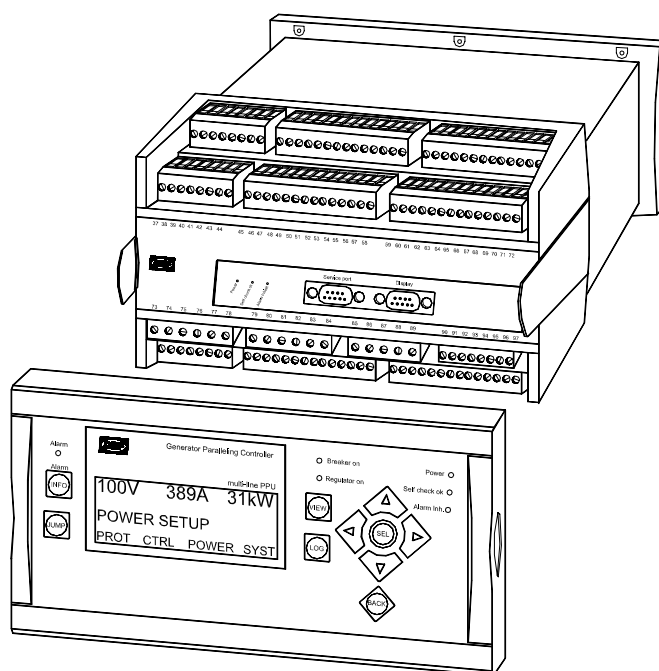


## Description of options

### Option C2, Generator add-on protection package Multi-line 2 – version 2

4189340287F  
SW version 2.4X.X



- *Description of options*
- *Functional description*
- *Parameter list*

CE

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**This manual is valid for standard multi-line 2 PPU/GPU/GPC units with firmware version 2.41.1 or later.**

## 1. Warnings and legal information

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### 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

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### 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 <sub>0</sub>
Zero sequence voltage	64, 59U <sub>0</sub>

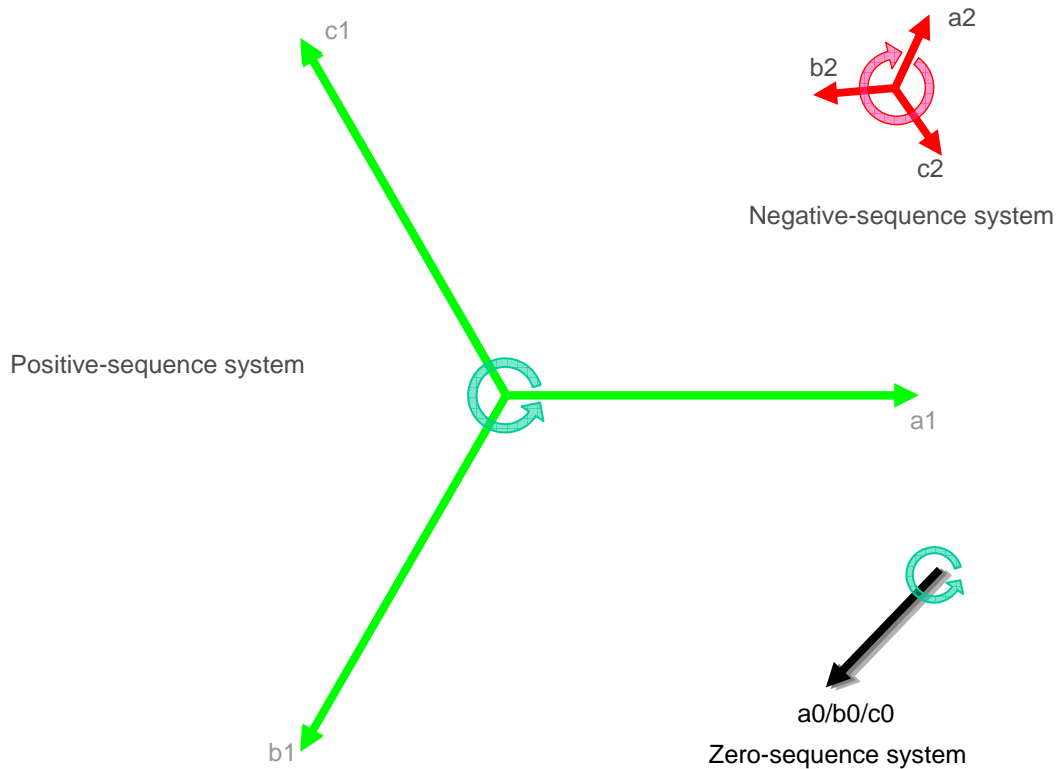
### 3. Functional description

#### Voltage vector system

The measurements of the generator currents and 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 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 voltages and currents in the positive sequence system are desirable, because they 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

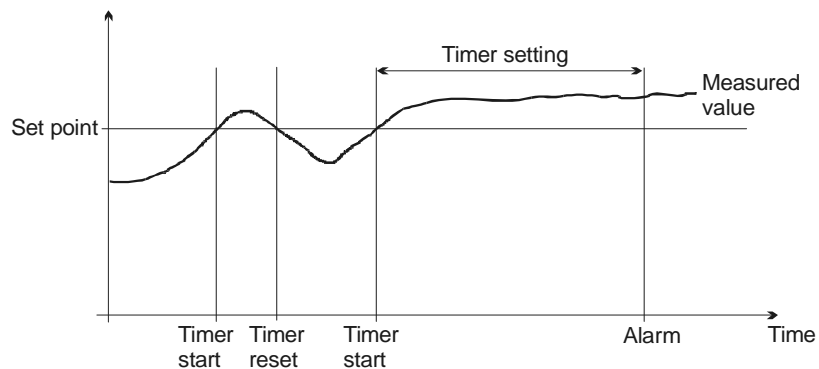
Zero sequence is used to detect an earth fault (earth current or neutral voltage). It is performed by measuring the vectorial displacement of the zero value (star point) for both current and voltage. The zero sequence measurement can therefore replace the more well-known methods, namely those using zero 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 falls below the set point value before the timer runs out, 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

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### 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	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	OFF



**Settings relate to nominal current (menu 4013).**

#### 1330 Negative sequence voltage protection

No.	Setting		Min. setting	Max. setting	Factory setting
1331	Neg Seq U	Set point	0.0%	100.0%	5.0%
1332	Neg Seq U	Time	0.2 s	100.0 s	0.5 s
1333	Neg Seq U	Relay output A	R0 (none)	Option dependent	R0 (none)
1334	Neg Seq U	Relay output B	R0 (none)		R0 (none)
1335	Neg Seq U	Enable	OFF	ON	OFF
1336	Neg Seq U	Select	Gen. Voltage	Bus/mains Voltage	Bus/mains voltage



**Settings relate to nominal voltage (menu 4014).**

## Zero sequence

### 1370 Generator zero sequence current protection

No.	Setting		Min. setting	Max. 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	OFF



Settings relate to nominal current (menu 4013).

### 1380 Zero sequence voltage protection

No.	Setting		Min. setting	Max. setting	Factory setting
1381	Zero Seq U	Set point	0.0%	100.0%	5.0%
1382	Zero Seq U	Time	0.2 s	100.0 s	0.5 s
1383	Zero Seq U	Relay output A	R0 (none)	Option dependent	R0 (none)
1384	Zero Seq U	Relay output B	R0 (none)		R0 (none)
1385	Zero Seq U	Enable	OFF	ON	OFF
1386	Zero Seq U	Select	Gen. Voltage	Bus/mains Voltage	Bus/mains voltage



Settings relate to nominal voltage (menu 4014).

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