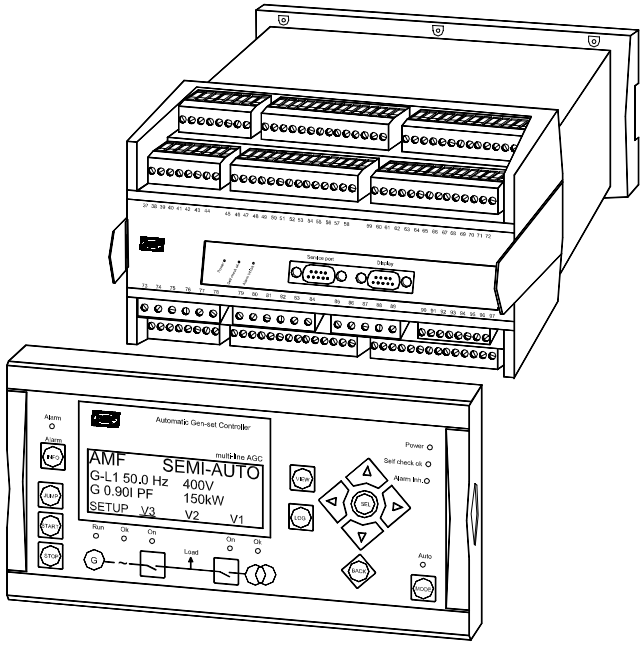
DEIF A/S

Description of options

Option C2,
Generator add-on protection package
Automatic Gen-set Controller

4189340345C
SW version 2.1X.X



- *Description of option*
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DEIF A/S, *Frisenborgvej 33*
DK-7800 Skive, Denmark

Tel.: +45 9614 9614, Fax: +45 9614 9615
E-mail: deif@deif.com, URL: www.deif.com

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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

C2 option

Option C2 is a software option and therefore not related to any hardware apart from the standard installed hardware. Option C2 is a mix of negative sequence and zero sequence protections as follows:

Protection	ANSI no.
Negative sequence current	46
Negative sequence voltage	47
Zero sequence current	$51I_0$
Zero sequence voltage	$59U_0$

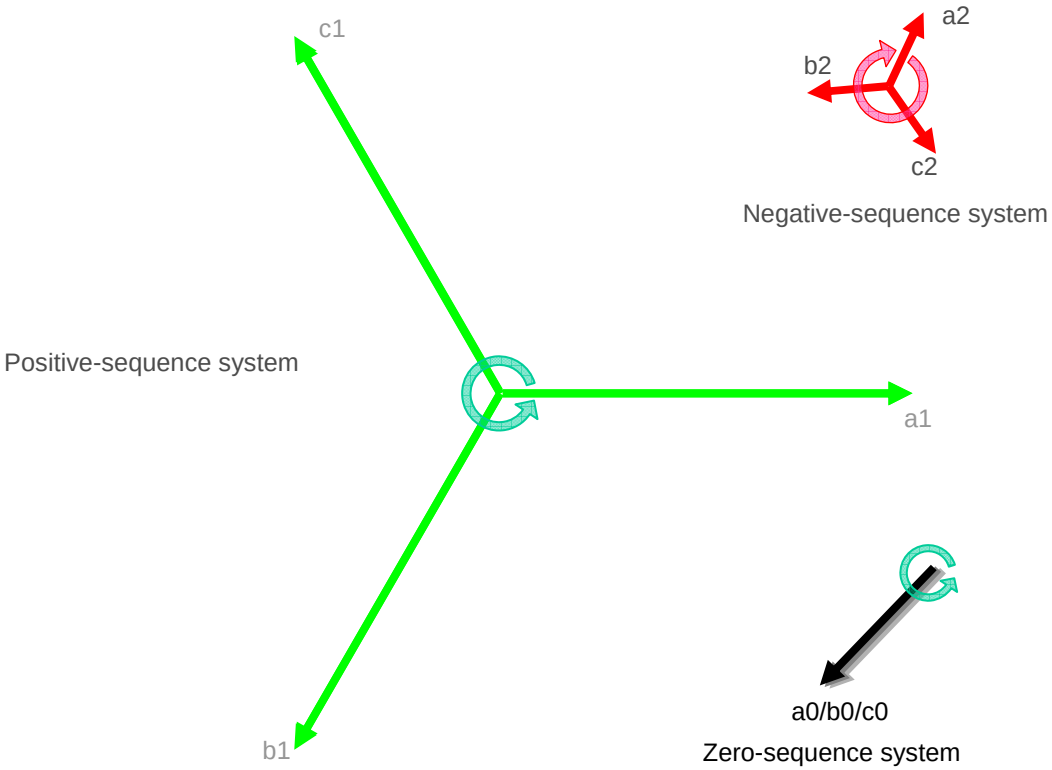
3. Functional descriptions

Voltage vector system

The measurements of the generator currents and 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

The positive sequence system is desirable, because these are the voltages and currents, which can be used by the consumers.

Negative sequence

A negative sequence current increases the risk of dangerous overheating in the generator, which could lead to general damage.

The negative sequence currents and voltages can occur e.g. in the event of single phase loads, unbalanced line short circuits and open conductors, unbalanced phase-phase or phase-neutral loads.

Especially the negative sequence currents can produce harmful overheating inside the generator. The reason is that these currents produce a magnetic field counter-rotating to the rotor. This field crosses the rotor at twice the rotor velocity inducing double-frequency currents in the field system and in the rotor body.

Zero sequence

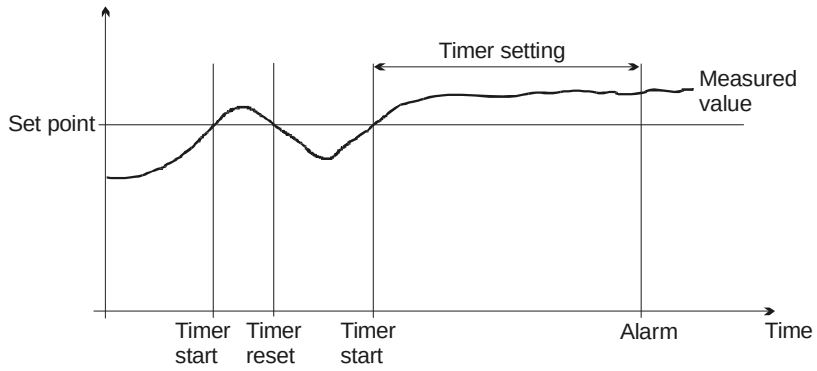
Zero sequence is used to detect a ground fault (ground current or neutral voltage). It is performed by measuring the vectorial displacement of the zero value (star point) for both current and voltage. The zero sequence measurement can therefore replace the more well-known methods, namely those using zero voltage measurement or summation transformers (zero sequence transformers).

Alarms

All settings are in % of the nominal generator value.

The delay settings are all of the definite time type, i.e. a set point and time is selected.

If the function is e.g. overvoltage, then the timer will be activated, if the set point is exceeded. If the voltage value goes below the set point value before the timer runs out, then the timer will be stopped and reset.



When the timer runs out, the output is activated. The total delay will be the delay setting + the reaction time.

4. Parameter list

Parameter table description

The table consists of the following possible adjustments.

Set point: The alarm set point is adjusted in the set point menu. The setting is in Hz/sec.

Timer: The timer setting indicates the duration of the period between the appearance of the alarm situation and the alarm occurrence.

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, please see the Designer's Reference Handbook.

Negative sequence

1320 Generator negative sequence current protection

No.	Setting		Min. setting	Max. setting	Third setting	Factory setting
1321	Gen Neg Seq I	Set point	0.0%	100.0%	-	20.0%
1322	Gen Neg Seq I	Time	0.2 s	100.0 s	-	0.5 s
1323	Gen Neg Seq I	Relay output A	R0 (none)	Option dependent	-	R0 (none)
1324	Gen Neg Seq I	Relay output B	R0 (none)		-	R0 (none)
1325	Gen Neg Seq I	Enable	OFF	ON	RUN	OFF
1326	Gen Neg Seq I	Fail class	Alarm	Trip MB	-	Trip MB

Settings relate to nominal current (menu 6013).

1330 Generator negative sequence voltage protection

No.	Setting		Min. setting	Max. setting	Third setting	Factory setting
1331	Gen Neg Seq U	Set point	1.0%	100.0%	-	5.0%
1332	Gen Neg Seq U	Time	0.2 s	100.0 s	-	0.5 s
1333	Gen Neg Seq U	Relay output A	R0 (none)	Option dependent	-	R0 (none)
1334	Gen Neg Seq U	Relay output B	R0 (none)		-	R0 (none)
1335	Gen Neg Seq U	Enable	OFF	ON	RUN	OFF
1336	Gen Neg Seq U	Fail class	Alarm	Trip MB	-	Trip MB

Settings relate to nominal voltage (menu 6014).

Zero sequence

1370 Generator zero sequence current protection

No.	Setting		Min. setting	Max. setting	Third setting	Factory setting
1371	Gen Zero Seq I	Set point	0.0%	100.0%	-	20.0%
1372	Gen Zero Seq I	Time	0.2 s	100.0 s	-	0.5 s
1373	Gen Zero Seq I	Relay output A	R0 (none)	Option dependent	-	R0 (none)
1374	Gen Zero Seq I	Relay output B	R0 (none)		-	R0 (none)
1375	Gen Zero Seq I	Enable	OFF	ON	RUN	OFF
1376	Gen Zero Seq I	Fail class	Alarm	Trip MB	-	Trip MB

Settings relate to nominal current (menu 6013).

1380 Generator zero sequence voltage protection

No.	Setting		Min. setting	Max. setting	Third setting	Factory setting
1381	Gen Zero Seq U	Set point	0.0%	100.0%	-	5.0%
1382	Gen Zero Seq U	Time	0.2 s	100.0 s	-	0.5 s
1383	Gen Zero Seq U	Relay output A	R0 (none)	Option dependent	-	R0 (none)
1384	Gen Zero Seq U	Relay output B	R0 (none)		-	R0 (none)
1385	Gen Zero Seq U	Enable	OFF	ON	RUN	OFF
1386	Gen Zero Seq U	Fail class	Alarm	Trip MB	-	Trip MB

Settings relate to nominal voltage (menu 6014).