



## Earth-fault indicator EOR-3D

### Version information up to Firmware V 2.0.2



## Contents

1. General.....	3
1.1 Content.....	3
2. Change information .....	4
2.1 Version 2.0.2 from 5.2.2021 .....	4
2.2 Version 2.0.0 from 31.7.2020 .....	5
2.3 Version 1.7.3 from 09.05.2019 .....	5
2.4 Version 1.7.1 from 13.12.2018 .....	7
2.5 Version 1.6.9 from 11.06.2018 .....	8
2.6 Version 1.6.5 from 22.12.2017 .....	9
2.7 Version 1.6.3 from 20.10.2017 .....	10
2.8 Version 1.6.0 from 29.06.2017 .....	11
2.9 Version 1.5.8 from 30.06.2016 .....	12
2.10 Version 1.5.7 from 16.06.2016 .....	13
2.11 Version 1.5.6 from 05.04.2016 (only loaded at the factory) .....	14
2.12 Version 1.5.4 from 28.01.2016l .....	15
2.13 Version 1.5.2 from 05.07.2014 - blocked .....	16
2.14 Version 1.5.1 from 10.01.2014 .....	17

# 1. General

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## 1.1 Content

This document contains information and changes about the released firmware versions for the earth fault indicator EOR-3D up to firmware version v2.0.2.

## 2. Change information

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### 2.1 Version 2.0.2 from 5.2.2021

#### General

- Bug fix for versions 1.7.1 to 2.0.0. In versions 1.7.1 to 2.0.0 a bug was detected which caused measurement values in the display and in the SCADA to freeze after approximately 71 days. This bug does not affect the internal measurement values, the earth fault and short circuit detection and the fault recorder. Hence an update to 2.0.2 is not mandatory if no measurement values for SCADA are needed.

## 2.2 Version 2.0.0 from 31.7.2020

### General

- Cyber-Security – Changed communication of the device to encrypted communication in networks and with software AEToolbox (AEToolbox version  $\geq$  2.0 necessary to communicate with EOR-3D devices with firmware version  $\geq$  2.0)
- Cyber-Security: User Management added:
  - TCP-user: 3 user roles with different read-/write-authorization for access via network TCP
  - Panel-user: 2 user roles with different read-/write-authorization for access via display-panel. Additionally it is now possible to lock the display completely
- System-Logfile (Syslog) added
- Feature for reset to default settings added via panel-display added (20x press left and confirm)
- Handling for device features edited and fixed bugs regarding displaying of BIs and BOs in AEToolbox
- Description of parameters reviewed and edited regarding consistency in device and AEToolbox
- Measurements values are now set to zero below added limits
- Changes in the panel:
  - Panel-user „logout“ added in first menu
  - Setup/Lua-Variables added
  - Parameter LCD-Logbook reset relocated from Setup to Administration
  - Setup/Commissioning: folder Scriptserver and ConMaster added
  - Setup/Commissioning /Telecontrol: protocols are now displayed depending on activated device features
  - Setup/Commissioning / Communication/Security: FTP-Security and Disable Boot Timeout added
  - Folder Pulse HPCI Puls hidden
  - User Management added to Administration

### Location Methods

- Revision of earth fault displaying for multiple earth faults in succession. Now always the last detected earth fault is shown in the display. In the previous versions the first detected earth fault was held until the earth fault was quit on the panel
- Fast pulsing (Pulse HPCI in revision and hence temporary hidden in the menu)

### SCADA

- Bugfix phase-phase voltages in 103 protocol
- Handling of SCADA-licenses edited, so that upgraded licenses can now be activated easily by the customer via AEToolbox 2.0

## 2.3 Version 1.7.3 from 09.05.2019

### **General**

- Bugfix Recorder-files: format of timestamp adapted in order that AEToolbox can find them
- Expansion of LUA script library by remote commands TCP/IP
- Missing SD-card is shown in the display
- WLAN parameters hidden
- When the screensaver is active the display is now completely black
- Usage of editable text variables in LUA scripts is now possible

### **Location Methods**

- Directed short-circuit detection function is extended by earth-short circuit
- BOF for earth-short-circuit added to UserBOF and in simulation mode
- New parameters: I\_k\_E\_min and T\_k\_E\_min for earth-short circuit
- Function earth-short-circuit added to display menu

### **SCADA**

## 2.4 Version 1.7.1 from 13.12.2018

### General

- Polarity of binary inputs 1 and 2 removed
- Fluctuations in Uo and Io in simulation mode of AEToolbox fixed
- Modbus master implemented in the EOR-3D to control a Modbus slave
- LUA script library integrated
- 

### Location Methods

- Reset qu2 message with drop of Uen voltage below the earth fault threshold

### SCADA

- Frequency value added in SCADA
- Measured values U23 and U31 added to SCADA protocols
- Extension of the LT data models by the maximum value and time of I> and I >>
- Minor improvements for IEC 61850 Goose
- Fixed bug in DNP3.0 data point list
- Fixed bug in the BE addresses in the 101 protocol

## 2.5 Version 1.6.9 from 11.06.2018

### General

- Update handling improved
- Correction of the calculated absolute value  $U_0$  in simulation mode
- Angle correction for currents and voltages in simulation mode
- Corrected units of S and Q on the display



## 2.6 Version 1.6.5 from 22.12.2017

### General

- Adjustable fault record length for I> and I >> limited to a maximum of 2.5 seconds
- Limitation of I> and I >> to 1.5 kA
- Correction for binary input functions (BEFs).  
These were not triggered with polarity "-"
- Correction in the angle measurement in the absence of voltage U1
- Measurement accuracy for the analog binary inputs improved.

### SCADA

- Transmission of SCADA data model, maximum value and time I> and I>> transferred
- Adjustments in the data point lists for the protocols IEC 103 and IEC 104

## 2.7 Version 1.6.3 from 20.10.2017

### General

- Improved measurement of harmonics
- KnuV inserted for adjustment of the pickup threshold for binary inputs BE1 and BE2
- Behavior of the relay status corrected
- Fixed bug in SD card formatting
- Implementation of a daily status entry in the logbook
- 

### Location Methods

- Improvement of the angle evaluation for a 2-pole short circuit
- Correction in the message extension in the event of a short circuit
- Correction of the parameters Umin\_OV5 and Umin\_fx1 (factor square root 3 too large)
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### SCADA

- Changes in RTC time handling made in the protocols IEC 101 and IEC 103. In rare cases, setting the RTC too often could cause the affected protocols to fail
- Adaptation of the Modbus data point list
- Correction in the transmission of the data points "dw\_angles\_50ms" in the protocols DNP 3.0, IEC 101, IEC 103, IEC 104
- Connection timeout for IEC 101 and IEC 103 extended to 90 seconds
- Routing handling when changing the redundant IP addresses for the IEC 104 protocol improved

## 2.8 Version 1.6.0 from 29.06.2017

### General

- Optimization of the start time of the EOR-3D
- Controlled shutdown after power failure (EOR-3D Compact) implemented
- Support 8 GB, 16 GB, 32 GB SD cards
- Corrected scaling factors for fault records
- Dynamic lists of binary inputs and outputs implemented in the XML file
- Method for automatic calibration of voltage channels implemented
- Adjustment of the scaling factors of the measurement data for EOR-3D Compact
- Commands for triggering the reset button via AE toolbox implemented
- Revision of the hardware configuration
- Accuracy of current measurement increased
- Limitation of the recorder lines per time (optimization of the recorder load)
- Fixed bug in the display log
- debounce of the binary inputs BE3 - BE6 of the EOR-3D Compact

### Location Methods

- Implementation of the "fast pulse location" detection algorithm
- Bug fixed in the OV\_250 procedure at the U\_250\_min threshold
- Bug fixed when resetting COS, OV\_250 and OV\_fx1 procedures (was only reset at Une <30V)
- Undirected and directed short circuit decoupled
- Delay implemented for BAF Ue
- Improved the display of the short circuit message

### SCADA

- IEC 61850 GOOSE implemented
- Frequency measurement values provided for SCADA protocols
- Sign correction of the measured values in the IEC 103 protocol
- Correction in the TCP interpreter
- Bug fixed in SCADA-Log
- Improvements in the IEC 104 protocol
- Correction in the DNP 3.0 protocol (allow address 0)
- Adaptation of the data point lists in the protocols IEC 101/103/104
- Modbus RTU timing revised
- Corrected behavior of the NTP time server

## 2.9 Version 1.5.8 from 30.06.2016

**ATTENTION: An update to firmware v 1.5.8 is strongly recommended  
(Handling of the start of the EOR-3D)**

### General

- Fault record log length for short circuit I >> (Sc2) set to 2.5 seconds

## 2.10 Version 1.5.7 from 16.06.2016

### General

- Bootsectorhandling implemented; fundamental change in the startup routine in the EOR-3D (could previously happen that devices do not start up)
- Remove the radio-parameter from the parameter list

### Location Methods

- Short circuit: Improvement of direction detection with directional short-circuit detection; Different kni per phase can now be used; Inversion of the current transformers is also taken into account; Detection of double errors integrated.

## **2.11 Version 1.5.6 from 05.04.2016 (only loaded at the factory)**

### **General**

- Boot (startup) handling activated from factory
- Relay tripping corrected for top hat rail version

## 2.12 Version 1.5.4 from 28.01.2016I

### General

- Correction in statistics / slave pointer (since firmware 1.5.2 and 1.5.3)
- Status now with function (previously only coupled to supply voltage)
- With measured value simulation, power values are calculated. Angle correction for devices with feature U24 (40 MOhm inputs), Corrected 8 ° angle error
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### Location Methods

- Transient algorithm (qu2): adapted, signal extension and overlap adapted for signals with permanent earth fault
- Restriking faults (qui): Log entries changed threshold minimum current corrected, parameter number of restriking activated
- Cos (phi): Message reset when Uo falls below the threshold

### SCADA

- DNP 3.0: Protocol integrated in firmware
- MODBUS: Old sockets remained → changed
- Binary input functions (BEF) now also trigger a fault record and device reset enabled (previously without function)

## 2.13 Version 1.5.2 from 05.07.2014 - blocked

**ATTENTION: Errors in the statistics mode lead to the device being blocked when the month changes. Action: Firmware update or deactivate statistics function!**

### General

- Slave pointer and statistics integrated for all available and calculated values
- Statistics for Transient algorithm (qu2) integrated
- power calculation customized
- SD card error detection revised
- Improved USB stick handling
- change screensaver; Display no longer completely off
- Status LED now steady (previously flashing)

### Location Methods

- Short circuit detection: converter factor (kni) now taken into account, previously fixed with 100/1 A in firmware 1.5.1
- Harmonic procedure: Logbook entries revised
- Sin(phi): Reset now also when falling below the I\_min
- Restriking faults (qui): current threshold active (previously without function)

### SCADA

- MODBUS: Answer at time sync implemented, improved reconnect behavior
- Statistics values and min / max values integrated in all protocols



## 2.14 Version 1.5.1 from 10.01.2014

### General

- RTC drift corrected, time in UTC format
- Time synchronization between the EOR-3D via RS485 (MODBUS level) now possible
- Deletion of fault records on the SD card is now possible

### Location Methods

- Short circuit detection: converter factor (kni) now taken into account, previously fixed with 100/1 A in firmware 1.5.1
- Harmonic procedure: Logbook entries revised
- Sin(phi): Reset now also when falling below the I\_min
- Restriking faults (qui): Current threshold active (previously without function)

### SCADA

- MODBUS: TCP corrected
- IEC 60870-5-103: duplicate messages removed