

CAN-EZ2

CAN ENERGY METER



User manual

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Safety requirements



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

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

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

Maintenance

If treated and used correctly, the device will not require any maintenance. Use a cloth moistened with mild alcohol (such as methylated spirits) to clean. Never use corrosive cleaning agents or solvents such as chloroethylene or trichloroethylene.

No components relevant to long term accuracy are subject to loading if the device is used correctly. Consequently long term drift is extremely low. The device therefore cannot be calibrated. Thus applying any compensation is impossible.

The design characteristics of the device must not be changed during repairs. Spare parts must correspond to the original spare parts and must be used in accordance with the build version.

Disposal



- Devices no longer in use or beyond a state of repair must be disposed of in an environmentally responsible manner by an authorised collection point. They must never be treated as ordinary household waste.
- We can undertake the environmentally responsible disposal of devices sold by the Technischen Alternative company upon request.
- Packaging material must be disposed of in an environmentally responsible manner.
- Incorrect disposal may result in considerable damage to the environment, as many of the materials used require professional handling.

System requirements

The CAN-EZ2 can be operated by a UV16x2/UVR610 controller, a CAN-MTx2 CAN monitor or via the C.M.I. (control and monitoring interface.)

This requires a minimum of version V1.15 on the UVR16x2 controller or version V1.19 on the C.M.I. A CAN bus device must have node number 1 in the CAN network.

Winsol version 2.05 or higher is required for Winsol datalogging.

Standard delivery

CAN-EZ2/C

- CAN energy meter 2 compact
- Operating instructions
- Accessories
 - 1x terminal (2-pole, contact spacing: 5.08 mm)
 - 1x terminal (4-pole, contact spacing: 5.08 mm)
 - 3x terminal (4-pole, contact spacing: 3.81 mm)

CAN-EZ2/E

- CAN energy meter 2 external
- Operating instructions
- Accessories
 - 1x terminal (2-pole, contact spacing: 5.08 mm)
 - 1x terminal (4-pole, contact spacing: 5.08 mm)
 - 1x terminal (4-pole, contact spacing: 10.16 mm)
 - 1x terminal (2-pole, contact spacing: 3.81 mm)
 - 1x terminal (4-pole, contact spacing: 3.81 mm)

Function description

The main task of the CAN-EZ2 CAN energy meter is to measure amounts of both electrical energy and heat.

Either 3-phase or single phase **electrical energy** can be metered, in both directions. The measuring limits specified in the technical data must be observed.

2 versions of the CAN-EZ2 are available:

- **CAN-EZ2/C** – Compact device with **integral** current transformers. The supply cable to the part of the system to be metered must be looped through the energy meter.
- **CAN-EZ2/E** – Energy meter with **external** hinged current transformers. With this version, the supply cable to the part of the system to be metered can bypass the CAN-EZ2. Only the voltage connection is required as a branch cable to the CAN-EZ2.

For the **heat meter**, the following are available in total: 4 analogue inputs for temperature sensors, 2 pulse inputs for VSG flow rate transducers, 2 inputs for direct transfer of measured values from FTS volume flow sensors and one data link input for DL sensors.

All function modules of the freely programmable controllers are available. However, only specific functions are used for the actual purpose of the energy meter and these are described in this manual. The CAN-EZ2 is programmed either with TAPPS2 or manually via the UVR16x2/UVR610 controller, the CAN-MTx2 CAN monitor or the C.M.I.

Input values, system values from electrical measuring and results of the metering and functions can be transferred to the CAN bus as network output variables. The same applies to values from inputs, which are not used for any metering (as for a CAN I/O module).

The CAN-EZ2 is not calibrated and consequently may not be used for billing purposes.

Installing and connecting the device

The CAN-EZ2 is integrated into a distribution box (CANEZ/C) or fitted to a level mounting surface in a dry room, in accordance with local regulations. It can be snapped onto a top-hat rail (TS35 DIN support rail to EN 50022) or bolted onto the mounting surface via the 2 holes in the casing tray.

CAN-EZ2/C: The CAN-EZ2/C is intended for **installation in a distribution box**.

The wires of the electrical energy meter are pulled through the current transformers and the voltage terminals with due regard to the energy direction. The supply cable must be installed free from tension, so that the current transformers and voltage terminals are not exposed to any mechanical pressure. Next, the screws for the voltage terminals must be tightened sufficiently to ensure that the tips of the mating plate press through the insulation and make contact with the conductor.

Caution: It is possible that the screws of the voltage connections take on the voltage of the penetrated conductor.

CAN-EZ2/E: The hinged current transformers are folded over the wires and connected to the 2-pole connectors in the CAN-EZ2. When doing this, pay attention to the correct assignment (I1 - I3) in accordance with the voltage connections and a positive phase sequence.

Caution: The surfaces of the current transformer ferrite cores must be **completely clean**. Even tiny dust particles or greasy films can severely affect the measuring result. These surfaces must therefore be cleaned with a clean, lint-free cloth or clean fingers before closing.

For voltage measuring, the required wires are connected to the voltage terminals in the CAN-EZ2. The connection of the sensors, the CAN and DL buses is carried out using the supplied connectors.

Power supply

The electricity meter requires a 12 V power supply originating either from a freely programmable controller or from a 12 V power supply unit.

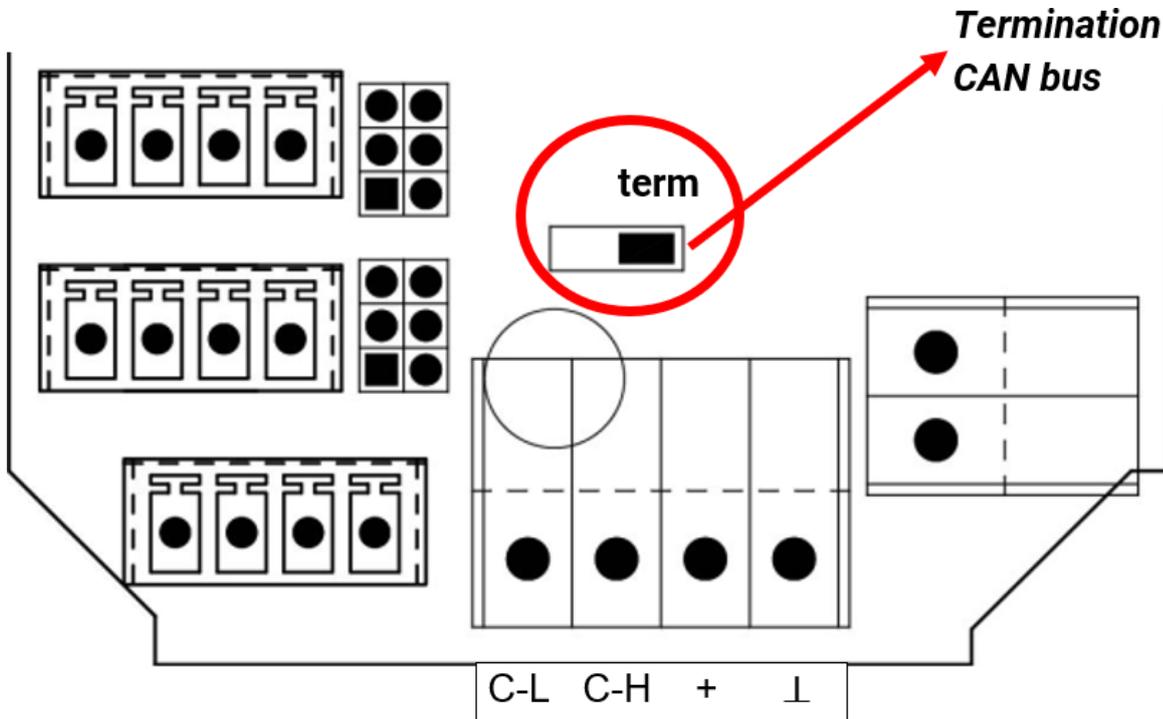
Time stamp

For metering to work in the CAN-EZ2, a device must be present in the CAN bus network with node number 1 that can supply a time stamp (UVR16x2, UVR610, RSM610, C.M.I. with internet connection, UVR1611).

CAN bus cable selection and network topology

The principles of CAN bus cabling are described extensively in the manuals for the freely programmable controllers. Therefore they are not included here in any detail, apart from the termination.

Each CAN network must be provided with a 120 ohm bus terminator at the first and last network node (termination - with plug-in jumper). A CAN network therefore always has two terminators (one at each end). Branch lines and star-shaped CAN wiring are not permitted by the official specification.



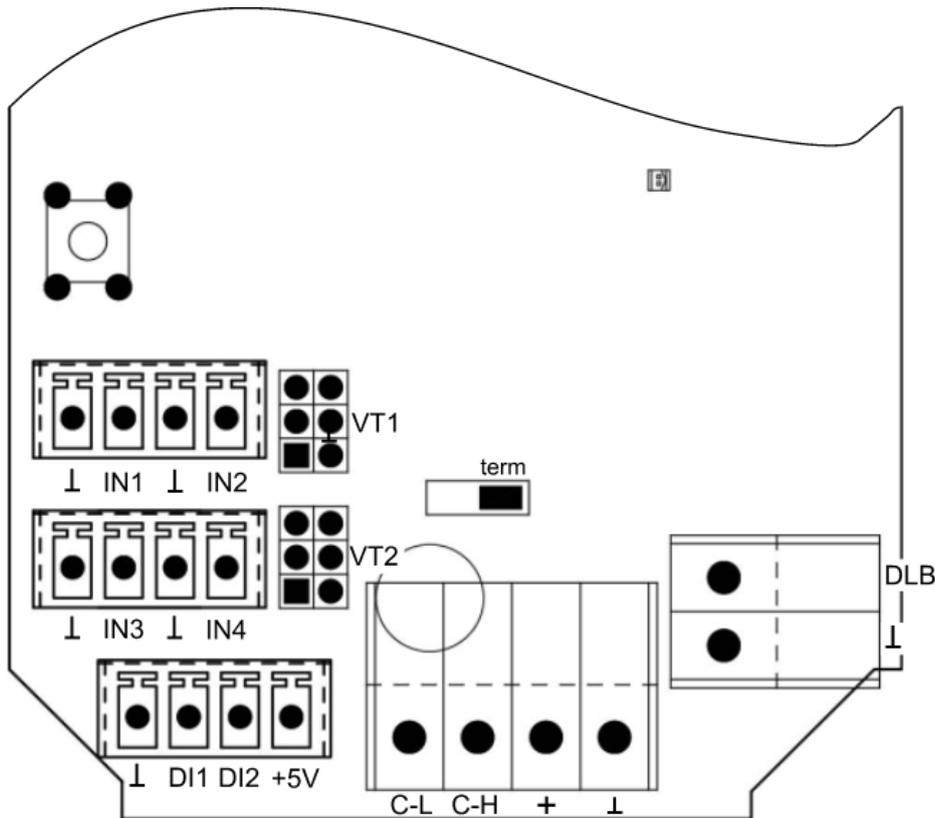
The CAN-EZ is terminated if the jumper is set on the side with the "term" inscription (as shown above).

Sensor leads, sensor installation, DL bus cable

The installation instructions for freely programmable controllers UVR16x2, UVR610 and RSM610 contain detailed information on these subjects.

Sensor, DL bus and CAN bus connections

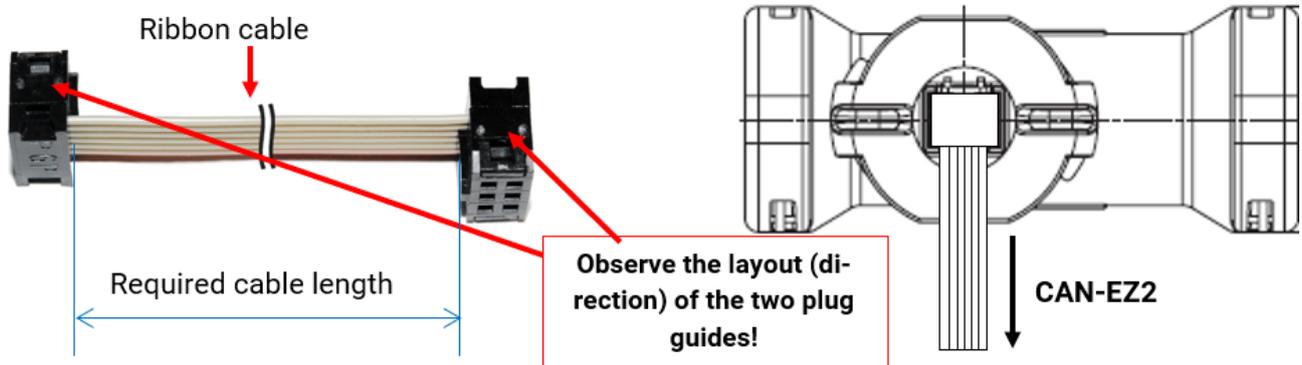
These connections are the same on both versions, CAN-EZ/C and CAN-EZ/E.



IN1.... IN4	Sensor inputs 1 – 4 Programming in the menu Inputs / Inputs 1 - 4 Connection of sensors between IN1 (2, 3, 4) and sensor earth ⊥
VT1...VT2	Special connection for FTS volume flow sensors (without DL) Programming: Menu Inputs / Inputs 3 - 4 for temperature (PT1000 sensor), Inputs 5 – 6 for flow rate and sensor selection (DN) The connecting cable is assembled in accordance with the following description
DI1...DI2	Inputs 5 – 6, for VSG pulse generator, Programming: Menu Inputs / Inputs 5 - 6 , Connections between DI... and sensor earth ⊥ These inputs can capture pulses with max. 20 Hz and a pulse duration of at least 25 ms (S0 pulses).
+5V	Power supply +5 V
DLB	DL bus input for VFS...DL volume flow sensors (with intermediate board) and other DL sensors (except RCV-DL), Programming: DL bus menu / DL input (type analogue) Connection between DLB and earth ⊥
C-L, C-H, +, ⊥	CAN-LOW, CAN-HIGH, +12 V, earth The principles of bus cabling are described extensively in the manuals for the freely programmable controllers and must be observed.

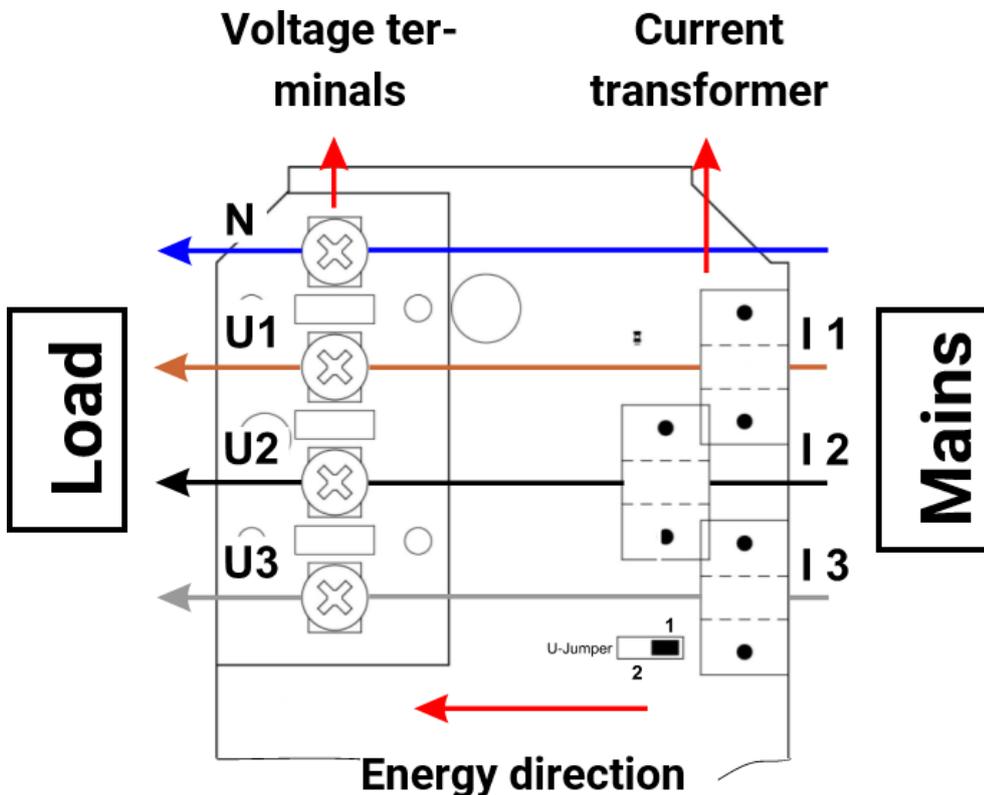
Sensor connection FTS... to VT1 or VT2

The volume flow sensors are connected directly to the CAN-EZ2, without intermediate board. The supplied ribbon cable is adjusted to the required length on site. For this the 2nd plug is pressed on to the cable according to the following drawing.



Electrical measuring

Measuring with CAN-EZ2/C



If the energy direction is changed, the energy meter counts in the negative.

3-phase measuring with CAN-EZ2/C

All 3 phase conductors (L1 - L3) are looped through current transformers I1 – I3 and connected to voltage terminals U1 – U3. The neutral conductor is connected to the N terminal.

U-jumper

Position 1: In the event of a U2 or U3 voltage failure, all power-related values of this phase are calculated with zero.

Position 2: In the event of a U2 and/or U3 phase voltage failure, the voltages are reconstructed and the power-related values calculated with the help of **phase simulation**. This results in **less precise** measuring.

If voltage U1 drops out, nothing is measured, regardless of the jumper position.

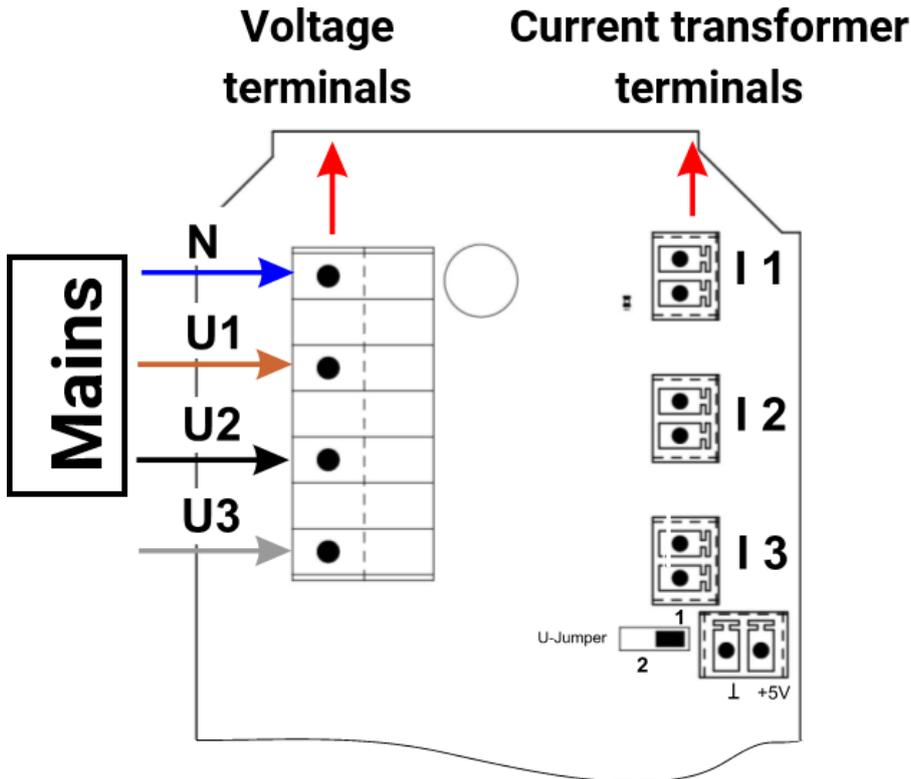
Single phase measuring with CAN-EZ2/C

Only phase conductor L1 is looped through the current transformer (I1) and voltage terminal (U1) and the neutral conductor is connected to N.

U-jumper

With single phase measuring, the jumper position has no effect on the measurement. In the event of U1 voltage failure, all power-related values are issued as zero.

Measuring with CAN-EZ2/E



3-phase measuring with CAN-EZ2/E

All 3 phase conductors (**L1 - L3**) are connected to voltage terminals **U1 - U3** and the neutral conductor to the **N** terminal. The 3 external hinged current transformers are connected to terminals **I1 - I3** in the correct sequence and folded over the wires to be measured.

U-jumper

Position 1: In the event of a voltage failure, all power-related values of this phase are calculated with zero.

Position 2: In the event of a **U2** and/or **U3** phase voltage failure, the voltages are reconstructed and the power-related values calculated with the help of **phase simulation**. This results in **less precise** measuring.

If voltage **U1** drops out, nothing is measured, regardless of the jumper position.

For **simple** measuring, it is possible to **only** connect phase conductor **L1** to **U1** and the neutral conductor to **N**. **U2** and **U3** remain unconnected. The **U-jumper** must be set to position **2**. In this case, the values (voltage / cos phi) for **U2** and **U3** are recreated using **U1**.

This results in **less precise** measuring.

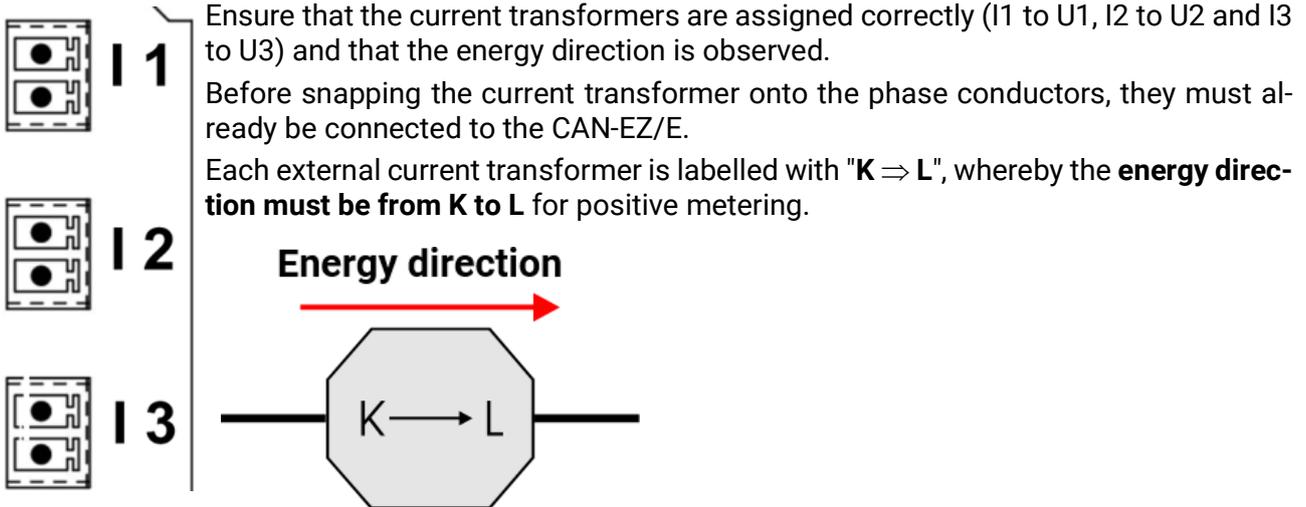
Single phase measuring with CAN-EZ2/E

Only phase conductor **L1** is connected to voltage terminal **U1** and the neutral conductor to the **N** terminal. An external hinged current transformer is connected to terminal **I1** and folded over the wire to be measured.

U-Jumper

With single phase measuring, the jumper position has no effect on the measurement. All power-related values are issued as zero.

External hinged current transformer for CAN-EZ2/E

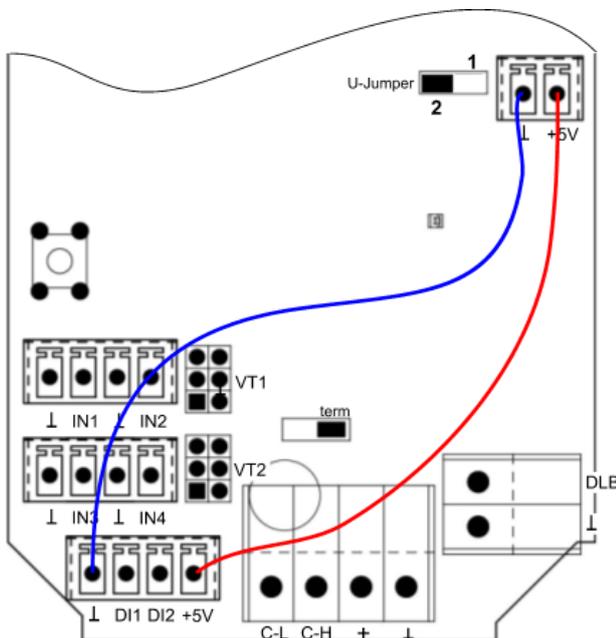


Each current transformer must be closed carefully by clicking the snap fastener securely into place. If the energy direction is changed, the energy meter counts in the negative.

Current measuring with CAN-EZ2/E

Current measuring **without** determining voltages, real powers, reactive powers and $\cos \varphi$ is possible if **only** the external hinged current transformers are connected. The apparent powers are calculated using $230 \text{ V} * I (1-3)$.

In addition, the evaluation electronics must be supplied with power by applying voltage to the +5 V and earth terminals. The U-jumper is set to position 2.



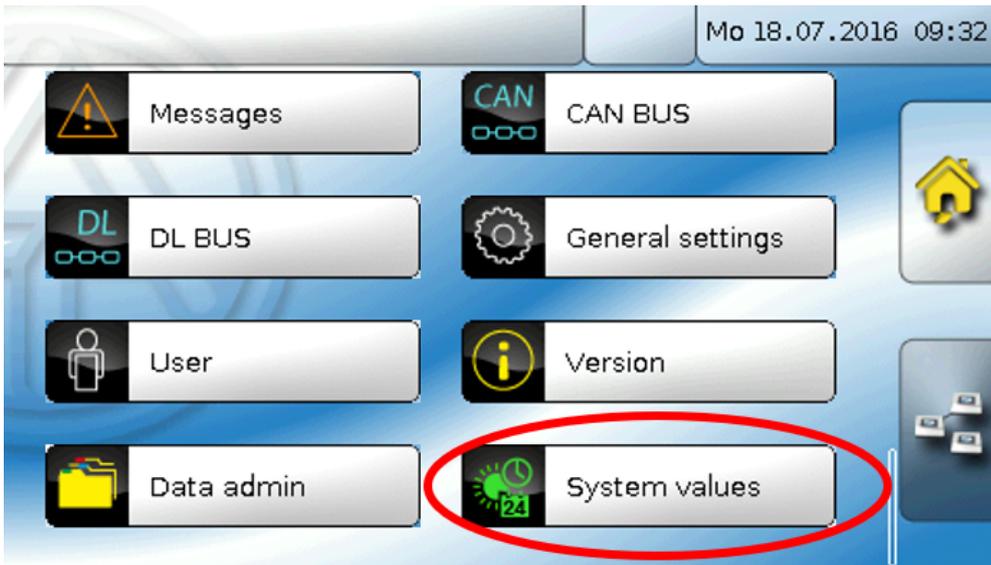
Important note:

If these connection lines are connected, on no account connect a voltage to U1 or N.

This could result in high voltage potentials reaching other CAN bus devices over the CAN bus.

System values

The measured electrical values are displayed as **system values** in the "Output" sub-menu.



Electrical power:

- Total apparent power
- Apparent power L1, L2, L3
- Total real power
- Real power L1, L2, L3
- Total reactive power
- Reactive power L1, L2, L3
- Voltage L1, L2, L3
- Total amperage
- Amperage L1, L2, L3
- Total $\cos \varphi$ power factor
- $\cos \varphi$ power factor L1, L2, L3
- Total φ phase shift
- φ phase shift L1, L2, L3
- Positive phase sequence Yes/No

These values can be used as input variables for functions, sources for CAN outputs and for CAN datalogging.

Various groups of system values are also available:

- **General**
- **Time**
- **Date**
- **Sun**

Programming with TAPPS2

The CAN-EZ2 is programmed either with TAPPS2 software or **manually** via the UVR16x2/UVR610 controller, the CAN-MTx2 CAN monitor or the C.M.I. interface.

Designations

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

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

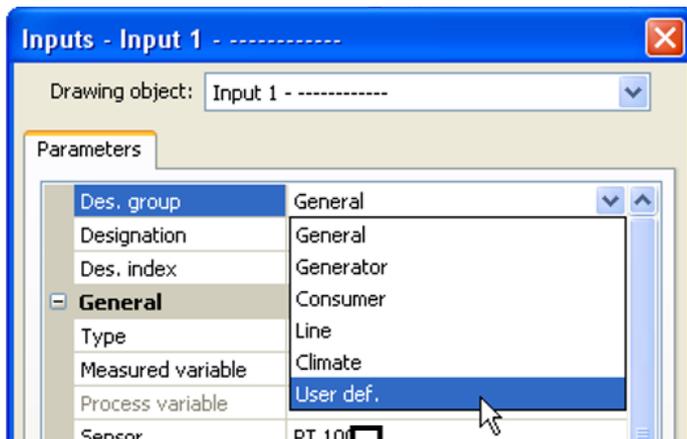
User defined designations

Up to 100 different designations can be defined by the user. The maximum number of characters per designation is **24**.

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

Example:

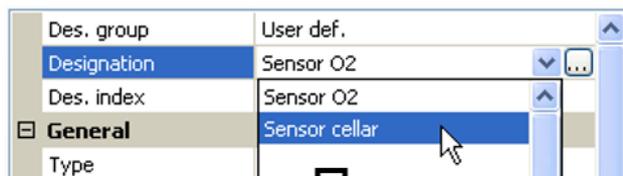
You want to assign a user defined designation to Input 1.



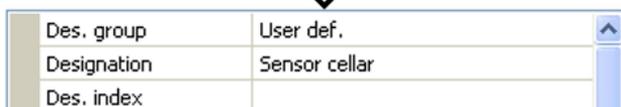
Click the field for creating the required designation.



Enter the designations, finish with "OK"



Select from the list of previously created user defined designations.



The required designation is displayed.

Inputs

The CAN-EZ2 has **6 inputs** for analogue signals (measurements), digital signals (ON/OFF) or pulses.

Sensor type, measured variable, Process variable

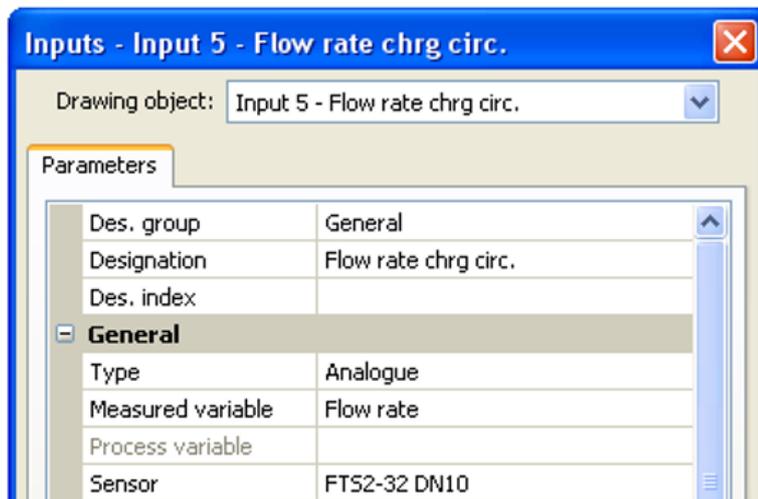
Once the required input is selected, the sensor type can be defined. Not all inputs have the same selection for sensor type.

Input properties

Type	Input 1	Input 2	Input 3	Input 4	Input 5	Input 6
Digital	X	X	X	X	X	X
Analogue (all measured variables and sensor types)	X	X	X	X		
Analogue Measured variable: Flow rate (Sensor: DN... = FTS...)					X (VT1)	X (VT2)
Pulse All measured variables (e.g. sensor: VSG...)	X	X	X	X	X (DI1)	X (DI2)

If an FTS sensor (without DL) is connected to VT1 (flow rate at input 5), no further temperature sensor can be connected to input 3, because the sensor temperature of the FTS is adopted at this input. The same applies to VT2 with regard to inputs 6 and 4.

Programming of the FTS sensors (without DL) at connections VT1 or VT2



The flow rate of the **sensor at VT1** is measured at **input 5** (example: sensor FTS2-32).

No other sensor may be connected directly to input 5.

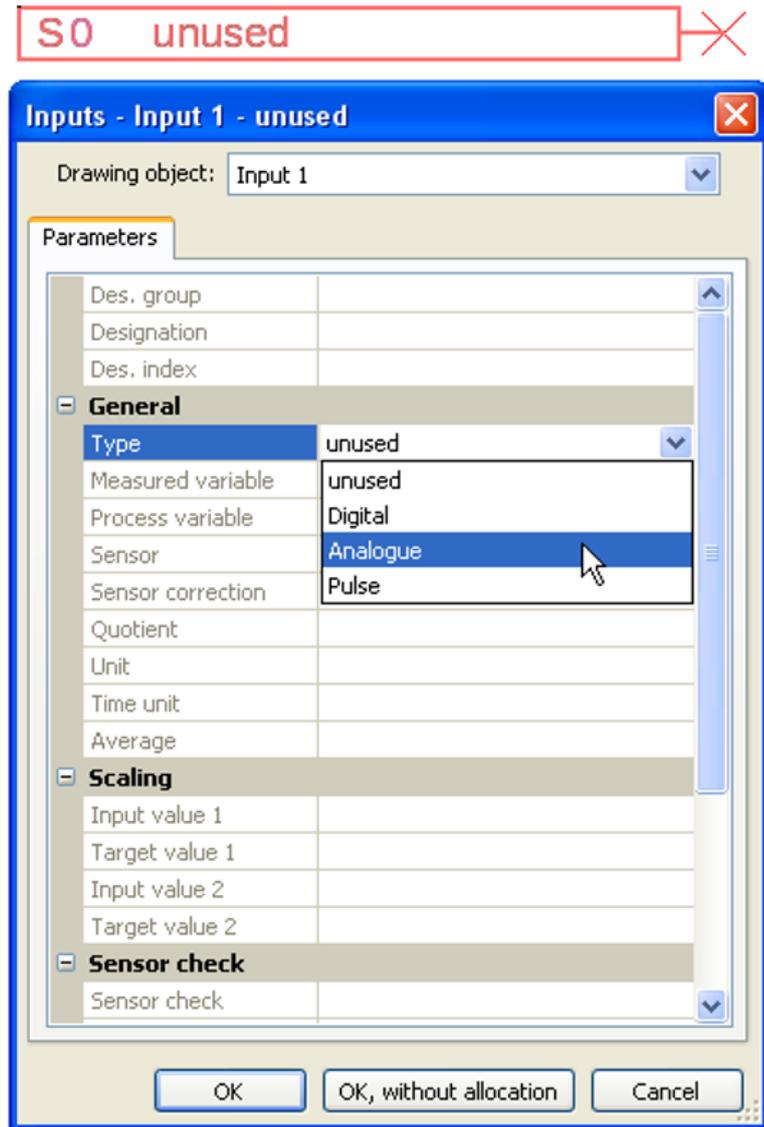
The internally measured **temperature** of the sensor is measured at **input 3**. This input must be programmed as a PT1000 temperature sensor.

No other sensor may be connected directly to input 3.

Similarly, the flow rate of the **sensor at VT2** is measured at **input 6**. Consequently, no other sensor may be connected directly to this input.

The internally measured **temperature** of the sensor is measured at **input 4**. Therefore no other sensor may be connected directly to this input either.

Since all the functions of a UVR16x2/UVR610 controller are available in the CAN-EZ2, all input types, measured variables and process variables of this controller are available **for inputs 1 – 4**.



3 types of input signal are available:

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

Digital

Select the **measured variable**:

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

Analogue

Select the **measured variable**:

- **Temperature**
Select the sensor type: **KTY** (2 k Ω /25°C = formerly Technische Alternative's standard type), **PT1000** (= current standard type), room sensors: **RAS**, **RASPT**, **THEL** thermocouple, **KTY** (1 k Ω /25°C), **PT100**, **PT 500**, **Ni1000**, **Ni1000 TK5000**
- **Solar radiation** (sensor type: GBS01)
- **Voltage** (max. 3.3 V)
- **Resistance**
- **Humidity** (sensor type: **RFS**)
- **Rain** (sensor type: **RES**)

Also select the **process variable** for the measured variables **Voltage** and **Resistance**:

- | | | |
|-------------------------------------|---|-------------------------|
| • dimensionless | • Absolute humidity | • Amperage mA |
| • dimensionless (.1) | • Pressure bar, mbar, Pascal | • Amperage A |
| • Performance factor | • Liter | • Resistance |
| • dimensionless (.5) | • Cubic meter | • Speed km/h |
| • Temperature °C | • Flow rate (l/min, l/h, l/d, m³/min, m³/h, m³/d) | • Speed m/s |
| • Global radiation | • Output | • Degree (angle) |
| • CO₂-content ppm | • Voltage | |
| • Percent | | |

Then you must use scaling to define the value range.

Example Voltage/Global radiation:

Scaling	
Input value 1	0,00 V
Target value 1	0 W/m ²
Input value 2	3,00 V
Target value 2	1500 W/m ²

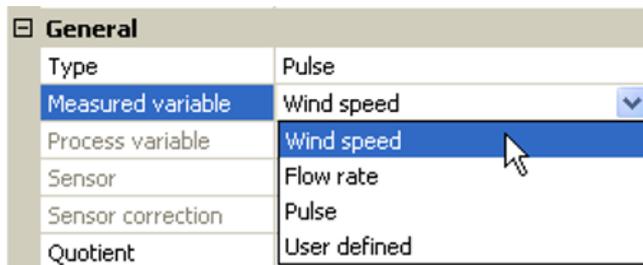
0.00 V equates to 0 W/m², 3.00 V yields 1500 W/m².

Pulse input

Inputs **5 - 6** can capture pulses of **max. 20 Hz** and at least **25 ms** pulse duration (**50** pulses).

Inputs **1 – 4** can capture pulses with **max. 10 Hz** and a pulse duration of at least **50 ms**.

Select the measured variable



Wind speed

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

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

Quotient	0,05 Hz
----------	---------

Setting range: 0,01 – 1,00 Hz

Flow rate

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

Quotient	0,5 l/Imp
----------	-----------

Setting range: 0,1 – 100,0 l/Pulse

Pulse

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

User defined

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

Quotient	0,50000 l/imp
Unit	l
Time unit	/h

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

Units: l, kW, km, m, mm, m³.

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

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

Quotient	0,00125 kWh/imp
Unit	kW
Time unit	

Designation

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

Sensor type Analogue / Temperature:

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

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

Sensor correction

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

Example: Pt1000 temperature sensor

General	
Type	Analogue
Measured variable	Temperature
Process variable	
Sensor	PT 1000
Sensor correction	0,2 K

Average

Average	1,0 sec
---------	---------

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

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

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

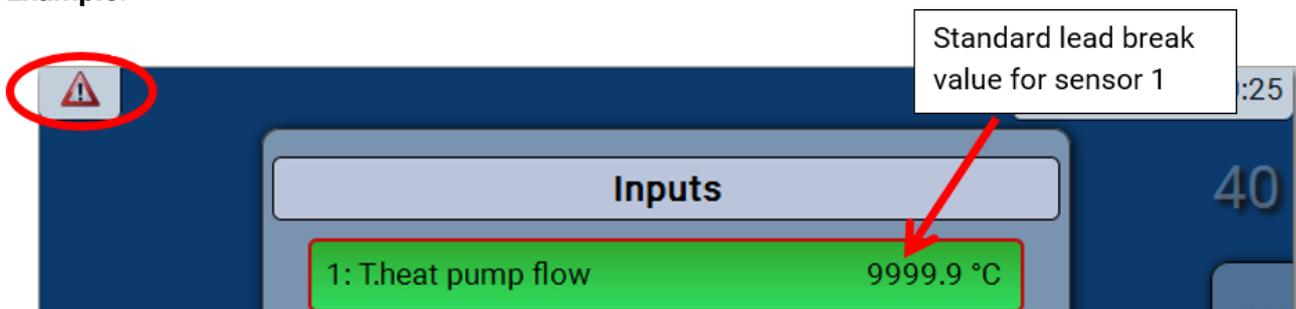
For simple measuring tasks, around 1 - 3 seconds should be selected. For hygienic domestic hot water heating with the ultra-fast sensor, 0.3 - 0.5 seconds should be selected.

Sensor check for analogue sensors

Sensor check	
Sensor check	Yes
Short circuit threshold	Standard
Threshold value	
Short circuit value	Standard
Output value	
Lead break threshold	Standard
Threshold value	
Lead break value	Standard
Output value	

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

Example:



Sensor error

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

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

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

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

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

Example: If the temperature value falls below the threshold of 0 °C (= "Threshold value"), a value of 0.0 °C (= "Output value") is issued and displayed for that sensor (fixed hysteresis: 1.0 °C). At the same time the "Sensor error" status is set to "Yes".

☐ Sensor check	
Sensor check	Yes
☐ Short circuit threshold	
Threshold value	0,0 °C
☐ Short circuit value	
Output value	20,0 °C

1: T.room
20.0 °C

If the sensor falls below 0 °C, 20 °C will consequently be displayed as the measurement value, and at the same time a sensor error will be displayed (with a red border).

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

In the case of **voltage measurements** on inputs (max. 3,3V), note that the internal resistance of the **voltage source** must not exceed 100 ohms otherwise the accuracy will be less than that specified in the technical data.

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

Table of resistances of various sensor types

Temp.		0	10	20	25	30	40	50	60	70	80	90	100
PT1000	[Ω]	1000	1039	1078	1097	1117	1115	1194	1232	1271	1309	1347	1385
KTY (2kΩ)	[Ω]	1630	1772	1922	2000	2080	2245	2417	2597	2785	2980	3182	3392
KTY (1kΩ)	[Ω]	815	886	961	1000	1040	1122	1209	1299	1392	1490	1591	1696
PT100	[Ω]	100	104	108	110	112	116	119	123	127	131	135	139
PT500	[Ω]	500	520	539	549	558	578	597	616	635	654	674	693
Ni1000	[Ω]	1000	1056	1112	1141	1171	1230	1291	1353	1417	1483	1549	1618
Ni1000 TK5000	[Ω]	1000	1045	1091	1114	1138	1186	1235	1285	1337	1390	1444	1500

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

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

NTC sensors

Sensor	NTC
Sensor correction	0,0 K
R25	10,00 kΩ
Beta	3800

For evaluating the NTC sensors, the R25 value and the beta value must be specified. The nominal resistance R25 is always based on 25 °C.

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

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

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

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

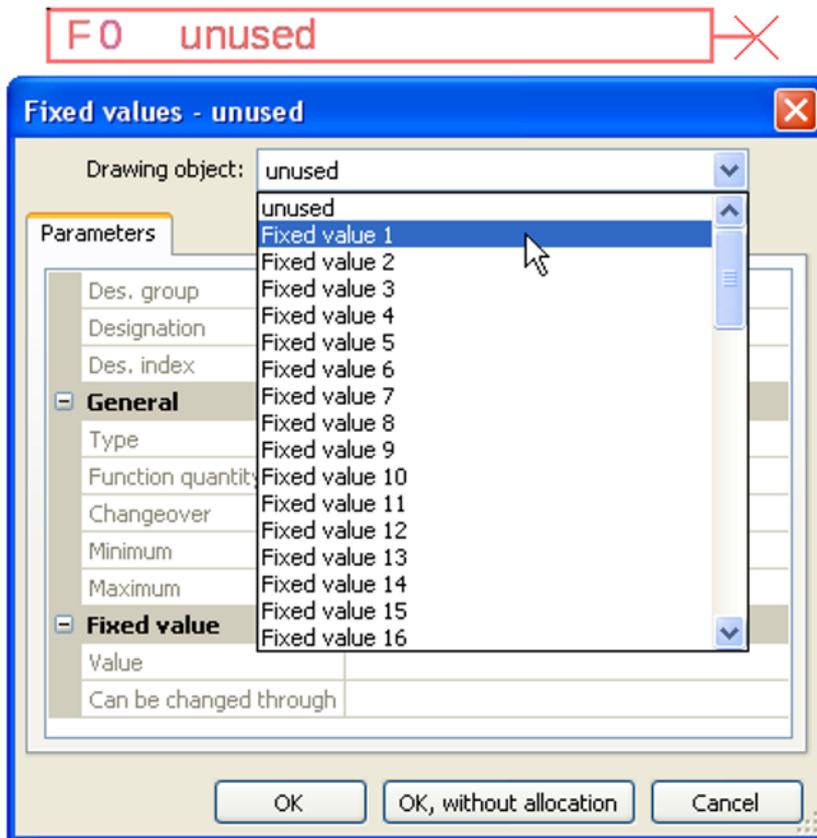
All temperatures in the formula must be given as **absolute temperatures in K** (Kelvin) (e.g. +20 °C = 273.15 K + 20 K = 293.15 K)

ln	Natural logarithm
R1 _(NT)	Resistance at the minimum temperature of the temperature range
R2 _(HT)	Resistance at the maximum temperature of the temperature range
T1 _(NT)	Minimum temperature of the temperature range
T2 _(HAT)	Maximum temperature of the temperature range

Fixed values

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

Example:



Fixed value type

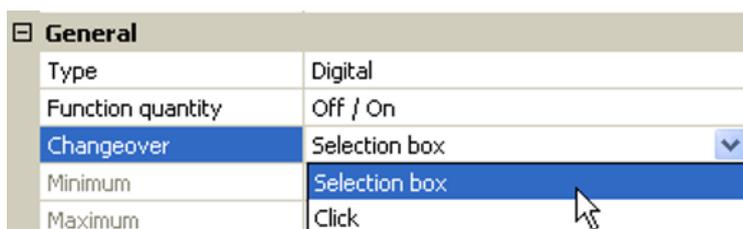
Once the required fixed value is selected, the fixed value type can be defined.

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

Digital

Select the **measured variable**:

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



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

Analogue

Select from a wide range of units and dimensions

General	
Type	Analogue
Function quantity	dimensionless
Changeover	dimensionless
Minimum	dimensionless(,1)
Maximum	Performance factor
Fixed value	
Value	Temperature °C
Can be changed through	Global radiation

Minimum	50,0 °C
Maximum	65,0 °C
Fixed value	
Value	55,0 °C

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

Pulse

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

Example:

Fixed values - Fixed value 1 - unused ✖

Drawing object: Fixed value 1

Parameters

Des. group	
Designation	
Des. index	
General	
Type	unused
Function quantity	unused
Changeover	Digital
Minimum	Analogue
Maximum	Pulse
Fixed value	
Value	
Can be changed through	

General	
Type	Pulse
Function quantity	ON pulse
Changeover	ON pulse
Minimum	OFF pulse

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

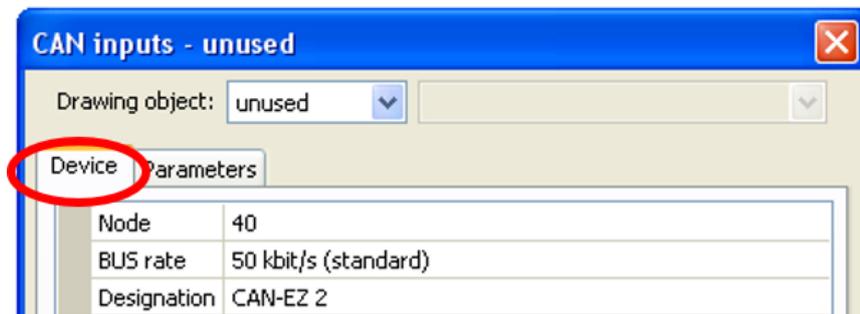
CAN bus

The CAN network allows communication between CAN bus devices. When analogue or digital values are sent via CAN **outputs**, other CAN bus devices can utilize those values as CAN **inputs**.
Up to 62 CAN bus devices can be operated in one network.
Every CAN bus device must be given its own node number in the network.

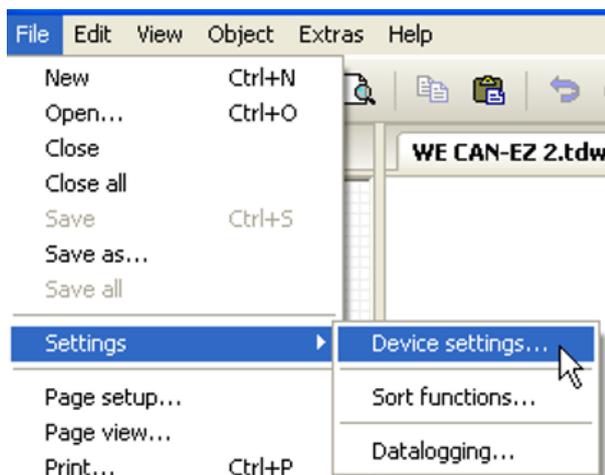
The **cable topology** of a CAN bus network is described in the installation instructions.

If a CAN input or CAN output is inserted into the drawing, the controller settings can be defined for the first time. These settings then apply to all other CAN elements as well.

CAN settings for the CAN-EZ2



These settings can also be entered in the menu "File / Settings / Device settings...":



Node

Define a **unique** CAN node number for the device (setting range: 1 – 62). The factory-set node number of the module is 40. The device with node number 1 provides the time stamp for all other CAN bus devices.

Bus rate

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

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

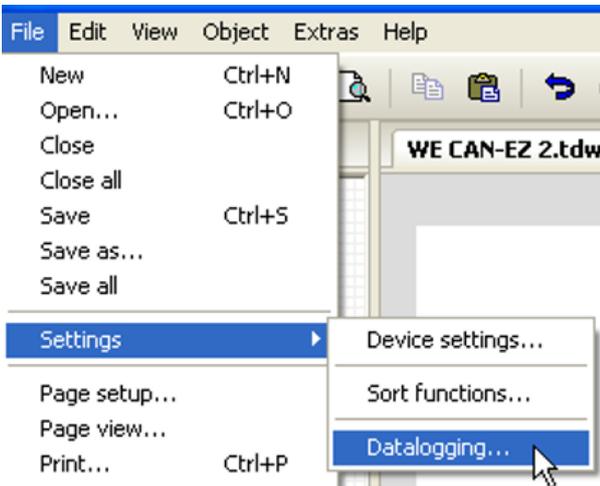
The bus rate can be set to between 5 and 500 kbit/s, with lower bus rates allowing longer cable networks (see installation instructions).

Designation

Parameters	
Node	40
BUS rate	50 kbit/s (standard)
Designation	Heat pump

Every CAN-EZ2 can be assigned its own designation.

Datalogging



This menu is used to define the parameters for CAN datalogging of analogue and digital values.

Example: TAPPS2 predefines the programmed inputs and outputs by default. This default setting can be changed or expanded.

The 'Datalogging' dialog box is shown with the 'Available parameters' list on the left and the 'Analogue values' and 'Digital values' list on the right. A hand icon with a circular arrow indicates a drag-and-drop action.

Analogue values	Digital values
ANALOGUE 1	Input 1: T.heat pump flow - Measurement
ANALOGUE 2	unused
ANALOGUE 3	Input 3: T.heat pump rtn - Measurement
ANALOGUE 4	unused
ANALOGUE 5	Input 5: Flow rate chrg circ. - Measurement
ANALOGUE 6	unused
ANALOGUE 7	unused
ANALOGUE 8	Function: Heat meter 1 - Output
ANALOGUE 9	Function: Heat meter 1 - Kilowatt hours total
ANALOGUE 10	Function: Energy meter 1 - Output
ANALOGUE 11	Function: Energy meter 1 - Kilowatt hours total
ANALOGUE 12	Function: Current perf. Factor - Result
ANALOGUE 13	Function: Performance factor - Prev. day value
ANALOGUE 14	unused
ANALOGUE 15	unused
ANALOGUE 16	unused
ANALOGUE 17	unused
ANALOGUE 18	unused
ANALOGUE 19	unused
ANALOGUE 20	unused
ANALOGUE 21	unused
ANALOGUE 22	unused
ANALOGUE 23	unused
ANALOGUE 24	unused
ANALOGUE 25	unused
ANALOGUE 26	unused
ANALOGUE 27	unused
ANALOGUE 28	unused
ANALOGUE 29	unused
ANALOGUE 30	unused
ANALOGUE 31	unused

Buttons: =>, <=, Delete all, Load standard, OK, Cancel

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

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

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

Each CANEZ2 can issue a maximum of 64 digital and 64 analogue values that are defined in the menu "**CAN bus/datalogging**" of the CANEZ2.

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

Note: Digital inputs must be defined within the range of **digital** values.

All counter functions (energy meters, heat meters, counters)

Any number of counter functions (but a maximum of 64 analogue values) can be logged. Like all other analogue values, the counter values to be logged are entered into the "Analogue datalogging" list.

CAN analogue inputs

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



Node number

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

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

General	
Node number	1
Output number	1

Designation

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

Example:

Parameters	
Des. group	Temperature actual value
Designation	T.collector
Des. index	1

CAN bus timeout

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

General	
Node number	1
Output number	1
CAN BUS timeout	00:20 [hh:mm]

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

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

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

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

Unit

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

Unit	
Measured variable	Automatic

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

Unit	
Measured variable	User def.
Unit	Temperature °C
Sensor correction	0,0 K

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

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

Value at timeout

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

Value at timeout	Unchanged
Output value	Unchanged
Sensor check	User def.
Sensor check	Yes



Value at timeout	User def.
Output value	20,0 °C

Sensor check

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

☐ Sensor check	
Sensor check	Yes

Sensor error

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

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

☐ Sensor check	
Sensor check	Yes
☐ Short circuit threshold	Standard
Threshold value	
☐ Short circuit value	Standard
Output value	
☐ Lead break threshold	Standard
Threshold value	
☐ Lead break value	Standard
Output value	

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

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

☐ Sensor check	
Sensor check	Yes
☐ Short circuit threshold	Standard
Threshold value	Standard
☐ Short circuit value	User def.
Output value	

↓

☐ Short circuit threshold	User def.
Threshold value	0,0 °C

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

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

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

CAN digital inputs

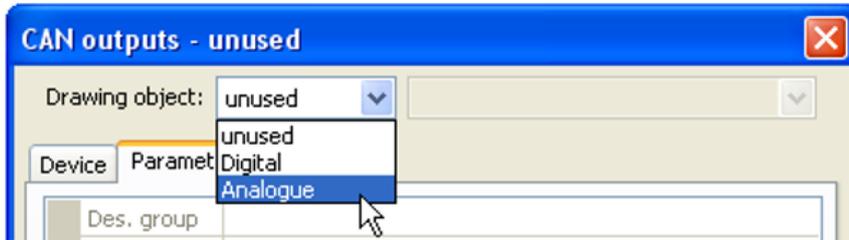
Up to 64 CAN digital inputs can be programmed. They are defined by specifying the **transmission** node number and the number of the **transmission** node's CAN output.

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

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

CAN analogue outputs

Up to 32 CAN analogue outputs can be programmed. They are defined by specifying the **source** in the CAN-EZ2.



Link to the source in the CAN-EZ2, which supplies the value for the CAN output.

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

Example: Source Input 3

Input variable	
Source type	Input
Source	3: T.outside
Variable	Measurement

Designation

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

Example:

Des. group	Temperature actual value
Designation	T.outside
Des. index	

Transmission condition

Example:

Transmission condition	
If change >	10
Blocking time	00:10 [mm:ss]
Interval time	5 min

If change > 10	A new transmission will be made if the current value has changed by more than the quantity specified (1.0 K in this example) compared to the last transmitted value. In the module, the unit of the source is applied together with the corresponding decimal place. (minimum setting: 1)
Blocking time 00:10 [mm:ss]	If the value changes by more than 1.0 K within 10 seconds of the last transmission, the value is nevertheless only transmitted again after 10 seconds. (minimum setting: 1 sec.)
Interval time 5 min	The value is transmitted every 5 minutes even if it has not changed by more than 1.0 K since the last transmission. (minimum setting: 1 minute)

CAN digital outputs

Up to 32 CAN digital outputs can be programmed. They are defined by specifying the **source** in the CAN-EZ2.

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

Designation

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

Example:

Device	Parameters
Des. group	Output general
Designation	Heat pump demand
Des. index	

Transmission condition

Example:

Transmission condition	
If change	Yes
Blocking time	00:10 [mm:ss]
Interval time	5 min

If change Yes/No	Transmission of the value if a status change occurs
Blocking time 00:10 [mm:ss]	If the value changes within 10 seconds of the last transmission, the value is nevertheless only transmitted again after 10 seconds (minimum setting: 1 sec.).
Interval time 5 min	The value is transmitted every 5 minutes even if it has not changed since the last transmission (minimum setting: 1 minute).

DL bus

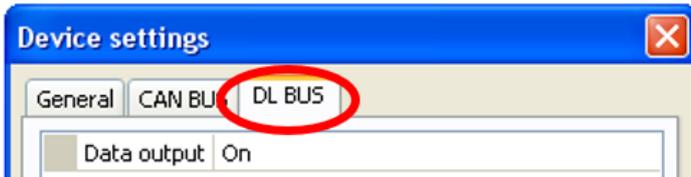
The DL bus acts as a bus cable for various sensors.

The DL bus is a bidirectional data link and is only compatible with products from Technische Alternative. The DL bus network operates independently of the CAN bus network.

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

The **cable topology** of a DL bus network is described in the controller's installation instructions.

DL settings



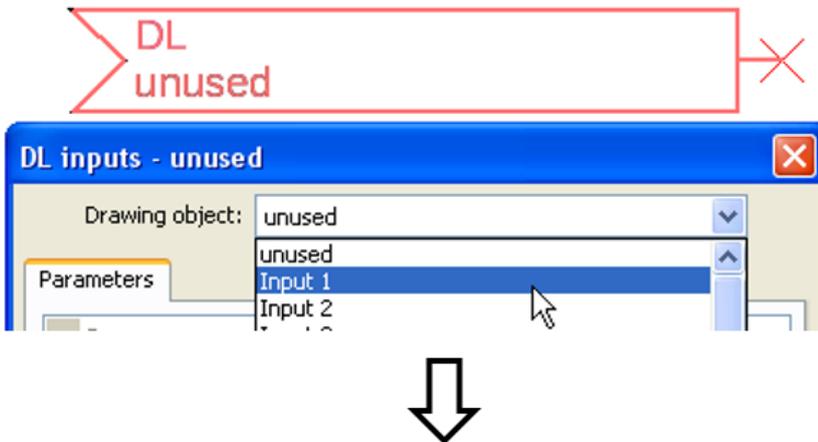
In the menu File / Settings / Device settings / DL BUS, you can activate or deactivate the data **output** for **datalogging** via the DL bus and for display on the **RAS-PLUS** room sensor.

DL input

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

Up to 32 DL inputs can be programmed.

Example: Programming the parameters of DL input 1



Select: Analogue or digital

General	
Type	Analogue
Address	1
Index	1

DL bus address and DL bus index

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

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

Designation

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

Example:

Parameter	
Des. group	Temperature actual value
Designation	T.solar flow
Des. index	

DL bus timeout

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

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

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

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

Unit

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

Unit	
Measured variable	Automatic

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

Unit	
Measured variable	User def.
Unit	Temperature °C
Sensor correction	0,0 K

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

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

Value at timeout

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

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

Value at timeout	Unchanged
Output value	Unchanged
Sensor check	User def.
Sensor check	No



Value at timeout	User def.
Output value	20,0 °C

Sensor check

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

Sensor check	
Sensor check	Yes

Sensor error

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

Sensor check	
Sensor check	Yes
Short circuit threshold	Standard
Threshold value	
Short circuit value	Standard
Output value	
Lead break threshold	Standard
Threshold value	
Lead break value	Standard
Output value	

If the **Standard** thresholds are selected, a short circuit will be indicated if the value falls below the **measurement limit** and a lead break will be indicated if the value exceeds the **measurement limit**. The **Standard** values for temperature sensors are -9999.9 °C for a short circuit and 9999.9 °C for a lead break. Those values are utilised in the internal calculations in the event of an error.

Sensor check	
Sensor check	Yes
Short circuit threshold	Standard
Threshold value	Standard
Short circuit value	User def.
Output value	

↓

Short circuit threshold	User def.
Threshold value	0,0 °C

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

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

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

DL digital inputs

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

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

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

Bus load of DL sensors

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

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

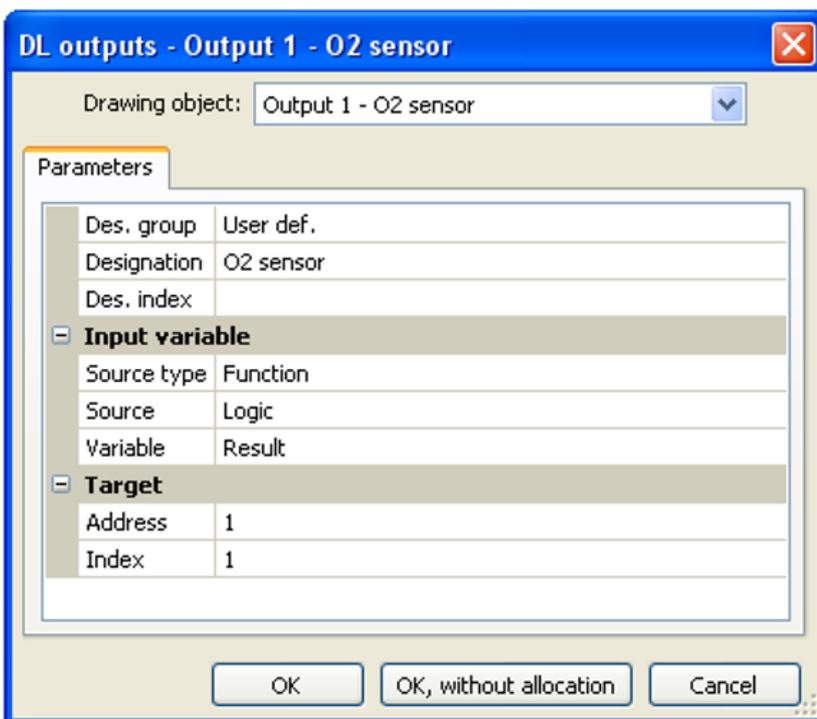
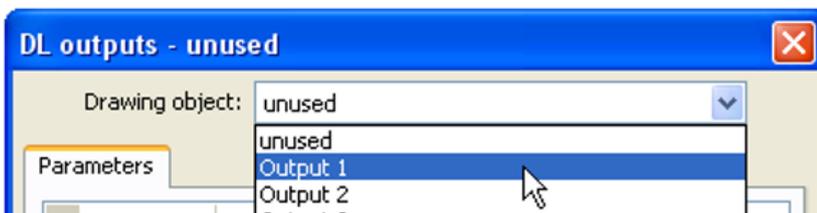
The CAN-EZ2 supplies the maximum **100 %** bus load. The bus loads of the DL sensors are listed in the technical data of each DL sensor.

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

DL output

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

Example: Programming the parameters of DL output 1



Entering the designation

Specify the source in the controller which supplies the value for the DL output.

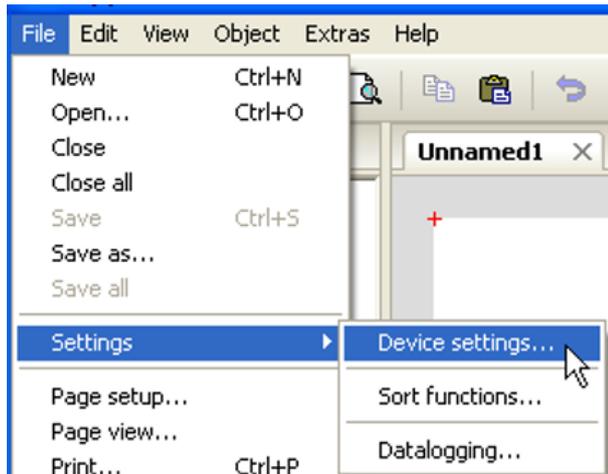
- **Inputs**
- **Outputs**
- **Functions**
- **Fixed values**
- **System values**
- **CAN bus analogue**
- **CAN bus digital**

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

Provision has been made for the specification of an index number, but there is not yet any DL bus device which requires that specification.

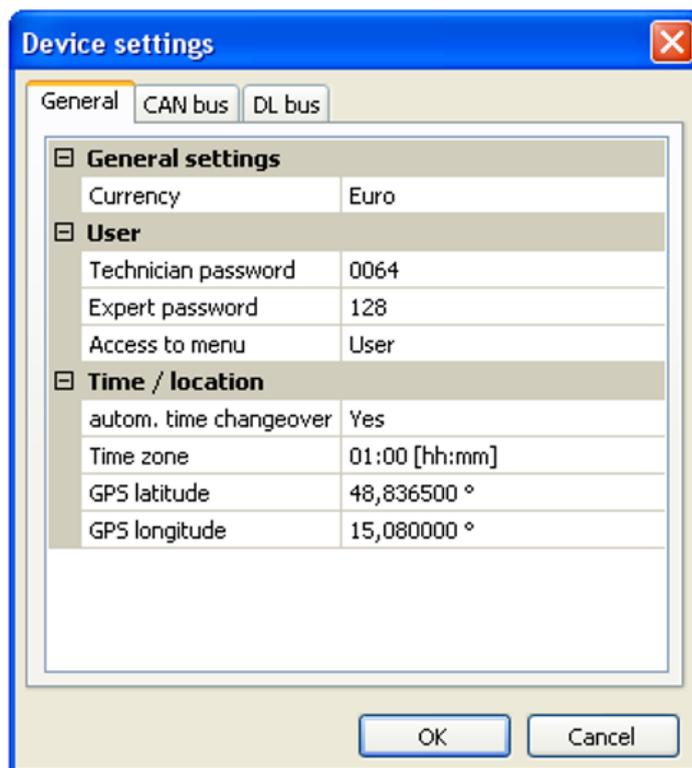
For the activation of the O₂ sensor, the index therefore has no effect and can be ignored.

Device settings



This menu allows global settings to be made for the module, the CAN bus and the DL bus.

General



Currency

Select the currency for yield metering

Technician / Expert password

Entry of the passwords for this programming

Access to menu

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

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

Time / location

- **Automatic time change** – If "**Yes**", the time will switch over automatically to summertime according to the specifications of the European Union.
- **Time zone** – 01:00 means the time zone "**UTC + 1 hour**". **UTC** stands for "Universal Time Coordinated", also known as GMT (= Greenwich Mean Time).
- **GPS latitude** – Geographical latitude according to GPS (= global positioning system)
- **GPS longitude** – Geographical longitude according to GPS

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

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

CAN / DL bus

These settings are described in the CAN bus and DL bus chapters.

Main menu (access via C.M.I.)

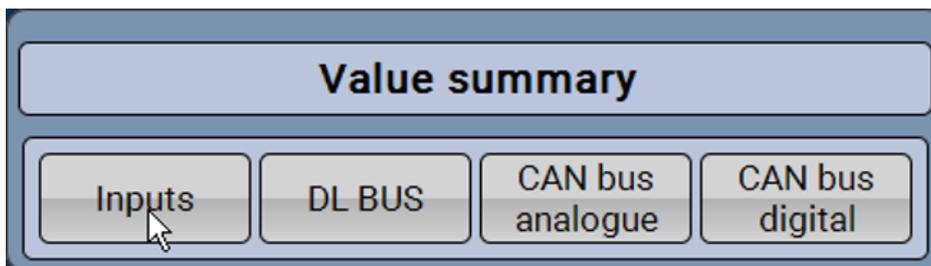


Date / time / location

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

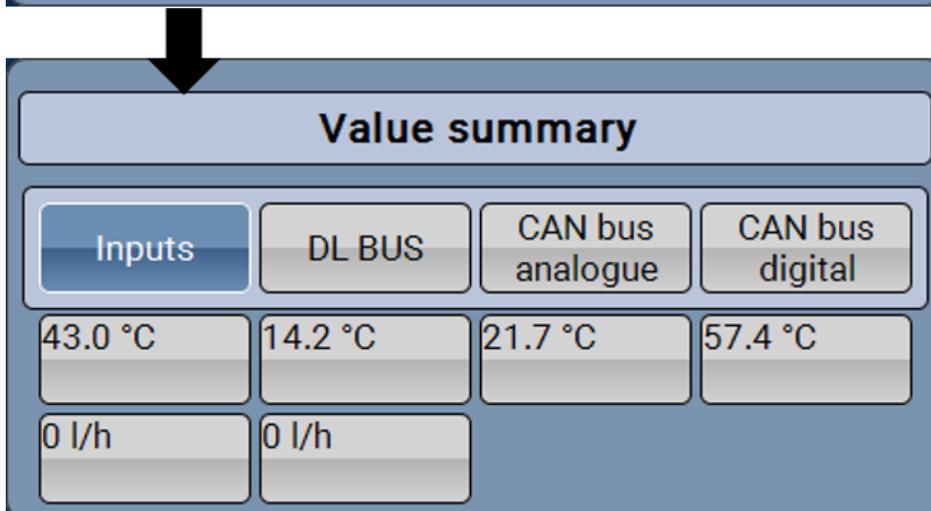
The date and time are adopted from network node 1 and cannot be changed in the CAN-EZ. Since the CAN-EZ has no clock function of its own, a UVR16x2/UVR610 or UVR1611 controller or a C.M.I. must have node number 1.

Value summary



The value summary shows all input CAN bus and DL values.

The overview is divided into 4 sections:



The values are displayed when one of the sections is selected.

Inputs, fixed values, CAN bus, DL bus, General settings

The programming of these values has already been described in chapter "Programming with TAPPS2" and is performed via the C.M.I. in a similar fashion.

Functions

All functions of the UVR16x2 controller are available. **You can choose from 43 different functions and can create up to 44 functions.** Functions can also be applied multiple times.

Only the 4 most important functions for the actual purpose of the CAN energy meter are described below.

The description of all other functions and general information about the functions are included in the programming manuals for the UVR16x2/UVR610 or RSM610 controller.

Definitions

COP value (COP= Coefficient of Performance)

Ratio of the output heat power (kW) to the consumed electrical operating power incl. auxiliary energy **under test conditions** (defined temperature conditions, defined time points).

$$\text{cop} = Q_{WP} / P_{el}$$

The COP value also includes the power of auxiliary units (thawing energy, fraction of pump capacity for heating, brine or groundwater heat pumps).

Consequently the COP value is a good criterion for heat pumps.

Test institutes determine this value according to a defined measuring method (DIN EN 255).

However performance number and COP value do not allow any energy-based evaluation of the over-all system. They are only a snapshot of certain heat pump (HP) type under favourable operating conditions (e.g. at 35°C flow temperature). The (yearly) performance factor is much more meaningful for a **system**.

Performance factor β

The performance factor is the actual COP during operation.

It is the ratio of the heat energy yield (kWh) to the consumed operating and auxiliary power kWh) over a given time period:

$$\beta = W_{\text{Useful}} / W_{el}$$

The more important performance factor for the efficiency of a system is therefore the (annual) performance factor β .

This is the result of **measurements** at the electricity meter for the supplied electrical energy (compressor, heat source pump) and at the heat meter (output thermal energy of the heat pump) over a given time interval. If the interval is one year, then the annual performance factor or annual COP is referred to.

Energy manager

Function description

The energy manager manages up to 12 output control functions. The (usually) available surplus output measured and calculated by the CAN-EZ3 is divided between the **output controls** involved due to various parameters and user defined priorities.

Input variables

Enable	General enabling of the function (digital value ON/OFF)
Power from grid	Power currently being drawn from the grid <ul style="list-style-type: none"> Negative when power is being exported to the grid Positive when power is being drawn from the grid
Set value	Set value for power drawn from the grid

- The **Power from grid** input variable is best linked to the **system value "Total active power"** of the energy meter used.
- The set value (factory setting: -500 W) makes it possible to prevent power being drawn from the grid for brief periods (= tolerance value).
Without this kind of tolerance value, a set output level may be specified for the consumer that cannot be generated by the system (any longer), with the result that power is briefly drawn from the grid to meet the set output level. By specifying a negative value, power is exported to the grid instead.

Parameters

No. of involved functions	No. of involved output control functions
Involved functions	Click once and then you can specify the involved output control functions.
Priority	Priorities can be assigned here to the output control functions that are set as involved. When surplus power is available, it is first used by the output control with priority 1 (= highest priority). The function with the next highest priority does not become active until the first function's max. consumer output is reached.

- It is not necessary to establish a link to the output control functions. Instead, the **Involved functions** parameter is used.

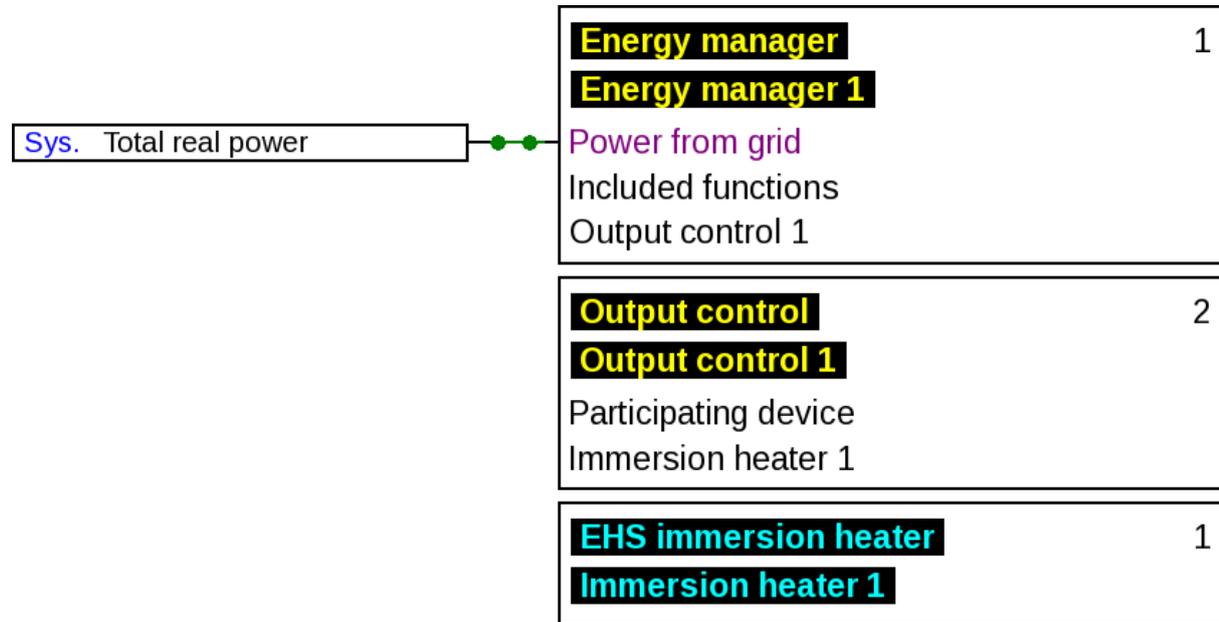
Output variables

Residual power	Amount of available power not used
Power used	Amount of available power used

- These output variables are only used for display purposes, e.g. in a function overview. The consumers are linked to the output variables of the involved output control functions.

Example of a standard diagram

Energy manager with output control
CAN-EZ3 and EHS(-R)



Output control

Standard diagram

See **Energy manager** function description.

Function description

The output control function is used to control loads (e.g. **EHS** immersion heater or **LST** output controller) according to the specifications of the **energy manager** function, or by means of forced operation.

When used with an **energy manager** function, output control is specified in this function's parameters as an **involved function**. Up to 12 output controls can be managed by one energy manager.

For use without an **energy manager** function, the **forced operation** and **forced operation output** input variables are used. The output can then be specified manually or by any other control event.

With the **Participating CORA device** parameter, **Output control** makes it possible to control a device using the "CORA" wireless system. Further information on this wireless system can be found in the installation instructions for the corresponding devices.

Input variables

Enable	General enabling of the function (digital value ON/OFF)
Minimum output	Upper and lower limits of the output to be consumed
Maximum output	
Start differential	<p>The consumer is not activated until the minimum output + start differential is reached.</p> <p>The consumer is deactivated again when the output falls below minimum output.</p> <p>Operation proceeds, taking account of the minimum runtime, stop delay and blocking time parameters.</p>
Forced operation	The consumer is enabled without taking account of the specifications of the energy manager (digital value ON/OFF).
Forced operation output	Set output when forced operation is active.
<ul style="list-style-type: none"> When used in conjunction with an energy manager, the set output comes from that function; otherwise from the forced operation output input variable. <ul style="list-style-type: none"> Forced operation takes precedence over the specifications of the energy manager function. The value of the maximum output input variable should not exceed the maximum output of the consumer (e.g. 3 kW for an EHS immersion heater). 	

Parameters	
Cycle time	Specifies the cycle in which the calculation of the output control should occur. Delayed responses of consumers can be compensated. This parameter also affects the higher ranking energy manager.
Minimum runtime	If the consumer is activated, it may only be deactivated again after this time has elapsed.
Run-on time	If the consumer is to be deactivated, it continues to run for this time until it is actually deactivated.
Pause time	If the consumer is deactivated, it may only be reactivated after this time has elapsed.
Involved network node (display only for devices with x2 wireless)	If the function is to control a device via x2 wireless, this is defined here. A link must first be established with the device in the Network node menu.
<ul style="list-style-type: none"> • Cycle time: If the values of the output control are transmitted, for example, via the CAN bus to a controller, which switches the consumer, the calculation of the function is much quicker than values can be transferred via the CAN bus. This can have a negative impact on delayed responses of the control characteristics (system starts to oscillate). The cycle time should be matched to the transfer time of the bus. • The minimum runtime, run-on time and pause time parameters also apply to forced operation. 	

Output variables	
Correcting variable	Selection of an analogue output for consumer output modulation Displays the percentage of modulated output specified for the selected analogue output (0-100 %)
Status	Selection of the switching output of the consumer Display ON/OFF
Effective set output	Output to be consumed at the moment (specified by the energy manager function)
Minimum runtime meter	Meter for the remaining minimum runtime (see Parameters)
Run-on time meter	Meter for the remaining run-on time (see Parameters)
Pause time meter	Meter for the remaining pause time (see Parameters)
Cycle timer	Meter for the remaining cycle time (see Parameters)
<ul style="list-style-type: none"> • The effective set output and the meters are for display only. 	

Energy meter

Function description

The energy meter takes the **analogue** value for **energy output** from other sources (e.g. CAN energy meter CAN-EZ) and meters the energy according to that value.

Input variables

Enable	General enabling of the function (digital value ON/OFF)
Output	Analogue value specifying the energy output in kW (to two decimal places)
Meter reset	Digital input signal, ON/OFF, to reset the meter
Price / unit	Input of a price per unit (1 kWh)

- When the energy output value is adopted, note that two decimal places must be included. **Example:** A dimensionless number 413 will be adopted as 4.13 kW.
- If the energy output values are negative, note that the metering will be negative as well, i.e. the metered values can also become negative.
- The **meter reset** is carried out by means of a digital ON pulse or manually from the parameter menu. It will delete **all** meter readings, in other words also those from previous periods.
- When the **Price / unit** is transferred from a source, note that five decimal places must be included. **Example:** A dimensionless number without a decimal point such as 413 will be adopted as 0.00413. If the source is a **Fixed value**, the unit used should not be a currency (Euro or Dollar) but rather **Dimensionless (.5)**.

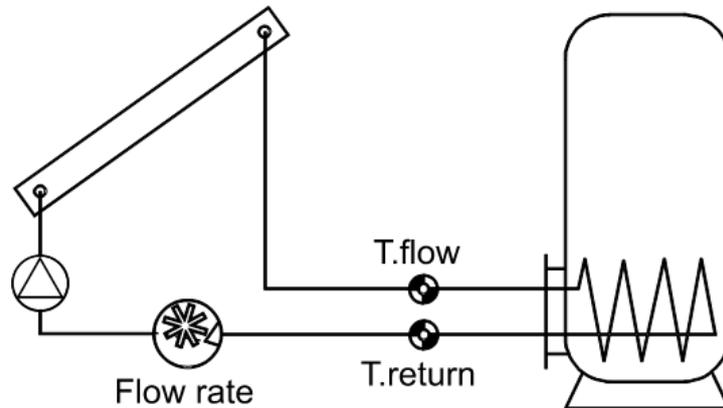
Parameters

Factor	Optional: enter an integral factor (a whole number) for the multiplication of the input value
Delete meter reading	Pressing this button opens a confirmation prompt, followed by a reset of all meter readings, including those from previous periods.

Output variables	
Output	The energy output, with the factor applied
Day meter reading	
Prev. day meter reading	
Week meter reading	
Prev. week meter reading	
Month meter reading	
Prev. month meter reading	
Year meter reading	
Prev. year meter reading	
Kilowatt hours total	
Day sum	
Previous day sum	
Week sum	
Prev. week sum	
Month sum	
Prev. month sum	
Year sum	
Prev. year sum	
Sum total	
<ul style="list-style-type: none"> • PLEASE NOTE: The meter readings from the Energy meter function module are saved to the internal memory every hour. Therefore, in the event of a power failure, no more than 1 hour of metering can be lost. • When loading function data, you will be prompted whether you want to apply the saved meter readings (see the Programming Part 1: General information manual). • The changeover of the Week meter occurs on Sundays at 24:00 h. • The meter readings can also be deleted manually in the parameter menu. 	

Heat meter

Standard diagram



Function description

Calculation of thermal output and metering of thermal energy via the temperature differential $T_{\text{flow}} - T_{\text{return}}$ and the flow rate, and allowing for the antifreeze component in the heat transfer medium.

Input variables

Enable	General enabling of the function (digital value ON/OFF)
Flow temperature	Analogue input signal for the flow temperature
Return temperature	Analogue input signal for the return temperature
Flow rate	Analogue input signal for the flow rate
Meter reset	Digital pulse input signal, ON/OFF, to reset the meter
Specific heat capacity	Optional: Analogue value specifying the heat capacity of the fluid in the measured system
Price / unit	A price per kWh for yield calculations

- The **BFPT1000 5x60MM** sensors fitted in the **KH ball valve** from Technische Alternative are particularly suitable for temperature measurement. The sensors can be removed with little effort for the calibration process.
- With a solar thermal system, the collector sensor can also be used as the flow sensor. For that to be possible, it must be installed in a sensor well at the flow outlet of the collector header. However, the captured amount of heat will then also include the losses in the solar flow line.
- Entering **User** as the source in the **Flow rate** input variable allows a fixed value to be entered as the flow rate instead the flow rate captured by a flow sensor.
- The **meter reset** is carried out by a digital ON pulse or manually in the parameter menu. It will delete **all** meter readings, in other words also those from previous periods. The meter will be blocked as long as this input variable is set to ON. The meter reset also works when Enable = Off.
- **Specific heat capacity:** This optional specification must be entered as a multiple of the unit **0.01 kJ/l*K** as a **dimensionless** number. **Example:** Pure water has a heat capacity of 4.18 kJ/l*K at 20 °C, so a dimensionless value of 418 must be entered for this heat capacity (at 20 °C).
N.B.: The heat capacity of fluids is temperature-dependent. The value entered should therefore be a variable value dependent on the temperature (e.g. from the Curve function).

Parameters	
Frost protection (shown only if the Specific heat capacity input variable is unused)	Specification of the antifreeze component in %
Reversing block	Available for selection: Yes / No
Status Calibration value	Display: Not calibrated or Calibrated Display of the differential T.flow – T.return measured during the calibration process (in Not calibrated status this value must be 0.0 K)
Start calibration	Select to start the calibration process (Note the section Calibration process!)
Delete calib. values	This can be used to undo the calibration. It resets the calibration value to 0.
Delete meter reading	Button for deleting all meter readings
<ul style="list-style-type: none"> • Antifreeze component (frost protection): An average has been calculated from the product specifications of all the major manufacturers and tabulated in relation to the mixing ratio. Under typical conditions this method results in an additional error of no more than one per cent. • Reversing block: Entering No permits negative metering; entering Yes means that the heat meter will only be able to meter positive values. • The tolerance of sensors and measuring device can sometimes lead to substantial errors in the calculation of the differential temperature. The device has a calibration process to compensate this error. • After selecting Start calibration, the user is prompted to confirm. If the calibration was performed by mistake or incorrectly, the result can be undone with Delete calib. values and/or corrected by means of a new calibration. 	
<h3>Calibration process</h3> <p>By simultaneously measuring the same temperature with both sensors, the deviation of the sensors from each other can be ascertained and included as a correction factor in future calculations.</p> <p>The calibration affects only the sensor values in the Heat meter function and is <u>not</u> factored into other functions.</p> <p>During the calibration process, it is very important that both sensors (flow and return) capture the same temperatures. This is achieved by binding the two sensor tips together with a piece of tape or wire. Both sensors should also be fitted now with the lead extensions which will be used later, so that the electrical resistances of the leads are included. If the collector sensor is being used, the required lead length should be estimated and integrated. The sensors must be connected to the two programmed inputs for flow and return and are immersed together in hot water (so that both are exposed to the same temperature).</p> <p>Calibration process:</p> <ol style="list-style-type: none"> 1. Immerse the sensors in the water. 2. Start the calibration process and confirm. Status display: Calibrated. 3. The calibration values displayed in the parameters and the corrected return temperature is included in the output variables. 	

Notes on accuracy

The accuracy of all measured energies and energy flows depends on many factors and is to be subject to closer consideration here.

- PT1000 **class B** temperature sensors have an accuracy of +/- 0.55 K (at 50 °C).
- Errors in temperature capture by the X2 device are typically +/- 0.4 K per channel.

For an assumed spread of 10 K, these two measuring errors result in a **maximum** measuring error between the flow and return of +/- 1.90 K = +/- **19.0 %** for class B and +/- 13.0 % for class A.

- At a lower spread, the percentage measuring error **increases**
- The accuracy of the FTS 4-50DL flow sensor is approx. +/- **1.5 %**

In the **worst case** scenario, the maximum overall measuring error for heat metering therefore equals:

$$1.19 \times 1.015 = 1.208$$

This means heat metering accuracy of +/- **20.8 %** in the **worst case scenario** (at 10 K spread, **without calibrating** the temperature sensors), although all measuring errors would then skew the results to the **same** extent.

Experience has shown that a worst case scenario **never** actually occurs and in an unfavorable scenario, half of this value can be expected. However, even 10.4 % is not justifiable.

After **calibrating** the temperature sensors (see above), the measuring error of the overall temperature measurement reduces to a maximum 0.3 K. Relative to the spread of 10 K as assumed above, this equals a measuring error of 3 %.

The maximum overall measuring error for the performance factor therefore equals:

$$1.03 \times 1.015 = 1.045$$

At a **10 K spread** and **with calibrated** temperature sensors, heat metering accuracy therefore improves for the **worst case scenario** to +/- **4.5 %**.

Output variables	
Output	Display of the current thermal output in kW (to two decimal places)
Corrected return temperature	Display of the return temperature corrected by the calibration process
Differential (Tflow-Trtn corr)	Display of the current temperature differential between the flow and corrected return temperature, which is critical for the heat meter
Day meter reading	} Meter readings
Prev. day meter reading	
Week meter reading	
Prev. week meter reading	
Month meter reading	
Prev. month meter reading	
Year meter reading	
Prev. year meter reading	
Kilowatt hours total	
Day sum	
Previous day sum	
Week sum	
Prev. week sum	
Month sum	
Prev. month sum	
Year sum	
Prev. year sum	
Sum total	
<ul style="list-style-type: none"> • ATTENTION: The meter readings from the Heat meter function module are saved to the internal memory every hour. Therefore, in the event of a power failure, no more than 1 hour of metering can be lost. • When loading function data, you will be asked whether you want to apply the saved counter readings (see manual Programming Part 1: General information). • If the flow temperature is lower than the return temperature, the meter will count negative energy if the reversing block is set to No. The meter reading will be reduced as a result. • The changeover of the Week meter occurs on Sundays at 24:00 h. 	

Date-specific memory

Function description	
<p>The date-specific function enables daily, monthly and annual recording of meter readings. The 2 different versions allow either the total meter readings for specific times, or the values for a time period (day, month, year) to be established.</p> <p>The integral mathematics function can, for example, calculate the performance factor of a heat pump.</p>	

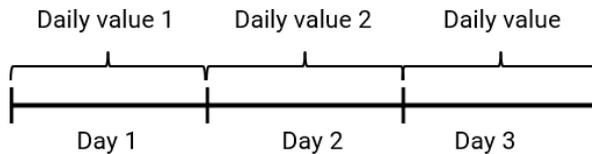
Input variables	
Input variables A - D	Analogue input signal for the value to be saved

Parameters

Mode	Selection: Differential, Value
Function quantity	A wide range of function quantities are available, which are applied together with their unit and their decimal places.

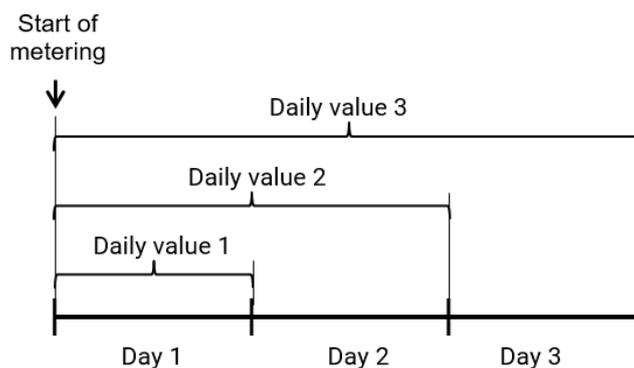
- Differential mode:** The **differentials** of the calculated values between beginning and end of the day, month and year are saved. This version is suitable, for example, for calculating the daily, monthly and annual performance factor of a heat pump.

Example: Daily value



- Value mode:** The calculated values (e.g. meter readings) **for the respective point in time** (end of day, end of month, end of year) are recorded.

Example: Daily value



Calculation

With the help of the integral mathematics function, the input variables A - D can be linked mathematically.

If only one input variable is available, variables B to D remain on value 1 and the operators on "multiplication". The result of the calculation is therefore identical to input variable A.

The result of the calculation is then saved in accordance with the mode

View on display

[] ((A [] B) [] (C [] D))

Function	<input type="text"/>	Operator 2	<input type="text" value="x"/>
Input variable A	1.00000	Input variable C	1.00000
Operator 1	<input type="text" value="x"/>	Operator 3	<input type="text" value="x"/>
Input variable B	1.00000	Input variable D	1.00000

View in TAPPS2

Formula: ((ΔA x ΔB) x (ΔC x ΔD))	
Function	
Input variable A	1,00000
Operator 1	x
Input variable B	1,00000
Operator 2	x
Input variable C	1,00000
Operator 3	x
Input variable D	1,00000

The arithmetic operation is performed according to the following formula:

$$\text{Function} ((A \text{ Operator 1 } B) \text{ Operator 2 } (C \text{ Operator 3 } D))$$

- The first field **Function** can remain empty, in which case it has no effect on the arithmetic operation. In this field, a function can be selected which will be applied to the result of the arithmetic calculation that follows:
 - Absolute value **abs**
 - Square root **sqrt**
 - Trigonometric functions **sin, cos, tan**
 - Inverse trigonometric functions **arcsin, arccos, arctan**
 - Hyperbolic functions **sinh, cosh, tanh**
 - Exponential function e^x **exp**
 - Natural and common logarithms **ln** and **log**
- The fields marked Operator 1 - 3 are for selecting the arithmetic operation::
 - Addition **+**
 - Subtraction **-**
 - Multiplication **x**
 - Division **:**
 - Modulo **%** (remainder from a division)
 - Exponentiation **^**
- The brackets must be observed in accordance with mathematical rules.
- In the "**differential**" version, these mathematical calculations therefore allow the daily, monthly and annual performance factors to be calculated by dividing the heat amount (thermal energy) by electrical energy and stored on a daily, monthly and annual basis.

Daily values

Monthly values

Yearly values

The stored values are displayed by selecting these buttons

Delete history

Selecting this button deletes the stored values after a confirmation prompt.

Output variables

Previous day value	Display of the stored previous day value
--------------------	--

Mathematics function

Function description	
The Mathematics function applies various mathematical calculations and functions to four values of analogue input variables to produce four different calculated results. The results can be assigned to selected function quantities.	

Input variables	
Enable	General enabling of the function (digital value ON/OFF)
Result (enable = off)	Analogue value for the Result output variable when Enable is OFF
Result ABCD (enable = off)	Analogue value for the Result ABCD output variable when Enable is OFF
Result AB (enable = off)	Analogue value for the Result AB output variable when Enable is OFF
Result CD (enable = off)	Analogue value for the Result CD output variable when Enable is OFF
Input variable A - D	Analogue values for the mathematical calculations (to five decimal places)
<ul style="list-style-type: none"> • If the function is blocked (Enable = Off), it issues values which are either defined by the user with Result (enable = off) or which come from a specific source. Enable can therefore be used to switch between analogue values. As the function produces four different results, there are also four input variables for those results when Enable is OFF. • If the source of an input variable is set to <i>User</i>, the user can specify an adjustable numeric value. • As the mathematical calculations can be carried out either using all four input variables or using two of them, appropriate selection of the unused input variables is important for a correct result. 	

Parameters

Function quantity Selection of the required function quantity. A wide range of function quantities are available, which are applied together with their unit and their decimal places.

- As it truncates (cuts off) the decimal places, the dimensionless function quantity (= without decimal places) is usually inappropriate when functions are used. For precise calculations, dimensionless function quantities with decimal places are available (e.g. Dimensionless (.5) with five decimal places).

View in TAPPS2

Formula: ((A x B) x (C x D))	
Function	
Input variable A	1,00000
Operator 1	x
Input variable B	1,00000
Operator 2	x
Input variable C	1,00000
Operator 3	x
Input variable D	1,00000

View on display:

[] ((A [] B) [] (C [] D))

Function	<input type="text"/>	Operator 2	<input type="text" value="x"/>
Input variable A	1.00000	Input variable C	1.00000
Operator 1	<input type="text" value="x"/>	Operator 3	<input type="text" value="x"/>
Input variable B	1.00000	Input variable D	1.00000

The arithmetic operation is performed according to the following formula:

$$\boxed{\text{Function}} \left((A \boxed{\text{Operator 1}} B) \boxed{\text{Operator 2}} (C \boxed{\text{Operator 3}} D) \right)$$

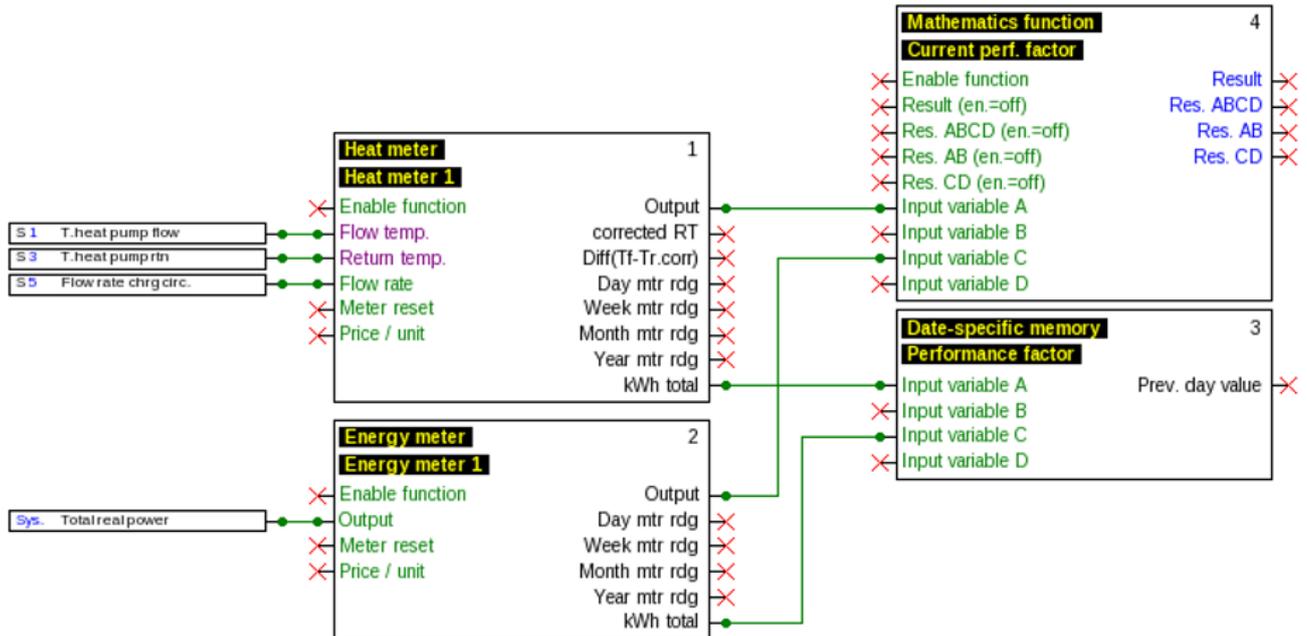
- The first field **Function** can remain empty, in which case it has no effect on the arithmetic operation. In this field, a function can be selected which will be applied to the result of the arithmetic calculation that follows:
 - Absolute value **abs**
 - Square root **sqrt**
 - Trigonometric functions **sin, cos, tan**
 - Inverse trigonometric functions **arcsin, arccos, arctan**
 - Hyperbolic functions **sinh, cosh, tanh**
 - Exponential function e^x **exp**
 - Natural and common logarithms **ln** and **log**
- The fields marked Operator 1 - 3 are for selecting the arithmetic operation::
 - Addition **+**
 - Subtraction **-**
 - Multiplication **x**
 - Division **:**
 - Modulo **%** (remainder from a division)
 - Exponentiation **^**
- The brackets must be observed in accordance with mathematical rules.

Output variables	
Result	The result of the calculation including any function calculation
Result ABCD	The result of the calculation for all four variables A, B, C and D without any function calculation
Result AB	The result of the calculation for the two variables A and B without any function calculation
Result CD	The result of the calculation for the two variables C and D without any function calculation
<ul style="list-style-type: none"> • The results are produced with the selected function quantity (unit) and the decimal places specified by it, and can be used as input variables for other functions, for example. • The results are not mathematically rounded. The decimal places not displayed are discarded. • If the Dimensionless (.5) function quantity is used in the calculation, the result will have five decimal places. The Scaling function can then be used to convert that result into a value with any other function quantity, with truncation removing any decimal places that are not required. 	

Default settings

The CAN-EZ2 CAN energy meter is delivered with the following default settings. This programming can of course be supplemented or replaced with your own programming.

TAPPS2 programming



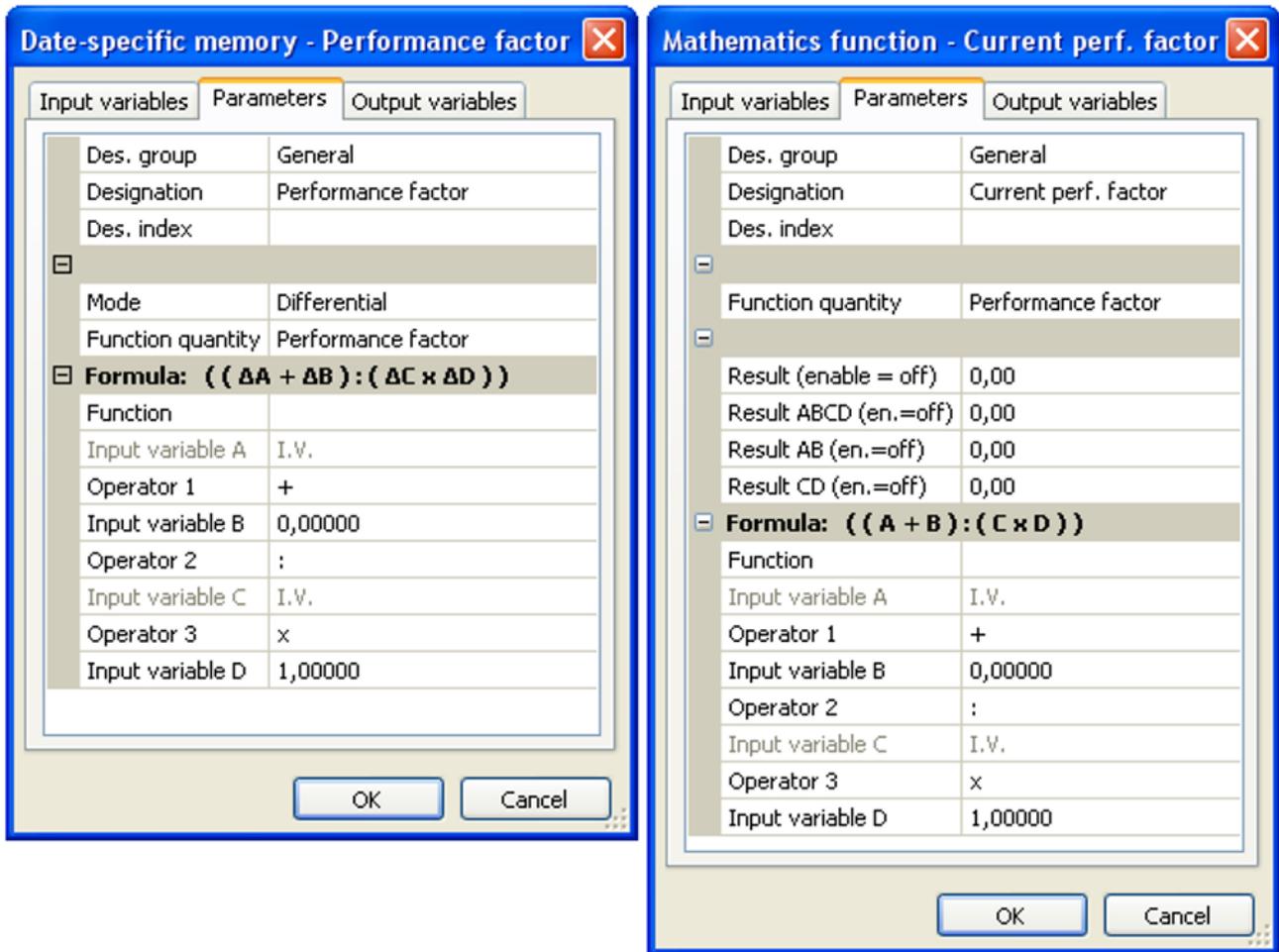
Inputs

- S1 PT1000 sensor
- S3 PT1000 sensor (in flow sensor S5)
- S5 Flow sensor FTS2-32DN10

Functions

Heat meter - Heat meter 1	
Input variables	Parameters
Des. group	General
Designation	Heat meter
Des. index	1
[-]	
Frost protection	0,0 %
Flow rate	I.V.
Price per unit	0,20000
Reversing block	No
[-]	
Total meter reading	0,0 kWh
Sum total	0,00

Energy meter - Energy meter 1	
Input variables	Parameters
Des. group	General
Designation	Energy meter
Des. index	1
[-]	
Output	I.V.
Price per unit	0,20000
[-]	
Factor	1
[-]	
Total meter reading	0,0 kWh
Sum total	0,00



Datalogging

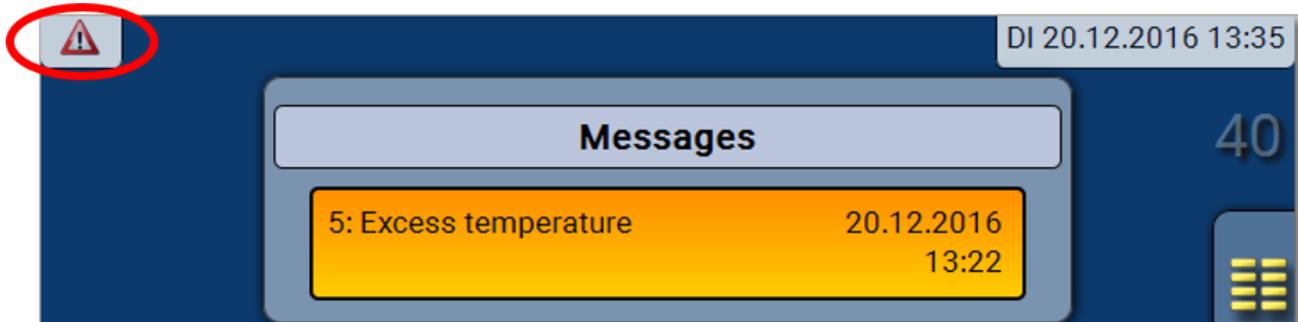
The following values are logged in data record „Analogue values“; data record „Digital values“ is unused:

Analogue values	Digital values
ANALOGUE 1	Input 1: T.heat pump flow - Measurement
ANALOGUE 2	unused
ANALOGUE 3	Input 3: T.heat pump rtn - Measurement
ANALOGUE 4	unused
ANALOGUE 5	Input 5: Flow rate chrg circ. - Measurement
ANALOGUE 6	unused
ANALOGUE 7	unused
ANALOGUE 8	Function: Heat meter 1 - Output
ANALOGUE 9	Function: Heat meter 1 - Kilowatt hours total
ANALOGUE 10	Function: Energy meter 1 - Output
ANALOGUE 11	Function: Energy meter 1 - Kilowatt hours total
ANALOGUE 12	Function: Current perf. factor - Result
ANALOGUE 13	Function: Performance factor - Prev. day value

Messages

This C.M.I. menu displays activated messages.

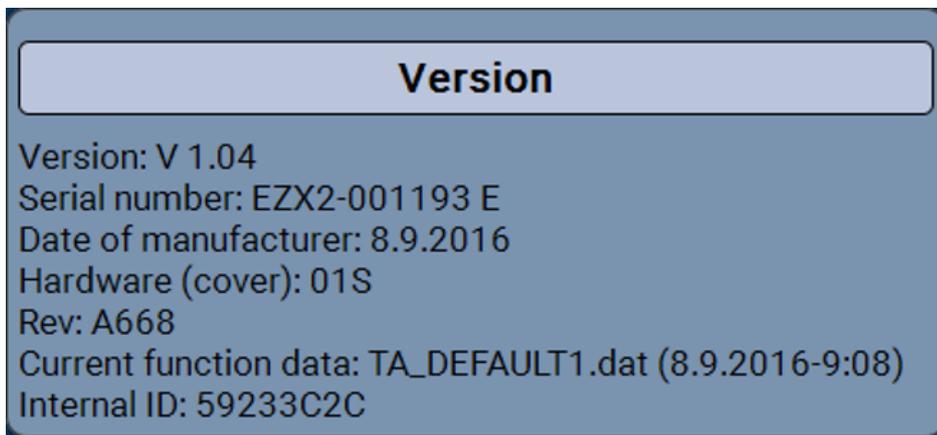
Example: Message 5 is active.



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

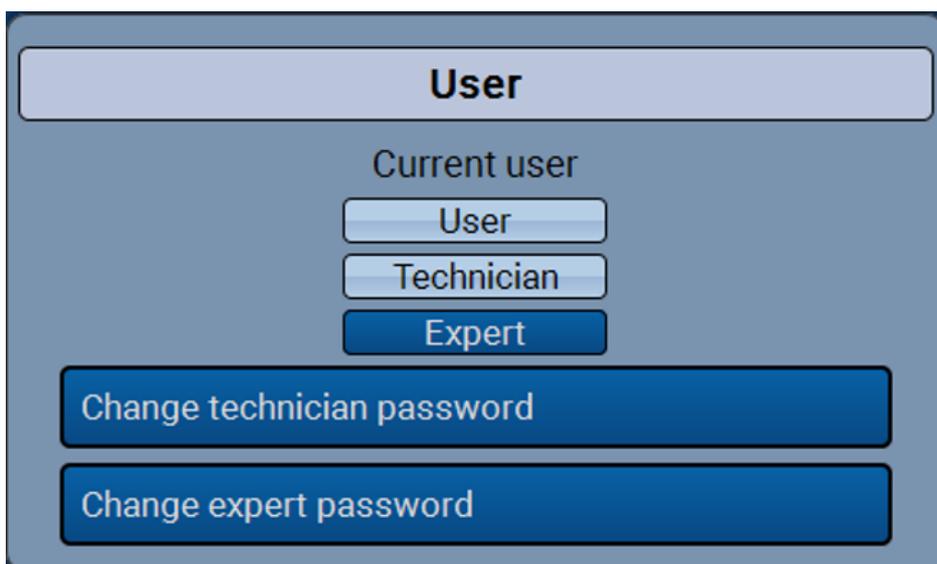
More detailed information on the messages is provided in the programming manuals for the freely programmable UVR16x2, UVR610 and RSM610 controllers.

Version



This menu item displays the operating system version (firmware), the serial number and internal production data.

User



"User" and "Technician" only have restricted access to the menus.

In order to access the technician or expert level, the password allocated by the programmer in TAPPS2 must be entered.

After function data has been loaded, the controller returns to the user level and adopts the programmed passwords.

When the CAN-EZ2 is started, the module is always in the User level.

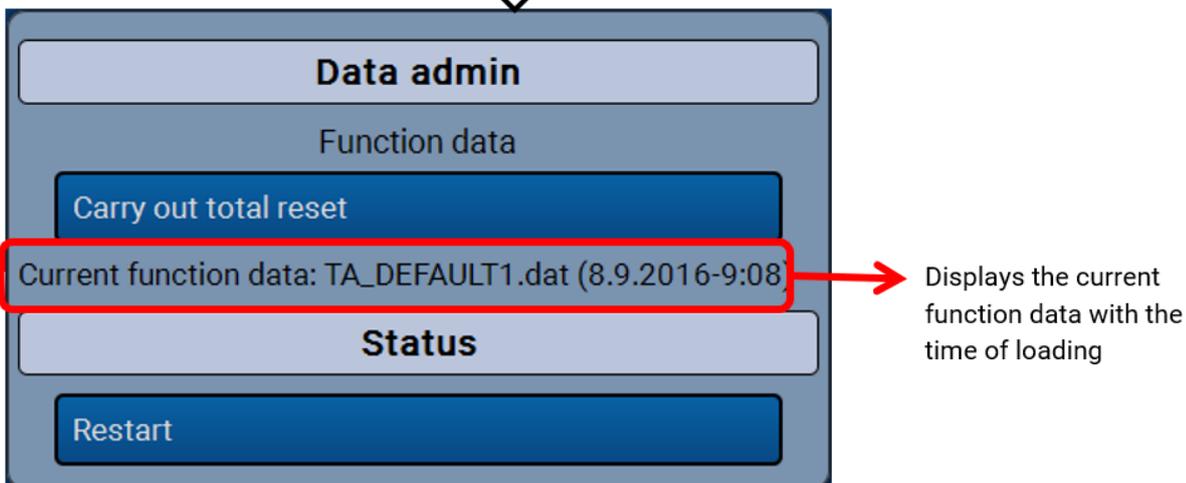
The password is set in the TAPPS2 program and can be modified by accessing the expert level via UVR16x2/UVR610 or CAN-MTx2.

List of permitted actions

User level	Display and permitted actions
User	<ul style="list-style-type: none"> • Function overview with options for control • Access to main menu only if enabled for "User" in the "General settings" • Summary of values • Inputs: display only, no access to the parameters • Fixed values: changes to the value or status of the fixed values enabled for User, no access to the parameters • Functions: display of the function status, no access to the parameters • Messages: display of active messages • CAN and DL bus: no access to the parameters • General settings: no access • User: change of user (with password entry) • System values: setting the date, time, location data, display of System values
Technician	<p>All of the above plus:</p> <ul style="list-style-type: none"> • Access to main menu only if enabled for Technician or User in the "General settings" • Changes to the parameters for inputs (except for type and measured variable), no creation of new ones • Changes to the parameters for fixed values (except for type and measured variable; value and status only if enabled for User or Technician), no creation of new ones • General settings: Changes to user defined designations and creation of new ones, selecting the currency • Functions: changes to user defined input variables and parameters • All settings in the CAN and DL bus menus • Data administration actions
Expert	All actions and all displays are accessible.

Data administration

C.M.I. - menu Data administration



Total reset

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

A **total reset** deletes the function modules, the parameter settings of all inputs and outputs, bus inputs and outputs, fixed values and system values. The settings for the CAN node number and the CAN bus rate are retained.

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

Restart

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

Loading function data or updating firmware via C.M.I.

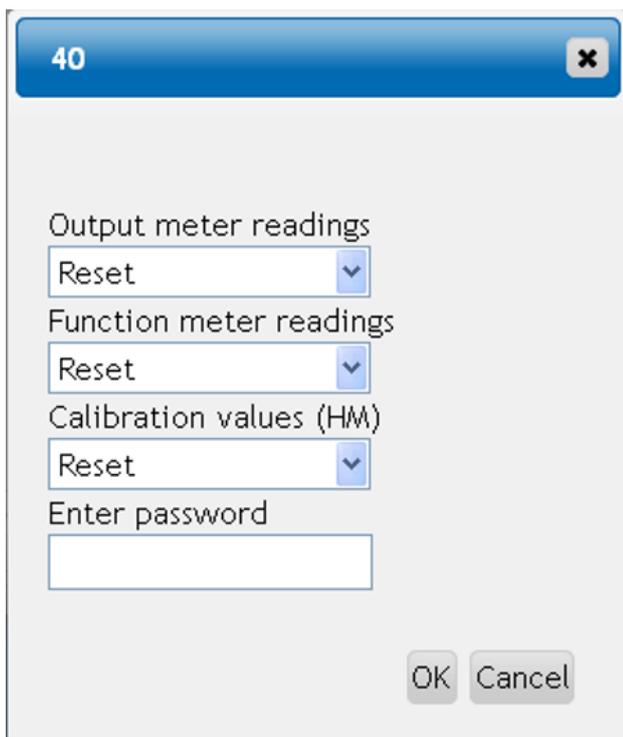
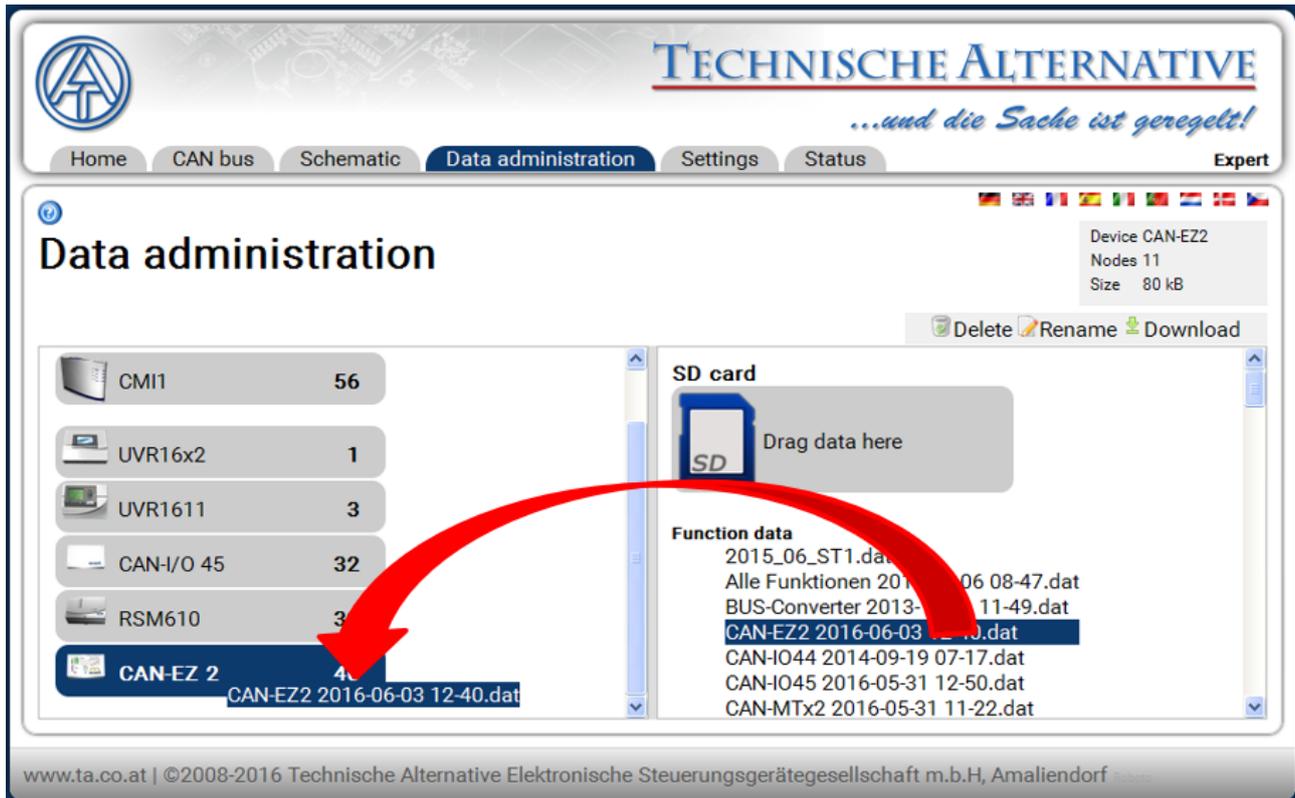
In the **Data admin** C.M.I. menu, function data can be loaded or saved and the firmware (the operating system) can be loaded onto the module.

A separate operating system version is required for each language. Consequently, unlike the UVR16x2 controller, the module does not have a menu for language selection.

The required file must first be loaded onto the SD card of the C.M.I., and then the file is transferred onto the RSM610.

You can perform these actions by simply dragging the files while holding down the left mouse button ("**drag & drop**").

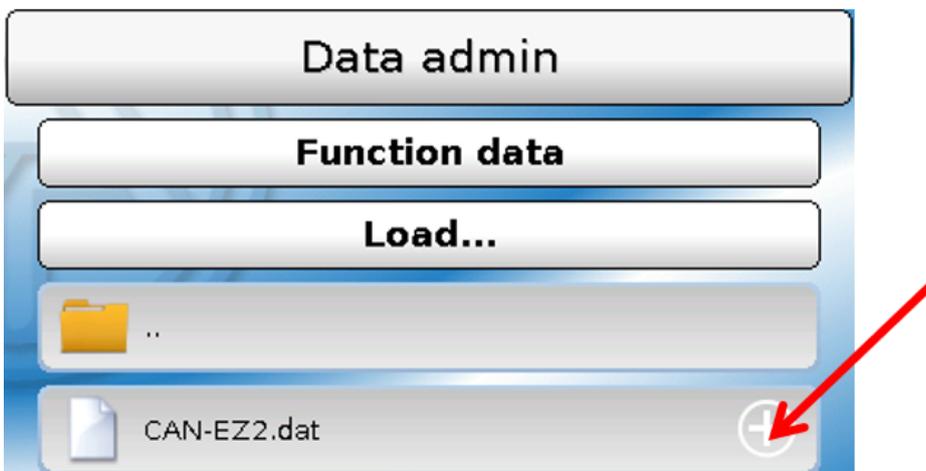
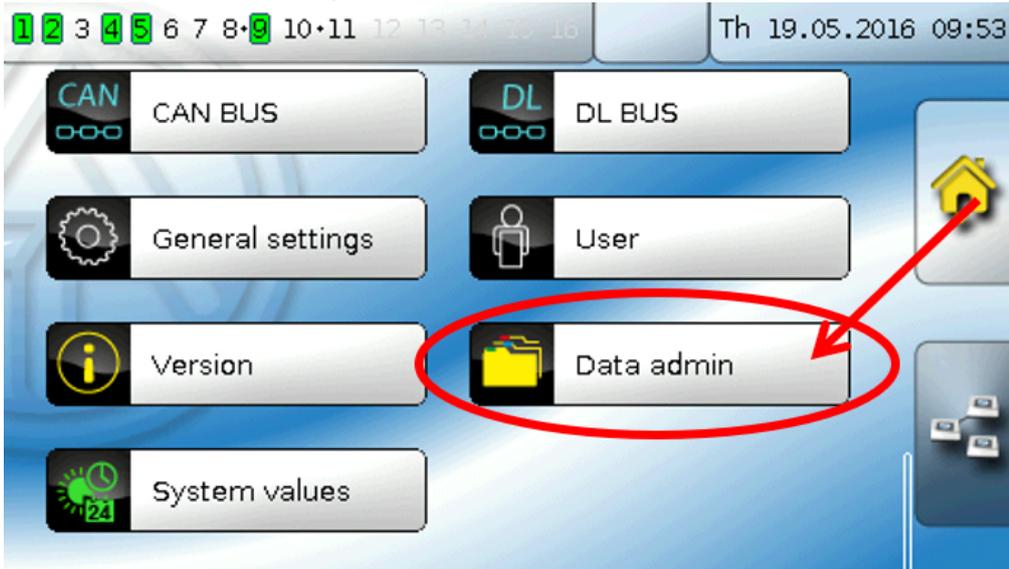
Example: Loading function data from the SD card of the C.M.I. onto the module



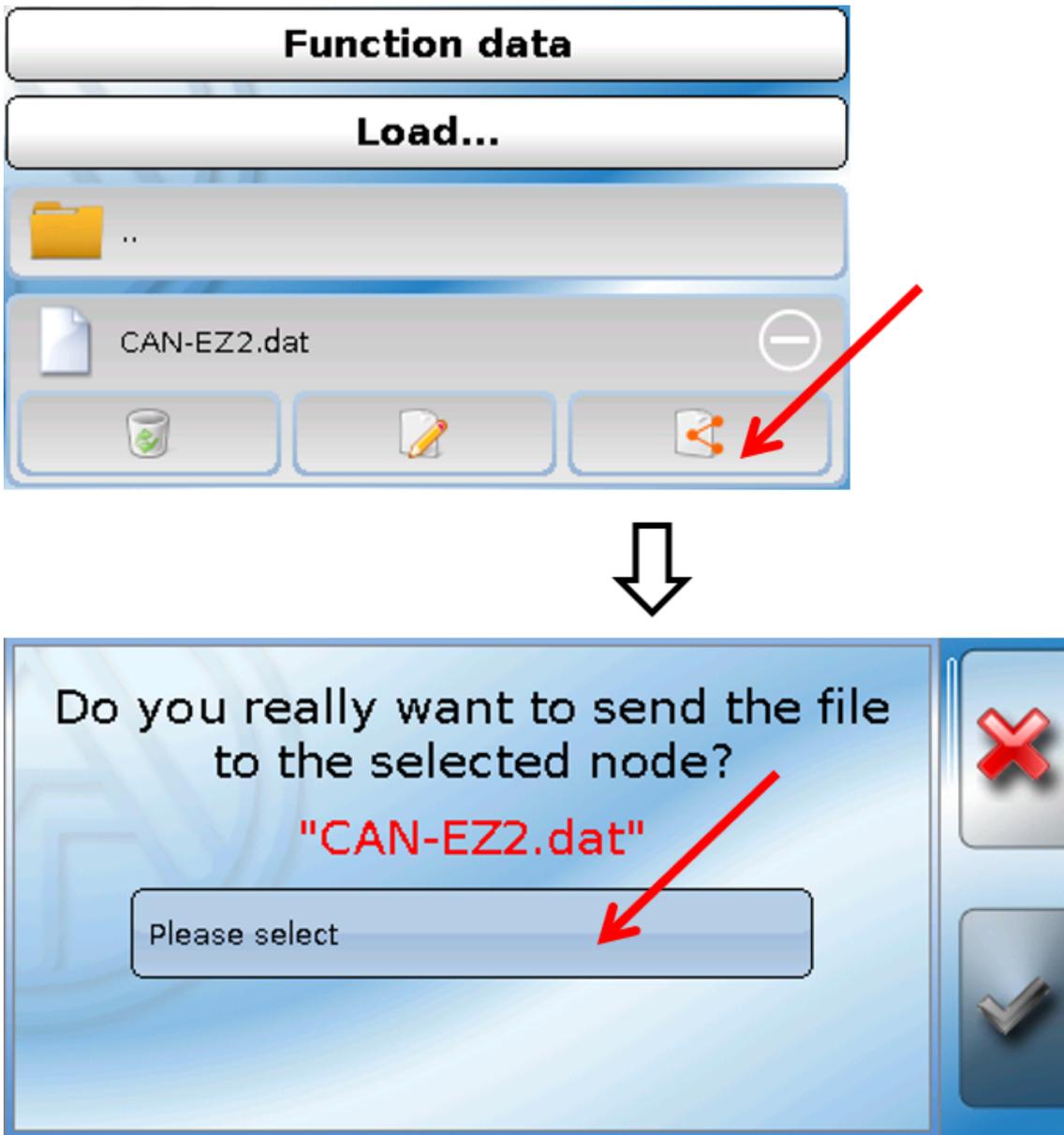
Before the start of the data transfer, you will be asked to provide meter readings and the **expert** or **technician password**.

Loading function data or updating firmware via UVR16x2 or CAN-MTx2

The data transfer can only be carried out in the technician or expert level, in the **data admin** menu.



In order to send the file to the RSM610, tap the plus-icon. A number of options will appear for selection.



Select the **node number** and then tap .

Tapping  cancels the action.

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

Notes on accuracy

The accuracy of all measured energies and energy flow depends on many factors and is to be subject to closer consideration here.

- PT1000 **class B** temperature sensors have an accuracy of +/- 0.55K (at 50°C).
- The uncertainty of the CAN-EZ2 temperature measurement is +/- 0.4K per channel.

For an assumed spread of 10K, these two measuring errors between the flow and return give a **maximum** measuring error of +/- 1.90K = +/- **19.0%** for class B and +/-13.0% for class A.

- At lower heat injections, the measurement error increases.
- The accuracy of the volume flow sensor FTS 4-50DL equals approximately +/- **1.5%**
- The measurement error of the electrical energy measurement equals +/- **3%** (for cos phi = 0.6)

The maximum overall measurement error for the performance coefficient therefore equals, in the most **unfavourable** case:

$$1,19 \times 1,015 \times 1,03 = 1,244$$

This means a performance factor accuracy in **the most unfavorable** case of +/- **24.4%** (at 10K injection, **without calibration** of the temperature sensors), whereby all the measurement errors must act to falsify the measurement result in the same direction.

From experience such a case (worst case) never actually occurs and in the worst case half this value can be assured. However even 12.2% is not justifiable.

After calibration of the temperature sensors (see chapter "Functions /Heat meter")

WMZ1-3/ Service menu") the measurement error of the overall temperature measurement reduces to a maximum 0.3K. Relative to the above assumed injection of 10K this equals a measurement error of 3%.

The maximum overall measurement error for the performance coefficient therefore equals:

$$1,03 \times 1,015 \times 1,03 = 1,077$$

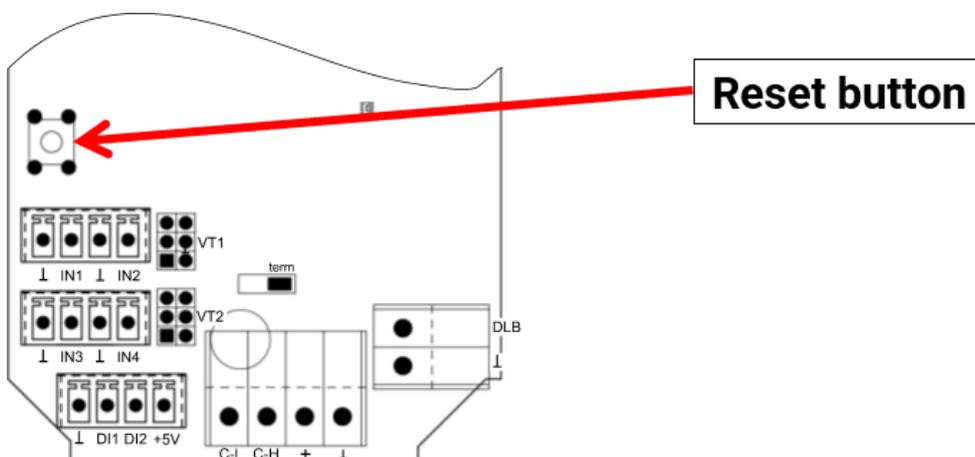
With 10K injection and **calibration** of the temperature sensors the accuracy of the performance factor measurement in the **worst** case improves to +/- **7.7%**.

Reset

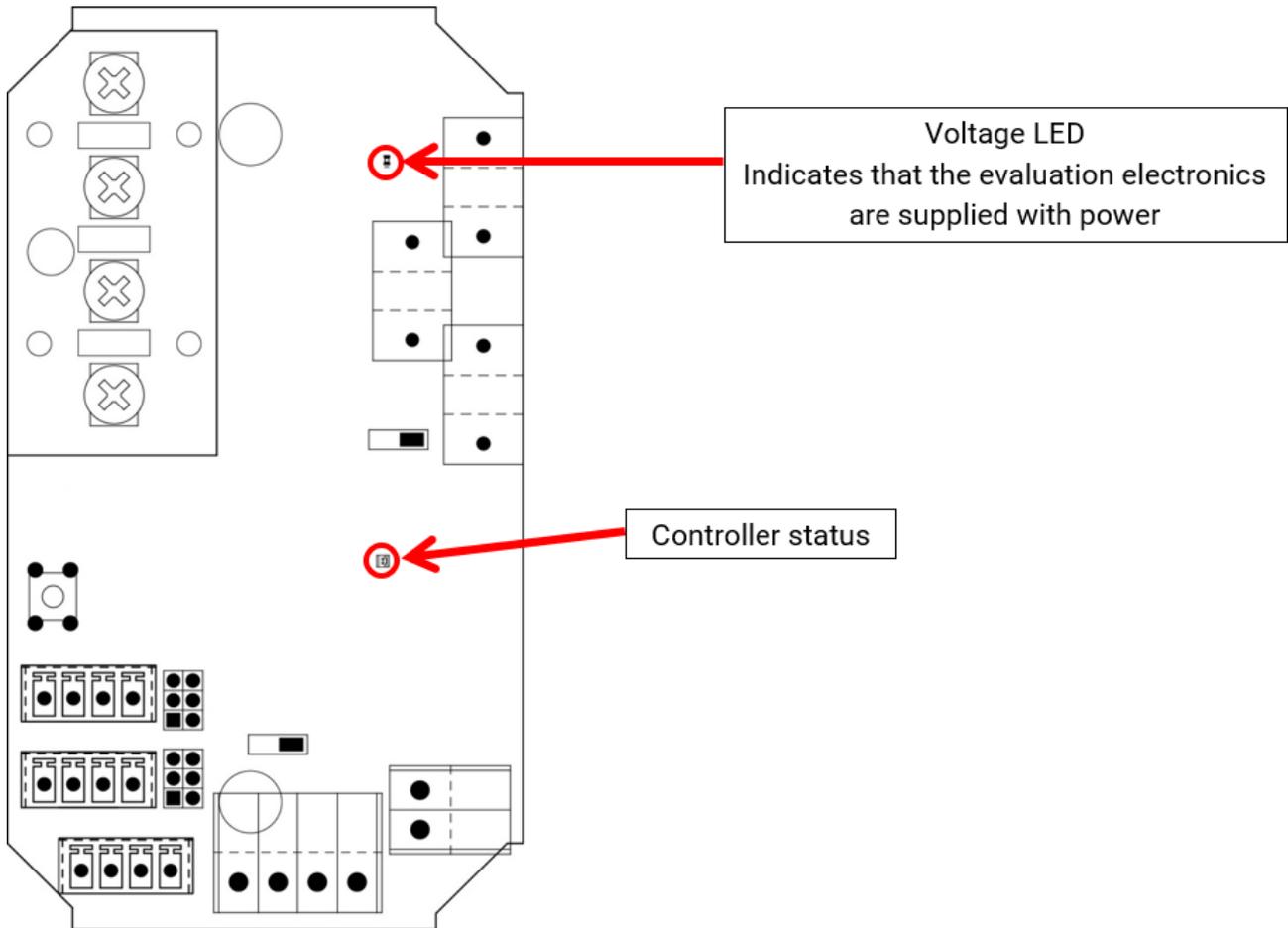
Pressing the reset button **briefly** (with a narrow-tip pen) restarts the controller (= reset).

Total reset: Pressing the button down for a **long time** causes the status LED to start flashing **quickly**. The button must be held down until the quick flashing changes to slow flashing.

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



LED status indicators



An active **Message** can be indicated by a change in the controller status indication. This can be set in the **Parameter menu** of the "Message" function.

LED indication „Controller status“ at module start

Indicator light	Explanation
Steady red light	The CAN-EZ2 boots up (= start routine after switching on, resetting or updating) or
Steady orange light	Hardware initialising after booting up
Flashing green light	After hardware initialisation, the CAN-EZ2 waits about 30 seconds to receive all the information necessary for function (sensor values, network inputs)
Steady green light	Normal CAN-EZ2 operation

Technical data

Important information about the measuring limits of the electrical energy meter:

1. If the effective power value is available as kW only, then cos phi must be observed.
2. The consumer load must lie within the specified power limits.
3. As the power consumption of heat pumps **with frequency converters (inverters)** is not sinusoidal, there is a risk of over control of the measuring movement resulting in a measurement error. The actual peak value of the current must never exceed 28A.

Rated voltage consumer	3 x 400/230V 50 Hz
Power range with single phase connected consumer	0,3 kVA bis 3,3 kVA / 230V, resolution 2VA
Power range with 3-phase connected consumer	0,8 kVA bis 10,0 kVA / 3x400V, resolution 6VA
Cross section range for energy meter CAN-EZ2/C	2,5 mm ² to 4 mm ²
Maximum cable diameter for CAN-EZ/E current transformer	10 mm Ø
Sensor inputs 1-4	Temperature sensors of type PT1000, KTY (2 kΩ/25 °C), KTY (1 kΩ/25 °C), PT100, PT500, Ni1000, Ni1000TK5000 and room sensors RAS or RASPT, radiation sensor GBS01, thermocouple THEL, humidity sensor RFS, rain sensor RES01, pulses max. 10 Hz (e.g. for flow rate transducer VSG), voltage up to 3.3 V DC , resistance (1-100 kΩ), and as a digital input
Sensor inputs 5, 6	Inputs for analog flow sensors (type FTS) or pulse (type VSG)
DL-bus input	For electronic sensors via DL-bus
DL-bus load	100%
Ribbon cable length for FTS...	2m
Max. ambient temperature	0°C to 40°C
IP rating	IP40
Protection class	II – Schutzisoliert
Dimensions	W x H x D = 127 x 76,5 x 46 mm

Amendments to technical data for CAN-EZ/E-30

Power range with single phase connected consumer	0,6 kVA bis 10,0 kVA / 230V, resolution 4VA
Power range with 3-phase connected consumer	1,6 kVA bis 30,0 kVA / 3x400V, resolution 12VA

Subject to technical modifications.

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EU Declaration of conformity

Document- No. / Date: TA17031 / 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: CAN-EZ2/C, CAN-EZ2/E, CAN-EZ2/E30
Product brand: Technische Alternative RT GmbH
Product description: CAN energy meter

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

Employed standards:

EN 60730-1: 2011 Automatic electrical controls for household and similar use –
Part 1: General requirements

EN 61000-6-3: 2007 Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission stan-
+A1: 2011 dard for residential, commercial and light-industrial environments
+ AC2012

EN 61000-6-2: 2005 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for
+ AC2005 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



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

This declaration is submitted by

A handwritten signature in black ink, appearing to read 'Schneider Andreas'.

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

This declaration certifies the agreement with the named standards, contains however no warranty of characteristics.

The security advices of included product documents are to be considered.

Warranty conditions

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

1. The company Technische Alternative RT GmbH provides a one-year warranty from the date of purchase for all the devices and parts which it sells. Defects must be reported immediately upon detection and within the guarantee period. Technical support knows the correct solution for nearly all problems. In this respect, contacting us immediately will help to avoid unnecessary expense or effort in troubleshooting.
2. The warranty includes the free of charge repair (but not the cost of on site troubleshooting, removal, refitting and shipping) of operational and material defects which impair operation. In the event that a repair is not, for reasons of cost, worthwhile according to the assessment of the Technische Alternative company, the goods will be replaced.
3. Not included is damage resulting from the effects of over-voltage or abnormal ambient conditions. Likewise, no warranty liability can be accepted if the device defect is due to: transport damage for which we are not responsible, incorrect installation and assembly, incorrect use, disregard of operating and installation instructions or incorrect maintenance.
4. The warranty claim will expire, if repairs or actions are carried out by persons who are not authorised to do so or have not been so authorised by us or if our devices are operated with spare, supplementary or accessory parts which are not considered to be original parts.
5. The defective parts must be sent to our factory with an enclosed copy of the proof of purchase and a precise description of the defect. Processing is accelerated if an RMA number is applied for via our home page www.ta.co.at. A prior clarification of the defect with our technical support is necessary.
6. Services provided under warranty result neither in an extension of the warranty period nor in a resetting of the warranty period. The warranty period for fitted parts ends with the warranty period of the whole device.
7. Extended or other claims, especially those for compensation for damage other than to the device itself are, insofar as a liability is not legally required, excluded.

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