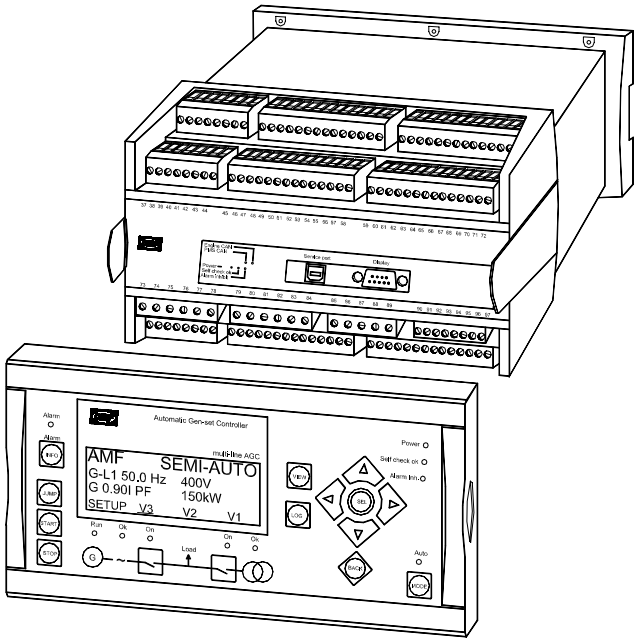
DEIF A/S

Description of options

Option A4,
Loss of mains protection package
Multi-line 2

4189340435A
SW version 3.0X.X



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1. Warnings and legal information

Legal information and responsibility

DEIF takes no responsibility for installation or operation of the generator set. If there is any doubt about how to install or operate the generator set controlled by the unit, the company responsible for the installation or the operation of the set must be contacted.

The units are not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.

Electrostatic discharge awareness

Sufficient care must be taken to protect the terminals against static discharges during the installation. Once the unit is installed and connected, these precautions are no longer necessary.

Safety issues

Installing the unit implies work with dangerous currents and voltages. Therefore, the installation should only be carried out by authorised personnel who understand the risks involved in working with live electrical equipment.

Be aware of the hazardous live currents and voltages. Do not touch any AC measurement inputs as this could lead to injury or death.

Definitions

Throughout this document a number of notes and warnings will be presented. To ensure that these are noticed, they will be highlighted in order to separate them from the general text.

Notes

The notes provide general information which will be helpful for the reader to bear in mind.

Warning

The warnings indicate a potentially dangerous situation which could result in death, personal injury or damaged equipment, if certain guidelines are not followed.

2. Description of option

A4 option

Option A4 is a software option and therefore not related to any hardware apart from the standard installed hardware.

This protection prevents motor malfunctioning due to insufficient or unbalanced supply voltage. The protection is used when the generator is running in parallel with the mains.

ANSI numbers

Protection	ANSI no.
Positive sequence voltage	47 U1, 27 pos

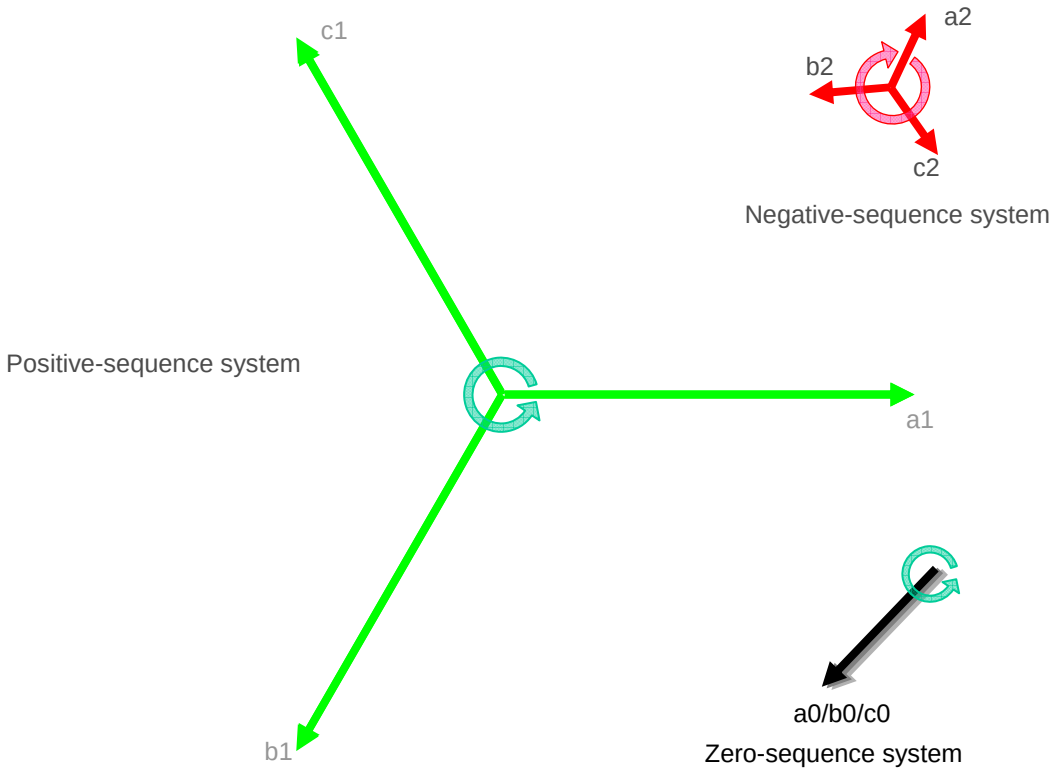
3. Functional description

Voltage vector system

The measurements of the busbar/mains voltages are split up in three theoretical systems:

- The positive sequence system with a positive direction of rotation
- The negative sequence system with a negative direction of rotation
- The zero sequence system with a positive direction of rotation

As a result of the generator's power production to the consumers the positive sequence system represents the fault-free part of the voltages and currents. The negative sequence system, which rotates in the opposite direction of the generator, is used by the protection's negative sequence current and negative sequence voltage to prevent the generator from overheating. The zero sequence system is used for detection of earth faults.



Positive sequence voltage

The positive sequence voltage detects voltage state on the positive sequence voltage part of the 3-phase voltage vector diagram of the busbar/mains.

The positive sequence voltage low calculation takes place in the zero crossing of all three phases to make the protection as fast as possible.

4. Parameter list

For further information about the structure of the parameter descriptions, please see the Designer's Reference Handbook.

Positive sequence voltage protection

1440 BB pos. seq. U

No.	Setting		Min. setting	Max. setting	Factory setting
1441	BB pos. seq. U	Set point	10.0%	110.0%	70.0%
1442	BB pos. seq. U	Delay	1 per	9 per	2 per
1443	BB pos. seq. U	Relay output A	Not used	Option dependent	Not used
1444	BB pos. seq. U	Relay output B	Not used		Not used
1445	BB pos. seq. U	Enable	OFF	ON	OFF
1446	BB pos. seq. U	Fail class	Alarm (1)	Trip MB (6)	Trip MB (6)

The timer factory setting is set to 2 periods. This means that the error has to be active in 2 whole periods before the alarm will be tripped.

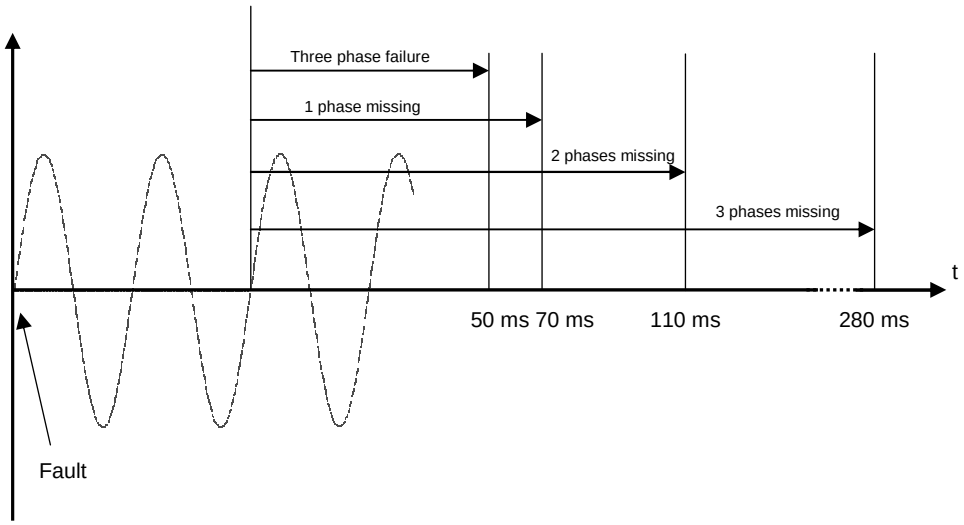
E.g. in a 50Hz system, the alarm will be activated if the positive sequence is below 70% of U nominal voltage for 40 ms. The alarm will trip the fail class as soon as possible after this delay.

5. Response time

The time delay for the positive sequence alarm can be adjusted. It is adjusted in periods, not seconds.

The response times specified below are measured with a 2 period delay.

Delay / Fault	Response time	Recommended protection for fast trip	Remarks
3 phase fault	<50 ms	BB pos seq volt	
1 phase missing	<70 ms	BB U<	Option A or B1
2 phases missing	<110 ms	BB U<	Option A or B1
3 phases missing	<285 ms	df/dt or vector jump	Option A



The diagram shows that when the fault has been present for two periods, the relay will trip within the specified time.

Response time is with 2 periods delay setting. The response time counts from the end of the delay.