DOCUMENTATION

Electronic heat cost allocator (EHCA) EURIS II

INNOTAS ELEKTRONIK GMBH

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1 Table of Contents

2 Revision directory

REVISION	DATE	MODIFICATION
1.0	17 June 2011	First edition
1.1	23 Sept 2011	Correction Sleep A and Sleep B
1.2	11/02/2011	Paragraph check number added, chapter 9.3 added according to WTP
1.3	11/09/2011	Chapter 9.3 added according to WTP specifications
1.4	04/01/2012	Corrected a typo in Section 9.3
1.5	03/01/2012	Optical extension and long radio protocol added
1.6	03/27/2012	Display of reference date, degree of protection added
1.7	01/28/2013	Calculation examples added
1.8	02/15/2013	Examples for W-MBUS reading and radiator determination added
1.9	04/02/2013	Reference to Innotas' optical head
1.9.1	01/14/2014	Page 19, monthly reference date corrected
1.9.2	08/14/2018	Version with yellow button replaced
1.9.3	06.10.2020	No variant without radio and 1 additional sensor

3 Variants

The EHCA EURIS II is available in two versions:

EURIS II 2F OF	Two-sensor version, optical interface and wMBUS-radio
EURIS II 2F OF FF	Two-sensor version, radiator sensor designed as a remote sensor, optical interface and wMBUS-radio

The EHCA is also offered as a version with LoRa radio technology, but is not the subject of this document.

3.1 2-sensor device

In the variant as a 2-sensor device, the EHCA measures the room temperature used for the calculation via an extra room temperature sensor. The achieved measurement accuracy is higher than with the 1-sensor device, which is no longer offered by Innotas. The radiator design temperature is 35 ° C to 95 ° C. In combination with a remote radiator sensor, the upper radiator design temperature is 105 ° C.

3.2 Radio interface

The radio communication standardized according to DIN EN13757-4 is used as the radio interface. The device can be parameterized in its radio parameters via the contact interface or the optical interface. The MDC PC program is used for parameterization. The radio times, radio modes S1 or T1, short or long protocol and AES128 encryption can be set. (See instructions MDC)

3.3 Optical interface

All EHCA variants have a contact interface that can be used to set parameters before mounting. The variants with the option of an optical interface also have the option of parameterizing and reading out via the optical interface. A commercially available IR optical head is used for reading. We recommend purchasing the opto head from Innotas, as some devices on the market do not work reliably if the USB voltage is too low. The MDC "Meter Device-Commander" is used as the readout software. The interface in the EHCA is active for 15 seconds after pressing a button.

3.4 Remote sensor

The version with remote sensor is available for 2-sensor devices. The radiator sensor is designed as a remote sensor. The remote sensor is installed on the radiator according to the installation instructions and the EHCA can be installed next to the radiator. This is often an advantage or even absolutely necessary for radiators that are difficult to access.

4-1 Button on the EHCA

4 Button

The EURIS II heat cost allocator is operated with a single, white button located on the front in the middle of the housing.
The button has two operating modes: Briefly press the button once (short button) or press it for longer than 3 seconds (long button). The operator does not have to count the seconds. From every display, however, the device automatically jumps back to sleep mode after 30 seconds without further pressing. Abbreviations:

LT - long press (> 3 seconds)

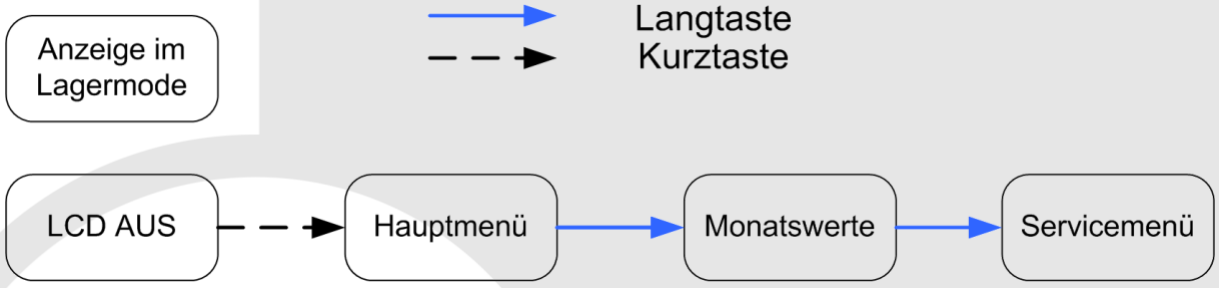
KT - push button briefly

5 Display

The EHCA has a 7 1/2 digits LCD display. The display is OFF in normal operation. If the user wants to read values or communicate with the interface, he "wakes" the device up by simply pressing a button. If the button is not operated any further, the EHKV returns to the "idle state" after 30 seconds and switches the display OFF.

5.1 Structure of the menu

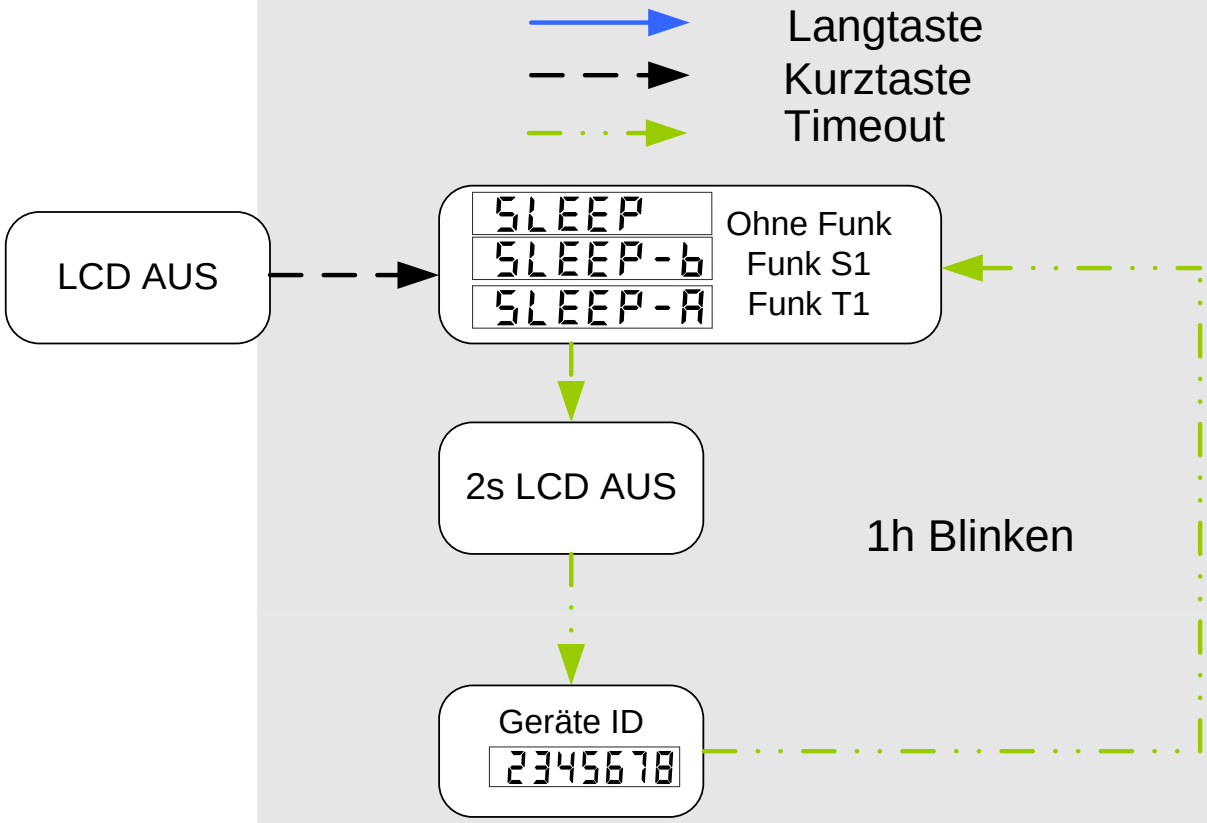
The display of the EHCA can be divided into 4 levels. Level 1 is the display in storage mode. This is the display he has before the installation and commissioning. The other levels can be reached by pressing a button in the installed state and are called the main menu, monthly values and service menu.



5-1 Menu structure

5.1.1 Displays in Storage mode

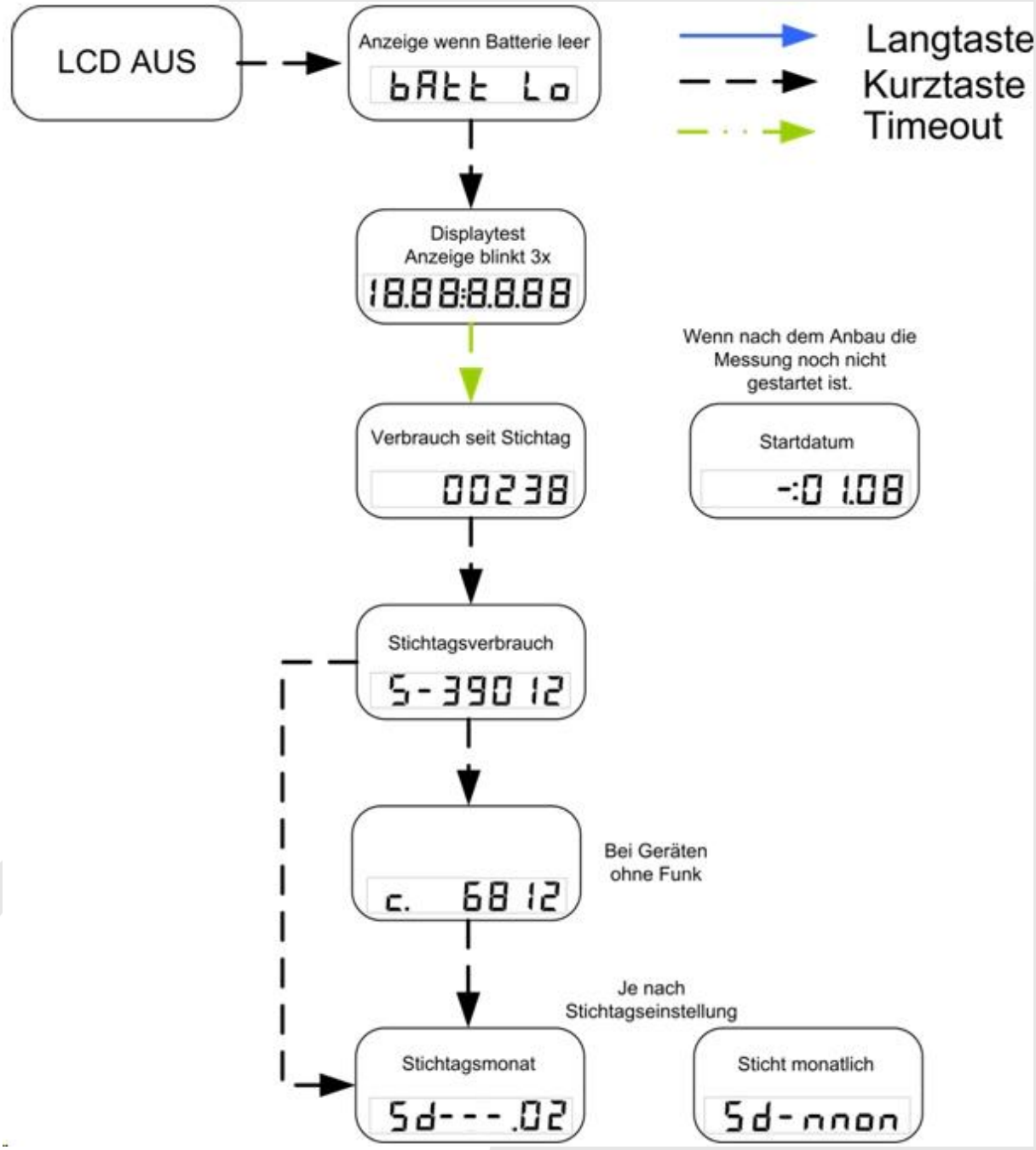
The EHCA is parameterized ex works with parameters according to customer requirements or with standard values. Then it is put into a transport mode (storage mode). In this state it is inactive and the display is off. After briefly pressing the button, the display flashes as follows:



5-2 DISPLAY IN STORAGE MODE

5.1.2 Displays in the main menu

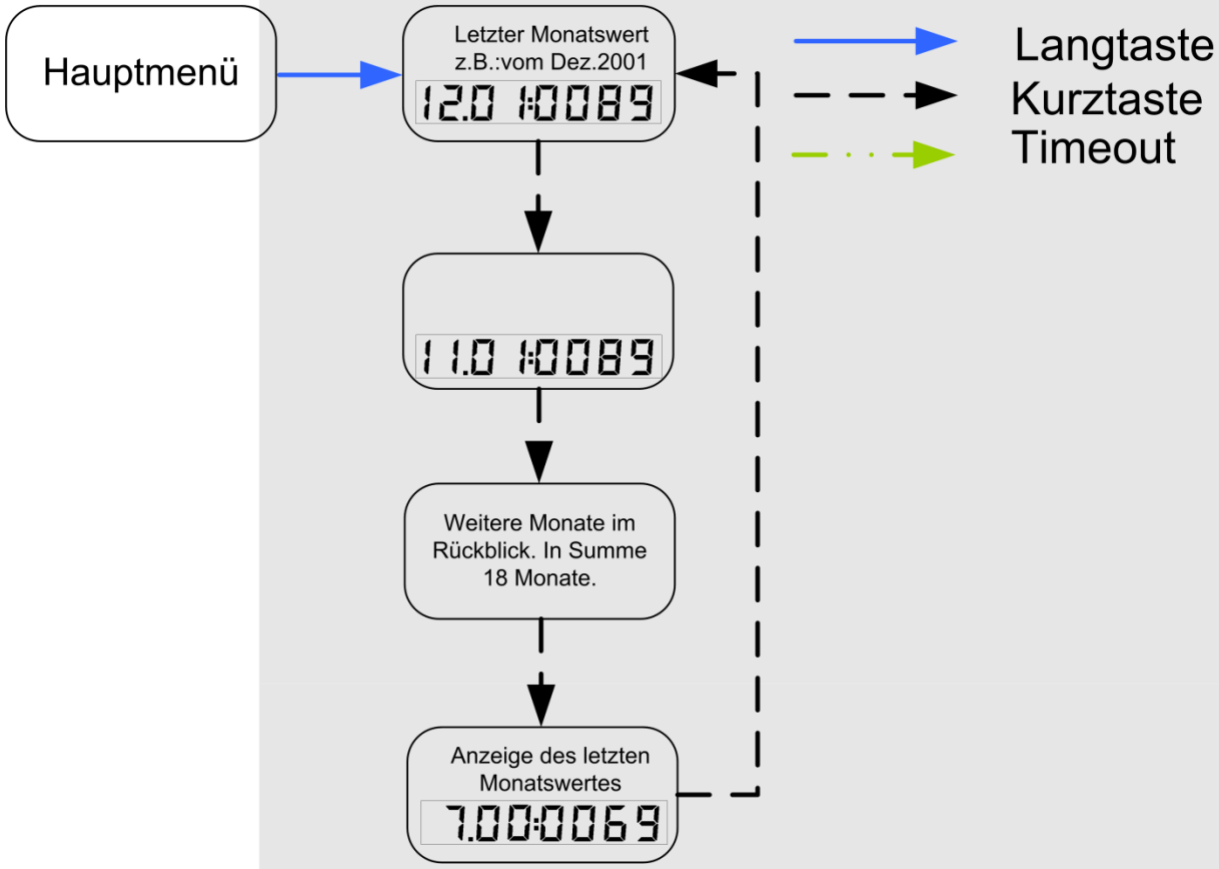
The main menu is activated with the attached and activated EHCA by briefly pressing the button. If no button is pressed for 30 seconds, the display switches off.



5-3 MAIN MENU

5.1.3 Displays in the monthly value menu

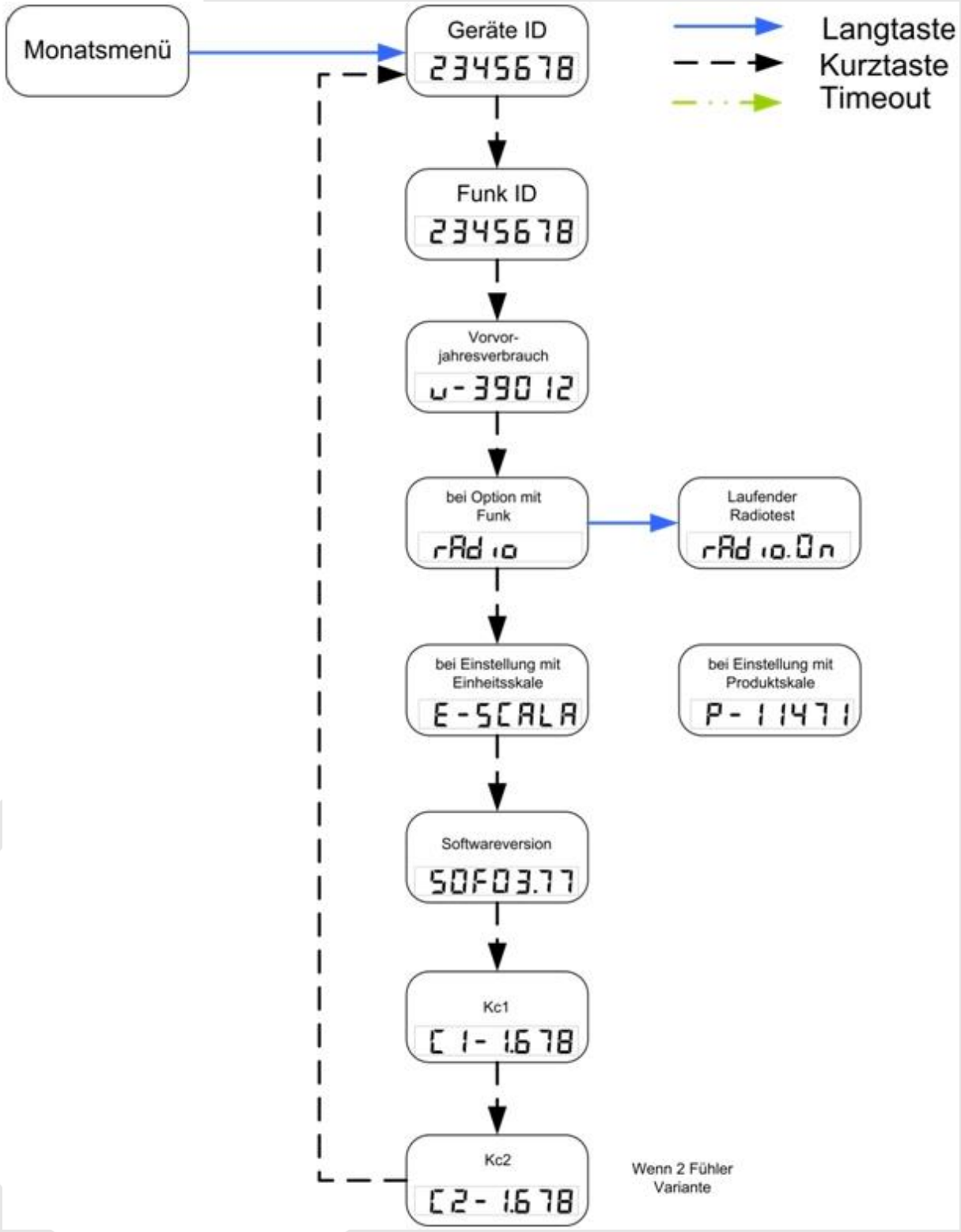
The monthly menu can be activated from a display in the main menu by pressing the long key. If no button is pressed for 30 seconds, the display switches off.



5-4 MONTHLY MENU

5.1.4 Displays in the service menu

The service menu can be activated by a long key from a display of the monthly menu. If no key is pressed for 30 seconds, the display switches off.



6 Self-monitoring

The EHCA monitors the most important basic functions and elements during its operation in order to ensure proper functioning and to signal possible errors in good time.

6.1 Check number

The check number is calculated according to an algorithm not known to the tenant and shown on the display. Consumption and error bits are encrypted in it. If the tenant reads it remotely, the check number can also be read out so that the metering service can subsequently check the consumption for plausibility. The check number is also suitable for checking the reading staff of the measuring services for reading errors.

6.2 Sabotage detection

The sabotage detection is used to register the removal of the attached EHCA from the radiator. The separation of the metallic back part from the EHCA is detected and signaled in an error bit. The EHCA continues to work independently. The error bit is offset in the check number at the next stitch time, transmitted via wM-Bus or read out via an interface. The sabotage detection is activated within the next 24 hours after installation and commissioning. A detected sabotage error can be reset via the interface.

6.3 Sensor monitoring

The sensor monitoring serves to detect a possible sensor breakage or sensor short-circuit. If one of the errors is recognized repeatedly, an error bit is set after approx. 40 minutes. The EHCA is now no longer able to deliver valid measured values. The error is indicated by switching on the LCD display and the message "Error". The error bit is offset in the check number at the next stitch time, transmitted via wM-Bus or read out via an interface. The error can be reset via the interface. The sensor monitoring is only activated after commissioning the device.

6.4 Battery monitoring

The EHCA battery has a guaranteed service life of 10 years in normal operation and a further 2 years of power reserve. A "Batt lo" error is set either after 11 years of factory operation or if the battery voltage falls below the limit in radio mode. From this point on, the EHCA still has a power reserve that can vary depending on the battery load (due to radio, low ambient temperature, etc.). If the error bit is set, a appears after pressing the button on the EHCA before the display test is displayed "Batt lo". The error bit is offset in the check number at the next stitch time, transmitted via wM-Bus or read out via an interface. The error can be reset via the interface. The battery monitoring is activated at the factory.

6.5 RESET monitoring

The EHCA registers a restart of the software in the event of an error. The error is noted in the next check number and communicated via radio and the interface.

6.6 Storage monitoring

The EHCA monitors the consistency of the set parameters. If it detects an error, a checksum error is set. The error is noted in the next check number and communicated via radio and the interface.

7 Attachment and commissioning

The EHCA is delivered packaged from the factory. He is in "storage mode". The display is initially off. Only after pressing the button does the display according to point 5.1.1 appear for one hour. The EHCA is inactive in storage mode, only the internal clock is running. If no special customer settings are required, the EHCA is delivered with the following standard settings:

- German winter time (UTC + 1h)
- Unit scale
- no measurement-free summer months
- Immediate measurement start after commissioning
- Cut-off time annually on December 31st at midnight
- Radio mode T1, every day of the week from 7 a.m. to 5 p.m. with a cycle time of 30s, transmission variance of 11s without AES

7.1 Attachment and assembly

The permissibe tolerance of the installation height is ± 10 mm.
If the exact installation location cannot be adhered to due to the radiator design, installation takes place with regard to

Radiator-midst	→	towards flow (valve)
Radiator-height (75%/50%)	→	offset upwards

To determine the exact installation location, please use the current version of the installation instructions.

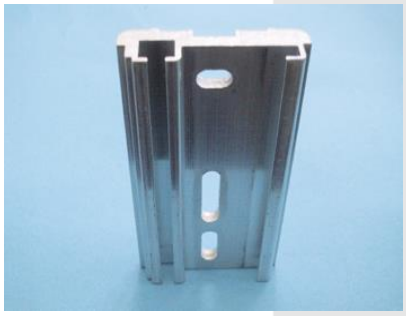
7.1.1 Mounting accessories

7.1.1.1 Thermal conductor adapter wide / 52

This additional adapter is required for special radiator types with special designs or large distances between sections. This is attached behind the standard heat conductor.

7-1 THERMAL CONDUCTOR ADAPTER

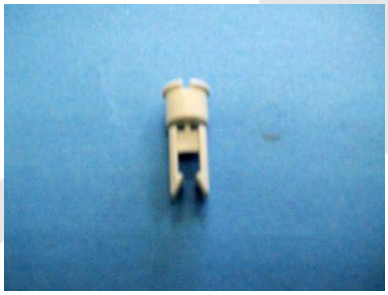
7.1.1.2 Aluminum heat conductor



Standard heat conductor (this is included with every EHCA).

7-2 ALUMINUM HEAT CONDUCTOR

7.1.1.3 Seal



Each EHCA is supplied with a seal for proper assembly.

7-3 SEAL

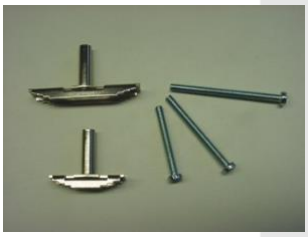
7.1.1.4 Plate and special radiators (welded assembly)

Welding stud:

M3x10
M3x12
M3x15
Shank nut M3
Slotted nut M3

7-4 ACCESSORIES FOR PLATES AND SPECIAL RADIATORS

7.1.1.5 Sectional radiators



7-4 Accessories for sectional radiators

Sliding nut 33/51 (55mm)
Sliding nut 14/32 (36mm)
To be installed with M4x35 / M4x45 / M4x55 screws as required!

7.1.1.6 Tubular radiators

7-6 Accessories for tube radiators

Sliding nut tube (36mm)
Sliding nut tube (45mm)
To be installed with M4x35 / M4x45 / M4x55 screws as required!

7.1.1.7 for convectors

7-5 Accessory for convectors

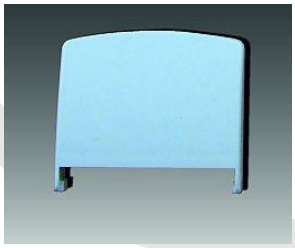
Convector bracket complete

7.1.1.8 Aluminum radiator

7-6 Accessories for aluminum radiators

2 knobs for aluminum radiators to be mounted with 2 screws M3x25
Alternatively: 2 self-tapping screws 4.2x25

7.1.1.9 Optical extensions

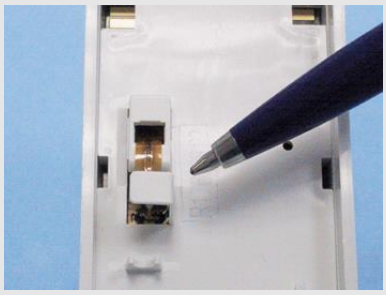


7-7 Accessory for tube conversion

2 optical extensions to cover color damage after converting from tubes to HCA.

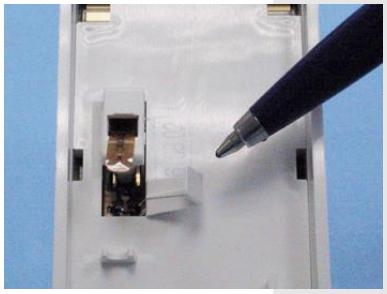
7.1.2 Assembly

7-9 Assembly of heat conductors

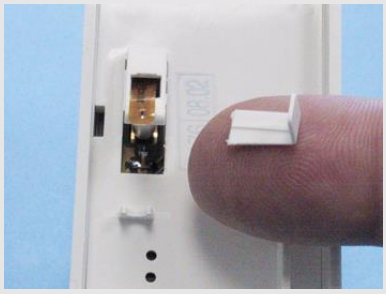


7-8 Sensor protection position

The heat conductor is installed on the radiator in accordance with the installation instructions (elongated holes facing down). The sensor protection must be removed from the rear of the EHCA (see Fig.7-12 Removal sensor protection 2)



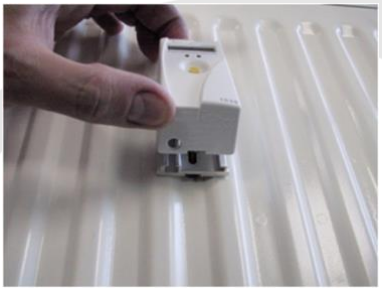
7-11 Removal sensor protection 1



7-10 Removal sensor protection 2

To do this, bend the sensor protection to the side and remove it by breaking it off.

Attention: The probe must not be bent!



7-12 Mounting EHCA on heat conductor

7-135 Inserting the seal

Then the EHCA is hooked into the heat conductor from above, pressed on and sealed on the underside.
The seal must click into place.

7.1.2.1 Notes on welding assembly

During welding assembly, sound impulses can arise to which pets react sensitively. Therefore, no pets should be in the assembly room.

7.1.2.2 General restrictions

The EHCA EURIS II must not be used for steam, floor and ceiling radiant heating or for combined valve and flap-controlled radiators. Unless the flap control has been removed or shut down. In the case of radiators with

additional blowers or heating cartridges, installation is only permitted when this additional electrical device is shut down.

7.2 Installation

After the EHCA has been installed, it can be put into operation. To do this, the button on the EHCA is held down for more than 3 seconds. The EHCA now switches to operating mode, it starts to flash with a display test and is now in the display menu according to point5-3 main menu. Depending on the previous or the factory setting, it now starts measuring. The EHCA begins to send after its set intervals. In addition, it sends an installation telegram every 30 seconds until midnight of the current day.

8 Parameterization

8-1 Interface contacts on the EHCA

The EHCA can be parameterized either via the optical interface or the contact interface.

The contact interface for parameterization is located on the back of the heat cost allocator on the left above the temperature sensor.

It can only be used with the appropriate adapter!

8-2 Contact interface adapter

The adapter contains a power supply and a connection cable to the RS232 or USB interface of the computer.

Attention! This interface can only be used if the heat cost allocator is not mounted on the heat conductor. You must also have the appropriate adapter and software!

Before data can be exchanged between the computer and the distributor, the interface must be activated by briefly pressing a button. After pressing the button, the interface is active for about 15 seconds. For further details, please refer to the description of the parameterization software.

8-3 EHCA with optical head

The parameterization and data readout can also take place via the optical interface (with optical read / write head). This optical head can be connected to a PC or mobile phone with an OTG interface. If you have an optical head and EHCA with an optical interface, the contact interface is superfluous and data can also be exchanged with the EHCA attached.

9 Radiator rating

The radiator assessment can only be carried out by qualified personnel.

9.1 KC values

The read-out value is converted into a billable value using the
Kc - weighting factor. This factor depends on the type of radiator. Only the use of a corresponding Kc value guarantees correct billing. A Kc value table is available on the Innotas Electronik website.

9.2 Scaling

The device can be configured in a unit or product scale. Devices are delivered with a standard scale. In the case of the variant with a product scale, each heat cost allocator must be parameterized depending on the respective radiator.

9.3 Calculation of consumption values

Each with: $K_1 = \frac{1}{(1-C_{1F})}$ and $K_2 = \frac{1}{(1-C_{2F})}$ as well as with Q60 in watts: $K_Q = \frac{Q_{60}}{1000W}$

9.3.1 The following applies to unit assessment

1F compact version and 1F remote sensor version (1FF)

The internal unit evaluation is carried out with $K_Q * K_T = 1$, $K_{1F} = 1$
The readings are corrected using the following formula:

$$\textbf{consumption value} = \textbf{reading value} * K_Q * K_T * \left(\frac{K_1}{1,0}\right)^{1,15}$$

The value for K1 of the radiator used can be found in the C value table of the EURISII.
K_T is the evaluation factor for rooms with low design indoor temperatures
KT = [(60K + 20 ° C-ti) / 60K] ^ 1.15 ti: design internal temperature <20 ° C

2F compact version (2F)

The internal unit evaluation is carried out with KQ = 1, K1 = 1.538, K2 = 2.5
The readings are corrected using the following formula:

$$\textbf{consumption value} = \textbf{reading value} * K_Q * \left(\frac{K_2}{2,5}\right)^{1,15}$$

The value for K2 of the radiator used can be found in the C value table of the EURISII.

2F remote sensor version (2FF)

The internal unit evaluation is carried out with KQ = 1, K1 and K2 = 1.538
The readings are corrected using the following formula:

$$\textbf{consumption value} = \textbf{reading value} * K_Q * \left(\frac{K_2}{1,538}\right)^{1,15}$$

The value for K2 of the radiator used can be found in the C value table of the EURISII.

9.3.2 The following applies to product reviews

1F and 2F versions

The EHCA is rated internally with KQ, K1 and K2. The values for K1 and K2 of the used Radiators can be found in the EURISII C-value table. The values KQ K1 K2 in the EHCA are to be entered extended by 1000.

consumption value = reading value[kW]

9.4 Calculation example

The use of a 2F compact device with a standard scale is assumed.

- After installation, the radiator type must be determined by the next billing time. Data sheets from the manufacturer or detection services such as WeBeS or Thermosoft2000 are used to determine the type.
- With the determined radiator type and its output KQ, the KC values are determined, for example, from the KC value table of the EHCA-EURISII.
- For example, the radiator type from Buderus Sanilo was determined. According to the table, the values for K1 = 1.03 and for K2 = 1.75 result. The determined size or output of the radiator is at Q60 = 1200W. $K_Q = \frac{Q_{60}}{1000W}$
- The due date consumption value read is 2345.
- The formula to use is:

$$\textbf{consumption value} = \textbf{reading value} * \mathbf{K_Q} * \left(\frac{\mathbf{K_2}}{\mathbf{2,5}}\right)^{\mathbf{1,15}}$$

- With inserted values we get:

$$\mathbf{1867} = \mathbf{2345} * \frac{1200W}{1000W} * \left(\frac{\mathbf{1,75}}{\mathbf{2,5}}\right)^{\mathbf{1,15}}$$

$$\mathbf{1867} = \mathbf{2345} * \mathbf{0,79624}$$

ATTENTION! The value K1 from the KC value table is not required for two-sensor devices to calculate the consumption value.
The EHCA requires the factory-set value for K1 = 1.538 for internal processing.

If the EHCA-EURISII is operated in the product scale mode, the values determined for K1, K2 and KQ must be entered before the first measurement. The EHCA offsets the values internally. The value read is then the consumption value.

In order to create a reliable cost accounting from the consumption values, the consumption values of all EHCAs in the system must be weighted with the consumption costs to be billed. There are corresponding regulations in the ordinance on heating billing.

9.5 Reading of consumption values via W-MBUS and MDC

The EHCA is parameterized as follows: Key date month 07 annually

HF setup T1 long

index	1
RadioID	23200029
TCount	7
MeterID	23200029
RTime	09/10/2013
medium	8
MC	INE
AES	yes
RSSI	-19
Value1	10
Unit	HCA
Value2	0
Unit	HCA [1]
Value3	420
Unit	HCA [2]
Value4	420
Unit	HCA [3]
Value5	420
Unit	HCA [4]
Value6	360
Unit	HCA [5]
Value7	310
Unit	HCA [6]
Value8	230
Unit	HCA [7]
Value9	160
Unit	HCA [8]
Value10	100
Unit	HCA [9]
Value11	70
Unit	HCA [10]
Value12	50
Unit	HCA [11]
Value13	0
Unit	HCA [12]
Value14	0
Unit	HCA [13]
Value15	0
Unit	HCA [14]
Value16	0
Unit	HCA [15]
Value17	0
Unit	HCA [16]
Value18	0
Unit	HCA [17]
Value19	0
Unit	STATE
Value20	
Unit	

T1 short

index	1
RadioID	23200029
TCount	7
MeterID	23200029
RTime	09/10/2013
medium	8
MC	INE
AES	yes
RSSI	-19
Value1	10
Unit	HCA
Value2	07/31/2013
Unit	DATE
Value3	420
Unit	HCA [1]
Value4	0
Unit	STATE
Value5	
Unit	
Value6	
Unit	
Value7	
Unit	
Value8	
Unit	
Value9	
Unit	
Value10	
Unit	
Value11	
Unit	
Value12	
Unit	
Value13	
Unit	
Value14	
Unit	
Value15	
Unit	
Value16	
Unit	
Value17	
Unit	
Value18	
Unit	
Value19	
Unit	
Value20	
Unit	

Months	monthly consumption	Cumulative consumption
8	0	0
9	0	0
10	50	50
11	20	70
12	30	100
1	60	160
2	70	230
3	80	310
4	50	360
5	60	420
6	0	420
7	0	420
8	0	0
9	10	10

The EHCA is parameterized as follows: The set day is monthly

HF setup T1 long

index	1
RadioID	23200029
TCount	7
MeterID	23200029
RTime	09/10/2013
medium	8
MC	INE
AES	yes
RSSI	-19
Value1	10
Unit	HCA
Value2	0
Unit	HCA [1]
Value3	0
Unit	HCA [2]
Value4	0
Unit	HCA [3]
Value5	60
Unit	HCA [4]
Value6	50
Unit	HCA [5]
Value7	80
Unit	HCA [6]
Value8	70
Unit	HCA [7]
Value9	60
Unit	HCA [8]
Value10	30
Unit	HCA [9]
Value11	20
Unit	HCA [10]
Value12	50
Unit	HCA [11]
Value13	0
Unit	HCA [12]
Value14	0
Unit	HCA [13]
Value15	0
Unit	HCA [14]
Value16	0
Unit	HCA [15]
Value17	0
Unit	HCA [16]
Value18	0
Unit	HCA [17]
Value19	0
Unit	STATE
Value20	
Unit	

T1 short

index	1
RadioID	23200029
TCount	7
MeterID	23200029
RTime	09/10/2013
medium	8
MC	INE
AES	yes
RSSI	-19
Value1	10
Unit	HCA
Value2	08/31/2013
Unit	DATE
Value3	0
Unit	HCA [1]
Value4	0
Unit	STATE
Value5	
Unit	
Value6	
Unit	
Value7	
Unit	
Value8	
Unit	
Value9	
Unit	
Value10	
Unit	
Value11	
Unit	
Value12	
Unit	
Value13	
Unit	
Value14	
Unit	
Value15	
Unit	
Value16	
Unit	
Value17	
Unit	
Value18	
Unit	
Value19	
Unit	
Value20	
Unit	

month	monthly consumption	Cumulative consumption
8	0	0
9	0	0
10	50	50
11	20	70
12	30	100
1	60	160
2	70	230
3	80	310
4	50	360
5	60	420
6	0	420
7	0	420
8	0	0
9	10	10

Please note that if you set the monthly cut-off date and short transmission telegram, you have to read it out monthly so that you do not lose any consumption values!

State values of the W-MBUS protocol

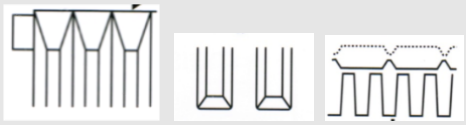
Bit0	Value	Error
0	1	Measuring error
1	2	sabotage
2	4	BattLow
3	8	CS error
4	16	HF error
5	32	RESET error
6	64	
7	128	

The status messages can appear at the same time. Then the values add up e.g. Measurement error and sabotage STATE = 3

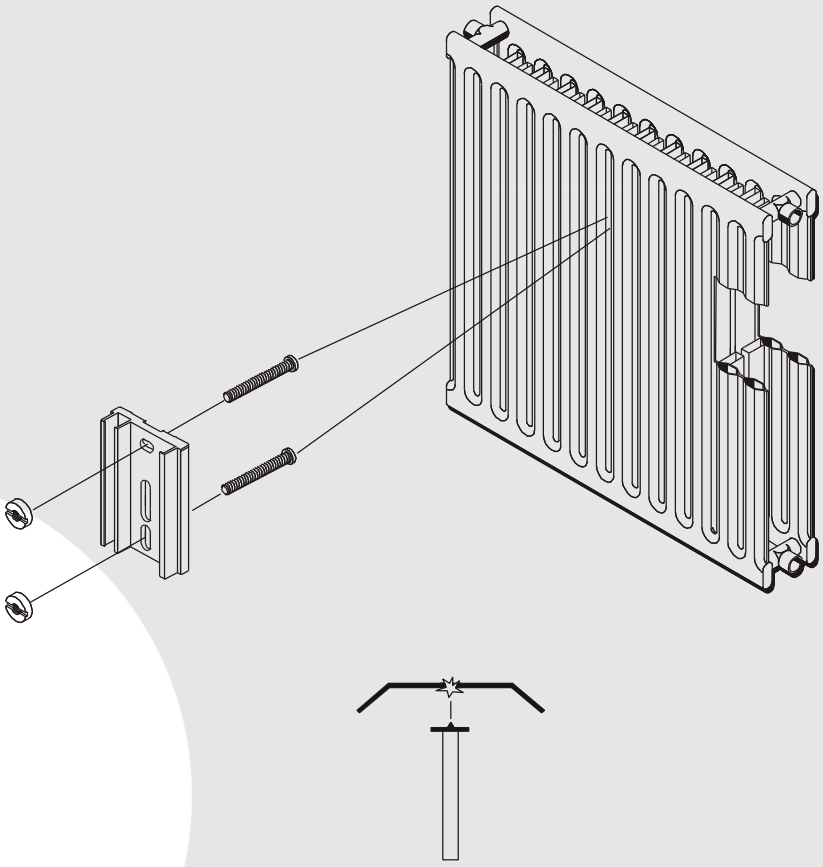
9.6 Procedure for finding the correct Kc values

To determine the correct Kc value for the respective radiator, proceed as follows:

- Determination of the group or design of the radiator (sectional radiator, panel radiator, etc.)



- Determination of individual structural features such as:
  Rib shape, water connections, lamella shape, etc.
- Since this is quite complex and complicated, the companies Thermosoft 2000 www.thermosoft2000.de and the company WeBeS Wärmeenergie + Beratung + Service GmbH www.webes-berlin.de have specialized in determining the radiators.
- The correct Kc value of this radiator for the EHCA EURISII can now be determined from the database using the determined type of radiator.
- If the corresponding radiator is not listed in the Kc value table, this radiator can in most cases be derived from the extensive database by the companies in question.



10 Technical specifications

Norms	DIN EN 834 (April 2015), DIN EN 13757-4
Measuring principle	2-sensor system / (1-sensor system)
Operating temperature limits 2-sensor (1-sensor)	Compact tmin / tmax = 35°C / 95°C (55 ° C / 95 ° C) Remote sensor tmin / tmax = 35°C / 105°C.
Operating temperatur	0 ° C … 55 ° C
Storage temperature	-25 ° C… 55 ° C for a short time 70 ° C
Processor	8 bit controller
Temperature sensor	2 sensors NTC (1 sensor at 1F)
Display	7 1/2 digit LCD
Service	Button and contact interface as well as (optional) optical interface
Opening detection	mechanically via seal; electronically via contact
Scaling	Unit or product scale
Power supply	3 V DC lithium battery
Delivery	Storage mode (measurement not active)
Operating time with one battery	10 + 2 years reserve
Radiator output	up to 10,000 W with product scale
Storage	last 18 monthly values
Measuring cycle	4 minutes
Error display	in the service menu and coding in check number
Reading	via LCD / optical interface or radio
Radio interface	W-MBUS with S1 or T1 according to DIN EN13757-4
Radio data encryption	AES 128 mode 5
Self-monitoring	Sabotage, sensor, operating time, reset, data
Certification mark	Approved according to HKVO
Degree of protection according to DIN 40050	IP 41

11 Warning and safety information

The EHCA EURIS II must not be used for steam, floor and ceiling radiant heating or for combined valve and flap-controlled radiators. Unless the flap control has been removed or shut down. In the case of radiators with additional blowers or heating cartridges, installation is only permitted when this additional electrical device is shut down.

The EHCA contains a battery and must be disposed of properly.

12 List of figures