

## Modbus RTU/TCP Specifications

for device PLU-A-16.16

### Supported Modbus types:

3 = Holding Register

4 = Input Register

### Supported Modbus functions:

3 = Read Holding Register

4 = Read Input Register

6 = Write Single Register

16 = Write Multiple Register

23 = Read/Write Multiple registers

### Physical Layer for MODBUS-RTU:

RS485, 2400 to 115200Baud, 1/8 unit-load, no terminator required, line polarization integrated  
max. 128 devices without repeater

### Physical Layer for MODBUS-TCP (PLU-A.../TCP):

Ethernet 10BASE-T, RJ45 Socket, Port: 502

Default IP address: 192.168.1.1

### Device Typ:

Modbus RTU Slave, Modbus TCP Server

For additional information about Modbus specifications see <http://www.modbus.org/>

### Default settings:

MODBUS physical values(slave address, baudrate and parity) can set to default settings  
by pressing the reset-button over X3.15 terminal for >5 sec.

After successful reset the status led will flash red for 1 sec.

| Input Register |        |                |               |     |                                 |
|----------------|--------|----------------|---------------|-----|---------------------------------|
| Signal Name    | Typ    | Modbus address | Default value | Typ | Description                     |
| dev_ver        | uint16 | 0 (30000)      |               |     | Device version                  |
| dev_typ        | uint16 | 1              |               |     | Device typ:<br>10 = PLU-A-16.16 |
| in_value(1)    | uint16 | 2              |               |     | Data of Input 1, see in_hw_conf |
| ...            |        |                |               |     |                                 |
| in_value(16)   | uint16 | 17             |               |     | Data of Input 16                |

|                       |        |    |  |  |                                                                                                                                                                                |
|-----------------------|--------|----|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| in_digital_hold       | uint16 | 18 |  |  | Data of Inputs set as digital input.<br>Input set High will be hold until read out<br>.0 Input 1<br>...<br>.16 Input 16                                                        |
| out_digital_status    | uint16 | 19 |  |  | Data of digital Outputs<br>(Status for output, set as digital limit controller)<br>.0 Output 1<br>...<br>.16 Output 16                                                         |
| in_value_high_res(1)  | int16  | 20 |  |  | Data of Input 1 with high resolution, for input configuration set to temp.-sensor only. The input is scaled to °C * 100. As example:<br>input value 0 = 0,00°C, 2000 = 20,00°C |
| ...                   |        |    |  |  |                                                                                                                                                                                |
| in_value_high_res(16) | int16  | 35 |  |  | Data of Input 16 with high resolution                                                                                                                                          |
| dev_config            | uint16 | 36 |  |  | Configuration of device, bit-array:<br>1 = device with inputs only (PLU-A-16.00)<br>2 = device with outputs only (PLU-A-00.16)<br>3 = device with inputs+outputs (PLU-A-16.16) |
| dev_last_error        | uint16 | 37 |  |  | Device errors during last reboot<br>0 = normal start<br>1 = brown-out reset (undervoltage)<br>2 = watchdog reset (timeout on software)                                         |
|                       |        |    |  |  |                                                                                                                                                                                |

## Holding Register

| Signal Name  | Typ    | Modbus address | Default value | Typ  | Description                                                                                                                                                                                         |
|--------------|--------|----------------|---------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| dev_mode     | uint16 | 0 (40000)      | 1             | rem. | Modbus slave mode:<br>1 = normal operation<br>2 = no Modbus packed error send<br>3 = cycle data send (no Modbus Protocol)                                                                           |
| dev_address  | uint16 | 1              | 1             | rem. | Modbus slave address                                                                                                                                                                                |
| dev_baudrate | uint16 | 2              | 8             | rem. | Modbus Baudrate:<br>0 = reserved<br>4 = 2400 Baud<br>5 = 4800 Baud<br>6 = 9600 Baud<br>7 = 14400 Baud<br>8 = 19200 Baud<br>9 = 28800 Baud<br>10 = 38400 Baud<br>11 = 57600 Baud<br>12 = 115200 Baud |
| dev_parity   | uint16 | 3              | 2             | rem. | Modbus parity bit:<br>0 = No parity (2bit stop)<br>1 = Odd parity (1bit stop)<br>2 = Even parity (1bit stop)<br>3 = No parity (1bit stop)                                                           |

|               |        |   |   |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------|--------|---|---|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| in_hw_conf(1) | uint16 | 4 | 2 | rem. | <p>Input configuration:</p> <p><b>For input configuration set to temp.-sensor the input value is scaled to Kelvin * 10. As example: input value 2731 = 0°C, 2931 = 20°C</b></p> <p>0 = disable</p> <p>1 = digital (5-24V DC, 0=OFF, 65535=ON)</p> <p>2 = analog (0-30V, 0=0V, 65535=30V)</p> <p>3 = low-analog (0-2,048V, 0V=0, 2,048V=65535)</p> <p>4 = resistance up to 15kOhm (*Ohm)</p> <p>128* = PT100 (*0,1K)</p> <p>129* = PT200 (*0,1K)</p> <p>130* = PT500 (*0,1K)</p> <p>131* = PT1000 (*0,1K)</p> <p>132* = NI100 DIN (*0,1K)</p> <p>133* = NI200 DIN (*0,1K)</p> <p>134* = NI500 DIN (*0,1K)</p> <p>135* = NI1000 DIN (*0,1K)</p> <p>136* = NI100 TK5000 (*0,1K)</p> <p>137* = NI200 TK5000 (*0,1K)</p> <p>138* = NI500 TK5000 (*0,1K)</p> <p>139* = NI1000 TK5000 (*0,1K)</p> <p>256 = NTC 1K (*0,1K)</p> <p>257 = NTC 1K8 (*0,1K)</p> <p>258 = NTC 2K (*0,1K)</p> <p>259 = NTC 2K2 (*0,1K)</p> <p><b>configuration only for for PLU-A-16.16.011:</b></p> <p>512 = Thermocouple type B (*0,1K)</p> <p>513 = Thermocouple type E (*0,1K)</p> <p>514 = Thermocouple type J (*0,1K)</p> <p>515 = Thermocouple type K (*0,1K)</p> <p>516 = Thermocouple type N (*0,1K)</p> <p>517 = Thermocouple type R (*0,1K)</p> <p>518 = Thermocouple type S (*0,1K)</p> <p>519 = Thermocouple type T (*0,1K)</p> <p>Thermocouple range only higher than cold Junction compensation.</p> <p><b>configuration only for for PLU-A-16.16.021:</b></p> <p>4 = resistance up to 65kOhm (*Ohm)</p> <p>260 = NTC 3K (*0,1K)</p> <p>261 = NTC 4K7 (*0,1K)</p> <p>262 = NTC 5K (*0,1K)</p> <p>263 = NTC 10K (*0,1K)</p> <p>264 = NTC 12K (*0,1K)</p> <p>265 = NTC 15K (*0,1K)</p> <p>266 = NTC 20K (*0,1K)</p> <p>267 = NTC 3k3, Stefa FT-T30 (*0,1K)</p> <p>268 = NTC 22k, Stefa FT-TH2 (*0,1K)</p> <p><b>configuration only for PLU-A-16.16.031:</b></p> <p>384=KP10/LMx35 (*0,1K)</p> <p>*=with sensor error detection:</p> <p>input value = 0: sensor short circuit</p> <p>input value = 65535: sensor open</p> |
|---------------|--------|---|---|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                     |        |     |       |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------|--------|-----|-------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ...                 |        |     |       |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| in_hw_conf(16)      | uint16 | 19  | 2     | rem. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| out_value(1)        | uint16 | 20  | 0     |      | out_value_min to out_value_max : 0-10V                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| ...                 |        |     |       |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| out_value(16)       | uint16 | 35  | 0     |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| out_value_min(1)    | uint16 | 36  | 0     | rem. | analog output: out_value for 0V output<br>digital limit controller: off switch point                                                                                                                                                                                                                                                                                                                                                                                                          |
| ...                 |        |     |       |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| out_value_min(16)   | uint16 | 51  | 0     | rem. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| out_value_max(1)    | uint16 | 52  | 65535 | rem. | analog output: out_value for 10V output<br>digital limit controller: on switch point                                                                                                                                                                                                                                                                                                                                                                                                          |
| ...                 |        |     |       |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| out_value_max(16)   | uint16 | 67  | 65535 | rem. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| io_bind             | uint16 | 68  | 0     | rem. | bind in_value to out_value (measuring amplifier)<br>.0: in/out(0)<br>...<br>.15: in/out(15)                                                                                                                                                                                                                                                                                                                                                                                                   |
| out_hw_conf(1)      | uint16 | 69  | 3     | rem. | Output configuration:<br>(digital output only PLU-A.../DO)<br>0 = disable<br>1 = digital (out_value=0: OFF, out_value>0: ON)<br>2 = digital pwm<br>(out_value=out_value_min: 0% pwm<br>out_value=out_value_max: 100% pwm)<br>3 = analog<br>(out_value=out_value_min: 0V<br>out_value=out_value_max: 10V)<br>4 = digital limit controller<br>(out_value < out_value_min: switch OFF,<br>out_value > out_value_max: switch ON,<br>change out_value_min and out_value_max for<br>output inverse) |
| ...                 |        |     |       |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| out_hw_conf(16)     | uint16 | 84  | 3     | rem. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| out_hw_pwm_time(1)  | uint16 | 85  | 200   | rem. | time for pwm cycle (1 step = 50ms)                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| ...                 |        |     |       |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| out_hw_pwm_time(16) | uint16 | 100 | 200   | rem. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| in_hw_s_lenght(1)   | uint16 | 101 | 0     | rem. | compensation value for resistance on cable<br>(temp.-sensor and resistance inputs) (*0,1Ohm)                                                                                                                                                                                                                                                                                                                                                                                                  |
| ...                 |        |     |       |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| in_hw_s_lenght(16)  | uint16 | 116 | 0     | rem. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| fault_timer         | uint16 | 117 | 0     | rem. | fault timer<br>0 = disabled<br>>0 = time for bus fault (1 step = 50ms)<br>On bus fault, out_value will be set to<br>fault_out_value                                                                                                                                                                                                                                                                                                                                                           |
| fault_out_value(1)  | uint16 | 118 | 0     | rem. | fault value for output 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| ...                 |        |     |       |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| fault_out_value(16) | uint16 | 133 | 0     | rem. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| dev_boot_count      | uint16 | 134 | 0     | rem. | count up by one on every device boot,<br>can be cleared by master                                                                                                                                                                                                                                                                                                                                                                                                                             |

|                  |        |     |   |      |                                                                        |
|------------------|--------|-----|---|------|------------------------------------------------------------------------|
| dev_reboot_count | uint16 | 135 | 0 | rem. | count up by one on non normal device boot,<br>can be cleared by master |
|                  |        |     |   |      |                                                                        |

rem. = remanence data