Feeder protection relay type VAMP 140

formerly known as VPJ 140

Feeder protection relay type VAMP 140

VAMP 140

- is fully numerical over current and earth fault relay
- has built-in disturbance recorder
- supports various communication protocols
- optionally accommodate an arc protection module
- can be an integrated part of the station level arc protection system

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Protection functionality

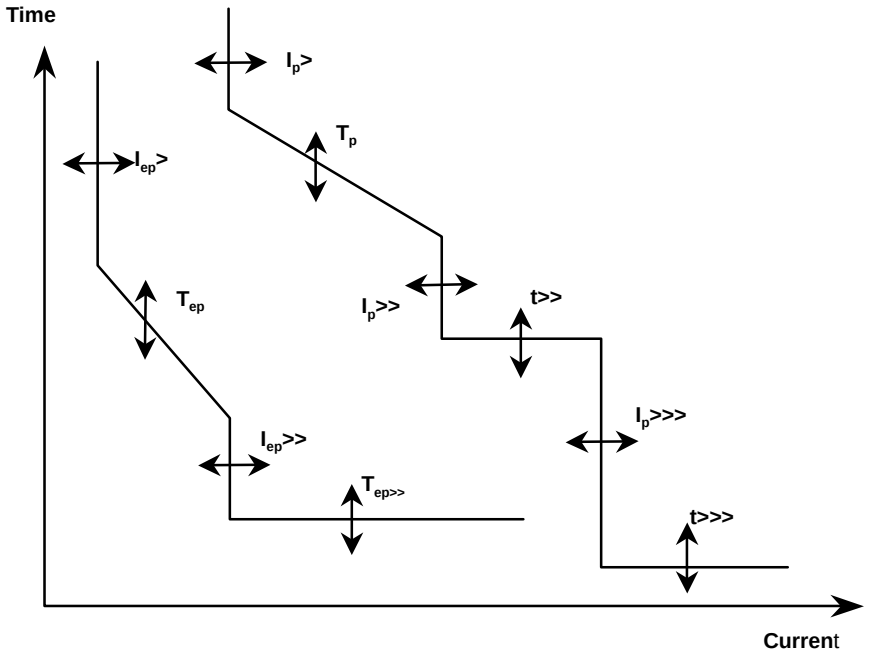
Three phase overcurrent
I>, I>>, I>>>

Earth fault overcurrent
Io>(s), Io>>, Io>>>

Current unbalance

Thermal overload

Arc protection (option)



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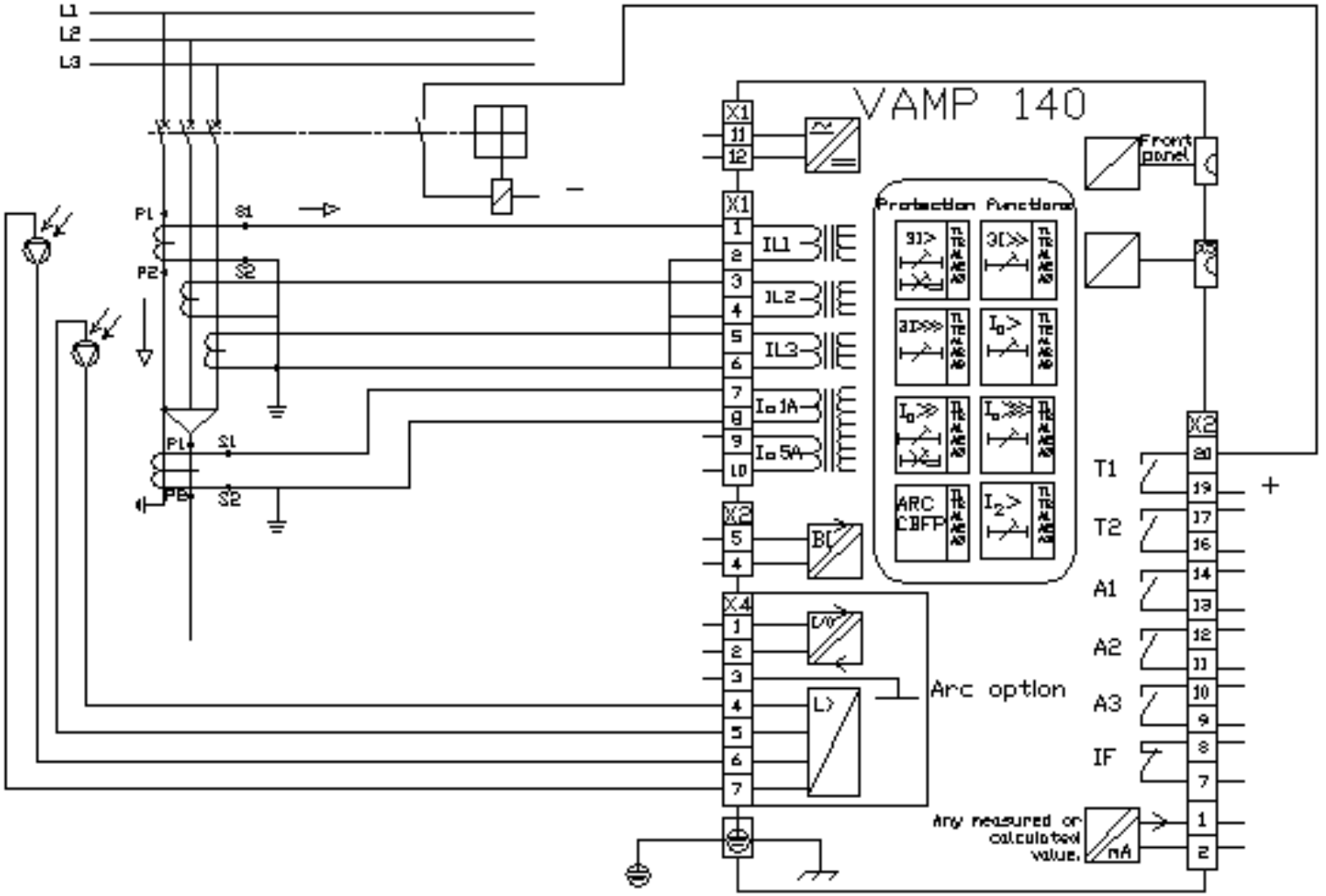

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Additional functions

Disturbance recorder
- Four analog and eight digital channels

Primary measurements
- Phase currents IL1, IL2, IL3, IL, maximum of IL
- Residual current: Io
- Phase unbalance: I2 / I1
- Frequency: f

Analog output
- 0 (4) ...20 mA
- One measured signal (IL1, IL2, IL3, IL, Io, I2/I1, f and I_Fault) can be linked in the output

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Over current protection stages

Low set stage, 50 / 51

I >	0,10 … 4,0 x In
t >	0,08 … 300 s
Inverse curves	Normal, very, extreme and long time
k	0,05 … 3.2

High set stage, 50 / 51

I >>	0,10 … 40 x In
t >>	0,05 … 300 s

Super high set stage, 50 / 51

I >>>	0,10 … 40 x In
t >>>	0,05 … 300 s

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Earth fault protection stages

Sensitive earth fault stage, 50N / 51N

Io(s) >	0,005 … 2,0 x In
to(s) >	0,08 … 300 s

Low set earth fault stage, 50N / 51N

Io >>	0,02 … 2,0 x In
to >>	0,05 … 300 s
Inverse curves	Normal, very, extreme and long time
k	0,05 … 3.2

High set earth fault stage, 50N / 51N

Io >>>	0,02 … 4,0 x In
to >>>	0,05 … 300 s

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Current unbalance

Current unbalance stage, 46

I2 / I1	5 … 70 %
t >	1 … 600 s

Thermal overload

Thermal overload stage, 49

T >	0,5 … 1,2 x In
Tau	2 … 60 min
T > alarm	60 … 99 %

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Arc protection

Arc protection I >, 50AR	
I >	0,5 … 10 x In
t > (fixed)	14 ms
Arc sensor channels(1	L1, L2, L1/L2, L1/BI, L2/BI, LI/L2/BI, BI
Arc protection Io >, 50NAR	
Io >	0,05 … 1,0 x In
to > (fixed)	14 ms
Arc sensor channels(1	L1, L2, L1/L2, L1/BI, L2/BI, LI/L2/BI, BI

1) The relay has two arc sensor channels (L1 and L2) as well as one binary channel (BI) for external light information

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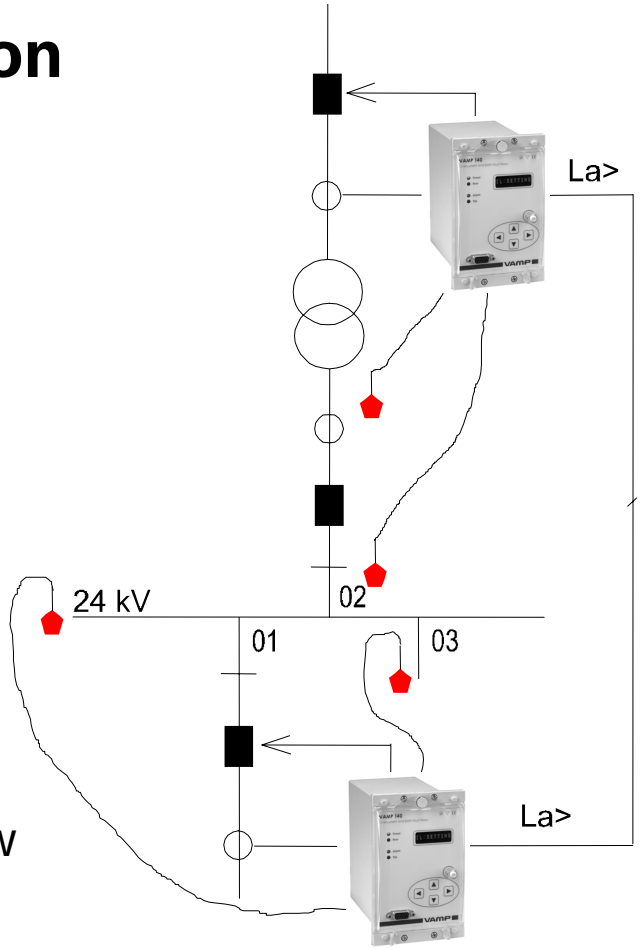
Example of adaptive arc protection made by feeder protection relay

Adaptive means that the arc protection is selective regardless the direction of the power flow.

The light information is shared between protection relays but the trip is carried out by a relay which has both current and light signals activated.

This is a true case where the feed can be from several directions. In a conventional arc protection system the problem would be how to measure the current from the right feeder. Now the over current is detected automatically from the correct feeder.



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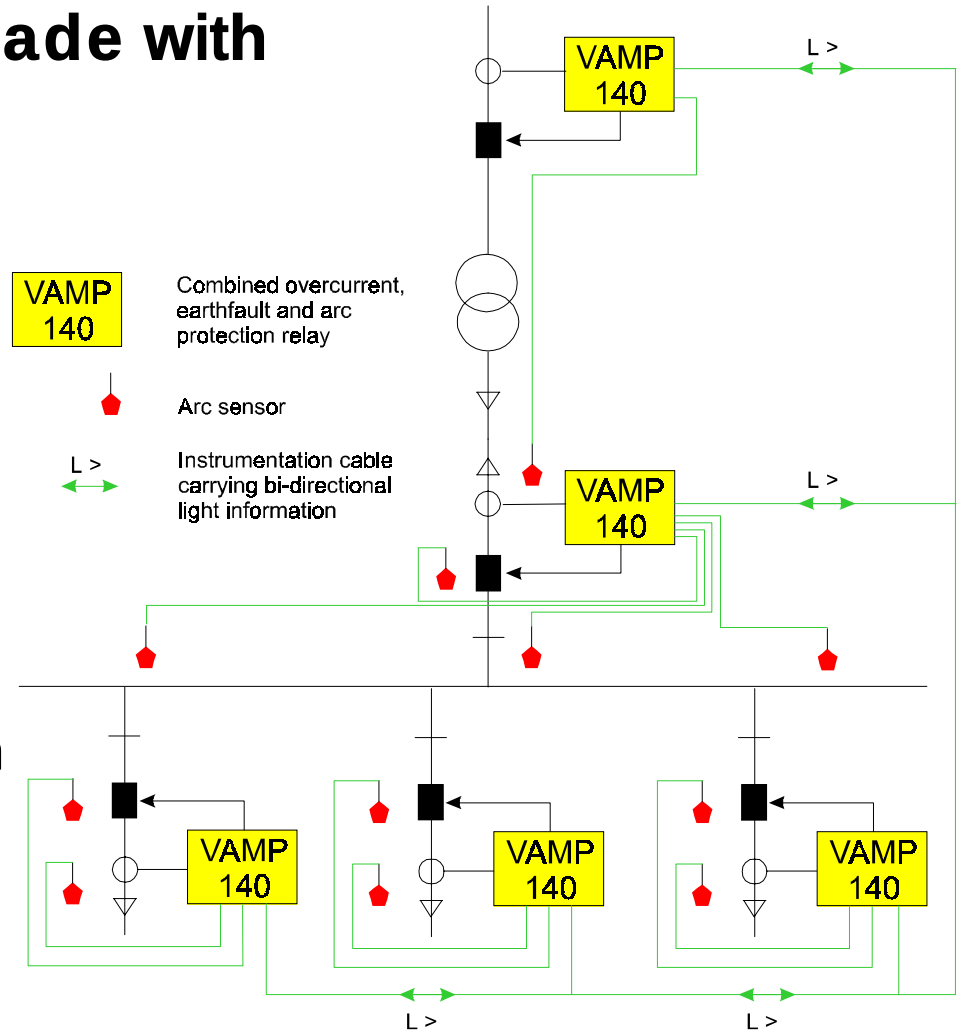
Example of a relay up-grade with built-in arc protection

Numerical feeder protection relays provide conventional overload, short circuit and earth fault protection

Arc protection operates quickly in arc faults in every network connection mode

Light information is shared between every relay



Feeder protection relay type VAMP 140

Disturbance recorder

Analog channels (1	IL1, IL2, IL3, Io, f, I2/I1, I2/In, IL1rms, IL2rms, IL3rms, Ilrms, IL
Digital input (DI)channels (1	Binary input Arc sensor channels L1 and L2, arc binary channel BI/O
Digital output (DO) channels(1	Status of output relays and arc binary channel BI/O
Log mode	Saturated, overflow

1) Maximum twelve channels can be in simultaneous use

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Disturbance recorder

Pre trigger rate 0 ... 100%

Sample rate 16, 8 samples per cycle, every 10ms, 20ms, 200ms, 1, 5, 10, 15, 30s and 1 min

Recording time when IL1, IL2, IL3, Io, DI, DO channels are used

Sampling rate	Recording time in total
16 /cycle	3,75 s
8 / cycle	7,5 s
10 ms	20 s
20 ms	40 s
200 ms	400 s
1 s	2000 s
30 s	16,7 h
60 s	33,3 h

Number of separate records can vary between 1 to 5 depending on the adjusted recording length and total recording time

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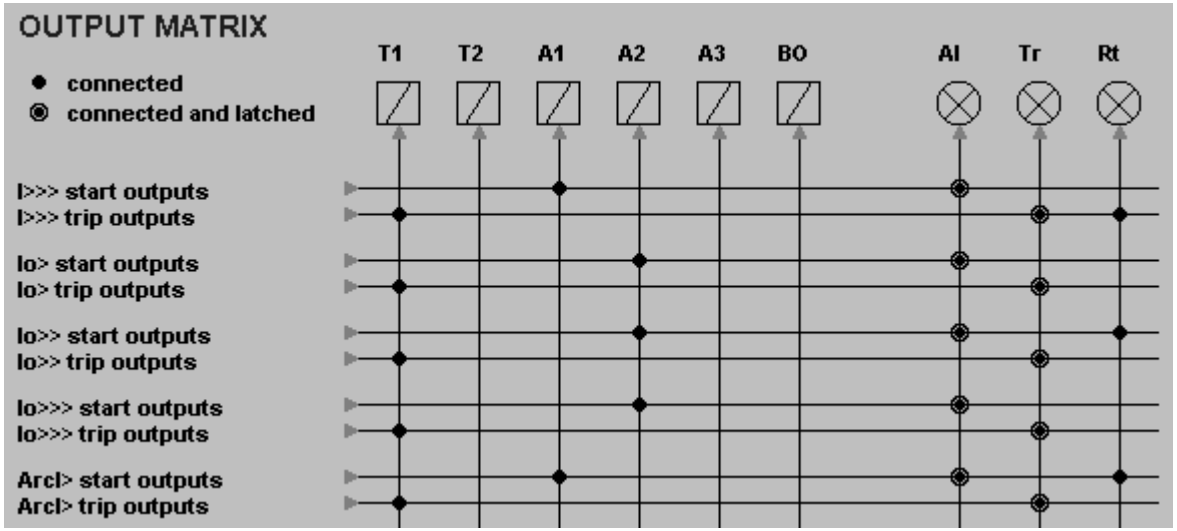
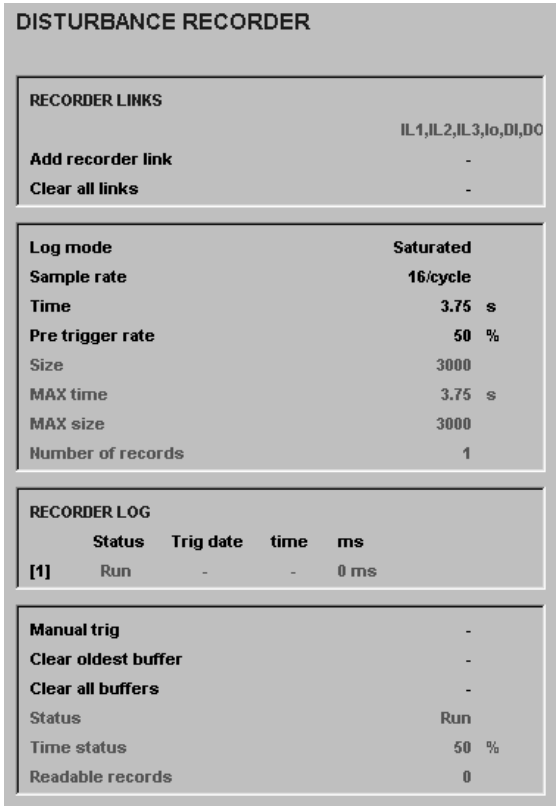
Disturbance recorder

The disturbance recoder views are used to the set recorder and triggering conditions (Rt) in the VEPSET software.





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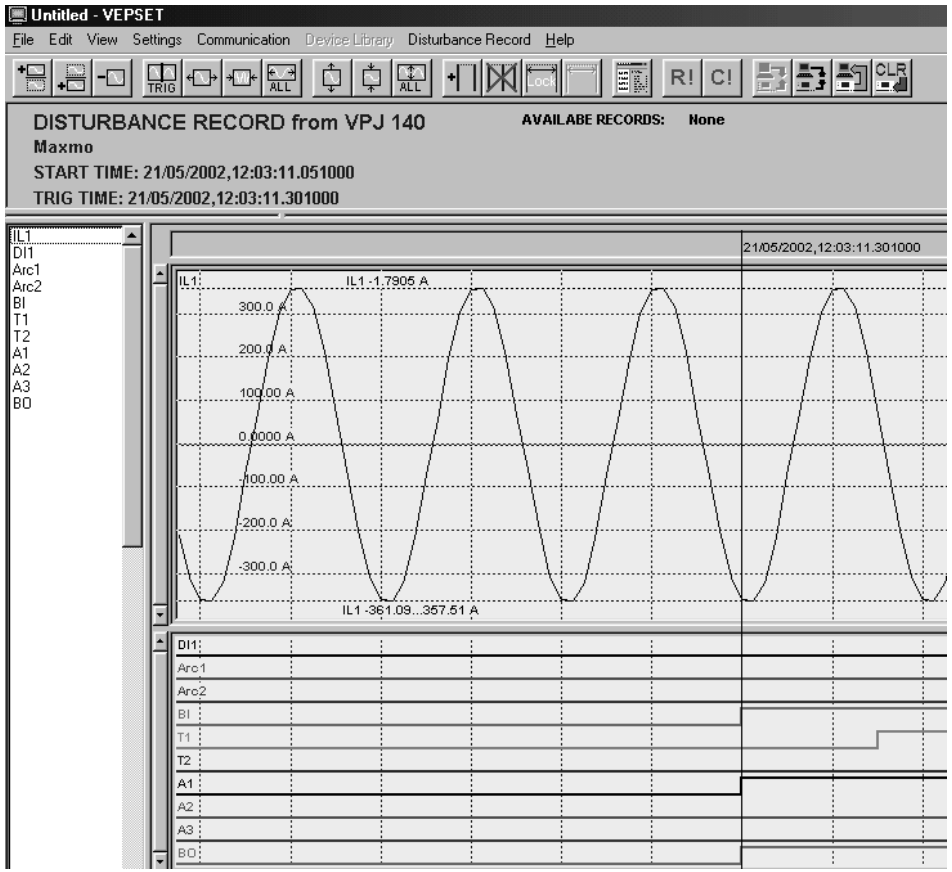
Disturbance recorder

The disturbance weveform recodings are evaluated by the VEPSET software.



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Primary measurements

Primary measurements
- Phase currents IL1, IL2, IL3, IL
- Residual current: Io (A), Io (%)
- Phase unbalance: I2 / I1
- 15 min average on IL
- IL maximum
- Frequency: f
- 15 min average on IL1, IL2, IL3, IL and Io (1
- 15 min maximum on IL1, IL2, IL3, IL and Io (1
- Current diagram (1

1) Using VEPSET software

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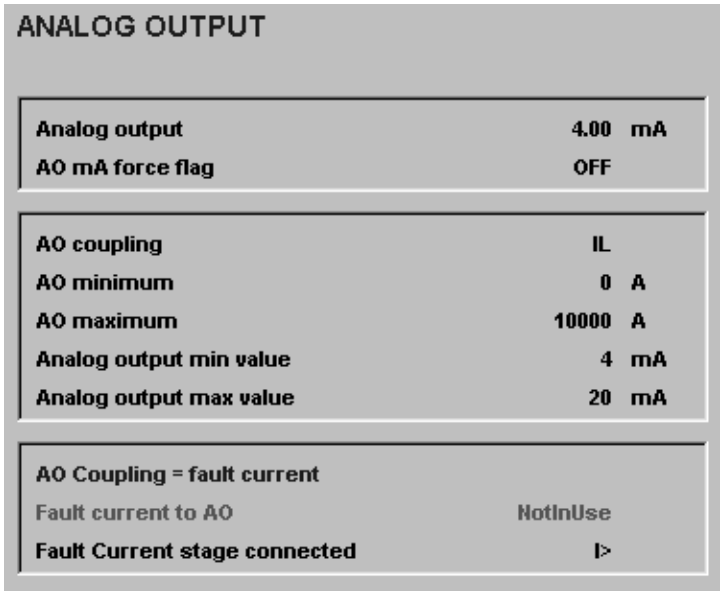
Analog output

Analog output

One measured signal (IL1, IL2, IL3, IL, Io, I2/I1, f and I_Fault) can be linked in the output

Output signal range is
minimum: 0 ... 19 mA
maximum: 1 ... 20 mA

mA test mode in order to calibrate the receiving device



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Example of the arc protection and fault current transfer to the network control system

Arc protection made by feeder protection relay

Arc sensors located in the busbar compartment

The fault current measured from the incomer is transferred to the control room as a mA message