

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Generator Automation System

with type designation(s)

**GENSYS MARINE, GENSYS 2.0 MARINE, MASTER 2.0 MARINE,
GENSYS 2.0 CORE MARINE, RDM 2.0 MARINE, GENSYS 2.0 LT MARINE**

Issued to

**CRE Technology
BIOT, France**

is found to comply with

Det Norske Veritas' Rules for Classification of High Speed & Light Craft

Application :

Location classes:

Type	Temperature	Humidity	Vibration	EMC	Enclosure
GENSYS MARINE	B	B	A	A	*
GENSYS 2.0 MARINE	B	B	A	A	*
MASTER 2.0 MARINE	B	B	A	A	*
GENSYS 2.0 CORE MARINE	B	B	A	A	*
RDM 2.0 MARINE	B	B	A	A	*
GENSYS 2.0 LT MARINE	B	B	A	A	*

*** Required protection according to DNV Rules shall be provided upon installation on board**

This Certificate is valid until **2017-06-30**.

Issued at **Høvik** on **2015-07-02**

DNV GL local station: **Le Havre**

Approval Engineer: **Poul Tranborg**

for **DNV GL**

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Odd Magne Nesvåg
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

Product description

Generator protection and control units:

GENSYS MARINE (A40Z1 and A40B0 to B9; different part numbers only reflect different graphics of the front panel)

GENSYS 2.0 MARINE (A53Z3 and A53B0 to B9)

MASTER 2.0 MARINE (A54Z3 and A54B0), identical to the GENSYS 2.0 except for the front face sticker

GENSYS 2.0 CORE MARINE (A53Z4 and A53C0 to C9)

RDM 2.0 MARINE (A53Y3 and A53Y4 to Y9) : one GENSYS divided in 2 parts in order to have a remote display

GENSYS 2.0 LT MARINE (A53Z5 and A53D0 to D9), identical to the GENSYS 2.0 except for the front face sticker.

System of up to 16 units linked by CAN bus to perform load dependent start/stop, dead bus recovery, active load sharing (droop or isochronous), reactive load sharing (droop or isochronous), auto-synchronising, trip of non-essential consumers, heavy consumer control, etc.

The following alarm, control and protection functions as defined by ANSI are available:

ANSI no.	Function / description
27/59	Under/Over voltage
32P/32Q	Active/Reactive reverse power
51/51N	Current overload / Neutral current overload
81L/81H	Under/Over frequency

Software versions:

GENSYS MARINE	v3.06
RDM 2.0 MARINE	v4.66a1
The same firmware applies to all modules in the GENSYS 2.0/MASTER 2.0 family*	v4.66a2
* GENSYS 2.0 MARINE, MASTER 2.0 MARINE, GENSYS 2.0 CORE MARINE, GENSYS 2.0 LT MARINE	

Electrical ratings:

Main Power supply: 100V – 480V AC / 1A / 5A – 50/60 Hz
Aux Power supply: 24V DC (8-35V)

Place of manufacture

STAYMATEL
Pôle d'Excellence Jean-louis,
Lot 26, 309, Via Nova
83600 FREJUS, France

Approval conditions

The Type Approval covers hardware and software listed under Product description.

When the type approved software is revised (affecting all future deliveries) DNV 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.

Case-by-case:

For each delivery where the product is included (typically a switchboard) the following information related to the GENSYS system is to be submitted for approval:

- Reference to this Type Approval Certificate

- System block diagram
- Power supply arrangement (may be part of the System block diagram)
- Functional description, preferably covering all functions of the switchboard
- List of implemented alarm and protection functions (ref. the ANSI lists above) with proposed limits and time delays
- Test program for test at the product manufacturer or the switchboard maker

Product certificate

Each delivery of the application system is to be certified according to Pt.4 Ch.9 Sec.1. The certification test is to be performed before the system is shipped to the yard, that is, at the manufacturer of the application system or at the switchboard manufacturer if agreed and adequate system competence and test facilities are available here. If certified together with the switchboard a combined control system and switchboard certificate may be issued. The certificate must identify this Type Approval Certificate plus the firmware by versions and date. After the certification the clause for application software control will be in force:

Clause for application software control.

All changes in software and parameter settings are to be recorded as long as the system is in use on board. The records of all changes are to be forwarded to DNV for evaluation and approval. Major changes in the software are to be approved before being installed in the computer.

Application/Limitation

Bustie breaker control and monitoring:

Control and monitoring of bustie breakers is not a standard feature of this product. However an application specific code (PLC equations) is available at CRE Technology to control and monitor the bustie breakers. (Not applicable on GENSYS 2.0 LT).

Load sharing failure:

Active/reactive power or current unbalance alarm while in symmetric load share mode must be provided by application specific code or by external means, ref. DNV Rules Pt.4 Ch.8 Sec. Sec.2 B104. The application specific code (PLC equations) is available at CRE Technology. (Not applicable on GENSYS 2.0 LT).

Generator Instrumentation:

Additional instruments may be required to be fitted in the switchboard, ref. DNV Rules Pt.4 Ch.8 H303

Overspeed protection

Rule requirements for separate prime mover safety functions (e.g. diesel engine overspeed protection) are to be observed.

Power Management functions

For a specific vessel the Rules may require additional power management functions than those available as standard features of this product, ref. Pt.4 Ch.8 Sec.12 A603 for electric propulsion vessels and Pt.6 Ch.7 Sec.5 A300 for DYNPOS vessels. For the latter, DYNPOS rules Pt.6 Ch.7 Sec.5 C101 requires that PMS is designed as a redundant system following the redundancy intent.

For high speed vessels category B (ref. Pt.4 Ch.8 Sec.2F) the system must be configured so as to ensure that the power management functions are active for each busbar section when the bustie breaker is open. Also, the communication network between units for one busbar section must not be affected by a defective communication network for the other busbar section.

Type Approval documentation

- GENSYS BLUE Data sheet
- Generator Management module, Technical Documentation Z090004-I, January 2006
- List of predefined variables, software versions, etc. A40 Z 0 90030-I Variables.xls
- GENSYS Help File A40Z090014-F.chm
- DNV Functional test proposal.doc dated 18/01/2009

- Parameter set and logic for GENSYS module 2, time tagged Mar 09 2009 10:39:56
- GYL Technologies, No.263103-SE-1-a, Test Report Gensys measurements and protections According to client technical document A40Z1-Protections_60255

Environmental test reports:

- DSF, No. 04030002, LR8 power supply variation test, dated April 8, 2003
- LCIE, No.39530010, Climatic and mechanical tests, dated 30 August 2002
- LCIE, No.39530020, EMC tests, dated April 16, 2002
- GYL technologies, No.263103-EB-1-a, Temperature class B, dated December 16, 2008
- GYL technologies, No. 263103-DB-1-a, EMC test report, dated 19 January 2009

Extension with GENSYS 2.0 e.a. in December 2011:

Drawing No.	Rev.	DNV No.	Title
A53 Z0 9 0020	E	10025	GENSYS 2.0 Generator management module Technical Documentation
A53Z0	4	10026	GENSYS 2.0 leaflet
A54Z0	4	10027	MASTER 2.0 leaflet
A53Y0		10028	RDM 2.0 leaflet
	12 07 2011	10016	CRE Technology, DNV FUNCTIONAL TEST
	17 07 2011	10015	CRE Technology, DNV FUNCTIONAL TEST (Complementary report)
263104-ED-1-a	09 05 2011	10020	GYL Technologies, Mechanical Type Test report, GENSYS 2.0
263105-ED-1-a	11 05 2011	10021	GYL Technologies, Mechanical Type Test report, RDM 2.0
263106-ED-1-a	13 05 2011	10022	GYL Technologies, Mechanical Type Test report, GENSYS 2.0 CORE
263108-ED-1-a	26 10 2011	10023	GYL Technologies, Environmental Type Test report, GENSYS 2.0, GENSYS 2.0 CORE and RDM 2.0
62118102	06 11 2008	10024	THALES, EMC/EMI Type test report, GENSYS 2.0
R10-015-EC	12 05 2010	10018	Centrale Marseille, EMC Type test report, MASTER/GENSYS2.0
R10-015A-EC	24 06 2010	10017	Centrale Marseille, EMC Type test report, MASTER/GENSYS2.0 (Complementary report on the surge immunity test)
R11-016-EC	20 06 2010	10019	Centrale Marseille, EMC Type test report, RDM 2.0
R12-011-EC	20-21 06 2012	10031	EMC test report - RDM 2.0 A53Y3 (addition to the R11-016-EC tests)
R12-012-EC	20-21 06 2012	10029	EMC test report - Gensys 2.0 A53Z3 (addition to the 62118102 tests)
R12-019-EC	12 07 2012	10032	EMC test report - RDM 2.0 A53Y3 (emissions 150k-30MHz, addition to the R11-016-EC tests and the additional tests R12-011-EC)
R12-020-EC	12 07 2012	10030	EMC test report - Gensys 2.0 A53Z3 (emissions 150k-30MHz, completes the 62118102 tests)

SW update notes:

DNV GL No	No	Title
10037	FME2092	RDM 2.0 - SW for A53Y0 update to v4.55
10038	FME2120	RDM 2.0 - SW for A53Y0 updated to v4.66a1
10033	FME2088	GENSYS 2.0 - SW for A53Zx / A54Z0 updated to v4.55
10041	FME2093	GENSYS 2.0 - SW for A53Z0 updated to v4.55a1
10034	FME2096	GENSYS 2.0 - SW for A53Z0 updated to v4.55a2
10035	FME2101	GENSYS 2.0 - SW for A53Zx updated to v4.66a1
10036	FME2126	GENSYS 2.0 - SW for A53Zx/A54Zx updated to v4.66a2

TA assessment report by DNV Marseille dated 2015-06-17

Job Id: **262.1-000953-5**
Certificate No: **TAA000000G**

Tests carried out

Applicable tests according to Standard for certification 2.4 April 2006.

Applicable tests according to IEC 60255.

Function test of a representative three-generator system with GENSYS MARINE conducted at manufacturer 2009-03-10.

Function test of a representative three-generator system with two GENSYS 2.0 and one GENSYS 2.0 Core + RDM 2.0 conducted at manufacturer 2011-07-17.

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

Periodical assessment is to be performed at least every second year and at renewal of this certificate.

END OF CERTIFICATE