

# Manual EMU Professional II TCP/IP

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| Version | Revision Date | Token    | Changes   |
|---------|---------------|----------|---|
| V1.0    | 01.07.2021    | fbo, met | Creation of document  |
| V1.1    | 13.10.2021    | met      | Further specification of time synchronization   |
| V1.2    | 14.03.2022    | fbo      | added requirements for updating   |
| V1.3    | 07.04.2022    | met      | update HTTP access. update data logger and logbook read-out   |
| V1.4    | 13.04.2022    | met      | update HTTP GUI description   |
| V1.5    | 11.05.2022    | met      | Rework of Doc.Ref numbers. Same document in different language no longer has a different Doc.Ref number |
| V1.6    | 27.05.2022    | fbo      | remark about firmware-update  |
| V1.6.1  | 14.06.2022    | fbo      | remark about update frequency   |
| V2.0    | 30.11.2022    | met      | Rework of document structure  |
| V2.1    | 24.04.2023    | met      | Read out configuration and meter values via HTTP-GET  |
| V2.2    | 02.06.2023    | met      | Correction of weblink examples  |
| V2.3    | 15.06.2023    | met      | Updated Access Protection   |
| V2.4    | 23.10.2023    | met      | languages added to web interface  |

## General

The EMU Professional II TCP/IP is equipped with a 100 MBit Ethernet-Interface and a RJ-45 connector.

Ex-Factory the EMU Professional II obtains its IP-Address via a DHCP-request. The assigned IP-Address can be read out on the display of the meter under "Settings" -> "IP-Address". Navigate to "Settings" by pressing the "Arrow right" button and then use the "Arrow down" button to reach "IP-Address".

This document explains the method of accessing and configuring the EMU Professional II TCP/IP via TCP/IP. Furthermore this document describes the read out of historical data. The output of such read outs is a CSV file, the structure of which is subsequently described. At the end of this document you will find a step-by-step guide to update the firmware via TCP/IP.

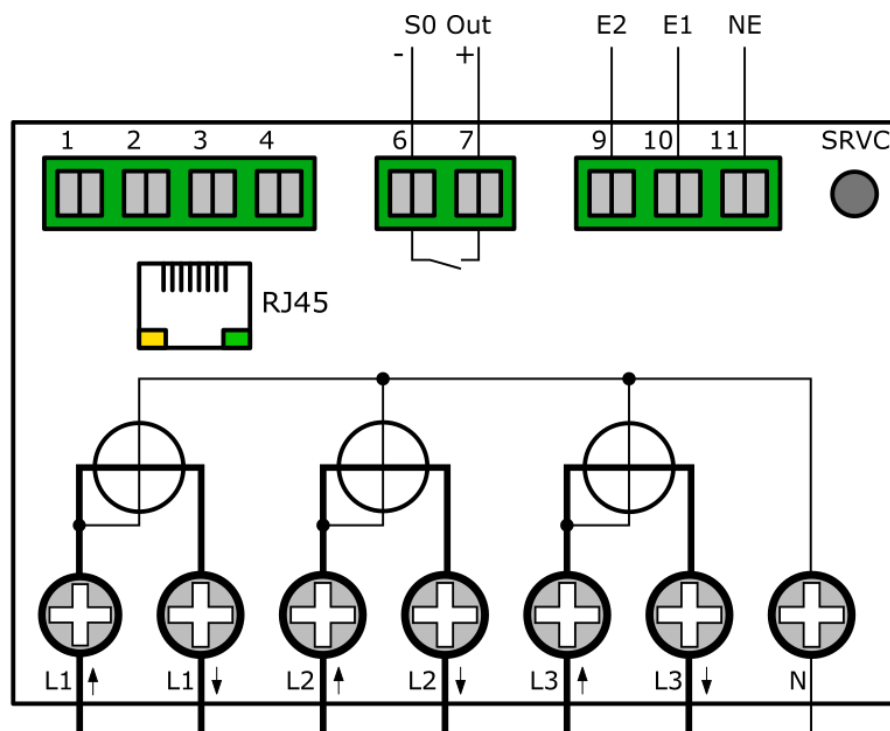


*Note: We recommend to check regularly (monthly) for available updates and perform at least one update per year. Further information about the updates can be found on our website or will be provided by e-mail upon request.*

## Connection Diagram TCP/IP



*Note: The TCP/IP interface is the same for both the EMU Professional II 3/100 TCP/IP and the EMU Professional II 3/5 TCP/IP.*



## LED on the LAN port

The LED on the LAN port on the EMU Professional II are programmed as follows. Only the Link LED (green) is used. It is lit green permanently if the meter is connected and will blink if any communication is happening on the port.

## Access via HTTP

Once the EMU Professional II TCP/IP is connected to your network via an Ethernet cable you are able to reach it on a web browser. Access your meter with the following address:

http://[IP-Address of the meter]/

The IP-Address can be found under "Settings" -> "IP-Address"

The web interface is set to english by default and the language package for the german language is already on the module. The interface will check your language setting in your browser and choose the fitting language package automatically.

If your browser is set to finnish, swedish, norwegian, czech, spanish, portuguese or polish the interface will automatically download and apply the corresponding language package from the website [www.emuag.ch](http://www.emuag.ch). You can add "?privacy" to the URL to ignore the browser language setting and display the default english language.

The following interface appears once the above link is entered. At the very top you can switch between "Current Readings" and "Configuration"

### Current Readings

This page shows the register values for Active Energy Import/Export as well as the momentary values of the Voltage, Active Power, Reactive Power, Current, Power Factor and Frequency of the meter. These values are updated once every 5 seconds.



*Note: All meters with serial numbers higher than 22350000 will also show the minimal and maximal values of the corresponding momentary values in this tab.*

| Current Values   | Configuration |       |              |      |              |      |           |      |          |    |          |
|--|---------------|-------|--------------|------|--------------|------|-----------|------|----------|----|----------|
| <b>Active Energy Import</b> <table border="1"> <tr> <td>Total</td> <td>1870.400 kWh</td> </tr> <tr> <td>T1</td> <td>1870.400 kWh</td> </tr> <tr> <td>T2</td> <td>0.000 kWh</td> </tr> </table>   |               | Total | 1870.400 kWh | T1   | 1870.400 kWh | T2   | 0.000 kWh |      |          |    |          |
| Total  | 1870.400 kWh  |       |              |      |              |      |           |      |          |    |          |
| T1   | 1870.400 kWh  |       |              |      |              |      |           |      |          |    |          |
| T2   | 0.000 kWh     |       |              |      |              |      |           |      |          |    |          |
| <b>Active Energy Export</b> <table border="1"> <tr> <td>Total</td> <td>0.000 kWh</td> </tr> <tr> <td>T1</td> <td>0.000 kWh</td> </tr> <tr> <td>T2</td> <td>0.000 kWh</td> </tr> </table>   |               | Total | 0.000 kWh    | T1   | 0.000 kWh    | T2   | 0.000 kWh |      |          |    |          |
| Total  | 0.000 kWh     |       |              |      |              |      |           |      |          |    |          |
| T1   | 0.000 kWh     |       |              |      |              |      |           |      |          |    |          |
| T2   | 0.000 kWh     |       |              |      |              |      |           |      |          |    |          |
| <b>Voltage</b> <table border="1"> <tr> <td colspan="2">Now</td> </tr> <tr> <td>L1-N</td> <td>230.1 V</td> </tr> <tr> <td>L2-N</td> <td>229.6 V</td> </tr> <tr> <td>L3-N</td> <td>230.1 V</td> </tr> </table>   |               | Now   |              | L1-N | 230.1 V      | L2-N | 229.6 V   | L3-N | 230.1 V  |    |          |
| Now  |               |       |              |      |              |      |           |      |          |    |          |
| L1-N   | 230.1 V       |       |              |      |              |      |           |      |          |    |          |
| L2-N   | 229.6 V       |       |              |      |              |      |           |      |          |    |          |
| L3-N   | 230.1 V       |       |              |      |              |      |           |      |          |    |          |
| <b>Active Power</b> <table border="1"> <tr> <td colspan="2">Now</td> </tr> <tr> <td>L123</td> <td>22.151 kW</td> </tr> <tr> <td>L1</td> <td>7.387 kW</td> </tr> <tr> <td>L2</td> <td>7.380 kW</td> </tr> <tr> <td>L3</td> <td>7.383 kW</td> </tr> </table> |               | Now   |              | L123 | 22.151 kW    | L1   | 7.387 kW  | L2   | 7.380 kW | L3 | 7.383 kW |
| Now  |               |       |              |      |              |      |           |      |          |    |          |
| L123   | 22.151 kW     |       |              |      |              |      |           |      |          |    |          |
| L1   | 7.387 kW      |       |              |      |              |      |           |      |          |    |          |
| L2   | 7.380 kW      |       |              |      |              |      |           |      |          |    |          |
| L3   | 7.383 kW      |       |              |      |              |      |           |      |          |    |          |
| <b>Reactive Power</b> <table border="1"> <tr> <td colspan="2">Now</td> </tr> <tr> <td>L123</td> <td>11.767 kvar</td> </tr> </table>  |               | Now   |              | L123 | 11.767 kvar  |      |           |      |          |    |          |
| Now  |               |       |              |      |              |      |           |      |          |    |          |
| L123   | 11.767 kvar   |       |              |      |              |      |           |      |          |    |          |

## Configuration

The configuration page has the following configurations available:

| Current Values                                | Configuration                              |
|---|--|
| <b>General Settings</b>                       |  |
| DHCP  | <input type="checkbox"/>                   |
| IP Address                                    | <input type="text" value="10.255.255.7"/>  |
| Subnet Mask                                   | <input type="text" value="255.255.255.0"/> |
| Gateway                                       | <input type="text" value="10.255.255.1"/>  |
| DNS Server                                    | <input type="text" value="192.168.1.236"/> |
| <b>Modbus TCP</b>                             |  |
| Modbus enabled                                | <input checked="" type="checkbox"/>        |
| Port  | <input type="text" value="502"/>           |
| <b>NTP Server (Time Server UTC)</b>           |  |
| Time Server                                   | <input type="text" value="pool.ntp.org"/>  |
| <b>Access protection for the "admin" user</b> |  |
| Enable  | <input type="radio"/>                      |
| Disable                                       | <input type="radio"/>                      |
| Unchanged                                     | <input checked="" type="radio"/>           |
| Enable online update                          | <input checked="" type="checkbox"/>        |
| <input type="button" value="Save"/>           |  |

|                  |                      |
|------------------|----------------------|
| Serial Number    | 21320281             |
| MAC Address      | 10:2C:EF:02:02:FA    |
| Firmware         | 1.0.16               |
| Time:            |                      |
| Local            | 7/4/2023, 3:06:28 PM |
| UTC (meter time) | 7/4/2023, 1:06:28 PM |



- General Settings
  - DHCP: Choose between letting the meter request its own IP-Address or entering one manually.
  - If DHCP is not selected, you are required to enter the network parameters (IP-Address, subnet mask, gateway and DNS server) manually.
- Modbus TCP
  - Modbus active: Choose whether the Modbus TCP server is turned on or not.
  - Port: Choose a TCP-Port over which the Modbus server accepts requests.

The Modbus registers are updated approximately every 5-10 seconds.

- NTP-Server
  - Time server: Enter the IP-Address or the DNS-name of a NTP-servers from which the EMU Professional II TCP/IP gets its time and date synchronization.

If an NTP-server is set the communication module will try to get it's synchronization every 1-2 minutes. After the first successful synchronization the communication module requests interval changes once per hour.

If access to an NTP-server is not possible, this may lead to short interruptions in the response to requests on the communication module.



*Note: The entered NTP-server must use a calibration valid time reference source.*

- Access Protection:
  - Activate: If you wish to secure your meter against unauthorized third parties you can chose the option "Activate". Make sure to enter your chosen password (max. 20 characters) in the intended field and save the settings. Access to the EMU Professional II TCP/IP is now only possible via HTTP-Basic-Auth with the user "admin".
  - Deactivate: Should you want to deactivate the password protection on your meter choose this option and save the change.
  - Keep: If you want to change another setting but keep the password protection, choose this option before saving the settings.
  - Allow Online-Updates: If you want to allow signed firmware updates from EMU Electronic AG please choose this option.

Save your settings by clicking on the "Save" button on the lower right hand side.



*Note: If you select the option "Activate Password" but do not set a password, the meter will deactivate the password protection automatically.*

## Read out Configuration | Values

The configuration and Values displayed on the web interface can be downloaded as a .json file.

`http://[ip-address]/status.json` lists the meter configurations that are displayed on the web interface.

```
{
  "networkdhcactive": false,
  "networkip": "**.*.*.*.*",
  "networknm": "**.*.*.*.*",
  "networkgw": "**.*.*.*.*",
  "networkdns1": "**.*.*.*.*",
  "mbactive": true,
  "mbport": 502,
  "ntpactive": true,
  "ntp1": "pool.ntp.org",
  "meterserial": "22350000",
  "meterfactorynr": 0,
  "meterdatetime": 0,
  "networkmac": "10:2C:EF:**:**",
  "softwareversion": "1.0.14",
  "updateractive": true
}
```

`http://[ip-address]/meterdata.json` lists the current energy and momentary values of the meter.

```
{
  "meterdatetime": 1681808392,
  "wpulse_cnt_L123_e": "306.722",
  "wpulse_cnt_L123_T1_e": "306.722",
  "wpulse_cnt_L123_T2_e": "0.000",
  "wpulse_cnt_ex_L123_e": "0.000",
  "wpulse_cnt_ex_L123_T1_e": "0.000",

```

```

"wpulse_cnt_ex_L123_T2_e": "0.000",
"p_L123_act_e": "6.973",
"p_L1_act_e": "2.326",
"p_L2_act_e": "2.323",
"p_L3_act_e": "2.323",
"q_L123_act_e": "3.687",
"q_L1_act_e": "1.229",
"q_L2_act_e": "1.232",
"q_L3_act_e": "1.225",
"i_L123_act_e": "34.180",
"i_L1_act_e": "11.397",
"i_L2_act_e": "11.409",
"i_L3_act_e": "11.374",
"u_L1_act_e": "230.9",
"u_L2_act_e": "230.4",
"u_L3_act_e": "230.9",
"pf_L1_act_e": "0.88",
"pf_L2_act_e": "0.88",
"pf_L3_act_e": "0.88",
"f_L123_act_e": "50.0",
"showMinMax":true,
"p_max_L1_e": "4.192",
"p_max_L2_e": "4.150",
"p_max_L3_e": "4.036",
"p_max_L123_e": "12.379",
"p_min_L1_e": "-4.049",
"p_min_L2_e": "-3.795",
"p_min_L3_e": "-3.989",
"p_min_L123_e": "-11.834",
"q_max_L1_e": "1.311",
"q_max_L2_e": "1.310",
"q_max_L3_e": "1.304",
"q_max_L123_e": "3.926",
"q_min_L1_e": "0.001",
"q_min_L2_e": "0.001",
"q_min_L3_e": "0.001",
"q_min_L123_e": "0.005",
"i_max_L1_e": "18.521",
"i_max_L2_e": "18.373",
"i_max_L3_e": "17.835",
"i_max_L123_e": "54.729",
"i_min_L1_e": "-17.648",
"i_min_L2_e": "-16.576",
"i_min_L3_e": "-17.386",
"i_min_L123_e": "-51.610",
"u_min_L1_e": "223.2",
"u_min_L2_e": "222.8",
"u_min_L3_e": "223.2",
"u_max_L1_e": "234.3",
"u_max_L2_e": "233.9",
"u_max_L3_e": "234.4",
"pf_max_L1_e": "1.00",
"pf_max_L2_e": "1.00",
"pf_max_L3_e": "1.00",
"pf_min_L1_e": "-1.00",
"pf_min_L2_e": "-1.00",
"pf_min_L3_e": "-1.00",
"f_min_L123_e": "49.8",
"f_max_L123_e": "51.9",

```



```

"ts_p_max_L1_e": 1680457945,
"ts_p_max_L2_e": 1680457945,
"ts_p_max_L3_e": 1680457945,
"ts_p_max_L123_e": 1680457945,
"ts_p_min_L1_e": 1680628117,
"ts_p_min_L2_e": 1680628117,
"ts_p_min_L3_e": 1680628117,
"ts_p_min_L123_e": 1680628117,
"ts_q_max_L1_e": 1679908541,
"ts_q_max_L2_e": 1679908541,
"ts_q_max_L3_e": 1679896832,
"ts_q_max_L123_e": 1679908541,
"ts_q_min_L1_e": 1679673392,
"ts_q_min_L2_e": 1679673392,
"ts_q_min_L3_e": 1679673392,
"ts_q_min_L123_e": 1679673392,
"ts_i_max_L1_e": 1680457945,
"ts_i_max_L2_e": 1680457945,
"ts_i_max_L3_e": 1680457945,
"ts_i_max_L123_e": 1680457945,
"ts_i_min_L1_e": 1680628117,
"ts_i_min_L2_e": 1680628117,
"ts_i_min_L3_e": 1680628117,
"ts_i_min_L123_e": 1680628117,
"ts_u_min_L1_e": 1681731345,
"ts_u_min_L2_e": 1681731345,
"ts_u_min_L3_e": 1681731345,
"ts_u_max_L1_e": 1681400950,
"ts_u_max_L2_e": 1681400952,
"ts_u_max_L3_e": 1681400952,
"ts_pf_max_L1_e": 1679933033,
"ts_pf_max_L2_e": 1679933033,
"ts_pf_max_L3_e": 1679933033,
"ts_pf_min_L1_e": 1679753738,
"ts_pf_min_L2_e": 1679753738,
"ts_pf_min_L3_e": 1679753738,
"ts_f_min_L123_e": 1679742136,
"ts_f_max_L123_e": 1681806387
}

```

The following abbreviations are used:

Active Energy Import Total wpulse\_cnt\_L123\_e [kWh]  
 Active Energy Import T1 wpulse\_cnt\_L123\_T1\_e [kWh]  
 Active Energy Import T2 wpulse\_cnt\_L123\_T2\_e [kWh]  
 Active Energy Export Total wpulse\_cnt\_ex\_L123\_e [kWh]  
 Active Energy Export T1 wpulse\_cnt\_ex\_L123\_T1\_e [kWh]  
 Active Energy Export T2 wpulse\_cnt\_ex\_L123\_T2\_e [kWh]  
 Voltage Momentary L1-N u\_L1\_act\_e [V]  
 Voltage Momentary L2-N u\_L2\_act\_e [V]  
 Voltage Momentary L3-N u\_L3\_act\_e [V]  
 Voltage Minimum L1-N u\_min\_L1\_e [V]  
 Voltage Minimum L2-N u\_min\_L2\_e [V]  
 Voltage Minimum L3-N u\_min\_L3\_e [V]  
 Voltage Maximum L1-N u\_max\_L1\_e [V]  
 Voltage Maximum L2-N u\_max\_L2\_e [V]  
 Voltage Maximum L3-N u\_max\_L3\_e [V]  
 Active Power Momentary L123 p\_L123\_act\_e [kW]  
 Active Power Momentary L1 p\_L1\_act\_e [kW]  
 Active Power Momentary L2 p\_L2\_act\_e [kW]

Active Power Momentary L3 p\_L3\_act\_e [kW]  
 Active Power Minimum L123 p\_min\_L123\_e [kW]  
 Active Power Minimum L1 p\_min\_L1\_e [kW]  
 Active Power Minimum L2 p\_min\_L2\_e [kW]  
 Active Power Minimum L3 p\_min\_L3\_e [kW]  
 Active Power Maximum L123 p\_max\_L123\_e [kW]  
 Active Power Maximum L1 p\_max\_L1\_e [kW]  
 Active Power Maximum L2 p\_max\_L2\_e [kW]  
 Active Power Maximum L3 p\_max\_L3\_e [kW]  
 Reactive Power Momentary L123 q\_L123\_act\_e [kvar]  
 Reactive Power Momentary L1 q\_L1\_act\_e [kvar]  
 Reactive Power Momentary L2 q\_L2\_act\_e [kvar]  
 Reactive Power Momentary L3 q\_L3\_act\_e [kvar]  
 Reactive Power Minimum L123 q\_min\_L123\_e [kvar]  
 Reactive Power Minimum L1 q\_min\_L1\_e [kvar]  
 Reactive Power Minimum L2 q\_min\_L2\_e [kvar]  
 Reactive Power Minimum L3 q\_min\_L3\_e [kvar]  
 Reactive Power Maximum L123 q\_max\_L123\_e [kvar]  
 Reactive Power Maximum L1 q\_max\_L1\_e [kvar]  
 Reactive Power Maximum L2 q\_max\_L2\_e [kvar]  
 Reactive Power Maximum L3 q\_max\_L3\_e [kvar]  
 Current Momentary L123 i\_L123\_act\_e [A]  
 Current Momentary L1 i\_L1\_act\_e [A]  
 Current Momentary L2 i\_L2\_act\_e [A]  
 Current Momentary L3 i\_L3\_act\_e [A]  
 Current Minimum L123 i\_min\_L123\_e [A]  
 Current Minimum L1 i\_min\_L1\_e [A]  
 Current Minimum L2 i\_min\_L2\_e [A]  
 Current Minimum L3 i\_min\_L3\_e [A]  
 Current Maximum L123 i\_max\_L123\_e [A]  
 Current Maximum L1 i\_max\_L1\_e [A]  
 Current Maximum L2 i\_max\_L2\_e [A]  
 Current Maximum L3 i\_max\_L3\_e [A]  
 Power Factor Momentary L1 pf\_L1\_act\_e []  
 Power Factor Momentary L2 pf\_L2\_act\_e []  
 Power Factor Momentary L3 pf\_L3\_act\_e []  
 Power Factor Minimum L1 pf\_min\_L1\_e []  
 Power Factor Minimum L2 pf\_min\_L2\_e []  
 Power Factor Minimum L3 pf\_min\_L3\_e []  
 Power Factor Maximum L1 pf\_max\_L1\_e []  
 Power Factor Maximum L2 pf\_max\_L2\_e []  
 Power Factor Maximum L3 pf\_max\_L3\_e []  
 Frequency Momentary All Phases f\_L123\_act\_e [Hz]  
 Frequency Minimum All Phases f\_min\_L123\_e [Hz]  
 Frequency Maximum All Phases f\_max\_L123\_e [Hz]

ts\_values are the epoch timestamps of the specific minimal and maximal values and therefore show the time of occurrence.

## Reset

In case of wrongly entered settings you can reset the TCP-configuration of the EMU Professional II TCP/IP. For this, navigate to the “Settings” menu on the EMU Professional II TCP/IP and from there to “TCP/IP Interface”. Confirm the reset by choosing “Factory RESET”. After a factory reset the EMU Professional II may remain inaccessible for up to 5 minutes. The option “Soft RESET” restarts the TCP-module of the energy meter.



*Note: Whichever RESET is done no meter reading, measurements, ongoing measurements or other processes relevant to calibration are changed.*

# Read-Out Data Logger

## Data Retrieval

|                           |   |
|---------------------------|---|
| Last 3000 entries         | <a href="/data/">/data/</a>                                     |
| Last 96 entries           | <a href="/data/?last=96">/data/?last=96</a>                     |
| Entry 1 to 100            | <a href="/data/?from=1&amp;to=100">/data/?from=1&amp;to=100</a> |
| Entry 20 to 1, descending | <a href="/data/?from=20&amp;to=1">/data/?from=20&amp;to=1</a>   |

You can get the historical data of your EMU Professional II TCP/IP via the links at the bottom of the “Current Measurements” tab or by entering the following URL in your browser:

`http://[IP-Address of the meter]/data/`

If you specify no further parameters, the last 3000 entries are printed in descending order.



*Note: Read-Out provides a maximum of 3000 entries per request, if more entries are required, the queries can be transmitted in staggered order.*

## Possible Parameters

To specify further which data points you want, you can add the following parameters to the URL (HTTP-GET).

| Parameter | Description                                       |
|-----------|---|
| last=x    | Read-Out of the last x entries of the data logger |
| from=a    | Start your read-out at index a                    |
| to=b      | Stop your read-out at index b                     |

If index a is less than index b, the data is read-out chronologically ascending. To receive a descending read-out, enter the bigger index first (a>b).

## Examples

The last 30 entries: `http://[IP-Address]/data/?last=30`

The entries 55 to 65: `http://[IP-Address]/data/?from=55&to=65`

## CSV-File Structure of the data logger

| Column | Description                    | Unit | Resolution | Example Value        |
|--------|--------------------------------|------|------------|----------------------|
| 1      | Time stamp                     | UTC  |            | 2022-09-28T10:30:00Z |
| 2      | Index                          |      |            | 2                    |
| 3      | Status                         |      |            | 2                    |
| 4      | Serial number                  |      |            | 22350000             |
| 5      | Active Energy Import L123 T1   | Wh   | 1 Wh       | 0                    |
| 6      | Active Energy Import L123 T2   | Wh   | 1 Wh       | 0                    |
| 7      | Active Energy Export L123 T1   | Wh   | 1 Wh       | 0                    |
| 8      | Active Energy Export L123 T2   | Wh   | 1 Wh       | 0                    |
| 9      | Reactive Energy Import L123 T1 | varh | 1 varh     | 0                    |
| 10     | Reactive Energy Import L123 T2 | varh | 1 varh     | 0                    |
| 11     | Reactive Energy Export L123 T1 | varh | 1 varh     | 0                    |
| 12     | Reactive Energy Export L123 T2 | varh | 1 varh     | 0                    |
| 13     | Active Power L123              | W    | 1 W        | 4252                 |
| 14     | Active Power L1                | W    | 1 W        | 2010                 |
| 15     | Active Power L2                | W    | 1 W        | 992                  |
| 16     | Active Power L3                | W    | 1 W        | 1250                 |
| 17     | Current L123                   | mA   | 1 mA       | 15680                |
| 18     | Current L1                     | mA   | 1 mA       | 8682                 |
| 19     | Current L2                     | mA   | 1 mA       | 4300                 |
| 20     | Current L3                     | mA   | 1 mA       | 2698                 |
| 21     | Current N                      | mA   | 1 mA       | 0                    |
| 22     | Voltage L1-N                   | V    | 0.1V       | 2326                 |
| 23     | Voltage L2-N                   | V    | 0.1V       | 2320                 |
| 24     | Voltage L3-N                   | V    | 0.1V       | 2304                 |
| 25     | Power factor L1                |      | 0.01       | 99                   |
| 26     | Power factor L2                |      | 0.01       | 99                   |
| 27     | Power factor L3                |      | 0.01       | 99                   |
| 28     | Frequency                      | Hz   | 0.1 Hz     | 500                  |

## Definition of the Status-Codes

The status code is bit-coded. The following table describes the status byte for binary, hex, and decimal read out.

| Bit-Position | Bin        | Hex  | Dec | Description                       |
|--------------|------------|------|-----|-----------------------------------|
| 0-7          | 0b00000000 | 0x0  | 0   | No Change                         |
| 0            | 0b00000001 | 0x1  | 1   | Time changed                      |
| 1            | 0b00000010 | 0x2  | 2   | Current transformer ratio changed |
| 2            | 0b00000100 | 0x4  | 4   | Voltage transformer ratio changed |
| 3            | 0b00001000 | 0x8  | 8   | Impulse length changed            |
| 4            | 0b00010000 | 0x10 | 16  | Impulse ratio changed             |
| 5            | 0b00100000 | 0x20 | 32  | Power Failure                     |
| 6            | 0b01000000 | 0x40 | 64  | No time synchronization occurred  |
| 7            | 0b10000000 | 0x80 | 128 | Logbook is full                   |

# Read-Out Logbook

## Logbook Retrieval

|                           |   |
|---------------------------|---|
| Last 2048 entries         | <a href="/logbook/">/logbook/</a>                                     |
| Last 96 entries           | <a href="/logbook/?last=96">/logbook/?last=96</a>                     |
| Entry 1 to 100            | <a href="/logbook/?from=1&amp;to=100">/logbook/?from=1&amp;to=100</a> |
| Entry 20 to 1, descending | <a href="/logbook/?from=20&amp;to=1">/logbook/?from=20&amp;to=1</a>   |



*Note: The logbook is only available on the LP version of the meter.*

You can get the Logbook of your EMU Professional II TCP/IP via the following URL:

`http://[IP-Address]/logbook/`

If you specify no further parameters, the last 2048 entries are printed in descending order.



*Note: Read-Out provides a maximum of 2048 entries per request.*

## Possible Parameters

To specify further which data points of the logbook you want, you can add the following parameters to the URL (HTTP-GET).

| Parameter | Description                                   |
|-----------|---|
| last=x    | Read-Out of the last x entries of the logbook |
| from=a    | Start your read-out at index a                |
| to=b      | Stop your read-out at index b                 |

If index a is less than index b, the data is read-out chronologically ascending. To receive a descending read-out, enter the bigger index first ( $a > b$ ).

## Examples

The last 30 entries of the logbook: `http://[IP-Address]/data/?last=30`

The entries 55 to 65 of the logbook: `http://[IP-Address]/data/?from=55&to=65`

## CSV-File Structure of the Logbook

| Column | Description                               | Unit | Resolution | Example Value        |
|--------|---|------|------------|----------------------|
| 1      | Time stamp                                | UTC  | 1 s        | 2022-09-28T10:35:00Z |
| 2      | Time stamp after change                   | UTC  | 1 s        | 2022-09-28T10:37:30Z |
| 3      | Index                                     |      |            | 3                    |
| 4      | Serial Number                             |      |            | 22350000             |
| 5      | Active Energy Import L123 T1              | Wh   | 1 Wh       | 2568                 |
| 6      | Active Energy Import L123 T2              | Wh   | 1 Wh       | 120                  |
| 7      | Active Energy Export L123 T1              | Wh   | 1 Wh       | 487                  |
| 8      | Active Energy Export L123 T2              | Wh   | 1 Wh       | 3615                 |
| 9      | Index of corresponding load profile entry |      |            | 35                   |
| 10     | CT setting primary actual                 |      |            | 500                  |

| Column | Description                         | Unit  | Resolution | Example Value |
|--------|-------------------------------------|-------|------------|---------------|
| 11     | CT setting primary pre change(if)   |       |            | 5             |
| 12     | CT setting secondary actual         |       |            | 5             |
| 13     | CT setting secondary pre change(if) |       |            | 5             |
| 14     | VT setting primary actual           |       |            | 200           |
| 15     | VT setting primary pre change(if)   |       |            | 100           |
| 16     | VT setting secondary actual         |       |            | 100           |
| 17     | VT setting secondary pre change(if) |       |            | 100           |
| 18     | S0 pulse value actual               | P/kWh |            | 1000          |
| 19     | S0 pulse value pre change(if)       | P/kWh |            | 10            |
| 20     | S0 pulse width actual               | ms    |            | 2             |
| 21     | S0 pulse width pre change(if)       | ms    |            | 40            |

# Firmware-Update

The EMU Professional II TCP/IP allows for firmware updates of its communication module via its built in “mcumgr-server”.

You are able to access the update server once the configuration on the web interface is activated.



*Note: Only signed update files from EMU Electronic AG are allowed.*



**Danger:** *Improper use or interrupting the firmware update can lead to damage to the EMU Professional II TCP/IP!*



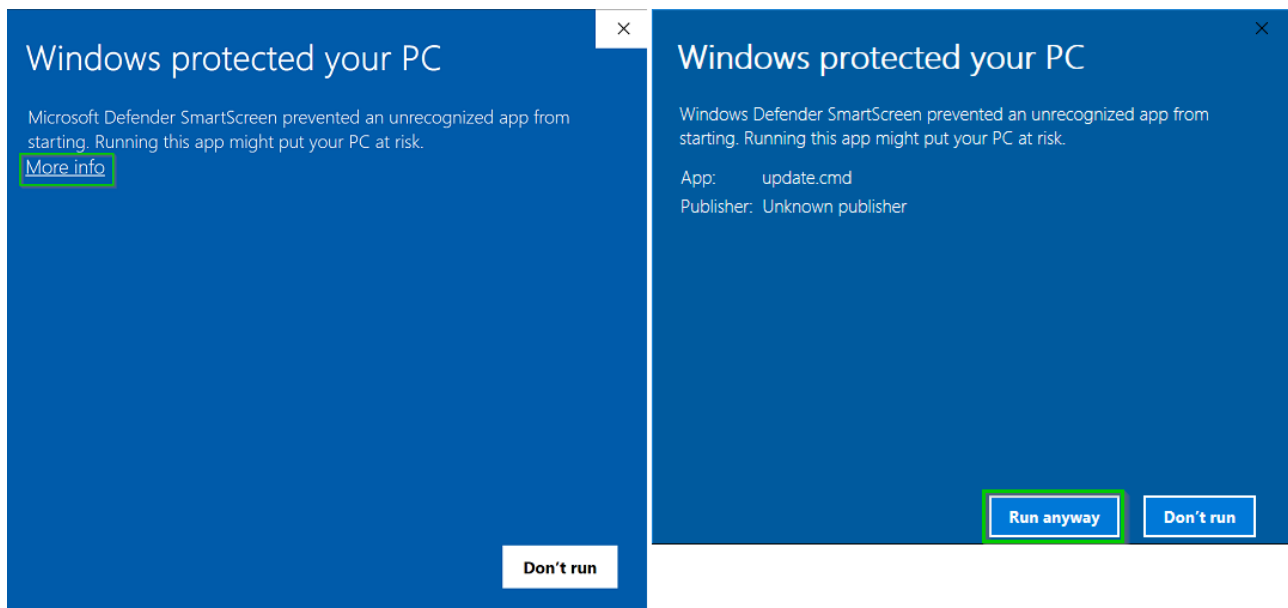
*Note: Updating is only possible on meters with a TCP firmware version 1.0.6 or newer.*



*Note: Updating the firmware of the communication module doesn't affect the firmware of the meter (FW-MID, FW-APP), also no meter reading, measurements, ongoing measurements or other processes relevant to calibration are changed.*



*Note: The first time you run the updater, a message from Microsoft Defender appears. Click on More information and then on Run anyway.*



## Requirements

Please make sure that the meter you want to update is in your local network and that the firewall and all other network-interfering programs are deactivated.

TCP port 1337 is a requirement for the update.

For an update under Windows 10, you can download the update tool incl. firmware here.

[https://www.emuag.ch/files/software/EMU\\_Professional\\_II\\_TCP\\_Updater.zip](https://www.emuag.ch/files/software/EMU_Professional_II_TCP_Updater.zip)

After downloading, the SHA256 hash of the mcumgr.exe file should be checked, this can be done with powershell as follows:

```
Get-FileHash .\mcumgr.exe -Algorithm SHA256
```

Output:

| Algorithm | Hash   |
|-----------|--|
| SHA256    | 311D5A72C040DFD0E1486B810B5E3EC32FE99A30CE245BF52C6C7B2B0EE8234E |

By starting the file "update.cmd" the update process is started.



*Note: When running the update.cmd command for the first time, a warning may appear that the computer is protected by Windows. To continue the update, you must select "More info" and then select the "Run anyway" option.*

The screenshot shows a Windows command prompt window titled "C:\WINDOWS\system32\cmd.exe". The window content displays the following text:

```
EMU Professional II TCP/IP Firmware update script
Enter IP Address:
```

The rest of the window is currently blank, indicating the script is waiting for user input.



## Example:

```
C:\WINDOWS\system32\cmd.exe
EMU Professional II TCP/IP Firmware update script
Enter IP Address:10.255.255.7
The device with the IP Address 10.255.255.7 will be updated, OK?
Continue [Y]   Cancel [N] y
Try to reach device with IP Address 10.255.255.7 ...
Device reachable ...
Connecting device and upload image ...
193.32 KiB / 193.32 KiB [=====] 100.00% 25.61 KiB/s 7s
Done
Image uploaded!
Images:
image=0 slot=0
  version: 1.0.13
  bootable: true
  flags: active confirmed
  hash: 247303db431765c07d04f726f60f085b8e22549dad16add3bc2e60849af9020d
image=0 slot=1
  version: 1.0.13
  bootable: true
  flags:
  hash: 247303db431765c07d04f726f60f085b8e22549dad16add3bc2e60849af9020d
Split status: N/A (0)
Activating new image ...
Images:
image=0 slot=0
  version: 1.0.13
  bootable: true
  flags: active confirmed
  hash: 247303db431765c07d04f726f60f085b8e22549dad16add3bc2e60849af9020d
image=0 slot=1
  version: 1.0.13
  bootable: true
  flags:
  hash: 247303db431765c07d04f726f60f085b8e22549dad16add3bc2e60849af9020d
Split status: N/A (0)
Restart TCP/IP modul ...
Done
Sent restart command, device should be up soon ...
Press any key to continue . . .
```

## Manually execute the Firmware Update

The update is done via the command line tool mcumgr. For the installation go must be installed in advance. After successful installation of “go”, the latest version of mcumgr can be installed via the command prompt:

```
go get -v github.com/apache/mynewt-mcumgr-cli/mcumgr
```



*Note: In the following example the EMU Professional II TCP/IP has the IP-Address 192.168.0.131 assigned.*

1. Download the new firmware and validate the checksum.
2. Read out the current firmware version of your EMU Professional II TCP/IP with the following command line argument:

```
mcumgr --conntype udp --connstring=192.168.0.131:1337 image list
```

The meter answers the following way. Version number and hash code may vary:

```
Images:
  image=0 slot=0
    version: 1.0.12
    bootable: true
    flags: active confirmed
    hash: oldHash
Split status: N/A (0)
```

3. Upload the new firmware version with the following command line argument:

```
mcumgr --conntype udp --connstring=192.168.0.131:1337 image upload [UpdateFilePath.bin]
```

The meter will send the following loading bar as answer:

```
200.11 KiB / 200.11 KiB [=====...====] 100.00% 34.99 KiB/s 5s
Done
```

4. The following command lets you review the status of the uploaded images. You can review the old, as well as the new firmware.

```
mcumgr --conntype udp --connstring=192.168.0.131:1337 image list
```

“Slot=0” contains the data of the old FW version and “Slot=1” contains the data of the newly uploaded FW version:

```
Images:
  image=0 slot=0
    version: 1.0.12
    bootable: true
    flags: active confirmed
    hash: oldHash
  image=0 slot=1
    version: 1.0.13
    bootable: true
    flags:
    hash: newHash
Split status: N/A (0)
```

5. Confirm the new firmware. The identification of the firmware is done via its checksum/Hash code. Use the following command line argument:

```
mcumgr --conntype udp --connstring=192.168.0.131:1337 image test
```

The meter answers with the following data:

```
Images:
image=0 slot=0
  version: 1.0.12
  bootable: true
  flags: active confirmed
  hash: oldHash
image=0 slot=1
  version: 1.0.13
  bootable: true
  flags: pending
  hash: newHash
Split status: N/A (0)
```

The new firmware has the flag “pending”.

6. Restart the TCP/IP module of the EMU Professional II TCP/IP with the following command line argument. After the successful restart of the TCP module the meter switches the old for the new firmware and starts up with the new firmware. Wait until the meter has received an IP-Address again before continuing with step 7.

```
mcumgr --conntype udp --connstring=192.168.0.131:1337 reset
```

7. Confirm the permanent change to the new firmware with the following command line argument:

```
mcumgr --conntype udp --connstring=192.168.0.131:1337 image confirm newHash
```

8. Delete the old firmware.



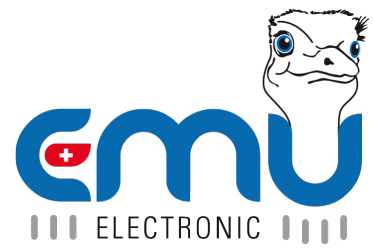
*Note: Deleting the old firmware is not mandatory. The firmware update is finished with step 7. This allows for switching between the two versions at any time.*



*Note: Please be advised that the EMU Professional II TCP/IP can only store 2 firmware images at any time. If both slots are full you will not be able to upload a new firmware update until you deleted one of the existing images!*

```
mcumgr --conntype udp --connstring=192.168.0.131:1337 image erase
```

The firmware update is finished successfully.



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