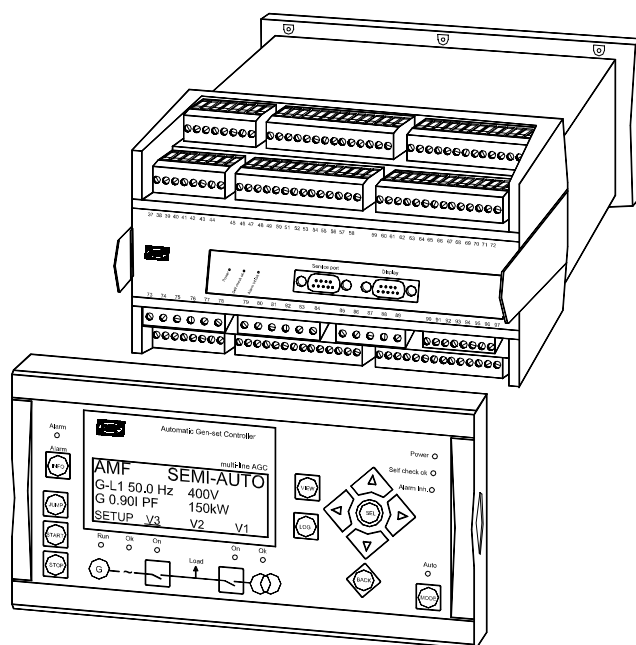


Description of options

Option A4, Loss of mains protection package Automatic Gen-set Controller

4189340373C
SW version 2.3X.X



- *Description of option*
- *Functional description*
- *Parameter list*
- *Response time*

CE

Table of contents

1. WARNINGS AND LEGAL INFORMATION	3
LEGAL INFORMATION AND RESPONSIBILITY	3
ELECTROSTATIC DISCHARGE AWARENESS	3
SAFETY ISSUES	3
DEFINITIONS	3
2. DESCRIPTION OF OPTION	4
ANSI NUMBERS	4
A4 OPTION	4
3. FUNCTIONAL DESCRIPTION	5
VOLTAGE VECTOR SYSTEM	5
POSITIVE SEQUENCE VOLTAGE	5
4. PARAMETER LIST	6
POSITIVE SEQUENCE VOLTAGE PROTECTION (OPTION A4)	6
5. RESPONSE TIME	7

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

ANSI numbers

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

This protection prevents motor malfunctioning due to insufficient or unbalanced supply voltage.

A4 option

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

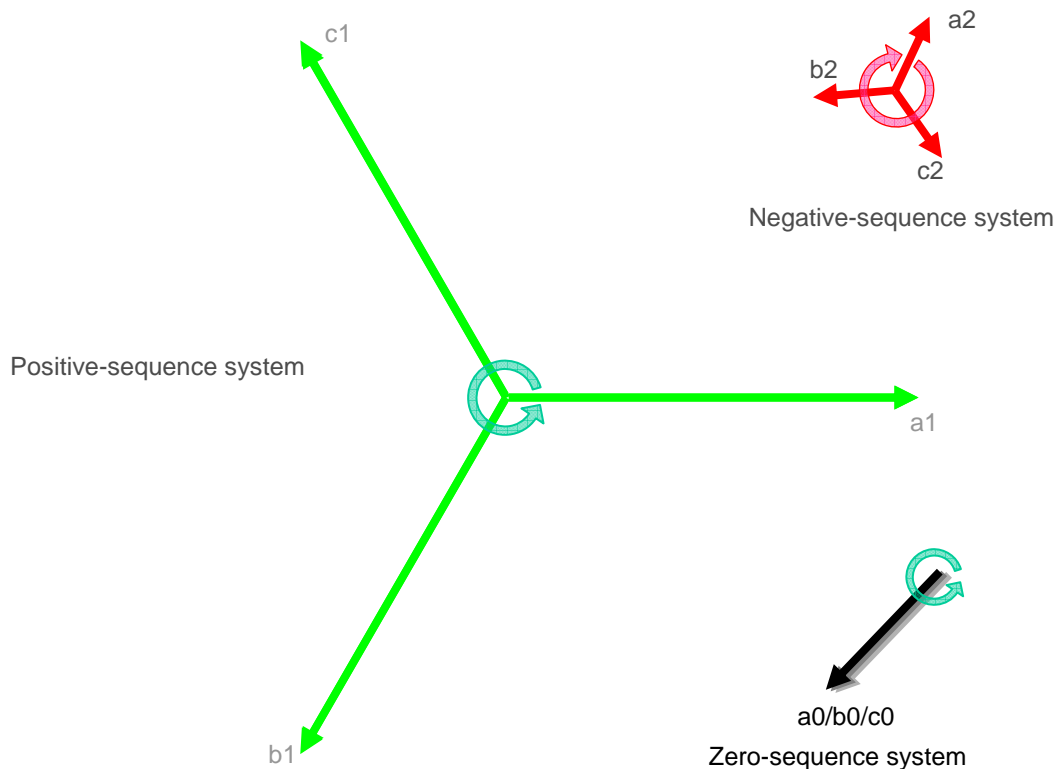
3. Functional description

Voltage vector system

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

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

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 counter-direction to the generator is used for the protections 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



The setup of parameters is done via the display or the PC utility software (USW).

For each setting, the table consists of the following possible adjustments:

Set point: The alarm set point is adjusted in the set point menu.

Delay: The timer setting is the time that must expire from the alarm level is reached until the alarm occurs. E.g. delay of 2 periods = 40 ms at 50Hz, in this case the alarm level must be measured for a minimum of 40 ms, before the alarm is activated.

Relay output A: A relay can be activated by the output A.

Relay output B: A relay can be activated by the output B.

Enable: The alarm can be activated or deactivated. ON means always activated. RUN means that the alarm has run status. This means it is activated when the running signal is present.



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

Positive sequence voltage protection (option A4)

The positive sequence voltage protection is used when the generator is running in parallel with the mains.

1390 BB positive sequence voltage

No.	Setting		Min. setting	Max. setting	Third setting	Factory setting
1391	BB pos seq volt	Set point	10.0%	110.0%	-	70.0%
1392	BB pos seq volt	Timer	1 per	9 per	-	2 per
1393	BB pos seq volt	Relay output A	R0 (none)	Option dependent	-	R0 (none)
1394	BB pos seq volt	Relay output B	R0 (none)		-	R0 (none)
1395	BB pos seq volt	Enable	OFF	ON	RUN	OFF
1396	BB pos seq volt	Fail class	1 (Alarm)	6 (MB trip)	-	1 (Alarm)



The number of relays available depends on the actual hardware configuration.

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. for 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.



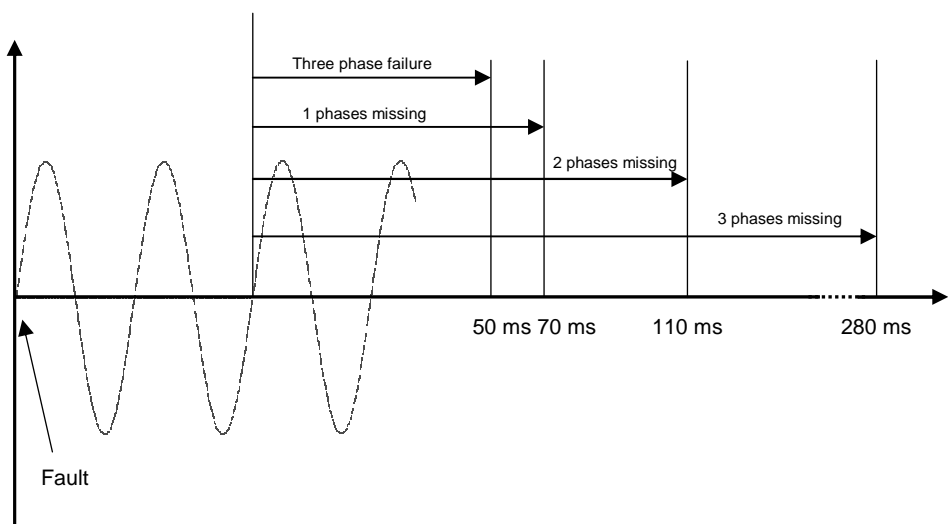
Please refer to the Designer's Reference Handbook for information regarding the alarm inhibit function.

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.

Fault	Delay	Response time	Recommended protection for fast trip
3 phase fault		<50 ms	Positive sequence
1 phase missing		<70 ms	BB low volt 2
2 phases missing		<110 ms	BB low volt 2
3 phases missing		<285 ms	df/dt or vector jump



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.

DEIF A/S reserves the right to change any of the above