Earth Fault Detection Relay

Model EOR-D

- **wall surface-mounted housing**
- **control panel housing**
- **Plug-in module for 19"rack**

1. Application

The base unit is designed to monitor up to 4 feeders, a 19-inch rack can be equipped with up to 4 relays. Therefore, at present, up to 16 feeders can be monitored using a single EOR system. Multiple racks can also be combined. Additional digital inputs and outputs are also possible through the use of REGSys components.

To exploit the advantages of each fault detection method in different fault situations, it is possible to select and combine the following methods with the freely programmable EOR-D fault detection relay:

1.1 Location methods for use in compensated networks

- **Transient earth fault detection** using the **qu2 and qui** algorithms for:
  - One-time fault (transient fault)
  - Intermittent fault
  - Faults in loops with large circulating currents (qu2)
  - Fault resistances locatable up to the kOhm range
- **Harmonic method**
  - Frequency 250 Hz or a freely selectable frequency
  - Quantitative comparison
  - Evaluation of the reactive power direction
- **Watt-metric method or cos(φ)**
  - Evaluation of active power direction (appropriate transformer required)
  - Watt residual current increase
- **Pulse detection (=> depth detection)**

1.2 Location methods for use in isolated networks

- **Transient earth fault detection** using the **qu2 and qui** algorithms for
  - One-time fault (transient fault)
  - Intermittent fault
  - Faults in loops with large circulating currents (qu2)
  - Fault resistances locatable in the kOhm range
- **sin(φ) procedure**
  - Frequency 50 Hz
  - Quantitative comparison
  - Evaluation of the reactive power direction
  - Part of the harmonic component method

1.3 General Features

- Configuration through COM1 **(USB or RS232 interface)**
- Fault recording (last two events)
- Event Logbook
- Signalling relay outputs
- 16 digital inputs
- E-LAN connection (2xRS485 with repeater), 2-wire or 4-wire
- 4 voltage inputs (Uen)
- 4 current inputs (3Io)

The following functions can be performed using the WinEDC PC software:

Configuring the relay

- detection method
- Trigger threshold
- Configuration of the signals
- Testing the current transformer direction

Fault analysis with

- Log book (event records)
- Transient recorder (10 kHz sampling rate)
- qu2 algorithm

Network analysis

- Data logger
- Calculation of the capacitance of each feeder

2. Detection methods Characteristics

2.1 Transient method based on the qu2 algorithm

With the new qu2 algorithm, transient earth faults can be selectively detected up to a few kΩ. In the zero sequence system the non-faulty feeders can be considered as capacitors. To obtain a zero-sequence voltage $u_{0(t)}$, these capacitors have to be charged. This charge is created with the zero sequence current $i_{0(t)}$ and results in the charge $q_{0(t)}$. With healthy feeders this yields the equation $q0(t) = C_0\ u_{0(t)}$. When $u_{0(t)}$ is plotted on the x-axis and $q_{0(t)}$ on the y-axis of the qu-graph, this gives a straight line for healthy feeders. This behaviour does not apply for faulty feeders. Figure 1 shows this behaviour for a low impedance earth fault on feeder A.

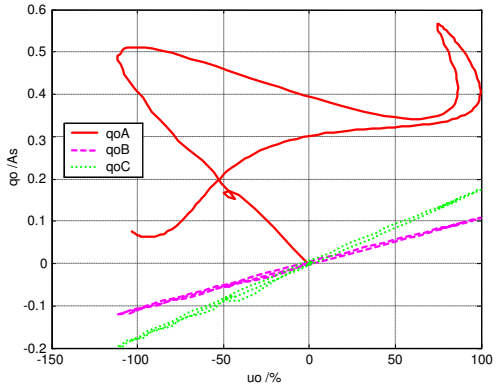


Figure 1: qu-graph for a low impedance earth fault

The transient method is suitable for:

- Earth faults up to several kΩ
- Restriking and intermittent earth faults
- Configurable triggering threshold of the zero sequence voltage U_{NE}
- Configuring the triggering current as an equivalent phase to earth capacitance
- Suppression of the earth fault indication within a selectable minimum duration of the earth fault
- Suppression of the earth fault indication in the direction of the busbar
- Reset of the indication by an external signal, automatically after a specified period or at the end of the earth fault (selectable and can be combined)
- Recording the transient events in the logbook
- Recording the transients over 10 periods with a sampling rate of 10.24 kHz

2.2 Detection of restriking and intermittent earth faults based on the qui algortihm

Restriking faults occur especially in cable networks. Figure 2 shows the change in the voltage of the faulty phase where Figure 3 shows the corresponding change in the zero sequence voltage. In the measurement, a mean value of the voltage over 10 periods is usually taken. As a result, this restriking fault is interpreted as a high-impedance fault and the failure location starts in the transmission line network, rather than in the area of the cable section. A further complication is that the usual permanent fault location methods, such as the cos (φ) method, would lead to the wrong fault location. This non-linear procedure for the restriking cannot be properly evaluated. The corresponding directional indications are arbitrary and hence they do not help with the fault location.

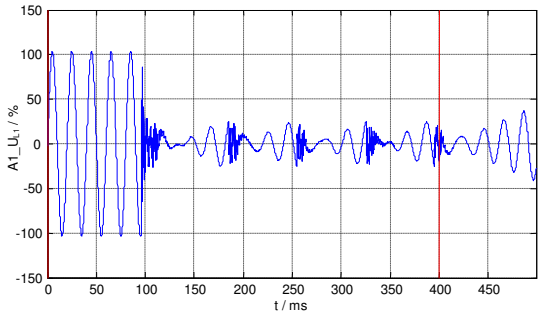


Figure 2: Voltage of the faulty conductor

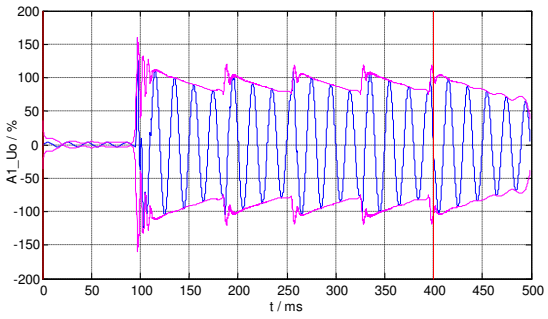


Figure 3: $u_0(t)$ with a restriking fault

The qui algorithm is based on the proven qu algorithm and is adapted to the *intermittent fault* only in terms of the time window parameter. A modified parameter set is required when, for example, the shift voltage no longer falls below the threshold value for the earth fault detection.

This results in the following essential properties for the qui algorithm:

- Directional indication also during restriking and intermittent earth faults
- The indication tracks the fault (i.e. if the faulty segment changes while creating the open connection in the circuit to the other feeder)
- Fault locating can already be performed during the restriking fault
- Fault locating can already be started on the faulty feeder because there is no misinterpretation as a high-impedance fault
- Log book event recording (configurable)
- A cyclic record of the measured values in the log book during the fault can be configured for subsequent evaluation

2.3 Harmonic method

Useful in cable networks

- The triggering threshold of the zero sequence voltage U_{NE} is configurable
  In isolated networks the fundamental frequency (50 Hz or 60 Hz) is used for the detection based on the **sin(φ) method**
- The evaluated frequencies are selectable (e.g. 250 Hz)
- Reduced demands on the accuracy of the zero current transformer
- Comparison of the magnitude of the harmonic currents in Io
  - High sensitivity due to the comparative analysis of the harmonics of the earth fault-prone area
  - Compensation of the daily fluctuations of the harmonics due to the comparative analysis
  - At least three feeders are required
  - Direction information for the neutral current is not needed
- Evaluation of the reactive power direction
  - The triggering threshold of the harmonic current is configurable
  - Only two outputs are required
  - The monitoring of all outputs is not necessary for the evaluation
- Suppression of the earth fault indication in the direction of the busbar
- Recording of the event and the measurements in the logbook

2.4 Wattmetric method cos(φ)

- The triggering threshold of the zero sequence voltage U_{NE} is configurable
- The threshold of watt-metric component of the zero current can be set separately for each output
- Selectable operating modes
  - Direction of the active power of the zero system
  - Watt-residual current increase with recording
  - Reset of the indication by an external signal automatically after a specified period or at the end of the earth fault
- Suppression of the earth fault indication in the direction of the busbar
- Recording of the event and the measurements in the logbook
- When using the active power direction procedure, the accuracy of the angle between current and voltage transformers must be monitored

2.5 Pulse locating

- Only Io is required for location
- The triggering threshold of the zero current is configurable
- During the recognition of the pulse pattern the stationary part of the null current is removed automatically
- Symmetrical and asymmetrical pulsing can be configured
- Reset of the indication by an external signal or automatically after a specified period (can be selected and combined)
- A simple depth localisation is possible due to the pulse location method

2.6 Connection to the control system and REGSys™

The EOR-D earth fault detection relay is part of the EORSys system and can easily be connected to the REG-D voltage regulator and the REG-DP Petersen coil controller.
An essential feature of both the EORSys and REGSys™ is that all the components that are connected to each other through the system bus E-LAN can be configured via a single interface and can be connected to the control system via a single interface. Therefore, the measured values and parameters of all connected devices are available for the control systems and can be read or changed remotely. There are **IEC 60870-5-104, IEC 60870-5-103, IEC 60870-5 - 101, IEC 61850 (ed. 1 and 2) and DNP 3.0** communication protocol standards available.

2.7 Multimaster system architecture

If multiple devices are connected via the system bus E-LAN, every bus participant can be configured or read using a PC via an interface (COM 1, COM 2) from every other bus participant.

2.8 Substation busbar configuration

In certain configurations, a switch position indication is necessary to correctly assign the zero sequence voltage to the zero current of each feeder. There are two different ways to do this:

- Measurement of U_{en} for each feeder
- Assignment via position signals from the disconnector or circuit breaker

The reading of the switch signals can be done via digital input or control (all common protocols).

The description of the configuration can be done easily using Excel and then transferred to the EOR-D.

2.9 Additional Features

The transient recorder

The transient recorder is triggered by the first bypass of the residual voltage threshold. The transient recording begins five periods before and ends five periods after triggering. These recordings are evaluated in the qu2 algorithm for the transient method. The recording can be read out via the device interface.

Event Log book

All important events are time stamped and saved in the logbook. Additional information such as the grouping of feeders, earth fault direction, measurements that led to the earth fault, etc. can also be found in the logbook and can be very helpful for the fault analysis. The logbook can be read via WinEDC and the serial interfaces.

Built-in programming language REG-L

With the REG-L programming language it is very easy to implement additional customer-specific functions without a firmware change being required.

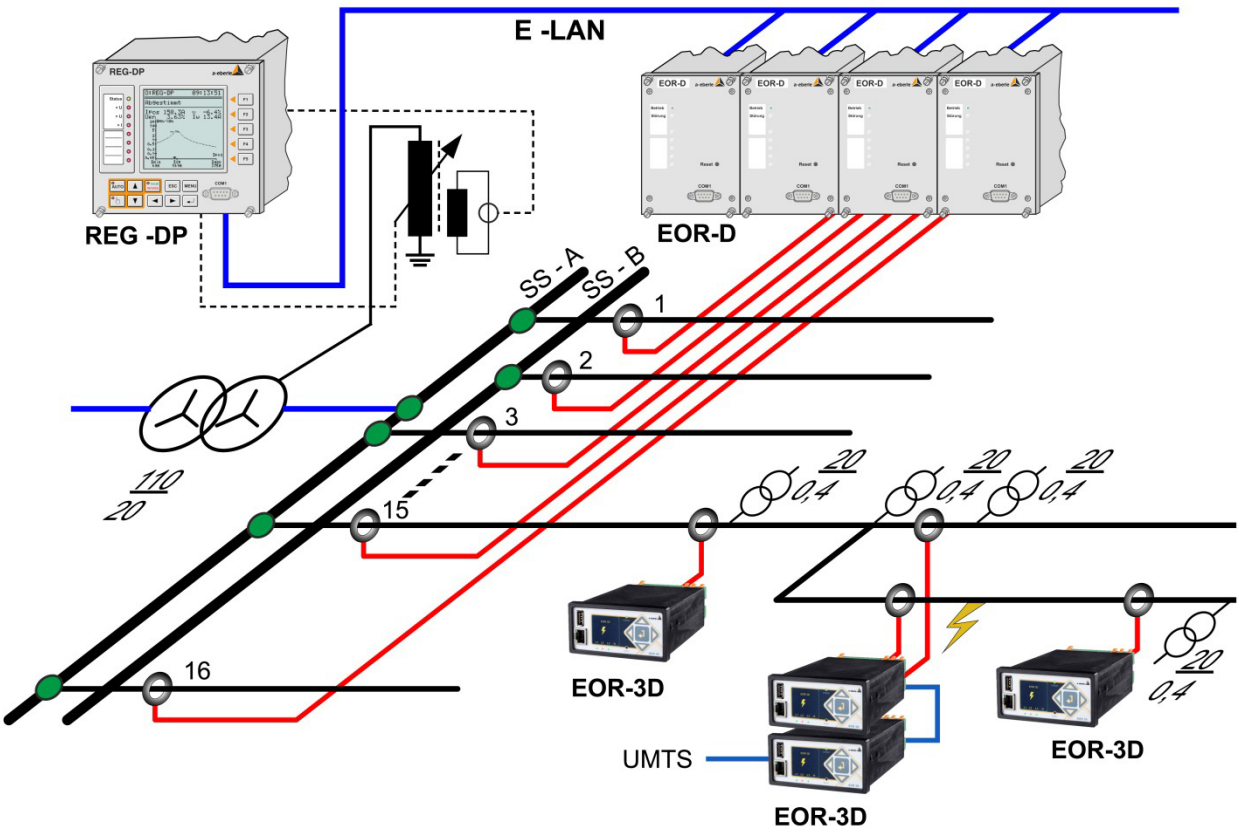


Figure 4: Configuration example for the EOR-D in the substation and the individual EOR-3D devices

3. The WinEDC PC software

The following functions are available when using WinEDC:

Configuring the relay

- System configuration
- Activation of the various detection processes
- Setting trigger levels
- S ignaling Configuration (LEDs and relay)
- Customer-specific application functions via REG-L programs

Support for easy commissioning

- Digital input and output testing
- Display of all measured values (50 Hz and harmonics)
- During normal operation and without additional equipment being required testing of the current transformer direction even in the healthy compensated networks

Fault analysis

- Log book download and display
- Download of the recorded transients (10 kHz) The records are converted into Excel-readable data or Comtrade format.

Network analysis

- Data logger
  This function makes it possible to use the EOR-D simultaneously as both a high accuracy earth fault location and data capture device. The measured values are constantly read out using WinEDC and recorded for later analysis in a local file on the PC.
- Calculation of the capacitance of each output

The WinEDC program can be connected directly to the EOR-D or via TCP/IP. All the functions listed above are also available via TCP/IP.

WinEDC is available for the following operating systems:

- Windows 8, 7, Vista, XP, NT

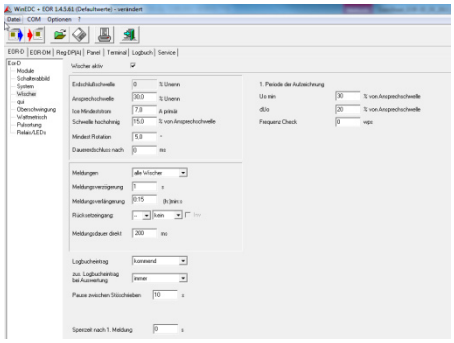


Figure 5: WinEDC configuration: Transient function

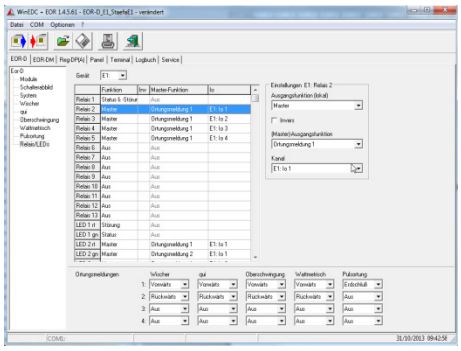


Figure 6: WinEDC configuration: Signal

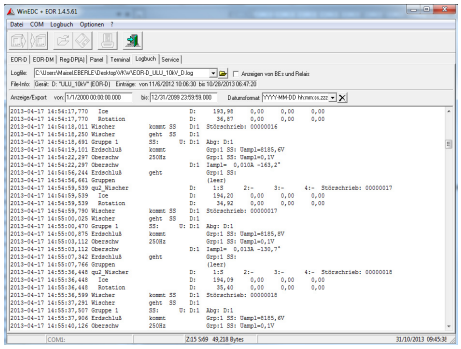


Figure 7: Example Logbook

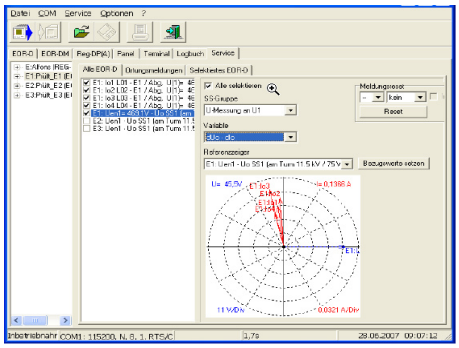


Figure 8: Example Service Page (Online)

4. Technical specifications

4.1 Regulations and standards

IEC 61010-1
CAN / CSA - C 22.2 No. 1010.1 92 VDE 0110
IEC 60255-22-1
IEC 61326-1
IEC 60259
IEC 60068-1
IEC 60688
IEC 61000-6-2
IEC 61000-6-4
IEC 61000-6-5

CE

4.2 AC voltage inputs (U_{NE})

Zero voltage U_{en}	0.1V … 200V
Frequency range	45....50....60....65 Hz
Internal consumption	≤ U_{E2} / 360 kΩ

4.3 AC current inputs (I_0)

Current range I_n	1 A / 5 A (can be selected in the software)
Shape of the curve	Sinus
Frequency range	45....50....60....65 Hz
Internal consumption	≤ 0.1 VA (1A)
Overload capacity Permanent ≤ 10s ≤ 1s ≤ 5ms	 10A 30 A 100 A 500 A

4.4 Digital Inputs (DE)

Inputs DE1 ... DE16

Input voltage	AC/DC in the range from 48 V ... 230 V
Shape of the curve	Rectangular, sinusoidal
H - Level	> 48 V
L - Level	< 10 V
Signal frequency	DC ... 50 Hz
Input resistance	108 kΩ
Potential isolation	Optocoupler; all inputs isolated from each other

4.5 Relay Outputs (R)

Relay R1 ... R6, incl. Status (M00 / M00.1)
Relay R1 ... R13, incl. status (M80 / M80.1)

Max. switching frequency	≤ 1 Hz
Potential isolation	galvanically isolated from all device-internal potentials
Contact load	AC:250 V, 5 A (cos φ = 1.0) AC:250 V, 3 A (cos φ = 0.4) DC: 220 V, 150 W switching capacity
Switching operations	≥ $1 \cdot 10^4$ electrical

4.6 Reference conditions

Reference temperature	23°C ± 1 K
Input quantities	V_{ne}=90 ... 110 V I_0=0 ... 1A / 0 ... 5A
Auxiliary voltage	H = Hn ± 1%
Frequency	50 Hz...60 Hz
other	IEC 688 - Part 1

4.7 Electrical safety

Safety class	I
Degree of pollution	2
Over-voltage category	II, III

III	II
Current and coltage inputs Auxiliary voltage	Control circuits COM, E-LAN

Operating voltages

50 V	120 V	230 V
E-LAN, COM1... COM3	voltage input	Auxiliary voltage Digital inputs Relay outputs

Test voltages	
Rack / Housing	2.5 kV
Auxiliary voltage	3.1 kV
COM, E-LAN, Time/Trigger-BUS	0.35 kV
digital outputs	1.8 kV
digital inputs (250 V)	1.8 kV
analog outputs	0.35 kV
input voltage (E1, E2)	1.4 kV
Input current	1.4 kV

Power supply

Characteristic	H1	H2
AC	85...264V	20...60 V
DC	88...280V	18...72V
Power consumption	≤ 15 VA	≤ 15 VA
Frequency	50 Hz / 60 Hz	-
Microfuse	T2 250V	T2 250V

The following applies to all characteristics:
Voltage dips of ≤ 25 ms result neither in data loss nor malfunctions

Storage	
Device parameter	serial EEPROM with ≥ 1000 k write/read cycles
RAM - Data	Li - laser-welded battery

4.8 Electromagnetic compatibility

Electromagnetic compatibility	
Interference emissions	Group 1 Class A limit in accordance with EN 55011:1991
Disturbance immunity	Electrostatic charge in accordance with EN 61000-4-2:1995 Air discharge: 8 kV Contact discharge: 4 kV Electromagnetic field in accordance with EN 50140:1993 or ENV 50204:1995 80 - 1000 MHz: 10 V/m 900 ± 5 MHz: 10 V / m pulse

Electromagnetic compatibility	
	modulated Fast transient bursts in accordance with EN 61000-4-4:1995 Supply voltage AC 230 V: 2 kV Data connections: 1 kV Conducted bursts in accordance with ENV 50141:1993 0.15 - 80 MHz: 10 Veff 50 Hz magnetic field in accordance with EN 61000-4-8:1993 30 A/m

Climatic conditions	
Temperature range – Function – Storage	 -25 °C ... +55 °C -40 °C ... +70 °C

4.9 Mechanical design

Plug-in module	
Front panel	Aluminium, RAL 7035 grey
Height	3 HE (132.5 mm)
Width	18 TE (91.44 mm)
Printed circuit board	160 mm x 100 mm
Weight	≤ 1.0 kg
Protection type – Plug-in module – Female multipoint connector	 IP 00 IP 00
In-panel mounting	in conformity with DIN 41494 Part 5
Plug-in connector	DIN 41612

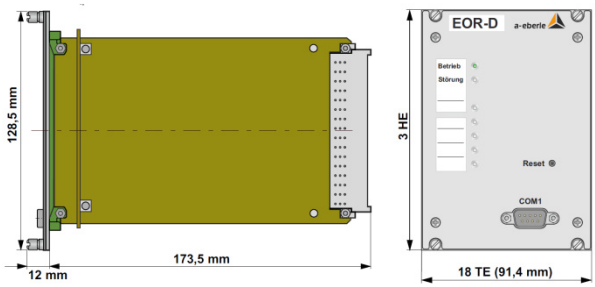


Figure 9: EOR-D dimensions

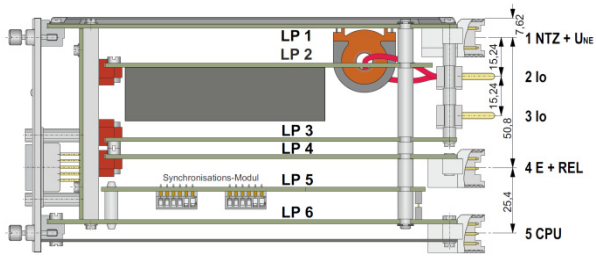


Figure 10: Position of the EOR-D male connectors

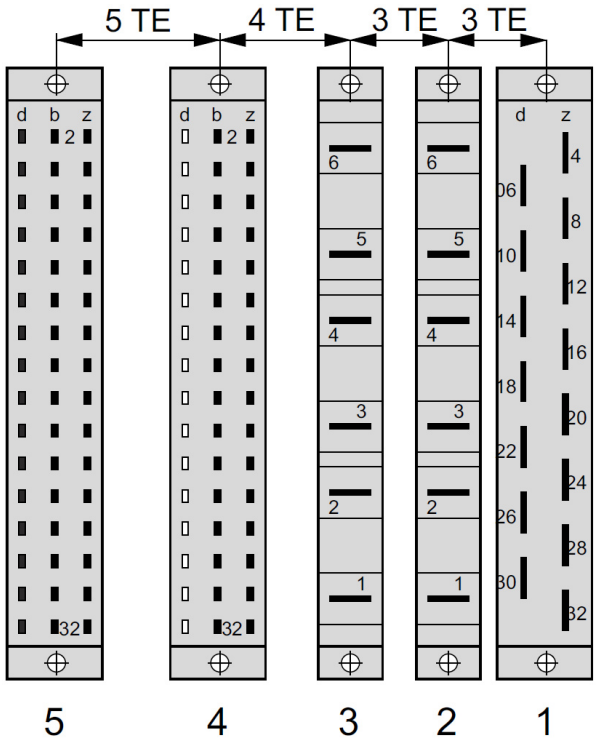


Figure 11: Position of the EOR-D female connectors

5. Interfaces

RS232 interfaces

The EOR-D earth fault detection relay has two RS232 serial interfaces (COM1, COM2); COM 1 is accessible on the front panel and COM 2 on the terminal strip. COM 2 is used for connecting the relay to primary control systems. Customer-specific protocols can be implemented via COM 2.

COM 1 **COM 2**	Male multipoint connector, sub min D on the front of the device, pin allocation as PC
Connection options	PC, terminal, modem, PLC
Number of data bits/protocol	Parity 8, even, off, odd
Transmission rate bit/s	1200, 2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200
Handshake	RTS/CTS or X_{ON}/X_{OFF}

RS485 interfaces

Every EOR-D has the RS485 double interface with repeater function for connecting to the E-LAN. This allows the integration of the EOR-D in a communication system with other components such as REG-D voltage regulators, REG-DP P-coil controller and PQI-D Power-Quality interface.

E-LAN (Energy- Local Area Network)

Characteristics

- 255 addressable participants
- Multi-master structure
- Integrated repeater function
- Open ring, bus or a mixture of bus and ring
- Protocol is based on SDLC/HDLC frames
- Transmission rate 62.5 ... 125 kbit/s
- Frame length 10 ... 30 Bytes
- Medium-throughput 100 frames/s

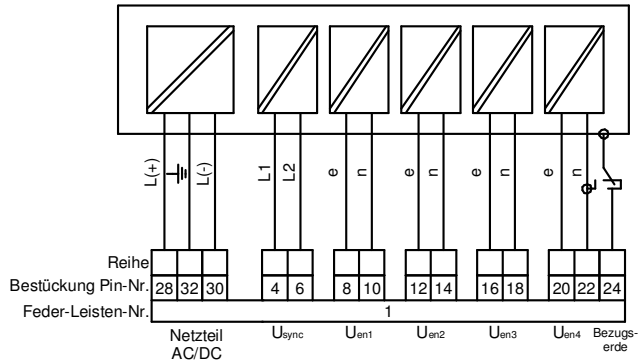
COM3

For connecting more than 15 interface modules (BIN-D) to the EOR-D relay

6. Assignment of the female connectors

6.1 Female connector 1

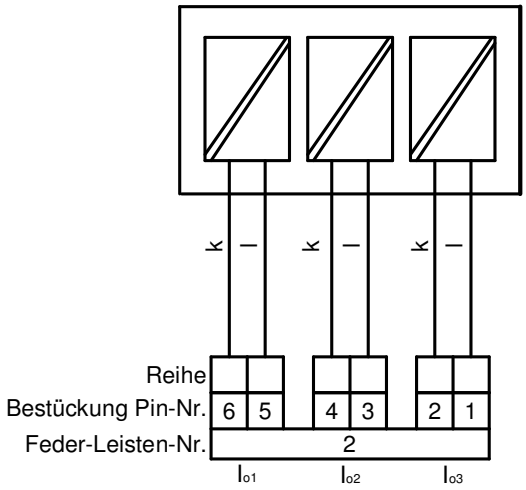
Auxiliary voltage, voltage inputs
Input voltage U_{1E}...U_{3E}, U_{NE}, U_{sync} and auxiliary voltage



Description		Function	Pin	Configuration
Synchronisation voltage	U_{Sync}	L1	4	
		L2	6	
Zero sequence voltage channel 1	U_{en1}	e	8	
		n	10	
Zero sequence voltage channel 2	U_{en2}	e	12	
		n	14	
Zero sequence voltage channel 3	U_{en3}	e	16	
		n	18	
Zero sequence voltage channel 4	U_{en4}	e	20	
		n	22	
Reference earth			24	
Auxiliary voltage	U_H	L (+)	28	
		L (-)	30	
		PE	32	

6.2 Female multipoint connector 2

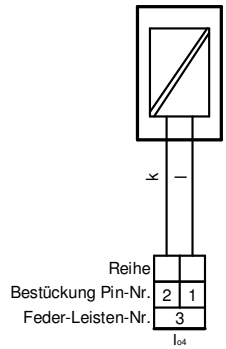
Total currents $I_{01}...I_{04}$



Description		Function	Pin	Configuration
Total current Channel 1	I_{01}	k	6	
		I	5	
Total current Channel 2	I_{01}	k	4	
		I	3	
Total current Channel 3	I_{01}	k	2	
		I	1	

6.3 Female multipoint connector 3

Total input I_{04}

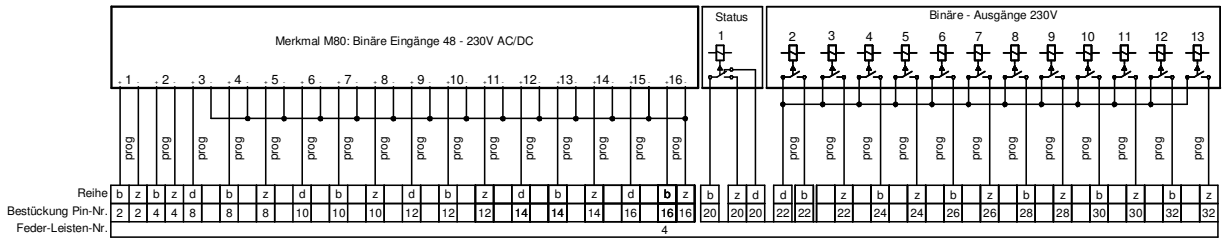


Description		Function	Pin	Configuration
Total current Channel 4	I_{01}	k	2	
		I	1	

6.4 Multipoint connector 4 type M80 / M80.1 (combi 4)

Digital inputs and relay outputs

Version with: 16 Digital inputs
12 Digital outputs (contact)
1 Status relay

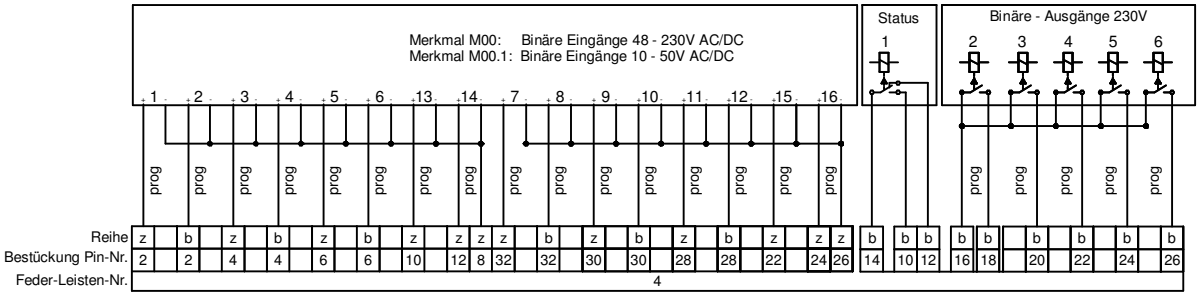


Description		Function	Pin	Configuration
Status	Relay	NCC	d20	Freely programmable
Digital outputs 230 V	R2	NOC	b22	Freely programmable
	R3	NOC	z22	Freely programmable
	R4	NOC	b24	Freely programmable
	R5	NOC	z24	Freely programmable
	R6	NOC	b26	Freely programmable
	R7	NOC	z26	Freely programmable
	R8	NOC	b28	Freely programmable
	R9	NOC	z28	Freely programmable
	R10	NOC	b30	Freely programmable
	R11	NOC	z30	Freely programmable
	R12	NOC	b32	Freely programmable
	R13	NOC	z32	Freely programmable
	R2...R13	Terminal	d22	
Digital inputs 48 - 230 V AC/DC	E1	+	z2	Freely programmable
		-	b2	Freely programmable
	E2	+	z4	Freely programmable
		-	b4	Freely programmable
	E3	+	d8	Freely programmable
	E4	+	b8	Freely programmable
	E5	+	z8	Freely programmable
	E6	+	d10	Freely programmable
	E7	+	b10	Freely programmable
	E8	+	z10	Freely programmable
	E9	+	d12	Freely programmable
	E10	+	b12	Freely programmable
	E11	+	z12	Freely programmable
	E12	+	d14	Freely programmable
	E13	+	b14	Freely programmable
	E14	+	z14	Freely programmable
	E15	+	d16	Freely programmable
	E16		b16	
	E3...E16	-	z16	

6.5 Multipoint connector 4 type M00 / M00.1 (combi 1b)

Digital inputs and relay outputs

Version with:	16	Digital inputs
	5	Digital outputs (contact)
	1	Status relay

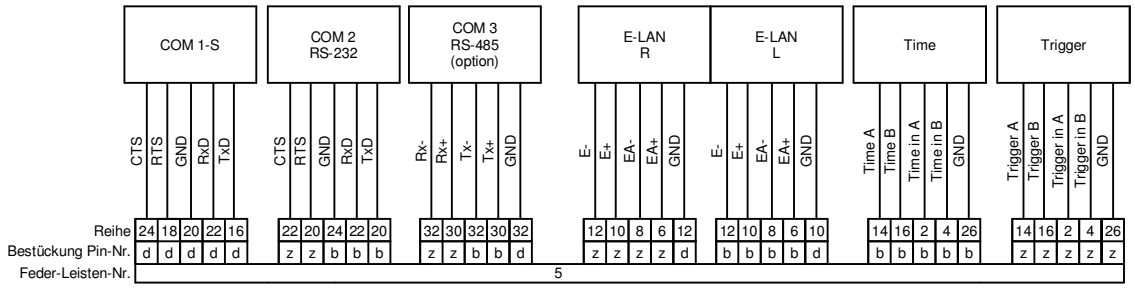


Description		Function	Pin	Configuration
Status	Relay	NCC	b10	Freely programmable
Digital outputs 230 V	R2	NOC	b18	Freely programmable
	R3	NOC	b20	Freely programmable
	R4	NOC	b22	Freely programmable
	R5	NOC	b24	Freely programmable
	R6	NOC	b26	Freely programmable
	R2...R6	Terminal	b16	
Digital inputs	E1	+	z2	Freely programmable
48 - 230 V AC/DC	E2	+	b2	Freely programmable
	E3	+	z4	Freely programmable
	E4	+	b4	Freely programmable
	E5	+	z6	Freely programmable
	E6	+	b6	Freely programmable
	E13	+	z10	Freely programmable
	E14	+	z12	Freely programmable
	E1..E14	-	z8	Freely programmable

Description		Function	Pin	Configuration
Digital inputs	E7	+	z32	Freely programmable
48 - 230 V AC/DC	E8	+	b32	Freely programmable
	E9	+	z30	Freely programmable
	E10	+	b30	Freely programmable
	E11	+	z28	Freely programmable
	E12	+	b28	Freely programmable
	E15	+	z22	Freely programmable
	E16	+	z24	Freely programmable
	E7..E16	-	z26	Freely programmable

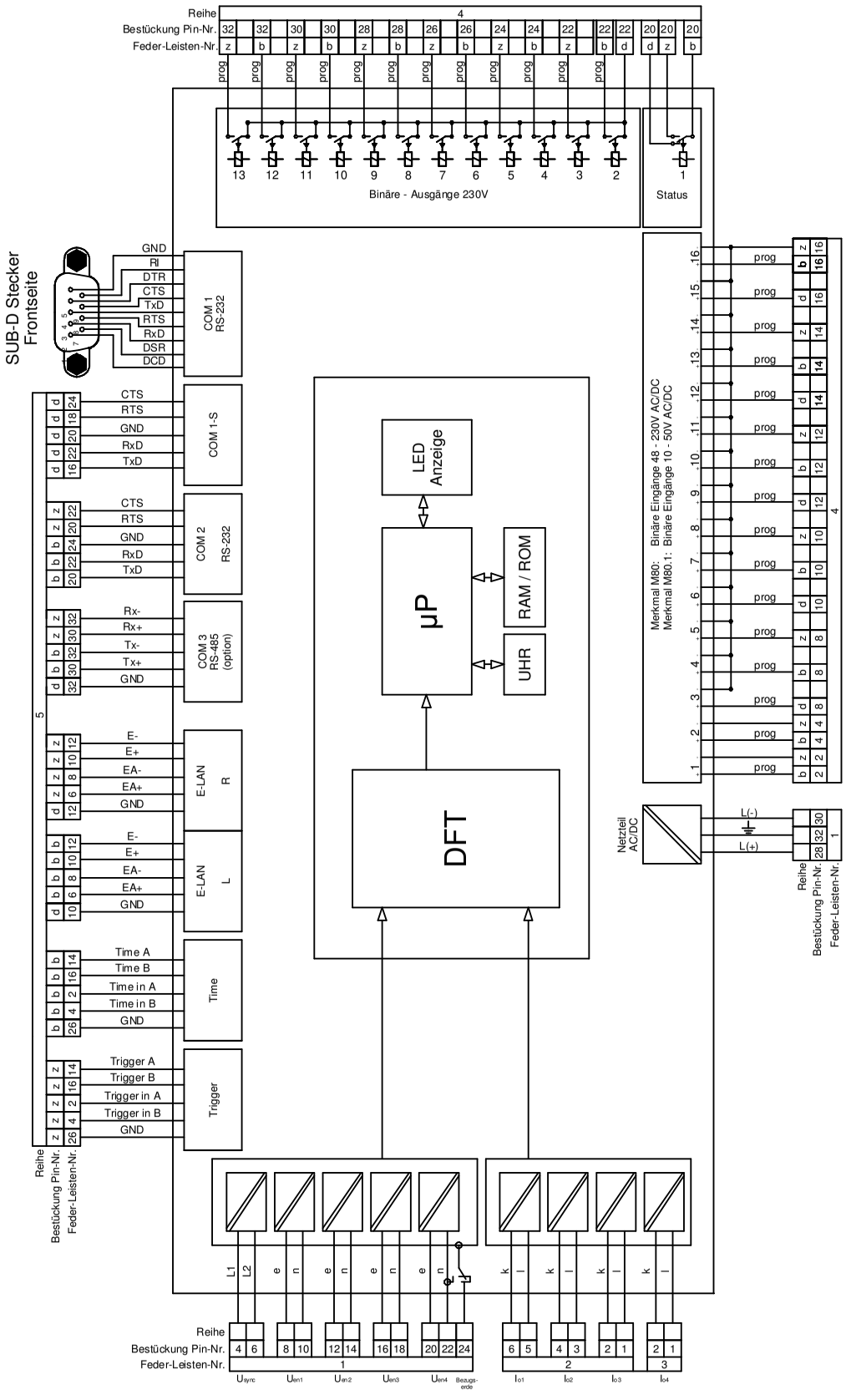
6.6 Female connector 5 interfaces

Communication COM1-S, COM2, COM3, E-LAN, Time/Trigger-BUS

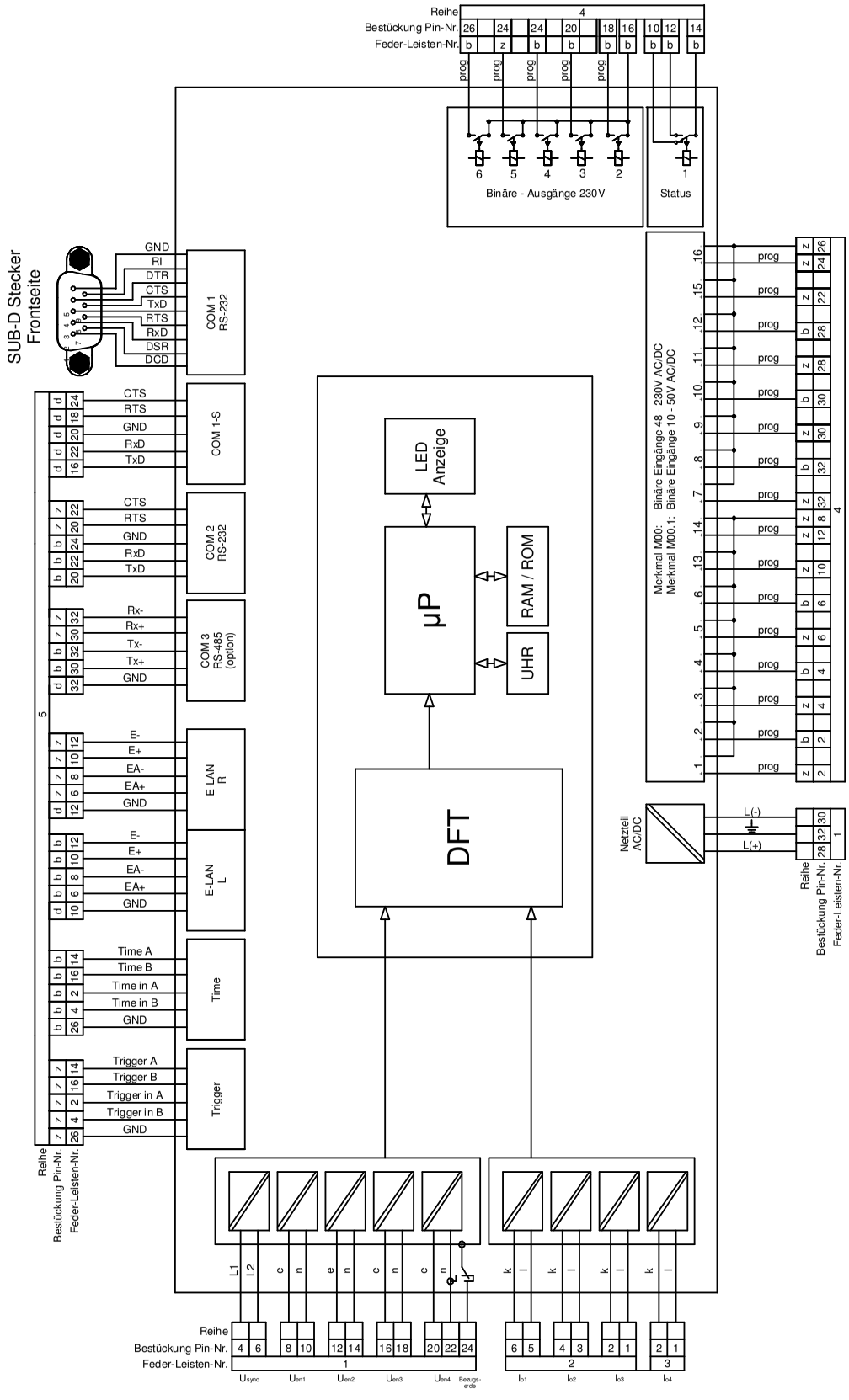


Description	Function	Pin
COM 1-S	CTS	d24
	RTS	d18
	GND	d20
	RxD	d22
	TxD	d16
COM 2 RS 232	CTS	z22
	RTS	z20
	GND	b24
	RxD	b22
	TxD	b20
	+12V	Z24
COM 3 RS 485	Rx -	z32
	Rx +	z30
	Tx -	b32
	Tx +	b30
	GND	d32
E-LAN R (right)	E-	z12
	E+	z10
	EA-	z8
	EA+	z6
	GND	d12
E-LAN L (left)	E-	b12
	E+	b10
	EA-	b8
	EA+	b6
	GND	d10
Time	Time A	b14
	Time B	b16
	Time in A	b2
	Time in B	b4
	GND	b26
Trigger	Trigger A	z14
	Trigger B	z16
	Trigger in A	z2
	Trigger in B	z4
	GND	z26

6.7 Block diagram M80 / M80.1



6.8 Block diagram M00 / M00.1



7. Serial interfaces

RS232 interfaces

The EOR-D has two RS232 serial interfaces (COM1, COM2). COM1 is accessible via the front Sub-D socket or via screw terminals or Sub-D connector on the housing, and COM2 via screw terminals or the Sub-D on the housing.

COM2 is used for connecting the control system to primary control systems or modems.

Connection elements

COM1	Male multipoint connector, sub min D on the front of the device, pin allocation as PC
COM1-S	Connector 5
COM2	Connector 5
Connection options	PC, terminal, modem, PLC
Number of data bits/protocol	Parity 8, even, off, odd
Transmission rate bit/s	1200, 2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200
Handshake	RTS / CTS or X_{ON} / X_{OFF}

E-LAN (Energy- Local Area Network)

Characteristics

- 255 addressable participants
- Multi-master structure
- Integrated repeater function
- Open ring, bus or a mixture of bus and ring
- Protocol is based on SDLC/HDLC frames
- Transmission rate 62.5 ... 125 kbit/s
- Frame length 10 ... 30 Bytes
- medium-throughput approx. 100 frames/s

COM3

For connecting of ≤ 8 interface modules (BIN-D) in any combination to any EOR-D.

8. Housing technology

EORSys has a very flexible housing technology. A few of the housing configurations are described below.

8.1 84 TE rack

The rack has 84 slots with 84 position numbers. In each case a specific position number

"n" is the reference point for mounting the guide holder and the connector elements at the rear of rack.

Position number

Female multipoint connector	1	2	3	4	5
Guide holder Screws	n n	- n+3	- n+6	- n+10	- n+15

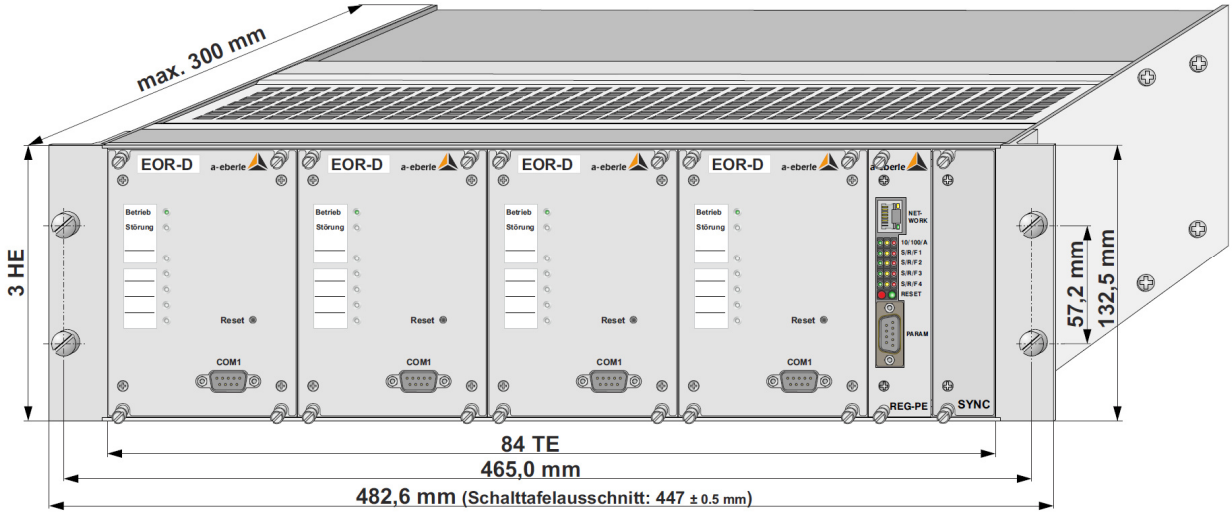


Figure 12: 84 TE rack containing four EOR-D for monitoring 16 control outputs including serial connection to the control (REG-PE)

8.2 Wall housing

Material	Polycarbonate (UL 94 V-0)
Protection type	IP 30
Weight	≤ 1.5 kg
Dimensions	Figures 13 / 14 /15 / 16

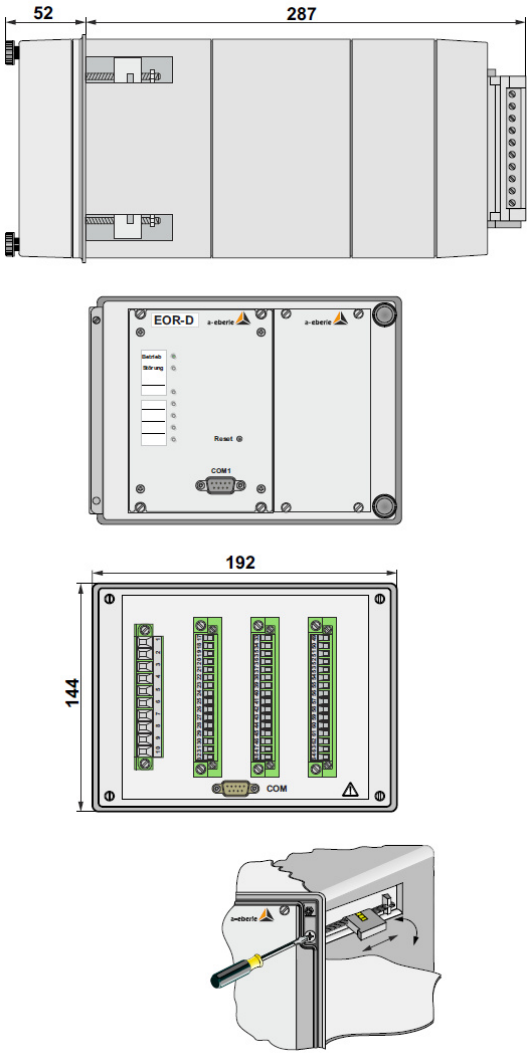


Figure 13: In control panel housing 30 TE

Cutout dimensions for panel mounting housing (H x W):

20TE	138.3 ±0.2 x 134.5 ±0.2
30TE	138.3 ±0.2 x 184.5 ±0.2

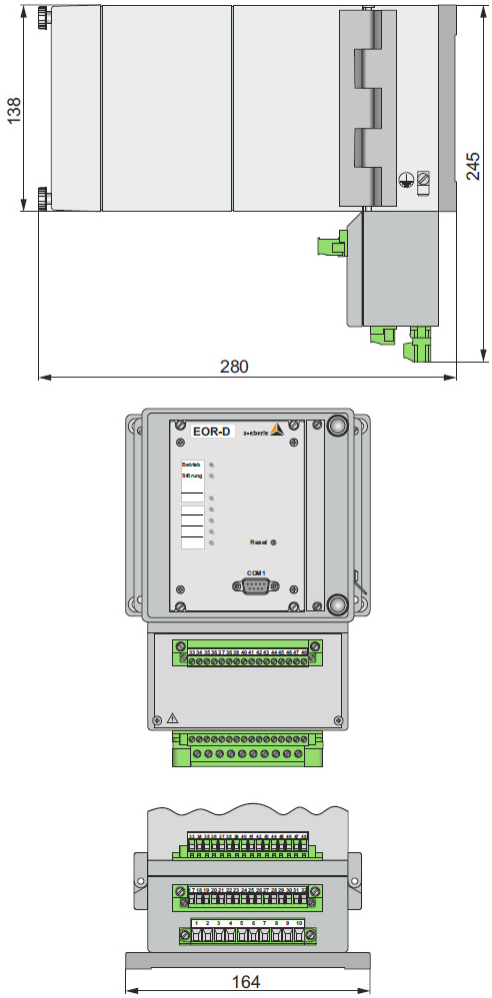


Figure 14: Wall-mounting housing 20 TE

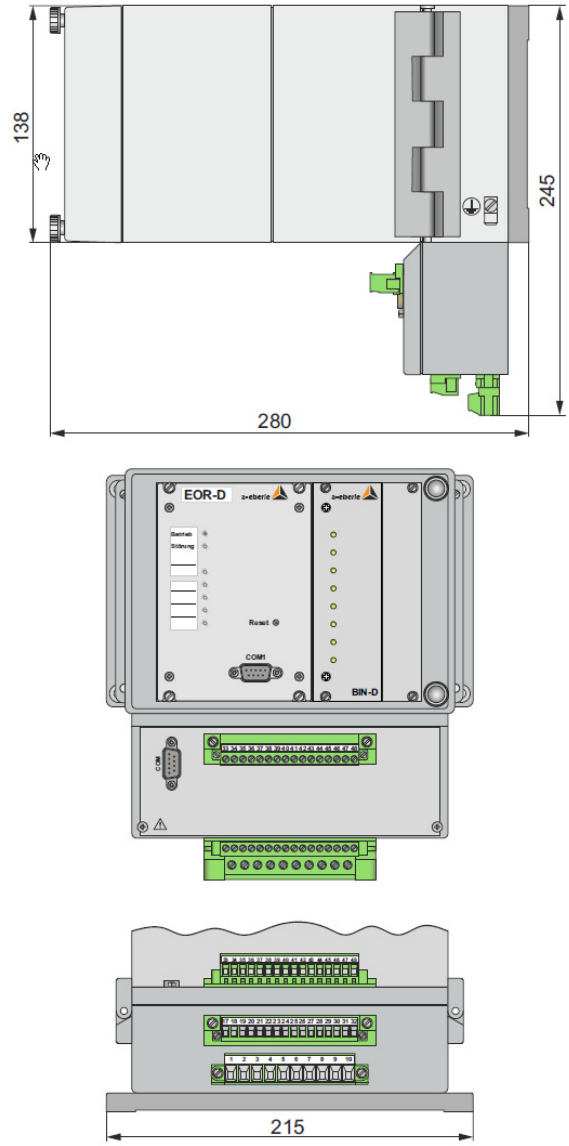


Figure 15: Wall-mounting housing 30 TE with 1 x EOR-D and 1 x BIN-D

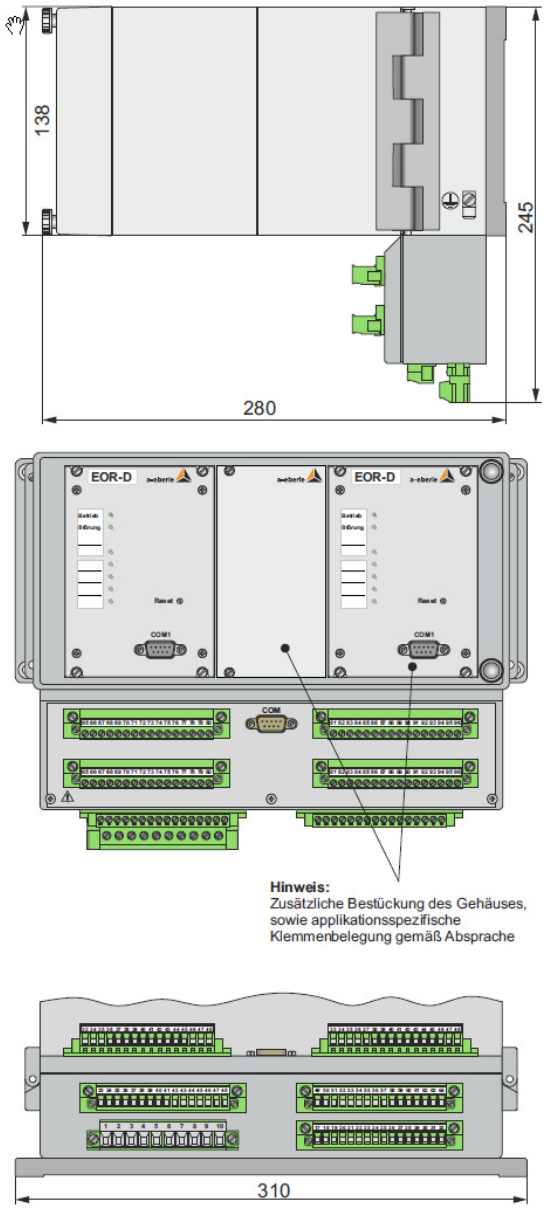


Figure 16: Wall-mounting housing 49 TE with 2 x EOR-D

9. Order specifications

For determining the order details:

- Only one unit can be ordered for codes with the same capital letter.
- When a code's capital letter is followed by the number 9, additional information may be required.
- When a code's capital letter is followed only by zeros, the code may be omitted.

EORSys - Device	
CHARACTERISTIC	**CODE**
Earth fault detection relay EOR-D, plug-in module (18TE, 3HE) suitable for earth fault detection on up to four feeders with double E-LAN interface, COM1, COM2, 16 digital inputs, 12 relay outputs plus status relay (M80 or M80.1) and 6 indicator LEDs Including WinEDC configuration software and connecting cable (null modem)	**EOR-D**
Model	
● Plug-in module	B01
● Wall mounting housing (20TE) and wiring prepared for installation of **one** EOR-D plug-in module	B02
● Wall mounting housing (49TE) and wiring prepared for installation of **two** EOR-D plug-in modules	B03
● Wall mounting/panel mounting housing (20/30/49 TE) mixed configuration with wiring on consultation (e.g. EOR-D with REG-PE or EOR-D with REG-P, etc.)	B91
● 19" rack with configuration and wiring on consultation	B92
● 19" rack, backplane model	B95
Note: All types incl. U_{sync}	
External power supply	
● AC 85 V ... 110V ... 264 V / DC 88 V ... 220V ... 280V	H1
● DC 18 V ... 60V ... 72V	H2
RS232 interface (COM 1)	
● RS 232	I0
● USB	I1
RS485 interface (COM 3)	
● None	R0
● where	R1

EORSys - Device	
CHARACTERISTIC	**CODE**
Digital inputs and outputs	
● 5 programmable relay lus Lpife contact 16 programmable digital inputs (AC/DC 48 V ..250 V)	M00
● 5 programmable relay plus life contact 16 programmable digital inputs (AC/DC 10 V ..50 V)	M00.1
● 12 programmable relay plus life contact 16 programmable digital inputs (AC/DC 48 V ..250 V)	M80
● 12 programmable relay plus life contact 16 programmable digital inputs (AC/DC 10 V ..50 V)	M80.1
Plant-specific project planning and documentation	
● None	L0
● With	L1

ACCESSORIES	Ident. No.
Synchronization unit for measurement inputs (6TE,3HE); mandatory per EORSys	356.7110.00
Time synchronisation:	
Radio clock DFC 77	111.9024.01
GPS radio clock NIS time, RS485, Uh: AC 85…110 V…264 V / DC 88 V…220 V…280 V	111.9024.45
GPS radio clock NIS time, RS485, Uh: DC 18…60 V…72 V	111.9024.46
GPS radio clock NIS time, RS232, Uh: AC 85…110 V…264 V / DC 88 V…220 V…280 V	111.9024.47
GPS radio clock NIS time, RS232, Uh: DC 18…60 V…72 V	111.9024.48
Communication	
Develo MicroLink 56Ki analogue modem, top-hat rail device incl. 230 V AC mains adapter	111.9030.03
TCP/IP adapter 10Mbit REG-COM; DIN rail including power supply 230V AC	A01
TCP/IP adapter 10Mbit REG-COM; plug-in module 8TE, 3HE; power supply AC 85…110 V…264 V / DC 88 V…220 V…280 V	A02
TCP/IP adapter 10Mbit REG-COM; plug-in module 8TE, 3HE; power supply DC 18…60 V…72 V	A03
Additional user manual for EOR-D	GX

Notes

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