DNV·GL

Certificate No:
TAA00002AW

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Engine Control System

with type designation(s)
SaCoS_one Control Module CM V1.X, SaCoS_one Injection Module IM V1.X & V2.X, SaCoS_one Gateway Module GM V1.X, SaCos_one Knock Control Module KCM V1.X, Pressure Module CPM V2.X

Issued to
MAN Energy Solutions SE
Augsburg, Bayern, Germany

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.

SaCoS_one Control Module	CM V1.X
SaCoS_one Injection Module	IM V1.X & V2.X
SaCoS_one Gateway Module	GM V1.X
SaCoS_one Knock Control Module	KCM V1.X
SaCoS_one Cylinder Pressure Module	CPM V2.X

Class Location	
Temperature	**B**
Humidity	**B**
Vibration	**B**
EMC	**A**
Enclosure	**Required protection according to DNV GL Rules shall be provided upon installation on board**

Issued at **Hamburg** on **2019-06-19**
This Certificate is valid until **2024-06-18**.
DNV GL local station: **Augsburg**

Approval Engineer: **Didier Girardin**

for **DNV GL**

Joannis Papanuskas
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.

Job Id: **262.1-031292-1**
Certificate No: **TAA00002AW**

Product description

SaCoS _one allowing system architecture connecting control and other modules for specialist function or standard input/output (I/O) ranges.

SaCoS_one Modules	TYPE	Product vers.	Notes
SaCoS _one Control Module	CM	V1.X	a)
SaCoS_one Injection Module	IM	V1.X, V2.X	b)
SaCoS_one Gateway Module	GM	V1.X	c)
SaCos_one Knock Control Module	KCM	V1.X	d)
SaCoS_one Cylinder Pressure Module	CPM	V2.X	e)

Notes

a) [1)] Control Module for 4 stroke engines
b) [1)] Injection Control Module for 4 stroke engines
c) [2)] Gatewaymodule for the SaCoS_one system
d) knocking detection & control in gas & dual fuel engines
e) cylinder Pressure monitoring in gas & dual fuel engines

1) integrated module designed for a variety of uses and feature a number of analog and digital I/O channels. They include the main processing system for use in SaCoS*one* products.

2) main interface-to-customer system functionality, as well as data logging options and a dual-core service module. They enable users to download and back up system software.

Approval conditions

The Type Approval covers hardware listed under Product description. When the hardware is used in applications to be classed by DNV GL, documentation for the actual application is to be submitted for approval by the manufacturer of the application system in each case:

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

- Reference to this Type Approval Certificate
- Reference to SaCoS_one SW or SW type approval certificate(s) or
- Functional description if software if not covered by DNVGL TA certificate
- System block diagram showing overall system layout and separation between Safety System and control and Monitoring
- Power supply arrangement (may be part of the System block diagram)
- List of control and monitored points
- Test program for application software at manufacturer

Reference is made to DNV GL rules for classification of ships Pt.4 Ch.9 Control and monitoring systems

Product certificate

Each delivery of the application system is to be certified according to Pt.4 Ch.9 Sec.1. The Certification is to be performed at the manufacturer before the system is shipped to the yard. After certification the clause for software control will be put into force.

Software control

All changes in software are to be recorded as long as the system is in use on board. Documentation of major changes is 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

Hidden

Tests carried out

Applicable tests according to class guideline DNVGL-CG-0339, November 2016

Marking of product

The products to be marked with:
- manufacturer name
- model 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

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.

END OF CERTIFICATE