

**LX449  
Advanced settings**

Document	LX449_IGP_V1.0.doc
Revision	V1.0
Classification	Released
Date	22-01-13
Author	EBL
Signature for release	

**SPECIAL PROTECTION FOR GENERATORSETS RUNNING IN  
PARALLEL TO THE MAINS UTILITY**



**Increased Generator Protection**

**Protects Generators for severe successive damage at the root**

**Revision History**

Revision No.	Author	Date	Description
V1.0	EBL	22-01-13	Initial release

**Increased Generator Protection**



**Protects Generators for severe successive damage at the root**

## 1.0 Introduction

This document describes the benefits of Increased Generator Protection (IGP).

System faults in generator sets in parallel to the mains utility more often lead to severe damage to the generator.

Protections of the power Generation System only trigger at the systems maximum limits, despite the momentarily operating situation.

Restarting with a generator fault often results in more damage, since no protection detects faults inside the generator.

Numerous additional protection devices and arbitration is necessary to fulfill these specific functions.

To install an aftermarket protection system is very difficult, costly and time consuming.

Another disadvantage is that you need know how for each of these devices and they are attuned for a specific system.

IGP offers in protections to limits which automatically adapt to the power generation specific mode in which the system is in operation at each moment.

Faults are easy detected, and cause generator and installation shutdown avoiding successive damage.

The LX449 has several protections which protect your generator, protections already installed are:

- Generator over-voltage
- Generator over-current
- Generator over-excitation
- Generator over-temperature
- Generator phase-loss
- Generator loss of excitation
- Generator loss of current
- AVR over-temperature

These protections do not always adapt to the situation in which the "mains parallel generator" operates, and are not fast enough to protect your generator from a major damage or break down.



## 2.0 IGP

IGP works on top of the existing protections. IGP works much faster than standard protections. An actual value for 50ms outside the boundaries causes the AVR to trip its status contact. If the error exists for more than 100ms the AVR disables excitation. A generator has several operation areas so has the IGP protection to. On the next page you see the detailed picture for a visual description. IGP has the following working areas:

- I. In the initial stage the AVR becomes active voltages are not yet stable. A delay of 2 sec. is active and IGP accepts a bigger bandwidth.
- II. After 2 sec stage II voltage buildup mode becomes active the bandwidth narrows.
- III. In this stage the voltage is stable and the status contact becomes active. A small IGP bandwidth is active, this to detect errors fast.
- IV. When the mains breaker and generator breaker closes, cosphi mode becomes active. At the moment of closing the breaker cosphi is not yet stable. So in a delay of 3 sec. a generator current of >50% of I-limit causes a trip.
- V. After this 3 sec. delay the trip bandwidth becomes active a cosphi outside the boundaries causes a trip. Also a current of >100% of I-limit causes a trip.
- VI. By opening the mains breaker or generator breaker stage VI. is active. Cosphi is not stable in this area so only a current 50% of I-limit causes a trip.
- VII. When frequency is below 47Hz or 57Hz when using 60Hz machines, bandwidth expand.
- VIII. When frequency is closing 25Hz a 4 sec. delay becomes active. In this delay set point is switching over to a lower set point. Only traditional protections are active during this delay. Status contact switches off when frequency is <25Hz.
- IX. After the 4 sec. delay a bigger error bandwidth becomes active generator is running at low rpm.

This protection is designed for main paralleling / cosphi mode.

See below for a detailed picture:

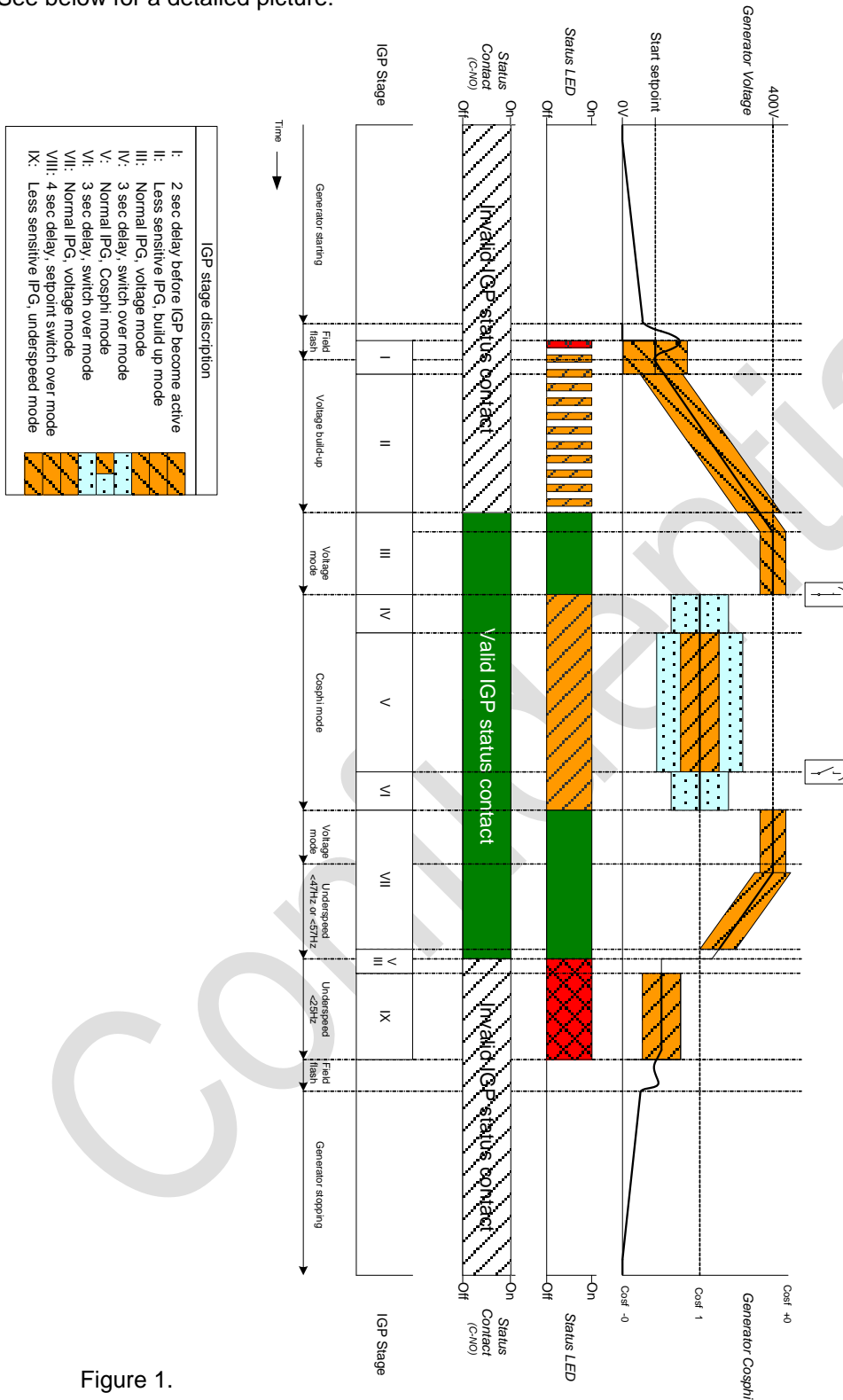


Figure 1.

Page left empty

Confidential

**A.2 Contact****Manufacturer:**

EMRI Electronics B.V.  
 Morsestraat 10  
 6716 AH, Ede, Netherlands  
 Tel: (+31) 0318 620427  
 Fax: (+31) 0318 634615  
 Website: [www.emri.nl](http://www.emri.nl)  
 E-mail: [info@emri.nl](mailto:info@emri.nl)

**Rafeining ehf**

Hafnarfjordur - Iceland  
 Tel: +354 565 3049  
 Fax: +354 565 3048  
 E-mail: [rafeining@rafeining.is](mailto:rafeining@rafeining.is)  
 Internet: [www.rafeining.is](http://www.rafeining.is)

**Myren & Co. AB**

Askim - Sweden  
 Tel: +46 317481860  
 Fax: +46 317481870  
 E-mail: [myren@myren.com](mailto:myren@myren.com)  
 Internet: [www.myren.com](http://www.myren.com)

**Marel Serwis**

Szczecin-Mierzyn - Poland  
 Tel: +48 91 48 58 388  
 Fax: +48 91 48 79 948  
 E-mail: [handel@marel.szczecin.pl](mailto:handel@marel.szczecin.pl)  
 Internet: [www.marel.szczecin.pl](http://www.marel.szczecin.pl)

**Frydenbø Electric A/S**

Bergen - Norway  
 Tel: + 47 55 34 91 00  
 Fax: + 47 55 34 91 10  
 E-mail: [firma.fel@frydenboe.no](mailto:firma.fel@frydenboe.no)  
 Internet: [www.frydenbo.no](http://www.frydenbo.no)

**KDU Technical Services**

Sharjah - United Arab Emirates  
 Tel: +971-6-5575480  
 Fax: +971-6-5575490  
 E-mail: [kdutech@kdutech.ae](mailto:kdutech@kdutech.ae)  
 Internet: [www.kdutech.ae](http://www.kdutech.ae)

**An-Elec Sp. z o.o.**

Gdynia - Poland  
 Tel: +48 58 668 44 00  
 Fax: +48 58 668 44 66  
 E-mail: [info@an-elec.pl](mailto:info@an-elec.pl)  
 Internet: <http://an-elec.pl>

**Yneldo Electronics**

Roodepoort - South Africa  
 Tel: +27(0)117637053  
 Fax: +27(0)117634212  
 E-mail: [yneldo@yneldo.com](mailto:yneldo@yneldo.com)  
 Internet: [www.yneldo.com](http://www.yneldo.com)

**Cyclelect Electrical Engineering**

Singapore  
 Tel: +65 6868 6013  
 Fax: +65 6863 6260  
 E-mail: [heng.p@cyclelect.com.sg](mailto:heng.p@cyclelect.com.sg)  
 Internet: [www.cyclelect.com.sg](http://www.cyclelect.com.sg)

**MJR Controls**

Stockton on Tees - United Kingdom  
 Tel: +44 1642 762 151  
 Fax: +44 1642 762 502  
 Email: [chris.milner@mjrcontrols.com](mailto:chris.milner@mjrcontrols.com)  
 Internet: [www.mjrcontrols.com](http://www.mjrcontrols.com)

**Stavros Kassidiaris S.A.**

Piraeus - Greece  
 Tel: +30 210 4636000  
 Fax: +30 210 4624471  
 E-mail: [info@kassidiaris.gr](mailto:info@kassidiaris.gr)  
 Internet: [www.kassidiaris.gr](http://www.kassidiaris.gr)

**Electricidad Juan Betancor S.L.**

Las Palmas – Canary Islands  
 Tel: +34 928327054  
 Fax: +34 928327055  
 Email:  
[admin@electricidadjbetancor.com](mailto:admin@electricidadjbetancor.com)



See our website [www.emri.nl](http://www.emri.nl) for local suppliers