



SMARTFOX PRO LIGHT 2



OPERATING INSTRUCTIONS

08 - 2022

www.smartfox.at

DECLARATION SAFETY INSTRUCTIONS

WARNING

Non-compliance can lead to damage to property and personal injury. The instructions given must therefore always be followed or implemented!

ATTENTION

Non-compliance can lead to malfunctions or damage to the unit. The instructions given must therefore always be followed or implemented!

NOTE

Useful tips to support you during commissioning. The instructions given are not mandatory.

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GENERAL INFORMATION

General notes

These operating instructions are part of the scope of delivery. They contain the information required for proper use. They are intended for electrotechnical personnel or specialists who are familiar with the installation, assembly and commissioning of the product described here. Should further information be required, additional information can be requested from the contact details on the back.

Conformity

This appliance complies with the provisions of the Directive of the Council of the European Communities on the approximation of the laws of the EC Member States relating to electromagnetic compatibility, EMC Directive 2004/108/EC, and the Low Voltage Directive 2006/95/EC.

Application

The "SMARTFOX Pro Light 2" energy consumption controller is used to optimise self-consumption to a maximum in electrotechnical systems with self-power generation. All relevant data for the application are measured, displayed and used for control. If desired, the measured values are stored when the microSD card is activated and shown on the 2-line (2x16 digits) display. Displayed measured values are voltage, current and power of the individual phases L1, L2, L3 as well as the total currents and powers. Calculated values are PNutz, work, energy, regenerated energy.

Function

The currents to be measured are measured either directly or via current transformers. The voltage is always measured directly (according to the connection diagram). The main function of the unit is to detect the current surplus power, calculated by U_{xI} , and thus to control a continuously controllable consumer with exactly this amount of energy. This is done via the analogue output 0/4-20mA. In addition, a relay make contact is available with freely selectable power and switch-on times per day.

SCOPE OF DELIVERY & TECHNICAL DATA

Scope of delivery

1x SMARTFOX Pro Light 2 energy consumption controller
1x Micro SD card incl. adapter
1x current transformer 3-phase up to 80A | 100A incl. connection set
1x operating manual

Technical data

| | |
|------------------------|--|
| Dimensions [W/H/D] | 98mm x 90mm x 58mm (5TE) |
| Rated current 4995A | 80A or via additional transformer |
| Power supply | 3 x 230V/400VAC 50Hz |
| Self-consumption | 4W |
| Display | 2-line display |
| Analogue outputs | 1 x 24VDC 1 x 0/4-20mA |
| Switching output | 1 x normally open relay 5A/250VAC |
| Interface | RS485 |
| Temperature input | PT1000 |
| Overload continuous | Voltage max. 265V, current 260A |
| Surge overload | Voltage 1000V 65µs |
| Connections | L1/L2/L3/N/PE 3xL 1xN 1xPE 1.5mm ² Analogue output pluggable 24VDC/I+/GND 1mm ² Converter Pluggable 1xRJ12 6pol. Relay 2x1,5mm ² |

REGULATIONS

| | |
|------------------------|--|
| EMC | DIN EN61326 |
| Mechanical strength | DIN EN 61010 Part 1 |
| Electrical safety | DIN EN 61010 Part 1 Housing with protective insulation, protection class II, for working voltages up to 600V (mains to neutral) pollution degree 2, measuring category CAT III |
| Accuracy, overload air | DIN EN 60688 |
| Disconnection | DIN EN 61010 Part 1, 3, 3KV 50Hz 4s |
| and creepage distance | DIN EN 61010 Part 1 |
| Protection class | DIN EN 60529 Housing IP21 |
| connection | DIN 43807 |

Warning.

This unit may only be installed by a qualified electrician, otherwise there is a risk of fire or electric shock!

Assembly

Top-hat rail mounting. At ambient temperatures of $>45^{\circ}\text{C}$, however, a distance of 10mm is recommended. The mounting location should be as vibration-free as possible and must not exceed an ambient temperature of 55°C .

Electrical connection

The regulations for the installation of electrical systems must be observed, according to DIN 43807, max. 1.5mm^2 via screw connection. When installing the current transformer, the correct current direction K and L must be observed (K corresponds to the utility side, L corresponds to the system side).

ATTENTION!

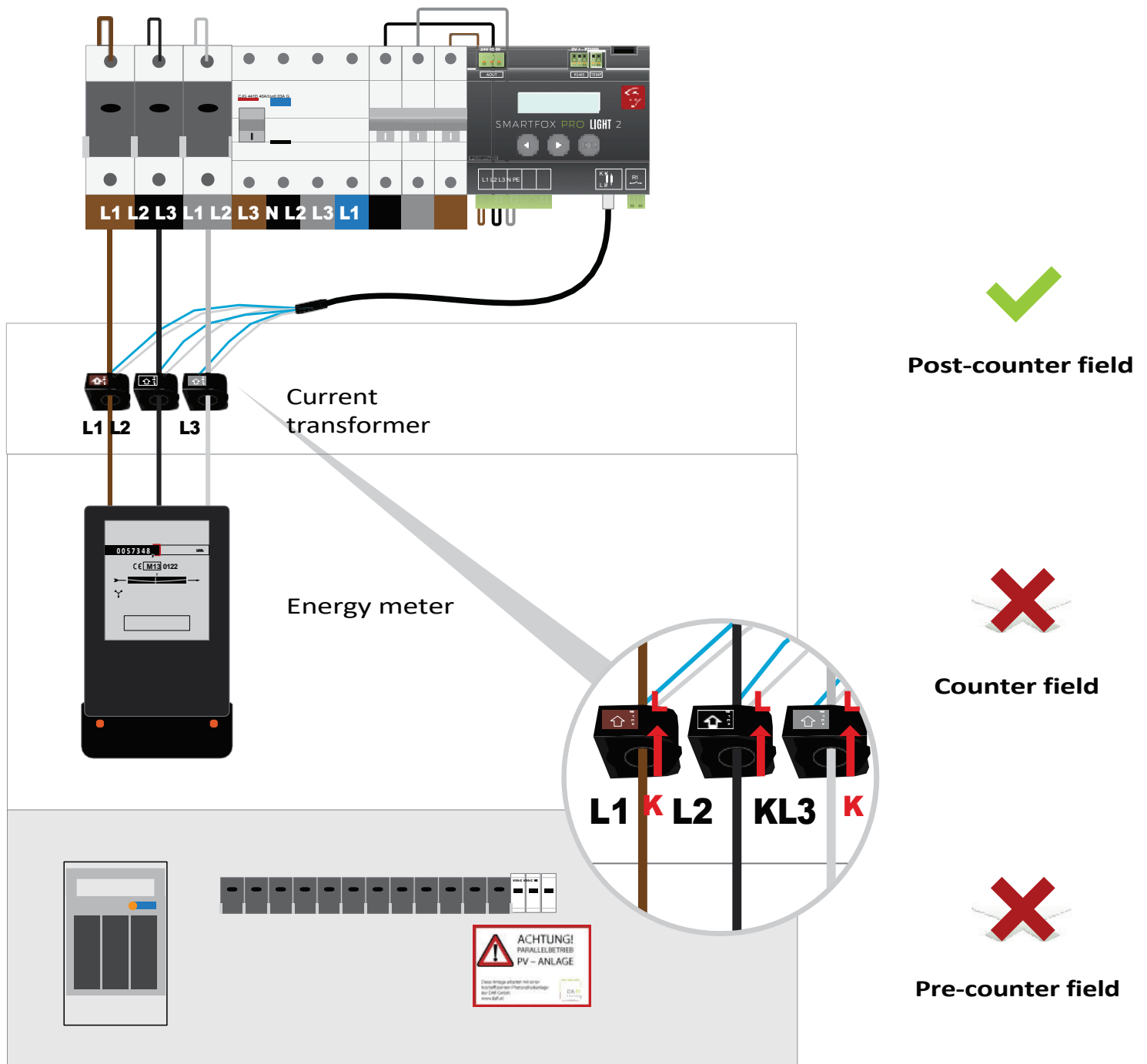
When connecting the voltage input variable, the assignment to the current connection is important, i.e. the respective terminal of the voltage connection must also be located in the outer conductor in which the current transformer is located.

Hedging

When connecting, ensure that a suitable back-up fuse is used (line protection). The unit itself is internally fused.

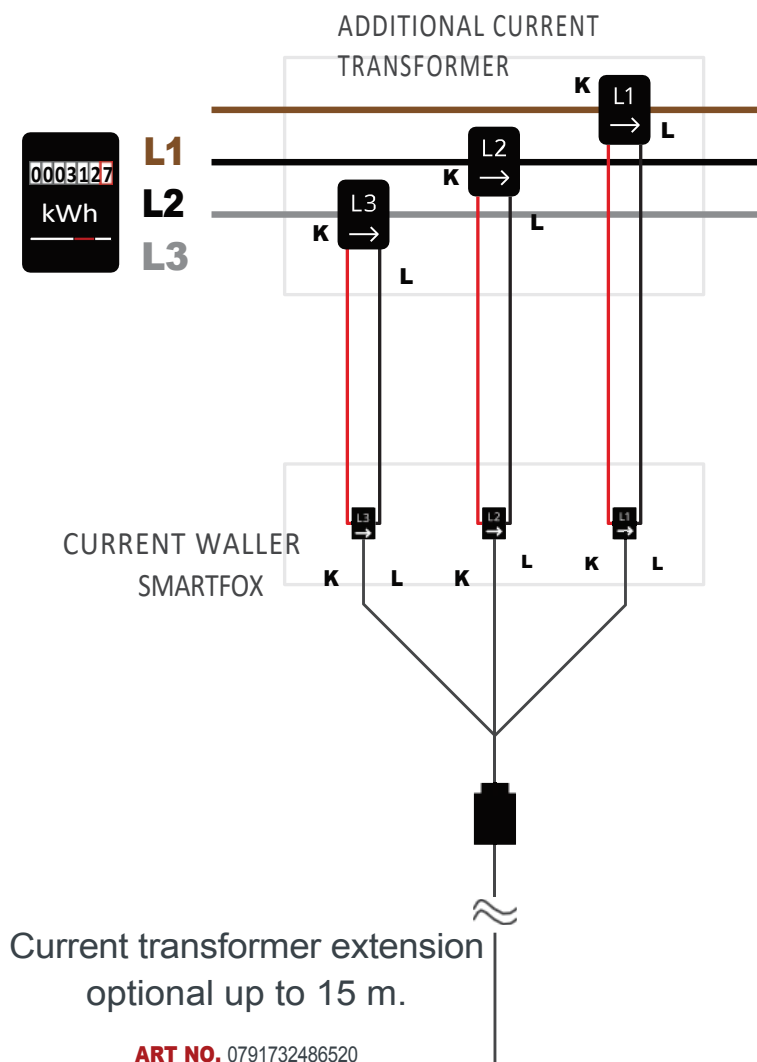
REGULATIONS

INSTALLATION OF THE SMARTFOX CURRENT TRANSFORMER



Attention! The SMARTFOX current transformers must always be connected as shown in the picture above. (Arrows point in the direction of the consumer).

SMARTFOX ADDITIONAL CURRENT TRANSFORMER



1. SW divisible 200A with 1m connection cable
ART NO. 0791732486490

2. SW divisible 500A / 5A 1m connection cable
ART NO. 0791732486650



WARNING!

The SMARTFOX current transformer cable must not be cut (loss of warranty).

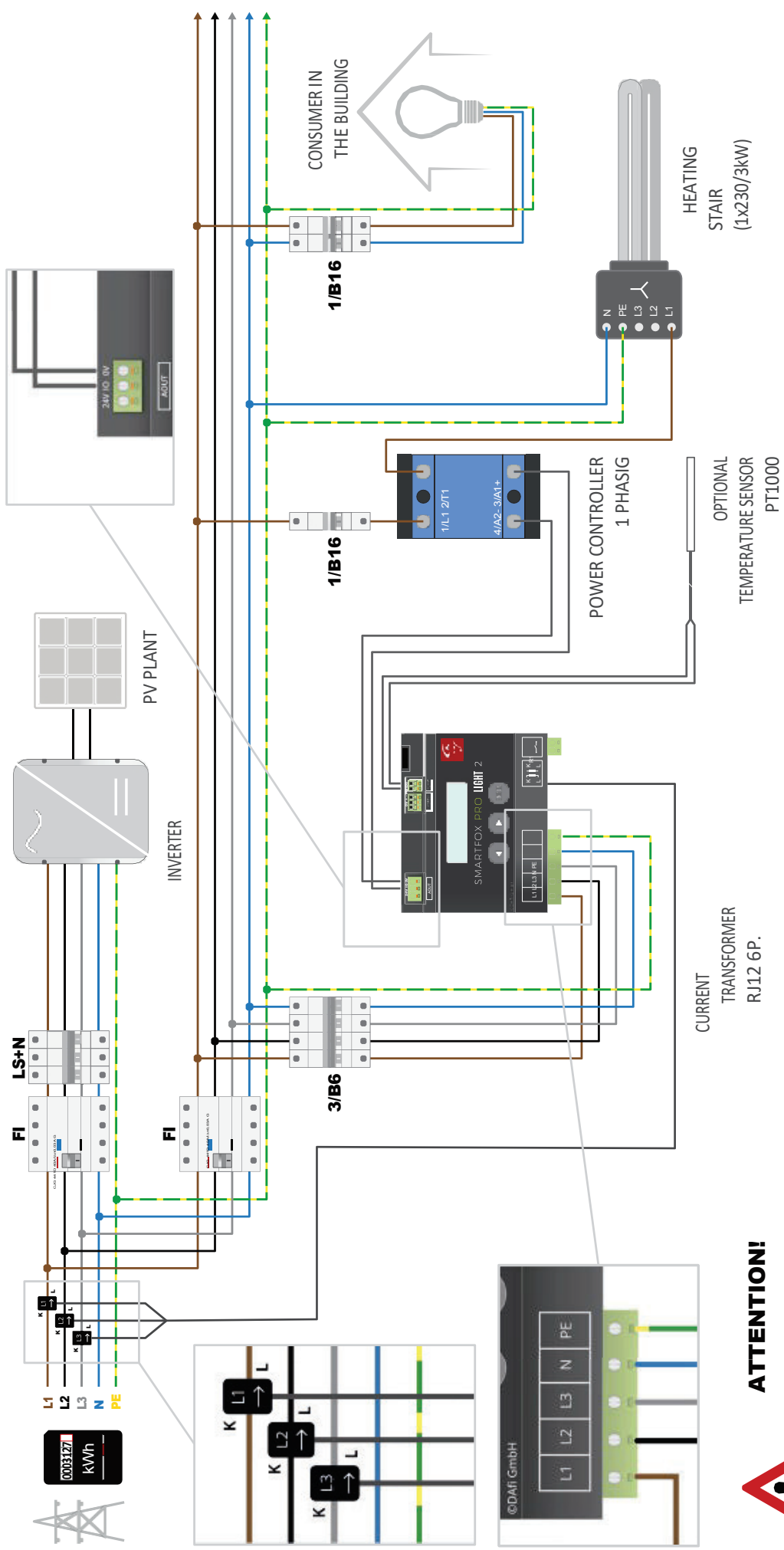
NOTE!

The SMARTFOX current transformer set can be extended up to 15m. A suitable current transformer extension must be used for this purpose.

SMARTFOX ADDITIONAL CURRENT TRANSFORMER

8

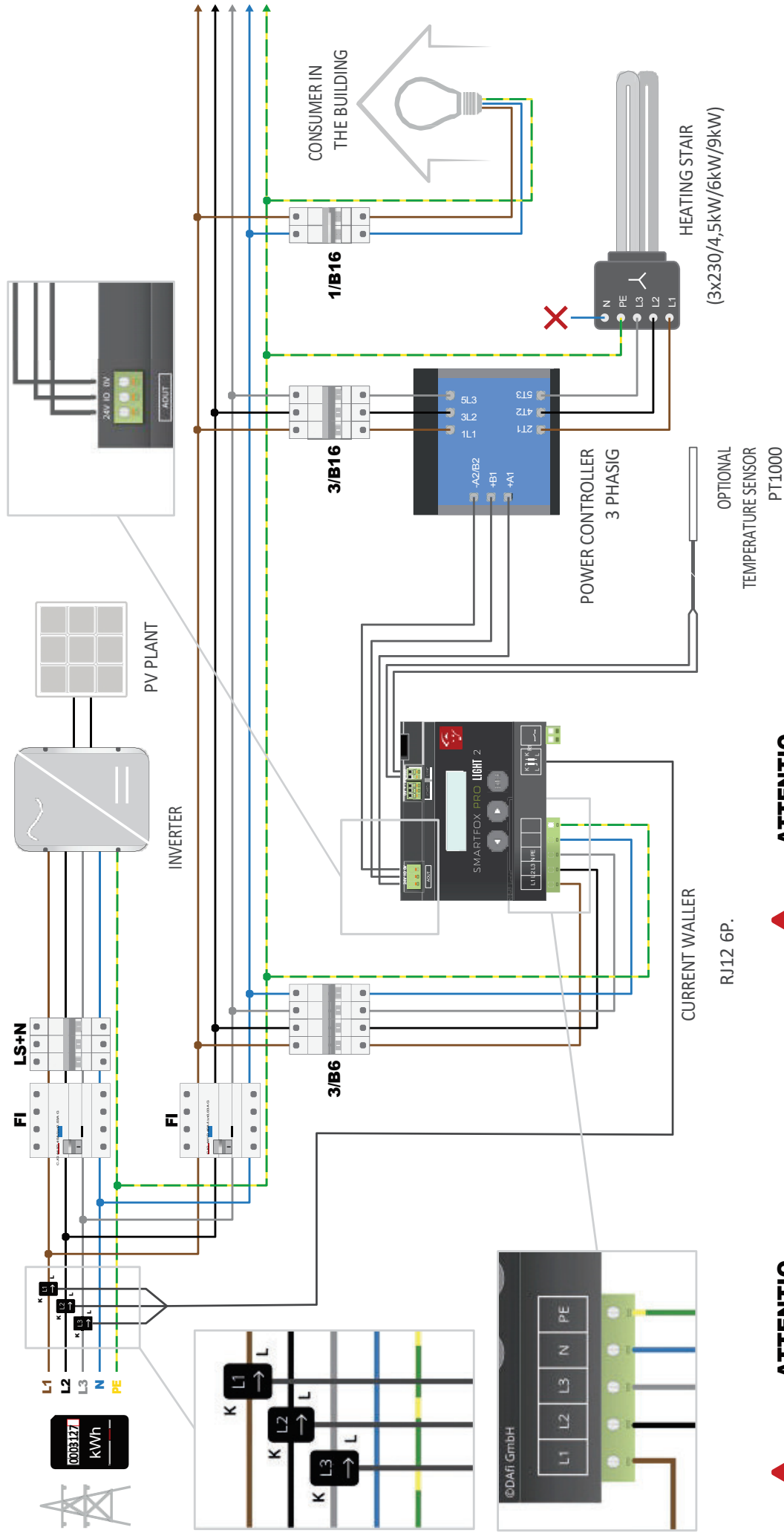
CONNECTION DIAGRAM POWER CONTROLLER & HEATING ROD 1-PHASE



ATTENTION!
Current and voltage path
must always be the same!

CONNECTION DIAGRAM POWER CONTROLLER & HEATING

ROD 3-PHASE



**ATTENTIO
N!**
Current and voltage path

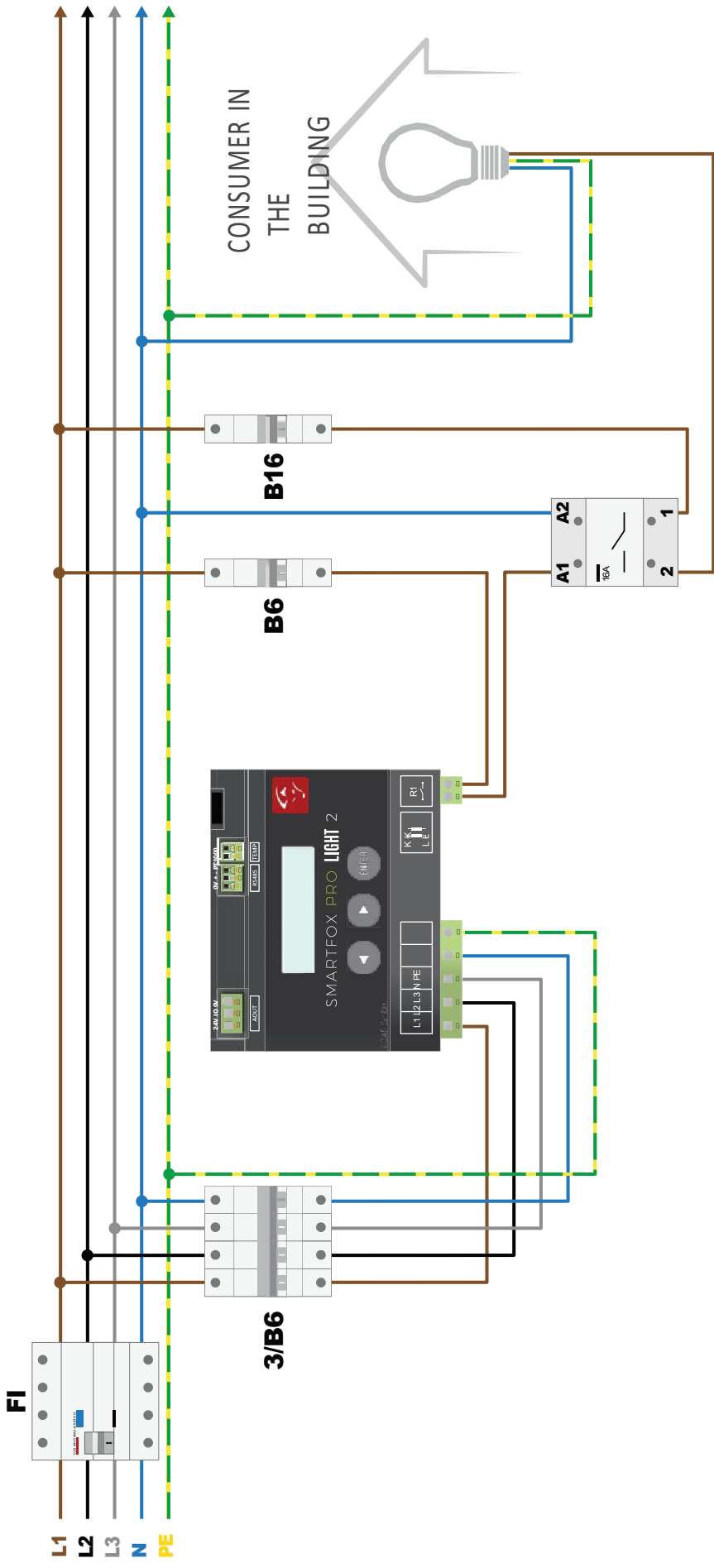


**ATTENTIO
N!**
must always be the same!

CONNECTION DIAGRAM POWER CONTROLLER & HEATING ROD 3-PHASE

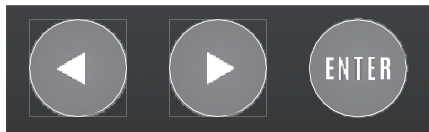
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CONNECTION DIAGRAM CONSUMER VIA RELAY



MAIN MENU

Navigation through the menu



Use the left and right arrow keys to scroll through the menu. To change a value/setting, press the Enter key (cursor starts flashing). Use the arrow keys left or right to change the set value. To navigate to the first line, press the Enter key until the cursor jumps to the first line.

NOTE!

Restart: Press the left and right buttons simultaneously for 5 seconds to restart.

NOTE!

Parameterisation: The unit is already pre-parameterised for the stepless control of a 3 kW heating element. If the unit is connected according to the connection diagram on page 9 (1-phase power controller), it is already ready for operation when the power supply is switched on. If a heating element with a different nominal power is connected, the "CONTROLLER P" value must be changed accordingly. The explanation of the individual setting parameters can be found in the following section.

Performance and P_{Nutz}

Least = 20 w p n u
t z = 0 w

POWER = 20W The current power is displayed. 20 Watt current consumption, drawn from the mains. A return delivery to the mains exists when a minus value is displayed. e.g. -20W.

PNUTZ= 500W. Currently, 500W is used via the analogue output (stepless). This is a calculated value according to the setting of the nominal load and the level of the analogue output. As soon as ANALOG OVERWR is displayed under PNUTZ, analogue monitoring is active. This means that the connected consumer is no longer consuming power (e.g. the thermostat of the heating element has switched off). After 5 minutes, a check is made again to see if the consumer is

it resumes performance.

Energy purchase

*B E C A U S E N E R G I E = 5
7 . 0 4 K W H*

Purchased energy = The total energy purchased from the grid.

Energy delivery

*l i e v e r n e r g i e s =
0 . 4 7 k w h*

Delivery energy = The total energy fed back into the grid.

Analogue output energy

*A N A L O G A N E R G I E = 0
. 0 0 K W H*

Analogue output energy = the total energy used by SMARTFOX/analogue output.

Voltage

*S P A N N E : A = 2 3 4 V B
= 2 3 5 V , C = 2 3 4 V*

Voltage A=234V B=235V, C=236V. The measured mains voltage per phase is displayed. (A=L1, B=L2, C=L3).

Power

*S T R O M : A = 0 . 3 5 A
B = 0 . 0 0 A C = 0 . 3 5
A*

Current A= 0.35A B= 0.00A C=0.35A. The measured current per phase is displayed (A=L1, B=L2, C=L3).

MAIN MENU

Power

*P (W / K W) : A = - 8 2 W
B = 0 . 0 0 W C = 8 0 W*

P(W/kW): A=-82W B=0.00W C=80W. The measured power is displayed (A=L1=-82W, B=L2=0.00W, C=L3=80W). On conductor L1, 82 watts are fed back into the mains. 80 watts are drawn from conductor L3. The sum of the 3 conductors gives the total power (Pges = -82W + 0W + 80W =-2W supplied to the mains).

Frequency

*f r e q u e n c e : 5 0 . 1
h Z*

Frequency: 50.1Hz, The current mains frequency is displayed. (50.1Hz)

Temperature

*T E M P e r a t u r e
5 0 c*

If a suitable sensor is connected to the PT1000 interface, the measured temperature is displayed here.

Analogue out

*a n a l o g o u t = 2 5 %
A U T O M A T I C H*

ANALOGOUT = 25%. The current level of the analogue output is displayed. There are 3 operating modes available:

AUTOMATIC: The output is automatically controlled by the SMARTFOX depending on the surplus situation.

MANUAL: The output can be set to a percentage value regardless of the surplus situation.

ATTENTION! Energy can be drawn from the mains.

SWITCHED OFF: The output is switched off and is not controlled.

Relay

```
relaisr1 = 0
```

RELAY R1: The current switching state of the relay is displayed. There are 3 operating modes available:

0: The relay is switched off.

1: The set switch-on condition is fulfilled, the relay has been switched on by the SMARTFOX.

M: The relay can be switched on regardless of the surplus situation.

ATTENTION! Energy can be drawn from the mains.

Setting Date Time

```
datum and contribution  
2018/09  
/1010:30
```

Display and setting of the current date and time. The unit switches automatically between summer and winter time.

SD card setting

```
SDCARD EINFREI  
1890MB
```

If a micro SD card is inserted and the setting is activated, all measurement data are written to the SD card at intervals of 30s. The unit creates a separate CSV file for each day (24h). Before removing the SD card, set the setting to "OFF". Micro SD cards up to 8GB are supported. The SD card must be formatted to FAT32. The free memory of the card is displayed in the second line.

Software version

```
www.smartfox.  
atMeterlp00.00  
.04
```

The currently installed software version is displayed. Available software updates can be downloaded from the Downloads section at www.smartfox.at/downloads.

Serial number

```
SERIANNUMBER  
5410ECAA06EB
```

The serial number of the unit is displayed.

PARAMETERISATION

N Getting started with Parameterisation

P A S S W O R T = 2 3 4 5

To access the parameterisation, switch to the menu item CONFIGURATION PASSWORD, set the "PASSWORD 2345" using the buttons and confirm.

IOUT

I O U T : 4 - 2 0 M A

Setting of the current output. You can choose between 4-20mA and 0-20mA. The current output is already pre-parameterised to 4-20mA.

Setting Controller & Behaviour

R E G L E R P = 3 0 0 W V E

R = 1

CONTROLLER P: P=3000W. Set the nominal power of the connected consumer (heating rod) here. The setting of the nominal power should be very precise, as this value is used as the basis for the PNUTZ calculation.

BEHAVIOUR: The BEHAVIOUR setting specifies how nimble or sluggish the analogue output is.

gear reacts. The value can be set between 1 (very quick) and 10 (very slow). By default, the value is set to 3 (nimble).

Target value & analogue monitoring

C I E L W E R T = - 0 0 2 0 W

A N A L O G U B E R W . = A I

N

TARGET VALUE: Setting TARGET VALUE between -30000W & +30000W, set the desired value here to which the system should constantly regulate. To avoid drawing energy from the mains, a negative value should be set here. The standard setting -20W is very suitable here.

NOTE!

If there is a battery storage in the system, the target value must be set to at least -200W.

PARAMETERISATIO

N

The relay also refers to this value when the ZW setting is set to ON (see page 19).

ANALOG MONITORING: If analogue monitoring is activated, the SMARTFOX automatically detects whether the connected consumer is actually consuming power. The unit thus determines whether the thermostat of the heating element has switched off. Instead of the value for PNUTZ, the display shows ANALOGÜBERW.

ATTENTION!

Deactivate analogue monitoring if several heating elements are operated in parallel at the analogue output. If the thermostat of one heating element switches off, the analogue monitoring would be triggered although the other heating elements are still drawing power.

Enable grid reference

```
F R E I G H T B E C A U S  
E S T A R T = 0 0 : 0 0
```

The start time for the timed forced release of the analogue output can be set here. This function is very suitable for ensuring hot water even during periods of bad weather.

ATTENTION! Energy can be drawn from the mains.

```
f r e i g h t e n e t z b e z  
p = 0 0 0 % d = 0 0 0 m i  
n
```

P: Under P=100%, set the level of the analogue output during forced release.

D: The duration of the forced release can be set here in minutes. The counter of the running time sets itself to zero daily at 06:00.

Relay R1

```
r1 : aus  
zw : ainpn : ain
```

R1: You can choose between 4 control behaviours (**heat pump, consumer, analogue relay & heating rod2**) and "Off".

ZW ON : The target value defined at the analogue output is taken into account.

ZW OFF: The relay calculates from zero watts.

PN ON: The relay is prioritised over the analogue output.

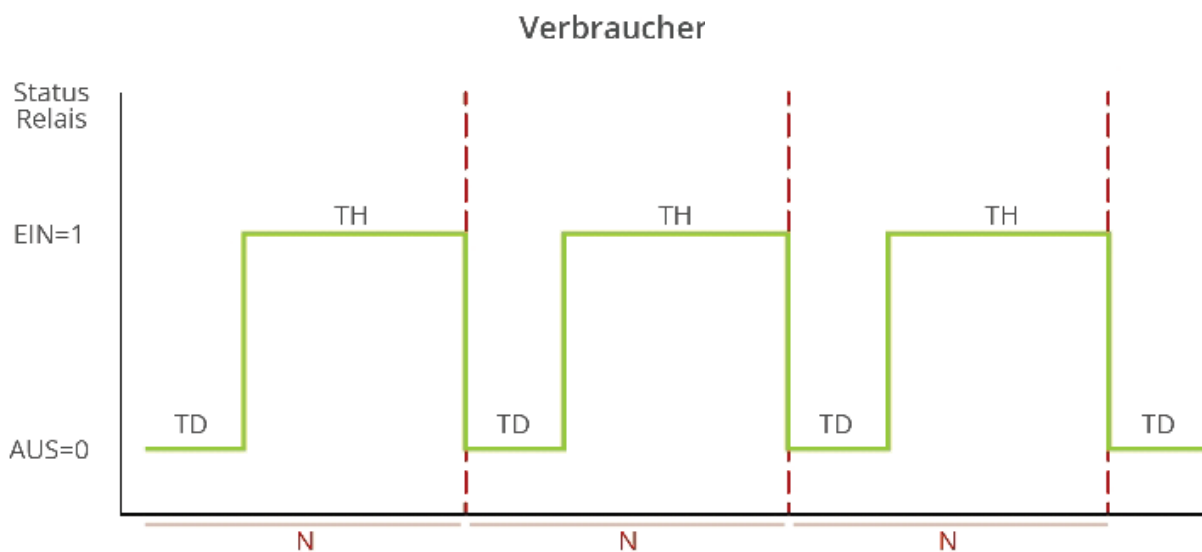
PN OFF: The analogue output is prioritised over the relays.

Consumer & Heat Pump

Under the control behaviour consumer or heat pump, the relay is activated as soon as the set power P for the selected switch-on delay TH was surplus.

Relay 1: Consumer

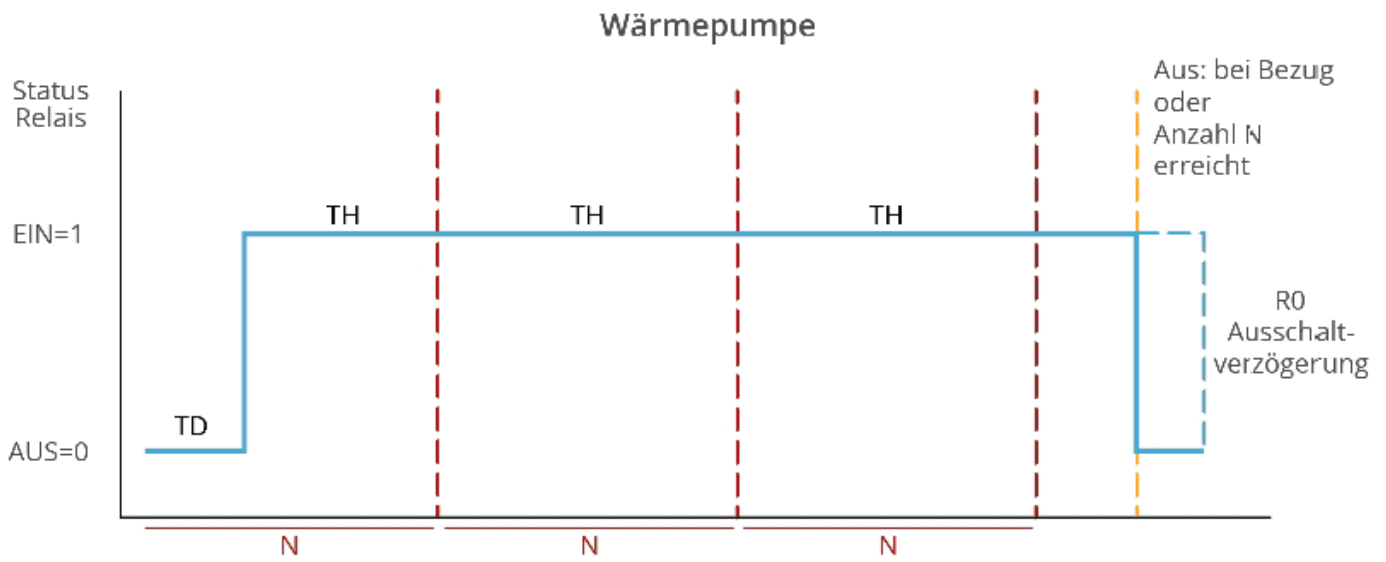
```
r1 : VERBRAUCHER  
zw : ainpn : ain
```



PARAMETERISATION

Relay 1= Heat pump

```
r1:waermepum  
pezw:ainpn:ai  
n
```



```
r1verzoe.000sw  
pschw.+000w
```

Heat pump: If the heat pump control behaviour is selected, two additional parameters are available.

R1 Switch-off delay: Relay switches off after the set time (0 to 999s) has elapsed after the set threshold value has been exceeded.

WP Threshold: The threshold can be set between -99999W and +99999W.

Relay 1

```
R1N=000TD=00MP  
=0000WTH=000M
```

R1 is the designation of the relay. N is the value of how often a relay should be activated per day, adjustable between 0 and 999.

0 means the relay is deactivated and is therefore not taken into account. If the relay is to be activated as often as possible, 999 can be selected.

P: P is the power value of the consumer connected to the relay, adjustable from 1 to 9999 watts.

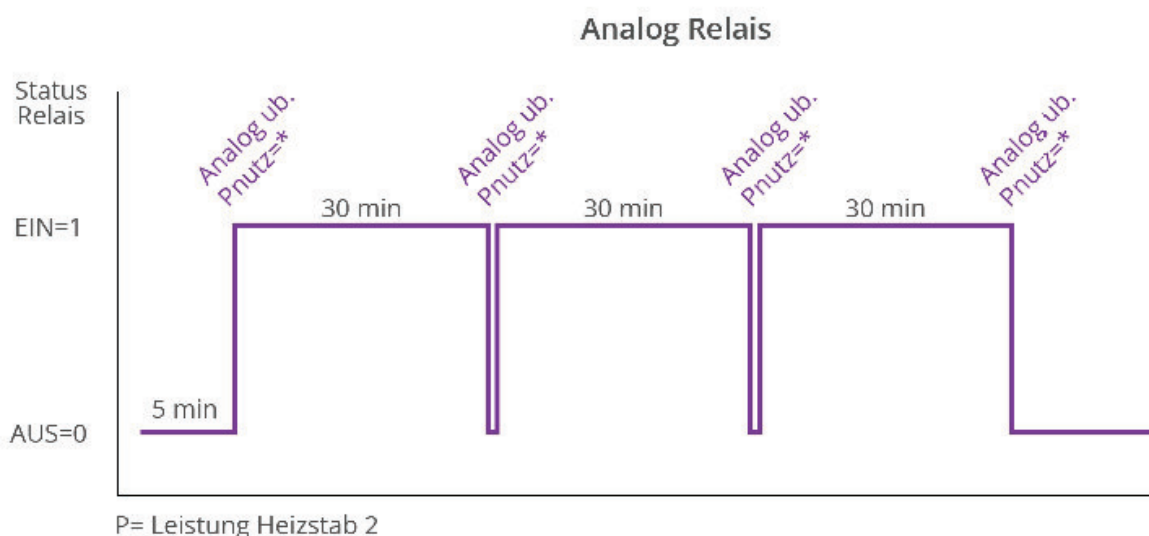
td: td is the delay time for how long the set power must exceed P to activate the relay. Adjustable between 0 and 99 minutes.

th: th is the minimum time the relay remains activated after the switch-on condition is fulfilled, adjustable between 1 and 999 minutes. If, for example, a th of 5min is set and the surplus collapses after 3 minutes (switch-on condition no longer fulfilled), the relay remains active for another two minutes.

Relay 1= Analogue relay

r 1 : A N A L O G R E L A I S
z w : a i n p n : a i n

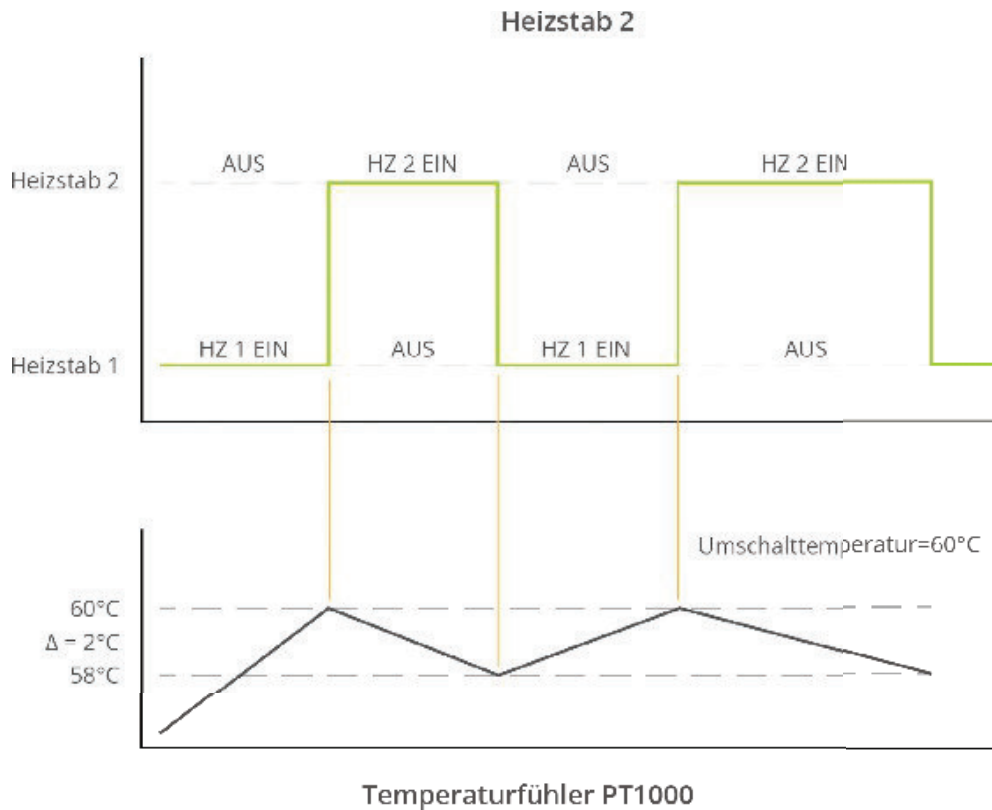
Analogue relay: If the control behaviour Analogue relay is selected, the relay switches as soon as the analogue monitoring is activated. This means whenever the heating element at the analogue output no longer consumes power (e.g. thermostat switched off). In this way, several heating elements can be operated steplessly one after the other by switching the contactor at the output of the power controller (e.g. boiler-buffer switchover). Only the setting P is required for the relay; the nominal power of the second heating rod must be stored here.



PARAMETERISATION

Relay 1= Heating rod 2

r 1 : H E I Z S T A B 2
z w : a i n p n : a i n



R1 Switching temperature = 60°C

R 1 U M S C H A L T - T E
M P E R A T U R E = 6 0 C

The HEATING BAR 2 function is only active if a temperature sensor is connected to the PT1000 input. The relay switches on when the set changeover temperature of the sensor is reached and switches off again when the temperature falls below this by 2°C. This offers the possibility of switching between several heating elements at the analogue output by means of the temperature sensor. This offers the possibility of switching between several heating elements at the analogue output by means of the temperature sensor (e.g. boiler-buffer switchover, heating element above - heating element below). Only the setting P is required for the relay; the nominal output of the second heating rod must be stored here and the switching temperature must be defined.

Forced release relay output

```
R 1 F N S T = 0 0 : 0 0 D U  
R = 9 9 9 M M O D E = M
```

Under ST, the daily switch-on time for the forced release is set, DUR specifies the switch-on time of the relay (0-999min). MODE specifies whether the time already run in automatic mode is to be deducted or not (A=Automatic: time is deducted, M=Manual: time is not deducted).

ATTENTION! Energy can be drawn from the mains.

```
R 1 F N R E S T : 0 0 0 M F  
N L A N G E : 0 0 0 M
```

FN REST: indicates the remaining runtime until the runtime set under forced release (DUR) is reached.

FN RUN TIME: Indicates the time the relay has already run.

PARAMETERISATION

Temperature sensor ON / OFF

*TEMPERATURSens
orein*

The PT1000 temperature sensor function can be activated here.

Minimum temperature

*Mindest - Tempe
rature: 00C*

The minimum temperature to be maintained can be set here.

Maximum temperature

*Maximal - Tempe
rature: 60C*

The maximum temperature to be reached can be set here

ATTENTION!

Minimum temperature and maximum temperature function only possible with connected PT1000 temperature sensor.

Display maximum - voltage

*MAXIMUM: A = 240
VB = 241 VC = 244 V*

The peak values of the voltage are displayed. A, B, C stand for L1, L2 and L3 respectively.

Display maximum - current

*MAXIMUM: A = 8,22
AB = 20,4 a C = 6,84 A*

The peak values of the currents are displayed. A, B, C stand for L1, L2 and L3 respectively.

Display maximum - active power

*MAXIMUM: A = 2,72 KW
b = 3,11 c = 1,85 kW*

The peak values of the active power are displayed. A, B, C stand for L1, L2 and L3 respectively.

Current transformer

*Stromwandlern
ern040:1*

When connecting with the supplied standard 80A or 100A converters (RJ12 plug), 1:1 is set here. With additional transformers, you can choose between 2 and 999, depending on the transformer ratio (e.g. 200:5 transformer results in a ratio of 40:1 $200:5=40$). Thus, a maximum transformer ratio of 4995A can be achieved with 5A transformers.

NOTE!

For connection of additional transformer, see page 8.

Energy values

*edities:
a/aus*

If the setting is activated, the stored energy values can be edited.

Delete all energy meters

*ALLENERGIEN
zaehlerloesche
n*

If the enter button is pressed for 10s, all stored energy values are reset to 0.

PARAMETERISATIO

N

Energy purchase

```
becausenergi  
es0000000000
```

The counter value for the energy drawn from the grid can be adjusted here.

Energy delivery

```
liefing.000  
000000
```

Here, the metered value for the energy supplied to the grid can be adjusted.

Analogue output energy

```
analogausg.e0  
0000000
```

The counter value for the energy used at the analogue output can be adjusted here.

Back to the main menu

```
therueckin  
shauptmenu  
e
```

Press the ENTER key to return to the main menu.

FIRMWAREUPDATE

1. Download firmware from smartfox.at/downloads.

2. Remove the SD card.



3. Unzip the file and copy it to the SD card.



5. Press and hold the left and right arrow keys simultaneously for 10 seconds.



6. After the update, check the firmware version on the display!

NOTE!

When updating, make sure that the settings file is available on the SD card. Otherwise the settings will be reset.

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