

We take care of it.

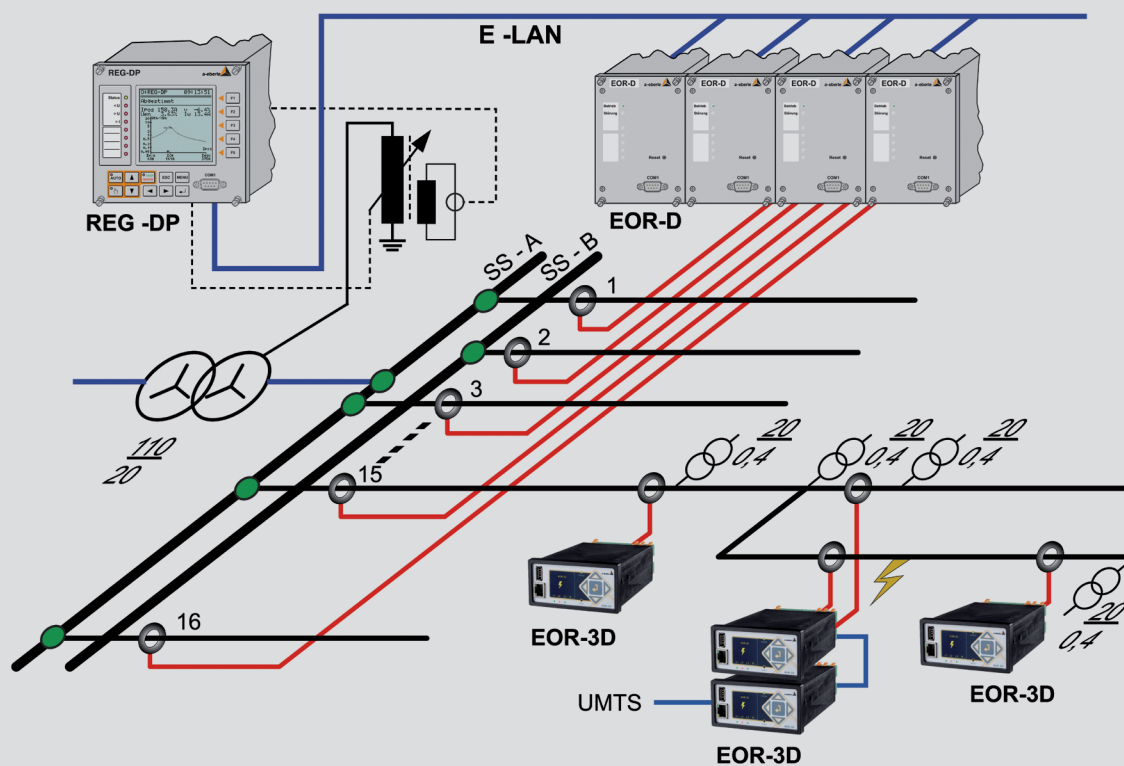


EORSys

An expert solution is within your reach.

- System solution for compensated, isolated and solidly grounded grids
- Precise control of arc suppression coils
- Reliable locating of earth faults
- Detection of restriking faults
- Detection of short circuits
- Fault data recording
- Extensive communication capabilities for devices remote connection
- Servicing, commissioning and failure analysis





EORSys product range deployment

The EORSys product family offers a complete solution for grids with resonant earthed, isolated and solidly grounded neutral.

Solutions for compensated grids

Using the controller for variable arc suppression coils (REG-DP and REG-DPA) you can comfortably regulate in compensated grids to the correct tuning point. If regulation is a bit more complicated or more difficult due to non-linear loads, the optionally available REG-DP and REG-DPA current injection provides a remedy. The current injection enables precise compensation/tuning of the arc suppression coils under the most difficult conditions.

If an earth fault occurs in the grid, multiple A. Eberle devices are simultaneously available to accurately locate it. The following localisation methods are included for detection in compensated grids:

Transient method using the qu2 principle, suitable for detection

- of faults up to 3 kOhm
- of parallel cables and in ring grids
- of faults in spur cables

Detecting restriking faults using the qui method

- directional display of restriking faults
- fault indication

Watt-metric Method $\cos(\varphi)$

- for Watt residual current
- for Watt residual power increase with additional resistance

Harmonic method for 250 Hz

Harmonic method for locating with ripple control signals

Pulse location method

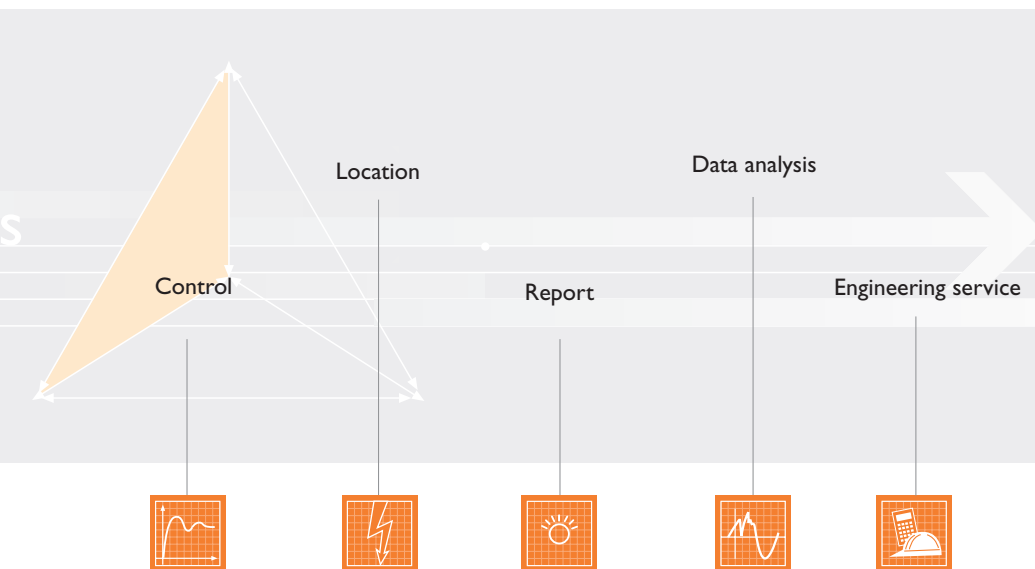
- classical with capacitors
- fast pulse location

Short-circuit detection using the definite time overcurrent principle (EOR-3D only)

- directional
- non-directional

Quickly locating earth faults.

Safe control of Petersen coils



Earth fault tests - restriking faults

Solution for isolated grids

In distribution grids with an insulated neutral the following detection procedures are available.

Transient method using the qu2 principle, suitable for location

- in parallel cables and in ring grids
- of faults in radial feeders

Detecting restriking faults using the qui method

- directional display of restriking faults
- fault indication display

Harmonics method $\sin(\varphi)$

Harmonic method for 250 Hz

Harmonic method for locating with ripple control signals

Short-circuit detection using the definite time overcurrent principle (EOR-3D only)

- directional
- non-directional

Solution for rigid/low impedance grounded systems

In solidly or low-impedance grounded grids, no significant increase in the zero sequence voltage occurs with a single-phase fault. In addition, the fault current, when compared to compensated and isolated grids is much higher in that case. Only one form of fault detection remains then available.

Short-circuit detection using the definite time overcurrent principle (EOR-3D only)

- directional
- non-directional



EORSys

A Controller for arc suppression coils

REG-DP and REG-DPA

The REG-DP devices (19" technology) and REG-DPA (industrial enclosures) are primarily used for the auto-tuning of adjustable arc suppression coils. They are used in coils in medium voltage grids and high-voltage grids up to 110 kV.

For good control performance, the phase angle information is taken into account in addition to the value of the zero sequence voltage. Consequently, even small changes in the values can be compensated.

Of course, each controller can perform other tasks that support the control or even a possible earth fault localisation.

The controllers also provide the following features:

- Control for fixed coils, parallel for plunge-core coils
- Parallel control of plunge-core coils through communication between control devices
- Parallel control of plunge-core coils without communication between control devices
- Controlling the resistor for the Watt residual current increase; including the thermal image of the resistance and thus overheating protection
- Connection and control of the current injection
- Compensation during an earth fault (only in combination with the EOR-D)
- Control of the pulsing current for classical pulse locating method

The control of the pulsing current can be freely programmed individually to your requirements.

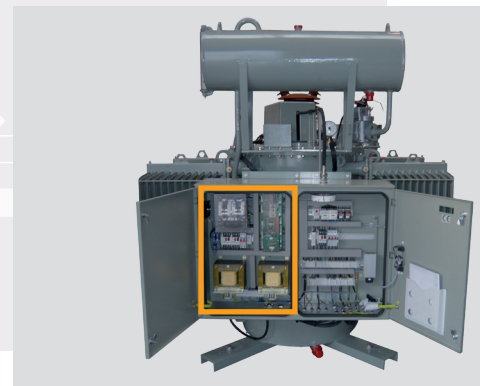
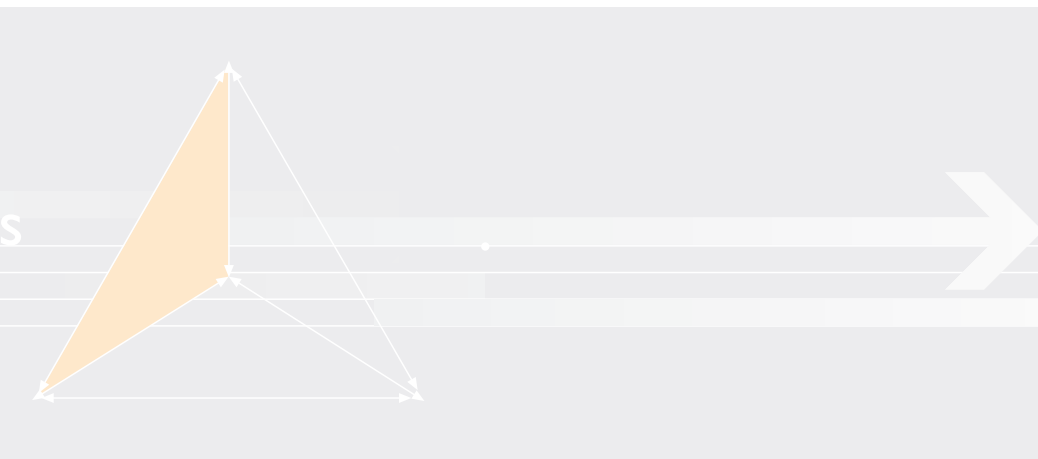
Hence a program ensures the correct degree of overcompensation, the control of the pulse devices and the monitoring of the pulse cycles.

For communication with the control centre there are sufficient relay outputs or all current communication protocols available.

Current injection

The control of arc suppression coils can be difficult under certain conditions. Why? Because of the increasing level of cabling of modern grids. This increases the natural symmetry of the conductor.

REG-DP/DPA: The expert solution.



Petersen coil with integrated current injection

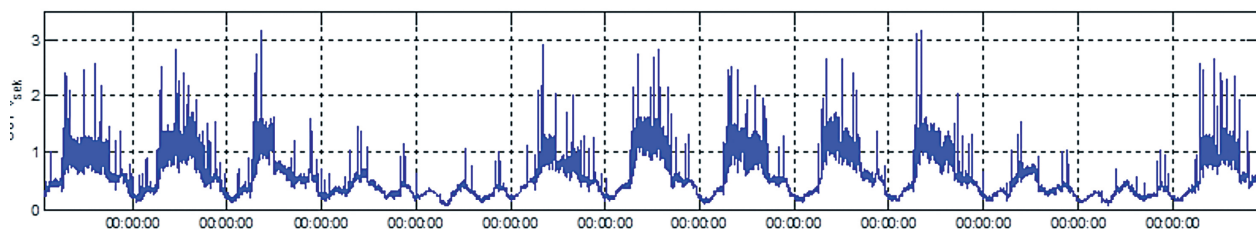
On the other hand, it reduces the magnitude (zero sequence voltage), which is used for the control purpose.

- Very small zero sequence voltage
- Unstable zero sequence voltage due to load crosstalk

The current injection is capable, without the adjustment of the plunge-core coil, to identify the tuning point by applying a defined signal. Thus it is particularly suitable for these difficult situations:

- Changing the natural symmetry per phase at constant total capacity

The so-called current injection was developed precisely for such cases.



Unstable history of the zero sequence voltage over 14 days with a constant grid capacity



EORSys

EORSys Product range: The Petersen coil control and fault location system

EOR-D earth fault locating relay

Reliable earth fault location is necessary in compensated and isolated grids due to the low fault currents.

The EOR-D provides the ability to monitor 4 output fields for earth faults per unit. Multiple devices can be connected to a single system. The advantage is that one needs only one configuration for the earth fault recording per substation or per station. In addition, this simplifies the remote control center connection. Only one protocol converter is required for each system.

Since each grid is different, there is no one location method for all situations. The EOR-D provides a choice of several methods:

- Directional transient detection using the qu2 method
- Directional detection of restriking faults using the qui method
- Directional detection using the harmonic method
- Localisation using ripple-control signals and the harmonic method
- watt-metric method $\cos(\varphi)$
- Pulse location method
- Harmonics method $\sin(\varphi)$ used for isolated grids

Combined earth fault and short circuit indicator - EOR-3D

The device for directional detection of earth faults and short-circuits for a single output field is the EOR-3D. It can handle all localisation methods using the same algorithms as the EOR-D. In addition, it has directional or non-directional short-circuit detection.

Due to its compact design, it is also easy to install in small stations.

One system, many solutions



EOR-3D industrial housing



EOR-3D DIN rail version

Special features of the EOR-3D

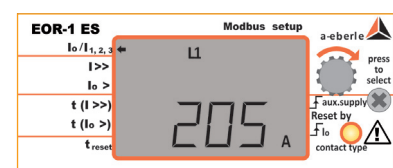
- 4 GB of internal memory for fault recording in second ranges
 - oscilloscope recording
 - display of the digital traces
- Communication using TCP/IP, USB 2.0, RS232, RS485
- colour OLED display
- for local operation via keyboard and graphic display
- integrated control protocols for
 - IEC 60870-5-101 / 103 / 104
 - MODBUS RTU and TCP
 - DNP 3.0 RS485 and TCP
- Use in combination with conventional transducers and sensors

NEW! EOR-I - simple earth fault and short circuit indicator with matching sensors in set for cables and overhead lines

The EOR-I range of devices is suitable for wide use in all forms of grids. They are characterized by their simplicity of operation and installation:

- Earth fault and short circuit indicator using current detection
- Signalling through relay contacts
- External signalling units available
- No operating software necessary
- Power supply from internal battery (external power supply available as option)

- inexpensive and robust current sensors for all common conductor diameters
- Current sensors for direct wire installation (with fibre-optic output)
- Remote signalling through relay contacts
- EOR-I ES model with integrated MODBUS module with power saving mode - no external supply needed!
- Overhead line indicator with remote control and data readout



EOR-I ES with load current monitoring

Remote signalling/communication

All devices in the EORSys range can be connected easily using control technology. There are enough relay outputs available for conventional telecontrol. Alternatively, the devices support the following communication protocols:

Protocol	REG-DP REG-DPA	EOR-D	EOR-3D	EOR-I ES
MODBUS RTU	x		x	x
MODBUS TCP	x		x	
DNP 3.0	x	x	x	
DNP 3.0 TCP	x	x	x	
IEC 60870-5-101	x	x	x	
IEC 60870-5-103	x	x	x	
IEC 60870-5-104	x	x	x	
IEC 61850 (Ed. 1/2)	x	x		

REG-DP/REG-DPA – The controller for plunge-core coils.

EOR-D – Earth fault detection for substations and stations with multiple feeders.

EOR-3D – Earth fault and short circuit indicator for substations, compact stations up to local grid stations with special requirements.

EOR-I ES – Earth fault and short circuit indicator for compact and local grid stations; optimized and reduced to essential functions.

Your sales partner



A. Eberle GmbH & Co. KG

Frankenstraße 160

D-90461 Nuremberg

Fon +49(0)911 628108-0

Fax +49(0)911 628108-99

Email info@a-eberle.de

Web www.a-eberle.de