Multi-line 2

4189340691E

Option A4

Loss of mains protection package

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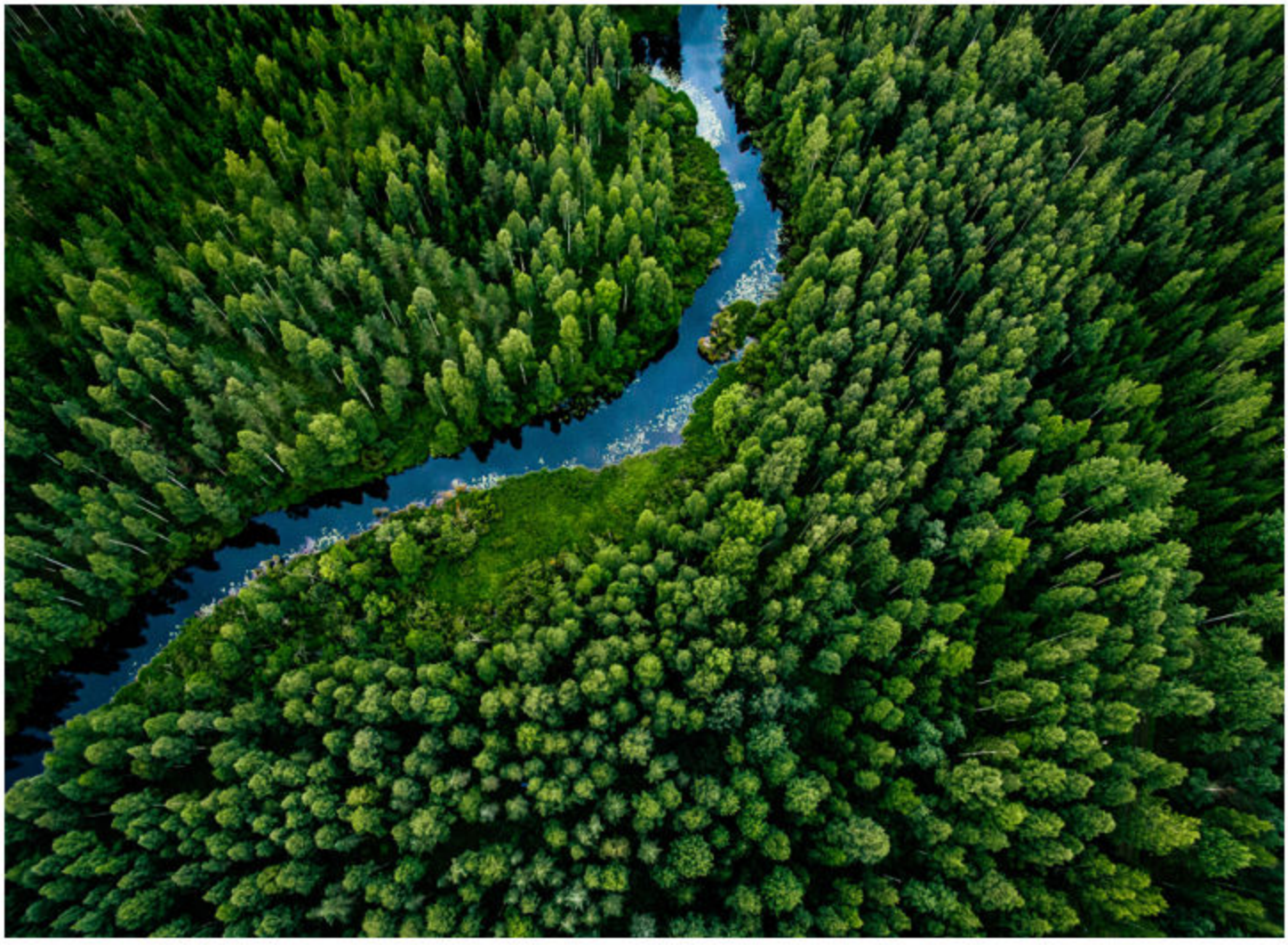

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1. Delimitation

1.1 Scope of option A4

This description of options covers the following products:

AGC-4 Mk II*	SW version 6.0x.x or later
AGC-4	SW version 4.0x.x or later
AGC-3	SW version 3.4x.x or later
AGC 200 series	SW version 3.5x.x or later
APU 200 series	SW version 3.53.x or later
GPC/GPU Hydro	SW version 3.0x.x or later
GPU/PPU	SW version 3.0x.x or later

*Note: Option A4 is included in the standard AGC-4 Mk II.

2. General information

2.1 Warnings, legal information and safety

2.1.1 Warnings and notes

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

Warnings

DANGER!

This shows dangerous situations.

If the guidelines are not followed, these situations will result in death, serious personal injury, and equipment damage or destruction.

Notes

NOTE Notes provide general information, which will be helpful for the reader to bear in mind.

2.1.2 Legal information and disclaimer

DEIF takes no responsibility for installation or operation of the generator set. If there is any doubt about how to install or operate the engine/generator controlled by the Multi-line 2 unit, the company responsible for the installation or the operation of the set must be contacted.

NOTE The Multi-line 2 unit is not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.

Disclaimer

DEIF A/S reserves the right to change any of the contents of this document without prior notice.

The English version of this document always contains the most recent and up-to-date information about the product. DEIF does not take responsibility for the accuracy of translations, and translations might not be updated at the same time as the English document. If there is a discrepancy, the English version prevails.

2.1.3 Safety issues

Installing and operating the Multi-line 2 unit may imply 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.

DANGER!

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

2.1.4 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.

2.1.5 Factory settings

The unit is delivered from the factory with default settings. These are not necessarily correct for the engine/generator set. Check all the settings before running the engine/generator set.

3. Description of option

3.1 Option A4

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.

3.2 ANSI numbers

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

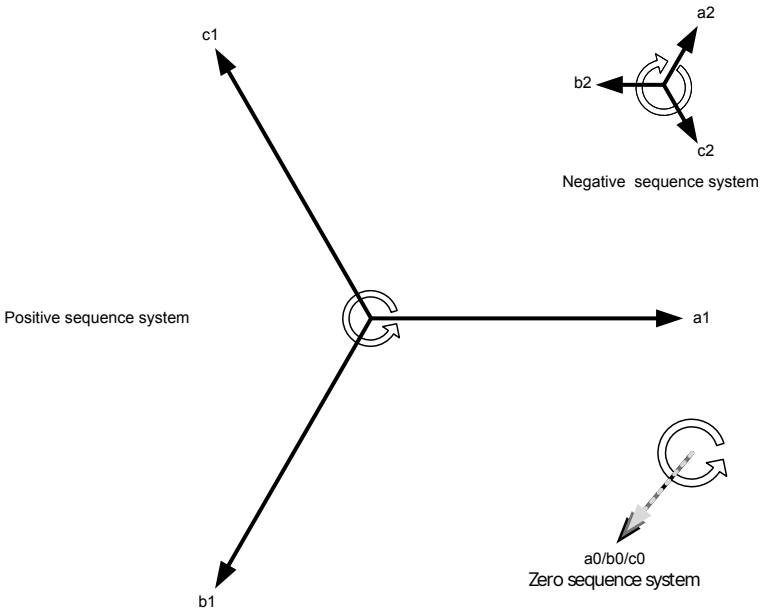
4. Function description

4.1 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.



Description of the approach

Positive, negative and zero sequence values are calculated based on estimated phase current/phase voltage phasors. The RMS value of the phase quantity expresses the absolute value of the phasors, and an evaluation of zero crossings delivers expressions for the angles between the phasors.

4.2 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.

5. Parameters

5.1 Further information

Option A4 relates to parameter 1440.

For more information, see the parameter list:

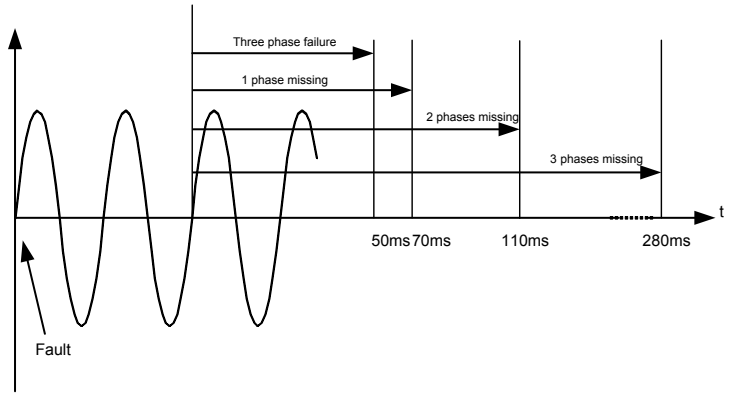
AGC-4 Mk II	Document number 4189341273
AGC-4	Document number 4189340688
AGC-3	Document number 4189340705
AGC 200	Document number 4189340605
GPC-3/GPU-3 Hydro	Document number 4189340580
GPU-3/PPU-3	Document number 4189340581

6. 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:	Response time	Recommended protection for fast trip	Remarks
Fault:			
3-phase fault	<50 ms	BB pos seq volt	
1 phase missing	<70 ms	BB U<	Option A
2 phases missing	<110 ms	BB U<	Option A
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.

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