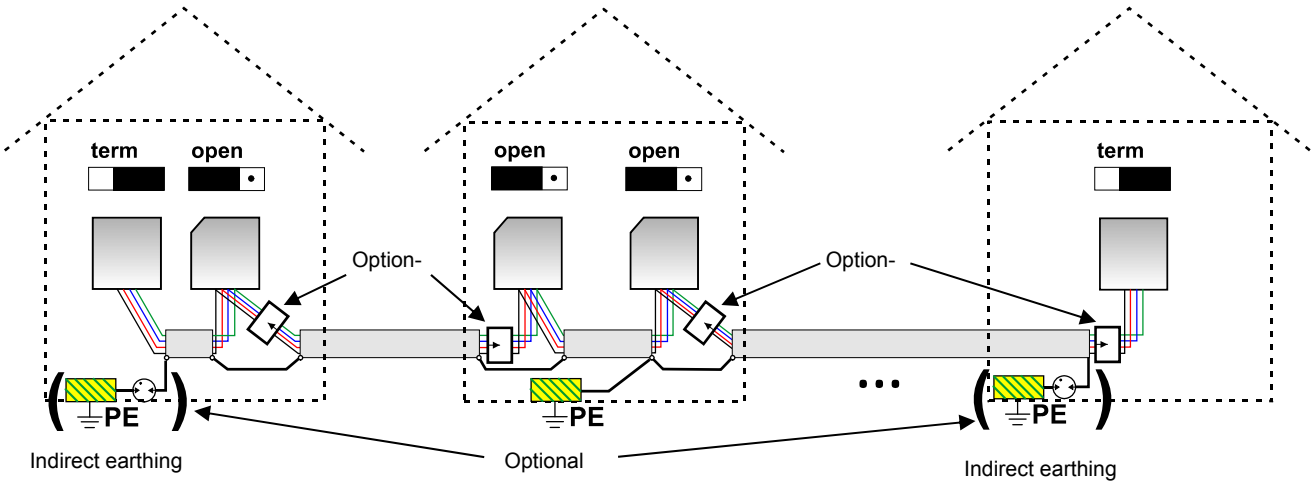
.. gas discharge arrester for indirect earthing

"Small" network (within one building):



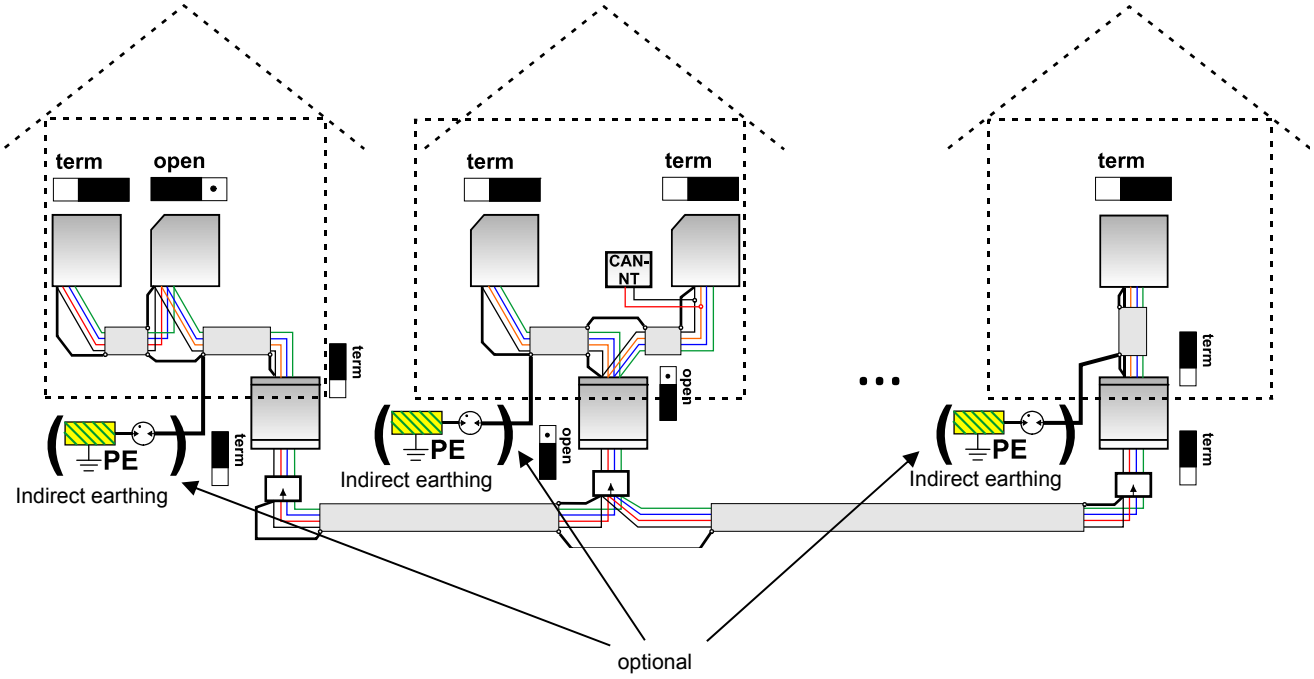
Max. cable length: 1000 m at 50 kbit/s
The screen must be continued at each network node and be connected to the device earth (GND).
The screen earthing or GND must only be implemented **indirectly** via a gas discharge arrester.
Ensure that no unintentional **direct** connection of earth or screen and the earth potential is created (e.g. via sensors and the earthed pipework).

Network (across several buildings) without CAN bus converter CAN-BC/C:



Max. cable length: 1000 m at 50 kbit/s
The screen must be continued at every network node and earthed at a **single** point, as close to the cable centre as possible. We recommend earthing the screen **indirectly** in the other buildings using a gas discharge arrester. The screen is **not** connected with the earth (GND) of the devices.

Network (across several buildings) with CAN BUS converter CAN-BC/C:



Maximum cable length: subject to the set Baud rate CAN-BC/C
The screen of the **disconnected** network is connected at each BUS converter to CAN BUS earth (GND). This screen must **not** be **directly** earthed.
Without CAN BUS surge arresters, this version only protects against potential differences **up to 1 kV**, therefore cannot be considered as lightning protection. In this case, the cable screen must be earthed at a **single** point between the CAN bus converters, as close to the cable centre as possible. We recommend earthing the screen **indirectly** in the other buildings using a gas discharge arrester.

A CAN bus converter is similar to a repeater. It receives CAN bus signals and passes them on. Each cable run on either side of the CAN bus converter must therefore be viewed as an independent CAN bus network.

Cable selection and network topology

Screened **twisted pairs** have proven useful in CANopen networks. These are cables with twisted pairs of conductors and a shared external screen. Such cables are relatively resistant to EMC interference and can still carry 50 kbit/s for up to 1000 m. The CANopen recommendations (CiA DR 303-1) for cable cross-sections are given in the table below.

BUS length [m]	Resistance in terms of length [mΩ/m]	Cross-section [mm²]
0…40	70	0.25…0.34
40…300	< 60	0.34…0.60
300…600	< 40	0.50…0.60
600…1000	< 26	0.75…0.80

The maximum cable length also depends on the number of nodes [n] linked with the BUS cable and the cable cross-section [mm²].

Cable cross-section [mm²]	Maximum length [m]	
	n=32	n=63
0.25	200	170
0.50	360	310
0.75	550	470

Recommendations

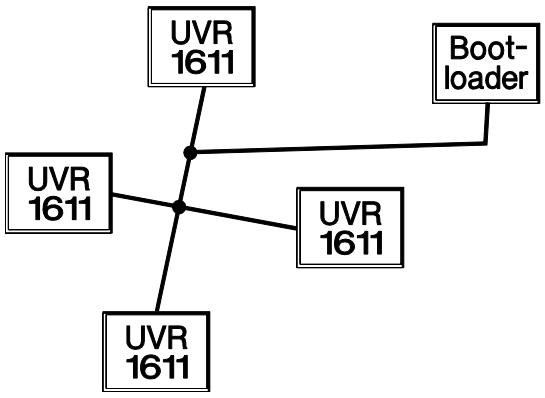
A 2x2-pole, screened twisted pair (twist CAN-L with CAN-H or +12 V with GND) with a cable cross-section of at least 0.5 mm² and a conductor-to-conductor capacity of no more than 60 pF/m and a nominal impedance of 120 ohms. The standard BUS speed of the UVR16x2 is 50 kbit/s. This recommendation corresponds, for example, to cable type **Unitronic®-BUS CAN 2x2x0.5** supplied by **Lapp Kabel** for permanent installation **in buildings or conduits.** Theoretically this would enable a BUS length of approx. 500 m to guarantee reliable transmission.

For **direct** routing **underground**, earth cable **2x2x0.5** mm² supplied by **HELUKABEL**, part no. 804269, or earth cable **2x2x0.75** mm² supplied by **Faber Kabel**, part no. 101465, would be suitable.

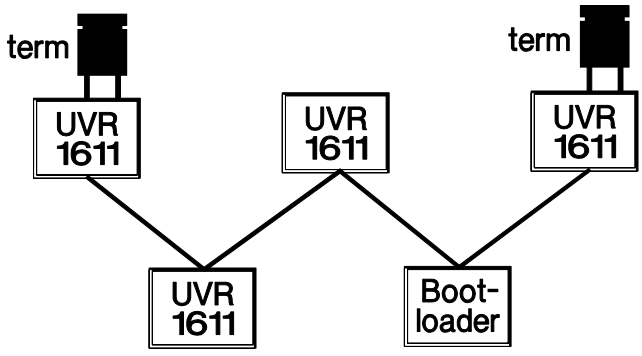
Wiring

A CAN BUS network should never have a **star topology**. Rather, the correct topology is a line from the first device (with terminator) to the second, third and so forth. The last bus device has the termination jumper again.

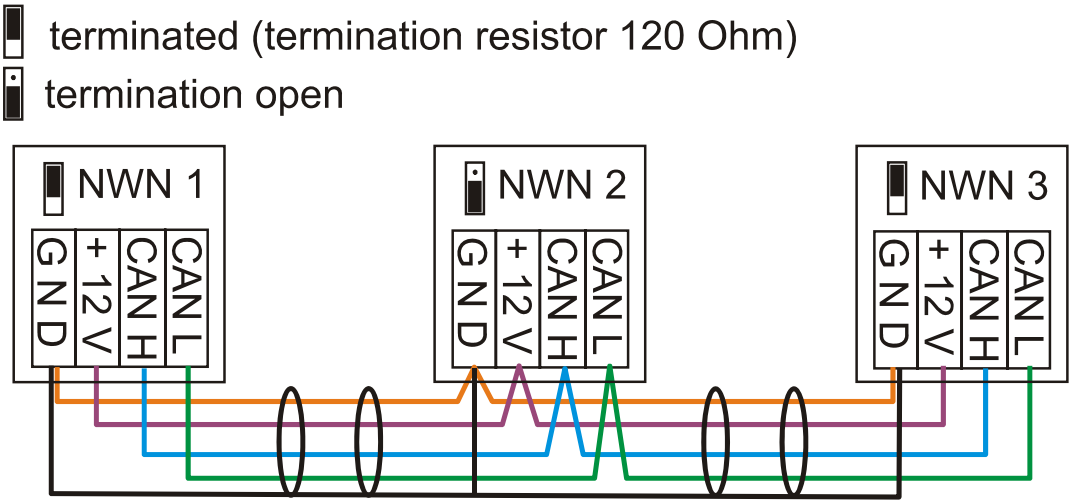
INCORRECT



CORRECT



Example: Connection of three network nodes (NK) with a 2x2-pole cable and **termination** of the terminal network nodes (network inside one building)

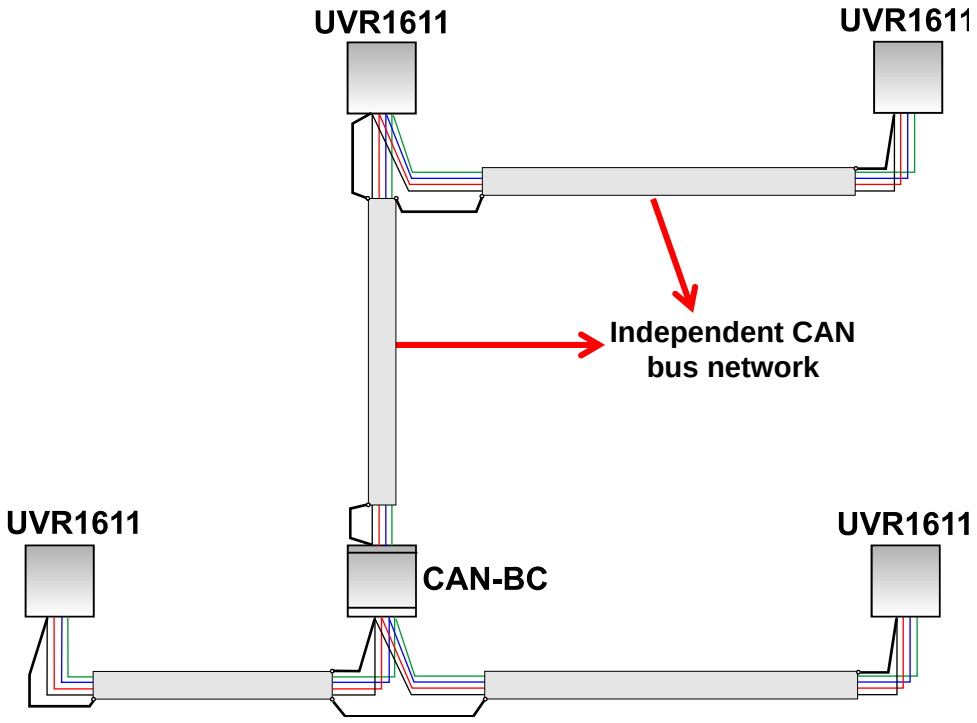


Each CAN network is to be provided with a 120 ohm BUS terminator at the first and last network subscriber (= **termination**). This is achieved with a plug-in jumper **at the back of the controller**. Each CAN network therefore always has two terminators (one at each end). Branch cables or a star topology are not permissible for CAN wiring.

As you can see from the tables, reliable transmission depends on a number of factors (cable type, cross-section, length, number of nodes, etc.). All of this information can be considered relatively conservative so that no problem should occur if you are prudent when dimensioning.

Branch cables

A CAN bus converter is used to provide reliable **long** branch cables. This means the branch cable is disconnected from the other CAN bus network and can be viewed as an independent CAN bus network.



Electrical connection

Trials at the factory have shown the following:

1) Branches with a star topology of up to 10 m will not impede transmission.

2) Up to a bus length of 250 m and a transfer rate of 50 kbit/s, data transfer works perfectly with a low number of CAN nodes and an inexpensive **J-Y(St)Y EIB KNX 2x2x0.8** KNX bus cable with a characteristic impedance of 75 to 90 ohm.

3) Up to a bus length of 150 m and with only a few nodes, the **CAT 5 24AWG** cable (typical Ethernet cable in PC networks) can be used.

Changing to cable types with different characteristic impedances is only permitted via signal separation through a CAN bus converter.

However, such networks do not comply with the recommended specification. Technische Alternative RT GmbH therefore cannot guarantee trouble-free operation if one of the three options listed above is applied.

Data link (DL bus)

Any cable with a cross section of 0.75 mm² can be used for the **data link** having a max. length of 30 m. For longer cables, we recommend the use of shielded cable. Cable channels for power and data lines may cause a disturbance in the data lines if they lie too close to each other over long stretches. Therefore a minimum distance of 20 cm between the two cable ducts or the use of shielded cabling is recommended. Where the processing of two control inputs by the data converter are concerned separate screened cables must be used. If screened cables are used, the screen must be connected to the GND. Equally the DL must never be put through the same cable with the CAN.

Equally the DL bus must never be routed in the same cable as the CAN bus.

The data line is connected to clamp DL (A14) and sensor earth.

Electrical connection

It should only be made by a professional electrician in accordance with the relevant local guidelines. The sensor lines must not be laid in the same cable as the supply voltage (standard, regulations). In a jointly used cable channel, appropriate shielding and separation have to be provided.

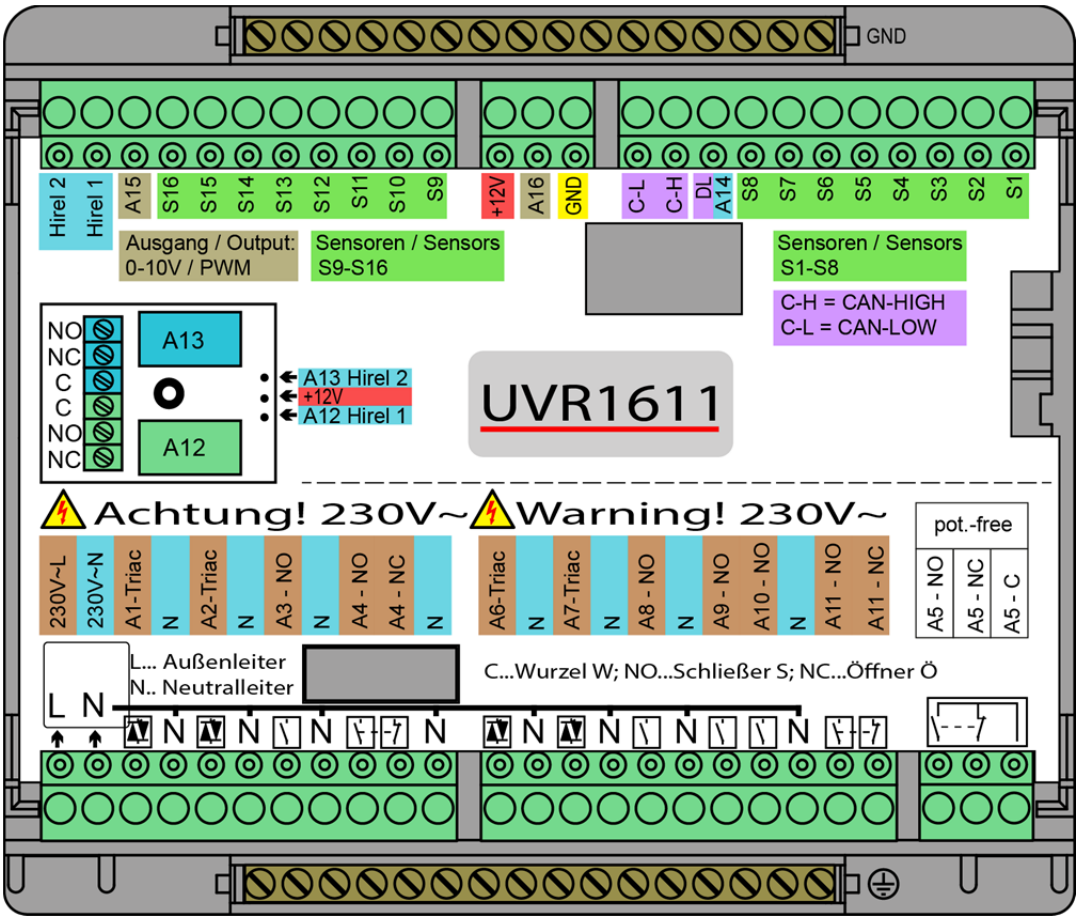
Notice: The system has to be grounded properly and furnished with surge arresters to protect it from damage due to lightening. Sensor failures due to thunderstorms and static electricity are usually the result of missing or incorrect earthing or missing surge protection.
Cable channels for power and sensor lines may cause a disturbance in the sensor lines if they lie too close to each other over long stretches. If no fast signals (such as ultrafast sensors) are transmitted, these disturbances can be filtered out by averaging the sensor inputs. However a minimum distance of 5 cm between the two cable ducts or the use of shielded sensor cabling is recommended.

Caution: Only work inside the console with the power cable disconnected. If you assemble the device with the power connected, the device may be damaged.
All sensors and pumps/valves must be connected as they are numbered in the design selected. For grade power, cross sections of 1 - 1.5² fine-strand are recommended except for the feed line. A terminal strip is available for the earth conductors. During assembly, this strip terminal can also be removed to make it easier. All cables can be fixed with a clamp (= strain relief) immediately after being connected. A side cutter is needed to remove the clamps; therefore, more parts than necessary are provided. Once all of the power connections have been made (without the protective conductor), the protective conductor terminal is inserted, and the remaining ground wires are connected.
There is only one connection to ground (GND) for all of the sensors on the protective low voltage side. An earth strip is located at the top of the mounting base. Prior to terminating the sensors, first connect a cable from this strip to the GND terminal.
All of the sensor lines with a cross-section of 0.5mm^2 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. One pole for these cables is connected to the relevant terminal (S1-S16); the second pole to the earth strip at the top.

Termination guide

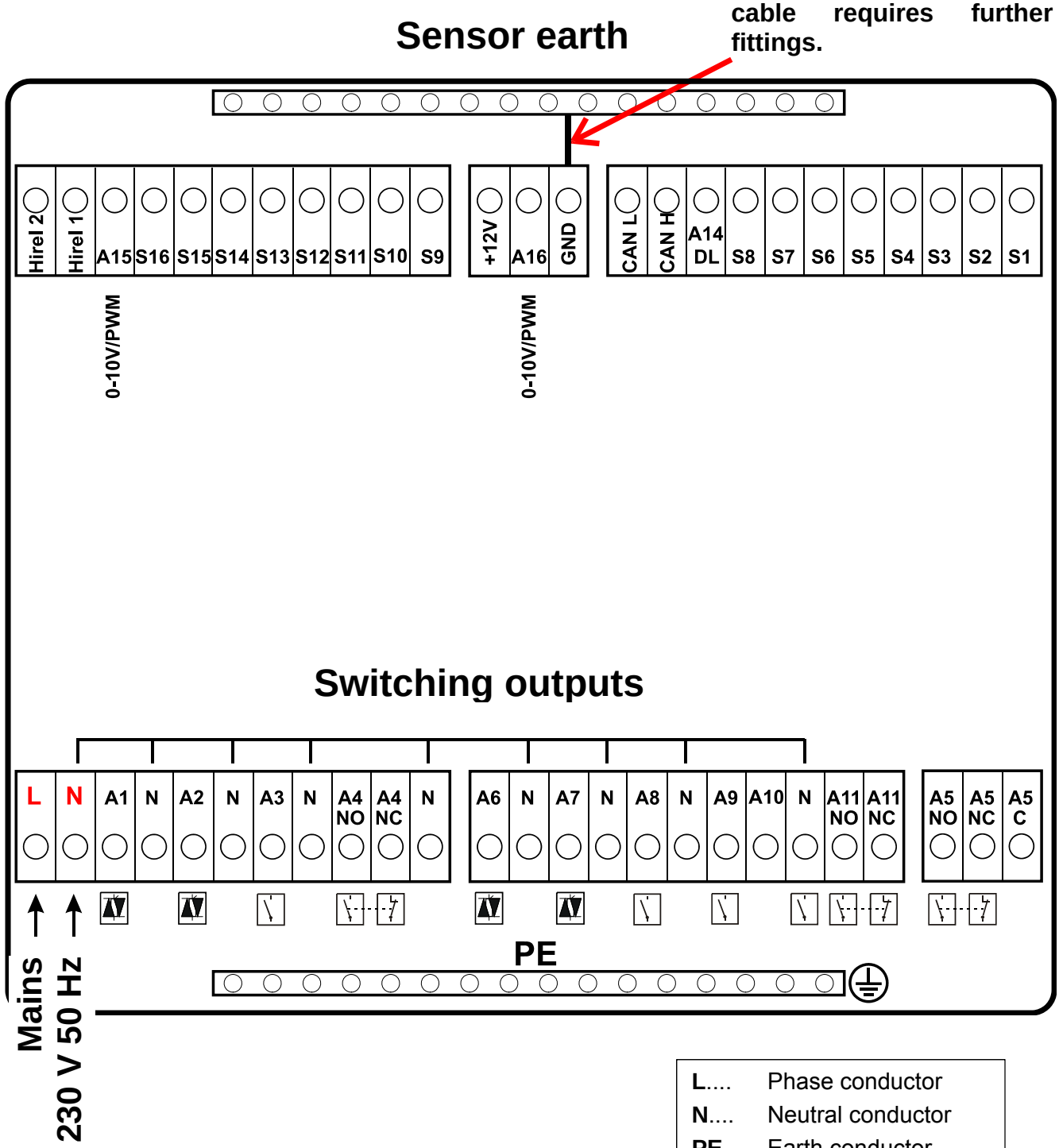
Each controller is supplied with a guide containing the terminal markings, which is clamped between the low voltage and 230 V terminals. After completion of the electrical connection, this guide can either be retained inside the controller or removed.

View with the guide fitted:



Complete overview of terminals

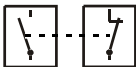
CAUTION This connection cable requires further fittings.



L....	Phase conductor
N....	Neutral conductor
PE....	Earth conductor
C....	Root
NO....	N/O contact
NC....	N/C contact

Triac output

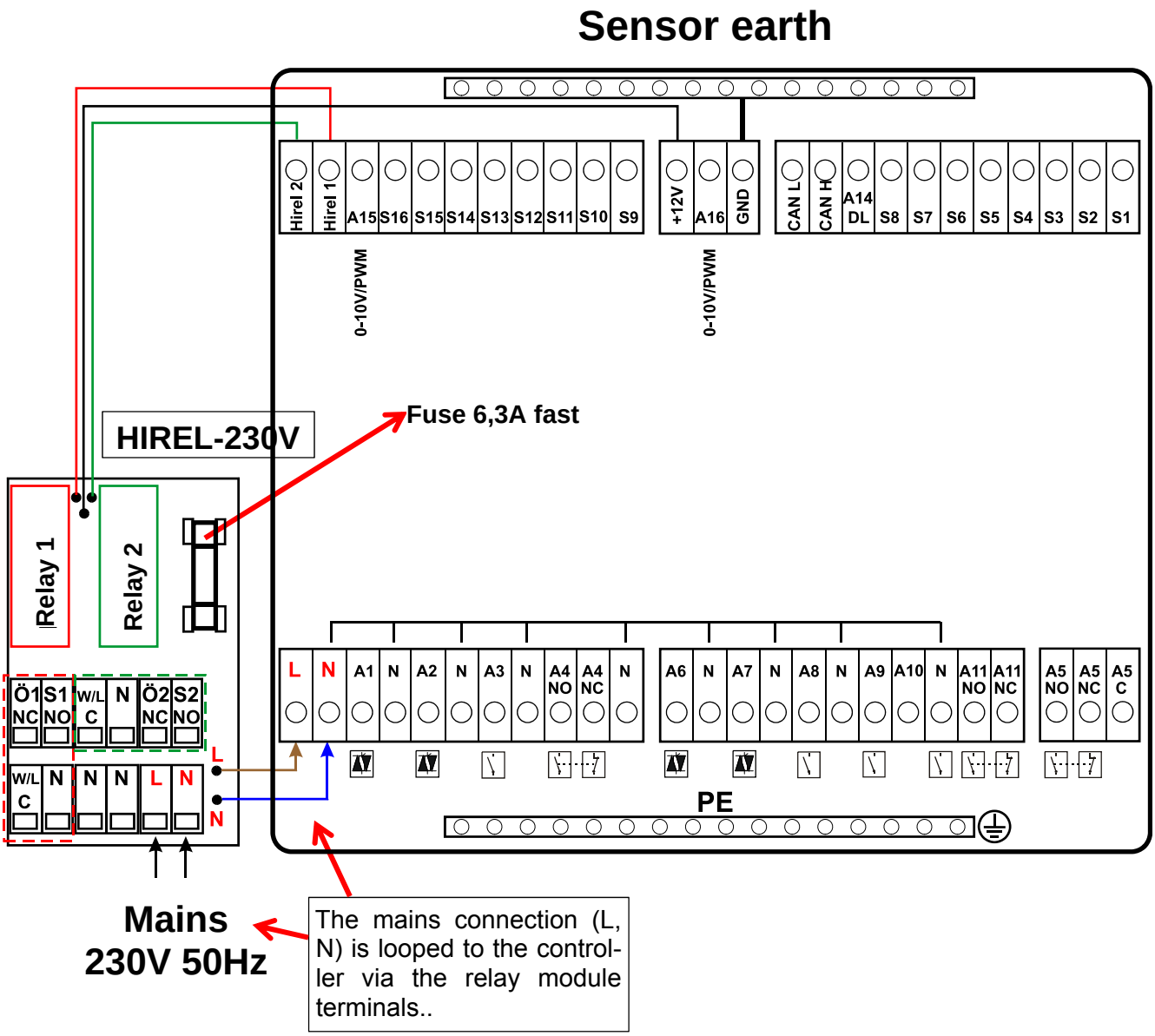
Relay output, normally open contact (N/O)


Relay output, normally open + normally closed contact (N/O + N/C)

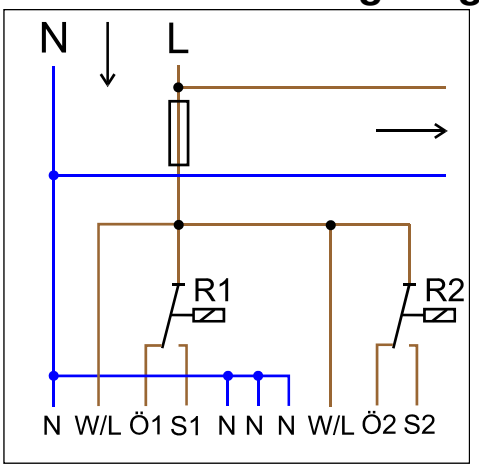
Caution: Output A5 is potential-free, i.e. is not connected to the mains power.

Connection auxiliary relay HIREL-230V

Example: Connection HIREL-230V for outputs 12 and 13
Program outputs A12 and A13 as switching outputs



HIREL-230V wiring diagram



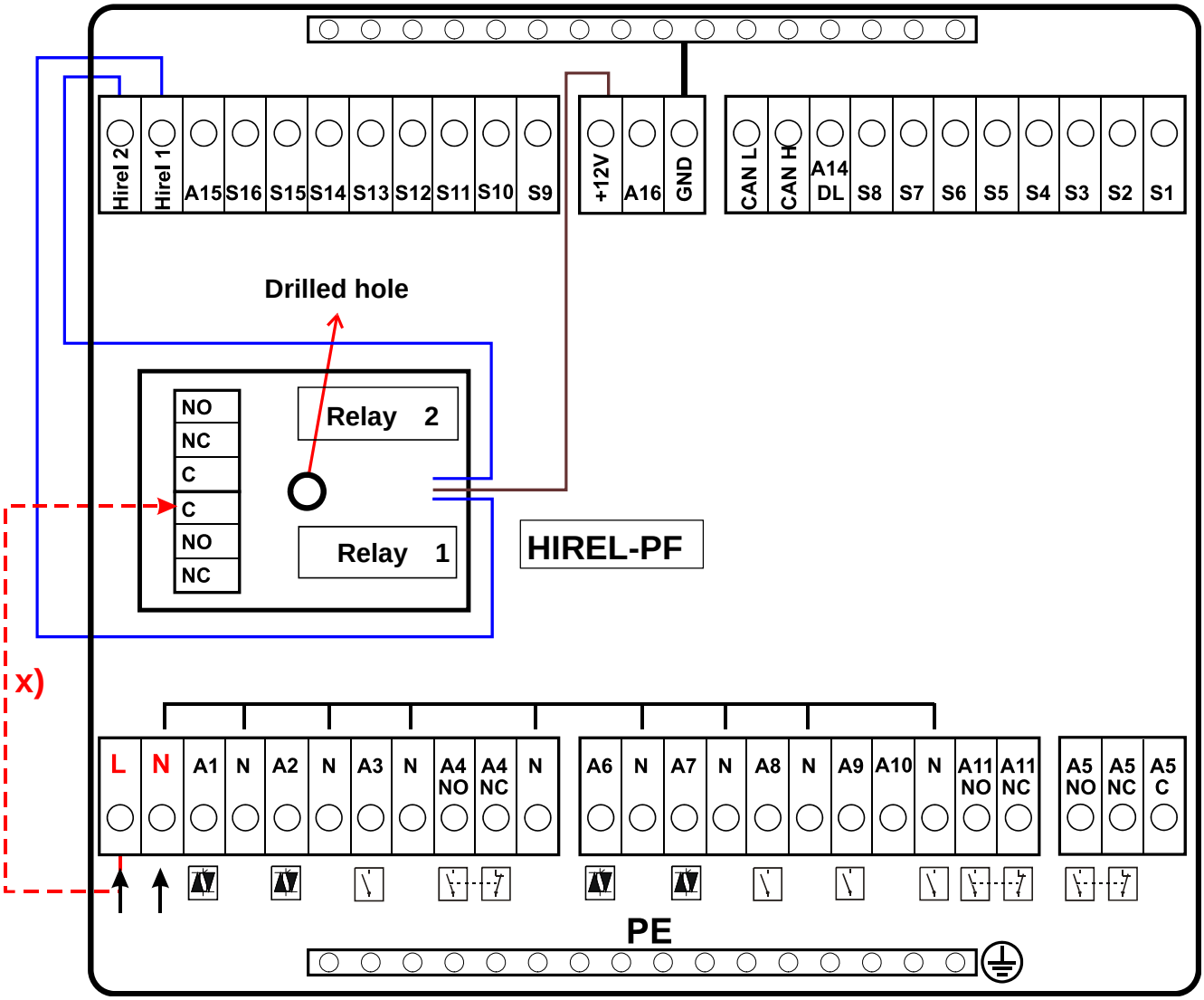
Relay 1:
Ö1... Normally closed contact (N/C)
S1... Normally open contact (N/O)
W/L... Root C

Relay 2:
Ö2... Normally closed contact (N/C)
S2... Normally open contact (N/O)
W/L... Root C

Both relay outputs are protected by the fuse on the relay module. Terminal "**W**" therefore corresponds to phase conductor "**L**".
If the fuse is removed, both outputs will be potential-free whilst remaining connected to one another via root "**W**".

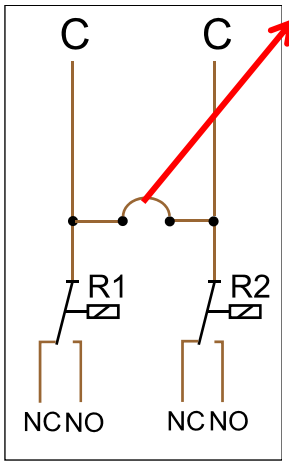
Connection auxiliary relay HIREL-PF

Example: Connection HIREL -PF for outputs 12 und 13
Program outputs A12 and A13 as switching outputs



x) This connection enables the HIREL-PF relay contacts to switch the phase conductor (230 V) to become conductive. As a consequence the relay outputs are no longer potential-free.

HIREL-PF wiring diagram



Drilled hole: The relay contacts are - **without** connection x) - potential--free, for which both roots(**C**) have been connected at the factory.
Widening the **hole** between both relays to at least **6 mm** in diameter separates the potential of both outputs across each other in accordance with industry

NC...	Normally closed contact
NO...	Normally open contact
C...	Root

Technical data UVR1611 (Triac version)

All sensor inputs	For temperature sensors of type KTY (2 kΩ/25°C), PT1000 and room sensors RAS or RASPT, radiation sensors, voltages up to 5V DC, as well as digital input
Sensor input 8	Additional for current loop (4 -20 mA), voltage (0-10 V DC) or resistance (0-12.50kΩ)
Sensor input 15, 16	Additional pulse input, such as for volume flow encoder
Output 1, 2, 6, 7	Speed-controlled for standard circulating pumps
Output 3, 4, 8-11	Relay outputs, partially with opener and closer
Output 5	Change-over contact relay – **potential free**
Outputs 12, 13	Accommodation for later expansions by a double auxiliary relay module
Output 14	Data link (DL bus) to capture suitable sensors and log data (in special cases configurable with 12V relay as switch output)
Max. bus load (DL bus)	100 %
Outputs 15,16	Analogue outputs 0-10V/20mA or PWM (10V/2kHz)
CAN- Bus	Data 50 kb/sec., power supply for external units 12V= / 100mA
Differential tempera-tures	Equipped with separate switch-on/off differential
Threshold values	Partially set up with an adjustable hysteresis or as an alternative with separate switch-on/off threshold
Speed control	30 speed stages constitute a quantity change of max. 10 Regulation by absolute value, difference and absolute value to event
Temperature display	-50 until +199°C with a dissolution of 0.1K
Accuracy	Typ. 0.4 and max. +-1K for the range of 0 - 100°C
Max. breaking capacity	**A1: 230V/0,7A**, A2, 6, 7: each 230V/1A relay outputs max. each 230/ 3A
Connection	230V, 50- 60Hz, (outputs and units are fused along with 6.3A quick-acting)
Supply cable	3x 1mm² H05VV-F conforming to EN 60730-1 (corresponding cable with safety plug contained in the basic package)
Power draw	Max. 4.2 W (without accessory equipment)
Protection	IP40
Permissible ambient temperature	+5 to +45°C

Standard delivery

UVR1611K-N-D: The UVR1611, console including all terminals, while attachment material, strain reliefs, operating instructions

UVR1611S-N-D: Device with terminal mounting plate, operating instructions

Tips on troubleshooting

If there is **no display**, there has been a power outage. First check the fuse (6.3A, quick-blow) that protects the device and the outputs (pumps, valves, etc.) from short circuits and the outputs in connection with the integrated overvoltage protection. The glass tube fuse is located on the rear side of the controller behind a screw cap.

Realistic temperature values but outputs not operating properly indicate false settings or connections. If it is possible to switch the outputs on and off in the manual mode, the device is in order, and all of the settings and the terminal should be checked.
Do endurance runs and standstills lead to the same reaction at the output? In other words, does this pump really run if the solar pump is activated manually, or does the heating circuit pump go into operation instead of the solar pump?
Are all of the sensors connected with the right terminal (heat up the sensor using a cigarette lighter and check the temperature display)?

If you still cannot find any error in the system, install a data logger (Bootloader or D-LOGG) in the system and record the temperature curve and switching statuses. **For data logging, output 14 must be set to "Data line" using the DL bus**.

Improper temperatures can have the following causes:

- If a value such as -999 is displayed when a sensor short-circuits or 9999 if there is a sensor interruption, the cause may not be a material or terminal error. Is the proper sensor type selected in the entry menu (KTY, PT1000, SPS, GBS, etc.)?
- The sensor can also be checked without a measuring device simply by changing the sensor that is probably defective with one that works at the strip terminal and checking the temperature display. If the error is reproduced, the problem is probably the sensor. However, if the problem remains on the same input of the device, the error is either due to the settings for sensor type, or the input itself is defective (such as defective overvoltage protection).

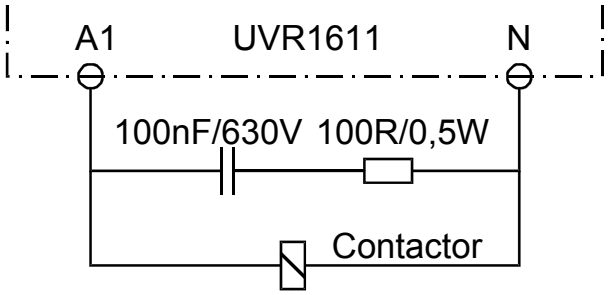
The following values should be found if the sensors are checked with an ohmmeter.

Temp. [°C]	0	10	20	25	30	40	50	60	70	80	90	100
R(KTY)[Ω]	1630	1772	1922	2000	2080	2245	2417	2597	2785	2980	3182	3392
R(PT1000) [Ω]	1000	1039	1078	1097	1117	1155	1194	1232	1271	1309	1347	1385

If the sensor is defective, pay attention to the type of sensor you exchange it with. While it is possible to use a different type of sensor, the parameters for that input also have to be set to the type used.

Not possible to manually switch an output:

- If the output has speed control (A1, A2, A6 or A7) and is actually set to speed control, pay attention to the speed stage when using manual mode. Set to stage 30 when testing the pump's basic function.
- **Electronic pumps cannot** be operated speed-controlled due to their internal structure. Connection to one of the outputs A1, A2, A6 or A7 as a **switch output** is possible. However it is recommended to connect these pumps to one of the relay outputs (A3 - A5, A8 - A11).
- If a valve or contactor is to be triggered using a speed-controlled output (also along with a pump), the parameters for this output have to be set as a switch output because the speed control cannot work on such a consumer!
- Speed-controlled outputs may not be able to switch **small loads** reliably (< 5 W, such as valves, contactor, etc.). This is especially true for output A1 with its integrated power line filter, which can only be operated with a minimum load ≥ 20 W. If the speed-controlled outputs (A2, A6, A7) **only** control small loads, an additional parallel load or the subsequent RC component is necessary to make switching reliable (available as a special accessory)



- Make sure that outputs 5, 12, and 13, are potential-free and do not have power. It is thus only possible to directly switch a 230V consumer when the proper wiring has been made.
- If it is not possible to switch an output on or off in manual mode because the cursor could not be positioned next to the proper parameter, there are the following two options:
  - A message is currently active and switches the relative output dominant ON or OFF (display of message in the function overview). In this case, manual mode is not possible.
  - An expert has set the setting User interlock (outputs) to yes. By this, only experts can manually operate the outputs.

Troubleshooting - hardware

If the cause of the error is clearly defective hardware, please send the equipment to your retailer or manufacturer for repairs. Please do not forget to describe the error when sending back the device (simply saying "the device does not work, please repair" is insufficient). Only then can the control system be repaired quickly and inexpensively.

Troubleshooting - programming

The manufacturer can help you find a remedy if the proper documentation and data are provided. The following are indispensable:

- A hydraulic diagram by fax (best option) or e-mail (WMF, JPG, ENG)
- Complete programming by means of TAPPS files or, at least, the function data by e-mail
- Operating system version for the control system
- All existing LOG files or at least the (temperature) values of the inputs at the time the system malfunctioned
- A telephone call to describe the problem - a written description of the error does often not suffice, and the manufacturer cannot accept it.

Troubleshooting in the CAN network

To localize the error, switching off of a part of the network at a time in order to see when the error disappears is recommended.

General tests:

- Node numbers - no node number may be allocated twice
- Power supply to the bus members (if necessary use the power pack CAN-NT)
- Setting of the baud rate (only if using the CAN bus converter CAN-BC/C)

Cabling tests:

For these tests all nodes must be switched off!

- Resistance between CAH-H and CAN-L
  - If this is above 70Ω, it indicates a missing terminating resistor.
  - If the resistance is below 60Ω, then search for extra terminating resistors or short circuits between wires.
- Check for a short circuit between GND or the shielding and the signal wires.
- Checking for earth loops - to do this the shielding is disconnected at the relevant node point and the connecting current measured. If a current exists, then an earth loop exists courtesy of an unwanted earth connection.

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]
UVR1611[5]	max. 8	max. 5	2.4	2.03 / 3.73	2.4 / 4.2

[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

[5] The class is defined on the basis of the programming of the heating circuit controller, in accordance with the Ecodesign Directive.

We reserve the right to make technical changes. © 2015

EU Declaration of conformity

Document- Nr. / Date:	TA17006 / 02/02/2017
Company / 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:	UVR1611K, UVR1611K-N-D, UVR1611K-N, UVR1611S, UVR1611S-N, UVR1611S-N-D, UVR1611E-NM, UVR1611E-DE, UVR1611E-NP
Product brand:	Technische Alternative RT GmbH
Product description:	Freely programmable universal controller

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

2014/35/EU	Low voltage standard
2014/30/EU	Electromagnetic compatibility
2011/65/EU	RoHS Restriction of the use of certain hazardous substances
2009/125/EC	Eco-design directive

Employed standards:

EN 60730-1: 2011	Automatic electrical controls for household and similar use – Part 1: General requirements
EN 61000-6-3: 2007 +A1: 2011 + AC2012	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments
EN 61000-6-2: 2005 + AC2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 50581: 2012	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.

Guarantee conditions

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

1. The company Technische Alternative RT GmbH provides a two-year guarantee from the date of purchase by the end consumer 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 guarantee includes the free of charge repair (but not the cost of on site fault-finding, 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 Technische Alternative, the goods will be replaced.

3. Not included is damage resulting from the effects of overvoltage or abnormal ambient conditions. Likewise, no guarantee 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, non-observance of operating and installation instructions or incorrect maintenance.

4. The guarantee 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 guarantee result neither in an extension of the guarantee period nor in a resetting of the guarantee period. The guarantee period for fitted parts ends with the guarantee 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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