DNV·GL

TYPE APPROVAL CERTIFICATE

Certificate No:
TAA00000Z3
Revision No:
1

This is to certify:

That the Generator Automation System

with type designation(s)
ECU 100 / GCU 100

Issued to
DEIF A/S
Skive, Midtjylland, Denmark

is found to comply with
DNV GL rules for classification – Ships, offshore units, and high speed and light craft

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

Location classes:

Temperature	**B**
Humidity	**B**
Vibration	**A**
EMC	**A**
Enclosure	**Required protection according to relevant rules shall be provided upon installation on board**

Issued at **Høvik** on **2019-01-14**
This Certificate is valid until **2021-02-12**.
DNV GL local station: **Aalborg**

Approval Engineer: **Bartosz Kabak**

for **DNV GL**

Jan Tore Grimsrud
Head of Section

Place of system modules manufacture

DEIF A/S
Skive
Denmark

Product description

The ECU 100 and GCU 100 series of products (ECU110, GCU111, GCU112, GCU113) are built for basic control, monitoring and protection of marine engines and generator sets. The variants and functions covered by this type approval are as follows:

Function	**ECU 110**	**GCU 111**	**GCU 112**	**GCU 113**
Engine start/stop	X	X	X	X
Engine monitoring and protection	X	X	X	X
CANbus engine communication, J1939	X	X	X	X
Modbus communication, RS485	X	X	X	X
Programmable logic, M-logic	X	X	X	X
Remote annunciator support, AOP-2	X	X	X	X
Multiple language support	X	X	X	X
Event and alarm log	X	X	X	X
Integrated emulation software	X	X	X	X
Generator monitoring and protection		X	X	X
Breaker control			X	X
Emergency genset control				X

The ECU/GCU is intended for the following engine types:

Engine manufacturer	**Engine controller / type**
Caterpillar	ADEM III and A4/C4.4, C6.6, C9, C15, C18, C32
Cummins	CM850/570/2150/2250, QSL, QSB5, QXL15 and 7, QSM11, QSK19, 50 and 60
Detroit Diesel	DDEC III and IV/Series 50, 60 and 2000
Deutz	EMR3, EMR 2 (EMR)/912, 913, 914 and L2011
Iveco	EDC7 (Bosch MS6.2)/Series NEF, CURSOR and VECTOR 8
John Deere	JDEC/PowerTech M, E and Plus
MTU	MDEC, module M.302 or M.303/Series 2000 and 4000
MTU	MDEC, module M.201 or M.304/Series 2000 and 4000
MTU	ADEC/Series 2000 and 4000 (ECU7)
MTU	J1939 Smart Connect/Series 1600 (ECU8)
Perkins	Series 1100, 1300, 2300, 2500 and 2800
Scania	EMS
Scania	EMS S6 (KWP2000)/Dx9x, Dx12x, Dx16x
Volvo Penta	EDC4
Volvo Penta	EMS
Volvo Penta	EMS 2 and EDCIII/D6, D7, D9, D12 and D16 (GE and AUX variants only)

The following alarm and protection functions as defined by ANSI are available in the GCU units:

Protection function	**ANSI**	**Levels**
Generator reverse power	32	2 steps
Generator over-current	50	2 steps
Fast over-current	51	2 steps
Generator over-voltage	59	2 steps
Generator under-voltage	27	2 steps
Generator over-frequency	81	2 steps
Generator under-frequency	81	2 steps

Protection function	ANSI	Levels
Busbar over-voltage	59B	2 steps
Busbar under-voltage	27B	2 steps
Busbar over-frequency	81B	2 steps
Busbar under-frequency	81B	2 steps
Generator overload	32	2 steps
Current unbalance	46	1 step
Voltage unbalance	60	1 step
Over-excitation	24	1 step
Loss of excitation	40	1 step

Software version 1.0x.x.

Application/Limitation

1. The Type Approval is valid for systems made by production facilities listed under Place of Manufacture
2. The Type Approval covers hardware and software listed under Product description. For engine types different than specified in the Product description, case by case evaluation will be carried out and certification according to Pt.4 Ch.9 Sec.1 [1.4] may be required.
3. Rule requirements for independent prime mover safety functions are to be fulfilled. Such required safety functions are to be implemented in a separate unit or in another independent system. Single ECU/GCU unit serving both start/stop and protection functions is not fulfilling those independency requirements.
4. When GCU 100 is used for emergency generator application, factory settings for trip functions shall be modified so as to comply with requirements for protective functions of emergency generator sets in Pt.4 Ch.8 Sec.2 [3.3.2]
5. Engine alarm and monitoring points are not in scope of this Type Approval and shall be checked in each case during approval of relevant documentation for engine control and monitoring system
6. The Type Approval does not cover functionality of M-Logic. Any functions implemented in M-Logic shall be documented. If functions affect rule requirements, certification will be required according to Pt.4 Ch.9 Sec.1 [1.4].

Documentation requirement:
For each delivery where the product is included the following information related to the application system is to be submitted for approval:
- Reference to this type approval certificate
- System block diagram/single line diagram including power supply arrangement and all communication lines / interfaces to other systems/locations
- Functional description, describing overall application and functionality, any implemented M-logic, any parameter which is not according to default setting
- Project-specific list of ANSI protection functions from the table above (with proposed limits and time delays) in addition to functions provided through the AOP(s) if applicable

Product certificate
As long as the delivered system is covered by this type approval, a product certificate according to Pt.4 Ch.9 Sec.1 [1.4] is not required. Correct parameterization and functionality are to be tested during commissioning after installation on board.

Software update notification
When the type approved software is revised (affecting all future deliveries) DNV GL is to be informed by forwarding updated software version documentation. If the changes are judged to affect functionality for which rule requirements apply a new functional type test may be required and the certificate may have to be renewed to identify the new software version.

Type Approval documentation

Tests carried out

Applicable tests according to Standard for Certification No. 2.4, April 2006.
Applicable tests according to IEC 60255-127/151.
Functional Type Tests on a representative system with one emergency generator/bus at DEIF's test bench during 2014.04.30.

Marking of product

On front side of product, the product is marked as either "ECU 100" or "GCU 100". On rear side of product the variant is identified as "Type", e.g. GCU 113.

Periodical assessment

The scope of the periodical assessment is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software versions, components and/or materials.

The main elements of the assessment are:

- Ensure that type approved documentation is available
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications
- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do not affect the type approval given
- Ensuring traceability between manufacturer's product type marking and the type approval certificate

A renewal assessment will be performed at renewal of the certificate.

END OF CERTIFICATE