# MODBUS RTU Protocol Description for Earthfault-Detection-Relay EOR-3D

Version: 3.7

Creation Date: 2011-06-04
Release Date: 2019-04-23

| Author | Department | Changes | Version | Date |
|---|---|---|---|---|
| Manfred Gruber | - | Initial Version | 1.0 | 2011-06-04 |
| Manfred Gruber | - | Changes | 1.1-1.9 | 2011-12-22 |
| Manfred Gruber | - | Time, coil | 2.0 | 2011-12-29 |
| Manfred Gruber | - | Text changes | 2.1 | 2012-05-21 |
| Manfred Gruber | - | Added cos phi | 2.2 | 2013-07-18 |
| Manfred Gruber | - | Added BE_LT9,10 | 2.3 | 2013-07-18 |
| Manfred Gruber | - | Added Extremas | 2.4 | 2014-07-05 |
| Manfred Gruber | - | Schreens new TB | 2.5 | 2016-01-13 |
| Manfred Gruber | - | New BEF, BE2..BE6 | 2.6 | 2016-01-21 |
| Manfred Gruber | - | New Power frequency | 2.7 | 2016-09-01 |
| Manfred Gruber | - | virtual var., reg. offset changes | 2.8 | 2018-04-17 |
| Manfred Gruber | - | Added U23,U31 | 2.9 | 2018-04-26 |
| Manfred Gruber | - | Added ISC | 3.0 | 2018-05-23 |
| Manfred Gruber | - | Removed errro, old Coils Adr used | 3.1 | 2018-10-10 |
| Manfred Gruber | - | Corrected errors | 3.2 | 2018-10-25 |
| Manfred Gruber | - | Corrected errors coil | 3.3 | 2019-01-21 |
| Manfred Gruber | - | Changed names | 3.4 | 2019-02-13 |
| Manfred Gruber | - | Added Time_2 and 0x6 Function | 3.5 | 2019-02-22 |
| Manfred Gruber | - | Changed >I->L | 3.6 | 2019-04-11 |
| Manfred Gruber | - | Added BAFs | 3.7 | 2019-04-23 |
| | | | | |
| | | | | |

**Distribution:**

| Name | Department | Location | Version |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# Content

# 1 Modbus Protocol

This document describes the characteristics of the MODBUS RTU communication protocol of EORD-3D device.

# 2 Modbus Protocol

EOR-3D devices can be connected to a Modbus Network in order to communicate MODBUS RTU protocol via RS232/RS485 and TCP/IP.

## 2.1 Technical characteristics of the MODBUS connection

### 2.1.1 Parameters of the MODBUS connection

The different parameters of the MODBUS connection are as follows:

- RS232 connection
- Isolated two-point RS485 connection (2kV 50Hz)
- MODBUS line protocol in RTU mode
- Communication speed can be configured

### 2.1.2 Transmission mode

Baud rate:

- 9600
- 19200
- 38400
- 57600
- 115200

Mode:

- 1 start / 8 bits / 1 stop: total 10 bits
- 1 start / 8 bits / even parity / 1 stop: total 11 bits
- 1 start / 8 bits / odd parity / 1 stop: total 11 bits
- 1 start / 8 bits / none parity / 2 stop: total 11 bits

--> 1,5 Stopbits are not supported by the Modbus Slave

### 2.1.3 Address of the EOR-3D

The address of the EOR-3D on the same MODBUS network is situated between 1 and 247. The address 0 is reserved for the broadcast messages.

### 2.1.4 MODBUS functions of the EOR-3D

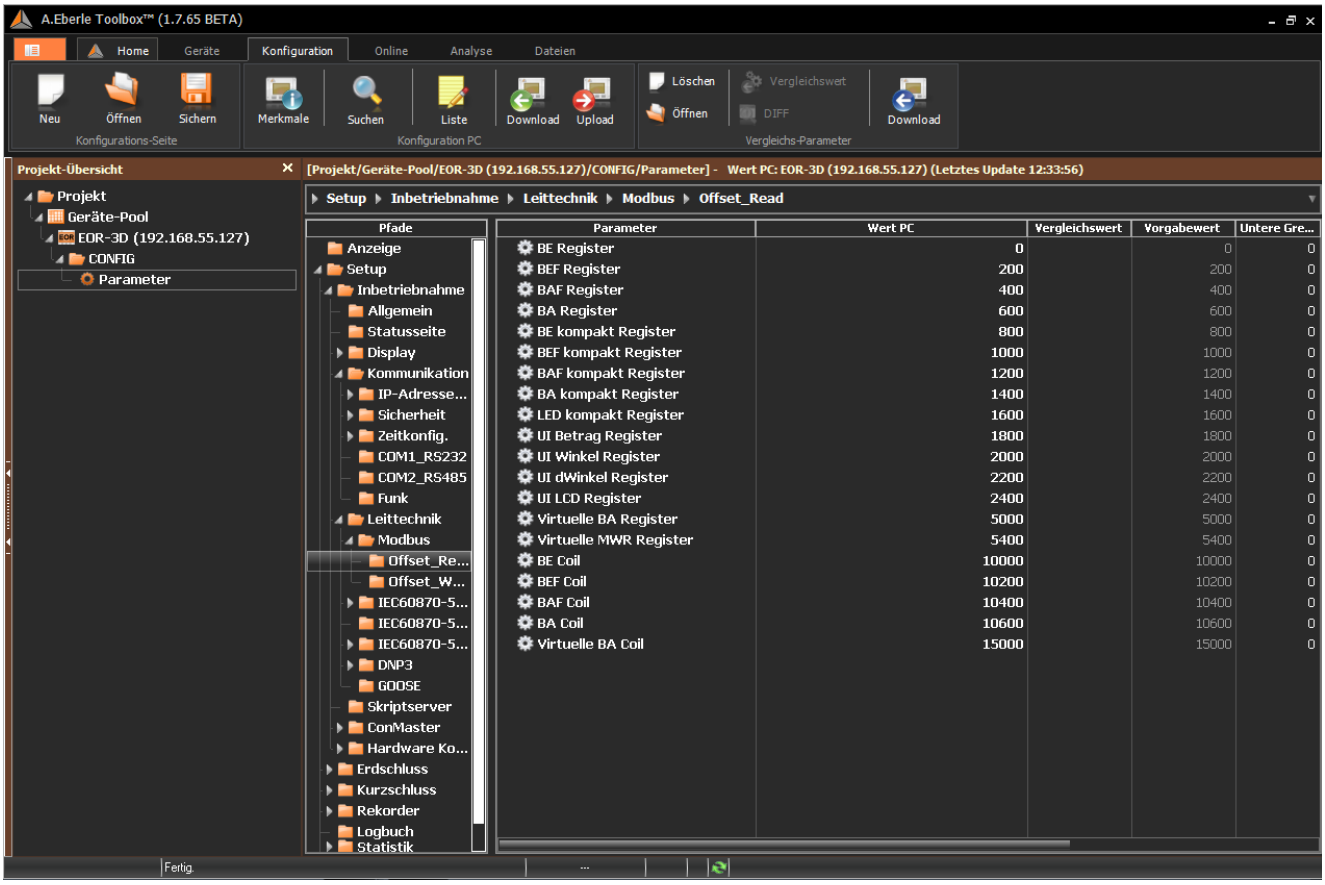
MODBUS functions implemented on the EOR-3D are:

- Function 01 (0x01): Read Coils
- Function 03 (0x03): Read Holding Registers
- Function 04 (0x04): Read Input Registers
- Function 05 (0x05): Write Coils
- Function 06 (0x06): Write Single Register (only use for 16 bit registers!)
- Function 15 (0x0F): Write Multiple Coils
- Function 16 (0x10): Write Multiple Registers (Holding Registers)

# 3 EOR-3D Modbus Register Organisation

## 3.1 EOR-3D Modbus Register Organisation – Register offsets

Modbus register offsets can be change via EOR-3D Toolbox. Please take care when changing offsets, that there are no overlapping registers (look at the size of the register block).




**Picture 1: Register offsets**

## 3.2 EOR-3D Modbus Register Organisation

MODBUS Input Registers and Holding Registers are mapped at the same register addresses. So it is possible to Read Input and Holding Registers on the same registers.

To write of multiple registers is possible with function 0x10 (Function 16 (0x10): Write Multiple Registers)

**--> Writing of "BE via LT" is possible, offset default 2600.**

MODBUS Coils are mapped to Holding Registers where coils are possible. Coils are on a special addresses mapped if systems have problems with multiple register.

**--> Offset of Coils start at 3000**

To write coils function 0x05 (Function 5 (0x05): Write Coils) and 0x0F (Function 15 (0x0F): Write Multiple Coils) is included.

**Information: BE** **Default offset: 0**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 0 | BE_1 (BE1) | int16 | false | BE_1 |
| 1 | BE_2 (BE2) | int16 | false | BE_2 |
| 2 | BE_3 (BE3) | int16 | false | BE_3 |
| 3 | BE_4 (BE4) | int16 | false | BE_4 |
| 4 | BE_5 (BE5) | int16 | false | BE_5 |
| 5 | BE_6 (BE6) | int16 | false | BE_6 |

**BE can be also read as coils and also be read at other default offset 3000, please look at the coils part.**

**Information: BEF** **Default offset: 200**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 200 | BEF_1 (AUS) | int16 | false | BEF_1 |
| 201 | BEF_2 (Reboot E3D) | int16 | false | BEF_2 |
| 202 | BEF_3 (Aufz. starten) | int16 | false | BEF_3 |
| 203 | BEF_4 (Reset alles) | int16 | false | BEF_4 |
| 204 | BEF_5 (Reset LEDs) | int16 | false | BEF_5 |
| 205 | BEF_6 (Reset qu2) | int16 | false | BEF_6 |
| 206 | BEF_7 (Reset cos(phi)) | int16 | false | BEF_7 |
| 207 | BEF_8 (Reset sin(phi)) | int16 | false | BEF_8 |
| 208 | BEF_9 (Reset OV) | int16 | false | BEF_9 |
| 209 | BEF_10 (Reset Puls50) | int16 | false | BEF_10 |
| 210 | BEF_11 (Reset Kurzschluss) | int16 | false | BEF_11 |
| 211 | BEF_12 (Reset Statistik) | int16 | false | BEF_12 |
| 212 | BEF_13 (Reset FastPuls) | int16 | false | BEF_13 |
| 213 | BEF_14 (Reset Adm2) | int16 | false | BEF_14 |
| 214 | BEF_15 (BEF nicht zugewiesen) | int16 | false | BEF_15 |
| 215 | BEF_16 (BEF nicht zugewiesen) | int16 | false | BEF_16 |

**BEF can be also read as coils and also be read at other default offset 3200, please look at the coils part.**

**Information: BAF** **Default offset: 400**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 400 | BAF_1 (AUS) | int16 | false | AUS |
| 401 | BAF_2 (PROG) | int16 | false | PROG |
| 402 | BAF_3 (Status) | int16 | false | Status |

| | | | | |
|---|---|---|---|---|
| 403 | BAF_4 (Störung) | int16 | false | Störung |
| 404 | BAF_5 (U1_ok) | int16 | false | U1_ok |
| 405 | BAF_6 (U2_ok) | int16 | false | U2_ok |
| 406 | BAF_7 (U3_ok) | int16 | false | U3_ok |
| 407 | BAF_8 (user_BAF1) | int16 | false | user_BAF1 |
| 408 | BAF_9 (user_BAF2) | int16 | false | user_BAF2 |
| 409 | BAF_10 (user_BAF3) | int16 | false | user_BAF3 |
| 410 | BAF_11 (user_BAF4) | int16 | false | user_BAF4 |
| 411 | BAF_12 (user_BAF5) | int16 | false | user_BAF5 |
| 412 | BAF_13 (user_BAF6) | int16 | false | user_BAF6 |
| 413 | BAF_14 (user_BAF7) | int16 | false | user_BAF7 |
| 414 | BAF_15 (user_BAF8) | int16 | false | user_BAF8 |
| 415 | BAF_16 (>Uerd) | int16 | false | >Uerd |
| 416 | BAF_17 (>Uerd_delay) | int16 | false | >Uerd_delay |
| 417 | BAF_18 (Uerd_L1) | int16 | false | Uerd_L1 |
| 418 | BAF_19 (Uerd_L2) | int16 | false | Uerd_L2 |
| 419 | BAF_20 (Uerd_L3) | int16 | false | Uerd_L3 |
| 420 | BAF_21 (Uerd_L1_d) | int16 | false | Uerd_L1_d |
| 421 | BAF_22 (Uerd_L2_d) | int16 | false | Uerd_L2_d |
| 422 | BAF_23 (Uerd_L3_d) | int16 | false | Uerd_L3_d |
| 423 | BAF_24 (Sum_Uerd ->L) | int16 | false | Sum_Uerd ->L |
| 424 | BAF_25 (Sum_Uerd ->S) | int16 | false | Sum_Uerd ->S |
| 425 | BAF_26 (Prio_Uerd ->L) | int16 | false | Prio_Uerd ->L |
| 426 | BAF_27 (Prio_Uerd ->S) | int16 | false | Prio_Uerd ->S |
| 427 | BAF_28 (qu2 ->L) | int16 | false | qu2 ->L |
| 428 | BAF_29 (qu2 ->S) | int16 | false | qu2 ->S |
| 429 | BAF_30 (qu2_DE ->L) | int16 | false | qu2_DE ->L |
| 430 | BAF_31 (qu2_DE ->S) | int16 | false | qu2_DE ->S |
| 431 | BAF_32 (qui ->L) | int16 | false | qui ->L |
| 432 | BAF_33 (qui ->S) | int16 | false | qui ->S |
| 433 | BAF_34 (cos ->L) | int16 | false | cos ->L |
| 434 | BAF_35 (cos ->S) | int16 | false | cos ->S |
| 435 | BAF_36 (sin ->L) | int16 | false | sin ->L |
| 436 | BAF_37 (sin ->S) | int16 | false | sin ->S |
| 437 | BAF_38 (c_s ->L) | int16 | false | c_s ->L |
| 438 | BAF_39 (c_s ->S) | int16 | false | c_s ->S |
| 439 | BAF_40 (OV_250 ->L) | int16 | false | OV_250 ->L |
| 440 | BAF_41 (OV_250 ->S) | int16 | false | OV_250 ->S |
| 441 | BAF_42 (OV_fx1 ->L) | int16 | false | OV_fx1 ->L |

| | | | | |
|---|---|---|---|---|
| 442 | BAF_43 (OV_fx1 ->S) | int16 | false | OV_fx1 ->S |
| 443 | BAF_44 (OV_fx2+ ->L) | int16 | false | OV_fx2+ ->L |
| 444 | BAF_45 (OV_fx2+ ->S) | int16 | false | OV_fx2+ ->S |
| 445 | BAF_46 (OV_fx2- ->L) | int16 | false | OV_fx2- ->L |
| 446 | BAF_47 (OV_fx2- ->S) | int16 | false | OV_fx2- ->S |
| 447 | BAF_48 (Puls_50) | int16 | false | Puls_50 |
| 448 | BAF_49 (Puls_50c) | int16 | false | Puls_50c |
| 449 | BAF_50 (Puls_50c ->L) | int16 | false | Puls_50c ->L |
| 450 | BAF_51 (Puls_50c ->S) | int16 | false | Puls_50c ->S |
| 451 | BAF_52 (Puls50 LED) | int16 | false | Puls50 LED |
| 452 | BAF_53 (Puls_HPCI_50) | int16 | false | Puls_HPCI_50 |
| 453 | BAF_54 (Puls_HPCI_50 ->L) | int16 | false | Puls_HPCI_50 ->L |
| 454 | BAF_55 (Puls_HPCI_50 ->S) | int16 | false | Puls_HPCI_50 ->S |
| 455 | BAF_56 (Puls_HPCI_fx) | int16 | false | Puls_HPCI_fx |
| 456 | BAF_57 (>I) | int16 | false | >I |
| 457 | BAF_58 (>I1) | int16 | false | >I1 |
| 458 | BAF_59 (>I2) | int16 | false | >I2 |
| 459 | BAF_60 (>I3) | int16 | false | >I3 |
| 460 | BAF_61 (>>I) | int16 | false | >>I |
| 461 | BAF_62 (>>I1) | int16 | false | >>I1 |
| 462 | BAF_63 (>>I2) | int16 | false | >>I2 |
| 463 | BAF_64 (>>I3) | int16 | false | >>I3 |
| 464 | BAF_65 (>I ->L) | int16 | false | >I ->L |
| 465 | BAF_66 (>I1 ->L) | int16 | false | >I1 ->L |
| 466 | BAF_67 (>I2 ->L) | int16 | false | >I2 ->L |
| 467 | BAF_68 (>I3 ->L) | int16 | false | >I3 ->L |
| 468 | BAF_69 (>>I ->L) | int16 | false | >>I ->L |
| 469 | BAF_70 (>>I1 ->L) | int16 | false | >>I1 ->L |
| 470 | BAF_71 (>>I2 ->L) | int16 | false | >>I2 ->L |
| 471 | BAF_72 (>>I3 ->L) | int16 | false | >>I3 ->L |
| 472 | BAF_73 (>I ->S) | int16 | false | >I ->S |
| 473 | BAF_74 (>I1 ->S) | int16 | false | >I1 ->S |
| 474 | BAF_75 (>I2 ->S) | int16 | false | >I2 ->S |
| 475 | BAF_76 (>I3 ->S) | int16 | false | >I3 ->S |
| 476 | BAF_77 (>>I ->S) | int16 | false | >>I ->S |
| 477 | BAF_78 (>>I1 ->S) | int16 | false | >>I1 ->S |
| 478 | BAF_79 (>>I2 ->S) | int16 | false | >>I2 ->S |
| 479 | BAF_80 (>>I3 ->S) | int16 | false | >>I3 ->S |
| 480 | BAF_81 (>Ferro Res.) | int16 | false | >Ferro Res. |

| | | | | |
|---|---|---|---|---|
| 481 | BAF_82 (50Hz -df) | int16 | false | 50Hz -df |
| 482 | BAF_83 (50Hz +df) | int16 | false | 50Hz +df |
| 483 | BAF_84 (50Hz n.a.) | int16 | false | 50Hz n.a. |
| 484 | BAF_85 (DynAdm ->L) | int16 | false | DynAdm ->L |
| 485 | BAF_86 (DynAdm ->S) | int16 | false | DynAdm ->S |
| 486 | BAF_87 (I_kE>) | int16 | false | I_kE> |
| 487 | BAF_88 (I_kE> ->L) | int16 | false | I_kE> ->L |
| 488 | BAF_89 (I_kE> ->S) | int16 | false | I_kE> ->S |

**BAF can be also read as coils and also be read at other default offset 3400, please look at the coils part.**

**Information: BA Default offset: 600**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 600 | BA_1 (Rel_1 Function depends on assignment) | int16 | false | BA_1 |
| 601 | BA_2 (Rel_2 Function depends on assignment) | int16 | false | BA_2 |
| 602 | BA_3 (Rel_3 Function depends on assignment) | int16 | false | BA_3 |
| 603 | BA_4 (Rel_4 Function depends on assignment) | int16 | false | BA_4 |
| 604 | BA_5 (Rel_5 Function depends on assignment) | int16 | false | BA_5 |
| 605 | BA_6 (Rel_6 Function depends on assignment) | int16 | false | BA_6 |
| 606 | BA_7 (Rel_7 Function depends on assignment) | int16 | false | BA_7 |
| 607 | BA_8 (Rel_8 Function depends on assignment) | int16 | false | BA_8 |

**BA can be also read as coils and also be read at other default offset 3600, please look at the coils part.**

**Information: BE compact Default offset: 800**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 800 | BE_compact_1 (BI as compact value) | int32 | false | BE_compact_1 |

**Information: BEF compact Default offset: 1000**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 1000 | BEF_compact_1 (BIF as compact value) | int32 | false | BEF_compact_1 |

**Information: BAF compact Default offset: 1200**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 1200 | BAF_1 (All BOFs and delayed BOFs => 8x uint32;) | int32 | false | BAF_compact_1 |
| 1202 | BAF_2 (All BOFs and delayed BOFs => 8x uint32;) | int32 | false | BAF_compact_2 |
| 1204 | BAF_3 (All BOFs and delayed BOFs => 8x uint32;) | int32 | false | BAF_compact_3 |
| 1206 | BAF_4 (All BOFs and delayed BOFs => 8x uint32;) | int32 | false | BAF_compact_4 |

| | | | | |
|---|---|---|---|---|
| 1208 | BAF_5 (All BOFs and delayed BOFs => 8x uint32;) | int32 | false | BAF_compact_5 |
| 1210 | BAF_6 (All BOFs and delayed BOFs => 8x uint32;) | int32 | false | BAF_compact_6 |
| 1212 | BAF_7 (All BOFs and delayed BOFs => 8x uint32;) | int32 | false | BAF_compact_7 |
| 1214 | BAF_8 (All BOFs and delayed BOFs => 8x uint32;) | int32 | false | BAF_compact_8 |

**Information: BA compact** **Default offset: 1400**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 1400 | BA_compact_1 (BO as compact value) | int32 | false | BA_compact_1 |

**Information: LED compact** **Default offset: 1600**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 1600 | LED_compact_1 (LED as compact value) | int32 | false | LED_compact_1 |

**Information: UI Values from EOR3D process image** **Default offset: 1800**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 1800 | UI_value_1 (Absolute value Uo in V (secondary)) | float32 | false | UI_value_1 |
| 1802 | UI_value_2 (Absolute value U1 in V (secondary)) | float32 | false | UI_value_2 |
| 1804 | UI_value_3 (Absolute value U2 in V (secondary)) | float32 | false | UI_value_3 |
| 1806 | UI_value_4 (Absolute value U3 in V (secondary)) | float32 | false | UI_value_4 |
| 1808 | UI_value_5 (Absolute value Io in mA (secondary)) | float32 | false | UI_value_5 |
| 1810 | UI_value_6 (Absolute value I1 in mA (secondary)) | float32 | false | UI_value_6 |
| 1812 | UI_value_7 (Absolute value I2 in mA (secondary)) | float32 | false | UI_value_7 |
| 1814 | UI_value_8 (Absolute value I3 in mA (secondary)) | float32 | false | UI_value_8 |

**Information: UI angle from EOR3D process image** **Default offset: 2000**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 2000 | UI_angle_1 (Angle Uo in degree) | float32 | false | UI_angle_1 |
| 2002 | UI_angle_2 (Angle U1 in degree) | float32 | false | UI_angle_2 |
| 2004 | UI_angle_3 (Angle U2 in degree) | float32 | false | UI_angle_3 |
| 2006 | UI_angle_4 (Angle U3 in degree) | float32 | false | UI_angle_4 |
| 2008 | UI_angle_5 (Angle Io in degree) | float32 | false | UI_angle_5 |
| 2010 | UI_angle_6 (Angle I1 in degree) | float32 | false | UI_angle_6 |
| 2012 | UI_angle_7 (Angle I2 in degree) | float32 | false | UI_angle_7 |
| 2014 | UI_angle_7 (Angle I3 in degree) | float32 | false | UI_angle_8 |

**Information: UI d. angle from EOR3D process image** **Default offset: 2200**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 2200 | UI_d_angle_1 (Angle (Uo_Io) in degree) | float32 | false | UI_d_angle_1 |
| 2202 | UI_d_angle_2 (Angle (U1_I1) in degree) | float32 | false | UI_d_angle_2 |
| 2204 | UI_d_angle_3 (Angle (U2_I2) in degree) | float32 | false | UI_d_angle_3 |
| 2206 | UI_d_angle_4 (Angle (U3_I3) in degree) | float32 | false | UI_d_angle_4 |

**Information: Values from EOR3D LCD Display** **Default offset: 2400**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 2400 | Up_0 (Absolute value Uo in kV (primary)) | float32 | false | Up_0 |
| 2402 | Up_1 (Absolute value U1 in kV (primary)) | float32 | false | Up_1 |
| 2404 | Up_2 (Absolute value U2 in kV (primary)) | float32 | false | Up_2 |
| 2406 | Up_3 (Absolute value U3 in kV (primary)) | float32 | false | Up_3 |
| 2408 | Ip_0 (Absolute value Io in A (primary)) | float32 | false | Ip_0 |
| 2410 | Ip_1 (Absolute value I1 in A (primary)) | float32 | false | Ip_1 |
| 2412 | Ip_2 (Absolute value I2 in A (primary)) | float32 | false | Ip_2 |
| 2414 | Ip_3 (Absolute value I3 in A (primary)) | float32 | false | Ip_3 |
| 2416 | Us_0 (Absolute value Uo in V (secondary)) | float32 | false | Us_0 |
| 2418 | Us_1 (Absolute value U1 in V (secondary)) | float32 | false | Us_1 |
| 2420 | Us_2 (Absolute value U2 in V (secondary)) | float32 | false | Us_2 |
| 2422 | Us_3 (Absolute value U3 in V (secondary)) | float32 | false | Us_3 |
| 2424 | Is_0 (Absolute value Io in mA (secondary)) | float32 | false | Is_0 |
| 2426 | Is_1 (Absolute value I1 in mA (secondary)) | float32 | false | Is_1 |
| 2428 | Is_2 (Absolute value I2 in mA (secondary)) | float32 | false | Is_2 |
| 2430 | Is_3 (Absolute value I3 in mA (secondary)) | float32 | false | Is_3 |
| 2432 | U12p (Absolute value U12) | float32 | false | U12p |
| 2434 | U12p_r (Real coefficient U12) | float32 | false | U12p_r |
| 2436 | U12p_i (Imaginary coefficient U12) | float32 | false | U12p_i |
| 2438 | wU12 (Angle U12) | float32 | false | wU12 |
| 2440 | Angle (Uo_Io) in degree (dw0) | float32 | false | dw_0 |
| 2442 | Angle (U1_I1) in degree (dw1) | float32 | false | dw_1 |
| 2444 | Angle (U2_I3) in degree (dw2) | float32 | false | dw_2 |
| 2446 | Angle (U3_I3) in degree (dw3) | float32 | false | dw_3 |
| 2448 | P_0 (Active power Zero sequence component Po in kW) | float32 | false | P_0 |
| 2450 | P_1 (Active power Phase_1 P1 in kW) | float32 | false | P_1 |
| 2452 | P_2 (Active power Phase_2 P2 in kW) | float32 | false | P_2 |
| 2454 | P_3 (Active power Phase_3 P3 in kW) | float32 | false | P_3 |
| 2456 | Q_0 (Reactive power Zero sequence component Qo | float32 | false | Q_0 |

| | | | | |
|---|---|---|---|---|
| | in kVar) | | | |
| 2458 | Q_1 (Reactive power Phase_1 Q1 in kVar) | float32 | false | Q_1 |
| 2460 | Q_2 (Reactive power Phase_2 Q2 in kVar) | float32 | false | Q_2 |
| 2462 | Q_3 (Reactive power Phase_3 Q3 in kVar) | float32 | false | Q_3 |
| 2464 | S_0 (Apparent power Zero sequence component So in kVA) | float32 | false | S_0 |
| 2466 | S_1 (Apparent power Phase_1 S1 in kVA) | float32 | false | S_1 |
| 2468 | S_2 (Apparent power Phase_2 S2 in kVA) | float32 | false | S_2 |
| 2470 | S_3 (Apparent power Phase_3 S3 in kVA) | float32 | false | S_3 |
| 2472 | Pg (All Active power P1+P2+P3) in kW | float32 | false | Pg |
| 2474 | Qg (All reactive power Q1+Q2+Q3) in kVar | float32 | false | Qg |
| 2476 | Sg (All apparent power S1+S2+S3) in kVA | float32 | false | Sg |
| 2478 | Cosphi | float32 | false | cosphi |
| 2480 | Power frequency | float32 | false | f_grid |
| 2482 | Uo Maximum value of magnitude | float32 | false | Umax_0 |
| 2484 | U1 Maximum value of magnitude | float32 | false | Umax_1 |
| 2486 | U2 Maximum value of magnitude | float32 | false | Umax_2 |
| 2488 | U3 Maximum value of magnitude | float32 | false | Umax_3 |
| 2490 | Uo Minimum value, that is greater than 0,5 * U_nenn | float32 | false | Umin_0 |
| 2492 | U1 Minimum value, that is greater than 0,5 * U_nenn | float32 | false | Umin_1 |
| 2494 | U2 Minimum value, that is greater than 0,5 * U_nenn | float32 | false | Umin_2 |
| 2496 | U3 Minimum value, that is greater than 0,5 * U_nenn | float32 | false | Umin_3 |
| 2498 | Uo Average of absolute values, magnitude | float32 | false | Uav_0 |
| 2500 | U1 Average of absolute values, magnitude | float32 | false | Uav_1 |
| 2502 | U2 Average of absolute values, magnitude | float32 | false | Uav_2 |
| 2504 | U3 Average of absolute values, magnitude | float32 | false | Uav_3 |
| 2506 | Io Maximum of magnitude | float32 | false | Imax_0 |
| 2508 | I1 Maximum of magnitude | float32 | false | Imax_1 |
| 2510 | I2 Maximum of magnitude | float32 | false | Imax_2 |
| 2512 | I3 Maximum of magnitude | float32 | false | Imax_3 |
| 2514 | Io Average of absolute values | float32 | false | Iav_0 |
| 2516 | I1 Average of absolute values | float32 | false | Iav_1 |
| 2518 | I2 Average of absolute values | float32 | false | Iav_2 |
| 2520 | I3 Average of absolute values | float32 | false | Iav_3 |
| 2522 | Po Positve maximum value, considered as a sink | float32 | false | Pmax_0 |
| 2524 | P1 Positve maximum value, considered as a sink | float32 | false | Pmax_1 |
| 2526 | P2 Positve maximum value, considered as a sink | float32 | false | Pmax_2 |
| 2528 | P3 Positve maximum value, considered as a sink | float32 | false | Pmax_3 |
| 2530 | Po Negative maximum value, considered as a source | float32 | false | Pmin_0 |

| | | | | |
|---|---|---|---|---|
| 2532 | P1 Negative maximum value, considered as a source | float32 | false | Pmin_1 |
| 2534 | P2 Negative maximum value, considered as a source | float32 | false | Pmin_2 |
| 2536 | P3 Negative maximum value, considered as a source | float32 | false | Pmin_3 |
| 2538 | Po Average of all values summarized as abs values | float32 | false | Pmin_0 |
| 2540 | P1 Average of all values summarized as abs values | float32 | false | Pmin_1 |
| 2542 | P2 Average of all values summarized as abs values | float32 | false | Pmin_2 |
| 2544 | P3 Average of all values summarized as abs values | float32 | false | Pmin_3 |
| 2546 | Qo dto. P_max | float32 | false | Qmax_0 |
| 2548 | Q1 dto. P_max | float32 | false | Qmax_1 |
| 2550 | Q2 dto. P_max | float32 | false | Qmax_2 |
| 2552 | Q3 dto. P_max | float32 | false | Qmax_3 |
| 2554 | Qo dto. P_min) | float32 | false | Qmin_0 |
| 2556 | Q1 dto. P_min) | float32 | false | Qmin_1 |
| 2558 | Q2 dto. P_min | float32 | false | Qmin_2 |
| 2560 | Q2 dto. P_min | float32 | false | Qmin_3 |
| 2562 | Qo dto. P_ac | float32 | false | Qav_0 |
| 2564 | Q1 dto. P_ac | float32 | false | Qav_1 |
| 2566 | Q2 dto. P_ac | float32 | false | Qav_2 |
| 2568 | Q3 dto. P_ac | float32 | false | Qav_3 |
| 2570 | Maximum value of the total positive power as a sink | float32 | false | P_max_all_0 |
| 2572 | Minimum value of the total negative power, as source | float32 | false | P_min_all_0 |
| 2574 | Average value of the power flow, summarized over abs values | float32 | false | P_av_all_0 |
| 2576 | Maximum of reactive power, as consumer, i.e. inductive, sum of all phases | float32 | false | Q_max_all_0 |
| 2578 | Minimum of reactive power == maximum of reactive capacitive reactive power, sum of all phases | float32 | false | Q_min_all_0 |
| 2580 | Average value of all phases for the specified time interval, as absolute value | float32 | false | Q_av_all_0 |
| 2582 | Abs value of the apparent power | float32 | false | S_max_all_0 |
| 2584 | Average of S_max_all of the last specified period | float32 | false | S_av_all_0 |
| 2586 | U12 Maximum of line to line voltage, only the absolute value, without angle | float32 | false | U_LL_max_0 |
| 2588 | U23 Maximum of line to line voltage, only the absolute value, without angle | float32 | false | U_LL_max_1 |
| 2590 | U31 Maximum of line to line voltage, only the absolute value, without angle | float32 | false | U_LL_max_2 |
| 2592 | Number of events of qu2 method hits forwarddirected to feeder) | float32 | false | EvCnt_Qu2Fw_0 |

**Information: BE via LT (WRITE and READ)** **Default offset: 2600**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 2600 | BE_LT_1 (AUS) | int16 | true | BE_via_LT_1 |
| 2601 | BE_LT_2 (Reboot E3D) | int16 | true | BE_via_LT_2 |
| 2602 | BE_LT_3 (Aufz. starten) | int16 | true | BE_via_LT_3 |
| 2603 | BE_LT_4 (Reset alles) | int16 | true | BE_via_LT_4 |
| 2604 | BE_LT_5 (Reset LEDs) | int16 | true | BE_via_LT_5 |
| 2605 | BE_LT_6 (Reset qu2) | int16 | true | BE_via_LT_6 |
| 2606 | BE_LT_7 (Reset cos(phi)) | int16 | true | BE_via_LT_7 |
| 2607 | BE_LT_8 (Reset sin(phi)) | int16 | true | BE_via_LT_8 |
| 2608 | BE_LT_9 (Reset OV) | int16 | true | BE_via_LT_9 |
| 2609 | BE_LT_10 (Reset Puls50) | int16 | true | BE_via_LT_10 |
| 2610 | BE_LT_11 (Reset Kurzschluss) | int16 | true | BE_via_LT_11 |
| 2611 | BE_LT_12 (Reset Statistik) | int16 | true | BE_via_LT_12 |
| 2612 | BE_LT_13 (Reset FastPuls) | int16 | true | BE_via_LT_13 |
| 2613 | BE_LT_14 (Reset Adm2) | int16 | true | BE_via_LT_14 |
| 2614 | BE_LT_15 (BEF nicht zugewiesen) | int16 | true | BE_via_LT_15 |
| 2615 | BE_LT_16 (BEF nicht zugewiesen) | int16 | true | BE_via_LT_16 |

**BE via LT can be also read and written as coils and also be read at other default offset 3800, please look at the coils part.**

**Information: TIME (WRITE and READ)** **Default register offset: 2800**

**The register information format for time handling is from IEC 60870-5-104! Time handling 4 sequential registers are used:**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 2800 | Time_1 (Milliseconds) | int16 | true | Time_1 |
| 2801 | Time_2 (Minutes and hours) | int16 | true | Time_2 |
| 2802 | Time_3 (Day/day of week/month) | int16 | true | Time_3 |
| 2803 | Time_4 (Year) | int16 | true | Time_4 |

**Register information format - Time_1 (Milliseconds) 2800:**

| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
|---|---|---|---|---|---|---|---|---|
| | Milliseconds | | | | | | | |
| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | Milliseconds | | | | | | | |

Milliseconds: 0-59999ms

**Register information format - Time_2 (Minutes and hours) 2801:**

| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
|---|---|---|---|---|---|---|---|---|
| | SU | RES2 | | Hours | | | | |
| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | IV | RES1 | Minutes | | | | | |

Minutes: 0-59 min
Hours: 0-23 hours
SU: 1 = Summer Time / 0 = Normal Time
IV: 0 = valid / 1 = invalid time tag
RES1/2: reserved

**Register information format - Time_3 (Day/day of week/month) 2802:**

| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
|---|---|---|---|---|---|---|---|---|
| | RES3 | | | | Month | | | |
| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | Day of week | | | Day month | | | | |

Day month: 1-31 days
Month: 1-12 month
Day of week: 1-7 day
RES3: reserved

**Register information format - Time_4 (Year) 2803**

| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
|---|---|---|---|---|---|---|---|---|
| | RES5 | | | | | | | |
| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | RES4 | Year | | | | | | |

Year: 0-127 years (0 = 2000 / 1 = 2001 / 2 = 2002 / …)

**Or direct expanded registers above 2810:**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 2810 | Time2_1 (Milliseconds) | int16 | true | Time2_1 |
| 2811 | Time2_2 (Minutes) | int16 | true | Time2_2 |
| 2812 | Time2_3 (Hours) | int16 | true | Time2_3 |
| 2813 | Time2_4 (Day) | int16 | true | Time2_4 |
| 2814 | Time2_5 (Day of week) | int16 | true | Time2_5 |
| 2815 | Time2_6 (Month) | int16 | true | Time2_6 |
| 2816 | Time2_7 (Year) | int16 | true | Time2_7 |
| 2817 | Time2_8 (Summertime bit) | int16 | true | Time2_8 |

**Register information format - Time2_1 (Milliseconds) 2810:**

| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
|---|---|---|---|---|---|---|---|---|
| | Milliseconds | | | | | | | |
| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | Milliseconds | | | | | | | |

Milliseconds: 0-59999ms

**Register information format - Time2_2 (Minutes) 2811:**

| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
|---|---|---|---|---|---|---|---|---|
| | RES | RES | RES | RES | RES | RES | RES | RES |
| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | RES | RES | Minutes | | | | | |

Minutes: 0-59 min RES: reserved

**Register information format - Time2_3 (Hours) 2812:**

| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
|---|---|---|---|---|---|---|---|---|
| | RES | RES | RES | RES | RES | RES | RES | RES |
| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | RES | RES | RES | Hours | | | | |

Hours: 0-23 hours RES: reserved

**Register information format - Time2_4 (Day of month) 2813:**

| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
|---|---|---|---|---|---|---|---|---|
| | RES | RES | RES | RES | RES | RES | RES | RES |
| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | RES | RES | RES | Day month | | | | |

Day month: 1-31 days RES: reserved

**Register information format - Time2_5 (Day of week) 2814:**

| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
|---|---|---|---|---|---|---|---|---|
| | RES | RES | RES | RES | RES | RES | RES | RES |
| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | RES | RES | RES | RES | RES | Day of week | | |

Day of week: 1-7 day RES: reserved

**Register information format - Time2_6 (Month) 2815:**

| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
|---|---|---|---|---|---|---|---|---|
| | RES | RES | RES | RES | RES | RES | RES | RES |
| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | RES | RES | RES | RES | Month | | | |

Month: 1-12 month RES: reserved

**Register information format - Time2_7 (Year) 2816:**

| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
|---|---|---|---|---|---|---|---|---|
| | RES5 | | | | | | | |
| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | RES4 | Year | | | | | | |

Year: 0-127 years (0 = 2000 / 1 = 2001 / 2 = 2002 / …)

**Register information format - Time2_8 (Summertime bit) 2817:**

| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
|---|---|---|---|---|---|---|---|---|
| | RES | RES | RES | RES | RES | RES | RES | RES |
| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | RES | RES | RES | RES | RES | RES | RES | SU |

SU: 1 = Summer Time / 0 = Normal Time RES: reserved

**Information: Values from EOR3D LCD Display 2** **Default offset: 4000**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 4000 | U23p (Absolute value U23) | float32 | false | U23p |
| 4002 | U23p_r (Real coefficient U23) | float32 | false | U23p_r |
| 4004 | U23p_i (Imaginary coefficient U23) | float32 | false | U23p_i |
| 4006 | wU23 (Angle U23) | float32 | false | wU23 |
| 4008 | U31p (Absolute value U31) | float32 | false | U31p |
| 4010 | U31p_r (Real coefficient U31) | float32 | false | U31p_r |
| 4012 | U31p_i (Imaginary coefficient U31) | float32 | false | U31p_i |
| 4014 | wU31 (Angle U31) | float32 | false | wU31 |
| 4016 | Shortcircuit current L1 | float32 | false | I_SC_0 |
| 4018 | Shortcircuit current L2 | float32 | false | I_SC_1 |
| 4020 | Shortcircuit current L3 | float32 | false | I_SC_2 |
| 4022 | Maximum short circuit current | float32 | false | I_SC_3 |

### 3.2.1 EOR-3D Modbus Coils Organisation

Coils are shown as shadow of the Bit 0 from the corresponding registers above. This coils here have a special address space, they can also been read from the addresses above. BE via LT can also been written at the register offset above.

**Information: COIL BE** **Default offset: 3000**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 3000 | BE_1 (BE1) | coil | false | BE_1 |
| 3001 | BE_2 (BE2) | coil | false | BE_2 |
| 3002 | BE_3 (BE3) | coil | false | BE_3 |
| 3003 | BE_4 (BE4) | coil | false | BE_4 |
| 3004 | BE_5 (BE5) | coil | false | BE_5 |
| 3005 | BE_6 (BE6) | coil | false | BE_6 |

**Information: COIL BEF** **Default offset: 3200**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 3200 | BEF_1 (AUS) | coil | false | BEF_1 |
| 3201 | BEF_2 (Reboot E3D) | coil | false | BEF_2 |
| 3202 | BEF_3 (Aufz. starten) | coil | false | BEF_3 |
| 3203 | BEF_4 (Reset alles) | coil | false | BEF_4 |
| 3204 | BEF_5 (Reset LEDs) | coil | false | BEF_5 |
| 3205 | BEF_6 (Reset qu2) | coil | false | BEF_6 |
| 3206 | BEF_7 (Reset cos(phi)) | coil | false | BEF_7 |

| | | | | |
|---|---|---|---|---|
| 3207 | BEF_8 (Reset sin(phi)) | coil | false | BEF_8 |
| 3208 | BEF_9 (Reset OV) | coil | false | BEF_9 |
| 3209 | BEF_10 (Reset Puls50) | coil | false | BEF_10 |
| 3210 | BEF_11 (Reset Kurzschluss) | coil | false | BEF_11 |
| 3211 | BEF_12 (Reset Statistik) | coil | false | BEF_12 |
| 3212 | BEF_13 (Reset FastPuls) | coil | false | BEF_13 |
| 3213 | BEF_14 (Reset Adm2) | coil | false | BEF_14 |
| 3214 | BEF_15 (BEF nicht zugewiesen) | coil | false | BEF_15 |
| 3215 | BEF_16 (BEF nicht zugewiesen) | coil | false | BEF_16 |

**Information: BAF** **Default offset: 3400**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 3400 | BAF_1 (AUS) | coil | false | AUS |
| 3401 | BAF_2 (PROG) | coil | false | PROG |
| 3402 | BAF_3 (Status) | coil | false | Status |
| 3403 | BAF_4 (Störung) | coil | false | Störung |
| 3404 | BAF_5 (U1_ok) | coil | false | U1_ok |
| 3405 | BAF_6 (U2_ok) | coil | false | U2_ok |
| 3406 | BAF_7 (U3_ok) | coil | false | U3_ok |
| 3407 | BAF_8 (user_BAF1) | coil | false | user_BAF1 |
| 3408 | BAF_9 (user_BAF2) | coil | false | user_BAF2 |
| 3409 | BAF_10 (user_BAF3) | coil | false | user_BAF3 |
| 3410 | BAF_11 (user_BAF4) | coil | false | user_BAF4 |
| 3411 | BAF_12 (user_BAF5) | coil | false | user_BAF5 |
| 3412 | BAF_13 (user_BAF6) | coil | false | user_BAF6 |
| 3413 | BAF_14 (user_BAF7) | coil | false | user_BAF7 |
| 3414 | BAF_15 (user_BAF8) | coil | false | user_BAF8 |
| 3415 | BAF_16 (>Uerd) | coil | false | >Uerd |
| 3416 | BAF_17 (>Uerd_delay) | coil | false | >Uerd_delay |
| 3417 | BAF_18 (Uerd_L1) | coil | false | Uerd_L1 |
| 3418 | BAF_19 (Uerd_L2) | coil | false | Uerd_L2 |
| 3419 | BAF_20 (Uerd_L3) | coil | false | Uerd_L3 |
| 3420 | BAF_21 (Uerd_L1_d) | coil | false | Uerd_L1_d |
| 3421 | BAF_22 (Uerd_L2_d) | coil | false | Uerd_L2_d |
| 3422 | BAF_23 (Uerd_L3_d) | coil | false | Uerd_L3_d |
| 3423 | BAF_24 (Sum_Uerd ->L) | coil | false | Sum_Uerd ->L |
| 3424 | BAF_25 (Sum_Uerd ->S) | coil | false | Sum_Uerd ->S |
| 3425 | BAF_26 (Prio_Uerd ->L) | coil | false | Prio_Uerd ->L |
| 3426 | BAF_27 (Prio_Uerd ->S) | coil | false | Prio_Uerd ->S |

| | | | | |
|---|---|---|---|---|
| 3427 | BAF_28 (qu2 ->L) | coil | false | qu2 ->L |
| 3428 | BAF_29 (qu2 ->S) | coil | false | qu2 ->S |
| 3429 | BAF_30 (qu2_DE ->L) | coil | false | qu2_DE ->L |
| 3430 | BAF_31 (qu2_DE ->S) | coil | false | qu2_DE ->S |
| 3431 | BAF_32 (qui ->L) | coil | false | qui ->L |
| 3432 | BAF_33 (qui ->S) | coil | false | qui ->S |
| 3433 | BAF_34 (cos ->L) | coil | false | cos ->L |
| 3434 | BAF_35 (cos ->S) | coil | false | cos ->S |
| 3435 | BAF_36 (sin ->L) | coil | false | sin ->L |
| 3436 | BAF_37 (sin ->S) | coil | false | sin ->S |
| 3437 | BAF_38 (c_s ->L) | coil | false | c_s ->L |
| 3438 | BAF_39 (c_s ->S) | coil | false | c_s ->S |
| 3439 | BAF_40 (OV_250 ->L) | coil | false | OV_250 ->L |
| 3440 | BAF_41 (OV_250 ->S) | coil | false | OV_250 ->S |
| 3441 | BAF_42 (OV_fx1 ->L) | coil | false | OV_fx1 ->L |
| 3442 | BAF_43 (OV_fx1 ->S) | coil | false | OV_fx1 ->S |
| 3443 | BAF_44 (OV_fx2+ ->L) | coil | false | OV_fx2+ ->L |
| 3444 | BAF_45 (OV_fx2+ ->S) | coil | false | OV_fx2+ ->S |
| 3445 | BAF_46 (OV_fx2- ->L) | coil | false | OV_fx2- ->L |
| 3446 | BAF_47 (OV_fx2- ->S) | coil | false | OV_fx2- ->S |
| 3447 | BAF_48 (Puls_50) | coil | false | Puls_50 |
| 3448 | BAF_49 (Puls_50c) | coil | false | Puls_50c |
| 3449 | BAF_50 (Puls_50c ->L) | coil | false | Puls_50c ->L |
| 3450 | BAF_51 (Puls_50c ->S) | coil | false | Puls_50c ->S |
| 3451 | BAF_52 (Puls50 LED) | coil | false | Puls50 LED |
| 3452 | BAF_53 (Puls_HPCI_50) | coil | false | Puls_HPCI_50 |
| 3453 | BAF_54 (Puls_HPCI_50 ->L) | coil | false | Puls_HPCI_50 ->L |
| 3454 | BAF_54 (Puls_HPCI_50 ->S) | coil | false | Puls_HPCI_50 ->S |
| 3455 | BAF_56 (Puls_HPCI_fx) | coil | false | Puls_HPCI_fx |
| 3456 | BAF_57 (>I) | coil | false | >I |
| 3457 | BAF_58 (>I1) | coil | false | >I1 |
| 3458 | BAF_59 (>I2) | coil | false | >I2 |
| 3459 | BAF_60 (>I3) | coil | false | >I3 |
| 3460 | BAF_61 (>>I) | coil | false | >>I |
| 3461 | BAF_62 (>>I1) | coil | false | >>I1 |
| 3462 | BAF_63 (>>I2) | coil | false | >>I2 |
| 3463 | BAF_64 (>>I3) | coil | false | >>I3 |
| 3464 | BAF_65 (>I ->L) | coil | false | >I ->L |
| 3465 | BAF_66 (>I1 ->L) | coil | false | >I1 ->L |

| | | | | |
|---|---|---|---|---|
| 3466 | BAF_67 (>I2 ->L) | coil | false | >I2 ->L |
| 3467 | BAF_68 (>I3 ->L) | coil | false | >I3 ->L |
| 3468 | BAF_69 (>>I ->L) | coil | false | >>I ->L |
| 3469 | BAF_70 (>>I1 ->L) | coil | false | >>I1 ->L |
| 3470 | BAF_71 (>>I2 ->L) | coil | false | >>I2 ->L |
| 3471 | BAF_72 (>>I3 ->L) | coil | false | >>I3 ->L |
| 3472 | BAF_73 (>I ->S) | coil | false | >I ->S |
| 3473 | BAF_74 (>I1 ->S) | coil | false | >I1 ->S |
| 3474 | BAF_75 (>I2 ->S) | coil | false | >I2 ->S |
| 3475 | BAF_76 (>I3 ->S) | coil | false | >I3 ->S |
| 3476 | BAF_77 (>>I ->S) | coil | false | >>I ->S |
| 3477 | BAF_78 (>>I1 ->S) | coil | false | >>I1 ->S |
| 3478 | BAF_79 (>>I2 ->S) | coil | false | >>I2 ->S |
| 3479 | BAF_80 (>>I3 ->S) | coil | false | >>I3 ->S |
| 3480 | BAF_81 (>Ferro Res.) | coil | false | >Ferro Res. |
| 3481 | BAF_82 (50Hz -df) | coil | false | 50Hz -df |
| 3482 | BAF_83 (50Hz +df) | coil | false | 50Hz +df |
| 3483 | BAF_84 (50Hz n.a.) | coil | false | 50Hz n.a. |
| 3484 | BAF_85 (DynAdm ->L) | coil | false | DynAdm ->L |
| 3485 | BAF_86 (DynAdm ->S) | coil | false | DynAdm ->S |
| 3486 | BAF_87 (I_kE>) | coil | false | I_kE> |
| 3487 | BAF_88 (I_kE> ->L) | coil | false | I_kE> ->L |
| 3488 | BAF_89 (I_kE> ->S) | coil | false | I_kE> ->S |

**Information: COIL BA** **Default offset: 3600**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 3600 | BA_1 (Rel_1 Function depends on assignment) | coil | false | BA_1 |
| 3601 | BA_2 (Rel_2 Function depends on assignment) | coil | false | BA_2 |
| 3602 | BA_3 (Rel_3 Function depends on assignment) | coil | false | BA_3 |
| 3603 | BA_4 (Rel_4 Function depends on assignment) | coil | false | BA_4 |
| 3604 | BA_5 (Rel_5 Function depends on assignment) | coil | false | BA_5 |
| 3605 | BA_6 (Rel_6 Function depends on assignment) | coil | false | BA_6 |
| 3606 | BA_7 (Rel_7 Function depends on assignment) | coil | false | BA_7 |
| 3607 | BA_8 (Rel_8 Function depends on assignment) | coil | false | BA_8 |

**Information: COIL BE via LT (WRITE and READ)** **Default offset: 3800**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 3800 | BE_LT_1 (AUS) | coil | true | BE_via_LT_1 |
| 3801 | BE_LT_2 (Reboot E3D) | coil | true | BE_via_LT_2 |
| 3802 | BE_LT_3 (Aufz. starten) | coil | true | BE_via_LT_3 |
| 3803 | BE_LT_4 (Reset alles) | coil | true | BE_via_LT_4 |
| 3804 | BE_LT_5 (Reset LEDs) | coil | true | BE_via_LT_5 |
| 3805 | BE_LT_6 (Reset qu2) | coil | true | BE_via_LT_6 |
| 3806 | BE_LT_7 (Reset cos(phi)) | coil | true | BE_via_LT_7 |
| 3807 | BE_LT_8 (Reset sin(phi)) | coil | true | BE_via_LT_8 |
| 3808 | BE_LT_9 (Reset OV) | coil | true | BE_via_LT_9 |
| 3809 | BE_LT_10 (Reset Puls50) | coil | true | BE_via_LT_10 |
| 3810 | BE_LT_11 (Reset Kurzschluss) | coil | true | BE_via_LT_11 |
| 3811 | BE_LT_12 (Reset Statistik) | coil | true | BE_via_LT_12 |
| 3812 | BE_LT_13 (Reset FastPuls) | coil | true | BE_via_LT_13 |
| 3813 | BE_LT_14 (Reset Adm2) | coil | true | BE_via_LT_14 |
| 3814 | BE_LT_15 (BEF nicht zugewiesen) | coil | true | BE_via_LT_15 |
| 3815 | BE_LT_16 (BEF nicht zugewiesen) | coil | true | BE_via_LT_16 |

### 3.2.2 EOR-3D Modbus virtual Variables (vBA, vMWR, vBE, vMWW, vBAcoil, vBEcoil)

The EOR3D has multible 96 variables, which can be used for a protocol converter with other SCADA Protocols or EOR3D connection master system with LUA.

**Information: vBA** **Default offset: 5000**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 5000 | vBA_1 | int16 | false | vBA_1 |
| 5001 | vBA_2 | int16 | false | vBA_2 |
| . | . | . | . | |
| . | . | . | . | |
| 5094 | vBA_95 | int16 | false | vBA_95 |
| 5095 | vBA_96 | int16 | false | vBA_96 |

**Information: vBA coil** **Default offset: 15000**

**- Like vBA but on offset 15000 as coil**

**Information: vMWR** **Default offset: 5400**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 5400 | vMWR_1 | float32 | false | vMWR_1 |
| 5402 | vMWR_2 | float32 | false | vMWR_2 |
| . | . | . | . | |
| . | . | . | . | |
| 5588 | vMWR_95 | float32 | false | vMWR_95 |
| 5590 | vMWR_96 | float32 | false | vMWR_96 |

**Information: vBE** **Default offset: 6000**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 6000 | vBE_1 | int16 | true | vBE_1 |
| 6001 | vBE_2 | int16 | true | vBE_2 |
| . | . | . | . | |
| . | . | . | . | |
| 6094 | vBE_95 | int16 | true | vBE_95 |
| 6095 | vBE_96 | int16 | true | vBE_96 |

**Information: vBE coil** **Default offset: 16000**

**- Like vBE but on offset 16000 as coil**

**Information: vMWW** **Default offset: 6400**

| Address + Offset | Description | Type | Write | Name |
|---|---|---|---|---|
| 6400 | vMWW_1 | float32 | true | vMWW_1 |
| 6402 | vMWW_2 | float32 | true | vMWW_2 |
| . | . | . | . | |
| . | . | . | . | |
| 6588 | vMWW_95 | float32 | true | vMWW_95 |
| 6590 | vMWW_96 | float32 | true | vMWW_96 |

# 4 EOR-3D Toolbox Modbus Configuration

Please keep in mind after changing Modbus Parameters, the Applications have to be **started new or a change from 0 to 1 of the Modbus active flag** has to happen! So the Modbus Slave gets it's new configuration.

The pictures can look different to your version of the EOR-3D Toolbox. It can also be that some things in the EOR-3D Toolbox is added or removed and not shown in the pictures.

## 4.1 Modbus – Global Modbus Parameters

- Modbus active (disable - all data 0 / enable update data)

  **--> On a changed from 0 to 1 the Modbus slave gets it new configuration.**
- Protocol (disabled / TCP/IP / COM2 RS485 / COM1 RS232)
- Modbus port (Port TCP/IP)
- Slave ID (ID for RS485 Modbus network, is also to be set on RS232 mode)

  **--> Please set the correct Slave ID also on a RS232 Master !!!**
- Modbus Storage Time (Time in ms)

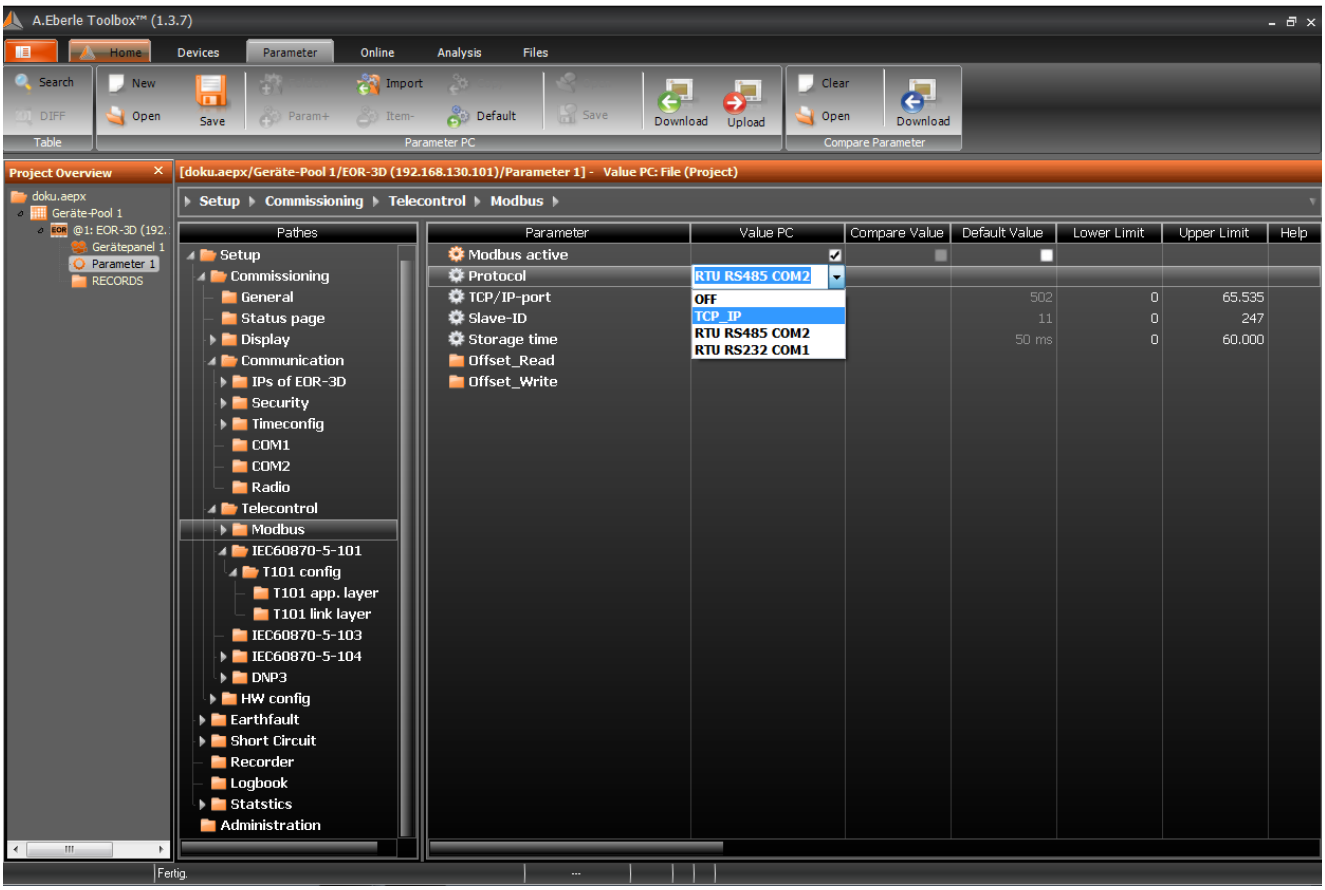
  **--> The Storage Time defines the time after a read from the device when Modbus Data does not get updated!**

  **--> Only the measured values are possible to be used with Storage Time! (UI value, UI angle and UI d. angle). All other values are normally updated on a read of the register !**

  **--> Please take care of the register offset for UI value, UI angel and UI d. angle. The Modbus slave checks the offset of UI value [0] and uses the Storage Time for 600 registers after UI value [0] offset!**

## 4.2 EOR-3D TCP/IP Configuration for Modbus

To change to Modbus TCP/IP please set the Protocol to TCP_IP and change the port what you want to use. Only one TCP/IP connection is allowed.




Picture 2: Toolbox TCP/IP

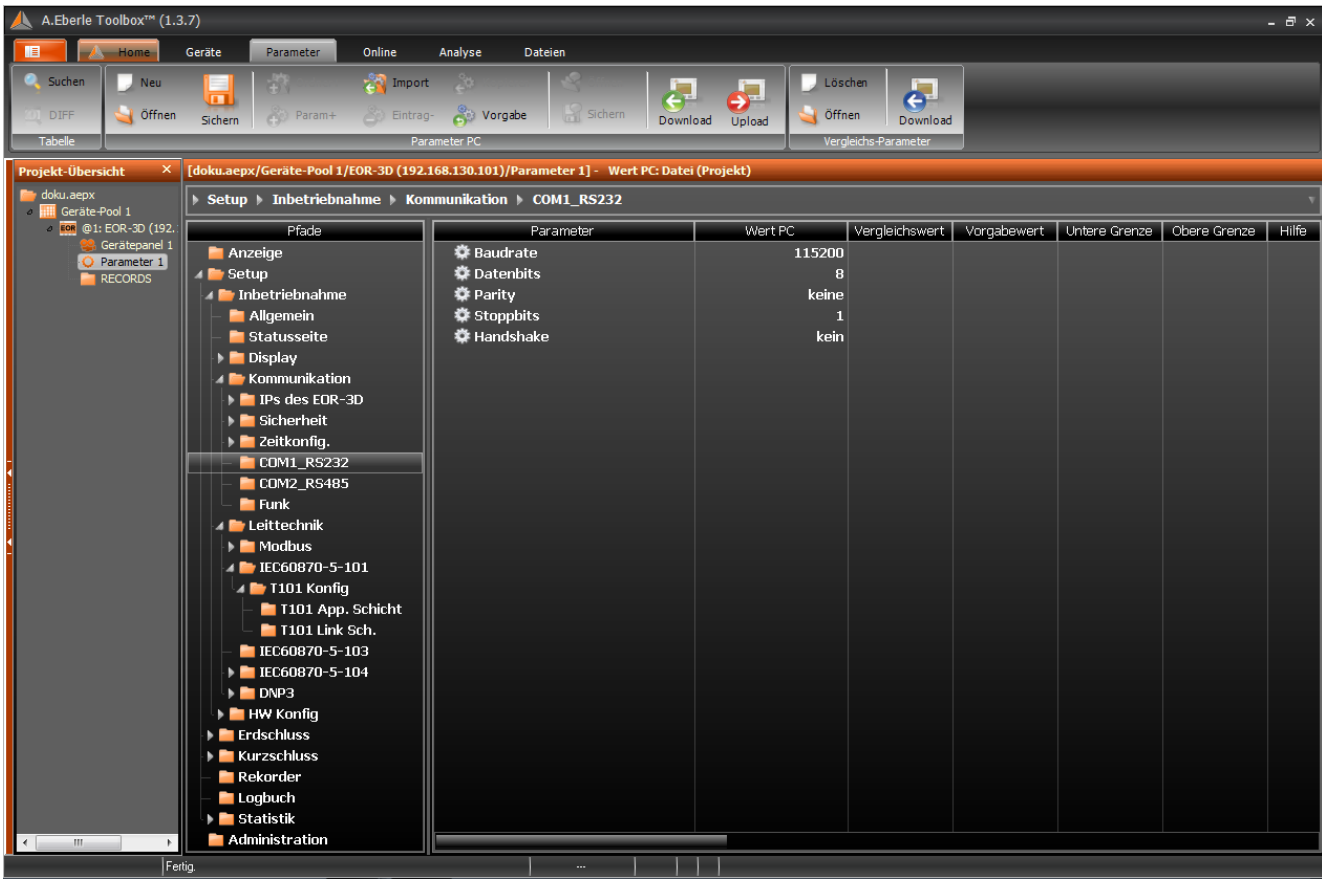
## 4.3 EOR-3D Serial Configuration for Modbus

### 4.3.1 COM1 – RS232 Device

Following parameters have to be set to configure the serial port:

- Baudrate
- Databits (has to be 8)
- Parity (N,E,O)
- Stopbits (depends on Parity – 1,2)
- Handshake (hast be none)

To change to Modbus RTU on RS232 COM1 please set the Protocol to RTU RS232. Set also the SLAVE ID, this is necessary because RS232 and RS485 work in the same way. Normal on a RS232 connection SLAVE ID is not necessary but here we have to set it. Don't forget to set the SLAVE ID also on the Modbus Master!




**Picture 3: Toolbox RS232**

### 4.3.2 COM2 – RS485 Device

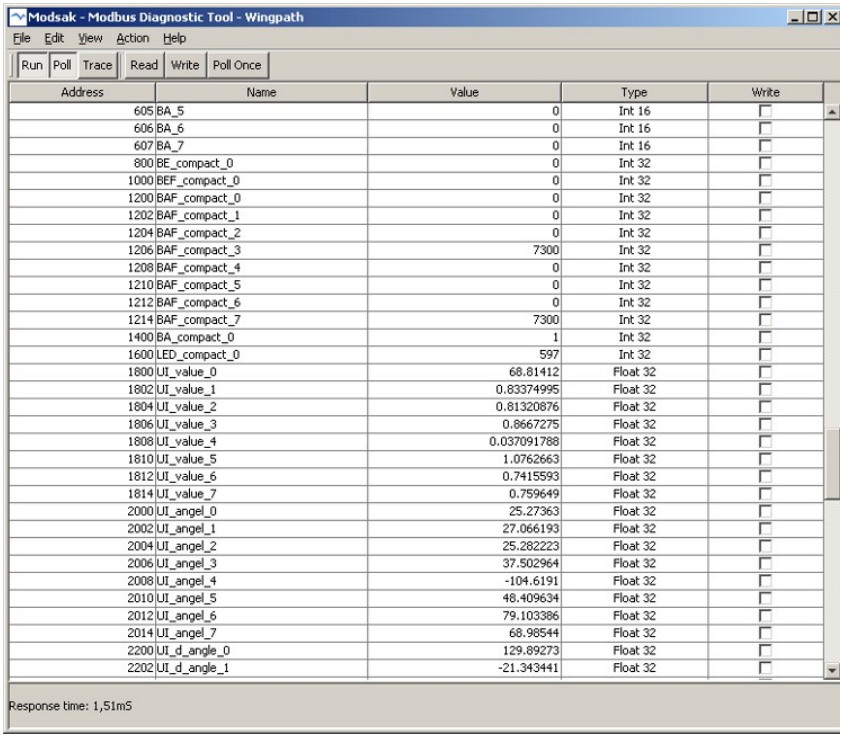
Following parameters have to be set to configure the serial port:

- Baudrate
- Databits (has to be 8)
- Parity (N,E,O)
- Stopbits (depends on Parity – 1,2)
- Handshake (hast be none)

To change to Modbus RTU on RS485 COM2 please set the Protocol to RTU RS485. Set also the SLAVE ID! Don't forget to set the SLAVE ID on the Modbus Master!

# 5 EOR-3D Example Modbus Communication with Modsak

A example configuration as file for RS232 and TCP/IP of the Modsak debugging tool can be provided.




| Address | Name | Value | Type | Write |
|---|---|---|---|---|
| 605 | BA_5 | 0 | Int 16 | |
| 606 | BA_6 | 0 | Int 16 | |
| 607 | BA_7 | 0 | Int 16 | |
| 800 | BE_compact_0 | 0 | Int 32 | |
| 1000 | BEF_compact_0 | 0 | Int 32 | |
| 1200 | BAF_compact_0 | 0 | Int 32 | |
| 1202 | BAF_compact_1 | 0 | Int 32 | |
| 1204 | BAF_compact_2 | 0 | Int 32 | |
| 1206 | BAF_compact_3 | 7300 | Int 32 | |
| 1208 | BAF_compact_4 | 0 | Int 32 | |
| 1210 | BAF_compact_5 | 0 | Int 32 | |
| 1212 | BAF_compact_6 | 0 | Int 32 | |
| 1214 | BAF_compact_7 | 7300 | Int 32 | |
| 1400 | BA_compact_0 | 1 | Int 32 | |
| 1600 | LED_compact_0 | 597 | Int 32 | |
| 1800 | UI_value_0 | 68.81412 | Float 32 | |
| 1802 | UI_value_1 | 0.83374995 | Float 32 | |
| 1804 | UI_value_2 | 0.81320876 | Float 32 | |
| 1806 | UI_value_3 | 0.8667275 | Float 32 | |
| 1808 | UI_value_4 | 0.037091788 | Float 32 | |
| 1810 | UI_value_5 | 1.0762663 | Float 32 | |
| 1812 | UI_value_6 | 0.7415593 | Float 32 | |
| 1814 | UI_value_7 | 0.759649 | Float 32 | |
| 2000 | UI_angel_0 | 25.27363 | Float 32 | |
| 2002 | UI_angel_1 | 27.066193 | Float 32 | |
| 2004 | UI_angel_2 | 25.282223 | Float 32 | |
| 2006 | UI_angel_3 | 37.502964 | Float 32 | |
| 2008 | UI_angel_4 | -104.6191 | Float 32 | |
| 2010 | UI_angel_5 | 48.409634 | Float 32 | |
| 2012 | UI_angel_6 | 79.103386 | Float 32 | |
| 2014 | UI_angel_7 | 68.98544 | Float 32 | |
| 2200 | UI_d_angle_0 | 129.89273 | Float 32 | |
| 2202 | UI_d_angle_1 | -21.343441 | Float 32 | |

**Picture 4: Modsak example**

# 6 BI (Binary Input) – Hardware differences

BE3 to BE6 is only available on EOR-3D compact Hardware Version!