DNV·GL

Certificate No:
TAA00000F1

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Generator Automation System

with type designation(s)
Generator Protection Module, GPM 500, Diesel Protection Module, DPM 500

Issued to
Wärtsilä SAM Electronics GmbH
Hamburg, Germany

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

Application :

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

Type	Temperature	Humidity	Vibration	EMC	Enclosure
Generator Protection Module					
GPM 500	**B**	**B**	**A**	**A**	*
Diesel Protection Module					
DPM 500	**B**	**B**	**A**	**A**	*

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

This Certificate is valid until **2018-06-02**.

Issued at **Hamburg** on **2016-06-03**
DNV GL local station: **Hamburg** for **DNV GL**

Approval Engineer: **Marco Rinkel**

Duy Nam Le
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.

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Product description

GEAPAS 500 covers :
Generator Protection Module - GPM500
Diesel Protection Module - DPM500

Hardware components :

BAT 500	Operator Panel
BAT 501	Operator Panel
DCC 500	DC/DC Converter
DIF 500	Differential-Current Detection
DIO 500	Digital I/O PCB
GOV 500	Governor-Motor Control
ISO 500	Analoge Input 8 x AI
NEG 500	Power Supply Unit
NEG 501	Power Supply Unit
NEG 510	Power Supply Unit Extension
SLE 500A	Current and Power Accquisition
SLE 501	Current and Power Accquisition
SST 500	Start/Stop Print Board
TRV 500	Buffer Amplifier
TRV 501	Buffer Amplifier
TRV 502	Buffer Amplifier
TRV 504	Buffer Amplifier
TRV 505	Buffer Amplifier
USS 500	Backup for Under-Voltage-Coil
ZKG 500	Central PCB
ZKG 501	Central PCB
ZM 432	Central Modul

Generator Protection Module GPM500 with touch panel BAT500/501 with the following functions:

- Protection
- Measurement
- Control (load dependent generator start/stop, consumer pre-selection, load sharing, blackout start, automatic synchronisation, frequency control)
- Monitoring

Protection functions avaiable for GPM500:

	ANSI Code	Protection Function
-	37 –	Underpower
-	50	Overcurrent instantaneous (Short circuit)
-	51	Overcurrent (delay time)
-	46	Phase current asymmetry
-	87	Differential protection
-	27	Undervoltage
-	59	Overvoltage
-	81	Overfrequency /Underfrequency
-	32	Reverse power
-	40	Monitoring of excitation
-	25	Synchronism check
-	47	Phase failure
-	51G/51N	Earth fault protection
-	51 (49)	IDTM - Overcurrent (Thermal overload protection)
-		Preferential trip (overcurrent/ underfrequency)

Diesel Protection Module DPM with touch panel BAT500/501 with the following functions:

- Protection functions (auxiliary or emergency diesel engine, decided by parameter setting)
- Overspeed (Standard)
- Lubricating oil pressure (Standard)
- Cooling water temperature (Standard)
- Optional: Cooling water pressure, Lubricating oil temperature, Fuel Leakage, Exhaust gas temperature,
- Bearing temperature, C02, Oil Mist concentration, TC Overspeed

Control functions:
- Start/Stop
- Blackout Start

Failure detection:
- Start / Stop Failure, Wire break of diesel protection sensors
- Diesel Engine Failure
- Power supply monitoring, Flash Checksum, EEPROM Checksum, Module Failure

Additional functions:
- Interface to external power management system
- Additional free programmable functions and controls (documentation to be submitted for each application).

Approval conditions

Case-by-case:
For each delivery where the product is included (for GPM500 typically as part of a switchboard, for DPM500 typically as part of an engine control panel) the following information related to the application 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)
- List of hardware modules as identified in this Type Approval Certificate
- Functional description including functions provided through BAT500/501 or other VDU as applicable
- List of implemented alarm and protection functions (for GPM500 ref. the ANSI list above, for DPM500 ref. the list of protection functions above) with proposed limits and time delays
- Test program for the certification test (when applicable, ref. product certificate conditions below)

The validity of the related separate TA certificate of the T7AM is to be checked.

Product certificate:
When GPM500 units are used for protection purposes only no product certificate is required. Correct configuration and set up for each delivery to be tested during commissioning after installation.

All other delivered units shall be listed in a product certificate acc. to Pt.4 Ch.8 Sec.1 and Pt.4 Ch.9 Sec.1 (switchboard certificate, control panel certificate or system certificate if the complete delivery is certified at the manufacturer.
After certification the following clause for application software control will be in force:

Clause for application software control:
All changes in software are to be recorded. Major changes are to be forwarded to DNVGL for evaluation and approval. Major changes in the software are to be approved before installed in the computer. A certification of application functions may be required for the particular vessel.

Application/Limitation

The Type Approval covers hardware listed under Product description.

- For DPM500 the required separation between a system performing required engine protection functions and the engine start/stop and monitoring system shall be observed.
- For an emergency diesel engine the only protection function shall be overspeed.

Type Approval documentation

Tests carried out

For GPM500/BAT500:
- Environmental tests according to
- DNV Standard for Certification No. 2.4, April 2001 and
  GL Guidelines for the Performance of Type Approvals Part 2, Edition 2003
  (Power supply failure, power supply variations, dry heat, damp heat, vibration and EMC).
  This is in line with DNVGL-CG-0339, 11/2015.
- Type tests of GPM500 in accordance with IEC 60255.

For DPM500:
- Performance test on 2011.01.18 witnessed by DNV Hamburg

Marking of product

Wärtsilä SAM Electronic – GPM500 / BAT500/501 (touch panel) – Type number.
Wärtsilä SAM Electronic – DPM500 / BAT500/501 (touch panel) – Type 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 at least every second year and at renewal of this certificate.

END OF CERTIFICATE