

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Power Management System

with type designation(s)
ARINE-PMS

Issued to

SAN Engineering Co.,Ltd.
Seongnam-si Gyeonggi-do, Korea

is found to comply with
DNV GL rules for classification – Ships and offshore units

Application :

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

Temperature	B
Humidity	B
Vibration	A
EMC	A
Enclosure	A

Issued at **Busan** on **2018-03-26**

This Certificate is valid until **2020-03-25**.

DNV GL local station: **Seoul**

for **DNV GL**

Approval Engineer: **Eun Jin Lee**

.....
Michael Jost Auf der Stroth
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

The ARINE-PMS is for full control and protection of the ship's electric power distribution system. The system has the features of distributed control architecture and provides synchronizing, load sharing and generator protection functions for each generator.

The hardware building blocks for ARINE-PMS are the followings :

- A-PMS
- DIP(Digital input processor)
- DOP(Digital output processor)
- HCP(Hybrid composed processor)
- TCAP-UP(Termination Cap-up)
- TCAP-DN(Termination Cap-down)
- FCAP(Filter cap)

The ARINE-PMS includes the following functions :

- Synchronizing
- Frequency and load control
- Unbalance load sharing
- Load dependent start/stop
- Automatic start after black-out
- Heavy consumer start control
- AC metering (kW, kVA, kVAr, A, V, Hz)
- Alarms and protection for :
 - Preferential trip
 - Reverse power trip
 - Overcurrent /Short circuit
 - High/low frequency
 - High/low voltage
 - Communication failure

Software Ver. : V1.0.2.0

Application/Limitation

The Type approval covers hardware and software listed under Product description

Documentation requirement:

The following documentation of the actual application is to be submitted for approval:

- Reference to this Type Approval Certificate
- Functional description
- System block diagram
- Power supply arrangement (may be part of the system block diagram)
- Test program for certification

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 installed onboard at the manufacturer of the PMS or company defined as responsible for the system, typically at the switchboard manufacturer. The product certificate must identify this Type Approval Certificate and software version. 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 documentation of all changes are to be forwarded to DNV GL for evaluation and approval before implemented on board. Certification of modified functionality may be required for the particular vessel.

Type Approval documentation

Tests carried out

Applicable tests according to DNVGL Class Guideline DNVGL-CG-0339, November 2016.
Functional type test on a representative 3 generator system.

Marking of product

Manufacturer's name
Serial number

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