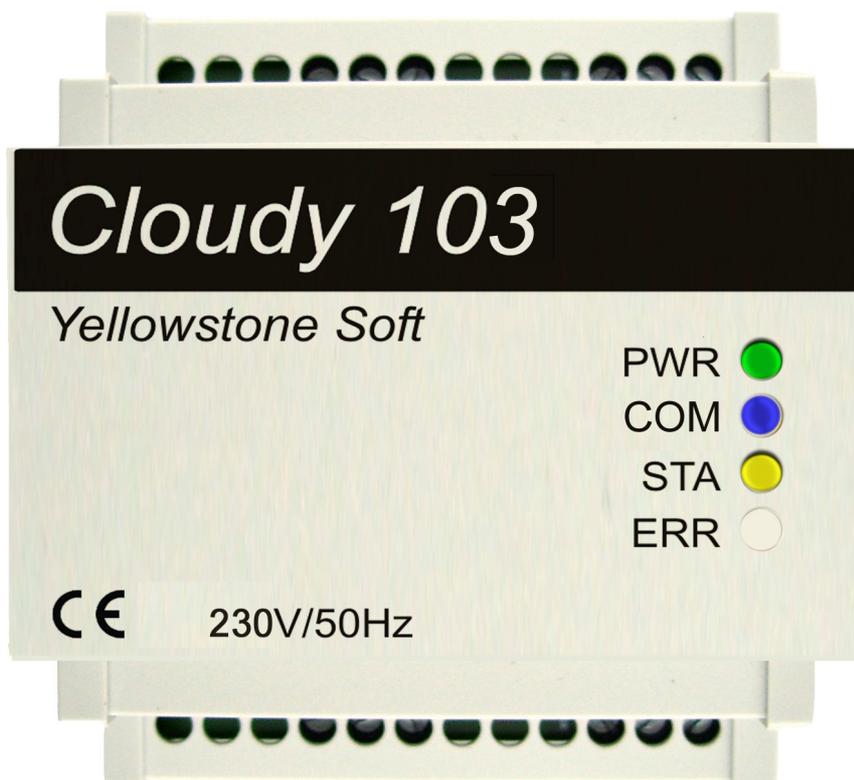


Operating and Installation Instructions for Product versions *Cloudy103 / Cloudy110 / Cloudy116*





Operating and Installation Instructions

Cloudy103 / Cloudy110 / Cloudy116

Revision:

| Datum | Autor | Ausgabe | Änderung |
|----------|-------|---------|----------------------|
| 14.09.13 | HB | 1 | Original Compliation |
| 21.11.16 | JS | 2 | English translation |
| 28.03.17 | JS | 3 | New Firmware |
| | | | |
| | | | |
| | | | |
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Note:

All software, hardware and brand names of the respective companies generally used in this documentation, are subject to trademark or patent protection.

All data given in this manual are not guaranteed characteristics in the legal sense. All information is subject to errors and technical amendments.

We also make mistakes and that's why we have a request to you: if, after despite conscientious examination, an error or discrepancy has crept into this documentation, please bring it to our attention. Please submit, the appropriate page with your discoveries, requests or suggestions. Thank you.



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1. Important Information:

1.1 Documentation

Please read the following documentation thoroughly, before installing and operating the Cloudy103 / Cloudy110 / Cloudy116.

1.2 Personnel Qualifications

The products described in this document are directed exclusively to qualified electricians.

1.3 Use

The components supplied, have a dedicated hardware and software configuration for a particular application. Modifications are only permitted, within the framework of the documentation. Any changes made to the hardware, software or improper use of the components, is a reason for a disclaimer from Yellowstone Soft.

Please ensure that the power has been switched off, before exchanging any components. Only clean tools and materials are to be used, when handling the components.

1.4 Notes on Operation

Position the unit securely or attach it properly on a mounting rail in a cabinet.

1.5 Maintenance and Warranty Information

The device is maintenance free. In case of damage, no repairs should be made. Opening the device will deem the warranty as null and void.

2 Product description:

2.1 Overview:

The Cloudy103 is an intelligent switching relay, providing a solution in the personal use of electricity from Photovoltaic systems.

The Cloudy110 is identical to the Cloudy103, but also features an additional RS485 interface.

The Cloudy116 is identical to the Cloudy110, but has 3 additional power relays, each with a maximum of 8A.

The Cloudy103 / Cloudy110 / Cloudy116 is connected directly to the power supply / bi-directional meter of the energy supplier.

An electricity meter with an optical D0 interface, according to DIN EN 62056-21 and data transmission with protocol Smart Message Language (SML) can be connected to the EHZ1 or EHZ2 interfaces. Connection to the meter is carried out with the Cloudy-IR optical sensor.

Meters that fulfil the criteria, are referred to as EDL21 meters. The Energy Industry Act (ENWG) Paragraph 21 stipulates, that since 01.01.2010, electronic electricity meters meeting the above requirements, have to be installed in all new and renovated buildings.

EDL21 meters are electronic household meters (eHZ) and possess the classic three-point mounting.

The RS485 interface of the Cloudy110 / Cloudy116, can be connected to the CloudyMeter630, a DIN rail supply meter. See Application Note AN813.

The Cloudy103 / 110 has three built-in relay contacts. There is a potential free version with three normally open contacts. Alternatively, there is a version whereby the 230V AC voltage is switched to the outputs.

The Cloudy103 / Cloudy110 / Cloudy116 measures several times per minute, the actual performance and flow direction of the energy. Based on this information, via an intelligent algorithm and a set of predefined rules, the Cloudy103/Cloudy110 decides on which relay to switch.

Consumers such as an electric heating element, heat pump or other electrical consumers can be controlled by the relay.

2.2 What can I do, if I do not have a modern electricity meter?

In Germany, most energy suppliers and Council utilities, offer the option of exchanging an existing electric meter with an EDL21 compliant version. Please enquire about this option, a fee may be payable to your energy supplier for the replacement.

Irrespective of the supplier, there is always of course the possibility of installing an additional electric meter, directly between the energy supplier meter and the subdistribution unit.

Yellowstone Soft offers two solutions. Firstly, the Cloudy630 energy meter with an integrated RS485 interface, which can be used in conjunction with the Cloudy110 / 116.

3 Installation und Commissioning:

3.1 Installation of the Cloudy103/Cloudy110/Cloudy116:

For installation, the device is to be attached onto a DIN rail TH 35-7.5, according to IEC60715 specifications.

The different connection options of the Cloudy103/110/116 are shown in the diagram below. The voltage supply to the screw terminals L1 / PE / N are connected as per the diagram (bottom left).

The optical sensor from the electronic supply meter (eHZ), is inserted into the 4P4C terminal. The optical sensor should always be inserted in the first terminal on the left of the electronic household meter (eHZ), labeled EHZ1.

The optional configuration cable (Cloudy-CAB) can be inserted into the terminal labeled EHZ3 which, with the help of a PC and the "CloudySeriell" software supplied, enables the Cloudy103/Cloudy110/Cloudy116 to be configured.

The Cloudy103 / Cloudy110 have three switching relays available on the bottom right.

The Cloudy116 has three additional switching relays in the middle level.

Attention:

Depending on which version of the Cloudy103/110 is purchased, there are potential-free contacts or contactors with 230V AC voltage.

The Cloudy103/110 **voltaged versions** are labeled:



The live Cloudy version is compatible with the Askoma heating element type AHR-B_PV-xxx.

Contacts 13, 23, and 33 respectively are relays which are activated with 230V AC. Contact 24 is neutral. Contact 23 is permanently at 230V AC.

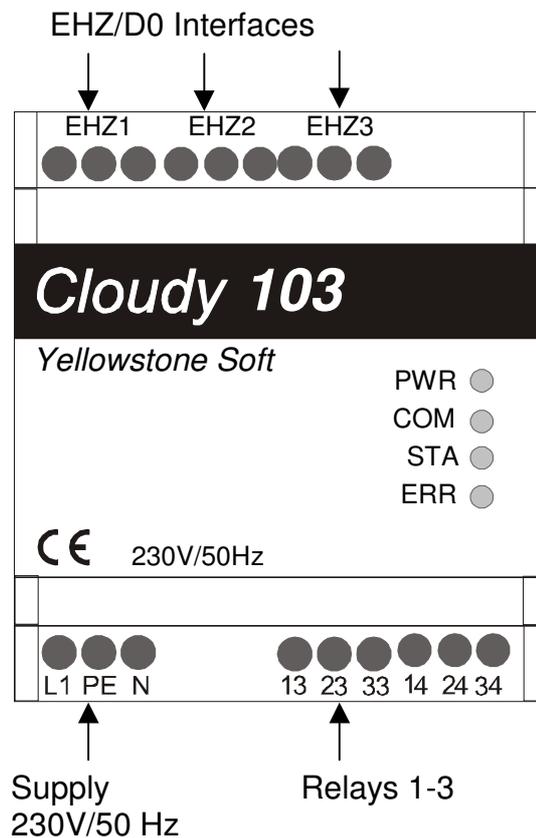
In the **potential free version**, the above mentioned label is missing. In this version, each potential free relay has a normally open contact.

The Cloudy116 is always designed as a potential-free version.

The first relay is connected to terminals 13/14, second relay to terminals 23/24 and the third relay to terminals 33/34.

On the upper left, the Cloudy110 and Cloudy116 have a four-pin connector, which enables the units to be connected directly to the CloudyMeter630. The necessary connection cable is included with the CloudyMeter630.

All undesigned screw terminals have no function.



3.2 Clarification of the LEDs:

Green LED (PWR) lights up when switched on, indicating that the unit is powered.

Yellow LED (STA) indicates whether the configuration has been set via the command interface or via the built-in microswitches. If the yellow LED flashes in a secondary cycle, the configuration set via the microswitches is valid and the measurement is carried out via the CloudyMeter630. If it flashes twice per second, the configuration set by the microswitches also applies. In this case, the measurement is made via the optical interface, which is connected to EHZ1. If the yellow LED is permanently on or permanently off, the configuration has been set via the command interface.

Flashing simultaneously, the yellow (STA) and blue (COM) LED's, indicates the unit is in update mode.

Red LED is permanently on, indicating the first eHZ/D0 interface is not connected to the electricity meter.

Red LED sporadic flashing, indicates a fatal system error. If after restarting, this error is not resolved, the unit must be replaced.

Red LED flashes cyclically in the secondary mode, dedicates the device is in configuration mode, for the radio system. The DIP switches 7 and 8 are set to ON. EHZ3 operates as a configuration interface and the radio system should be connected to EHZ2. **No meter is requested for EHZ1 in this mode.**

| | |
|---|--|
| green LED (PWR) on | Unit is powered |
| yellow LED (STA) on | Type of configuration |
| blue LED (COM) flickeriing | Sporadic flickering indicates communication on one of the eHZ interfaces |
| yellow LED (STA) off | Relay contact not activated |
| red LED (ERR) flashing sporadically | Fatal error in unit |
| red LED (ERR) on | Not connected to eHZ interface |
| red LED (ERR) flashes cyclically 1s | Configuration mode |
| yellow (STA) and blue (COM) LEDs flashing simultaneously 2 Hz | Software Update is active |



Note:

1. If the DIP switch 8 is set to ON, EH3 operates as a configuration interface. If it is set to OFF, a meter is requested on EH3. In this mode, you cannot connect to the Windows tool.
2. If the configuration is activated via the microswitches 2 and 3, any existing configuration previously set via the command interface is overwritten.

3.3 Combined with a heating element:

When a Askoma AHR-B-PV-xx heating element is used, connection of the live version of the Cloudy103/Cloudy110 can be done directly with the heating element, via the four core cable (eg 4 x 1 mm²) supplied.

An additional power relay must be installed, when a heating element from another Manufacturer (or the Askoma AHR-B-S-xx) is used. The heating element is to be wired in accordance with the specifications of the manufacturer's documentation.

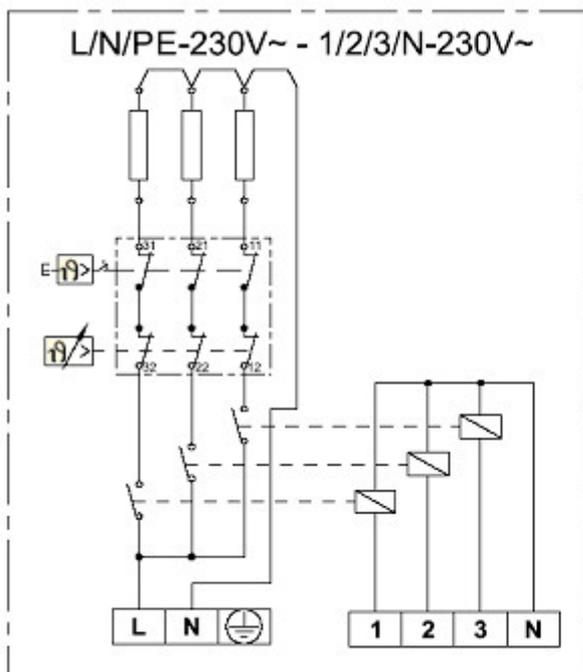
If the Cloudy116 is used, each relay contact in the middle level can be switched to a maximum of 1500 W.

Please note, installation instructions of the Askoma heating element are included with the unit itself, as well as in this document:

Askoma_012-0801--12.pdf

Heating elements from Askoma or other manufacturers must be connected according to the installation instructions of the heating element!

The following circuit diagram is of an Askoma AHR-B-PV-xx heating element.



Operating voltages

| | | |
|------------------|----------|-------|
| Power: | L/N/PE: | 230V~ |
| Control Voltage: | 1/2/3/N: | 230V~ |

The heating element terminals are connected via the control cable to the Cloudy103/Cloudy110 relays. The connections described below are determined by which Cloudy has been purchased:

Connecting the Cloudy103 / Cloudy110, live version:

with label ⚡ 230V AC ⚡

| | |
|-------------------|-----------|
| Heating Element 1 | Cloudy 13 |
| Heating Element 2 | Cloudy 23 |
| Heating Element 3 | Cloudy 33 |
| Heating Element N | Cloudy 24 |

Connecting the Cloudy103 / Cloudy110, potential free version:

without label ⚡ 230V AC ⚡

| | |
|-------------------|--------------|
| Heating Element 1 | Cloudy 13 |
| Heating Element 2 | Cloudy 23 |
| Heating Element 3 | Cloudy 33 |
| Heating Element N | with neutral |

Additionally, the Cloudy103/Cloudy110 terminals 14, 24, 34 must be connected with 230V AC.

Connecting the Cloudy116, potential free version:

| | | |
|-------------------|--------|----|
| L1 | Cloudy | 43 |
| Heating Element 1 | Cloudy | 44 |
| L2 | Cloudy | 53 |
| Heating Element 2 | Cloudy | 54 |
| L3 | Cloudy | 63 |
| Heating Element 3 | Cloudy | 64 |

| | |
|--------------------|---------------------------|
| Heating Element N | with neutral |
| Heating Element PE | with protective conductor |

The heating element thermostat must be preset with a cut-off temperature.

The heating element switches off independently from the Cloudy103/Cloudy110/Cloudy116, once the water has reached the preset temperature.



Operating and Installation Instructions

Cloudy103 / Cloudy110 / Cloudy116

4 Technical Data:

Housing:

Standard Unit: DIN 43880

Dimensions: 70 x 90 x 71 mm

Housing Material: Cover: PC - GF, light grey RAL 7035
Base plate: Black RAL 9005

Temperature Resistance: in accordance with UL 746 B: 115 °C
in accordance with Vicat ISO 306 Meth. B: 145 °C
in accordance with EN 75-2 (1,8 MPa):136 °C
(0,45 MPa):142 °C

Environmental Conditions:

Operating Temperature: 0 to 55 °C

Storage Temperature: -20 to 70 °C

Humidity (non-condensing): 10% to 70%

Terminals:

Solid Cable cross section: 0,14 to 4 mm²

Stranded Cable cross section: 0,14 to 2,5 mm² (cable with sleeve)

Relays:

Type: Variation 1:
Cloudy103/110 3 x est. Voltage 230V AC

Variation 2:
Cloudy103/110/116 3 x Normally open potential
free

Max. Voltage: 250V AC, 30V DC

Max. Current: 1A AC, 1A DC

Max. Capacity: 30 W

Power Relay (only Cloudy116):

Max. Voltage: 250V AC, 30V DC

Max. Current: 8A AC

Max. Capacity: 1500 W



Operating and Installation Instructions

Cloudy103 / Cloudy110 / Cloudy116

Pin Assignment:

Variation1 (voltage):

13 Switching voltage relay 1, 230V AC
23 Switching voltage relay 2, 230V AC
33 Switching voltage relay 3, 230V AC
14 Continuous voltage 230V AC
24 Neutral
34 PE - PE conductor is connected on the left of
the Cloudy103/110

Variation 2 (potential free):

13 Contact 1 from Relay 1
23 Contact 1 from Relay 2
33 Contact 1 from Relay 3
14 Contact 2 from Relay 1
24 Contact 2 from Relay 2
34 Contact 2 from Relay 3

Cloudy116 (additional contacts):

43 Contact 1 from Relay 4
44 Contact 1 from Relay 4
53 Contact 1 from Relay 5
54 Contact 2 from Relay 5
63 Contact 2 from Relay 6
64 Contact 2 from Relay 6

Power Supply:

Voltage: 230V AC 50Hz
Current Consumption: < 20 mA

eHZ/D0 Interface:

There are three eHZ/D0 interfaces available.

Standard Unit

VDE specifications OKK for BKE assembly
Transmission Speed: 9600 Baud
Connector Type: 4P4C Modular plug
Pin Assignment:
Auxiliary Voltage - Pin 1
GND - Pin 2
RxD - Pin 3
TxD - Pin 4

In the latest software version, two or three electricity meters may be connected (Interfaces 1 and 2). The function of the third interface depends on the position of the DIP switch 8. If this is ON, it works as a service interface for visualization and configuration. If the DIP switch 8 is set to OFF, an EHZ can also be connected to the interface.

With the Cloudy103/Cloudy110/Cloudy116, only one meter can be connected, therefore it is preferred that the first interface is used.

RS485 Interface (Cloudy110/Cloudy116)

The Cloudy110/Cloudy116 has an additional RS485 opto-isolated interface. The CloudyMeter630 can be connected to this interface.

The RS485 Pin assignment is as follows (from right to left):

Cloudy110/Cloudy116

CloudyMeter630

| | | | |
|---|--------------|----------|----------|
| 1 | GND | (black) | Marked G |
| 2 | RS485 – A | (yellow) | Marked A |
| 3 | RS485 – B | (red) | Marked B |
| 4 | not assigned | | |

5 Configuration of the Switching Relay:

5.1 Overview:

The Cloudy product relays can be configured via the command interface or built-in microswitches and the software tool Cloudy-Serial.

Three relays are included in the Cloudy103/Cloudy110.

The Cloudy116 has three additional power relays, with a maximum switching capacity of 1500 W.

The maximum switching parameters must be observed, when connecting consumers to the switching relay.

5.2 Configuration via integrated Microswitches:

Configuration via integrated Microswitches (Cloudy116)

The Cloudy116 configuration is done either via the "CloudySerial" software together with the accompanied cable or, via the microswitches which are accessible on the outside of the housing.
For the correct procedure, please see the description below.



Switch 1 OFF
Switch 1 ON

RS485 Termination is OFF
RS485 Termination is ON



Switch 2 OFF
Switch 3 OFF

parameters configured via the command interface are active



Switch 2 ON
Switch 3 OFF

parameter switches 4-6 are active,
power measurement via the CloudyMeter630



Switch 2 OFF
Switch 3 ON

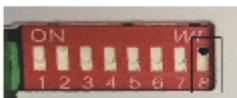
parameter switches 4-6 are active, power
measurement via the Cloudy-IR connected to
interface EHZ1



Switch 4 OFF
Switch 5 ON
Switch 6 OFF

Example: configuration of a 2 kW heating
element

| Switch 4 | Switch 5 | Switch 6 | Power levels | Recommended Askoma heat elements |
|----------|----------|----------|----------------------|--|
| OFF | OFF | OFF | 0,33 / 0,66 / 1,0 kW | AHR-B-PV-1.0, AHR-B-S-1.0 |
| ON | OFF | OFF | 0,5 / 1,0 / 1,5 kW | AHR-B-PV-1.5, AHR-B-S-1.5 |
| OFF | ON | OFF | 0,66 / 1,33 / 2,0 kW | AHR-B-PV-2.0, AHR-B-S-2.0, AHR-BI-PV2-2.0 |
| ON | ON | OFF | 0,83 / 1,66 / 2,5 kW | AHR-B-PV-2.5, AHR-B-S-2.5, AHR-BI-PV2-2.5 |
| OFF | OFF | ON | 1,0 / 2,0 / 3,0 kW | AHR-B-PV-3.0, AHR-B-S-3.0 |
| ON | OFF | ON | 1,27 / 2,54 / 3,8 kW | AHR-B-PV-3.8, AHR-B-S-3.8 |
| OFF | ON | ON | 1,33 / 2,66 / 4,0 kW | AHR-BI-PV2-4.0 |
| ON | ON | ON | 1,5 / 3,0 / 4,5 kW | AHR-B-PV-4.5, AHR-B-S-4.5 |



Switch 8 OFF
Switch 8 ON

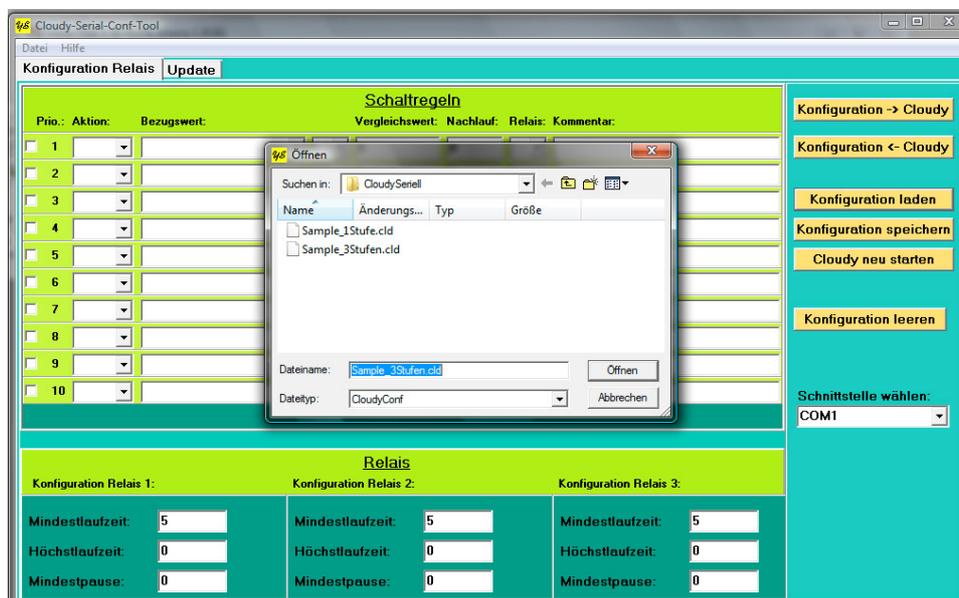
serial command interface is OFF
serial command interface is ON

5.3 Configuration via the Command Interface:

The Cloudy switching relays can be configured via the third serial interface.

A special service cable and software ,Cloudy Serial Conf Tool' is required for the configuration (see chapter "Software Update").

The service interface is only active when the DIP Switch 8 is set to ON. If the DIP switch is re-configured, the change will only take effect after the Cloudy has been restarted.



Procedure:

Connect the PC serial port (or USB/serial adapter cable) to the Cloudy103/ Cloudy110/Cloudy116 via the eHZ3 interface.

Start the ,Cloudy Serial Conf Tool'. The „Configuration relay“ tab should now be active, if not activate it.

„Configuration -> Cloudy“ Tab

The actual configuration is now transmitted to the Cloudy.

„Configuration <- Cloudy“ Tab

The existing configuration of the Cloudy is transmitted to and displayed on the PC.

„Load Configuration“ Tab

Upload the configuration from the hard drive. To select the configuration file, open the dialog box by clicking on the „Update“ tab.

„Save Configuration“ Tab

Saves the present configuration to the hard drive.

„Cloudy Restart“ Tab

Restarts the Cloudy.

„Delete Configuration“ Tab

Deletes all data in the configuration tool.

„Select Interface“ Drop down menu

Select the serial interface. It will display all available serial ports in the PC.

5.3.1 Switching Rule Configuration:**Checkbox:**

Switching control is active/inactive

Priority:

Priority display. The highest priority is Rule 1. Only one rule can be processed at any given time.

Action:

"On" control, turns a relay on (contact closes). "Off" control, a relay switches off (normally open).

Reference Value:

Selection field of the measured eHZ values.

Selection Field:

Select higher and lower

Comparison Value:

Comparative value in Watts



Lag:

Lead/lag time is in minutes. A minimum time value must be present before it is taken into account.

Relays:

Select Relay 1 - 3

Comment:

Rule description

5.3.2 Relay Configuration:

Minimum runtime

Minimum runtime of the switching rule in minutes

Maximum runtime:

Maximum runtime of the switching rule in minutes

Minimum pause:

Minimum pause of the switching rule in minutes

5.4 Processing Principle of the Switching Rules:

Switching rules are always checked from top to bottom. Therefore, Rule number 1 has the highest priority.

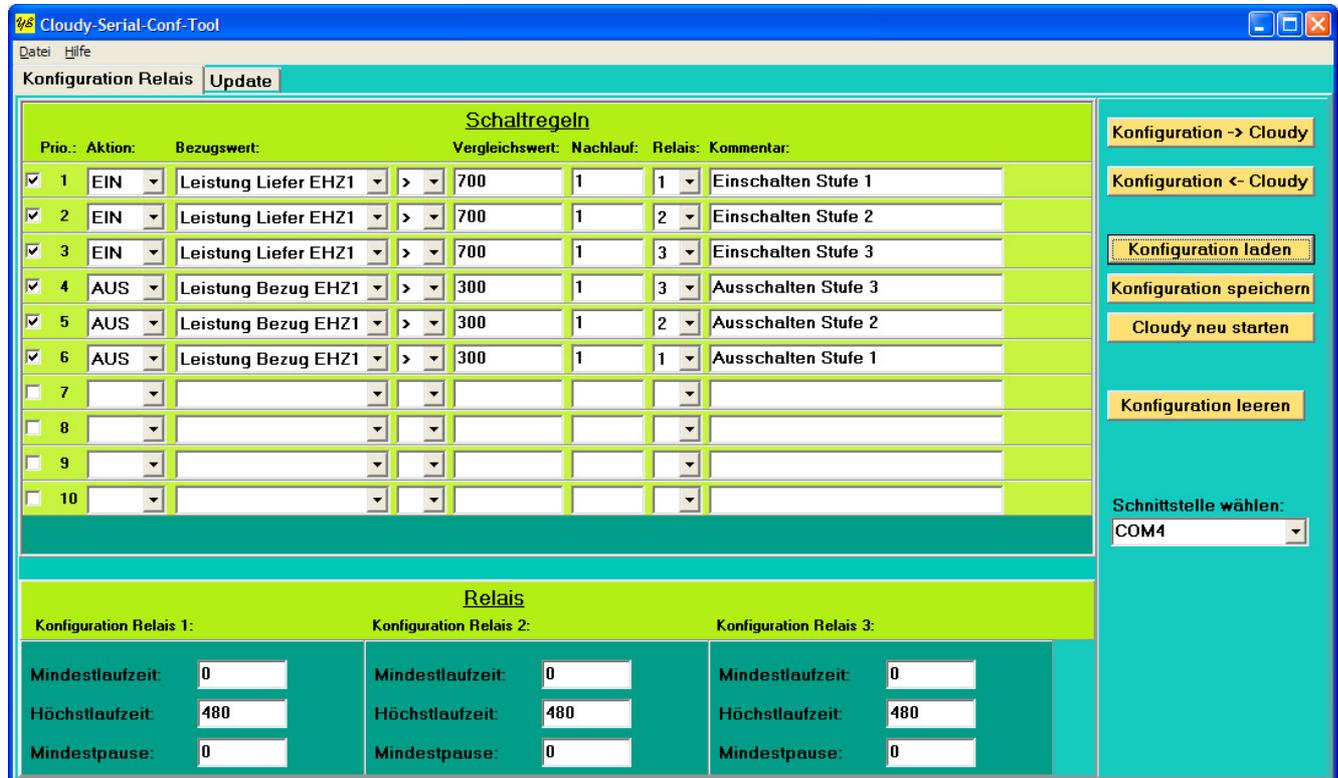
Once per minute, the switching rules are checked.

Once a rule is active, it will not be checked again.

If a relay is "On" the rule is, that this relay is not included. Similarly, if a relay is "Off" it is therefore also not considered.

The control is processed accurately for every passing minute and should therefore be accepted as correct.

5.5 Example:



The screenshot shows the 'Schaltregeln' (Switching Rules) configuration window. The table below represents the data visible in the interface:

| Prio.: | Aktion: | Bezugswert: | Vergleichswert: | Nachlauf: | Relais: | Kommentar: | | |
|-------------------------------------|---------|-------------|----------------------|-----------|---------|------------|---|---------------------|
| <input checked="" type="checkbox"/> | 1 | EIN | Leistung Liefer EHZ1 | > | 700 | 1 | 1 | Einschalten Stufe 1 |
| <input checked="" type="checkbox"/> | 2 | EIN | Leistung Liefer EHZ1 | > | 700 | 1 | 2 | Einschalten Stufe 2 |
| <input checked="" type="checkbox"/> | 3 | EIN | Leistung Liefer EHZ1 | > | 700 | 1 | 3 | Einschalten Stufe 3 |
| <input checked="" type="checkbox"/> | 4 | AUS | Leistung Bezug EHZ1 | > | 300 | 1 | 3 | Ausschalten Stufe 3 |
| <input checked="" type="checkbox"/> | 5 | AUS | Leistung Bezug EHZ1 | > | 300 | 1 | 2 | Ausschalten Stufe 2 |
| <input checked="" type="checkbox"/> | 6 | AUS | Leistung Bezug EHZ1 | > | 300 | 1 | 1 | Ausschalten Stufe 1 |
| <input type="checkbox"/> | 7 | | | | | | | |
| <input type="checkbox"/> | 8 | | | | | | | |
| <input type="checkbox"/> | 9 | | | | | | | |
| <input type="checkbox"/> | 10 | | | | | | | |

Below the table, there are three sections for 'Relais' configuration (Relais 1, 2, and 3), each with input fields for 'Mindestlaufzeit', 'Höchstlaufzeit', and 'Mindestpause'. The sidebar on the right contains buttons for 'Konfiguration -> Cloudy', 'Konfiguration <- Cloudy', 'Konfiguration laden', 'Konfiguration speichern', 'Cloudy neu starten', and 'Konfiguration leeren', along with a 'Schnittstelle wählen:' dropdown menu set to 'COM4'.

A PV system produces e.g. 1800 W. When it is found that there is no personal consumption taking place in the home, 1800 W is the measured output. The first Rule defines that, as soon as an output of more than 700W is supplied, then Relay 1 is switched "On". When Relay 1 is „On“, the first stage of the heating element is activated. The heating element type AHR-B-PV 2.0 has an active power consumption of 670W. After a further minute, the power supply now measures 1130 W. Rule 1 is not considered, as it already applies. Rule 2 defines that, when more than 700 W is supplied, Relay 2 switches „On“. This is encountered, when Relay 2 and the second stage of the heating element is activated, resulting in a total consumption of 1330W.

A further minute later, the power supply is measured at only 470 W. Rules 1 and 2 are no longer considered. Rule 3 is not going to be activated, therefore by definition, the power supply measured would have had to be more than 700 W. The third stage of the heating element will not be activated. The PV system, after a defined period of time will deliver e.g. only 700 W. Since the actual usage in the house is 1330 W, 630 W is supplied from the grid. Rule 5 now applies, because Relay 2 is „On“ and the required "reference >300 W" has been achieved. Relay 2 drops out, therefore the second stage of the heating element is switched off. Again, with the next reading the power supply measures 70 W. As a result, none of the rules are active and until the output of the PV system changes, the switching state of the relay does not change.

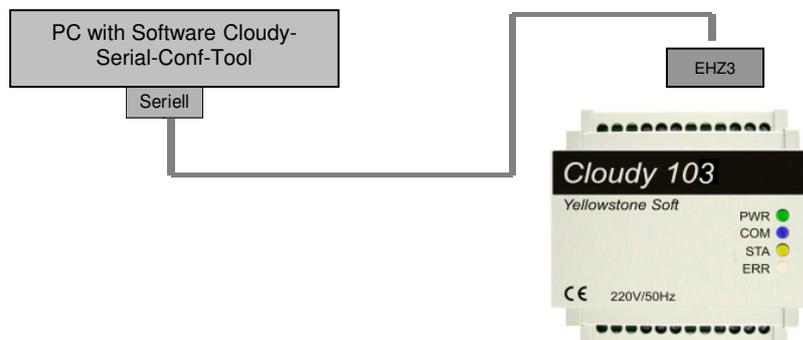
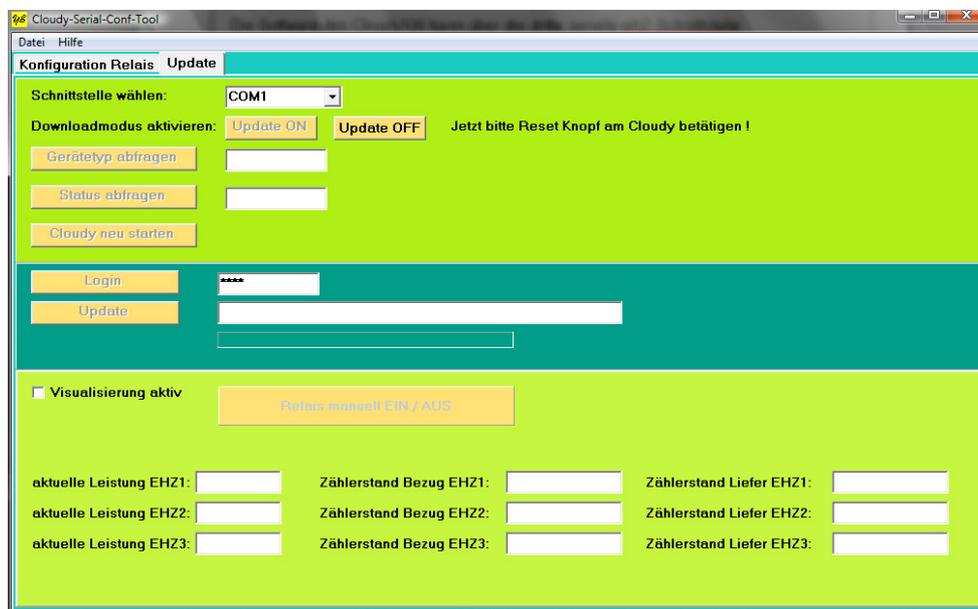
6 Software Update:

The Cloudy103/Cloudy110/Cloudy116 software can be updated via the third eHZ serial interface.

Note:

Please note, Software Update is only for loading new System Software. No software update is required for the transfer of switching rules, as described in Chapter 4.

A special service cable and the software ,Cloudy Serial Conf Tool‘ is required for software updates.



Procedure:

Connect the PC serial port (or USB/serial adapter cable) to the Cloudy103/ Cloudy110/ Cloudy116 via the eHZ3 interface.

Start the ‚Cloudy Serial Conf tool‘ software.

Activate the ‚Cloudy Serial Conf Tool‘ by clicking the "Update" tab.

On the "Update" page, select the serial interface in the option box.

Click the "Update ON" tab

Press the reset button with a pointed tool or pen on the Cloudy.

The Cloudy LED display should now display the following signals:

PWR lights up green

STA (yellow) and COM (blue) flash simultaneously

Note: An update is only possible in this state!

Click the "Update OFF" tab in the ‚Cloudy Serial Conf Tool‘.

Click the „Check device type“ tab, the tool recognizes the associated Cloudy type (Cloudy100, Cloudy103, ..) and displays it in the text field.

Enable the "Check Status" tab.

When the Cloudy is in download mode, "Update" appears in the display.

Click the "Login" tab.

After clicking the „Update“ tab, a dialog window opens, now select the update file (ending in: s3).

Once the update file has been selected, confirm that the update should really be carried out. The update will be performed only once the „Yes“ tab has been clicked.

If the update has been successful, a confirmation will appear on the display.

To complete the „Cloudy Serial Conf“ update process, click the „Restart Cloudy“ tab.

LED display after a successful update:

PWR lights up green

STA off

LED display after faulty update:

PWR lights up green

STA lights up yellow

ERR flashes red

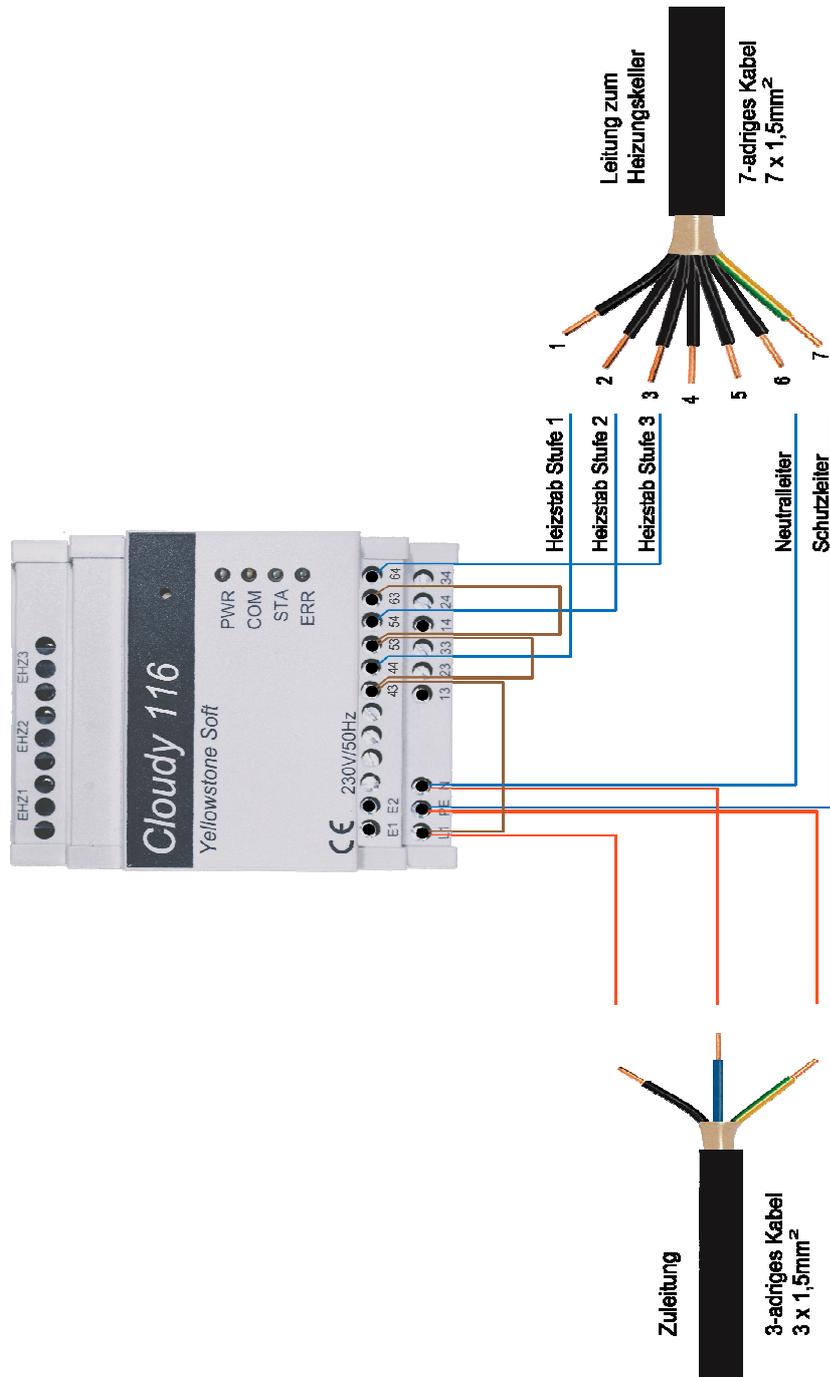
Error: incorrect file update

Note:

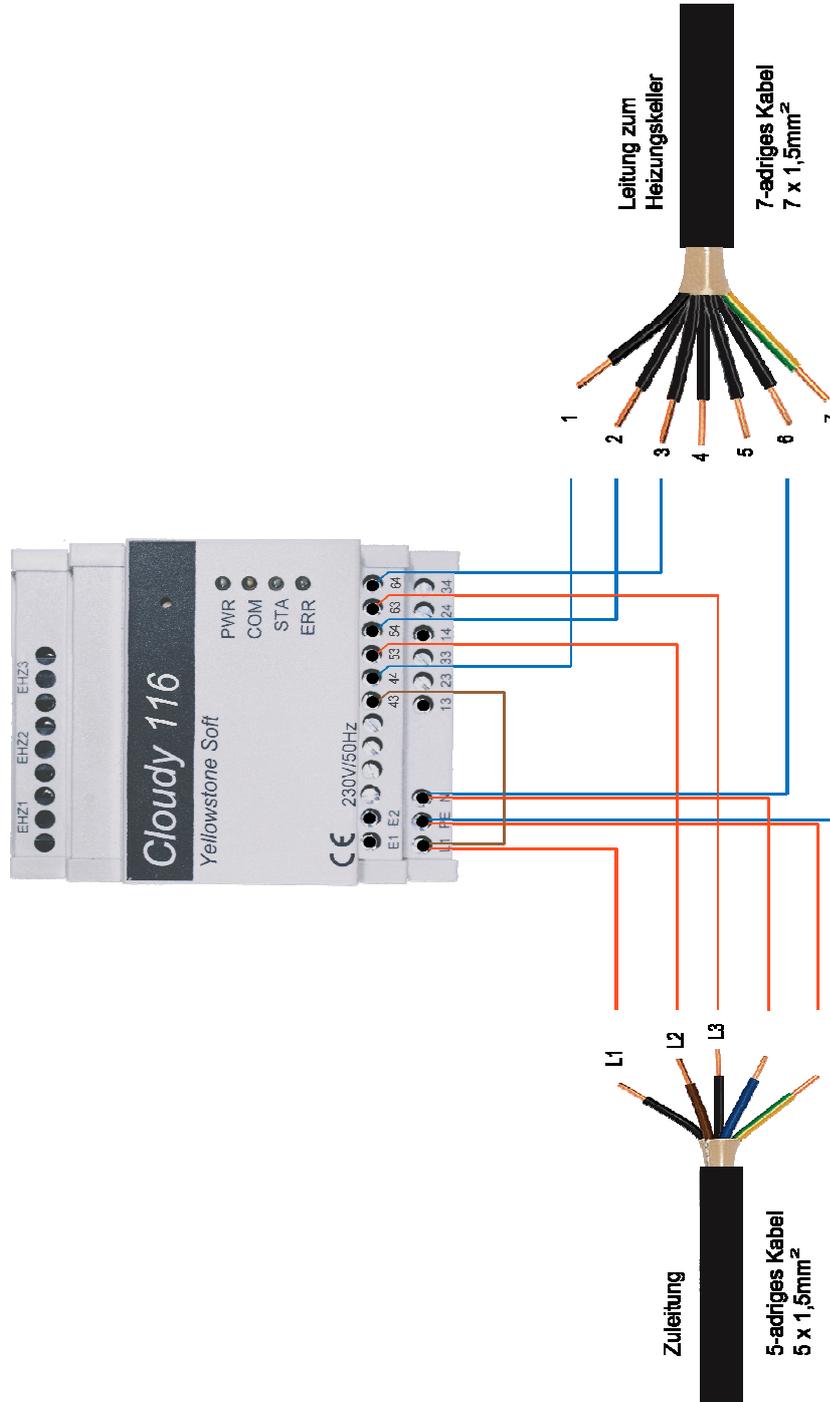
When the update is interrupted by clicking the "Update OFF" tab, after one minute, the Cloudy returns to its original state, before the update mode.

Appendix A: Connection examples:

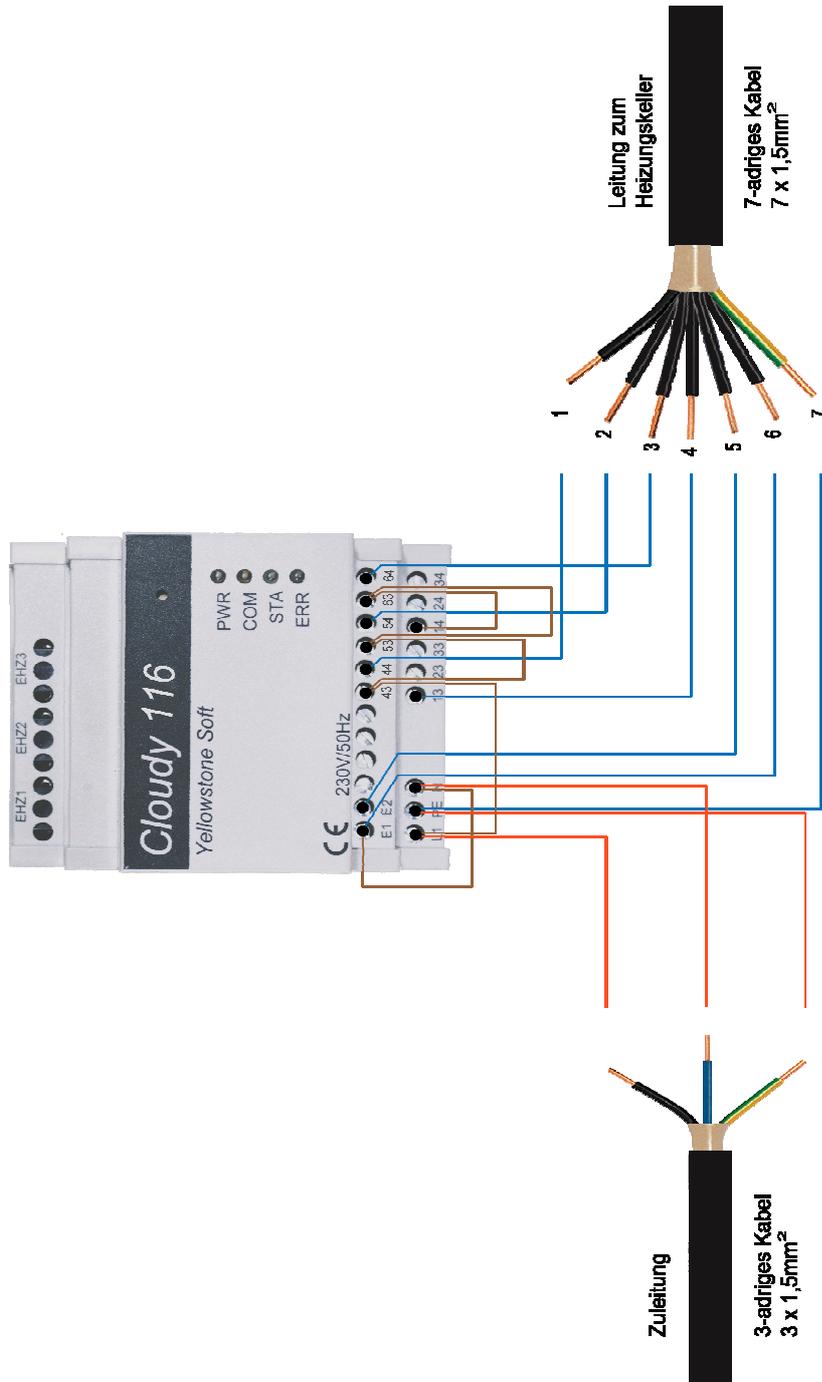
Cloudy116 einphasiger Anschluss, Heizstab bis 4.5 kW



Cloudy116 dreiphasiger Anschluss, Heizstab bis 4.5 kW



Cloudy116 einphasiger Anschluss, Heizstab bis 4.5 kW, Variante Thermofresh



Cloudy116 dreiphasiger Anschluss, Heizstab bis 4.5 kW, Variante Thermofresh

