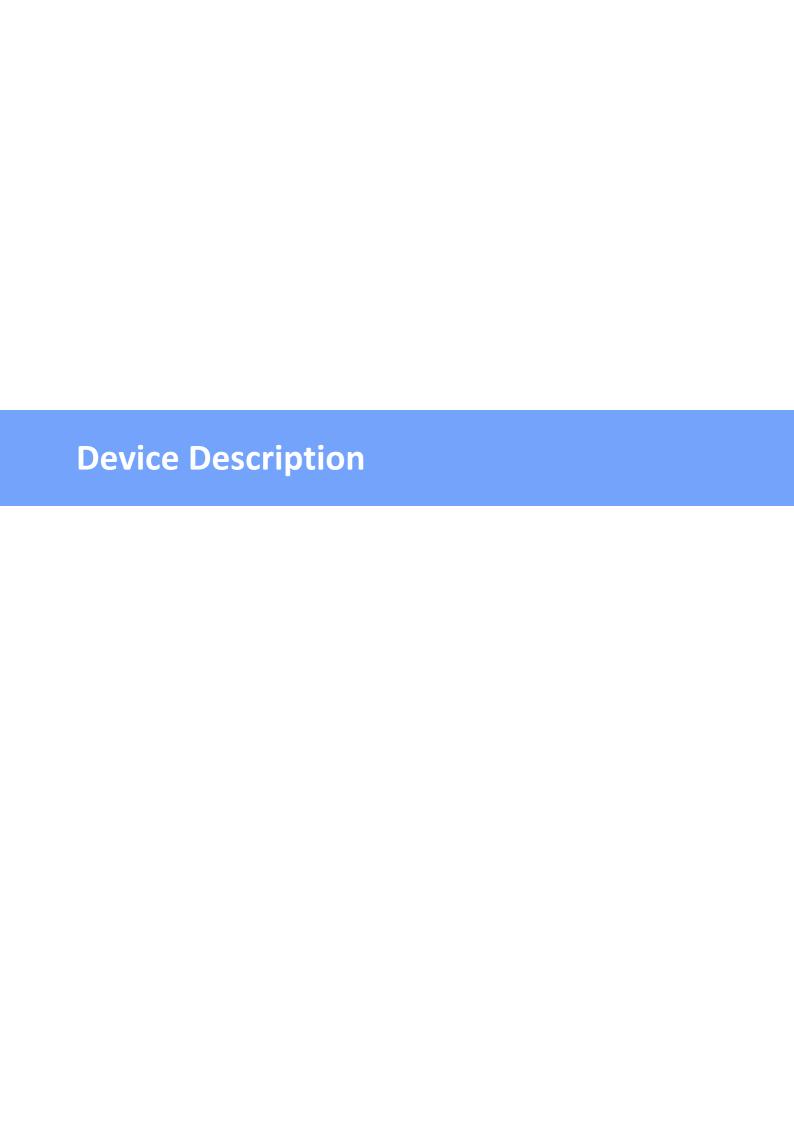


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### **1** Device Description

### 1.1 Security Advice

- The device may only be installed and used by qualified personnel. The manufacturer accepts no liability for damage or injury caused by improper use of the device.
- It is not possible for the customer to repair the device. Repairs may only be carried out by the manufacturer.
- This equipment contains live parts with dangerous voltages and must not be opened or disassembled.
- The device may only be connected to a 100 240 volt AC mains supply (50 60 Hz).
- The power cords, plugs and sockets have to be in good condition. Always connect the device to properly grounded power sockets.
- In order to be able to disconnect the device from the mains quickly and safely, the socket outlet that supplies the device with power must be easily accessible.
- This equipment is designed for indoor use only. It must not be used in condensing or excessively hot environments.
- Please observe the other instructions in the manual for the proper handling of the device.
- Please also observe the safety instructions and operating instructions for the other devices that are connected to the unit.
- For safety and approval reasons, it is not permitted to modify the device without our consent.
- The device is not a toy. It must not be stored or operated within the reach of children.
- Do not leave packaging material lying around carelessly. Plastic films/ bags, polystyrene parts etc. could become a dangerous toy for children. Please recycle the packaging material.
- If you are not clear about the correct connection or if any questions arise that are not clarified by the operating instructions, please contact our support.
- Please never leave connected devices that may cause damage unattended.
- Connect only electrical devices that do not have limited on-time. I.e. in case of failure, all connected appliances have to cope with a continuous on-time without causing damage.

### 1.2 Content of Delivery

The package includes:

- Expert Power Control 1104 / 1105
- · Quick Start Guide

### 1.3 Description

The **Expert Power Control 1104 / 11105** can switch one different load output. The device has the following features:

- One Power Port switchable directly on the device, via HTTP(S), SNMP
- Dedicated high-inrush relay avoid welding of relay contacts at start-up peaks

# **Device Description**

- Metering of energy, current, power factor, phase angle, frequency, voltage and active/apparent/reactive power (EPC 1105)
- Two energy meters, one meters continously, the other energy meter is resettable (EPC 1105)
- Interface for optional sensors for environmental monitoring
- · Console commands via SSH and Telnet
- · SSH support with public key and passwords
- Individually parameterisable switch-on delay of all outputs
- Programmable timetables and turn-on/turn-off sequences
- Individually adjustable watchdog for each output, which switches depending on accessibility (network ping)
- Dual TCP/IP stack with IPv4 and IPv6 support (IPv6-ready)
- Control and monitoring of the device via Ethernet with an integrated web server with SSL encryption (TLS 1.1, 1.2, 1.3)
- Control and configuration with CGI parameters and JSON messages via HTTP (REST API)
- SNMP (v1, v2c and v3, traps)
- MQTT 3.1.1 Support
- Modbus TCP support
- Radius support
- Generation of messages (e-mail, syslog and SNMP traps) and switching of relays depending on sensor measurement limits
- Firmware update during operation via Ethernet possible
- Encrypted e-mails (SSL, STARTTLS)
- Access protection through IP access control
- Low own consumption
- · Developed and produced in Germany

### 1.4 Installation





- 1. LED display for the status of the power port
- 2. Status LED
- 3. Connection for sensor (RJ45)
- 4. Network connection (RJ45)
- 5. OK Button

#### For models EPC 1104-2 or 1105-2

- 6. Load output (IEC C13, max. 10 A)
- 7. Mains supply (IEC C14, max. 10 Å)

### Start-up the device

- Connect the power cord to the mains supply.
- Plug the network cable into the Ethernet socket (RJ45).
- Connect the optional external sensor.

# 1.5 Technical Specifications

| Interfaces   | (EPC 1104-1 / 1105-1)  1 x Power supply (CEE 7/4 type E, max. 16 A)  1 x Load output (CEE 7/3 type E, max. 16 A)  1 x Ethernet port (RJ45)  1 x RJ45 for external Sensor  (EPC 1104-2 / 1105-2)  1 x Power supply (IEC C14, max. 10 A)  1 x Load output (IEC C13, max. 10 A)  1 x Ethernet port (RJ45)  1 x RJ45 for external Sensor |
|--|--|
| Network connectivity   | 10/100 MBit/s 10baseT Ethernet   |
| Power Supply   | internal power supply (90-265V AC / -15% / +10%)   |
| Environment     Operating temperature     Storage temperature     Humidity | 0°C - 50 °C<br>-20°C - 70 °C<br>0% - 95% (non-condensing)  |
| Case   | Synthetic  |
| Measurements   | 484mm x 46mm x 74mm (L x H x W)  |
| Weight   | approx. 1050 kg  |

### 1.5.1 Electrical Measurement

typical fault tolerances for Ta=25°C, I=1Arms...16Arms, Un=90Vrms...265Vrms

| Electrical Measurement Specification |               |          |                 |                         |  |  |
|--------------------------------------|---------------|----------|-----------------|-------------------------|--|--|
|                                      |               |          |                 |                         |  |  |
| Category                             | Range         | Unit     | Resolu-<br>tion | Inaccuracy<br>(typical) |  |  |
| Voltage                              | 90-265        | V        | 0.01            | < 1%                    |  |  |
| Current                              | 0 - 16        | Α        | 0.001           | < 1.5%                  |  |  |
| Frequency                            | 45-65         | Hz       | 0.01            | < 0.03%                 |  |  |
| Phase                                | -180 - +180   | 0        | 0.1             | < 1%                    |  |  |
| Active power                         | 0 - 4000      | W        | 1               | < 1.5%                  |  |  |
| Reactive power                       | -4000 - 4000  | Var      | 1               | < 1.5%                  |  |  |
| Apparent power                       | 0 - 4000      | VA       | 1               | < 1.5%                  |  |  |
| Power factor                         | 0 - 1         | -        | 0.01            | < 3%                    |  |  |
|                                      |               |          |                 |                         |  |  |
|                                      | Eı            | nergy Co | unter           |                         |  |  |
|                                      |               |          |                 |                         |  |  |
| Active Energy (total)                | 9.999.999,999 | kWh      | 0.001           | < 1.5%                  |  |  |
| Active Energy (resettable)           | 9.999.999,999 | kWh      | 0.001           | < 1.5%                  |  |  |

### 1.6 Sensor

One external sensor can be connected to the **Expert Power Control 1104 / 1105**. The following sensors are currently available



7101

7104 - 7106

| Product Name                           | 7101 (End-of-<br>Life)                                    | 7104-1  | 7105-1  | 7106-1  |
|--|---|---|---|---|
| Calibrated<br>Sensor                   | -   | 7104-2  | 7105-2  | 7106-2  |
| Cable Length                           | ≈ 2m  | ≈ 2m  | ≈ 2m  | ≈ 2m  |
| Connector                              | RJ45  | RJ45  | RJ45  | RJ45  |
| temperature range                      | -20°C to +80°C at<br>±2°C (maximum)<br>and ±1°C (typical) |
| air humidity range<br>(non-condensing) | -   | -   | 0-100%, ±3% (typical), 10-80% ±2% (typical)               | 0-100%, ±3%<br>(typical), 10-80%<br>±2% (typical)         |
| air pressure range<br>(full)           | -   | -   | -   | ± 1 hPa (typical)<br>at 300 1100<br>hPa, 0 +40 °C         |
| air pressure range<br>(ext)            | -   | -   | -   | ± 1.7 hPa (typical)<br>at 300 1100<br>hPa, -20 0 °C       |
| Protection                             | IP68  | -   | -   | -   |



7201, 7202



7205, 7206

# **Device Description**

| Product Name                           | 7201 (End-of-<br>Life)                                    | 7202 (End-of-<br>Life)                                    | 7205  | 7206  |
|--|---|---|---|---|
| Connector                              | RJ45  | RJ45  | RJ45  | RJ45  |
| temperature range                      | -20°C to +80°C at<br>±2°C (maximum)<br>and ±1°C (typical) |
| air humidity range<br>(non-condensing) | -   | 0-100%, ±3%<br>(typical)                                  | 0-100%, ±3%<br>(typical), 10-80%<br>±2% (typical)         | 0-100%, ±3% (typ-<br>ical), 10-80% ±2%<br>(typical)       |
| air pressure range<br>(full)           | -   | -   |   | ± 1 hPa (typical) at<br>300 1100 hPa, 0<br>+40 °C         |
| air pressure range<br>(ext)            | -   | -   |   | ± 1.7 hPa (typical)<br>at 300 1100 hPa,<br>-20 0 °C       |



7207, 7209, 7210

| Product Name                           | 7207  | 7209  | 7210  |
|--|---|---|---|
| Connector                              | RJ45  | RJ45  | RJ45  |
| temperature range                      | -20°C to +80°C at ±2°C<br>(maximum) and ±1°C<br>(typical) | -20°C to +80°C at ±2°C<br>(maximum) and ±1°C<br>(typical) | -20°C to +80°C at ±2°C<br>(maximum) and ±1°C<br>(typical) |
| air humidity range<br>(non-condensing) | -   | 0-100%, ±3% (typical),<br>10-80% ±2% (typical)            | 0-100%, ±3% (typical),<br>10-80% ±2% (typical)            |
| air pressure range (full)              | -   | -   | ± 1 hPa (typical) at 300<br>1100 hPa, 0 +40 °<br>C        |
| air pressure range (ext)               | -   | -   | ± 1.7 hPa (typical) at<br>300 1100 hPa, -20<br>0 °C       |
| Inputs                                 | 2x  | 2x  | 2x  |

### **Technical data inputs**

| ·        | digital input, internal pull-up<br>active: max. 24V, < 3V Low, > 8V High<br>passive: switching contact |
|----------|--|
| Terminal | 3-pole - AK1550/3-3.5-GREEN  |

#### **Behavior inputs**

| Input     | Logic              | Logic inverted<br>(Fabdefault) |
|-----------|--------------------|--------------------------------|
| open      | High / on / closed | low / off / open               |
| closed    | Low / off / open   | High / on / closed             |
| Voltage   |                    |                                |
| < 3V      | Low / off / open   | High / on / closed             |
| > 8V      | High / on / closed | Low / off / open               |
| otherwise | undefined          | undefined                      |

Event messages are generated when the logic changes. In the sensor configuration the logic can be inverted. So that "High" appears when the input is closed, the logic is configured as inverted as fabdefault. In protocols with numeric values (e.g. SNMP or ModbusTCP) a "1" is considered as High, and a "0" as Low.

#### Sensor in web interface

The sensor is automatically detected after connect. This is indicated by the green LED on the sensor port that is lit permanently. The sensor values are displayed at the "Control Panel" web page:

| ld      | Name | Temperature °C | Humidity<br>% | Dew Point<br>°C | Dew Diff<br>°C | Pressure<br>hPa |
|---------|------|----------------|---------------|-----------------|----------------|-----------------|
| 1: 7106 | 7106 | 22.5           | 34.2          | 5.9             | 16.6           | 1013.8          |

A click on the link in the "Name" column opens the display of the Min and Max values. The values in a column can be reset using the "Reset" button. The "Reset" button in the name column deletes all stored Min and Max values.

| ld      | Name            | Temperature °C | Humidity<br>% | Dew Point<br>°C | Dew Diff<br>°C | Pressure<br>hPa |
|---------|-----------------|----------------|---------------|-----------------|----------------|-----------------|
| 1: 7106 | 7106<br>30m min | 22.5<br>0.0    | 34.4<br>34.1  | 6.1<br>5.9      | 16.5<br>16.4   | 1013.8<br>125.0 |
|         | 30m max         | 22.6           | 34.7          | 6.2             | 300.0          | 1013.8          |
|         | Reset           | Reset          | Reset         | Reset           | Reset          | Reset           |

If external sensors with inputs are connected, these are also added on the "Control Panel" web page:

| Port         | Name         | logical state            | time since transition | toggle count |
|--------------|--------------|--------------------------|-----------------------|--------------|
| 2: 7207 - I1 | Extern Input | <pre>0: off / open</pre> | 1d 03:48:48           | 0            |
| 2: 7207 - I2 | Extern Input | <pre>0: off / open</pre> | 1d 03:48:48           | 0            |

#### 1.6.1 Calibration

From this firmware version it is possible to store a value offset in the sensor for internal sensors (Expert Sensor Box) or external sensors. This offset is zero ex works, because the sensors are normally not calibrated. The offset can be specified by the following commands via Telnet / SSH:

```
extsensor {port_num} {sen_field} calib set {float}
extsensor {port_num} {sen_field} calib show
```

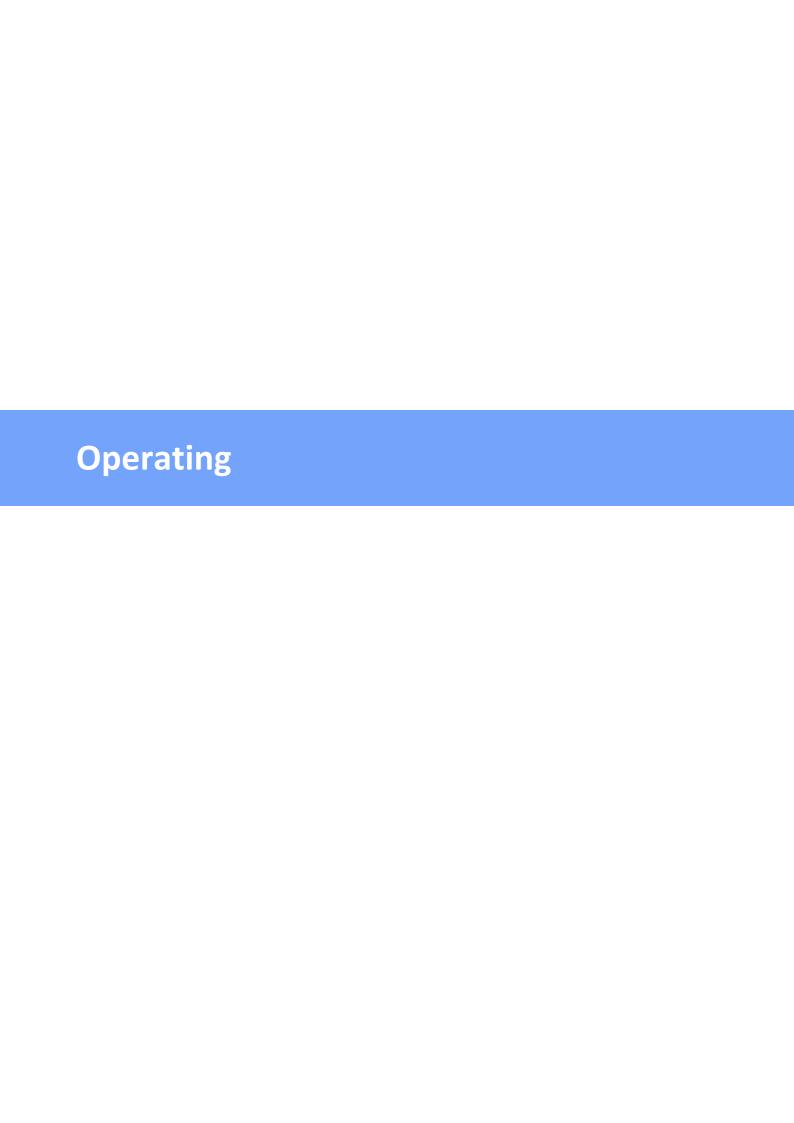
# **Device Description**



For internal sensors (such as the Expert Sensor Box), the internal sensor port is 1.

# External Sensor Field Table "{sen\_field}".

| Index | Description  | Unit |
|-------|--------------|------|
| 0     | Temperature  | °C   |
| 1     | Humidity     | %    |
| 3     | Air pressure | hPa  |



### 2 Operating

### 2.1 Operating the device directly

#### Status-LED

The Status LED shows the different states of the device:

- red: The device is not connected to the Ethernet.
- orange: The device is connected to the Ethernet and waits for data from the DHCP server
- green: The device is connected to the Ethernet and the TCP/IP settings are allocated.
- periodic blinking: The device is in Bootloader mode.

#### Switching the port with the button

The current status of the port is indicated by the color of the LED. Red indicates that the port is off, green shows that the port is on.

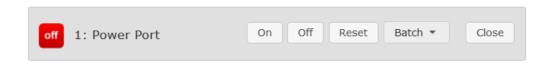
Press and hold the button for a total of 6 seconds. During the first 3 seconds, the status LED flashes in a long-on, short-off rhythm. During the next 3 seconds, the status LED flashes in a twice short, once long rhythm. At this moment, release the button and press the button again briefly to switch the relay, or if you wait 6 seconds instead, the device will return to the initial state.

#### 2.2 Control Panel

Access the web interface: http://"IP-address" and log-in.



The web page provides an overview of the switching state, energy measurement values (only **EPC 1105**), as well as the external sensor, provided that it is connected. When the port is clicked at the **Expert Power Control 1104 / 1105**, a panel with buttons to control the port appear:



## **Operating**

The port icon is green when the relay is closed, or red in the open state. An additional small clock icon indicates that a timer is active. Timer can be activated by delay, reset or batch mode.



An activated Watchdog is represented by an eye icon. An "X" means, that the address that should be observed, could not be resolved. Two circular arrows show a booting status.



The port can be switched manually with the "On" and "Off" buttons. If the port is turned on, it can be turned off by pressing the "Reset" button, until after a delay it turns itself on again. The delay time is determined by the parameter <u>Reset Duration</u>, which is described in the chapter "Configuration - Power Ports 24". The "Close" button dissolves the panel again.

#### **Batchmode**

The port can be set for a selectable period of time to the state "switch on" or "switch off". After the selected time it is automatically switched to the second preselected state.



Optionally the device can be switched via a Perl script or external tools like wget. More information is available on our support wiki at www.gude.info/wiki.

#### 2.3 Maintenance

The actual device generation with IPv6 and SSL allows all maintenance functions in the web interface to be carried out on the Maintenance Page 19.

#### Maintenance in the web interface

The following functions are available from the maintenance web page:

- Firmware Update
- Change the SSL certificate
- Load and save the configuration
- · Restart the device
- Factory Reset
- Jump into the Bootloader
- · Delete the DNS cache

#### **Upload Firmware, Certificate or Configuration**

On the Maintenance Page [19], select the required file with "Browse .." in the sections "Firmware Update", "SSL Certificate Upload" or "Config Import File Upload" and press "Upload". The file is now transferred to the update area of the device and the contents are checked. Only now, pressing the "Apply" button will permanently update the data, or abort with "Cancel".

Only one upload function can be initiated with a reboot, eg. you cannot transmit firmware and configuration at the same time.

If after a firmware update, the web page is not displayed correctly anymore, this may be related to the interaction of Javascript with an outdated browser cache. If a Ctrl-F5 does not help, it is recommended that you manually delete the cache in the browser options. Alternatively, you can test start the browser in "private mode".

During a firmware update, old data formats are sometimes converted to new structures. If an older firmware is newly installed, the configuration data and the energy meters may be lost! If the device then does not run correctly, please restore the factory settings (e.g. from the Maintenance Page 19).

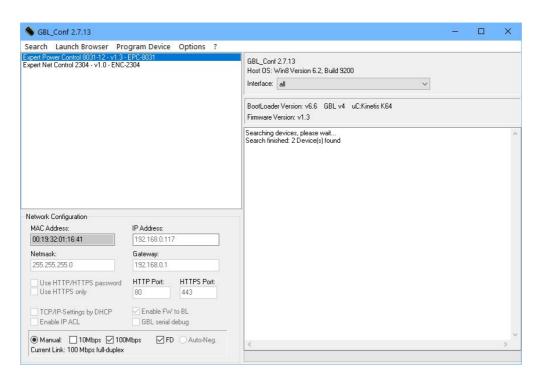
#### **Actions in Bootloader mode**

If the web interface of the device is no longer accessible, the device can be put into Bootloader mode (see chapter Bootloader activation 21). The following functions can be executed using the GBL\_Conf.exe application:

- Set IPv4 address, net-mask and gateway
- Turn HTTP password on and off
- Turn IP-ACL on and off
- Factory Reset
- · Allow jump from firmware to bootloader
- · Restart the device

For devices with relays, entering or exiting the bootloader mode does not change the state of the relays as long as the operating voltage is maintained.

The GBL\_Conf.exe program is available free of charge on our website www.gude-systems.com.



Interface GBL\_Conf

To check the network settings with GBL\_Conf.exe, start the program and choose "All Devices" in the "Search" menu. From the list select the appropriate device. The lower part of the left half of the window now shows the current network settings of the device. If the IP address is displayed with the default settings (192.168.0.2), either no DHCP server is present on the network, or there could be no free IP address assigned to it.

- Activate the Bootloader Mode (see Chapter Bootloader Mode) and choose in menu "Search" the item "Bootloader-Mode Devices only"
- Enter the desired settings in the edit window and save them with "Save Config".
- Deactivate the boot loader mode for the changes to take effect. Select again "All Devices" in the "Search" menu of GBL\_Conf.exe.

The new network configuration is now displayed.

Changing the configuration with gbl\_conf.exe is explicitly only allowed in boot-loader mode!

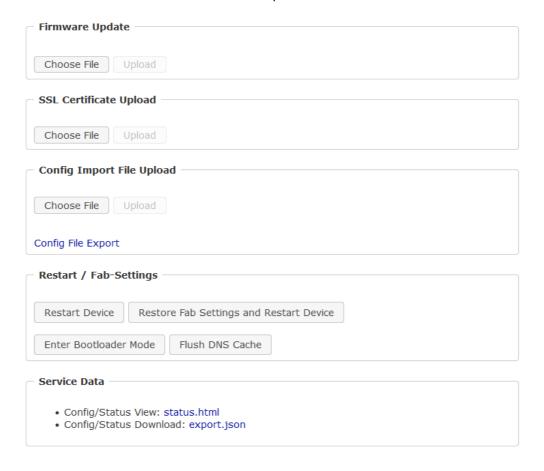
#### **Factory Reset**

The device can be reset to the factory default via the web interface from the Maintenance Page 19 or from the Bootloader mode (see chapter Bootloader activation 21). All TCP/IP settings are reset in this operation.

If a unit is set to factory defaults, an uploaded certificate or updated firmware will be preserved.

#### 2.3.1 Maintenance Page

This section provides access to important functions such as Firmware Update or Restart Device. It is advisable to set an HTTP password for this reason.



Firmware Update: Start a firmware update.

SSL Certificate Upload: Saves your own SSL certificate. See chapter "SSL [93]" for the generation of a certificate in the right format.

<u>Config Import File Upload</u>: Loads a new configuration from a text file. To apply the new configuration, a "Restart Device" must be executed after the "Upload".

Config File Export: Saves the current configuration in a text file.

Saving the configuration should only be carried out in an SSL connection, since it contains sensitive password information (even if it is encrypted or hashed).

Restart Device: Restarts the device without changing the status of the relays.

Some functions such as a firmware update or changing of the IP-address and HTTP settings require a restart of the device. A jump to the boot loader or a restart of the device lead by no means to a change of the relay states.

Restore Fab Settings and Restart Device: Performs a restart and resets the device to factory default 2.

<u>Enter Bootloader Mode</u>: Jumps into bootloader mode, where additional settings can be made with GBL\_Conf.exe.

## **Operating**

<u>Flush DNS Cache</u>: All entries in the DNS cache are discarded and address resolutions are requested again.

Config/Status View: status.html: Displays the status.html page with the JSON data.

Config/Status Download: <u>export.json</u>: Direct file download of JSON data from status.hml.

#### 2.3.2 Configuration Management

The device configuration can be saved and restored in the maintenance area 1971.

| <ul> <li>Config Import File Upload</li> </ul> |  |  |
|---|--|--|
|   |  |  |
|   |  |  |
| Channa File                                   |  |  |
| Choose File Upload                            |  |  |
|   |  |  |
|   |  |  |
| Config File Export                            |  |  |
| Soming this Export                            |  |  |

The "Config File Export" function can be used to save the current configuration as a text file. The syntax used in the configuration file corresponds to the commands of the Telnet console. If the configuration of a device is to be restored from a text file, load the file with "Upload" and restart the device with "Restart Device".

Saving the configuration should only be carried out in an SSL connection, since it contains sensitive password information (even if it is encrypted or hashed). For the same reasons, it is advisable to carefully handle the generated configuration files when archiving.

#### Editing the configuration file

It is possible to customize a saved configuration file with a text editor for your own needs. For example, one scenario would be to use a script language to automate the creation of many customized versions of a configuration, then equip a large number of devices with an individualized configuration. Also Upload and restart with CGI commands can be done in scripting languages. With use of the comment sign "#" you can quickly hide single commands or add personal notes.

If you modify a configuration file manually, it is not always clear which limits are allowed for parameters. After uploading and restarting, commands with invalid parameters are ignored. Therefore, the generated configuration includes comments describing the boundaries of the parameters. Where "range:" refers to a numeric value, and "len:" to a text parameter. E.g:

```
email auth set 0 #range: 0..2
email user set "" #len: 0..100
```

The command "system fabsettings" from the beginning of a generated configuration file brings the device into the factory state, and then executes the individual commands that modify the configuration state. It may be desirable to make the changes relative to the current configuration, and not out of the factory state. Then the "system fabsettings" should be removed.

#### No output of default values

The configuration file contains (with exceptions) only values which differ from the default. The command "system fabsettings" (go to the factory state) from the beginning of a generated configuration file should not be removed, otherwise the device can get incompletely configured.

#### **Configuration via Telnet**

The configuration files can in principle also be transferred in a Telnet session, but then the settings are changed during operation, and not completely when restarting, as it would have been the case with an upload. It can happen that events are triggered at the same time as the device is configured. One should therefore:

- a) disable the function
- b) completely parametrize
- c) reactivate the function

#### An example:

```
email enabled set 0
email sender set "" #len: 0..100
email recipient set "" #len: 0..100
email server set "" #len: 0..100
email port set 25
email security set 0 #range: 0..2
email auth set 0 #range: 0..2
email user set "" #len: 0..100
email passwd hash set "" #len: 0..100
email enabled set 1 #range: 0..1
```

#### 2.3.3 Bootloader Activation

The configuration of the device from the application "GBL\_Conf.exe" is only possible, if the device is in Bootloader Mode.

#### **Activation of the Bootloader Mode**

- 1) via push button:
- Hold both buttons for 3 seconds
- 2) or
- Remove the power supply
- Hold down the "Select" button. If the push button is recessed, use a pin or paper clip
- Connect the operating voltage
- 3) by Software:
- Start the "GBL\_Conf.exe" program
- Do a network search with the "Search" menu action
- Activate in menu "Program Device" the item "Enter Bootloader"

This function is only possible if "Enable FW to BL" was activated in the application "GBL\_Conf.exe" before, while the device was already in the bootloader.

## **Operating**

4) via web interface:

Press "Enter Bootloader Mode" on the maintenance 19 web page.

Whether the device is in Bootloader mode, is indicated by the flashing of the status LED, or it is shown in "GBL\_Conf.exe" application after a renewed device search (appendix "BOOT-LDR" after the device name). In Bootloader mode the program "GBL\_Conf.exe" can disable the password and the IP ACL, perform a firmware update, and restore the factory settings.

For devices with relays, entering or exiting the bootloader mode does not change the state of the relays as long as the operating voltage is maintained.

#### Abandonment of the Bootloader Mode

- 1) via push button:
- Hold both buttons for 3 seconds (only if the device has 2 buttons)
- 2) or
- Remove and connect the power supply without operating a button
- 3) by Software:
- Start the "GBL Conf.exe" application
- Do a network search with the "Search" menu action
- In menu "Program Device" activate the item "Enter Firmware"

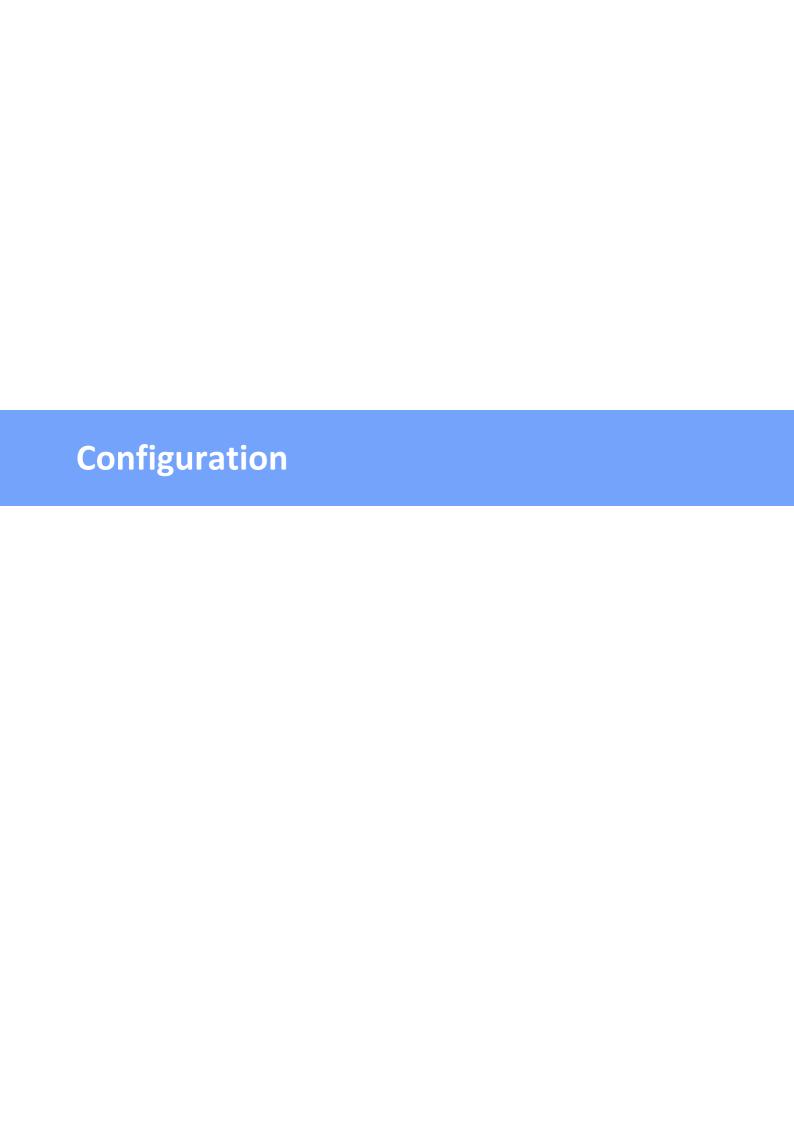
For devices with relays, entering or exiting the bootloader mode does not change the state of the relays as long as the operating voltage is maintained.

#### **Factory Reset**

If the device is in bootloader mode, it can always be put back to its factory default. All TCP/IP settings are reset in this operation.

If a unit is set to factory defaults, an uploaded certificate or updated firmware will be preserved.

- 1) via push button:
- · Activate the Bootloader Mode of the device
- Hold down the button (or the "Select" button for devices with 2 buttons) for 6 seconds. If the push button is recessed, use a pin or paper clip
- The status LED will blink in a fast rhythm, please wait until the LED blinks slowly (about 5 seconds)
- 2) by Software:
- Activate the Bootloader Mode of the device
- "Start the GBL\_Conf.exe" program
- In menu "Program Device" activate the item "Reset to Fab Settings"
- The status LED will blink in a fast rhythm, please wait until the LED blinks slowly (about 5 seconds)

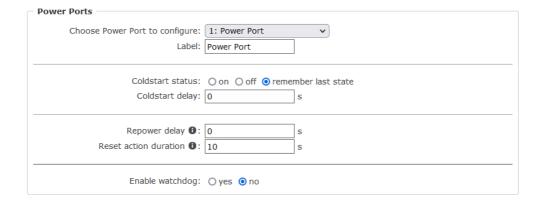


#### TCP/IP configuration by DHCP

After switching on the device is scanning on the Ethernet for a DHCP server and requests an unused IP address. Check the IP address that has been assigned and adjust if necessary, that the same IP address is used at each restart. To turn off DHCP use the software GBL Conf.exe or use the configuration via the web interface.

To check the network settings with GBL\_Conf.exe, start the program and choose "All Devices" in the "Search" menu. From the list select the appropriate device. The lower part of the left half of the window now shows the current network settings of the device. If the IP address is displayed with the default settings (192.168.0.2), either no DHCP server is present on the network, or there could be no free IP address assigned to it.

#### 3.1 Power Ports



<u>Choose Power Port to configure</u>: This field is used to select the power ports to be configured.

<u>Label</u>: You can assign a name up to 15 characters for each of the power ports. Using the name, an identification of the the device connected to the port can be facilitated.

#### Start-up Monitoring

It is important, that if necessary the condition of the power ports can be restored after a power failure. Therefore each port can be configured with <u>Initialization status</u> to a specific start-up state. This start-up sequence can be carried out delayed by the parameter <u>Initialization Delay</u>. There is in any case a minimum one-second delay between switching of ports.

<u>Coldstart status</u>: This is the port state (on, off, remember last state) the port should be set when the device is turned on. The setting "remember last state" saves the last manually set state of the power port in the EEPROM.

<u>Coldstart delay</u>: Here can be configured how long the port should wait to switch to its defined state after the device is turned on. The delay may last up to 8191 seconds. This corresponds to a period of approx. two hours and 20 minutes. A value of zero means that the initialization is off.

Repower delay: When this feature is enabled (value greater than 0), the power port will switch itself on again a specified time after it has been disabled. Unlike the "Reset" button this function applies to all switch actions, including SNMP, or an optional serial interface.

Reset action duration: When the "Reset" button is triggered, the device turns the power port off, waits for the time entered here (in seconds) and turns the power port on.

Enable watchdog: Activates the watchdog function for this power port.

#### 3.1.1 Watchdog

The watchdog feature enables to monitor various remote devices. Therefore either ICMP pings or TCP pings are sent to the device to be monitored. If these pings are not answered within a certain time (both the time and the number of attempts can be set), the port is reset. This allows e.g. to automatically restart not responding server or NAS systems. The mode IP master-slave port allows you to switch a port depending on the availability of a remote device.

When a watchdog is activated it presents various information in the Control Panel. The information is color-coded.

- Green text: The watchdog is active and regularly receives ping replies.
- Orange text: The watchdog is currently enabled, and waits for the first Ping response.
- Red text: The watchdog is active and receives no ping replies anymore from the configured IP address.

After the watchdog has been enabled, the display remains orange until the watchdog receives a ping response for the first time. Only then the watchdog is activated. Even after triggering a watchdog and a subsequent power port reset, the display will remain orange until the device is rebooted and responds again to ping requests. This will prevent a premature watchdog reset of the port, e.g. when a server needs a long time for a file check.

You can monitor devices on your own network, as well as devices on an external network, e.g. the operating status of a router.

| Enable watchdog:   | yes ○ no                                 |  |  |
|--|--|--|--|
| Ping type:   |  |  |  |
| Hostname:  |  |  |  |
| Ping interval:   | 10 s                                     |  |  |
| Ping retries:  | 6  |  |  |
| Watchdog mode:   | Reset port when host down:               |  |  |
| <ul><li>Infinite wait for booting host after reset</li></ul> |  |  |  |
| O Repeat reset on booting host after 10 ping timeouts        |  |  |  |
|  | O Switch off once when host down         |  |  |
| O IP Master-Slave port:                                      |  |  |  |
| O host comes up -> switch on, host goes down -> switch off   |  |  |  |
| O host goes down -> switch on, host comes up -> switch off   |  |  |  |
|  | $\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $ |  |  |

Enable watchdog: Enables the watchdog function for this Power Port.

<u>Watchdog type</u>: Here you can choose between the monitoring by ICMP pings or TCP pings.

- ICMP Pings: The classic ping (ICMP echo request). It can be used to check the accessibility of network devices (for example, a server).
- TCP Pings: With TCP pings, you can check if a TCP port on the target device would accept a TCP connect. Therefore a non-blocked TCP port should be selected. A good choice would be port 80 for http or port 25 for SMTP.

<u>TCP port</u>: Enter the TCP port to be monitored. When using ICMP pings this is not needed.

Hostname: The name or IP address of the monitored network device.

<u>Ping interval</u>: Select the frequency (in seconds) at which the ping packet is sent to each network device to check its operating status.

<u>Ping retries</u>: After this number of consecutive unanswered ping requests the device is considered inactive.

<u>Watchdog mode</u>: When <u>Reset port when host down</u> is enabled, the Power Port is turned off and switched back on after the time set in <u>Reset Duration</u>. In mode <u>Switch</u> off once when host down the Power Port remains disabled.

At the default setting (Infinite wait for booting host after reset) the watchdog monitors the connected device. When there is no longer a reply after a set time, the watchdog performs the specified action, usually a reset of the Power Port. Now the watchdog waits until the monitored device reports again on the network. This may take several minutes depending on the boot duration of the device. Only when the device is accessible from network again, the watchdog is re-armed. If the option Repeat reset on booting host after x ping timeout is enabled, this mechanism is bypassed. Now the watchdog is re-activated after N Ping intervals (input field ping timeouts).

When enabling the <u>IP master-slave mode</u>, the port is switched depending on the availability of a remote device. Depending on the configuration, the port is switched on when the terminal is reachable, or vice versa.

The option Repeat reset on booting host after x ping timeout has the following pit-fall: If a server, that is connected to the monitored Port is in need for a long boot process (e.g. it is doing a file system check), the server would probably exceed the tripping time of the watchdog. The server would be switched off and on again, and the file system check is restarted. This would be repeated endlessly.

count PING requests as unreplied when ethernet link down: If the Ethernet link of the device is not active, watchdog monitoring is not possible and the watchdog function is not activated. If this option is activated, a watchdog is also triggered if the Ethernet link is down.

#### 3.2 Ethernet

#### 3.2.1 IP Address

<u>Hostname</u>: Here you can enter a name with up to 63 characters. This name will be used for registration on the DHCP server.

Special characters and umlauts can cause problems in the network.

IPv4 Address: The IP address of the device.

<u>IPv4 Netmask</u>: The network mask used in the network.

IPv4 Gateway address: The IP address of the gateway.

<u>IPv4 DNS address</u>: The IP address of the DNS server.

<u>Use IPv4 DHCP</u>: With "yes the TCP/IP settings are obtained directly from the DHCP server. When the function is selected, each time the device powers up it is checked if a DHCP server is available on the network.

If no DHCP server is available, the last IP address is used. However, the DHCP client tries to reach a DHCP server again every 5 minutes. The DHCP request lasts one minute until it is aborted. During this time the IP-address is not accessible! It is therefore essential to deactivate DHCP for a static IP addresses!

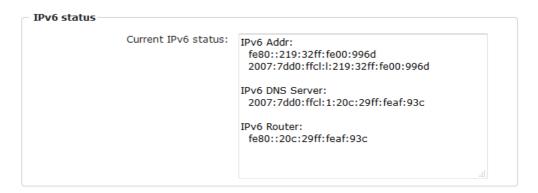
Use IPv6 Protocol: Activates IPv6 usage.

<u>Use IPv6 Router Advertisement</u>: The Router Advertisement communicates with the router to make global IPv6 addresses available.

<u>Use DHCP v6</u>: Requests from an existing DHCPv6 server addresses of the configured DNS server.

Use manual IPv6 address settings: Activates the entry of manual IPv6 addresses.

 $\underline{\mathsf{IPv6}\ \mathsf{status}}$ : Displays the IPv6 addresses over which the device can be accessed, and additionally DNS and router addresses.



For IP changes a firmware reset is required. This can be done in the Maintenance web page. A restart of the device leads by no means to a change of the relay states.

### **Manual IPv6 Configuration**

| IPv6 (manual)         |                                     |      |
|-----------------------|-------------------------------------|------|
| IPv6 Addresses:       | 2007:7dd0:ffc1:0:219:32ff:fe00:996d | / 64 |
|                       |                                     | / 64 |
|                       |                                     | / 64 |
|                       |                                     | / 64 |
| IPv6 DNS addresses:   | 2007:7dd0:ffc1:0:20c:29fffeaf:93c   |      |
|                       |                                     |      |
| IPv6 Gateway address: | fe80::20c:29ff:feaf:93c             |      |

The input fields for the manual setting of IPv6 addresses allow you to configure the prefix of four additional IPv6 device addresses, and to set two DNS addresses, and a gateway.

#### **PHY Setting**

PHY preferences can be set for 10 Mbps or 100 Mbps, half-duplex or full-duplex. Advertising means that a proposal for the connection is made, which can be rejected by the remote terminal (e.g. the switch).

| PHY Settings  |
|---|
| Actual Speed: 100 Mbps                                |
| Actual Duplex Mode: Full Duplex                       |
| Change Settings (Advertising): 100 Mbps / Full Duplex |

#### 3.2.2 IP ACL

| IP Address · IP ACL · HTTP Server |  |  |  |
|-----------------------------------|--|--|--|
| - ICMP Ping                       |  |  |  |
| Reply ICMP ping reques            | ts: • yes Ono                                |  |  |
| IP Access Control List            |  |  |  |
| Enable IP filt                    | er: 💿 yes 🔾 no                               |  |  |
| 1. Grant IP access to host/n      | et: 1234::4ef0:eec1:0:219:32ff:fe00:f124 - + |  |  |
| 2. Grant IP access to host/n      | et: 192.168.1.84 - +                         |  |  |
| 3. Grant IP access to host/n      | et: mypc.locdom - +                          |  |  |
| 4. Grant IP access to host/n      | et: 192.168.1.0/24 - +                       |  |  |
| 5. Grant IP access to host/n      | et: 1234:4ef0:eecl:0::/64 - +                |  |  |
|                                   | Apply  |  |  |

Reply ICMP ping requests: If you enable this feature, the device responds to ICMP pings from the network.

<u>Enable IP filter</u>: Enable or disable the IP filter here. The IP filter represents an access control for incoming IP packets.

Please note that when IP access control is enabled HTTP and SNMP only work if the appropriate servers and clients are registered in the IP access control list.

If you choose a wrong IP ACL setting and locked yourself out, please activate the Bootloader Mode and use GBL\_Conf.exe to deactivate the IP ACL. Alternatively, you can reset the device to factory default.

#### 3.2.3 HTTP

| - HTTP                         |                           |                     |
|--------------------------------|---------------------------|---------------------|
|                                |                           |                     |
| HTTP Server option:            | O HTTP + HTTPS            |                     |
|                                | O HTTP redirects to HTTPS |                     |
|                                | OHTTPS only OHTTP only    | •                   |
|                                |                           |                     |
| Server port HTTP:              | 80                        |                     |
| Server port HTTPS:             | 443                       |                     |
| Supported TLS versions:        | TLS v1.2 only             |                     |
|                                |                           |                     |
| HTTP Password                  |                           |                     |
| Enable password protestion     | <b>Q</b> vas One          |                     |
| Enable password protection:    |                           |                     |
| Use radius server passwords:   | •                         |                     |
| Use locally stored passwords:  | ⊙ yes ○ no                |                     |
| Set new <b>admin</b> password: |                           | (32 characters max) |
| ·                              |                           | (32 Characters max) |
| Repeat <i>admin</i> password:  | ••••                      |                     |
| Set new <i>user</i> password:  | ••••                      | (32 characters max) |
| Repeat <b>user</b> password:   | ••••                      |                     |
| ·                              |                           |                     |
|                                |                           |                     |
|                                |                           |                     |
| Session Timeout (admin):       | (seconds)                 |                     |
| Session Timeout (user):        | 600 (seconds)             |                     |
| Select Authentication Mode:    | Basic Compatible V        |                     |

HTTP Server option: Selects whether access is possible only with HTTP, HTTPS, or both.

<u>Server port HTTP</u>: Here can be set the port number of the internal HTTP. Possible values are from 1 to 65534 (default: 80). If you do not use the default port, you must append the port number to the address with a colon to address the device from a web browser. Such as: "http://192.168.0.2:800"

<u>Server port HTTPS</u>; The port number to connect the web server via the SSL (TLS) protocol.

Supported TLS versions: Limits the supported TLS versions.

<u>Enable Ajax autorefresh</u>: If this is activated, the information of the status page is automatically updated via http request (AJAX).

For some HTTP configuration changes a firmware reset is required. This can be done in the Maintenance web page. A restart of the device leads by no means to a change of the relay states.

<u>Enable password protection</u>: Password access protection can be activated. If the admin password is assigned, you can only log in by entering this password to change settings. Users can log in by entering the user password in order to query the status in-

formation and initiate switching operations.

<u>Use radius server passwords</u>: Username and password are validated by a Radius Sever.

<u>Use locally stored passwords</u>: Username and password are stored locally. In this case, an admin password and a user password must be assigned. The password can have a maximum of 31 characters. The name "admin" and "user" are provided for the user name in the password entry mask of the browser. In factory settings, the password for the admin is set to "admin" or "user" for the user password.

If the password mask is redisplayed, only four "bullets" are shown as a symbolic placeholder, since for security reasons the device never stores the password itself, but only the SHA2-256 hash. If you want to change a password, the complete password must always be re-entered.

If you have forgotten your password, please activate the bootloader mode and then turn off the password prompt in GBL Conf.exe.

Logout (09:55)

If a password is activated, the web session is automatically terminated after a timeout and you are redirected to the login page. A timeout of "0" disables the automatic logout.

Session Timeout (admin): Logout time for the admin.

Session Timeout (user): Logout time for the user.

<u>Select Authentication Mode</u>: Sets the session authentication mode. For details see HTTP Authentication.

#### 3.3 Protocols

#### 3.3.1 Console

Console · Syslog · SNMP · Radius · Modbus · MQTT

| TCP/IP Console                   |              |
|----------------------------------|--------------|
| Enable Telnet:                   | : • yes Ono  |
| Telnet TCP port:                 | : 23         |
| Raw mode:                        | : Oyes ono   |
| Active negotiation:              | : Oyes ono   |
| Activate echo:                   | : Oyes ono   |
| Push messages:                   | : ○yes ⊙no   |
| Delay after 3 failed logins:     | : ○yes ⊙no   |
|                                  |              |
|                                  | •            |
|                                  | : • yes O no |
| SSH TCP port:                    |              |
| Activate echo:                   |              |
| Push messages:                   | : ○yes ⊙no   |
|                                  |              |
| Require user login (Telnet/SSH): | : Oves Ono   |
| Use radius server passwords:     |              |
| Use locally stored passwords:    |              |
| Username:                        | 700 0        |
| Set new password:                |              |
| Repeat password:                 |              |
|                                  |              |
| Upload new SSH public key:       | ·            |
|                                  | lh.          |

Enable Telnet: Enables Telnet console .

<u>Telnet TCP port</u>: Telnet sessions are accepted on this port.

Raw mode: The VT100 editing and the IAC protocol are disabled.

Activate echo: The echo setting if not changed by IAC.

Active negotiation: The IAC negotiation is initiated by the server.

Require user login: Username and password are required.

<u>Delay after 3 failed logins</u>: After 3 wrong entries of username or password, the next login attempt is delayed.

<u>Use radius server passwords</u>: Username and password are validated by a Radius Sever.

Use locally stored passwords: Username and password are stored locally

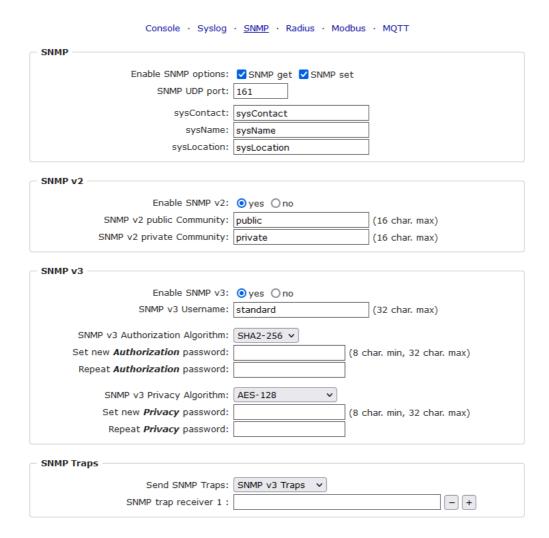
#### **3.3.2** Syslog



Enable Syslog: Enables the usage of Syslog Messages.

<u>Syslog Server</u>: If you have enabled Syslog Messages, enter the IP address of the server to which the syslog information should be transmitted.

#### 3.3.3 **SNMP**



SNMP-get: Enables the acceptance of SNMP-GET commands.

SNMP-set: Allows the reception of SNMP-SET commands.

SNMP UDP Port: Sets the UDP port where SNMP messages are received.

sysContact: Value of RFC 1213 sysContact.

sysName: Value of RFC 1213 sysName.

sysLocation: Value of RFC 1213 sysLocation.

Enable SNMP v2: Activates SNMP v2.

Because of security issues, it is advisable to use only SNMP v3, and to disable SNMP v2. Accesses to SNMP v2 are always insecure.

Community public: The community password for SNMP GET requests.

Community private: The community password for SNMP SET requests.

Enable SNMP v3: Activates SNMP v3.

SNMP v3 Username: The SNMP v3 User Name.

<u>SNMP v3 Authorization Algorithm</u>: The selected Authentication Algorithm.

SNMP v3 Privacy Algorithm: SNMP v3 Encryption Algorithm..

If the password mask is redisplayed, only four "bullets" are shown as a symbolic placeholder, since for security reasons the device never stores the password itself, but only the key formed using the Authorization Algorithm. If you want to change a password, the complete password must always be re-entered.

The calculation of the password hashes varies with the selected algorithms. If the Authentication or Privacy algorithms are changed, the passwords must be re-entered in the configuration dialog. "SHA-384" and "SHA512" are calculated purely in software. If "SHA-512" is set on the configuration page, the time for the key generation may take once up to approx. 45 seconds.

<u>Send SNMP traps</u>: Here you can specify whether, and in what format the device should send SNMP traps.

<u>SNMP trap receiver</u>: You can insert here up to eight SNMP trap receiver.

MIB table: The download link to the text file with the MIB table for the device.

More information about SNMP settings are available from our support or can be found on the Internet at www.gude.info/wiki.

#### **3.3.4** Radius

Radius Enable Radius Client: Oyes Ono Authentication Protocol: OPAP OCHAP Default Session Timeout: 1800 Primary Server: Set new shared secret: | •••• Repeat new shared secret: | •••• Timeout: 5 Retries: 3 Use backup server: yes no Backup Server: Set new shared secret: | •••• Repeat new shared secret: | •••• Timeout: 5 Retries: 3

Console · Syslog · SNMP · Radius · Modbus · MQTT

Enable Radius Client: Enables validation over Radius.

Use CHAP: Use CHAP password encoding.

<u>Use Message Authentication</u>: Adds the "Message Authentication" attribute to the Authentication Request.

<u>Primary Server</u>: Name or IP address of the Primary Radius server.

<u>Shared secret</u>: Radius Shared Secret. For compatibility reasons, only use ASCII characters.

<u>Timeout</u>: How long (in seconds) will be waited for a response from an Authentication Request.

Retries: How often an authentication request is repeated after a timeout.

Use Backup Server: Activates a Radius Backup server.

Backup Server: Name or IP address of the Radius Backup server.

<u>Shared secret</u>: Radius Shared Secret. For compatibility reasons, only use ASCII characters.

<u>Timeout</u>: How long (in seconds) will be waited for a response from an Authentication Request.

Retries: How often an authentication request is repeated after a timeout.

| Test Radius Server |  |
|--------------------|--|
| Test Username:     |  |
| Test Password:     |  |
| Test Radius Server |  |
|                    |  |

<u>Test Username</u>: Username input field for Radius test.

<u>Test Password</u>: Password input field for Radius test.

The "Test Radius Server" function allows you to check whether a combination of Username and Password is accepted by the configured Radius Servers.

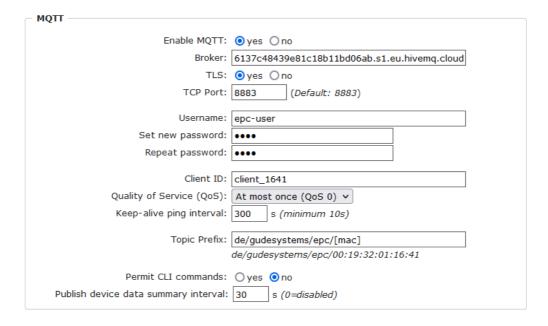
#### 3.3.5 Modbus TCP



Enable Modbus TCP: Enables Modbus TCP support.

Modus TCP port: The TCP/IP port number for Modbus TCP.

#### 3.3.6 MQTT



Enable MQTT: Enables MQTT support.

Broker: DNS or IP address of the MQTT broker.

TLS: Turns on TLS encryption.

Mode TCP port: The TCP/IP port number of the broker.

Username: The MQTT username.

password: The password for the username.

Client ID: The MQTT client ID.

The client IDs of a user must be different! If two clients of a user have the same name, the connection of one client is normally terminated.

Quality of Service (QoS): Sets the QoS value (0 or 1) of the MQTT publishes.

<u>Keep-alive ping interval</u>: This defines the time interval in which the client sends an MQTT ping.

<u>Topic prefix</u>: Defines the beginning of the topic with which all messages are sent. The strings **[mac]** and **[host]** symbolize the MAC address or the hostname of the device.

Permit CLI commands: Enables the execution of console commands.

<u>Publish device data summary</u> interval: Time interval in which messages with the global status of the device are sent.

#### **MQTT Logs**

- MQTT client connected
- MQTT sending client id:'client\_1641' username:'epc-user'
- MQTT broker connected
- MQTT broker DNS resolved
- MQTT broker DNS not yet resolved
- MQTT resolving host 'f3c06b76137c48439e81c18b11bd06ab.s1.eu.hivemq.cloud' TCP port 8883

#### **MQTT Broker Status**

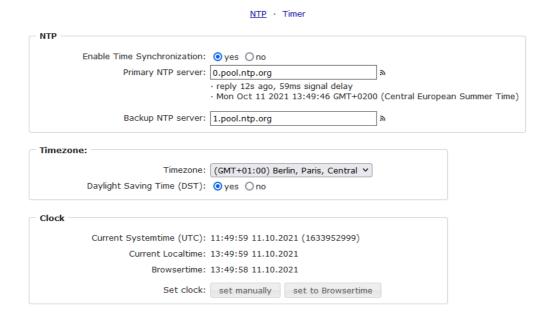
- Broker DNS ready, connected since 71 seconds
- Last publish 11 seconds ago

MQTT Logs: Outputs individual log messages about the connection setup.

MQTT Broker Status: Time information about connection duration, the last publish and the last keep-alive.

#### 3.4 Clock

#### 3.4.1 NTP



Enable Time Synchronization: Enables the NTP protocol.

Primary NTP server: IP address of the first NTP server.

<u>Backup NTP server</u>: IP address of the second NTP server. Used when the first NTP server does not respond.

<u>Timezone</u>: The set time zone for the local time.

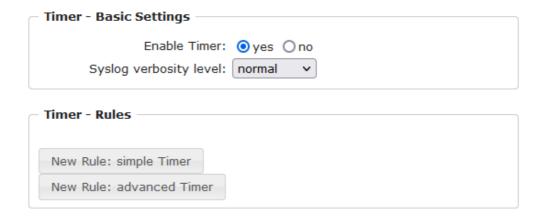
<u>Daylight Saving Time</u>: If enabled, the local time is converted to Central European Summer Time.

set manually: The user can set a time manually.

set to Browsertime: Sets the time corresponding to web browser.

If Time synchronization is enabled, a manual time will be overwritten at the next NTP synchronization.

#### 3.4.2 Timer



Enable Timer: nables or disables all timers globally.

Syslog verbosity level: Sets the verbosity level for timer syslog output.

New Rule simple Timer: Shows a dialog for a simple timer rule.

New Rule advanced Timer: Brings up the dialog for advanced timer settings.

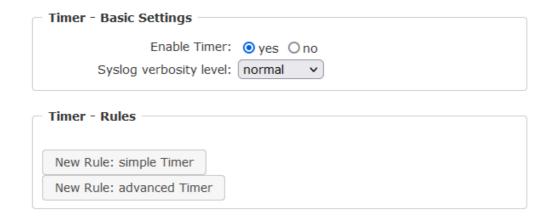
## 3.4.3 Timer Configuration

In the timer configuration you have three options: Create a simple timer, add a complex timer, or change an existing configuration.

Timer rules are only executed if the device has a valid time. See configuration NTP 38.

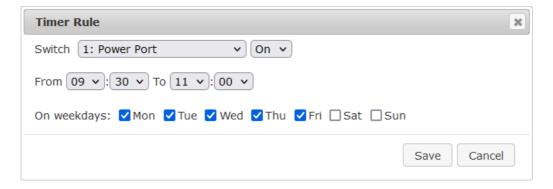
The number of timers is limited to 32.

This instruction chapter applies to all Gude devices. For devices without switchable ports you can only create a complex timer. For an action there is only the register "Action CLI" available, and not the register "Action PortSwitch".

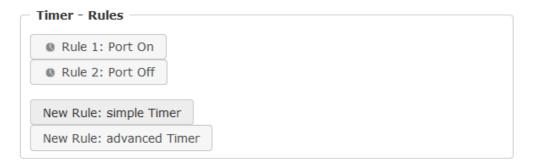


### Creating a simple timer

If you activate "New Rule: simple Timer" the following dialog is displayed:



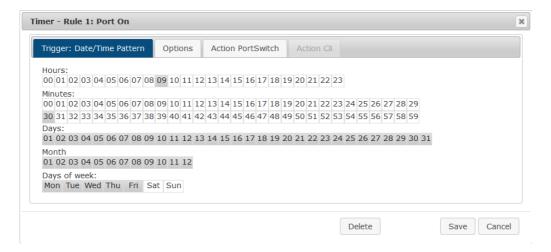
You set here which port should be switched for which time period, and on which days of the week the rule is active. In this example the period 9:00 to 17:00 is changed to 9:30 to 11:00 compared to the default input mask. Also, this rule should not be applied on Saturday and Sunday. The rule we have now says that every day, except Saturday and Sunday, port 1 will be switched on at 9:30 and switched off after 1.5 hours. Clicking on "Save" saves this rule.



We have now created 2 rules, one for when the port is turned on and the second for when it is turned off.

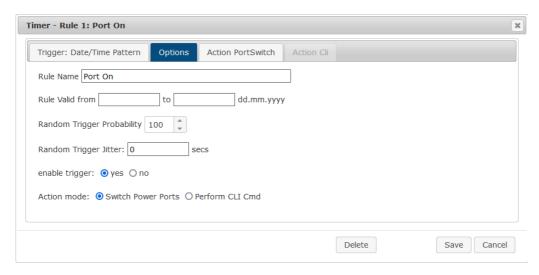
#### Creating a complex timer

If you create a complex timer or change an existing timer, you will always see an extended dialog. Here, ports can be switched as well as other actions can be executed via CLI commands. The setting of the switching times is more granular.



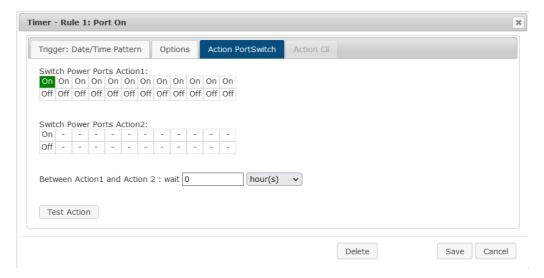
You can see here the extended representation of the first rule of the simple timer from the previous example. The action is started every day of every month at 9:30. The weekdays Saturday and Sunday are excluded. An existing rule can be removed with the "Delete" button.

If a rule is deleted, the following rules move up. The numbering of the following rules also changes by one. This also applies to the index in the console commands.



The button <u>enable trigger</u> allows to switch a timer on and off without the need to completely delete or recreate the rule. A simple timer is directly "enabled", for a newly created complex timer "enable trigger" must be switched on manually. You can set a probability and a jitter for the timer rules. This makes random events possible. In this example the rule is executed with 100% probability. A jitter of 0 means that the action takes place exactly at the programmed time. Ports are switched as action mode, alternatively a console command (CLI Cmd) can be executed.

After changes to existing timers, the "Rule Name" may no longer be meaningful. To keep the overview, it may be useful to adjust the name.

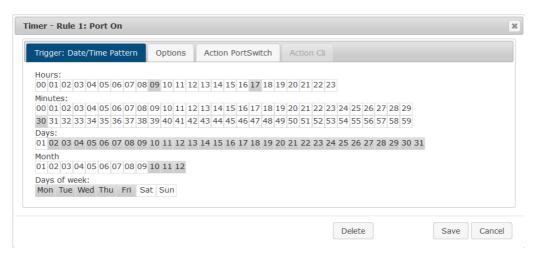


The switching function can be set in more detail on the "Action PortSwitch" register. Port 1 is switched on. You could extend the rule and switch more ports on or off. Additionally you can set a time for a batchmode in the field after "Between Action1 and Action 2 : wait", which starts "Action 2" after expired time. However, the batch mode has the disadvantage that it is not automatically restarted when the device is rebooted. Also, the port is locked against manual operation on the web page as long as the batch mode is running.

🧩 The "Action PortSwitch" function is only available for devices with switchable ports.

### Extending a rule

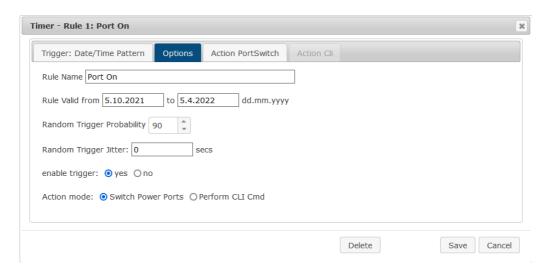
For demonstration purposes, here is an extension to the simple timer from the previous example:



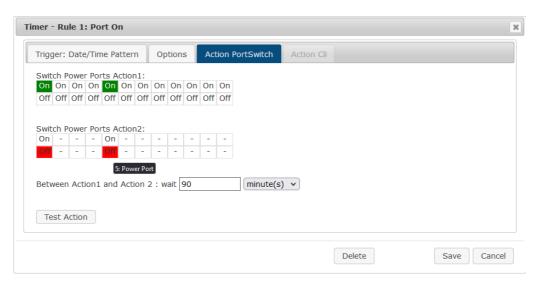
The action is now started not only at 9:30, but also at 17:30 There are other changes: The timer is only active between October and December, also the action does not take place on the first day of a month.

Since all fields in the mask are always considered, it is not possible to define the times 9:30 and 17:10 in a single timer rule. You need a second rule for this. If you set the hours 9 and 17, as well as the minutes 10 and 30, then the four times 9:10, 9:30, 17:10 and 17:30 would be programmed.

To change a field in this input mask without changing the state of the other fields, the Ctrl key must be pressed during the mouse click.



For this rule, on the "Options" tab, the time period is limited to the range between 5.10.2021 and 5.4.2022. In this example, the timer rule is only executed with a probability (Random Trigger Probability) of 90%.

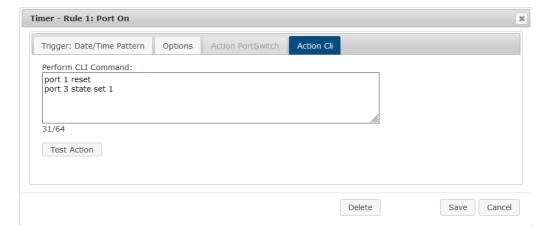


In this example, port 1 and port 5 are enabled and disabled after 90 minutes by batch mode.

Action 2 is realized internally by a batch mode. This does not continue to run if a restart of the device has taken place in the meantime.

🇱 A popup on the mouse pointer shows the port number of the field.

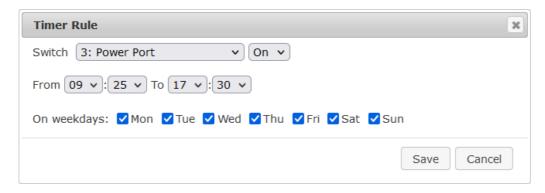
#### **Console Commands**



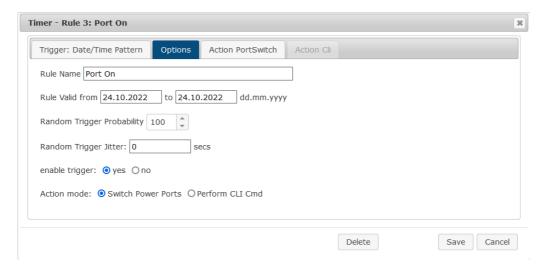
Instead of switching a port, one or more console commands can be executed. These commands are entered in the "Action CLI" register. The "Action Cli" tab can only be selected if the option "Perform CLI Cmd" is activated in "Options".

### **Example Switching a Port on a Date**

If you want to switch on a timer on a certain date at a certain time and switch it off at a later time, you cannot do it directly with a simple timer. Therefore it can be useful to create the timer as a simple timer first, and then customize it in the advanced dialog.

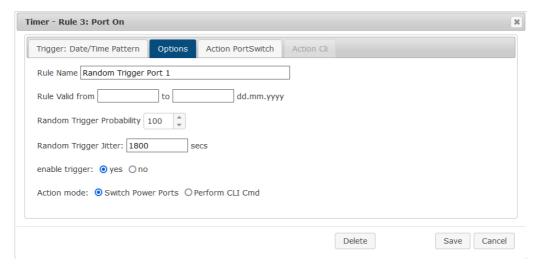


Switch port 3 on every day at 9:25, and off again at 17:30. You save.



Then call up the two timer rules you created ("On" and "Off") and enter the date on which the switching operation is to take place in the "Options" tab.

### **Example blind control**



You can use the jitter e.g. for a shutter control. In the classic example of a shutter control, you do not always want to raise and lower the shutters at the same time in order to confuse potential burglars. The jitter of 1800 seconds means that the action is executed randomly in a period between 30 minutes before and 30 minutes after the pro-

grammed time. The probability (Random Trigger Probability) of execution here is 100%.

### 3.5 Sensors

| Sensors Coning                          |                                      |
|---|--------------------------------------|
| Sensor:                                 | 1: 7106 - 7106 🔻                     |
| Sensor Name:                            | 7106                                 |
| Select Sensor Field:                    | Temperature (°C) V                   |
|   |                                      |
| Enable value-threshold message trigger: | ⊚ yes ○ no                           |
| Maximum value:                          | 65.0 °C                              |
| Minimum value:                          | 25.0 °C                              |
| Hysteresis:                             | 3.0 °C                               |
| When above Max value:                   | Switch port 1: Power Port v to Off v |
| When below Max value:                   | Switch port 1: Power Port v to On v  |
| When above Min value:                   | Switch port - v to - v               |
| When below Min value:                   | Switch port - v to - v               |
|   |                                      |
| Enable time-interval message trigger:   | yes ○ no                             |
|   | every 10 second(s)                   |
|   | for Console- and MQTT channels       |
|   |                                      |
| Enable value-delta message trigger:     | yes ○ no                             |
|   | every value step of 5.0 °C           |
|   | for Console- and MQTT channels       |
|   |                                      |
| Message channels:                       | ✓ Syslog ☐ SNMP ☐ Email ☐ Console    |
|   | ✓ MQTT: retained MQTT message ∨      |
|   |                                      |
| Miss soussy options                     |                                      |
| Misc sensor options                     |                                      |
| Min/Max measurement period:             | 24 Hours v                           |
|   |                                      |

<u>Sensor</u>: Selects a sensor type to configure it. The first digit "1:" indicates the number of the sensor port (only important for devices with more than one sensor port). This is followed by the sensor name, and the adjustable sensor name.

<u>Sensor Name</u>: Changeable name for this sensor. For example, you can give the temperature and the humidity a different name, even if they belong to the same sensor.

Select Sensor Field: Selects a data channel from a sensor.

<u>Enable value-threshold message trigger</u>: Enables monitoring of sensor threshold values.

<u>Maximum/Minimum value</u>: Adjustable threshold values at which messages should be sent via console (Telnet/SSH), SNMP trap, Syslog, MQTT or e-mail.

<u>Hysteresis</u>: Defines the distance that must be exceeded after a limit value of an external sensor has been exceeded in order to signal that the limit value has fallen below.

When above/below Min/Max value Switch Port: Switches a port depending on the exceeding or falling below of a limit value.

<u>Enable time interval message trigger</u>: Generates console (Telnet/SSH) and MQTT messages within time intervals.

<u>Enable value-delta message trigger</u>: Generates console (Telnet/SSH) and MQTT messages when a sensor value deviates by a delta value.

Message channels: Enables the generation of messages on different channels.

Min/Max measurement period: Selects the time range for the sensor min/max values on the overview web page.

### **Hysteresis Example:**

A Hysteresis value prevents that too much messages are generated, when a sensor value is jittering around a sensor limit. The following example shows the behavior for a temperature sensor and a hysteresis value of "1". An upper limit of "50 °C" is set.

#### Example:

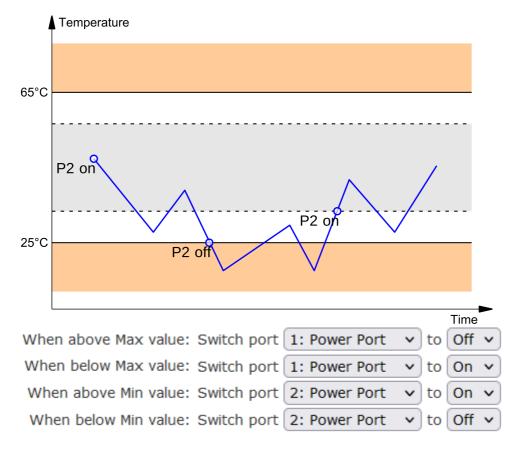
```
49.9 °C - is below the upper limit
50.0 °C - a message is generated for reaching the upper limit
50.1 °C - is above the upper limit
...

49.1 °C - is below the upper limit, but in the hysteresis range
49.0 °C - is below the upper limit, but in the hysteresis range
48.9 °C - a message is generated for underrunning the upper limit inclusive hysteresis range
...
```

### 3.5.1 Port Switching

Depending on the measured Current and the measured sensor values, switching actions can be triggered. During operation, the actions configured for crossing the limits are executed. For example, when a value moves from the range "above max value" inside the range "below max value", the action defined for "below max value" is performed. In the case of device start, configuration or plug-in of the sensor, the actions corresponding to the range in which the current temperature is located are switched.

Example with "Maximum value" of 65 °C, "Minimum value" of 25 °C and hysteresis of 3 °C. The dotted line shows the hysteresis.



Actions during configuration, device start or plugging in the sensor (for given example):

| actual temperature during configuration | actions  |
|---|--|
| 70 °C                                   | Port 1 Off (above max) + Port 2 On (above min) |
| 45 °C                                   | Port 1 On (below max) + Port 2 On (above min)  |
| 20 °C                                   | Port 1 On (below max) + Port 2 Off (below min) |

Action matrix during operation when limit values are exceeded (for given example):

|                  | to "above max" | to "below max" | to "above min" | to "below min" |
|------------------|----------------|----------------|----------------|----------------|
| from "above      | -              | P1 On          | P1 On          | P1 On + P2 Off |
| max"             |                |                |                |                |
| from "below max" | P1 Off         | -              | -              | P2 Off         |
| from "above min" | P1 Off         | -              | -              | P2 Off         |
| from "below min" | P1 Off + P2 On | P2 On          | P2 On          | -              |

Only the switching operations for which actions have been defined, are triggered. If no "On" or "Off" action is defined for a port, the port can never reach this state by exceeding sensor values. Unless it is the initial state.

### 3.6 E-Mail



Enable E-Mail: Activates the E-Mail dispatch of messages.

Sender address: The E-Mail address of the sender.

<u>Recipient address</u>: The E-Mail address of the recipient. Additional E-Mail addresses, separated by comma, can be specified. The input limit is 100 characters.

<u>SMTP Server</u>: The SMTP IP-address of the E-Mail server. Either as FQDN, e.g: "mail.gmx.net", or as IP-address, e.g: "213.165.64.20". If required, attach a designated port, e.g: "mail.gmx.net:25".

<u>SMTP server port</u>: The port address of the E-Mail server. In the normal case this should be the same as the default, that is determined by the setting <u>SMTP Connection Security</u>.

SMTP Connection Security: Transmission via SSL or no encryption.

SMTP Authentification (password): Authentication method of the E-Mail Server.

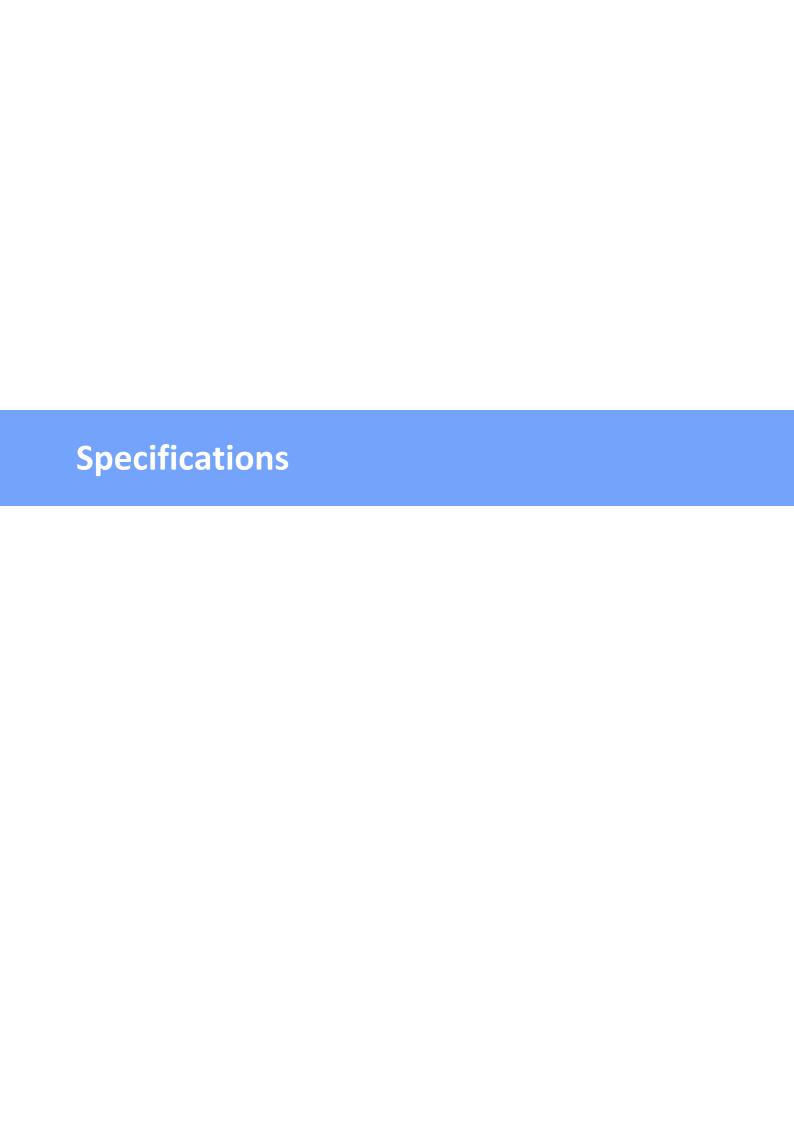
Username: User name that is registered with the SMTP E-Mail server.

<u>Set new password</u>: Enter the password for the login to the E-Mail server.

Repeat password: Enter the password again to confirm it.

If the password mask is redisplayed, only four "bullets" are shown as a symbolic placeholder, since for security reasons the password is never shown itself. If you want to change a password, the complete password must always be re-entered.

E-Mail Logs: Logging of E-Mail system messages.



### 4.1 Automated Access

The device can be accessed automatically via four different interfaces, which offer different possibilities to access the configuration data and status information. Only http and the console (telnet and serial) provide full access to the device.

This chapter is general for all Gude devices. Depending on the device model are ports, certain sensors or other features not available.

List of different access options:

| Interface  | Scope of Access  |
|------------|--|
| HTTP       | read / write status of Power Ports (relays or eFuses)  |
|            | read / write all configuration data                    |
|            | read / write all status information                    |
|            | (full access to the device)                            |
| Console 50 | read / write status of Power Ports (relays or eFuses)  |
|            | read / write all configuration data                    |
|            | read / write all status information                    |
|            | (full access to the device)                            |
| SNMP 87    | read / write status of Power Ports (relays or eFuses)  |
|            | read / write names of Power Ports (relays or eFuses)   |
|            | read / write status of Port start configuration        |
|            | read / write status Buzzer                             |
|            | read / write configuration of power sources (EPC 8291) |
|            | read / write fan configuration (EPC 8291)              |
|            | read measurement values of external sensors            |
|            | read measurement values of all energy sensors          |
|            | read NTP time and status                               |
|            | resetting the energy meters                            |
| M II TOD   | read the status of Overvoltage Protection              |
| Modbus TCP | read / write status of Power Ports (relays or eFuses)  |
|            | read status of Inputs                                  |
|            | read / write configuration of power sources (EPC 8291) |
|            | read / write fan configuration (EPC 8291)              |
|            | read measurement values of external sensors            |
|            | read measurement values of all energy sensors          |
| MOTT       | read the status of Overvoltage Protection              |
| MQTT       | Execute console commands                               |

The device can be controlled via HTTP interface with CGI commands and returns the internal configuration and status in JSON format. The structure of the CGI commands and the JSON data is explained in more detail in our Wiki article: http://wiki.gude.info/EPC\_HTTP\_Interface

### 4.2 Console

For the configuration and control of the device, there is a set of commands with parameters that can be entered through a console. The console is available via SSH or Telnet, or for devices with RS232 port through using a serial terminal. It is not necessary to use Telnet, in **Raw Mode** a simple TCP/IP connection is sufficient to send commands. The communication can also be performed automated (e.g. via scripting lan-

guages). The console features are configured through the web interface 32.

### Login

A ssh / telnet log in can be configured with password or without:

```
192.168.100.116 - PuTTY

Console activated.
```

```
192.168.100.116 - PuTTY

Console activated.

Console login: admin

Password: ****

Login accepted.
```

#### **Command Set**

There are several command levels. The following commands are usable from each level:

| back     | go back one level                 |
|----------|-----------------------------------|
| help     | all commands of the actual level  |
| help all | show all commands                 |
| logout   | logout (only when login required) |
| quit     | quit console                      |

The "help" command returns all the commands of the current level. If "help" is called from the top level, e.g. the line "http [subtopics]" appears. This means that there is another level for "http". With the command "http help" all commands below "http" are shown. Alternatively, with entering "http" you can select the http level, and "help" shows all the commands on the selected level. The command "back" again selects the top level. It is possible to use "help" at any position: "http passwd help" provides all commands that have the prefix "http passwd".

You will find a complete list of all possible device commands in the chapter "Cmd Overview".

#### **Parameter**

If parameters are expected for the command, the parameter may be passed as numeric or constant. If e.g. you get the following line as help:

```
http server set {http_both=0|https_only=1|http_only=2}
```

the following instruction pairs are equivalent:

```
http server set https_only
http server set 1

or

http server set https_both
http server set 0
```

Numerical parameters can be entered with different bases. Here is an example of the decimal value 11:

| Base             | Input  |
|------------------|--------|
| decimal (10)     | 11     |
| hexadecimal (16) | 0xb    |
| octal (8)        | 013    |
| binary (2)       | 0b1011 |

#### **Bit Field Parameter**

Some parameters can take several values at the same time. In the following example, all values between 0 and 5 can be set. In the help, this can be recognized by the fact that the values are not separated by the "|" character, but by commas.

```
"{EVT SYSLOG=0,EVT SNMP=1,EVT EMAIL=2,EVT SMS=3,EVT GSMEMAIL=4,EVT BEEPER=5}"
```

To set EVT\_SYSLOG and EVT\_EMAIL in a command, you can use the following syntax:

```
>extsensor 1 2 0 events type set "EVT_SYSLOG,EVT_EMAIL"
OK.
```

#### or numeric

```
>extsensor 1 2 0 events type set "0,2" OK.
```

Additionally you can set all values with "ALLSET" or encode any bit pattern as hexadecimal with a syntax like "#7f1a".

#### **Return Values**

If a command is unknown or a parameter is incorrect, the output "ERR." is given at the beginning of the line, followed by a description of the fault. Successful instructions without special return value will be acknowledged by "OK.". All other return values are output within a single line. There are of two exceptions:

- Some configuration changes, that affect TCP / IP and UDP, need a restart to be applied. These parameters are output on two lines. In the first line the current value is shown, on the second row the value after a restart. In the "Cmd Overview" table this is marked with "Note 2".
- Other configurations (such as the assigned IPv6 addresses) have several values that can change dynamically. This is marked with "Note 3" in the "Cmd Overview" table.

#### **Numerical Returns**

For parameters that support constants, these constants are output as return values. To better deal with scripting languages, it may be easier to work only with numerical returns. The command "vt100 numeric set ON" enables that only numerical values appear.

#### Comments

If you use a tool to send an entire file of commands via Telnet, it is helpful, if you can place comments in there. Beginning with the comment character "#", the remaining contents of a line is ignored.

#### **Telnet**

If the configuration "Raw Mode" is turned off, it is tried to negotiate the Telnet configuration between client and server using IAC commands. If this fails, the editing functions are not active, and the "Activate echo" option determines whether the characters sent to the Telnet server will be returned. Normally the client begins with the IAC negotiation. If this is not the case with the client, the device configuration "Active negotiation" should be turned on.

#### **Raw Mode**

If you want to use the console only automated, it may be advantageous to set the configuration "Raw mode" to "yes" and "Activate echo" to "no" to. Then there is no interfering interaction with the editor functions and the is no need to filter the sent characters to process the return values.

If in the console "Raw mode" is activated but not in the used Telnet client, the IAC commands sent at the beginning can appear as interfering characters in the command line (partially invisible).

### **Editing**

The following edit functions are available when the terminal supports VT100, and Raw Mode is deactivated. Entered characters are inserted at the cursor position.

| Keys          | Function                                     |
|---------------|--|
| Left, Right   | moves cursor left or right                   |
| Pos1, End     | moves cursor to the beginning or end of line |
| Del           | deletes character under the cursor           |
| Backspace     | deletes character left of cursor             |
| Up, Down      | shows input lines history                    |
| Tab, Ctrl-Tab | completes the word at cursor                 |
| Ctrl-C        | clears the line                              |

This chapter is general for <u>all</u> Gude devices. Depending on the device type, ports or certain sensors may not be available.

#### **Sensor Examples**

#### a) External Sensors

```
>extsensor all show E=1,L="7106",0="21.3°C",1="35.1%",3="1013hPa",4="5.2°C",5="16.0°C"" E=2,L="7102",0="21.2°C",1="35.4%",4="5.3°C",5="15.9°C""
```

The command lists one connected external sensor per line, and the individual measured values are separated by commas after the label name. The digit before the equal sign corresponds to the Index field in the External Sensor Table.

>extsensor 1 0 value show

Displays temperature of the sensor at Port 1

#### b) Line Sensors



🦊 For devices with 230V input metering (Metered PDU).

```
>linesensor all "0,1,2,3,12" show
L=1,L="Power Port",0="13000Wh",1="0W",2="225V",3="0A",12="998218s"
L=2, L="Power Port", 0="13000Wh", 1="0W", 2="223V", 3="0A", 12="996199s"
```

This command outputs all line sensor values in one line. A list of all fields (according to the energy sensor table) is transferred as parameter. In this example these are the fields Absolute Active Energy (0), Power Active (1), Voltage (2), Current (3) and Reset Time (12).

```
>linesensor 1 "0, 1, 2, 3, 12" show
>linesensor 1 1 show
```

These variants give the sensor values of the field list or of a sensor at Line-In 1.

🦊 For devices with Overvoltage Protection, the "linesensor all" command also outputs the state of the protection ("OVP=x"). A "1" means ok, a "0" a failure of the protection.

#### c) Port Sensors



🦊 For devices with 230V output metering (Outlet-Metered PDU).

```
>portsensor all "0,1,2,3,12" show
P=1, L="Power Port", 0="13000Wh", 1="0W", 2="225V", 3="0A", 12="998218s"
P=2, L="Power Port", 0="13000Wh", 1="0W", 2="225V", 3="0A", 12="996199s"
P=12,L="Power Port",0="13000Wh",1="0W",2="225V",3="0A",12="998218s"
```

This command outputs all port sensor values in one line. A list of all fields (according to the energy sensor table) is passed as parameter. In this example these are the fields Absolute Active Energy (0), Power Active (1), Voltage (2), Current (3) and Reset Time (12).

```
>portsensor 2 "0,1,2,3,12" show
>portsensor 2 1 show
```

These variants give the sensor values of the field list or a sensor to at Outlet Port 2.



The following examples refer to Gude devices that have switchable ports.

#### d) Displaying Port Relays

```
>port all state 1 show
P1=ON, P2=OFF, P3=ON, P4=OFF, P5=OFF, P6=OFF, P7=OFF, P8=ON
```

The command "port all state {MODE0=0|MODE1=1|MODE2=2} show" returns the switching state of all relays in 3 possible formats.

#### e) Switching Port Relays

```
#port all state set "1,2,12" 1
```

OK.

The command syntax "port all state set "{port\_list}" {OFF=0|ON=1}" sets a list of ports to ON=1 or OFF=0.

#### 4.2.1 SSH

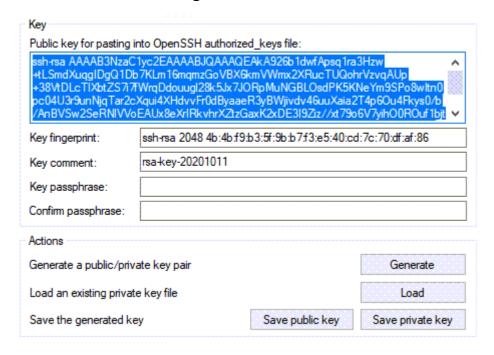
The device supports SSH-2 connections with either public key authentication or user name and password. The "login" must be enabled for SSH. Users and passwords can be stored locally or retrieved via a radius server. If you want to use SSH in a terminal, Activate echo should be enabled.

#### Public Keys

The following public keys are accepted:

| Key type | Length     |
|----------|------------|
| RSA      | 2048, 4096 |
| ECDSA    | 256, 384   |

### **Generation with PuTTYgen**



Generated keys can be copied directly from e.g. PuTTYgen,

Upload new SSH public key:

SSh-rsa

AAAAB3NzaC1yc2EAAA 
ADAQABAAABAQDTliqb/ ///

Delete public key

and inserted into the Configuration - Console input field. Public keys are accepted in SSH2 or OpenSSH format.

## Generation with ssh-keygen

The tool ssh-keygen is mostly shipped with Linux and Windows to generate SSH keys. Here is an example to generate an ECDSA 384 key.

```
ssh-keygen -t ecdsa -b 384 -f ssh.key
```

In the file ssh.pub is then the private key, the content of ssh.key.pub is inserted into the field "Upload SSH public key:".

Upload new SSH public key:

ecdsa-sha2-nistp384 ^ AAAAE2VjZHNhLXNoYTI v tbmlzdHAzODQAAAAIbm //

Delete public key

#### 4.2.2 Console Cmd 1104

| Command  | Description                                      | Note |
|--|--|------|
| logout   | go to login prompt when enabled                  | 2    |
| quit   | quits telnet session - nothing in serial console | 2    |
| back   | back one cmd level                               | 2    |
| help   | show all cmds from this level                    | 2    |
| help all   | show all cmds                                    | 2    |
| neip all   | Show all cirius                                  |      |
| clock  | enters cmd group "clock"                         |      |
| clock ntp enabled set {OFF=0 ON=1}                   | enables ntp                                      |      |
| clock ntp enabled show                               | shows if ntp enabled                             |      |
| clock timezone set {minutes}                         | sets timezone                                    |      |
| clock timezone show                                  | shows timezone                                   |      |
| clock dst enabled set {OFF=0 ON=1}                   | enables dst                                      |      |
| clock dst enabled show                               | shows if dst is enabled                          |      |
| clock manual set "{hh:mm:ss yyyy-mm-dd}"             | sets time and date manually                      |      |
| clock show   | shows actual time and date                       |      |
| clock show clock ntp server {PRIMARY=0 BACKUP=1} set |  |      |
| "{dns name}"   | sets ntp server name                             |      |
| clock ntp server {PRIMARY=0 BACKUP=1} show           | shows ntp server name                            |      |
|  |  |      |
| console  | enters cmd group "console"                       |      |
| console version                                      | shows unique console version number              |      |
| console telnet enabled set {OFF=0 ON=1}              | enables telnet on/off                            |      |
| console telnet enabled show                          | shows if telnet enabled                          |      |
| console telnet port set {ip port}                    | sets telnet port                                 |      |
| console telnet port show                             | shows telnet port                                |      |
| console telnet raw set {OFF=0 ON=1}                  | sets raw mode (disables editing) on/off          |      |
| console telnet raw show                              | shows if raw mode enabled                        |      |
| console telnet echo set {OFF=0 ON=1}                 | enables echo on/off                              |      |
| console telnet echo show                             | shows if echo enabled                            |      |
| console telnet activeneg set {OFF=0 ON=1}            | enables telnet active negotiation (IAC) on/off   |      |
| console telnet activeneg show                        | shows if active negotiation enabled              |      |
| console telnet login set {OFF=0 ON=1}                | enables login on/off                             |      |
| console telnet login show                            | shows if login enabled                           |      |
| console telnet login local set {OFF=0 ON=1}          | enables local login on/off                       |      |
| console telnet login local show                      | shows if local login enabled                     |      |
| console telnet login radius set {OFF=0 ON=1}         | enables login for RADIUS on/off                  |      |
| console telnet login radius show                     | shows if RADIUS login enabled                    |      |
| console telnet login delay set {OFF=0 ON=1}          | enables delay (after 3 login fails) on/off       |      |
| console telnet login delay show                      | shows if login delay enabled                     |      |
| console telnet pushmsgs config set {OFF=0            | ,  |      |
| ON=1}  | enables persistent push msgs                     |      |
| console telnet pushmsgs config show                  | shows if persistent push msgs are enabled        |      |
| console telnet pushmsgs set {OFF=0 ON=1}             | enables temporary push msgs                      |      |
| console telnet pushmsgs show                         | shows if temporary push msgs are enabled         |      |
| console telnet user set "{username}"                 | sets login user name                             |      |
| console telnet user show                             | shows login user name                            |      |
| console telnet passwd set "{passwd}"                 | sets login password                              |      |
| console telnet passwd hash set "{passwd}"            | sets login hashed password                       |      |

| console ssh enabled set {OFF=0 ON=1}  | enables SSH<br>shows if SSH enabled  |
|---|--|
| console ssh enabled show console ssh port set {ip_port}   | sets SSH port  |
| console ssh port show   | shows SSH port   |
| console ssh echo set {OFF=0 ON=1}   | enables echo on/off  |
| console ssh echo show console ssh pushmsgs config set {OFF=0 ON=1}  | shows if echo enabled enables persistent push msgs   |
| console ssh pushmsgs config show  | shows if persistent push msgs are enabled  |
| console ssh pushmsgs set {OFF=0 ON=1}   | enables temporary push msgs  |
| console ssh pushmsgs show   | shows if temporary push msgs are enabled   |
| console ssh public hash set "{passwd}" console ssh public hash show   | sets hash of SSH public key<br>shows hash of SSH public key  |
| concole con public flacin chem  | chows had not cert public key  |
| email   | enters cmd group "email"   |
| email enabled set {OFF=0 ON=1}<br>email enabled show  | enables email on/off<br>shows if email is enabled  |
| email sender set "{email_addr}"   | sets email sender address  |
| email sender show   | shows email sender address   |
| email recipient set "{email_addr}"  | sets email recipient address   |
| email recipient show email server set "{dns name}"  | shows email recipient address<br>sets email SMTP server address  |
| email server show   | shows email SMTP server address  |
| email port set {ip_port}  | sets email SMTP port   |
| email port show<br>email security set {NONE=0 STARTTLS=1  | shows email SMTP port  |
| SSL=2}  | sets SMTP connection security  |
| email security show   | shows SMTP connection security   |
| email auth set {NONE=0 PLAIN=1 LOGIN=2}   | sets email authentication  |
| email auth show email user set "{username}"   | show email authentication<br>sets SMTP username  |
| email user show   | shows SMTP username  |
| email passwd set "{passwd}"   | sets SMTP password   |
| email passwd hash set "{passwd}"  | sets crypted SMTP password   |
| email testmail  | send test email  |
| ethernet  | enters cmd group "ethernet"  |
| ethernet mac show   | shows MAC address  |
| ethernet link show<br>ethernet phyprefer set {10MBIT_HD=0   | shows ethernet link state  |
| 10MBIT FD=1 100MBIT HD=2 100MBIT FD=3}  | sets preferred speed for PHY Auto Negotiation  |
|   |  |
| ethernet phyprefer show   | shows preferred speed for PHY Auto Negotiation   |
|   |  |
| extinput  | enters cmd group "extinput"  |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1   | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view   |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show  | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes  4  |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}"  | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label   |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name show  | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor   |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name show extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1}  | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label   |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name show extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled   | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor   |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name show extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled show  | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor inverts input on/off shows if input inverted  |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name show extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled show extinput {port_num} {inp_num} label {LOW=0  HIGH=1} set "{name}"   | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor inverts input on/off  |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name show extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled show extinput {port_num} {inp_num} label {LOW=0  HIGH=1} set "{name}" extinput {port_num} {inp_num} label {LOW=0  | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor inverts input on/off shows if input inverted sets input low/high text   |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled show extinput {port_num} {inp_num} label {LOW=0  HIGH=1} set "{name}" extinput {port_num} {inp_num} label {LOW=0  HIGH=1} show  | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor inverts input on/off shows if input inverted sets input low/high text shows input low/high text   |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name show extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled show extinput {port_num} {inp_num} label {LOW=0  HIGH=1} set "{name}" extinput {port_num} {inp_num} label {LOW=0  | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor inverts input on/off shows if input inverted sets input low/high text shows input low/high text   |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name show extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled show extinput {port_num} {inp_num} label {LOW=0  HIGH=1} set "{name}" extinput {port_num} {inp_num} label {LOW=0  HIGH=1} show extinput {port_num} {inp_num} events set {OFF=0 ON=1} extinput {port_num} {inp_num} events show  | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor inverts input on/off shows if input inverted sets input low/high text shows input low/high text   |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name show extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled show extinput {port_num} {inp_num} label {LOW=0  HIGH=1} set "{name}" extinput {port_num} {inp_num} label {LOW=0  HIGH=1} show extinput {port_num} {inp_num} events set {OFF=0 ON=1} extinput {port_num} {inp_num} events show extinput {port_num} {inp_num} events type set  | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor inverts input on/off shows if input inverted sets input low/high text shows input low/high text enables input events on/off shows if input events are enabled   |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name show extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled set show extinput {port_num} {inp_num} label {LOW=0  HIGH=1} set "{name}" extinput {port_num} {inp_num} label {LOW=0  HIGH=1} show extinput {port_num} {inp_num} events set {OFF=0 ON=1} extinput {port_num} {inp_num} events show extinput {port_num} {inp_num} events type set "{EVT_SYSLOG=0,EVT_SNMP=1,EVT_EMAIL=2}   | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor inverts input on/off shows if input inverted sets input low/high text shows input low/high text enables input events on/off shows if input events are enabled   |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name show extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled show extinput {port_num} {inp_num} label {LOW=0  HIGH=1} set "{name}" extinput {port_num} {inp_num} label {LOW=0  HIGH=1} show extinput {port_num} {inp_num} events set {OFF=0 ON=1} extinput {port_num} {inp_num} events show extinput {port_num} {inp_num} events type set "{EVT_SYSLOG=0,EVT_SNMP=1,EVT_EMAIL=2 ,EVT_BEEPER=5,EVT_DISPLAY=6,EVT_CONS OLE=7,EVT_MQTT=8}"  | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor inverts input on/off shows if input inverted sets input low/high text shows input low/high text enables input events on/off shows if input events are enabled enables different event types   |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name show extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled show extinput {port_num} {inp_num} label {LOW=0  HIGH=1} set "{name}" extinput {port_num} {inp_num} label {LOW=0  HIGH=1} show extinput {port_num} {inp_num} events set {OFF=0 ON=1} extinput {port_num} {inp_num} events show extinput {port_num} {inp_num} events type set "{EVT_SYSLOG=0,EVT_SNMP=1,EVT_EMAIL=2,EVT_BEEPER=5,EVT_DISPLAY=6,EVT_CONS OLE=7,EVT_MQTT=8}" extinput {port_num} {inp_num} events type show  | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor inverts input on/off shows if input inverted sets input low/high text shows input low/high text enables input events on/off shows if input events are enabled   |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name show extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled show extinput {port_num} {inp_num} invert enabled show extinput {port_num} {inp_num} label {LOW=0  HIGH=1} set "{name}" extinput {port_num} {inp_num} label {LOW=0  HIGH=1} show extinput {port_num} {inp_num} events set {OFF=0 ON=1} extinput {port_num} {inp_num} events show extinput {port_num} {inp_num} events type set "{EVT_SYSLOG=0,EVT_SNMP=1,EVT_EMAIL=2,EVT_BEEPER=5,EVT_DISPLAY=6,EVT_CONS OLE=7,EVT_MQTT=8}" extinput {port_num} {inp_num} events type show   | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor inverts input on/off shows if input inverted sets input low/high text shows input low/high text enables input events on/off shows if input events are enabled enables different event types shows what event types are enabled  |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled show extinput {port_num} {inp_num} label {LOW=0  HIGH=1} set "{name}" extinput {port_num} {inp_num} events set {OFF=0 ON=1} extinput {port_num} {inp_num} events show extinput {port_num} {inp_num} events type set "{EVT_SYSLOG=0,EVT_SNMP=1,EVT_EMAIL=2,EVT_BEEPER=5,EVT_DISPLAY=6,EVT_CONS OLE=7,EVT_MQTT=8}" extinput {port_num} {inp_num} events type show extinput {port_num} {inp_num} events type show extinput {port_num} {inp_num} events type show extinput {port_num} {inp_num} publish mode set {NONE=0 INTERVAL=1 DELTA=2  INTERV_DELTA=3}  | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor inverts input on/off shows if input inverted sets input low/high text shows input low/high text enables input events on/off shows if input events are enabled enables different event types shows what event types are enabled sets publish mode  |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name show extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled show extinput {port_num} {inp_num} label {LOW=0  HIGH=1} set "{name}" extinput {port_num} {inp_num} events set {OFF=0 ON=1} extinput {port_num} {inp_num} events show extinput {port_num} {inp_num} events type set "{EVT_SYSLOG=0,EVT_SNMP=1,EVT_EMAIL=2,EVT_BEEPER=5,EVT_DISPLAY=6,EVT_CONS OLE=7,EVT_MQTT=8}" extinput {port_num} {inp_num} events type show extinput {port_num} {inp_num} publish mode set {NONE=0 INTERVAL=1 DELTA=2  INTERV_DELTA=3} extinput {port_num} {inp_num} publish mode show  | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor inverts input on/off shows if input inverted sets input low/high text shows input low/high text enables input events on/off shows if input events are enabled enables different event types shows what event types are enabled sets publish mode  |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name show extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled show extinput {port_num} {inp_num} label {LOW=0  HIGH=1} set "{name}" extinput {port_num} {inp_num} events set {OFF=0 ON=1} extinput {port_num} {inp_num} events set {OFF=0 ON=1} extinput {port_num} {inp_num} events type set "{EVT_SYSLOG=0,EVT_SNMP=1,EVT_EMAIL=2,EVT_BEEPER=5,EVT_DISPLAY=6,EVT_CONS OLE=7,EVT_MQTT=8}" extinput {port_num} {inp_num} events type show extinput {port_num} {inp_num} events type show extinput {port_num} {inp_num} publish mode set {NONE=0 INTERVAL=1 DELTA=2  INTERV_DELTA=3} extinput {port_num} {inp_num} publish mode show   | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor inverts input on/off shows if input inverted sets input low/high text shows input low/high text enables input events on/off shows if input events are enabled enables different event types shows what event types are enabled sets publish mode  |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name show extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled show extinput {port_num} {inp_num} label {LOW=0  HIGH=1} set "{name}" extinput {port_num} {inp_num} events set {OFF=0 ON=1} extinput {port_num} {inp_num} events show extinput {port_num} {inp_num} events type set "{EVT_SYSLOG=0,EVT_SNMP=1,EVT_EMAIL=2,EVT_BEEPER=5,EVT_DISPLAY=6,EVT_CONS OLE=7,EVT_MQTT=8}" extinput {port_num} {inp_num} events type show extinput {port_num} {inp_num} publish mode set {NONE=0 INTERVAL=1 DELTA=2  INTERV_DELTA=3} extinput {port_num} {inp_num} publish mode show  | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor inverts input on/off shows if input inverted sets input low/high text shows input low/high text enables input events on/off shows if input events are enabled enables different event types shows what event types are enabled sets publish mode sets mqtt retain   |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled show extinput {port_num} {inp_num} label {LOW=0  HIGH=1} set "{name}" extinput {port_num} {inp_num} label {LOW=0  HIGH=1} show extinput {port_num} {inp_num} events set {OFF=0 ON=1} extinput {port_num} {inp_num} events type set "{EVT_SYSLOG=0,EVT_SNMP=1,EVT_EMAIL=2,EVT_BEEPER=5,EVT_DISPLAY=6,EVT_CONS OLE=7,EVT_MQTT=8}" extinput {port_num} {inp_num} events type show extinput {port_num} {inp_num} events type show extinput {port_num} {inp_num} events type show extinput {port_num} {inp_num} publish mode set {NONE=0 INTERVAL=1 DELTA=2  INTERV_DELTA=3} extinput {port_num} {inp_num} publish mode show | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor inverts input on/off shows if input inverted sets input low/high text shows input low/high text enables input events on/off shows if input events are enabled enables different event types shows what event types are enabled sets publish mode  |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name show extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled show extinput {port_num} {inp_num} label {LOW=0  HIGH=1} set "{name}" extinput {port_num} {inp_num} label {LOW=0  HIGH=1} show extinput {port_num} {inp_num} events set {OFF=0 ON=1} extinput {port_num} {inp_num} events type set "{EVT_SYSLOG=0,EVT_SNMP=1,EVT_EMAIL=2,EVT_BEEPER=5,EVT_DISPLAY=6,EVT_CONS OLE=7,EVT_MQTT=8}" extinput {port_num} {inp_num} events type show extinput {port_num} {inp_num} events type show extinput {port_num} {inp_num} publish mode set {NONE=0 INTERVAL=1 DELTA=2  INTERV_DELTA=3} extinput {port_num} {inp_num} publish mode show extinput {port_num} {inp_num} publish mode show extinput {port_num} {inp_num} publish mqtt retain set {OFF=0 ON=1} extinput {port_num} {inp_num} publish mqtt retain show extinput {port_num} {inp_num} publish mqtt retain show extinput {port_num} {inp_num} publish timer set   | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor inverts input on/off shows if input inverted sets input low/high text shows input low/high text enables input events on/off shows if input events are enabled enables different event types shows what event types are enabled sets publish mode sets mqtt retain   |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled set show extinput {port_num} {inp_num} label {LOW=0  HIGH=1} set "{name}" extinput {port_num} {inp_num} label {LOW=0  HIGH=1} show extinput {port_num} {inp_num} events set {OFF=0 ON=1} extinput {port_num} {inp_num} events show extinput {port_num} {inp_num} events type set "{EVT_SYSLOG=0,EVT_SNMP=1,EVT_EMAIL=2,EVT_BEEPER=5,EVT_DISPLAY=6,EVT_CONS OLE=7,EVT_MQTT=8}" extinput {port_num} {inp_num} events type show extinput {port_num} {inp_num} events type show extinput {port_num} {inp_num} publish mode set {NONE=0 INTERVAL=1 DELTA=2  INTERV_DELTA=3} extinput {port_num} {inp_num} publish mode show extinput {port_num} {inp_num} publish mode show extinput {port_num} {inp_num} publish mqtt retain set {OFF=0 ON=1} extinput {port_num} {inp_num} publish timer set {num_secs}  | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor inverts input on/off shows if input inverted sets input low/high text shows input low/high text enables input events on/off shows if input events are enabled enables different event types shows what event types are enabled sets publish mode sets mqtt retain shows if mqtt retain set sets publish time interval |
| extinput extinput {port_num} {inp_num} state show extinput all state {MODE0=0 MODE1=1  MODE2=2} show extinput {port_num} {inp_num} name set "{name}" extinput {port_num} {inp_num} name show extinput {port_num} {inp_num} invert enabled set {OFF=0 ON=1} extinput {port_num} {inp_num} invert enabled show extinput {port_num} {inp_num} label {LOW=0  HIGH=1} set "{name}" extinput {port_num} {inp_num} label {LOW=0  HIGH=1} show extinput {port_num} {inp_num} events set {OFF=0 ON=1} extinput {port_num} {inp_num} events type set "{EVT_SYSLOG=0,EVT_SNMP=1,EVT_EMAIL=2,EVT_BEEPER=5,EVT_DISPLAY=6,EVT_CONS OLE=7,EVT_MQTT=8}" extinput {port_num} {inp_num} events type show extinput {port_num} {inp_num} events type show extinput {port_num} {inp_num} publish mode set {NONE=0 INTERVAL=1 DELTA=2  INTERV_DELTA=3} extinput {port_num} {inp_num} publish mode show extinput {port_num} {inp_num} publish mode show extinput {port_num} {inp_num} publish mqtt retain set {OFF=0 ON=1} extinput {port_num} {inp_num} publish mqtt retain show extinput {port_num} {inp_num} publish mqtt retain show extinput {port_num} {inp_num} publish timer set   | enters cmd group "extinput" shows input state shows input state of all ports in 3 different view modes sets sensor name to label shows label of sensor inverts input on/off shows if input inverted sets input low/high text shows input low/high text enables input events on/off shows if input events are enabled enables different event types shows what event types are enabled sets publish mode sets mqtt retain shows if mqtt retain set sets publish time interval |

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| xtinput {port_num} {inp_num} {LOW=0 HIGH=1}                                       | shows Port for Power Port Switching actions  |   |
|---|--|---|
| ort show<br>xtinput {port_num} {inp_num} {LOW=0 HIGH=1}                           | sets Port state for Power Port Switching actions   |   |
| tate set {OFF=0 ON=1 DISABLED=2} xtinput {port_num} {inp_num} {LOW=0 HIGH=1}      | shows Port state for Power Port Switching actions  |   |
| tate show   | <u> </u>   |   |
| xtsensor<br>xtsensor all show   | enters cmd group "extsensor"<br>shows all values from connected external sensors   |   |
| xtsensor all show   | shows all plugged sensors and fields   |   |
| xtsensor {port_num} {sen_field} value show  | shows sensor value   | 6 |
| xtsensor {port_num} {sen_type} label set  | sets sensor name to label  | 6 |
| [name]"   |  |   |
| xtsensor {port_num} {sen_type} label show   | shows label of sensor  | 6 |
| xtsensor {port_num} type show   | shows type of sensor   |   |
| xtsensor {port_num} {sen_type} {sen_field} vents set {off=0 on=1}                 | enables sensor events on/off   | 6 |
| xtsensor {port_num} {sen_type} {sen_field}  |  | ^ |
| vents show  | shows if sensor events are enabled   | 6 |
| xtsensor {port_num} {sen_type} {sen_field}  |  |   |
| vents type set  |  |   |
| [EVT_SYSLOG=0,EVT_SNMP=1,EVT_EMAIL=2<br>EVT_SMS=3,EVT_GSMEMAIL=4,EVT_BEEPER       | enables different event types  | 6 |
| 5,EVT_DISPLAY=6,EVT_CONSOLE=7,EVT_M   | • •  |   |
| 9,EV1_DI3PLAT-0,EV1_CONSOLE-7,EV1_W<br>(TT=8)"                                    |  |   |
| xtsensor {port_num} {sen_type} {sen_field}  |  | _ |
| vents type show   | shows what event types are enabled   | 6 |
| xtsensor {port_num} {sen_type} {sen_field}  | sets maximum value for sensor  | 6 |
| naxval set {num}  | 3013 Maximum value for 301301  | _ |
| xtsensor {port_num} {sen_type} {sen_field}  | shows maximum value for sensor   | 6 |
| naxval show xtsensor {port_num} {sen_type} {sen_field}                            |  |   |
| ninval set {num}  | sets minimum value for sensor  | 6 |
| xtsensor {port_num} {sen_type} {sen_field}  | the control of the co | ^ |
| ninval show   | shows minimum value for sensor   | 6 |
| xtsensor {port_num} {sen_type} {sen_field} hyst                                   | sets hysterese value for sensor  | 6 |
| et {num}  |  | _ |
| xtsensor {port_num} {sen_type} {sen_field} hyst how                               | shows hysterese value for sensor   | 6 |
| xtsensor {port_num} {sen_type} {sen_field}  |  |   |
| ublish mode set {NONE=0 INTERVAL=1  | sets publish mode  |   |
| DELTA=2 INTERV_DELTA=3}   | ·  |   |
| xtsensor {port_num} {sen_type} {sen_field}  | shows publish mode   |   |
| ublish mode show  | - Charles Fuzzion mode   |   |
| xtsensor {port_num} {sen_type} {sen_field}<br>ublish mqtt retain set {OFF=0 ON=1} | sets mqtt retain   |   |
| xtsensor {port_num} {sen_type} {sen_field}  |  |   |
| ublish mgtt retain show   | shows if mqtt retain set   |   |
| xtsensor {port_num} {sen_type} {sen_field}  | acta nublich tima interval   |   |
| ublish timer set {num_secs}   | sets publish time interval   |   |
| xtsensor {port_num} {sen_type} {sen_field}  | shows publish time interval  |   |
| ublish timer show   |  |   |
| xtsensor {port_num} {sen_type} {sen_field} ublish delta set {float}               | sets publish delta value   |   |
| xtsensor {port_num} {sen_type} {sen_field}  | ·  |   |
| ublish delta show   | shows publish delta value  |   |
| xtsensor {port_num} {sen_type} {sen_field}  |  |   |
| BELOWMÎN=0 ABOVEMIN=1 ABOVEMAX=2  | sets Port for Power Port Switching actions   | 6 |
| ELOWMAX=3} port set {port_num}  |  |   |
| xtsensor {port_num} {sen_type} {sen_field}  |  | _ |
| BELOWMIN=0 ABOVEMIN=1 ABOVEMAX=2  | shows Port for Power Port Switching actions  | 6 |
| ELOWMAX=3} port show<br>xtsensor {port_num} {sen_type} {sen_field}                |  |   |
| BELOWMIN=0 ABOVEMIN=1 ABOVEMAX=2  |  | _ |
| ELOWMAX=3} state set {OFF=0 ON=1  | sets Port state for Power Port Switching actions   | 6 |
| ISABLED=2}  |  |   |
| xtsensor {port_num} {sen_type} {sen_field}  |  |   |
| BELOWMIN=0 ABOVEMIN=1 ABOVEMAX=2  | shows Port state for Power Port Switching actions  | 6 |
| ELOWMAX=3} state show   |  |   |
| xtsensor period set {24H=0 12H=1 2H=2 1H=3  | sets sensor Min/Max measurement period   |   |
| 0MIN=4}<br>xtsensor period show   | shows sensor Min/Max measurement period  |   |
| xtsensor {port_num} {sen_field} calib set {float}                                 | sets calibration offset for temperature or humidity  |   |
|   | shows calibration offset for temperature or  |   |
| xtsensor {port_num} {sen_field} calib show  | humidity   |   |
|   |  |   |
|   | <b>,</b>   |   |

| shows accepted connection types sets http port shows http port sets https port shows https port restricts TLS mode shows TLS mode restriction sets http session authentication mode shows http session authentication mode and compatibility enables http password on/off |  |
|---|--|
| shows http port sets https port shows https port restricts TLS mode shows TLS mode restriction sets http session authentication mode shows http session authentication mode and compatibility   |  |
| shows https port restricts TLS mode shows TLS mode restriction sets http session authentication mode shows http session authentication mode and compatibility   |  |
| restricts TLS mode shows TLS mode restriction sets http session authentication mode shows http session authentication mode and compatibility  |  |
| shows TLS mode restriction sets http session authentication mode shows http session authentication mode and compatibility   |  |
| sets http session authentication mode shows http session authentication mode and compatibility  |  |
| shows http session authentication mode and compatibility  |  |
| compatibility   |  |
| , ,   |  |
|   |  |
| sets admin session timeout  |  |
| shows admin session timeout   |  |
| sets user session timeout   |  |
|   |  |
|   |  |
|   |  |
| <u> </u>  |  |
|   |  |
| sets http user password   |  |
| sets http admin password  |  |
| sets hashed http user password  |  |
| sets hashed http admin password   |  |
| enters cmd group "ip4"  |  |
| sets device hostname  |  |
| shows device hostname   | 3  |
| sets IPv4 address   |  |
|   | 3  |
|   | 3  |
|   | 3  |
|   | 3  |
| sets IPv4 DNS server address  |  |
| shows IPv4 DNS server address   | 3  |
| enables IPv4 DHCP on/off  |  |
| shows IPv4 DHCP state   | 3  |
| enters cmd group "ip6"  |  |
| enables IPv6 on/off   |  |
|   | 3  |
|   | 2  |
|   | 3  |
|   | 3  |
|   | 4  |
| show all IPv6 gateways  | 4  |
| show all IPv6 DNS server  | 4  |
| enables manual IPv6 addresses   |  |
|   | 3  |
|   | 3  |
|   | J  |
|   | 3  |
| sets manual IPv6 DNS server address   |  |
| shows manual IPv6 DNS server address  | 3  |
| enters cmd group "ipacl"  |  |
|   |  |
| shows if ICMP ping enabled  |  |
| enable IP filter on/off   |  |
| shows if IP filter enabled  |  |
|   |  |
|   |  |
|   |  |
|   |  |
| sets Modbus TCP port  |  |
| shows Modbus TCP port   |  |
| enters cmd group "mqtt"   |  |
|   | shows user session timeout shows if http password enabled enables local login on/off shows if local login enabled enables login for RADIUS on/off shows if RADIUS login enabled sets http user password sets hathed http user password sets hashed http user password sets hashed http admin password  enters cmd group "ip4" sets device hostname shows device hostname sets IPv4 address sets IPv4 address sets IPv4 netmask shows IPv4 atdress sets IPv4 pateway address sets IPv4 pateway address sets IPv4 DNS server address shows IPv4 DNS server address enables IPv4 DNS server address enables IPv4 DHCP on/off shows IP IPv6 on/off shows IP IPv6 on/off shows IP IPv6 on/off shows IPv6 DHCP on/off shows IPv6 DHCP on/off shows IPv6 DHCP is enabled enables IPv6 on/er enabled show all IPv6 addresses show all IPv6 addresses show all IPv6 addresses show all IPv6 addresses shows if manual IPv6 addresses shows manual IPv6 addresses shows manual IPv6 address sets manual IPv6 address shows manual IPv6 address sets manual IPv6 pateway address sets manual IPv6 pateway sets iPva pateway address sets iPva pateway ad |

| mqtt {broker_idx} enabled show   | shows if mqtt enabled  |   |
|--|--|---|
| mqtt {broker_idx} server set "{dns_name}"  | sets broker name<br>shows broker name  |   |
| mqtt {broker_idx} server show mqtt {broker_idx} tls enabled set {OFF=0 ON=1}   | enable TLS   |   |
| mqtt {broker_idx} tls enabled show   | shows if TLS enabled   |   |
| mqtt {broker_idx} port set {ip_port}   | set broker TCP/IP port   |   |
| mqtt {broker_idx} port show  | shows broker TCP/IP port   |   |
| mqtt {broker_idx} user set "{username}" mqtt {broker_idx} user show  | sets username<br>shows username  |   |
| mqtt {broker_idx} passwd set "{passwd}"  | sets password  |   |
| mqtt {broker_idx} passwd hash set "{passwd}"   | sets hashed passwd   |   |
| mqtt {broker_idx} client set "{name}"  | sets client name   |   |
| mqtt {broker_idx} client show<br>mgtt {broker_idx} qos set {QOS0=0 QOS1=1}   | shows client name<br>sets QoS level  |   |
| mqtt {broker_idx} qos show   | shows QoS level  |   |
| mqtt {broker_idx} keepalive set {num_secs}   | sets keep-alive time   |   |
| mqtt {broker_idx} keepalive show   | shows keep-alive time  | _ |
| mqtt {broker_idx} topic set "{name}" mqtt {broker_idx} topic show  | sets topic prefix shwos topic prefix   |   |
| mqtt {broker_idx} console enabled set {OFF=0   |  |   |
| ON=1}  | permit console cmds  |   |
| mqtt {broker_idx} console enabled show   | shows if console cmds allowed  |   |
| mqtt {broker_idx} device data timer set {num_secs}   | sets telemetry interval  |   |
| mqtt {broker idx} device data timer show   | shows telemetry interval   |   |
| ·  |  |   |
| port   | enters cmd group "port"  |   |
| port {port_num} state set {OFF=0 ON=1}<br>port {port_num} state show   | sets port to new state shows port state  |   |
| · · · · - ·  | sets several ports in one cmd - e.g. port all state  |   |
| port all state set "{port_list}" {OFF=0 ON=1}  | set "1,3,5" 1  |   |
| port all state {MODE0=0 MODE1=1 MODE2=2}   | shows all port states in 3 different view modes 4  | ļ |
| show port all set {OFF=0 ON=1 OFF_REV=2  |  |   |
| ON_REV=3}  | switch all ports on/off forward or reverse   |   |
| port restart all set {REINIT=0 <br>OFF_REV_REINIT=1,OFF_REINIT=2}  | reinit coldstart sequence (optional first all off)   |   |
| port {port_num} reset  | start reset sequence for port  |   |
| port {port_num} toggle   | toggles port   | _ |
| port {port_num} batch set {OFF=0 ON=1} wait<br>{num_secs} {OFF=0 ON=1}   | starts batch mode for port   |   |
| port {port_num} batch cancel   | cancels batch mode   |   |
| port {port_num} label set "{name}"   | sets port label name   |   |
| port {port_num} label show   | shows port label name  | _ |
| port {port_num} initstate coldstart set {OFF=0 <br>ON=1 REMEMBER=2}  | sets port coldstart initialization   |   |
| port {port_num} initstate coldstart show   | shows port coldstart initialization  |   |
| port {port_num} initstate delay set {num}  | sets port init delay   |   |
| port {port_num} initstate delay show   | chowe nort init delay  |   |
|  | shows port init delay  | _ |
| port {port_num} repowerdelay set {num}   | sets port repower delay  |   |
|  | sets port repower delay<br>shows port repower delay  |   |
| port {port_num} repowerdelay set {num} port {port_num} repowerdelay show port {port_num} resettime set {num} port {port_num} resettime show  | sets port repower delay  |   |
| port {port_num} repowerdelay set {num} port {port_num} repowerdelay show port {port_num} resettime set {num} port {port_num} resettime show port {port_num} watchdog enabled set {OFF=0  | sets port repower delay<br>shows port repower delay<br>sets port reset duration<br>shows port reset duration   |   |
| port {port_num} repowerdelay set {num} port {port_num} repowerdelay show port {port_num} resettime set {num} port {port_num} resettime show port {port_num} watchdog enabled set {OFF=0  ON=1}   | sets port repower delay shows port repower delay sets port reset duration shows port reset duration sets port watchdog to on/off   |   |
| port {port_num} repowerdelay set {num} port {port_num} repowerdelay show port {port_num} resettime set {num} port {port_num} resettime show port {port_num} watchdog enabled set {OFF=0  ON=1} port {port_num} watchdog enabled show   | sets port repower delay shows port repower delay sets port reset duration shows port reset duration sets port watchdog to on/off shows port watchdog state   |   |
| port {port_num} repowerdelay set {num} port {port_num} repowerdelay show port {port_num} resettime set {num} port {port_num} resettime show port {port_num} watchdog enabled set {OFF=0  ON=1}   | sets port repower delay shows port repower delay sets port reset duration shows port reset duration sets port watchdog to on/off   |   |
| port {port_num} repowerdelay set {num} port {port_num} repowerdelay show port {port_num} resettime set {num} port {port_num} resettime show port {port_num} watchdog enabled set {OFF=0  ON=1} port {port_num} watchdog enabled show port {port_num} watchdog mode set {OFF=0  PORT_RESET=1 IP_MS=2 IP_MS_INV=3} port {port_num} watchdog mode show  | sets port repower delay shows port repower delay sets port reset duration shows port reset duration sets port watchdog to on/off shows port watchdog state sets port watchdog mode shows port watchdog mode  |   |
| port {port_num} repowerdelay set {num} port {port_num} repowerdelay show port {port_num} resettime set {num} port {port_num} resettime show port {port_num} resettime show port {port_num} watchdog enabled set {OFF=0  ON=1} port {port_num} watchdog enabled show port {port_num} watchdog mode set {OFF=0  PORT_RESET=1 IP_MS=2 IP_MS_INV=3} port {port_num} watchdog mode show port {port_num} watchdog type set {WD_ICMP=0  | sets port repower delay shows port repower delay sets port reset duration shows port reset duration sets port watchdog to on/off shows port watchdog state sets port watchdog mode shows port watchdog mode  |   |
| port {port_num} repowerdelay set {num} port {port_num} repowerdelay show port {port_num} resettime set {num} port {port_num} resettime show port {port_num} resettime show port {port_num} watchdog enabled set {OFF=0  ON=1} port {port_num} watchdog enabled show port {port_num} watchdog mode set {OFF=0  PORT_RESET=1 IP_MS=2 IP_MS_INV=3} port {port_num} watchdog mode show port {port_num} watchdog type set {WD_ICMP=0  WD_TCP=1}   | sets port repower delay shows port repower delay sets port reset duration shows port reset duration sets port watchdog to on/off shows port watchdog state sets port watchdog mode shows port watchdog mode  |   |
| port {port_num} repowerdelay set {num} port {port_num} repowerdelay show port {port_num} resettime set {num} port {port_num} resettime set {num} port {port_num} resettime show port {port_num} watchdog enabled set {OFF=0  ON=1} port {port_num} watchdog enabled show port {port_num} watchdog mode set {OFF=0  PORT_RESET=1 IP_MS=2 IP_MS_INV=3} port {port_num} watchdog mode show port {port_num} watchdog type set {WD_ICMP=0  WD_TCP=1} port {port_num} watchdog type show port {port_num} watchdog link down set {OFF=0  PORT_num} watch | sets port repower delay shows port repower delay sets port reset duration shows port reset duration sets port watchdog to on/off shows port watchdog state sets port watchdog mode shows port watchdog mode sets port watchdog type shows port watchdog type   |   |
| port {port_num} repowerdelay set {num} port {port_num} repowerdelay show port {port_num} resettime set {num} port {port_num} resettime set {num} port {port_num} resettime show port {port_num} watchdog enabled set {OFF=0  ON=1} port {port_num} watchdog enabled show port {port_num} watchdog mode set {OFF=0  PORT_RESET=1 IP_MS=2 IP_MS_INV=3} port {port_num} watchdog mode show port {port_num} watchdog type set {WD_ICMP=0  WD_TCP=1} port {port_num} watchdog type show port {port_num} watchdog link down set {OFF=0  ON=1}  | sets port repower delay shows port repower delay sets port reset duration shows port reset duration sets port watchdog to on/off shows port watchdog state sets port watchdog mode shows port watchdog mode sets port watchdog type shows port watchdog type shows port watchdog type sets if watchdog active when eth link down   |   |
| port {port_num} repowerdelay set {num} port {port_num} repowerdelay show port {port_num} resettime set {num} port {port_num} resettime set {num} port {port_num} resettime show port {port_num} watchdog enabled set {OFF=0  ON=1} port {port_num} watchdog enabled show port {port_num} watchdog mode set {OFF=0  PORT_RESET=1 IP_MS=2 IP_MS_INV=3} port {port_num} watchdog mode show port {port_num} watchdog type set {WD_ICMP=0  WD_TCP=1} port {port_num} watchdog type show port {port_num} watchdog link down set {OFF=0  ON=1} port {port_num} watchdog link down show  | sets port repower delay shows port repower delay sets port reset duration shows port reset duration sets port watchdog to on/off shows port watchdog state sets port watchdog mode shows port watchdog mode sets port watchdog type shows port watchdog type shows port watchdog type shows port watchdog active when eth link down shows if watchdog active when eth link down  |   |
| port {port_num} repowerdelay set {num} port {port_num} repowerdelay show port {port_num} resettime set {num} port {port_num} resettime set {num} port {port_num} resettime show port {port_num} watchdog enabled set {OFF=0  ON=1} port {port_num} watchdog enabled show port {port_num} watchdog mode set {OFF=0  PORT_RESET=1 IP_MS=2 IP_MS_INV=3} port {port_num} watchdog mode show port {port_num} watchdog type set {WD_ICMP=0  WD_TCP=1} port {port_num} watchdog type show port {port_num} watchdog link down set {OFF=0  ON=1}  | sets port repower delay shows port repower delay sets port reset duration shows port reset duration sets port watchdog to on/off shows port watchdog state sets port watchdog mode shows port watchdog mode sets port watchdog type shows port watchdog type shows port watchdog type sets if watchdog active when eth link down   |   |
| port {port_num} repowerdelay set {num} port {port_num} repowerdelay show port {port_num} resettime set {num} port {port_num} resettime set {num} port {port_num} resettime show port {port_num} watchdog enabled set {OFF=0  ON=1} port {port_num} watchdog enabled show port {port_num} watchdog mode set {OFF=0  PORT_RESET=1 IP_MS=2 IP_MS_INV=3} port {port_num} watchdog mode show port {port_num} watchdog type set {WD_ICMP=0  WD_TCP=1} port {port_num} watchdog type show port {port_num} watchdog link down set {OFF=0  ON=1} port {port_num} watchdog link down show port {port_num} watchdog host set "{dns_name}" port {port_num} watchdog host set "{dns_name}" port {port_num} watchdog port set {ip_port}  | sets port repower delay shows port repower delay sets port reset duration shows port reset duration sets port watchdog to on/off shows port watchdog state sets port watchdog mode shows port watchdog mode sets port watchdog type shows port watchdog type sets if watchdog active when eth link down shows if watchdog host target shows port watchdog host target sets port watchdog TCP port  |   |
| port {port_num} repowerdelay set {num} port {port_num} repowerdelay show port {port_num} resettime set {num} port {port_num} resettime set {num} port {port_num} resettime show port {port_num} watchdog enabled set {OFF=0  ON=1} port {port_num} watchdog enabled show port {port_num} watchdog mode set {OFF=0  PORT_RESET=1 IP_MS=2 IP_MS_INV=3} port {port_num} watchdog mode show port {port_num} watchdog type set {WD_ICMP=0  WD_TCP=1} port {port_num} watchdog type show port {port_num} watchdog link down set {OFF=0  ON=1} port {port_num} watchdog link down show port {port_num} watchdog host set "{dns_name}" port {port_num} watchdog host set "{dns_name}" port {port_num} watchdog port set {ip_port} port {port_num} watchdog port set {ip_port} port {port_num} watchdog port set {ip_port} port {port_num} watchdog port show   | sets port repower delay shows port repower delay sets port reset duration shows port reset duration sets port watchdog to on/off shows port watchdog state sets port watchdog mode shows port watchdog mode shows port watchdog type shows port watchdog type sets if watchdog active when eth link down shows if watchdog active when eth link down sets port watchdog host target shows port watchdog host target sets port watchdog TCP port shows port watchdog TCP port   |   |
| port {port_num} repowerdelay set {num} port {port_num} repowerdelay show port {port_num} resettime set {num} port {port_num} resettime set {num} port {port_num} resettime show port {port_num} watchdog enabled set {OFF=0  ON=1} port {port_num} watchdog enabled show port {port_num} watchdog mode set {OFF=0  PORT_RESET=1 IP_MS=2 IP_MS_INV=3} port {port_num} watchdog mode show port {port_num} watchdog type set {WD_ICMP=0  WD_TCP=1} port {port_num} watchdog type show port {port_num} watchdog link down set {OFF=0  ON=1} port {port_num} watchdog link down show port {port_num} watchdog host set "{dns_name}" port {port_num} watchdog host show port {port_num} watchdog port set {ip_port} port {port_num} watchdog port set {ip_port} port {port_num} watchdog port set {ip_port} port {port_num} watchdog port show port {port_num} watchdog pinginterval set {num}   | sets port repower delay shows port repower delay sets port reset duration shows port reset duration sets port watchdog to on/off shows port watchdog state sets port watchdog mode shows port watchdog mode shows port watchdog type shows port watchdog type sets if watchdog active when eth link down shows if watchdog active when eth link down sets port watchdog host target shows port watchdog host target sets port watchdog TCP port shows port watchdog TCP port sets port watchdog ping interval  |   |
| port {port_num} repowerdelay set {num} port {port_num} repowerdelay show port {port_num} resettime set {num} port {port_num} resettime set {num} port {port_num} resettime show port {port_num} watchdog enabled set {OFF=0  ON=1} port {port_num} watchdog enabled show port {port_num} watchdog mode set {OFF=0  PORT_RESET=1 IP_MS=2 IP_MS_INV=3} port {port_num} watchdog mode show port {port_num} watchdog type set {WD_ICMP=0  WD_TCP=1} port {port_num} watchdog type show port {port_num} watchdog link down set {OFF=0  ON=1} port {port_num} watchdog link down show port {port_num} watchdog host set "{dns_name}" port {port_num} watchdog host show port {port_num} watchdog port set {ip_port} port {port_num} watchdog port set {ip_port} port {port_num} watchdog port show port {port_num} watchdog pinginterval set {num} port {port_num} watchdog pinginterval set {num} port {port_num} watchdog pinginterval show  | sets port repower delay shows port repower delay sets port reset duration shows port reset duration sets port watchdog to on/off shows port watchdog state sets port watchdog mode shows port watchdog mode sets port watchdog type shows port watchdog type sets if watchdog active when eth link down shows if watchdog active when eth link down sets port watchdog host target shows port watchdog TCP port shows port watchdog TCP port sets port watchdog ping interval shows port watchdog ping interval  |   |
| port {port_num} repowerdelay set {num} port {port_num} repowerdelay show port {port_num} resettime set {num} port {port_num} resettime set {num} port {port_num} resettime show port {port_num} watchdog enabled set {OFF=0  ON=1} port {port_num} watchdog enabled show port {port_num} watchdog mode set {OFF=0  PORT_RESET=1 IP_MS=2 IP_MS_INV=3} port {port_num} watchdog mode show port {port_num} watchdog type set {WD_ICMP=0  WD_TCP=1} port {port_num} watchdog type show port {port_num} watchdog link down set {OFF=0  ON=1} port {port_num} watchdog link down show port {port_num} watchdog host set "{dns_name}" port {port_num} watchdog host show port {port_num} watchdog port set {ip_port} port {port_num} watchdog port set {ip_port} port {port_num} watchdog port show port {port_num} watchdog pinginterval set {num} port {port_num} watchdog pinginterval show port {port_num} watchdog pinginterval show port {port_num} watchdog pinginterval show port {port_num} watchdog pingretries set {num} port {port_num} watchdog pingretries show   | sets port repower delay shows port repower delay sets port reset duration shows port reset duration sets port watchdog to on/off shows port watchdog state sets port watchdog mode shows port watchdog mode shows port watchdog type shows port watchdog type sets if watchdog active when eth link down shows if watchdog active when eth link down sets port watchdog host target shows port watchdog host target sets port watchdog TCP port shows port watchdog TCP port sets port watchdog ping interval  |   |
| port {port_num} repowerdelay set {num} port {port_num} repowerdelay show port {port_num} resettime set {num} port {port_num} resettime set {num} port {port_num} resettime show port {port_num} watchdog enabled set {OFF=0  ON=1} port {port_num} watchdog enabled show port {port_num} watchdog mode set {OFF=0  PORT_RESET=1 IP_MS=2 IP_MS_INV=3} port {port_num} watchdog mode show port {port_num} watchdog type set {WD_ICMP=0  WD_TCP=1} port {port_num} watchdog type show port {port_num} watchdog link down set {OFF=0  ON=1} port {port_num} watchdog link down show port {port_num} watchdog host set "{dns_name}" port {port_num} watchdog host show port {port_num} watchdog port set {ip_port} port {port_num} watchdog port show port {port_num} watchdog pinginterval set {num} port {port_num} watchdog pinginterval set {num} port {port_num} watchdog pinginterval show port {port_num} watchdog pinginterval show port {port_num} watchdog pingretries set {num} port {port_num} watchdog pingretries show port {port_num} watchdog retrybooting set  | sets port repower delay shows port repower delay sets port reset duration shows port reset duration sets port watchdog to on/off shows port watchdog state sets port watchdog mode shows port watchdog mode sets port watchdog type shows port watchdog type shows port watchdog type sets if watchdog active when eth link down shows if watchdog active when eth link down sets port watchdog host target shows port watchdog host target sets port watchdog TCP port shows port watchdog TCP port sets port watchdog ping interval shows port watchdog ping interval sets port watchdog ping interval sets port watchdog ping retries |   |
| port {port_num} repowerdelay set {num} port {port_num} repowerdelay show port {port_num} resettime set {num} port {port_num} resettime set {num} port {port_num} resettime show port {port_num} watchdog enabled set {OFF=0  ON=1} port {port_num} watchdog enabled show port {port_num} watchdog mode set {OFF=0  PORT_RESET=1 IP_MS=2 IP_MS_INV=3} port {port_num} watchdog mode show port {port_num} watchdog type set {WD_ICMP=0  WD_TCP=1} port {port_num} watchdog type show port {port_num} watchdog link down set {OFF=0  ON=1} port {port_num} watchdog link down show port {port_num} watchdog host set "{dns_name}" port {port_num} watchdog host show port {port_num} watchdog port show port {port_num} watchdog port show port {port_num} watchdog port show port {port_num} watchdog pinginterval set {num} port {port_num} watchdog pinginterval show port {port_num} watchdog pinginterval show port {port_num} watchdog pinginterval show port {port_num} watchdog pingretries set {num} port {port_num} watchdog pingretries set {num} port {port_num} watchdog pingretries show  | sets port repower delay shows port repower delay sets port reset duration shows port reset duration sets port watchdog to on/off shows port watchdog state sets port watchdog mode shows port watchdog mode shows port watchdog type shows port watchdog type sets if watchdog active when eth link down shows if watchdog active when eth link down sets port watchdog host target shows port watchdog TCP port shows port watchdog TCP port shows port watchdog ping interval shows port watchdog ping interval sets port watchdog ping retries shows port watchdog ping retries   |   |

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| port {port_num} watchdog bootretries show  | hows port watchdog retry boot timeout   |
|--|---|
| radius   | enters cmd group "radius"   |
| radius {PRIMARY=0 SECONDARY=1} enabled set <off=0 on="1"></off=0>  | enables radius client   |
| radius {PRIMARY=0 SECONDARY=1} enabled show  | show if radius client enabled   |
| radius {PRIMARY=0 SECONDARY=1} server set ' <dns_name>"</dns_name>   | sets radius server address  |
| radius {PRIMARY=0 SECONDARY=1} server show   | shows radius server address   |
| radius {PRIMARY=0 SECONDARY=1} password set "{passwd}"   | sets radius server shared secret  |
| radius {PRIMARY=0 SECONDARY=1} password<br>nash set "{passwd}"<br>radius {PRIMARY=0 SECONDARY=1} auth        | sets radius server crypted shared secret  |
| radius {PRIMARY=0 SECONDARY=1} auth<br>radius {PRIMARY=0 SECONDARY=1} auth                                   | sets server request timeout   |
| radius {FRIMARY=0 SECONDARY=1} autilities set radius {PRIMARY=0 SECONDARY=1} retries set                     | shows server request timeout  |
| (099) radius {PRIMARY=0 SECONDARY=1} retries   | sets server number of retries   |
| show   | shows server number of retries  |
| radius chap enabled set <off=0 on="1"></off=0>   | enables CHAP  |
| radius chap enabled show   | shows if CHAP is enabled  |
| radius message auth set <off=0 on="1"></off=0>   | enables request message authentication shows if request message authentication is |
| radius message auth show   | enabled   |
| radius default timeout set {num_secs}  | sets default session timeout (when not returned as Session-Timout Attribute)      |
| radius default timeout show  | shows default session timeout   |
| snmp   | enters cmd group "snmp"   |
| snmp port set {ip_port}  | sets SNMP UDP port  |
| snmp port show<br>snmp snmpget enabled set {OFF=0 ON=1}  | shows SNMP UDP port<br>enables SNMP GET cmds on/off                               |
| snmp snmpget enabled show  | show if SNMP GET cmds are enabled   |
| snmp snmpset enabled set {OFF=0 ON=1}  | enables SNMP SET cmds on/off  |
| snmp snmpset enabled show  | show if SNMP SET cmds are enabled   |
| snmp snmpv2 enabled set {OFF=0 ON=1}   | enables SNMP v2 on/off  |
| snmp snmpv2 enabled show   | show if SNMP v2 is enabled  |
| snmp snmpv2 public set "{text}"  | enables SNMP v3 on/off  |
| snmp snmpv2 public show  | show if SNMP v3 isenabled   |
| snmp snmpv2 private set "{text}" snmp snmpv2 private show  | sets SNMP v2 public cummnity<br>shows SNMP v2 public community                    |
| sninp sninpv2 private snow<br>snmp system {CONTACT=0 NAME=1 <br>LOCATION=2} set "{text}"                     | sets sysLocation/sysName/sysContact   |
| snmp system {CONTACT=0 NAME=1 <br>LOCATION=2} show   | gets sysLocation/sysName/sysContact   |
| snmp snmpv3 enabled set {OFF=0 ON=1}   | sets SNMP v2 private community  |
| snmp snmpv3 enabled show   | shows SNMP v2 private community   |
| snmp snmpv3 username set "{text}" snmp snmpv3 username show  | sets SNMP v3 username<br>shows SNMP v3 username                                   |
| sninp sninpv3 dserialne snow<br>snmp snmpv3 authalg set {NONE=0 MD5=1 <br>SHA1=2 SHA256=3 SHA384=4 SHA512=5} | sets SNMP v3 authentication   |
| snmp snmpv3 authalg show snmp snmpv3 privalg set {NONE=0 DES=1   | show SNMP v3 authentication algorithm   |
| 3DES=2 AES128=3 AES192=4 AE\$256=5 <br>AES192*=6 AES256*=7}  | sets SNMP v3 privacy algorithm  |
| snmp snmpv3 privalg show   | show SNMP v3 privacy algorithm  |
| snmp snmpv3 authpasswd set "{passwd}"  | sets SNMP v3 authentication password  |
| snmp snmpv3 privpasswd set "{passwd}"  | sets SNMP v3 privacy password<br>sets SNMP v3 authentication hashed password      |
| snmp snmpv3 authpasswd hash set "{passwd}" snmp snmpv3 privpasswd hash set "{passwd}"                        | sets SNMP v3 authentication hashed password sets SNMP v3 privacy hashed password  |
| snmp trap type set {NONE=0 V1=1 V2=2 V3=3} snmp trap type show   | sets SNMP to privacy hashed password sets type of SNMP traps show SNMP trap type  |
| snmp trap receiver {trap_num} set "{dns_name}"   | sets address and port of SNMP trap receiver<br>{trap num}                         |
| snmp trap receiver {trap_num} show   | show address and port of SNMP trap receiver<br>{trap num}                         |
| avala e  |   |
| syslog   | enters cmd group "syslog"   |
| syslog enabled set {OFF=0 ON=1}  | enables syslog msgs on/off<br>show if syslog enabled                              |
| svelog enabled show  |   |
| syslog enabled show<br>syslog server set "{dns_name}"  | sets address of syslog server   |

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| system   | enters cmd group "system"                   |
|--|---|
| system restart   | restarts device                             |
| system fabsettings   | restore fab settings and restart device     |
| system bootloader  | enters bootloader mode                      |
| system flushdns  | flush DNS cache                             |
| system uptime  | number of seconds the device is running     |
| system name show   | shows device name                           |
| system version show  | shows actual firmware version               |
| system sensor {VSYS=0 VAUX=1 VMAIN=2 <br>TCPU=3} show  | shows internal sensors if model supports it |
| system {SWITCH_PORT=0} events set {OFF=0  ON=1}  | enable global events                        |
| system {SWITCH_PORT=0} events show   | shows if global events enabled              |
| system {SWITCH_PORT=0} events type set "{EVT_SYSLOG=0,EVT_SNMP=1,EVT_EMAIL=2 ,EVT_SMS=3,EVT_GSMEMAIL=4,EVT_BEEPER =5,EVT_DISPLAY=6,EVT_CONSOLE=7,EVT_M QTT=8}" |   |
| system {SWITCH_PORT=0} events type show  | shows what event types are enabled          |
| system {SWITCH_PORT=0} events mqtt retain set {OFF=0 ON=1}   | sets mqtt retain                            |
| system {SWITCH_PORT=0} events mqtt retain show   | shows if mqtt retain set                    |
|  |   |
| timer  | enters cmd group "timer"                    |
| timer enabled set {OFF=0 ON=1}   | enables timer functions                     |
| timer enabled show   | shows if timer a enabled                    |
| timer syslog facility set {023}  | sets facility level for timer syslog        |
| timer syslog facility show   | shows facility level for timer syslog       |
| timer syslog verbose set {07}  | sets verbose level for timer syslog         |
| timer syslog verbose show  | shows verbose level for timer syslog        |
| timer {rule_num} enabled set {OFF=0 ON=1}  | enables rule                                |
| timer {rule_num} enabled show  | shows if rule is enabled                    |
| timer {rule_num} name set "{name}"   | sets name of rule                           |
| timer {rule_num} name show   | shows name of rule                          |
| timer {rule_num} {FROM=0 UNTIL=1} set "{yyyy-<br>mm-dd}"   | sets date range of rule                     |
| timer {rule num} {FROM=0 UNTIL=1} show   | shows date range of rule                    |
| timer {rule num} trigger jitter set {065535}   | sets jitter for rule                        |
| timer {rule_num} trigger jitter show   | show jitter of rule                         |
| timer {rule num} trigger random set {0100}   | sets probability for rule                   |
| timer {rule num} trigger random show   | shows rule probability                      |
| timer {rule_num} trigger {HOUR=0 MIN=1 SEC=2 <br>DAY=3 MON=4 DOW=5} set "{time_date_list}"   |   |
| timer {rule_num} trigger {HOUR=0 MIN=1 SEC=2 <br>DAY=3 MON=4 DOW=5} show   | shows time date list                        |
| timer {rule_num} action mode set {SWITCH=1 <br>CLI=2}  | sets switch or cli cmd                      |
| timer {rule_num} action mode show  | shows if switch or cli cmd                  |
| timer {rule_num} action {SWITCH1=0 <br>SWITCH2=1} {OFF=0 ON=1} set "{port_list}"   | sets port list for switch cmd               |
| timer {rule_num} action {SWITCH1=0 <br>SWITCH2=1} {OFF=0 ON=1} show  | shows port list for switch cmd              |
| timer {rule_num} action delay set {065535}   | delay between cmds                          |
| timer {rule_num} action delay show   | shows delay between cmds                    |
| timer {rule_num} action console set "{cmd}"  | sets cmd string                             |
| timer {rule_num} action console show   | shows cmd string                            |
| timer {rule num} action hash set "{data}"  | sets action binary form                     |
| timer {rule num} action hash show  | shows action binary form                    |
| timer {rule_num} delete  | delete one timer                            |
| timer delete all   | delete all timer                            |
| vt100  | enters cmd group "vt100"                    |
| vt100 echo set {OFF=0 ON=1}  | sets console echo state                     |
| vt100 echo sertor i = 0   0   1   1   1   1   1   1   1   1  | shows console echo state                    |
| vt100 ecno snow<br>vt100 numeric set {OFF=0 ON=1}  | sets numeric mode                           |
| vt100 numeric set {OFF=0 ON=1}   | shows numeric mode state                    |
|  |   |
| vt100 reset  | resets terminal                             |

## Notes

- Legacy The command has been replaced by a newer version
   Command can be entered on any level

- 3. The output may show 2 lines the 1st line shows the actual state, the 2nd line the status after reboot
- 4. The output may show several lines
- 5. Please see the **Energy Sensor Table** for the right energy index
- 6. Please see the **External Type and External Sensor Field Tables** for the correct sensor index

## Energy Sensor Table "{energy\_sensor}"

| Index | Description                                       | Unit       |
|-------|---|------------|
| 0     | Forward Active Energy                             | kWh        |
| 1     | Power Active                                      | W          |
| 2     | Voltage   | V          |
| 3     | Current   | Α          |
| 4     | Frequency   | 0.01 hz    |
| 5     | Power Factor                                      | 0.001      |
| 6     | Power Angle                                       | 0.1 degree |
| 7     | Power Apparent                                    | VA         |
| 8     | Power Reactive                                    | VAR        |
| 9     | Forward Active Energy Resettable                  | kWh        |
| 10    | Forward Reactive Energy                           | kVARh      |
| 11    | Forward Reactive Energy Resettable                | kVARh      |
| 12    | Reset Time - sec. since last Energy Counter Reset | S          |
| 13    | Reverse Active Energy                             | kWh        |
| 14    | Reverse Reactive Energy                           | kVARh      |
| 15    | Reverse Active Energy Resettable                  | kWh        |
| 16    | Reverse Reactive Energy Resettable                | kVARh      |
| 17    | Absolute Active Energy                            | kWh        |
| 18    | Absolute Reactive Energy                          | kVARh      |
| 19    | Absolute Active Energy Resettable                 | kWh        |
| 20    | Absolute Reactive Energy Resettable               | kVARh      |

## External Sensor Type Table "{sen\_type}"

Constants "{7x01=0|7x04=0|7x02=1|7x05=1|7x06=2}"

| Index | Description                         | Products               |
|-------|-------------------------------------|------------------------|
| 0     | Temperature                         | 7001, 7101, 7201       |
| 0     | Temperature                         | 7004, 7104, 7204, 7208 |
| 1     | Temperature, Humidity               | 7002, 7102, 7202       |
| 1     | Temperature, Humidity               | 7005, 7105, 7205, 7209 |
| 2     | Temperature, Humidity, Air Pressure | 7006, 7106, 7206, 7210 |

## External Sensor Field Table "{sen\_field}"

| Index | Description                      | Unit |
|-------|----------------------------------|------|
| 0     | Temperature                      | °C   |
| 1     | Humidity                         | %    |
| 3     | Air Pressure                     | hPa  |
| 4     | Dew Point                        | °C   |
| 5     | Dew Point Temperature Difference | °C   |

## 4.2.3 Console Cmd 1105

| Command   | Description  | Note |
|---|--|------|
| logout  | go to login prompt when enabled  | 2    |
| quit  | quits telnet session - nothing in serial console                         | 2    |
| back  | back one cmd level   | 2    |
| help  | show all cmds from this level  | 2    |
| help all  | show all cmds  | 2    |
| clock   | enters cmd group "clock"   |      |
| clock ntp enabled set {OFF=0 ON=1}  | enables ntp  |      |
| clock ntp enabled show  | shows if ntp enabled   |      |
| clock timezone set {minutes}  | sets timezone  |      |
| clock timezone show   | shows timezone   |      |
| clock dst enabled set {OFF=0 ON=1}  | enables dst  |      |
| clock dst enabled show  | shows if dst is enabled  |      |
| clock manual set "{hh:mm:ss yyyy-mm-dd}"  | sets time and date manually  |      |
| clock show  | shows actual time and date   |      |
| clock ntp server {PRIMARY=0 BACKUP=1} set "{dns name}"                          | sets ntp server name   |      |
| clock ntp server {PRIMARY=0 BACKUP=1} show                                      | shows ntp server name  |      |
| console   | enters cmd group "console"   |      |
| console version   | shows unique console version number                                      |      |
| console telnet enabled set {OFF=0 ON=1}   | enables telnet on/off  |      |
| console telnet enabled show   | shows if telnet enabled  |      |
| console telnet port set {ip_port}   | sets telnet port   |      |
| console telnet port show  | shows telnet port  |      |
| console telnet raw set {OFF=0 ON=1}   | sets raw mode (disables editing) on/off                                  |      |
| console telnet raw show   | shows if raw mode enabled enables echo on/off                            |      |
| console telnet echo set {OFF=0 ON=1} console telnet echo show                   | shows if echo enabled  |      |
| console telnet activeneg set {OFF=0 ON=1}                                       | enables telnet active negotiation (IAC) on/off                           |      |
| console telnet activeneg show   | shows if active negotiation enabled                                      |      |
| console telnet login set {OFF=0 ON=1}   | enables login on/off   |      |
| console telnet login show   | shows if login enabled   |      |
| console telnet login local set {OFF=0 ON=1}                                     | enables local login on/off   |      |
| console telnet login local show   | shows if local login enabled   |      |
| console telnet login radius set {OFF=0 ON=1} console telnet login radius show   | enables login for RADIUS on/off  |      |
| console telnet login delay set {OFF=0 ON=1}                                     | shows if RADIUS login enabled enables delay (after 3 login fails) on/off |      |
| console telnet login delay show   | shows if login delay enabled   |      |
| console telnet pushmsgs config set {OFF=0                                       |  |      |
| ON=1}   | enables persistent push msgs   |      |
| console telnet pushmsgs config show   | shows if persistent push msgs are enabled                                |      |
| console telnet pushmsgs set {OFF=0 ON=1}  | enables temporary push msgs  |      |
| console telnet pushmsgs show  | shows if temporary push msgs are enabled                                 |      |
| console telnet user set "{username}" console telnet user show                   | sets login user name<br>shows login user name                            |      |
| console telnet passwd set "{passwd}"  | sets login password  |      |
| console telnet passwd set \passwd\<br>console telnet passwd hash set "{passwd\" | sets login hashed password   |      |
| console ssh enabled set {OFF=0 ON=1}  | enables SSH  |      |
| console ssh enabled show  | shows if SSH enabled   |      |
| console ssh port set {ip_port}  | sets SSH port  |      |
| console ssh port show   | shows SSH port   |      |
| console ssh echo set {OFF=0 ON=1}   | enables echo on/off  |      |
| console ssh echo show console ssh pushmsgs config set {OFF=0 ON=1}              | shows if echo enabled enables persistent push msgs                       |      |
| console ssh pushmsgs config set {OFF=U ON=1} console ssh pushmsgs config show   | shows if persistent push msgs are enabled                                |      |
| console ssh pushmsgs set {OFF=0 ON=1}   | enables temporary push msgs  |      |
| console ssh pushmsgs show   | shows if temporary push msgs are enabled                                 |      |
| console ssh public hash set "{passwd}"  | sets hash of SSH public key  |      |
| console ssh public hash show  | shows hash of SSH public key   |      |
| email   | enters cmd group "email"   |      |
| email enabled set {OFF=0 ON=1}  | enables email on/off   |      |
| email enabled show  | shows if email is enabled  |      |
| email sender set "{email_addr}"   | sets email sender address  |      |
| email sender show email recipient set "{email_addr}"                            | shows email sender address<br>sets email recipient address               |      |
| email recipient set {email_addi}  | shows email recipient address  |      |
| email server set "{dns name}"   | sets email SMTP server address   |      |
| email server show   | shows email SMTP server address  |      |
| email port set {ip_port}  | sets email SMTP port   |      |
| email port show   | shows email SMTP port  |      |

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| email security set {NONE=0 STARTTLS=1 <br>SSL=2}  | sets SMTP connection security                            |   |
|---|--|---|
| email security show   | shows SMTP connection security                           |   |
| email auth set {NONE=0 PLAIN=1 LOGIN=2}   | sets email authentication                                |   |
| email auth show   | show email authentication                                |   |
| email user set "{username}"   | sets SMTP username                                       |   |
| email user show   | shows SMTP username                                      |   |
| email passwd set "{passwd}"<br>email passwd hash set "{passwd}"   | sets SMTP password<br>sets crypted SMTP password         |   |
| email testmail  | send test email  |   |
| -th   | and an and an an Wall and All                            |   |
| ethernet<br>ethernet mac show   | enters cmd group "ethernet"<br>shows MAC address         |   |
| ethernet link show  | shows ethernet link state                                |   |
| ethernet phyprefer set {10MBIT_HD=0   |  |   |
| 10MBIT_FD=1 100MBIT_HD=2 100MBIT_FD=3}  | sets preferred speed for PHY Auto Negotiation            |   |
| ethernet phyprefer show   | shows preferred speed for PHY Auto Negotiation           |   |
| extinput  | enters cmd group "extinput"                              |   |
| extinput {port_num} {inp_num} state show  | shows input state  |   |
| extinput all state {MODE0=0 MODE1=1 <br>MODE2=2} show   | shows input state of all ports in 3 different view modes | 4 |
| extinput {port_num} {inp_num} name set "{name}"   | sets sensor name to label                                |   |
| extinput {port_num} {inp_num} name show   | shows label of sensor                                    |   |
| extinput {port_num} {inp_num} invert enabled set  | inverts input on/off                                     |   |
| [OFF=0 ON=1}<br>extinput {port_num} {inp_num} invert enabled  | ·  |   |
| show  | shows if input inverted                                  |   |
| extinput {port_num} {inp_num} label {LOW=0 <br>HIGH=1} set "{name}"   | sets input low/high text                                 |   |
| extinput {port_num} {inp_num} label {LOW=0 <br>HIGH=1} show   | shows input low/high text                                |   |
| extinput {port_num} {inp_num} events set {OFF=0<br>ON=1}  | enables input events on/off                              |   |
| extinput {port_num} {inp_num} events show   | shows if input events are enabled                        |   |
| extinput {port_num} {inp_num} events type set   |  |   |
| '{EVT_SYSLOG=0,EVT_SNMP=1,EVT_EMAIL=2<br>EVT_BEEPER=5,EVT_DISPLAY=6,EVT_CONS<br>OLE=7,EVT MQTT=8}"  | enables different event types                            |   |
| extinput {port_num} {inp_num} events type show  | shows what event types are enabled                       |   |
| extinput {port_num} {inp_num} publish mode set<br>[NONE=0 INTERVAL=1 DELTA=2 <br>NTERV DELTA=3}   | sets publish mode  |   |
| extinput {port_num} {inp_num} publish mode show   | shows publish mode                                       |   |
| extinput {port_num} {inp_num} publish mqtt retain set {OFF=0 ON=1}  | sets mqtt retain   |   |
| extinput {port_num} {inp_num} publish mqtt retain   | shows if mqtt retain set                                 |   |
| show<br>extinput {port_num} {inp_num} publish timer set   | sets publish time interval                               |   |
| [num_secs}<br>extinput {port_num} {inp_num} publish timer show  |  |   |
| extinput {port_num} {inp_num} {LOW=0 HIGH=1}  | sets Port for Power Port Switching actions               |   |
| port set {port_num}   | sets Port for Power Port Switching actions               |   |
| extinput {port_num} {inp_num} {LOW=0 HIGH=1} port show  | shows Port for Power Port Switching actions              |   |
| extinput {port_num} {inp_num} {LOW=0 HIGH=1} state set {OFF=0 ON=1 DISABLED=2}  | sets Port state for Power Port Switching actions         |   |
| extinput {port_num} {inp_num} {LOW=0 HIGH=1} state show   | shows Port state for Power Port Switching actions        |   |
| extsensor   | enters cmd group "extsensor"                             |   |
| extsensor all show  | shows all values from connected external sensors         |   |
| extsensor all show  | shows all plugged sensors and fields                     | ^ |
| extsensor {port_num} {sen_field} value show<br>extsensor {port_num} {sen_type} label set  | shows sensor value                                       | 6 |
| '{name}"  | sets sensor name to label                                | 6 |
| extsensor {port_num} {sen_type} label show  | shows label of sensor                                    | 6 |
| extsensor {port_num} type show  | shows type of sensor                                     |   |
| avtoonoor (nort num) (oon time) (oon fiel-1)  | enables sensor events on/off                             | 6 |
| extsensor {port_num} {sen_type} {sen_field} events set {off=0lon=1}   |  | 6 |
| events set {off=0 on=1} extsensor {port_num} {sen_type} {sen_field}   | shows if sensor events are enabled                       |   |
| events set {off=0 on=1} extsensor {port_num} {sen_type} {sen_field} events show   | shows if sensor events are enabled                       |   |
| events set {off=0 on=1} extsensor {port_num} {sen_type} {sen_field} events show extsensor {port_num} {sen_type} {sen_field} events type set |  |   |
| events set {off=0 on=1} extsensor {port_num} {sen_type} {sen_field} events show extsensor {port_num} {sen_type} {sen_field} events type set |  | 6 |
| events set {off=0 on=1} extsensor {port_num} {sen_type} {sen_field} events show extsensor {port_num} {sen_type} {sen_field}                 |  | 6 |

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| extsensor {port_num} {sen_type} {sen_field} events type show  | shows what event types are enabled  | 6 |
|---|---|---|
| extsensor {port_num} {sen_type} {sen_field}<br>maxval set {num}   | sets maximum value for sensor   | 6 |
| extsensor {port_num} {sen_type} {sen_field} maxval show   | shows maximum value for sensor  | 6 |
| extsensor {port_num} {sen_type} {sen_field} minval set {num}  | sets minimum value for sensor   | 6 |
| extsensor {port_num} {sen_type} {sen_field}   | shows minimum value for sensor  | 6 |
| minval show extsensor {port_num} {sen_type} {sen_field} hyst  | sets hysterese value for sensor   | 6 |
| set {num}<br>extsensor {port_num} {sen_type} {sen_field} hyst   | shows hysterese value for sensor  | 6 |
| show<br>extsensor {port_num} {sen_type} {sen_field}   | Shows hysterese value for sensor  |   |
| publish mode set {NONE=0 INTERVAL=1 <br>DELTA=2 INTERV_DELTA=3}   | sets publish mode   |   |
| extsensor {port_num} {sen_type} {sen_field} publish mode show   | shows publish mode  |   |
| extsensor {port_num} {sen_type} {sen_field} publish mqtt retain set {OFF=0 ON=1}  | sets mqtt retain  |   |
| extsensor {port_num} {sen_type} {sen_field} publish mqtt retain show  | shows if mqtt retain set  |   |
| extsensor {port_num} {sen_type} {sen_field} publish timer set {num secs}  | sets publish time interval  |   |
| extsensor {port_num} {sen_type} {sen_field}   | shows publish time interval   |   |
| publish timer show extsensor {port_num} {sen_type} {sen_field}  | sets publish delta value  |   |
| <pre>publish delta set {float} extsensor {port_num} {sen_type} {sen_field}</pre>  | shows publish delta value   |   |
| <pre>publish delta show extsensor {port_num} {sen_type} {sen_field}</pre>   | •   |   |
| {BELOWMIN=0 ABOVEMIN=1 ABOVEMAX=2 <br>BELOWMAX=3} port set {port_num}   | sets Port for Power Port Switching actions  | 6 |
| extsensor {port_num} {sen_type} {sen_field} {BELOWMIN=0 ABOVEMIN=1 ABOVEMAX=2 <br>BELOWMAX=3} port show                             | shows Port for Power Port Switching actions   | 6 |
| extsensor {port_num} {sen_type} {sen_field} {BELOWMIN=0 ABOVEMIN=1 ABOVEMAX=2 <br>BELOWMAX=3} state set {OFF=0 ON=1 <br>DISABLED=2} | sets Port state for Power Port Switching actions  | 6 |
| extsensor {port_num} {sen_type} {sen_field} {BELOWMIN=0 ABOVEMIN=1 ABOVEMAX=2 <br>BELOWMAX=3} state show                            | shows Port state for Power Port Switching actions   | 6 |
| extsensor period set {24H=0 12H=1 2H=2 1H=3  30MIN=4}   | sets sensor Min/Max measurement period  |   |
| extsensor period show<br>extsensor {port_num} {sen_field} calib set {float}   | shows sensor Min/Max measurement period sets calibration offset for temperature or humidity |   |
| extsensor {port_num} {sen_field} calib show   | shows calibration offset for temperature or humidity  |   |
| http  | enters cmd group "http"   |   |
| http server set {HTTP_BOTH=0 HTTPS_ONLY=1<br>HTTP_ONLY=22 HTTPS_REDIR=3}  | sets accepted connection types  |   |
| http server show http port set {ip port}  | shows accepted connection types<br>sets http port   |   |
| http port show  | shows http port   |   |
| http portssl set {ip_port}  | sets https port   |   |
| http portssl show   | shows https port  |   |
| http tls mode set {TLS12=0 TLS13_12=1 <br>TLS13=2 TLS13_12_11=3}  | restricts TLS mode  |   |
| http tls mode show<br>http auth mode set {BASIC=0 SESSION=1   | shows TLS mode restriction sets http session authentication mode                            |   |
| SESSION_EXT=2}<br>http auth mode show   | shows http session authentication mode and  |   |
| http passwd enabled set {OFF=0 ON=1}  | compatibility enables http password on/off  |   |
| http timeout admin set {num_secs} http timeout admin show   | sets admin session timeout<br>shows admin session timeout                                   |   |
| http timeout user set {num_secs}  | sets user session timeout   |   |
| http timeout user show  | shows user session timeout  |   |
| http passwd enabled show  | shows if http password enabled  |   |
| http passwd local set {OFF=0 ON=1}  | enables local login on/off  |   |
| http passwd local show<br>http passwd radius set {OFF=0 ON=1}   | shows if local login enabled<br>enables login for RADIUS on/off                             |   |
| http passwd radius show   | shows if RADIUS login enabled   |   |
| http passwd user set "{passwd}"   | sets http user password   |   |
|   |   |   |

| nttp passwd admin set "{passwd}" nttp passwd hash user set "{passwd}"                                | sets http admin password sets hashed http user password  |   |
|--|--|---|
| nttp passwd hash admin set "{passwd}"  | sets hashed http admin password  |   |
| nap passiva nasir aaniin see (passiva)   | oto nasnou nap danim password  |   |
| p4   | enters cmd group "ip4"   |   |
| p4 hostname set "{name}"   | sets device hostname   |   |
| p4 hostname show   | shows device hostname  | 3 |
| p4 address set "{ip_address}"  | sets IPv4 address  | 3 |
| p4 address show<br>p4 netmask set "{ip_address}"   | shows IPv4 address<br>sets IPv4 netmask  | 3 |
| p4 netmask set {ip_address}<br>p4 netmask show   | shows IPv4 netmask   | 3 |
| p4 gateway set "{ip_address}"  | sets IPv4 gateway address  | J |
| p4 gateway show  | shows IPv4 gateway address   | 3 |
| p4 dns set "{ip_address}"  | sets IPv4 DNS server address   |   |
| p4 dns show  | shows IPv4 DNS server address  | 3 |
| p4 dhcp enabled set {OFF=0 ON=1}   | enables IPv4 DHCP on/off   |   |
| p4 dhcp enabled show   | shows IPv4 DHCP state  | 3 |
| 0  | and an analysis of the control of th |   |
| p6   | enters cmd group "ip6"   |   |
| p6 enabled set {OFF=0 ON=1}  | enables IPv6 on/off<br>shows if IPv6 is enabled  | 2 |
| p6 enabled show<br>p6 routadv enabled set {OFF=0 ON=1}   | enables IPv6 router advertisement  | 3 |
| p6 routady enabled set {OFF=U ON=1}<br>p6 routady enabled show                                       | shows IPv6 router advertisement state  | 3 |
| p6 dhcp enabled set {OFF=0 ON=1}   | enables IPv6 DHCP on/off   | 3 |
| p6 dhcp enabled set {Or r =0 ON=1}   | shows if IPv6 DHCP is enabled  | 3 |
| po differ chabled show   | show all IPv6 addresses  | 4 |
| p6 gateway show  | show all IPv6 gateways   | 4 |
| p6 dns show  | show all IPv6 DNS server   | 4 |
| p6 manual enabled set {OFF=0 ON=1}   | enables manual IPv6 addresses  |   |
| p6 manual enabled show   | shows if manual IPv6 addresses are enabled   | 3 |
| p6 manual address {14} set "{ip_address}"  | sets manual IPv6 address   |   |
| p6 manual address {14} show  | shows manual IPv6 address  | 3 |
| p6 manual gateway set "{ip_address}"   | sets manual IPv6 gateway address   |   |
| p6 manual gateway show   | shows manual IPv6 gateway address  | 3 |
| p6 manual dns {12} set "{ip_address}"  | sets manual IPv6 DNS server address  |   |
| p6 manual dns {12} show  | shows manual IPv6 DNS server address   | 3 |
| pacl   | enters cmd group "ipacl"   |   |
| paci<br>pacl ping enabled set {OFF=0 ON=1}   | enables ICMP ping on/off   |   |
| pact ping enabled set {Or r = 0 ON=1}  | shows if ICMP ping enabled   |   |
| pacl enabled set {OFF=0 ON=1}  | enable IP filter on/off  |   |
| pacl enabled show  | shows if IP filter enabled   |   |
| pacl filter {ipacl_num} set "{dns_name}"   | sets IP filter {ipacl_num}   |   |
| pacl filter {ipacl_num} show   | shows IP filter {ipacl_num}  |   |
|  |  |   |
| inesensor  | enters cmd group "linesensor"  |   |
| inesensor all {field_list} show  | shows energy sensors according field list of all line  | 5 |
|  | sensors shows energy sensors according field list of one   |   |
| inesensor {line_num} {field_list} show   | line sensor  | 5 |
| inesensor {line num} {energy sensor} value show  |  | 5 |
| inesensor {line_num} ovp show  | show state of Overvoltage Protection   |   |
| inesensor {line num} counter reset   | resets energy metering counter   |   |
| inesensor {line_num} label set "{name}"  | sets line meter to label   |   |
| inesensor {line_num} label show  | shows label of line meter  |   |
| inesensor {line_num} {energy_sensor} events set  | enables events on/off  |   |
| OFF=0 ON=1}  |  |   |
| inesensor {line_num} {energy_sensor} events<br>show  | shows if events are enabled  |   |
| inesensor {line num} {energy sensor} events  |  |   |
| ype set  |  |   |
| ype set<br>{EVT_SYSLOG=0,EVT_SNMP=1,EVT_EMAIL=2  | enables different event types  |   |
| EVT SMS=3,EVT GSMEMAIL=4,EVT BEEPER  |  |   |
| =5}"   |  |   |
| inesensor {line_num} {energy_sensor} events  | shows what event types are enabled   |   |
| vne show   | shows what event types are enabled   |   |
| ypc snow<br>inesensor {line_num} {energy_sensor} maxval set<br>float\                                | sets maximum value for line meter  |   |
| nodij  | COLO MIGAMINAMI VALAGIOTI INICIMICIO   |   |
| inesensor {line_num} {energy_sensor} maxval  | shows maximum value for line meter   |   |
| show   |  |   |
| inesensor {line_num} {energy_sensor} minval set  | sets minimum value for line meter  |   |
| (f) = _4)  |  |   |
| [float]  |  |   |
| inesensor {line_num} {energy_sensor} minval  | shows minimum value for line meter   |   |
| inesensor {line_num} {energy_sensor} minval show   |  |   |
| inesensor {line_num} {energy_sensor} minval<br>show<br>inesensor {line_num} {energy_sensor} hyst set | shows minimum value for line meter sets hysterese value for line meter   |   |
| inesensor {line_num} {energy_sensor} minval  | sets hysterese value for line meter  |   |

| linesensor {line_num} {energy_sensor} publish mode set {NONE=0 INTERVAL=1 DELTA=2  INTERV_DELTA=3}                      | sets publish mode  |   |
|---|--|---|
| linesensor {line_num} {energy_sensor} publish mode show   | shows publish mode   |   |
| linesensor {line_num} {energy_sensor} publish mqtt retain set {OFF=0 ON=1}  | sets mqtt retain   |   |
| linesensor {line_num} {energy_sensor} publish mqtt retain show  | shows if mqtt retain set   |   |
| linesensor {line_num} {energy_sensor} publish timer set {num_secs}  | sets publish time interval   |   |
| linesensor {line_num} {energy_sensor} publish timer show  | shows publish time interval  |   |
| linesensor {line_num} {energy_sensor} publish   | sets publish delta value   |   |
| delta set {float} linesensor {line_num} {energy_sensor} publish delta show  | shows publish delta value  |   |
| linesensor {line_num} {energy_sensor} {BELOWMIN=0 ABOVEMIN=1 ABOVEMAX=2  BELOWMAX=3} port set {port_num}                | sets Port for Power Port Switching actions   |   |
| linesensor {line_num} {energy_sensor} {BELOWMIN=0 ABOVEMIN=1 ABOVEMAX=2  BELOWMAX=3} port show                          | shows Port for Power Port Switching actions  |   |
| linesensor {line_num} {energy_sensor} {BELOWMIN=0 ABOVEMIN=1 ABOVEMAX=2  BELOWMAX=3} state set {OFF=0 ON=1  DISABLED=2} | sets Port state for Power Port Switching actions                                       |   |
| linesensor {line_num} {energy_sensor}<br>{BELOWMIN=0 ABOVEMIN=1 ABOVEMAX=2 <br>BELOWMAX=3} state show                   | shows Port state for Power Port Switching actions                                      |   |
| linesensor {line_num} events set {OFF=0 ON=1}   | LEGACY - enables events on/off   | Ļ |
| linesensor {line_num} events show linesensor {line_num} events type set   | LEGACY - shows if events are enabled   | L |
| "{EVT_SYSLOG=0,EVT_SNMP=1,EVT_EMAIL=2,EVT_SMS=3,EVT_GSMEMAIL=4,EVT_BEEPER=5,EVT_DISPLAY=6,EVT_CONSOLE=7,EVT_MQTT=8}"    |  | L |
| linesensor {line_num} events type show  | LEGACY - shows what event types are enabled  | L |
| linesensor {line_num} maxval set {float}  | LEGACY - sets maximum value for line meter   | L |
| linesensor {line_num} maxval show linesensor {line_num} minval set {float}  | LEGACY - shows maximum value for line meter LEGACY - sets minimum value for line meter | L |
| linesensor {line_num} minval show   | LEGACY - shows minimum value for line meter  | Ē |
| linesensor (line_num) hyst set (float)  | LEGACY - sets hysterese value for line meter   | L |
| linesensor {line_num} hyst show<br>linesensor {line_num} {BELOWMIN=0  | LEGACY - shows hysterese value for line meter  | L |
| ABOVEMIN=1 ABOVEMAX=2 BELOWMAX=3} port set {port_num}   | LEGACY - sets Port for Power Port Switching actions                                    | L |
| linesensor {line_num} {BELOWMIN=0 <br>ABOVEMIN=1 ABOVEMAX=2 BELOWMAX=3}<br>port show                                    | LEGACY - shows Port for Power Port Switching actions                                   | L |
| linesensor {line_num} {BELOWMIN=0 <br>ABOVEMIN=1 ABOVEMAX=2 BELOWMAX=3}<br>state set {OFF=0 ON=1 DISABLED=2}            | LEGACY - sets Port state for Power Port<br>Switching actions                           | L |
| linesensor {line_num} {BELOWMIN=0 <br>ABOVEMIN=1 ABOVEMAX=2 BELOWMAX=3}<br>state show                                   | LEGACY - shows Port state for Power Port<br>Switching actions                          | L |
| modbus  | enters cmd group "modbus"  |   |
| modbus enabled set <off=0 on="1"></off=0>   | enables Modbus TCP support   |   |
| modbus enabled show   | shows if Modbus is enabled   |   |
| modbus port set <ip_port> modbus port show</ip_port>  | sets Modbus TCP port<br>shows Modbus TCP port  |   |
| mqtt  | enters cmd group "mqtt"  |   |
| mqtt {broker_idx} enabled set {OFF=0 ON=1}  | enable mqtt  |   |
| mqtt {broker_idx} enabled show mqtt {broker_idx} server set "{dns_name}"  | shows if mqtt enabled sets broker name   |   |
| mqtt {broker_idx} server show   | shows broker name  |   |
| mqtt {broker_idx} tls enabled set {OFF=0 ON=1}  | enable TLS   |   |
| mqtt {broker_idx} tls enabled show  | shows if TLS enabled   |   |
| mqtt {broker_idx} port set {ip_port} mqtt {broker_idx} port show  | set broker TCP/IP port<br>shows broker TCP/IP port                                     |   |
| mqtt {broker_idx} user set "{username}"   | sets username  |   |
| mqtt {broker_idx} user show   | shows username   |   |
| mqtt {broker_idx} passwd set "{passwd}" mqtt {broker_idx} passwd hash set "{passwd}"                                    | sets password<br>sets hashed passwd  |   |
| mqtt {broker_idx} client set "{name}"   | sets client name   |   |

| nqtt {broker_idx} client show<br>nqtt {broker_idx} qos set {QOS0=0 QOS1=1}   | shows client name<br>sets QoS level   |   |
|--|---|---|
| ngtt {broker_idx} gos set {QOSU=0 QOST=1}  | shows QoS level   |   |
| nqtt {broker_idx} keepalive set {num_secs}   | sets keep-alive time  |   |
| nqtt {broker_idx} keepalive show   | shows keep-alive time   |   |
| nqtt {broker_idx} topic set "{name}"   | sets topic prefix   |   |
| ngtt {broker_idx} topic show   | shwos topic prefix  |   |
| nqtt {broker_idx} console enabled set {OFF=0 <br>DN=1}   | permit console cmds   |   |
| nqtt {broker_idx} console enabled show nqtt {broker_idx} device data timer set   | shows if console cmds allowed   |   |
| num_secs}  | sets telemetry interval   |   |
| nqtt {broker_idx} device data timer show   | shows telemetry interval  |   |
| ort  | enters cmd group "port"   |   |
| ort {port_num} state set {OFF=0 ON=1}<br>ort {port_num} state show   | sets port to new state shows port state                                     |   |
| ort all state set "{port_list}" {OFF=0 ON=1}   | sets several ports in one cmd - e.g. port all state                         |   |
| ort all state {MODE0=0 MODE1=1 MODE2=2}  | set "1,3,5" 1 shows all port states in 3 different view modes               | 4 |
| how<br>ort all set {OFF=0 ON=1 OFF_REV=2   |   |   |
| DN_REV=3}<br>ort restart all set {REINIT=0   | switch all ports on/off forward or reverse                                  |   |
| OFF_REV_REINIT=1,OFF_REINIT=2}   | reinit coldstart sequence (optional first all off)                          |   |
| oort {port_num} reset<br>oort {port_num} toggle  | start reset sequence for port toggles port                                  |   |
| ort {port_num} batch set {OFF=0 ON=1} wait<br>num_secs} {OFF=0 ON=1}   | starts batch mode for port  |   |
| ort {port_num} batch cancel  | cancels batch mode  |   |
| ort {port_num} label set "{name}"  | sets port label name  |   |
| ort {port_num} label show  | shows port label name   |   |
| ort {port_num} initstate coldstart set {OFF=0 <br>DN=1 REMEMBER=2}   | sets port coldstart initialization  |   |
| ort {port_num} initstate coldstart show  | shows port coldstart initialization   |   |
| ort {port_num} initstate delay set {num}   | sets port init delay  |   |
| oort {port_num} initstate delay show   | shows port init delay   |   |
| ort {port_num} repowerdelay set {num} ort {port_num} repowerdelay show   | sets port repower delay<br>shows port repower delay                         |   |
| ort {port_num} repowerderay snow<br>ort {port_num} resettime set {num}   | sets port reset duration  |   |
| oort {port_num} resettime show   | shows port reset duration   |   |
| ort {port_num} watchdog enabled set {OFF=0 <br>DN=1}   | sets port watchdog to on/off  |   |
| ort {port_num} watchdog enabled show   | shows port watchdog state   |   |
| ort {port_num} watchdog mode set {OFF=0 <br>PORT_RESET=1 IP_MS=2 IP_MS_INV=3}  | sets port watchdog mode   |   |
| ort {port_num} watchdog mode show<br>ort {port_num} watchdog type set {WD_ICMP=0   | shows port watchdog mode  |   |
| VD_TCP=1}  | sets port watchdog type   |   |
| ort {port_num} watchdog type show<br>ort {port_num} watchdog link down set {OFF=0  | shows port watchdog type  |   |
| ON=1}  | sets if watchdog active when eth link down                                  |   |
| ort {port_num} watchdog link down show<br>ort {port_num} watchdog host set "{dns_name}"  | shows if watchdog active when eth link down sets port watchdog host target  |   |
| ort {port_num} watchdog host set {difs_name}   | shows port watchdog host target   |   |
| ort {port_num} watchdog port set {ip_port}   | sets port watchdog TCP port   |   |
| ort {port_num} watchdog port show  | shows port watchdog TCP port  |   |
| ort {port_num} watchdog pinginterval set {num}   | sets port watchdog ping interval  |   |
| port {port_num} watchdog pinginterval show   | shows port watchdog ping interval   |   |
| ort {port_num} watchdog pingretries set {num} ort {port_num} watchdog pingretries show   | sets port watchdog ping retries shows port watchdog ping retries            |   |
| ort {port_num} watchdog retrybooting set   | sets port watchdog retry booting to on/off                                  |   |
| OFF=0 ON=1} ort {port_num} watchdog retrybooting show  | shows port watchdog retry booting to on/on                                  |   |
| oort {port_num} watchdog bootretries set {num} oort {port_num} watchdog bootretries show   | sets port watchdog retry boot timeout hows port watchdog retry boot timeout |   |
| adius  | enters cmd group "radius"   |   |
| adius {PRIMARY=0 SECONDARY=1} enabled et <off=0 on="1"></off=0>  | enables radius client   |   |
| adius {PRIMARY=0 SECONDARY=1} enabled  | show if radius client enabled   |   |
| show radius {PRIMARY=0 SECONDARY=1} server set   | sets radius server address  |   |
| <dns_name>" adius {PRIMARY=0 SECONDARY=1} server</dns_name>  | shows radius server address   |   |
| how adius {PRIMARY=0 SECONDARY=1} password   |   |   |
| ENTRE OF THE PROPERTY OF THE P | JULI JALIUJ JULI JIIAITU JULIT  |   |

| adius {PRIMARY=0 SECONDARY=1} password nash set "{passwd}"                        | sets radius server crypted shared secret                                     |
|---|--|
| adius {PRIMARY=0 SECONDARY=1} auth imeout set {num_secs}                          | sets server request timeout  |
| adius {PRIMARY=0 SECONDARY=1} auth imeout show                                    | shows server request timeout   |
| adius {PRIMARY=0 SECONDARY=1} retries set 099}                                    | sets server number of retries  |
| adius {PRIMARY=0 SECONDARY=1} retries   | shows server number of retries   |
| adius chap enabled set <off=0 on="1"></off=0>                                     | enables CHAP   |
| adius chap enabled show   | shows if CHAP is enabled   |
| adius message auth set <off=0 on="1"></off=0>                                     | enables request message authentication                                       |
| adius message auth show   | shows if request message authentication is enabled                           |
| adius default timeout set {num_secs}  | sets default session timeout (when not returned as Session-Timout Attribute) |
| adius default timeout show  | shows default session timeout  |
| nmp   | enters cmd group "snmp"  |
| nmp port set {ip port}  | sets SNMP UDP port   |
| snmp port show  | shows SNMP UDP port  |
| nmp snmpget enabled set {OFF=0 ON=1}  | enables SNMP GET cmds on/off   |
| nmp snmpget enabled show  | show if SNMP GET cmds are enabled  |
| nmp snmpset enabled set {OFF=0 ON=1}  | enables SNMP SET cmds on/off   |
| snmp snmpset enabled show   | show if SNMP SET cmds are enabled  |
| snmp snmpv2 enabled set {OFF=0 ON=1}  | enables SNMP v2 on/off   |
| snmp snmpv2 enabled show  | show if SNMP v2 is enabled   |
| snmp snmpv2 public set "{text}"   | enables SNMP v3 on/off   |
| nmp snmpv2 public show<br>nmp snmpv2 private set "{text}"                         | show if SNMP v3 isenabled sets SNMP v2 public cummnity                       |
| nmp snmpv2 private set {text}   | shows SNMP v2 public community   |
| nmp system {CONTACT=0 NAME=1  | sets sysLocation/sysName/sysContact  |
| OCATION=2) set "{text}"  snmp system {CONTACT=0 NAME=1                            | gets sysLocation/sysName/sysContact  |
| .OCATION=2} show<br>snmp snmpv3 enabled set {OFF=0 ON=1}                          | sets SNMP v2 private community   |
| snmp snmpv3 enabled show  | shows SNMP v2 private community  |
| nmp snmpv3 username set "{text}"  | sets SNMP v3 username  |
| nmp snmpv3 username show  | shows SNMP v3 username   |
| nmp snmpv3 authalg set {NONE=0 MD5=1  | acta CNMD v2 authentication  |
| SHA1=2 SHA256=3 SHA384=4 SHA512=5}  | sets SNMP v3 authentication  |
| nmp snmpv3 authalg show   | show SNMP v3 authentication algorithm  |
| snmp snmpv3 privalg set {NONE=0 DES=1 <br>BDES=2 AES128=3 AES192=4 AES256=5       | sets SNMP v3 privacy algorithm   |
| AES192*=6 AES256*=7}  | show CNMD v2 privacy algorithm   |
| nmp snmpv3 privalg show<br>nmp snmpv3 authpasswd set "{passwd}"                   | show SNMP v3 privacy algorithm<br>sets SNMP v3 authentication password       |
| nmp snmpv3 authpasswd set {passwd}<br>nmp snmpv3 privpasswd set "{passwd}"        | sets SNMP v3 authentication password sets SNMP v3 privacy password           |
| snmp snmpv3 authpasswd set {passwd}<br>snmp snmpv3 authpasswd hash set "{passwd}" | sets SNMP v3 privacy password sets SNMP v3 authentication hashed password    |
| nmp snmpv3 autipasswd hash set "{passwd}"   | sets SNMP v3 privacy hashed password   |
| snmp trap type set {NONE=0 V1=1 V2=2 V3=3}  | sets type of SNMP traps  |
| snmp trap type show   | show SNMP trap type  |
| nmp trap receiver {trap_num} set "{dns_name}"                                     | sets address and port of SNMP trap receiver                                  |
| with and receiver frighting ser faris_rigitle}                                    | {trap_num}   |
| nmp trap receiver {trap_num} show   | show address and port of SNMP trap receiver<br>{trap_num}                    |
| syslog  | enters cmd group "syslog"  |
| syslog enabled set {OFF=0 ON=1}   | enables syslog msgs on/off   |
| syslog enabled show   | show if syslog enabled   |
| syslog server set "{dns_name}"  | sets address of syslog server  |
| syslog server show  | shows address of syslog server   |
| system<br>system restart  | enters cmd group "system" restarts device                                    |
| system restart  | restore fab settings and restart device                                      |
| system bootloader   | enters bootloader mode   |
| system flushdns   | flush DNS cache  |
|   | number of seconds the device is running                                      |
| system uptime   |  |
| system uptime<br>system name show   | shows device name  |
| ystem name show<br>system version show  | shows actual firmware version  |
| system name show  |  |

| system {SWITCH_PORT=0} events show            | shows if global events enabled        |
|---|---------------------------------------|
| system {SWITCH_PORT=0} events type set        |                                       |
| "{EVT_SYSLOG=0,EVT_SNMP=1,EVT_EMAIL=2         | 2                                     |
| ,EVT_SMS=3,EVT_GSMEMAIL=4,EVT_BEEPER          | t enables different event types       |
| =5,EVT DISPLAY=6,EVT CONSOLE=7,EVT M          | ••                                    |
| QTT=8}"                                       |                                       |
| system {SWITCH_PORT=0} events type show       | shows what event types are enabled    |
| system {SWITCH PORT=0} events mgtt retain     |                                       |
| set {OFF=0 ON=1}                              | sets mqtt retain                      |
| system {SWITCH PORT=0} events mgtt retain     |                                       |
| show  | shows if mqtt retain set              |
|   |                                       |
| timer   | enters cmd group "timer"              |
| timer enabled set {OFF=0 ON=1}                | enables timer functions               |
| timer enabled show                            | shows if timer a enabled              |
| timer syslog facility set {023}               | sets facility level for timer syslog  |
| timer syslog facility show                    | shows facility level for timer syslog |
| timer syslog verbose set {07}                 | sets verbose level for timer syslog   |
| timer syslog verbose show                     | shows verbose level for timer syslog  |
| timer {rule_num} enabled set {OFF=0 ON=1}     | enables rule                          |
| timer {rule_num} enabled show                 | shows if rule is enabled              |
| timer {rule num} name set "{name}"            | sets name of rule                     |
| timer {rule_num} name show                    | shows name of rule                    |
| timer {rule num} {FROM=0 UNTIL=1} set "{yyyy- | acts data range of rule               |
| mm-dd}"                                       | sets date range of rule               |
| timer {rule num} {FROM=0 UNTIL=1} show        | shows date range of rule              |
| timer {rule num} trigger jitter set {065535}  | sets jitter for rule                  |
| timer {rule num} trigger jitter show          | show jitter of rule                   |
| timer {rule num} trigger random set {0100}    | sets probability for rule             |
| timer {rule num} trigger random show          | shows rule probability                |
| timer {rule num} trigger {HOUR=0 MIN=1 SEC=2  | anda diman alada liad                 |
| DAY=3 MON=4 DOW=5} set "{time date list}"     | sets time date list                   |
| timer {rule num} trigger {HOUR=0 MIN=1 SEC=2  | aleanie Alean alaka liak              |
| DAY=3 MON=4 DOW=5  show                       | shows time date list                  |
| timer {rule num} action mode set {SWITCH=1    | and a suitable and the suitable and   |
| CLI=2}  | sets switch or cli cmd                |
| timer (rule num) action mode show             | shows if switch or cli cmd            |
| timer {rule num} action {SWITCH1=0            | acts part list for quitab and         |
| SWITCH2=1} {OFF=0 ON=1} set "{port_list}"     | sets port list for switch cmd         |
| timer {rule num} action {SWITCH1=0            | alsonia mantifat fan arritala ana d   |
| SWITCH2=1} {OFF=0 ON=1} show                  | shows port list for switch cmd        |
| timer {rule num} action delay set {065535}    | delay between cmds                    |
| timer {rule num} action delay show            | shows delay between cmds              |
| timer {rule_num} action console set "{cmd}"   | sets cmd string                       |
| timer {rule num} action console show          | shows cmd string                      |
| timer {rule num} action hash set "{data}"     | sets action binary form               |
| timer {rule num} action hash show             | shows action binary form              |
| timer {rule num} delete                       | delete one timer                      |
| timer delete all                              | delete all timer                      |
|   |                                       |
| vt100   | enters cmd group "vt100"              |
| vt100 echo set {OFF=0 ON=1}                   | sets console echo state               |
| vt100 echo show                               | shows console echo state              |
| vt100 numeric set {OFF=0 ON=1}                | sets numeric mode                     |
| vt100 numeric show                            | shows numeric mode state              |
| vt100 reset                                   | resets terminal                       |
|   |                                       |

#### **Notes**

- 1. Legacy The command has been replaced by a newer version
- 2. Command can be entered on any level3. The output may show 2 lines the 1st line shows the actual state, the 2nd line the status after reboot
- 4. The output may show several lines
- 5. Please see the **Energy Sensor Table** for the right energy index
- 6. Please see the External Type and External Sensor Field Tables for the correct sensor index

## Energy Sensor Table "{energy\_sensor}"

| Index | Description                                       | Unit       |
|-------|---|------------|
| 0     | Forward Active Energy                             | kWh        |
| 1     | Power Active                                      | W          |
| 2     | Voltage   | V          |
| 3     | Current   | Α          |
| 4     | Frequency   | 0.01 hz    |
| 5     | Power Factor                                      | 0.001      |
| 6     | Power Angle                                       | 0.1 degree |
| 7     | Power Apparent                                    | VA         |
| 8     | Power Reactive                                    | VAR        |
| 9     | Forward Active Energy Resettable                  | kWh        |
| 10    | Forward Reactive Energy                           | kVARh      |
| 11    | Forward Reactive Energy Resettable                | kVARh      |
| 12    | Reset Time - sec. since last Energy Counter Reset | S          |
| 13    | Reverse Active Energy                             | kWh        |
| 14    | Reverse Reactive Energy                           | kVARh      |
| 15    | Reverse Active Energy Resettable                  | kWh        |
| 16    | Reverse Reactive Energy Resettable                | kVARh      |
| 17    | Absolute Active Energy                            | kWh        |
| 18    | Absolute Reactive Energy                          | kVARh      |
| 19    | Absolute Active Energy Resettable                 | kWh        |
| 20    | Absolute Reactive Energy Resettable               | kVARh      |

## External Sensor Type Table "{sen\_type}"

Constants "{7x01=0|7x04=0|7x02=1|7x05=1|7x06=2}"

| Index | Description                         | Products               |
|-------|-------------------------------------|------------------------|
| 0     | Temperature                         | 7001, 7101, 7201       |
| 0     | Temperature                         | 7004, 7104, 7204, 7208 |
| 1     | Temperature, Humidity               | 7002, 7102, 7202       |
| 1     | Temperature, Humidity               | 7005, 7105, 7205, 7209 |
| 2     | Temperature, Humidity, Air Pressure | 7006, 7106, 7206, 7210 |

## External Sensor Field Table "{sen\_field}"

| Index | Description                      | Unit |
|-------|----------------------------------|------|
| 0     | Temperature                      | °C   |
| 1     | Humidity                         | %    |
| 3     | Air Pressure                     | hPa  |
| 4     | Dew Point                        | °C   |
| 5     | Dew Point Temperature Difference | °C   |

### 4.3 HTTP Authentication

In the past, only *HTTP Basic Access* Authentication was supported as password authentication for Gude devices. Now cookie-based Session Authentication is used by default. This has the following advantages:

- Clicking on the "Logout" tab now mandatorily results in having to provide user name and password again to get into the device. This is often not the case with Basic Access Authentication because it is under the control of the web browser.
- · Session Authentication is less susceptible to cross-site scripting. In addition, en-

- hanced security can be configured by using a CSRF-Token.
- Combined with Session Authentication is a configurable logout time, where the login page is automatically referred to after inactivity.

## **Configuration of the Session Authentication**

| Session Timeout (admin):    |             | (seconds |
|-----------------------------|-------------|----------|
| Session Timeout (user):     | 600         | (seconds |
| Select Authentication Mode: | Basic Compa | tible 🔻  |

You can select the automatic logout times in case of inactivity and the Session Authentication mode in the Ethernet configuration (sub-selection HTTP Server). If the logout time is zero, there is no automatic logout. The authentication modes are:

- 1. <u>Basic Compatible</u>: Basic Access and Session Authentication are accepted.
- 2. Session: Only Session Authentication is allowed.
- 3. Session Extended: A CSRF-Token token is required in addition to Session Authentication.

Session and Session Extended modes behave slightly differently in the web interface: If you open a new browser tab for a running session in Session mode, no new login is required. In Session Extended mode, if a new tab is opened, the user name and password must be re-entered. This is because the CSRF-Token is stored locally to the tab in the web browser.

## Compatibility with previous Basic Accesses

- In <u>Basic Compatible</u> mode, normal accesses with Basic Access Authentication are
  possible. Also everything may be accessed with a HTTP GET request. This leads to
  compatibility with controllers and drivers already on the market that communicate
  with Gude devices.
- If not accessed with Basic Access Authentication but with Session Authentication, CGI queries with passwords, configuring the device and switching relays are no longer allowed with HTTP GET requests. A POST request must be used.

If you have logged in to the web interface once with Session Authentication, the system will automatically try to work with Session Authentication. If you want to use Basic Access Authentication, you must first delete the session cookies and then access a page that is not the login page.

## **Authentication examples**

To demonstrate how scripts can perform the different authentication modes, here are command line examples using curl:

#### **Basic Access Authentication**

```
curl -u "admin:test" "192.168.0.10/status.json?components=16"
```

#### Session Authentication with Cookies

Session authentication with cookies and CSRF-Token

In this example, the CSRF-Token sessionidX from the output of the first curl call was added as an additional header in the second curl call.

## 4.4 IP ACL

#### **IP Access Control List**

The IP Access Control List (ACL IP) is a filter for incoming IP packets. If the filter is active, only the hosts and subnets whose IP addresses are registered in the list, can contact via HTTP or SNMP, and make changes. For incoming connections from unauthorized PCs, the device is not completely transparent. Due to technical restraints, a TCP/IP connection will be accepted at first, but then rejected directly.

#### Examples:

| Entry in the IP ACL   | Meaning   |
|-----------------------|---|
| 192.168.0.123         | the PC with IP Address "192.168.0.123" can access the device        |
| 192.168.0.1/24        | all devices of subnet "192.168.0.1/24" can access the device        |
| 1234:4ef0:eec1:0::/64 | all devices of subnet "1234:4ef0:eec1:0::/64" can access the device |

If you choose a wrong IP ACL setting and locked yourself out, please activate the Bootloader Mode and use GBL\_Conf.exe to deactivate the IP ACL. Alternatively, you can reset the device to factory default.

## 4.5 IPv6

## **IPv6 Addresses**

IPv6 addresses are 128 bit long and thus four times as long as IPv4 addresses. The first 64 bit form a so-called prefix, the last 64 bit designate a unique interface identifier. The prefix is composed of a routing prefix and a subnet ID. An IPv6 network interface can be reached under several IP addresses. Usually this is the case under a global address and the link local address.

#### **Address Notation**

IPv6 addresses are noted in 8 hexadecimal blocks at 16 bit, while IPv4 normally is

noted in decimal. The seperator is a colon, not a period.

E.g.: 1234:4ef0:0:0:0019:32ff:fe00:0124

Leading zeros may be omitted within a block. The previous example can be rewritten as:

1234:4ef0:0:0:19:32ff:fe00:124

One may omit one or more successive blocks, if they consist of zeros. This may be done only once within an IPv6 address!

1234:4ef0::19:32ff:fe00:124

One may use the usual decimal notation of IPv4 for the last 4 bytes:

1234:4ef0::19:32ff:254.0.1.36

## 4.6 Messages

Depending on adjustable events, various messages can be sent from the device. The following message types are supported:

- · Sending of e-mails
- SNMP Traps
- Syslog messages

## E-Mail messages

Email messages are triggered by the following events:

- · Switching of the Ports
- Exceeding of the max / min values of attached sensors
- State change of digital sensor input ports

## **SNMP Traps**

SNMP Traps are system messages that are sent via the SNMP protocol to different recipients. SNMP traps are triggered by the following events:

- · Switching of the Ports
- Exceeding of the max / min values of attached sensors
- State change of digital sensor input ports

## Syslog messages

Syslog messages are simple text messages that are sent via UDP to a syslog server. Under Linux, normally a syslog daemon is already running (eg. syslog-ng), for Microsoft Windows systems some freeware programs are available on the market. The syslog messages are sent for the following events:

- Turning on the device
- Enable/disable of syslog in the configuration
- · Switching of the Ports

- Exceeding of the max / min values of attached sensors
- State change of digital sensor input ports

|                             | SNMP Trap     | Console | MQTT | Syslog | Email |  |  |
|-----------------------------|---------------|---------|------|--------|-------|--|--|
| Global                      |               |         |      |        |       |  |  |
| Device started              | Х             | Х       | Х    | Х      | Х     |  |  |
| Switch port                 | Х             | Х       | Х    | Х      | Х     |  |  |
| Port watchdog status        | Х             | Х       | Х    | Х      | Х     |  |  |
| Syslog switched on/off      |               |         |      | Х      |       |  |  |
| MQTT connection established |               |         | Х    | Х      |       |  |  |
| MQTT connection lost        |               |         |      | Х      |       |  |  |
| Value-Threshold             |               |         |      |        |       |  |  |
| external sensors            |               |         |      |        |       |  |  |
| Current                     | Х             | X       | Х    | Х      | х     |  |  |
| Time-Interval               | Time-Interval |         |      |        |       |  |  |
| external sensors            |               |         |      |        |       |  |  |
| Current                     |               | X       | Х    |        |       |  |  |
| Value-Delta                 | -             |         |      |        |       |  |  |
| external sensors            |               |         |      |        |       |  |  |
| Current                     |               | X       | Х    |        |       |  |  |

## **SNMP traps**

There are common traps for state changes of the same device resource. For example, a SwitchEvtPort trap is sent when a port is turned on or off. The state change itself is conveyed by the supplied data within the trap.

## **MQTT** published data

Messages on the MQTT channel are sent in JSON format.

Example switch a port: "{"type": "portswitch", "idx": 2, "port": "2", "state": 1, "cause": {"id": 2, "txt": "http"}, "ts": 1632}"

## **Console Push Messages**

Push messages can be activated on the console channels (Telnet, SSH or serial console), which output sensor values at timed intervals (every n seconds) or as of a configurable change in the magnitude of the sensor value on that channel. The generated message always starts with a "#" and ends with a CR/LF.

Example: Switch a port: "#port 2 ON"

If you open a telnet or SSH connection, the push messages are either preconfigured, or you switch on the push messages temporarily with "console telnet pushmsgs set 1" (or "console ssh pushmsgs set 1"). From now on, push messages will be sent asynchronously on this channel. The asynchronous nature of the messages can cause problems on a connection if you send commands yourself at the same time. There are then the possibilities:

- Filter all incoming characters between "#" and CR/LF
- or open a second channel (Telnet, SSH, serial) and switch on the push messages there.

## 4.7 Modbus TCP

Important: All calculations in this chapter are based on addresses starting at "0". For some Modbus TCP Utilities, however, the addresses start at 1, in which case a 1 must be added to the addresses in this chapter. Please try both possibilities for tests!

Important: If an attempt is made to access registers that do not exist for the respective device, then an access error will occur. If a device has e.g. 8 relays, then only the first eight coils can be accessed without error!

If Modbus TCP is activated in the configuration, the ports (relays, outputs, eFuses) can be switched and the following data is callable:

#### Address range overview:

| Device Resource          | Start  | End    | Modbus Data Type  |
|--------------------------|--------|--------|-------------------|
| Power/Output/eFuse Ports | 0x000  | 0x3ff  | Coils             |
| DC Inputs                | 0x400  | 0x7ff  | Discrete Inputs   |
| Stop Condition active    | 0x800  | 0x800  | Discrete Inputs   |
| POE active               | 0x801  | 0x801  | Discrete Inputs   |
| Status Power Sources     | 0x1000 | 0x100f | Discrete Inputs   |
| OVP active (Line-Ins)    | 0x1010 | 0x101f | Discrete Inputs   |
| Fuse ok                  | 0x1020 | 0x102f | Discrete Inputs   |
| ETS Input Power nominal  | 0x1030 | 0x1031 | Discrete Inputs   |
| eFuse Errors             | 0x1100 | 0x11ff | Discrete Inputs   |
| Info Area                | 0x000  | 0x005  | Input Registers   |
| CPU Sensor values        | 0x080  | 0x083  | Input Registers   |
| External Sensors         | 0x100  | 0x1ff  | Input Registers   |
| Fan Level                | 0x200  | 0x20f  | Input Registers   |
| Line Energy Sensors      | 0x400  | 0x39ff | Input Registers   |
| Port Energy Sensors      | 0x3a00 | 0x81ff | Input Registers   |
| Bank Energy Sensors      | 0x8200 | 0x823f | Input Registers   |
| Power Source Sensors     | 0x8240 | 0x827f | Input Registers   |
| Residual Current Monitor | 0x8280 | 0x82cf | Input Registers   |
| Bank Power Source Select | 0x000  | 0x00f  | Holding Registers |
| Fan Mode                 | 0x010  | 0x01f  | Holding Registers |

This chapter is general for <u>all</u> Gude devices. Depending on the device type, some ports or certain sensors are not available.

The Unit-ID is ignored because the device is uniquely identified by its IP address.

## **Supported Modbus TCP Functions**

| Function             | Request Code |
|----------------------|--------------|
| Read Coils           | 0x01         |
| Read Discrete Inputs | 0x02         |
| Write Single Coil    | 0x05         |
| Write Multiple Coils | 0x0f         |
| Read Input Registers | 0x04         |

| Read Holding Registers           | 0x03        |
|----------------------------------|-------------|
| Write Holding Register           | 0x06        |
| Write Multiple Holding Registers | 0x10        |
| Read Device Identification       | 0x2B / 0x0E |

## Coils

| Device Resource    | Start | End   | Device Function            |
|--------------------|-------|-------|----------------------------|
| Power/Output/eFuse | 0x000 | 0x3ff | Coil represents Port State |

## **Discrete Inputs**

| Device Resource        | Start  | End    | Function when set          |
|------------------------|--------|--------|----------------------------|
| DC Inputs              | 0x400  | 0x7ff  | Input logically 1          |
| Stop Condition active  | 0x800  | 0x800  | Stop Input active          |
| POE active             | 0x801  | 0x801  | POE active                 |
| Status Power Sources   | 0x1000 | 0x100f | Power Source active        |
| OVP active (Line-Ins)  | 0x1010 | 0x101f | OVP active                 |
| Fuse ok                | 0x1020 | 0x1020 | Fuse funtional (ETS 8801)  |
| ETS Input Power normal | 0x1030 | 0x1031 | Voltage nominal (ETS 8801) |
| eFuse Error            | 0x1100 | 0x11ff | eFuse Error (EPC 8291)     |

## DC Inputs:

The DC inputs can be found in the *Discrete Inputs*. The inputs are arranged as follows:

Input: 0x0400 + Port \* 0x40 + Input-number (starts with zero).

Port is the number of the external sensor port. For inputs permanently installed in the device, Port = 0.

Example for the first input at external input sensor in port 2: 0x400 + 2 \* 0x40 + 0 = 0x480

#### **Status Power Sources:**

| Power Sources   | Offset                         |
|-----------------|--------------------------------|
| EPC 8221 / 8226 | 0 = Bank A, 1 = Bank B         |
| ENC 2111 / 2191 | 0 = Pwr1, 1 = Pwr2             |
| ESB 7213 / 7214 | 0 = Pwr1, 1 = Pwr2 (only 7214) |

## **Input Registers**

| Device Resource   | Start | End   | Function                |
|-------------------|-------|-------|-------------------------|
| Info Bereich      | 0x000 | 0x005 | see table               |
| CPU Sensor values | 0x080 | 0x083 | see table               |
| Externe Sensoren  | 0x100 | 0x1ff | see table               |
| Fan Level         | 0x200 | 0x20f | 0 (aus) bis 3 (maximal) |

| Line Energy Sensors      | 0x400  | 0x39ff | see table |
|--------------------------|--------|--------|-----------|
| Port Energy Sensors      | 0x3a00 | 0x81ff | see table |
| Bank Energy Sensors      | 0x8200 | 0x823f | see table |
| Power Source Sensors     | 0x8240 | 0x827f | see table |
| Residual Current Monitor | 0x8280 | 0x82cf | see table |

#### Info Area

| Address | Width  | Information                    |
|---------|--------|--------------------------------|
| 0       | 16-bit | Number of Ports (Relay)        |
| 1       | 16-bit | Number of Ports (Outlets) with |
|         |        | Energy Measurement             |
| 2       | 16-bit | Number of Banks                |
| 3       | 16-bit | Number of Line-In              |
| 4       | 16-bit | Phases per line                |
| 5       | 16-bit | Number of Inputs               |

## **Sensor Type Description**

| Address          | Width           | Information                 |
|------------------|-----------------|-----------------------------|
| 0x080 to 0x083   | 16-bit (signed  | CPU Sensor values           |
| 0x100 to 0x1ff   | 16-bit (signed) | external Sensors            |
| 0x400 to 0x39ff  | 32-bit (signed) | Line Energy Sensors         |
| 0x3a00 to 0x81ff | 32-bit (signed) | Port Energy Sensors         |
| 0x8200 to 0x823f | 16-bit (signed) | Bank Energy Sensors         |
| 0x8240 to 0x827f | 16-bit (signed) | Power Source Energy Sensors |
| 0x8280 to 0x82cf | 16-bit (signed) | Residual Current Monitor    |

#### **CPU Sensor Values**

| Offset | Sensor Field    | Unit   |
|--------|-----------------|--------|
| 0      | Vsystem         | 0.01 V |
| 1      | Vaux            | 0.01 V |
| 2      | Vmain           | 0.01 V |
| 3      | CPU Temperature | 0.1 °C |

#### **External Sensors:**

The measured value of the external sensors are coded as fixed point arithmetic. For a factor of e.g. 0.1 in the unit the value must be divided by 10 in order to reach the real measured value. A value of 0x8000 means that no sensor is plugged into the corresponding port, or the corresponding field in the sensor is not available. The formula for the address is (the port numbers start at zero):

0x100 + Port \* 8 + Offset

In the Expert Sensor Box 7213 / 7214 the internal sensor corresponds to the value Port = 0, and is coded Port = 1 for Sensor 2 and Port = 2 for Sensor 3.

| Offset | Sensor Field  | Unit             |
|--------|---------------|------------------|
| 0      | Temperature   | 0.1 °C           |
| 1      | Humidity      | 0.1 %            |
| 2      | Digital Input | bool             |
| 3      | Air Pressure  | 1 hPa (millibar) |
| 4      | Dew Point     | 0.1 °C           |

| 5 | Dew Point Difference | 0.1 °C |
|---|----------------------|--------|

For example, the humidity of the second port has the address: 0x100 + 1 \* 8 + 1 = 0x109

### **Energy Sensors:**

This applies to devices that support 230V input measurement (Line) and/or devices that support 230V output measurement (Port).

We distinguish the line sensors (which correspond to the input circuits) and the port sensors, which measure the energy that is passed over the switched port. The measured values of the energy sensors are returned as signed 32-bit integers. The high-order 16-bits are starting on the even address, followed by the low-order 16-bits on the odd address. To calculate the address, there are the following formulas (the values for line, port and phase start at zero):

Line: 0x0400 + Line \* 0x120 + Phase \* 0x60 + Offset \* 2

Port: 0x3a00 + Port \* 0x120 + Phase \* 0x60 + Offset \* 2



For devices with only one phase, the phase is set to zero in the formula.

#### **Examples:**

"Power Active" for 1st line sensor and 3rd phase: 0x400 + 0 \* 0x120 + 2 \* 0x60 + 1 \* 2 = 0x4C2

"Voltage" for 2nd line sensor and single phase device: 0x400 + 1 \* 0x120 + 2 \* 2 = 0x524

"Power Angle" for 4th port sensor and single phase device: 0x3a00 + 3 \* 0x120 + 6 \* 2 = 0x3d6c

| Offset | Sensor Field                                      | Unit       |
|--------|---|------------|
| 0      | Absolute Active Energy                            | Wh         |
| 1      | Power Active                                      | W          |
| 2      | Voltage   | V          |
| 3      | Current   | mA         |
| 4      | Frequency   | 0.01 hz    |
| 5      | Power Factor                                      | 0.001      |
| 6      | Power Angle                                       | 0.1 degree |
| 7      | Power Apparent                                    | VA         |
| 8      | Power Reactive                                    | VAR        |
| 9      | Absolute Active Energy Resettable                 | Wh         |
| 10     | Absolute Reactive Energy                          | VARh       |
| 11     | Absolute Reactive Energy Resettable               | VARh       |
| 12     | Reset Time - sec. since last Energy Counter Reset | S          |
| 13     | Forward Active Energy                             | Wh         |
| 14     | Forward Reactive Energy                           | VARh       |
| 15     | Forward Active Energy Resettable                  | Wh         |
| 16     | Forward Reactive Energy Resettable                | VARh       |
| 17     | Reverse Active Energy                             | Wh         |
| 18     | Reverse Reactive Energy                           | VARh       |
| 19     | Reverse Active Energy Resettable                  | Wh         |
| 20     | Reverse Reactive Energy Resettable                | VARh       |

| 1 | 21 | Residual Current Type A | 0.1 mA |
|---|----|-------------------------|--------|
| 1 | 22 | Neutral Current         | 0.1 mA |

Whether the measured values "Residual Current" and "Neutral Current" are supported depends on the respective device model. For measured values such as "Neutral Current", which are independent of the phase, the same value is returned for all phases.

#### **DC Energy Sensors:**

With the EPC 8291 / 8290 devices, the voltage and current of the individual banks and voltage sources can be read out. The measured values of the energy sensors are returned as signed 16-bit integers. The following formulas are available for the address (the values for Bank and PowerSrc start at zero):

Bank: 0x8200 + Bank \* 2 + Offset

Power Source: 0x8240 + PowerSrc \* 2 + Offset

## **Examples:**

"Voltage" at third bank: 0x8200 + 2 \* 2 + 0 = 0x8204

"Current" at first PowerSrc: 0x8240 + 0 \* 2 + 1 = 0x8241

| Offset | Sensor Field | Unit   |
|--------|--------------|--------|
| 0      | Voltage      | 0.01 V |
| 1      | Current      | mA     |

#### Residual Current Monitor Type B (RCMB):

Devices with a Residual Current Monitor Type B (RCMB) module separately measure the RMS and DC fault current components of the input supply. The values are returned as signed 16-bit integers. The following formulas are used for the address (the module number starts at zero):

Bank: 0x8280 + ModuleNo \* 8 + Offset.

## **Examples:**

"Residual Current DC" at first module: 0x8280 + 0 \* 8 + 1 = 0x8281.

"Output DC" for second module: 0x8280 + 1 \* 8 + 3 = 0x828b

| Offset | Addr. Module 0 | Sensor Field                | Unit   |
|--------|----------------|-----------------------------|--------|
| 0      | 0x8280         | Residual Current RMS Type B | 0.1 mA |
| 1      | 0x8281         | Residual Current DC Type B  | 0.1 mA |
| 2      | 0x8282         | Output RMS                  | bool   |
| 3      | 0x8283         | Output DC                   | bool   |
| 4      | 0x8284         | Module State                |        |

Whether a Residual Current Monitor Type B (RCMB) module is present depends on the particular device model.

## **Holding Registers**

| Device Resource   | Start | End   | Function                    |
|-------------------|-------|-------|-----------------------------|
| Bank Power Source | 0x000 | 0x00f | Sets Power Source for Bank  |
| Fan Mode          | 0x010 | 0x01f | 0 = Automatic / 1 = Maximum |

Bank Power Source applies to EPC 8291 and ETS 8801 models. Only the EPC 8291 model has a fan.

## **Device Identification**

Returns manufacturer name and device identification:

| Request Code     | 1 Byte | 0x2b |
|------------------|--------|------|
| MEI Type         | 1 Byte | 0x0e |
| Read Dev ID code | 1 Byte | 0x01 |
| Object Id        | 1 Byte | 0x00 |

| Response Code     | 1 Byte   | 0x2b              |
|-------------------|----------|-------------------|
| MEI Type          | 1 Byte   | 0x0e              |
| Read Dev ID code  | 1 Byte   | 0x01              |
| Conformity Level  | 1 Byte   | 0x01              |
| More Follows      | 1 Byte   | 0x00              |
| NextObjectID      | 1 Byte   | 0x00              |
| Number of Objects | 1 Byte   | 0x03              |
| Object ID         | 1 Byte   | 0x00              |
| Object Length     | 1 Byte   | n1                |
| Object Value      | n1 Bytes | "Company Id"      |
| Object ID         | 1 Byte   | 0x00              |
| Object Length     | 1 Byte   | n2                |
| Object Value      | n2 Bytes | "Product Id"      |
| Object ID         | 1 Byte   | 0x00              |
| Object Length     | 1 Byte   | n3                |
| Object Value      | n3 Bytes | "Product Version" |

## 4.7.1 Sensor Tables

Important: All calculations in this chapter are based on addresses starting at "0". With some Modbus TCP utilities the addresses start at 1. In this case a 1 must be added to the addresses in this chapter. Please try both possibilities for tests!

## **External sensors addresses (Input Register)**

| Sensor field         | Port 1 |
|----------------------|--------|
| Temperature          | 0x100  |
| Humidity             | 0x101  |
| Digital input        | 0x102  |
| Air Pressure         | 0x103  |
| Dew Point            | 0x104  |
| Dew Point Difference | 0x105  |

A value of 0x8000 means that no sensor is plugged into the corresponding port or the corresponding field in the sensor is not available.

## Line-In Energy Addresses (Input Register)

| Offset | Sensor Field                        | Line 1 |
|--------|-------------------------------------|--------|
| 0      | Absolute Active Energy              | 0x400  |
| 1      | Power Active                        | 0x402  |
| 2      | Voltage                             | 0x404  |
| 3      | Current                             | 0x406  |
| 4      | Frequency                           | 0x408  |
| 5      | Power Factor                        | 0x40a  |
| 6      | Power Angle                         | 0x40c  |
| 7      | Power Apparent                      | 0x40e  |
| 8      | Power Reactive                      | 0x410  |
| 9      | Absolute Active Energy Resettable   | 0x412  |
| 10     | Absolute Reactive Energy            | 0x414  |
| 11     | Absolute Reactive Energy Resettable | 0x416  |
| 12     | Reset Time - sec. since Reset       | 0x418  |
| 13     | Forward Active Energy               | 0x41a  |
| 14     | Forward Reactive Energy             | 0x41c  |
| 15     | Forward Active Energy Resettable    | 0x41e  |
| 16     | Forward Reactive Energy Resettable  | 0x420  |
| 17     | Reverse Active Energy               | 0x422  |
| 18     | Reverse Reactive Energy             | 0x424  |
| 19     | Reverse Active Energy Resettable    | 0x426  |
| 20     | Reverse Reactive Energy Resettable  | 0x428  |
| 21     | Residual Current Type A             | 0x42a  |
| 22     | Neutral Current                     | 0x42c  |

The measured values of the energy sensors are returned as signed 32-bit integers. On the even address are first the high-order 16-bit, then follow on the odd address the low-order 16-bit.

## **4.8 MQTT**

This device supports MQTT 3.1.1 to send configured messages and also to receive commands. This chapter is general for all Gude devices, some Gude models do not have switchable ports.

- Default port for an unencrypted connection is port 1883.
- Default port for a TLS secured connection is port 8883.
- If the broker allows anonymous login, username and password are arbitrary, but a username must be specified.
- If multiple MQTT clients are connected to a broker, the names of the clients must be different. For this reason, "client\_xxxx" is generated as the default name. Here "xxxx" are the last 4 digits of the MAC address.

## **Message format**

The MQTT messages of the device are always sent in JSON format. E.G..

{"type": "portswitch", "idx": 2, "port": "2", "state": 1, "cause": {"id": 2, "txt": "http"}, "ts": 1632}

This is a switching of the second port to the state on. The source of the switching command is CGI ("http"). The index is always numeric, "port" can also be alphanumeric for devices with multiple banks, e.g. "A2". At the end follows a timestamp ("ts"), which indicates the number of seconds the device is on, or unixtime if the device has synchronized with an NTP server.

## **MQTT Topic Prefix**

The topic prefix for the messages can be set in the MQTT configuration. A default would be e.g. "de/gudesystems/epc/[mac]". Here "[mac]" is a placeholder for the MAC address of the device, another possible placeholder is "[host]", which contains the host name. An example topic for a switching message of the second port would then be:

"de/gudesystems/epc/00:19:32:01:16:41/switch/2".

## **Executing console commands**

The device can be controlled remotely via MQTT using console commands. A list of all commands can be found in the Console so chapter. Depending on the topic, the commands are accepted in different formats.

As default the execution of commands is not allowed, but must be enabled in the MQTT configuration! ("Permit CLI commands")

#### Format 1: Command in JSON Syntax

Publish Topic: "de/gudesystems/epc/00:19:32:01:16:41/cmd" Publish Message: "{"type": "cli", "cmd": "port 2 state set 1", "id": 10}"

Response from device to "de/gudesystems/epc/00:19:32:01:16:41/cmdres" "{"type": "cli", "cmdres": ["OK."], "result": {"num": 0, "hint": "ok"}, "id": 10}"

The JSON object "result" returns whether the command was valid. The object "id" in the command is optional and is passed through in the response from the device. The passed number can help to establish a synchronicity between command and response via the broker.

### Format 2: Raw Text

Publish Topic: "de/gudesystems/epc/00:19:32:01:16:41/cmd/cli" Publish Message: "port 2 state set 1".

Response from device to "de/gudesystems/epc/00:19:32:01:16:41/cmdres/cli" "OK."

## Format 3: Simplified port switching

Publish Topic: "de/gudesystems/epc/00:19:32:01:16:41/cmd/port/2" Publish Message: "0" or "1".

Response from device to "de/gudesystems/epc/00:19:32:01:16:41/cmdres/port/2" "0" or "1"

🇱 This special form exists only for the port switching commands.

## **Device Data Summary**

In the **Device Data Summary** the most important data of the device are summarized in a JSON object and sent periodically in a configurable time interval. This summary depends on the properties of the device and the connected sensors, and could look like this:

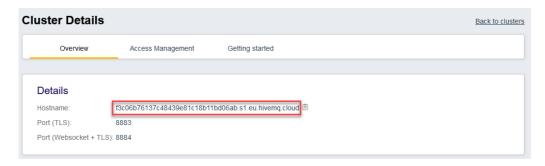
Topic: en/gudesystems/epc/00:19:32:01:16:41/device/telemetry

```
Message:
```

```
"type": "telemetry",
}, {
         "port": "2",
"name": "Power Port",
"state": 0
}, {
         "port": "3",
"name": "Power Port",
"state": 0
}, {
         "port": "4",
"name": "Power Port",
         "state": 0
}],
"line_in": [{
    "---1+a
         "voltage": 242.48,
"current": 0.000
}],
"sensors": [{
        }, {
                  "field": "humidity",
                  "v": 71.9,
"unit": "%"
                  "field": "dew_point",
                  "v": 15.8,
"unit": "deg C"
         }, {
                  "field": "dew_diff",
                  "v": 5.3,
"unit": "deg C"
         }]
}],
"ts": 210520
```

## 4.8.1 Example HiveMQ

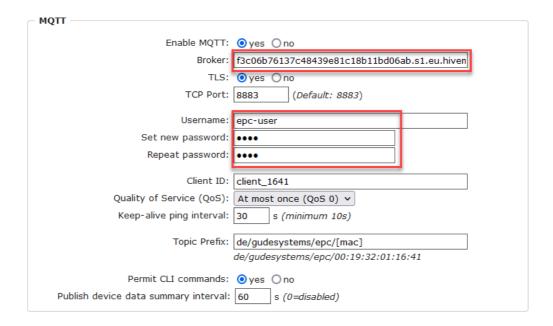
What does an MQTT configuration look like using HiveMQ as an example?



Create a free or commercial account at www.hivemq.com and create a new cluster.



In the "Manage Clusters" section, go to "Access Management" and add an MQTT user with name and password.



In the MQTT configuration of the Gude device, transfer the hostname of the HiveMQ broker, as well as username and password. Additionally activate TLS and set the correct port.

## 4.9 Radius

The passwords for HTTP, telnet, and serial console (depending on the model) can be stored locally and / or authenticated via RADIUS. The RADIUS configuration supports a primary server and a backup server. If the primary server does respond, the RADIUS request is sent to the backup server. If the local password and RADIUS are enabled at the same time, the system is first checking locally, and then in the event of a failure the RADIUS servers are contacted.

#### **RADIUS attributes**

The following RADIUS attributes are evaluated by the client:

**Session-Timeout**: This attribute specifies (in seconds) how long an accepted RADIUS request is valid. After this time has elapsed, the RADIUS server must be prompted again. If this attribute is not returned, the default timeout entry from the configuration is used instead. Please set this value to 300 seconds or greater to prevent the radius requests from becoming too large.

**Filter-Id**: If the value "admin" is set for this attribute, then an admin rights are assigned for the login, otherwise only user access.

**Service-Type**: This is an alternative to Filter-Id. A service type of "6" or "7" means admin rights for the HTTP login, otherwise only limited user access.

## **HTTP Login**

The HTTP login takes place via Basic Authentication. This means that it is the responsibility of the web server, how long the login credentials are temporarily stored there. The RADIUS parameter "Session-Timeout" therefore does not determine when the user has to login again, but at what intervals the RADIUS servers are asked again.

## 4.10 SNMP

SNMP can be used for status information via UDP (port 161). Supported SNMP commands are:

- GET
- GETNEXT
- GETBULK
- SET

To query via SNMP you need a Network Management System, such as HP OpenView, OpenNMS, Nagios etc., or the simple command line tools of NET-SNMP software. The device supports SNMP protocols v1, v2c and v3. If traps are enabled in the configuration, the device messages are sent as notifications (traps). SNMP Informs are not supported. SNMP Requests are answered with the same version with which they were sent. The version of the sent traps can be set in the configuration.

#### **MIB Tables**

The values that can be requested or changed by the device, the so-called "Managed Objects", are described in Management Information Bases (MIBs). These substructures are subordinate to so-called "OID" (Object Identifiers). An OID digit signifies the location of a value inside a MIB structure. Alternatively, each OID can be referred to with its symbol name (subtree name). The device's MIB table can be displayed as a text file by clicking on the link "MIB table" on the SNMP configuration page in the browser.

#### SNMP v1 and v2c

SNMP v1 and v2c authenticates the network requests by so-called communities. The SNMP request has to send along the so-called community public for queries (read access) and the community private for status changes (write access) . The SNMP

communities are read and write passwords. In SNMP v1 and v2 the communities are transmitted unencrypted on the network and can be easily intercepted with IP sniffers within this collision domain. To enforce limited access we recommend the use of DMZ or IP-ACL.

#### SNMP v3

Because the device has no multiuser management, only one user (default name "standard") is detected in SNMP v3. From the User-based Security Model (USM) MIB variables, there is a support of "usmStats ..." counter. The "usmUser ..." variables will be added with the enhancement of additional users in later firmware versions. The system has only one context. The system accepts the context "normal" or an empty context.

#### **Authentication**

The algorithms "HMAC-MD5-96" and "HMAC-SHA-96" are available for authentication. In addition, the "HMAC-SHA-2" variants (RFC7630) "SHA-256", "SHA-384" and "SHA-512" are implemented.

"SHA-384" and "SHA512" are calculated purely in software. If "SHA-384" or "SHA-512" is set on the configuration page, the time for the key generation may take once up to approx. 45 seconds.

#### **Encryption**

The methods "DES", "3DES", "AES-128", "AES-192" and "AES-256" are supported in combination with "HMAC-MD5-96" and "HMAC-SHA-96." For the "HMAC-SHA-2" protocols, there is currently neither RFC nor draft that will allow for cooperation with an encryption.

While in the settings "AES-192" and "AES256" the key calculation is based on "draft-blumenthalphoto-aes-usm-04", the methods "AES 192-3DESKey" and "AES 256-3DESKey" utilize a key generation, which is also used in the "3DES" configuration ("draft-reeder-snmpv3-usm-3desede-00"). If one is not an SNMP expert, it is recommended to try in each case the settings with and without "...- 3DESKey".

#### **Passwords**

The passwords for authentication and encryption are stored only as computed hashes for security reasons. Thus it is, if at all, very difficult to infer the initial password. However, the hash calculation changes with the set algorithms. If the authentication or privacy algorithms are changed, the passwords must be re-entered in the configuration dialog.

#### Security

The following aspects should be considered:

- If encryption or authentication is used, then SNMP v1 and v2c should be turned off. Otherwise the device could be accessed with it.
- If only authentication is used, then the new "HMAC-SHA-2" methods are superior to the MD5 or SHA-1 hashing algorithms. Since only SHA-256 is accelerated in hardware, and SHA-384 and SHA-512 are calculated purely in software, one should normally select SHA-256. From a cryptographic point of view, the security of SHA-256 is sufficient for today's usage.
- For SHA-1, there are a little less attack scenarios than MD5. If in doubt, SHA-1 is preferable.
- Encryption "DES" is considered very unsafe, use only in an emergency for reasons

- of compatibility!
- For cryptologists it's a debatable point whether "HMAC-MD5-96" and "HMAC-SHA-96" can muster enough entropy for key lengths of "AES-192" or "AES-256".
- From the foregoing considerations, we would recommended at present "HMAC-SHA-96" with "AES-128" as authentication and encryption method.

## **Change in Trap Design**

🦊 In older MIB tables, a separate trap was defined for each combination of an event and a port number. This results in longer lists of trap definitions for the devices. For example, from epc8221SwitchEvtPort1 to epc8221SwitchEvtPort12. Since new firmware versions can generate many more different events, this behavior quickly produces several hundred trap definitions. To limit this overabundance of trap definitions, the trap design has been changed to create only one specific trap for each event type. The port or sensor number is now available in the trap as an index OID within the variable bindings.

In order to recognize this change directly, the "Notification" area in the MIB table has been moved from sysObjectID.0 to sysObjectID.3. This way, unidentified events are generated until the new MIB table is imported. For compatibility reasons, SNMP v1 traps are created in the same way as before.

#### **NET-SNMP**

NET-SNMP provides a very widespread collection of SNMP command-line tools (snmpget, snmpset, snmpwalk etc.) NET-SNMP is among others available for Linux and Windows. After installing NET-SNMP you should create the device-specific MIB of the device in NET-SMP share directory, e.g. after

```
c:\usr\share\snmp\mibs
```

or

/usr/share/snmp/mibs

So later you can use the 'subtree names' instead of OIDs:

```
Name: snmpwalk -v2c -mALL -c public 192.168.1.232 gudeads
OID: snmpwalk -v2c -mALL -c public 192.168.1.232 1.3.6.1.4.1.28507
```

#### **NET-SNMP Examples**



🦊 These examples refer to Gude devices that have switchable ports.

Query Power Port 1 switching state:

snmpget -v2c -mALL -c public 192.168.1.232 epc822XPortState.1

Switch on Power Port 1:

snmpset -v2c -mALL -c private 192.168.1.232 epc822XPortState.1 integer 1

## 4.10.1 Device MIB 1104

Below is a table of all device-specific OID 's which can be accessed via SNMP. In the numerical representation of the OID the prefix " 1.3.6.1.4.1.28507 " (Gude Enterprise OID) was omitted at each entry in the table to preserve space. The example for a complete OID would be "1.3.6.1.4.1.28507.68.1.1.1.1". A distinction is made in SNMP OID 's in between tables and scalars. OID scalar have the extension ".0" and only specify a value. In SNMP tables the "x" is replaced by an index (1 or greater) to address a value from the table.

| Name                          |   | OID   | Туре                  | Acc.        |
|-------------------------------|---|---|-----------------------|-------------|
|                               | Description   |   |                       |             |
| epc1104TrapCtrl               | 0 = off 1 = Ver. 1 2 = Ver. 20                          | .68.1.1.1.1.0<br>c 3 = Ver. 3               | Integer32             | RW          |
| epc1104TrapIPIndex            | A unique value, greater than                            | .68.1.1.1.2.1.1.x                           | Integer32<br>er slot. | RO          |
| epc1104TrapAddr               |   | .68.1.1.1.2.1.2.x                           | OCTETS                | RW          |
|                               | DNS name or IP address sp optionally be specified: 'nam |   |                       |             |
| epc1104portNumber             | The number of Relay Ports                               | .68.1.3.1.1.0                               | Integer32             | RO          |
| epc1104PortIndex              | A unique value, greater than                            | .68.1.3.1.2.1.1.x<br>r zero, for each Relay | Integer32<br>Port.    | RO          |
| epc1104PortName               | A textual string containing n                           | .68.1.3.1.2.1.2.x<br>ame of a Relay Port.   | OCTETS                | RW          |
| epc1104PortState              | current state a Relay Port                              | .68.1.3.1.2.1.3.x                           | INTEGER               | RW          |
| epc1104PortSwitchCount        | The total number of switch a                            | .68.1.3.1.2.1.4.x                           | Integer32             | RO<br>s not |
|                               | count switch commands whi                               | ich will not switch the                     |                       |             |
| epc1104PortStartupMode        | relay switches are displayed                            | .68.1.3.1.2.1.5.x                           | INTEGER               | RW          |
|                               | set Mode of startup sequence                            |   | r last state)         |             |
| epc1104PortStartupDelay       | Delay in sec for startup action                         |   | Integer32             | RW          |
| epc1104PortRepowerTime        | Delay in sec for repower por                            | .68.1.3.1.2.1.7.x<br>t after switching off  | Integer32             | RW          |
| epc1104PortResetDuration      |   | .68.1.3.1.2.1.8.x                           | Integer32             | RW          |
| epc1104NTPTimeValid           | Delay in sec for turning Port                           | on again after Reset .68.1.5.15.1.0         | INTEGER               | RO          |
| epc 1104NTF Time valid        | Show if valid Time is receive                           |   | INTEGER               | NO          |
| epc1104NTPUnixTime            | show received NTP time as                               | .68.1.5.15.2.0                              | Unsigned32            | RO          |
| epc1104NTPLastValidTimestamp  | show seconds since last val                             | .68.1.5.15.3.0                              | Unsigned32            | RO          |
| epc1104SensorIndex            | SHOW Seconds Since last val                             | .68.1.6.1.1.1.x                             | Integer32             | RO          |
| analinaTampCanaar             | None  | 60 1 6 1 1 2 4                              | Integer22             | DO.         |
| epc1104TempSensor             | actual temperature                                      | .68.1.6.1.1.2.x                             | Integer32             | RO          |
| epc1104HygroSensor            | actual humidity   | .68.1.6.1.1.3.x                             | Integer32             | RO          |
| epc1104InputSensor            | logical state of input sensor                           | .68.1.6.1.1.4.x                             | INTEGER               | RO          |
| epc1104AirPressure            | actual air pressure                                     | .68.1.6.1.1.5.x                             | Integer32             | RO          |
| epc1104DewPoint               | dew point for actual tempera                            | .68.1.6.1.1.6.x                             | Integer32             | RO          |
| epc1104DewPointDiff           | dew point for actual tempera                            | .68.1.6.1.1.7.x                             | Integer32             | RO          |
|                               | difference between dew poir DewPoint)                   |   |                       |             |
| epc1104ExtSensorName          | A textual string containing n                           | .68.1.6.1.1.32.x<br>ame of a external Ser   | OCTETS                | RW          |
| epc1104ExtActiveInputs        | Number of supported Input                               | .68.1.6.2.1.0                               | Unsigned32            | RO          |
| epc1104ExtInputIndex          | None  | .68.1.6.2.2.1.1.x                           | Unsigned32            | RO          |
| epc1104ExtInput               |   | .68.1.6.2.2.1.2.x                           | INTEGER               | RO          |
| epc1104ExtInputName           | Input state of device                                   | .68.1.6.2.2.1.32.x                          | OCTETS                | RW          |
| epc1104ExtInputPortNum        | A textual string containing n                           | ame of the Input<br>.68.1.6.2.2.1.33.x      | Integer32             | RO          |
| opor to textilipati offitalii |   | .00.1.0.2.2.1.00.8                          | micgeroz              |             |

|                           | Number of external Sensor Port when value greater zero, else device built-in Input. |                  |
|---------------------------|---|------------------|
| epc1104ExtInputBlockIndex | .68.1.6.2.2.1.34.x Integ  | jer32 RO         |
|                           | Either index of device built-in Input, or index of Input in                         | external sensor. |

#### 4.10.2 Device MIB 1105

Below is a table of all device-specific OID 's which can be accessed via SNMP. In the numerical representation of the OID the prefix " 1.3.6.1.4.1.28507 " (Gude Enterprise OID) was omitted at each entry in the table to preserve space. The example for a complete OID would be "1.3.6.1.4.1.28507.69.1.1.1.1". A distinction is made in SNMP OID 's in between tables and scalars. OID scalar have the extension ".0" and only specify a value. In SNMP tables the "x" is replaced by an index (1 or greater) to address a value from the table.

| Name                                  |  | OID                                      | Type                                    | Acc.          |
|---------------------------------------|--|--|---|---------------|
|                                       | Description  |  | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |               |
| epc1105TrapCtrl                       | <u> </u>   | .69.1.1.1.1.0                            | Integer32                               | RW            |
| and 10FT ran IDInday                  | 0 = off 1 = Ver. 1 2 = Ver.                        |  | Intogoraa                               | BO            |
| epc1105TraplPIndex                    | A unique value, greater th                         | .69.1.1.1.2.1.1.x                        | Integer32                               | RO            |
| epc1105TrapAddr                       | 7 amque value, greater an                          | .69.1.1.1.2.1.2.x                        | OCTETS                                  | RW            |
|                                       | DNS name or IP address                             |  |   |               |
| epc1105portNumber                     | optionally be specified: 'na                       | ame:port' An empty str<br>.69.1.3.1.1.0  | ing disables thi<br>Integer32           | s slot.<br>RO |
| epc i rosportivumber                  | The number of Relay Port                           |  | megersz                                 | KO            |
| epc1105PortIndex                      | ,  | .69.1.3.1.2.1.1.x                        | Integer32                               | RO            |
|                                       | A unique value, greater th                         |  |   | DW            |
| epc1105PortName                       | A textual string containing                        | .69.1.3.1.2.1.2.x                        | OCTETS                                  | RW            |
| epc1105PortState                      | A textual string containing                        | .69.1.3.1.2.1.3.x                        | INTEGER                                 | RW            |
|                                       | current state a Relay Port                         |  |   |               |
| epc1105PortSwitchCount                | T  | .69.1.3.1.2.1.4.x                        | Integer32                               | RO            |
|                                       | The total number of switch count switch commands w |  |   |               |
|                                       | relay switches are display                         |  | e raiay state, st                       | just rear     |
| epc1105PortStartupMode                |  | .69.1.3.1.2.1.5.x                        | INTEGER                                 | RW            |
|                                       | set Mode of startup seque                          |  |   | 5111          |
| epc1105PortStartupDelay               | Delay in sec for startup ac                        | .69.1.3.1.2.1.6.x                        | Integer32                               | RW            |
| epc1105PortRepowerTime                | Delay III Sec for Startup at                       | .69.1.3.1.2.1.7.x                        | Integer32                               | RW            |
|                                       | Delay in sec for repower p                         |  |   |               |
| epc1105PortResetDuration              |  | .69.1.3.1.2.1.8.x                        | Integer32                               | RW            |
| ana1105 Active Dower Chan             | Delay in sec for turning Po                        | ort on again after Rese<br>.69.1.5.1.1.0 |   | RO            |
| epc1105ActivePowerChan                | Number of suppported Po                            |  | Unsigned32                              | KO            |
| epc1105PowerIndex                     | . rainibo. o. oapppontou . o                       | .69.1.5.1.2.1.1.x                        | Integer32                               | RO            |
| 110501 011                            | Index of Power Channel e                           |  |   |               |
| epc1105ChanStatus                     | 0 = data not active, 1 = da                        | .69.1.5.1.2.1.2.x                        | Integer32                               | RO            |
| epc1105AbsEnergyActive                | 0 - data not active, 1 - da                        | .69.1.5.1.2.1.3.x                        | Unsigned32                              | RO            |
|                                       | Absolute Active Energy co                          |  | - · · · · · · · · · · · · · · · · · · · |               |
| epc1105PowerActive                    |  | .69.1.5.1.2.1.4.x                        | Integer32                               | RO            |
| epc1105Current                        | Active Power                                       | .69.1.5.1.2.1.5.x                        | Unsigned32                              | RO            |
| epc i 103Current                      | Actual Curent on Power C                           |  | Offsigned32                             | NO            |
| epc1105Voltage                        |  | .69.1.5.1.2.1.6.x                        | Unsigned32                              | RO            |
| 44055                                 | Actual Voltage on Power                            |  |   | D0            |
| epc1105Frequency                      | Frequency of Power Chan                            | .69.1.5.1.2.1.7.x                        | Unsigned32                              | RO            |
| epc1105PowerFactor                    | Frequency of Fower Chair                           | .69.1.5.1.2.1.8.x                        | Integer32                               | RO            |
|                                       | Power Factor of Channel                            | between -1.0 and 1.00                    |   |               |
| epc1105Pangle                         | D. A. I. I. ( ) // I                               | .69.1.5.1.2.1.9.x                        | Integer32                               | RO            |
|                                       | Phase Angle between Vol 180.0                      | tage and L Line Currei                   | nt between -180                         | 0.0 and       |
| epc1105PowerApparent                  | 100.0  | .69.1.5.1.2.1.10.x                       | Integer32                               | RO            |
| · · · · · · · · · · · · · · · · · · · | L Line Mean Apparent Por                           | wer                                      |   |               |
| epc1105PowerReactive                  | Libra Maria Break D                                | .69.1.5.1.2.1.11.x                       | Integer32                               | RO            |
| epc1105AbsEnergyReactive              | L Line Mean Reactive Pov                           | ver<br>.69.1.5.1.2.1.12.x                | Unsigned32                              | RO            |
| epo i 100AbsEnergyrteactive           |  | .03.1.3.1.2.1.12.8                       | Unsigneusz                              | NO            |

|                                    | Absolute Reactive Energy of                      | counter.                                   |                                 |             |
|------------------------------------|--|--|---------------------------------|-------------|
| epc1105AbsEnergyActiveResettable   | )  | .69.1.5.1.2.1.13.x                         | Unsigned32                      | RW          |
|                                    | Resettable Absolute Active resettable counter.r. | Energy counter. Writi                      | ing '0' resets all              |             |
| epc1105AbsEnergyReactiveReset able |  | .69.1.5.1.2.1.14.x                         | Unsigned32                      | RO          |
| epc1105ResetTime                   | Resettable Absolute Reacti                       | ve Energy counter.<br>.69.1.5.1.2.1.15.x   | Unsigned32                      | RO          |
| epc1105ForwEnergyActive            | Time in seconds since last                       |  |                                 | RO          |
|                                    | Forward Active Energy cou                        | nter.                                      |                                 | _           |
| epc1105ForwEnergyReactive          | Forward Reactive Energy of                       | .69.1.5.1.2.1.17.x<br>ounter.              | Unsigned32                      | RO          |
| epc1105ForwEnergyActiveResettable  | 1  | .69.1.5.1.2.1.18.x                         | Unsigned32                      | RO          |
| epc1105ForwEnergyReactiveRese      | Resettable Forward Active                        | <u> </u>                                   | l Incianod22                    | DO.         |
| ttable                             | Resettable Forward Reactive                      | .69.1.5.1.2.1.19.x<br>/e Energy counter    | Unsigned32                      | RO          |
| epc1105RevEnergyActive             | Reverse Active Energy cou                        | .69.1.5.1.2.1.20.x                         | Unsigned32                      | RO          |
| epc1105RevEnergyReactive           | - C  | .69.1.5.1.2.1.21.x                         | Unsigned32                      | RO          |
| epc1105RevEnergyActiveResettal     | Reverse Reactive Energy c                        | .69.1.5.1.2.1.22.x                         | Unsigned32                      | RO          |
| le                                 | Resettable Reverse Active                        |  | 0.1.5.g.1.5452                  |             |
| epc1105RevEnergyReactiveReset able | t  | .69.1.5.1.2.1.23.x                         | Unsigned32                      | RO          |
| epc1105LineSensorName              | Resettable Reverse Reactive                      | ve Energy counter.<br>.69.1.5.1.2.1.100.x  | OCTETS                          | RW          |
| ·                                  | A textual string containing r                    | name of a Line Senso                       | r                               |             |
| epc1105NTPTimeValid                | Show if valid Time is receiv                     |  | INTEGER                         | RO          |
| epc1105NTPUnixTime                 | show received NTP time as                        | .69.1.5.15.2.0 sunixtime (secs since       | Unsigned32<br>1 January 1970    | RO<br>))    |
| epc1105NTPLastValidTimestamp       | show seconds since last va                       | .69.1.5.15.3.0<br>Ilid NTP timestamp re    | Unsigned32 ceived               | RO          |
| epc1105SensorIndex                 | None   | .69.1.6.1.1.1.x                            | Integer32                       | RO          |
| epc1105TempSensor                  | actual temperature                               | .69.1.6.1.1.2.x                            | Integer32                       | RO          |
| epc1105HygroSensor                 | <u> </u>   | .69.1.6.1.1.3.x                            | Integer32                       | RO          |
| epc1105InputSensor                 | actual humidity                                  | .69.1.6.1.1.4.x                            | INTEGER                         | RO          |
| epc1105AirPressure                 | logical state of input sensor                    | .69.1.6.1.1.5.x                            | Integer32                       | RO          |
| epc1105DewPoint                    | actual air pressure                              | .69.1.6.1.1.6.x                            | Integer32                       | RO          |
| epc1105DewPointDiff                | dew point for actual temper                      |  | Integer32                       | RO          |
| eper 100Dewr ollifolii             | difference between dew poi                       |  |                                 | NO          |
| epc1105ExtSensorName               | DewPoint)  | .69.1.6.1.1.32.x                           | OCTETS                          | RW          |
| epc1105ExtActiveInputs             | A textual string containing r                    | .69.1.6.2.1.0                              | nsor<br>Unsigned32              | RO          |
| epc1105ExtInputIndex               | Number of suppported Inpu                        | t Channels.<br>.69.1.6.2.2.1.1.x           | Unsigned32                      | RO          |
| epc1105ExtInput                    | None   | .69.1.6.2.2.1.2.x                          | INTEGER                         | RO          |
| epc1105ExtInputName                | Input state of device                            | .69.1.6.2.2.1.32.x                         | OCTETS                          | RW          |
|                                    | A textual string containing r                    | name of the Input                          |                                 |             |
| epc1105ExtInputPortNum             | Number of external Sensor                        | .69.1.6.2.2.1.33.x<br>Port when value grea | Integer32<br>iter zero, else de | RO<br>evice |
| epc1105ExtInputBlockIndex          | built-in Input.                                  | .69.1.6.2.2.1.34.x                         | Integer32                       | RO          |
|                                    | Either index of device built-                    | in Input, or index of In                   | put in external s               | ensor.      |

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### 4.11 SSL

#### TLS Standard

The device is compatible with TLS v1.1 to TLS v1.3 standards, but due to lack of security, SSL v3.0, TLS 1.0, and RC4, MD5, SHA1, and DES encryption are disabled. All ciphers use Diffie-Hellman key exchange (Perfect Forward Secrecy).

## **Creating your own Certificates**

The SSL stack is supplied with a specially newly generated self-signed certificate. There is no function to generate the local certificate anew at the touch of a button, since the required random numbers in an embedded device are usually not independent enough. However, you can create new certificates and import them to the device. The server accepts RSA (2048/4096) and ECC (Elliptic Curve Cryptography) certificates.

Usually OpenSSL is used to create an SSL certificate. For Windows for example, there is the light version of Shining Light Productions. There you open a command prompt, change to the directory "C:\OpenSSL-Win32\bin" and set these environment variables:

```
set openssl_conf=C:\OpenSSL-Win32\bin\openssl.cfg
set RANDFILE=C:\OpenSSL-Win32\bin\.rnd
```

Here are some examples for the generation with OpenSSL:

#### Creation of a self-signed RSA 2048-bit certificate

```
openssl genrsa -out server.key 2048 openssl req -new -x509 -days 365 -key server.key -out server.crt
```

#### RSA 2048-bit certificate with Sign Request:

```
openssl genrsa -out server.key 2048
openssl req -new -key server.key -out server.csr
openssl req -x509 -days 365 -key server.key -in server.csr -out server.crt
```

The server keys should be created with "openssI genrsa". The Gude device processes keys in the traditional PKCS#1 format. This can be recognized by the fact that the generated key file starts with "-----BEGIN RSA PRIVATE KEY-----". If the file starts with "-----BEGIN PRIVATE KEY-----", the file is in PKCS#8 format and the key is not recognized. If you have only a key in PKCS#8 format, you can convert it to PKCS#1 with openssI: "openssI rsa -in pkcs8.key -out pkcs1.key".

#### **ECC Certificate with Sign Request:**

```
openssl ecparam -genkey -name prime256v1 -out server.key openssl req -new -key server.key -out server.csr openssl req -x509 -days 365 -key server.key -in server.csr -out server.crt
```

If you have created your key and certificate, both files are concatenated to one file:

#### Linux:

```
cat server.crt server.key > server.pem
```

#### Windows:

```
copy server.crt + server.key server.pem
```

The created server.pem can only be uploaded in the maintenance section of the device

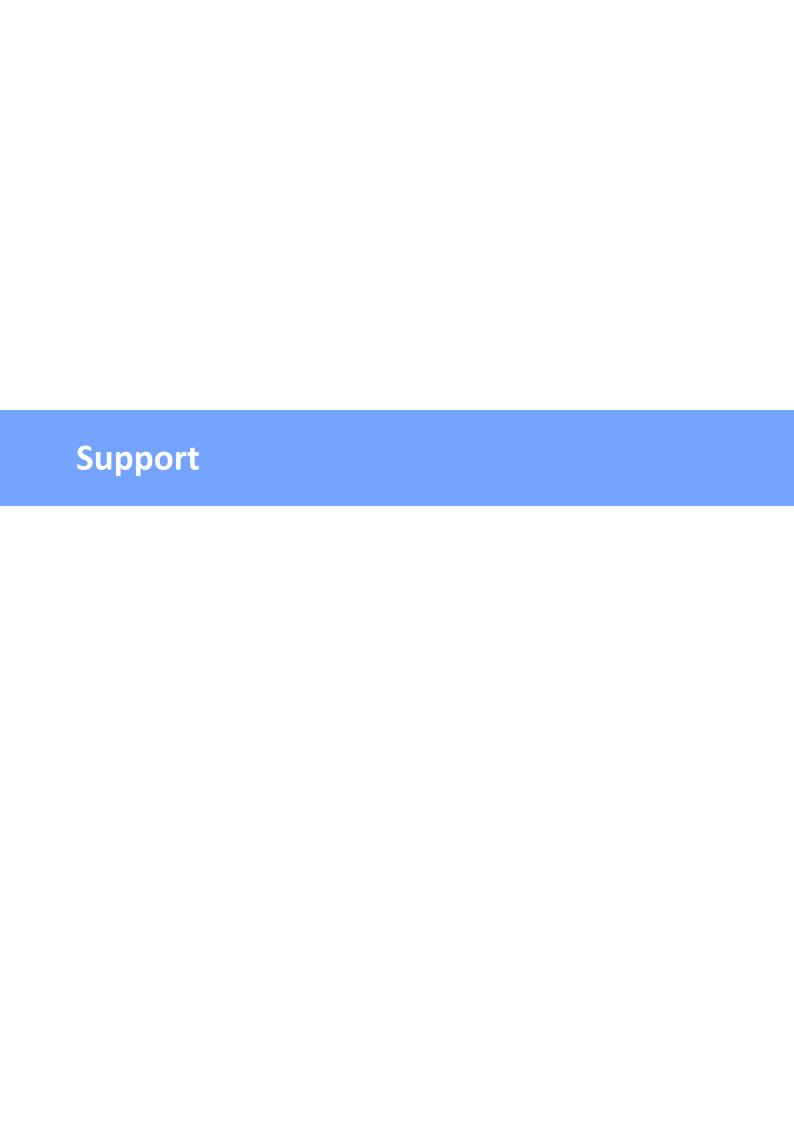
If several certificates (Intermediate CRT's) should also be uploaded to the device, one should make sure, that firstly the server certificate and secondly the Intermediates are assembled, e.g:

cat server.crt IM1.crt IM2.crt server.key > server.pem

An uploaded certificate will be preserved, when a device is put back to factory defaults 2.

## **Performance Considerations**

If RSA 4096 certificates are used, the first access to the web server can take 8-10 seconds, because the math unit of the embedded CPU is highly demanded. After that, the parameters are in the SSL session cache, so all other requests are just as fast as with other certificate lengths. For a quick response even on the first access, we recommend RSA 2048-bit certificates that offer adequate security, too.



## 5 Support

You will find the latest product software on our website at www.gude.info available for download. If you have further questions about installation or operation of the unit, please contact our support team. Furthermore, we present in our support wiki at www.gude.info/wiki FAQs and configuration examples.

## 5.1 Data Security

To provide the device with a high level of data security, we recommend the following measures:

- Check that the HTTP password is switched on.
- Set up your own HTTP password.
- Configure HTTP Extended Session Authentication.
- Allow access to HTTP via SSL (TLS) only.
- Use TLS 1.3 if possible and avoid TLS 1.1.
- Enable authentication and encryption in SNMPv3 and disable SNMP v2 access.
- Enable STARTTLS or SSL in the e-mail configuration.
- Archive configuration files securely, they contain sensitive information.
- In the IP ACL, enter only the devices that require access to HTTP or SNMP.
- Use SSH if possible, since Telnet is not encrypted.
- Set login for telnet or serial console.
- Use MQTT 3.1.1 only with TLS and password.
- Only permit MQTT CLI commands when the broker is trustworthy.
- Modbus TCP is not encrypted, only activate it in a secure environment.
- Activate "Message Authentication" in RADIUS.

## When accessed from the Internet

- Use a randomized password with at least 32 characters.
- If possible, place the device behind a firewall.

## 5.2 HTTP Performance

Access to the Gude devices via the REST API can normally be conducted from one source every second with HTTP. If accessed from multiple sources simultaneously, it is recommended to adjust the poll interval accordingly.

## SSL (TLS) performance

The initial setup for an SSL (TLS) connection results in numerous crypto operations at the start of the connection. If an RSA 2048 certificate is used, the delay at the beginning is about 2-3 seconds, with RSA 4096 the connection establishment can take up to 10 seconds. The delays result from a limitation of the math unit in the embedded CPU. We therefore recommend an ECC 256 certificate, which is significantly more performant to calculate. Previously established connections TLS connections are stored in a TLS Session Cache (or Session Tickets). However, this cache is not always supported by browsers, or it expires after only a short time. Especially browsers (HTTPS clients) of other embedded devices (e.g. media controllers) may be limited in the TLS cache.

A remedy for this can be an HTTP keep-alive connection. Once a connection with HTTP keep-alive is opened, it is closed again after 10 seconds if no data is transferred. If you want to receive data periodically, it is therefore recommended to request the data at intervals of less than 10 seconds (e.g. every 5-8 seconds) after establishing the connection with HTTP keep-alive.

## Special TLS 1.3 performance problem with Chrome (MS Edge)

When TLS 1.3 and insecure certificates are used in combination with a web browser with Chromium engine (Google Chrome or MS Edge), performance may be affected, resulting in longer loading times. In this constellation, the Chromium Engine does not correctly support the TLS Session Cache (or Session Tickets) and the math unit of the embedded CPU may be overwhelmed with persistent RSA operations. Possible solutions:

- Use secure certificates (official certificate authority or marked as secure in the OS)
- or keep-alive with poll interval less than 10 seconds
- · or use of Firefox browser
- or use ECC 256 (no RSA) certificates
- or configure to "TLS v1.2 only

## 5.3 Contact

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Value added tax identification number (VAT): DE 122778228

## 5.4 Declaration of Conformity

This product from the **Expert Power Control 1104 / 1105** series is in conformity with the European directives for CE marking applicable to this product. The complete CE declaration of conformity for this product can be found on the website www.gude-systems.com in the download section of the product.

## **5.5 FAQ**

#### 1. What can I do if the device is no longer accessible?

- If the Status LED is red, the device has no connection to the switch. Unplug and plug
  the Ethernet cable. If the Status LED is still red, try other switches. If one uses no
  switch, but connects e.g. a laptop directly to the device, make sure you are using a
  crossover Ethernet cable.
- If the status LED is orange for a longer time after unplugging and plugging the Ethernet cable, then DHCP is configured, but no DHCP server was found in the network.
   After a timeout, the last IP address is configured manually.
- If there is a physical link (status LED is green) to the device, but you can not access the web server, bring the device into bootloader mode and search for it with GBL\_Conf.exe 16. Then check the TCP-IP parameters and change them if necessary.
- If the device is not found by GBL\_Conf.exe in bootloader mode, you can reset the settings to factory defaults 2 as the last option.

# 2. Why is a device sporadically no longer accessible when DHCP is activated? or Why does the text "DHCP is configured, but DHCP is not responding!" appear?

 If DHCP is enabled but no DHCP server responds, the last IP address continues to be used. However, the DHCP client tries to reach a DHCP server again every 5 minutes. The DHCP request lasts one minute until it is aborted. During this time the IP address is not accessible! With a static IP address, DHCP should therefore be deactivated in the device.

# 3. What can be done if the device is no longer accessible, but the buttons still respond?

• Entering or leaving the bootloader mode does not change the state of the relays. In the chapter Maintenance 21 there is a description how to activate the bootloader by pressing the buttons and how to exit the bootloader afterwards. This will restart the firmware without switching relays. However, this procedure does not help if the network itself is incorrectly configured.

## 4. Where is the serial number stored in the device?

The serial number is not stored in the device, but only visible on the device label. However, you can display the MAC address in the IP address configuration [27]. If you contact Gude Systems Support with the MAC address, we will be happy to give you the corresponding serial number.

# 5. Why does it sometimes take so long to configure new SNMPv3 passwords on the website?

The authentication methods "SHA-384" and "SHA-512" are calculated purely in software, and can not use the crypto hardware. On the configuration page, e.g. "SHA-512", needs up to 45 seconds to calculate the key.

## 6. Can you enter multiple e-mail recipients?

Yes. In the E-Mail configuration in the Recipient Address field, it is possible to enter

## **Support**

multiple e-mail addresses separated by commas. The input limit is 100 characters.

## 7. Why did the MIB tables change after the firmware update?

• Since the number of possible event types was increased, the previous trap design resulted in an excess of trap definitions: See Change in Trap Design

### 8. Importing an older firmware

• During a firmware update, old data formats are sometimes converted to new structures. If an older firmware is newly installed, the configuration data and the energy meters may be lost! If the device then does not run correctly, please restore the factory settings (e.g. from the Maintenance Page 19). Sometimes the text "Upload complete, firmware downgrade not compatible" is displayed during a firmware update. In this special case a downgrade is not possible. This usually happens when a newer hardware component in the device is not supported by an older firmware.

## 9. Disable switching events

• You can set the sending of syslog, emails etc. when switching ports (only concerns Gude devices with relays) under "System" in the sensor configuration 45.

| - I -                                |
|--------------------------------------|
| Installation 8<br>IP-ACL 28, 74      |
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