Certificate No:
TAA00002Y0

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Power Management System

with type designation(s)
PGS (Power Generation System)

Issued to
Siemens Energy Global GmbH & Co. KG
Hamburg, **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.
Environmental and EMC Class location [1)]

Note 1) Class location to be observe according valid DNV Type approval certificate for system components build in.

Issued at **Hamburg** on **2021-05-27**
This Certificate is valid until **2026-05-26**.
DNV local station: **Hamburg – CMC North/East**

Approval Engineer: **Didier Girardin**

for **DNV**

Joannis Papanuskas
Head of Section

Product description
The PGS (Power Generation System) controls and regulates power generation within independent electrical networks. It maintains a supply, as interruption free as possible in all operational states, of sufficient electrical power to the consumer. Protection for the network and the power generating aggregates is an integral component of the PGS.
PGS (Power Generation System) is a modular hardware and software system. Simatic S7 components and the SIPROTEC protection unit (optional) are used for the hardware. The software modules are engineered with PCS7. The hardware and software modules are matched to one-another.

The system consists of the following hardware modules:

Central Racks
Generator Substations
Bus-tie-line Substations
Shaft Generator Motor Substation
Turbo Generator Substations
Shore Connection Substations
System Visualizations

- **System configuration see Annex**

- **The following Alarm and protection functions as defined by ANSI are realized inside the PGS:**

Protection Function	ANSI No.	PGS Function
Overcurrent	50TD-8	Alarmstart
Overcurrent	50TD-9	Alarmstart
Forward Power	32F-1	Alarmstart
Forward Power	32F-2	Alarmstart
Underfrequency	81-2	Alarmstart
Overvoltage	59-5	Delay Stop
Undervoltage	27-1	Delay Stop
Overvoltage	59-4	Changeover via Blackout
Undervoltage	27-2	Changeover via Blackout
Underfrequency	81-2	Changeover via Blackout

Application/Limitation

- Present system type approval is covering software PGS AS-LIB V 1.x and hardware according certificates listed under present certificate annex.
- Software easily readable during on board survey
- The Type Approval is valid for systems made by production facilities listed under Place of Manufacture

Documentation requirement:
For each delivery where the product is included (typically a switchboard), the following information related to PGS (Power Generation System) is to be submitted for approval:

- Reference to present Type Approval Certificate
- Reference to valid hardware Type Approval Certificates
- System block diagram
- Power supply arrangement (may be part of the System block diagram)
- List of hardware and software modules as identified in this Type Approval Certificate
- Functional description including functions provided
- Project specific list of control and monitoring points (I/O list)
- List of implemented alarm and protection functions (ref. the ANSI list above) with proposed limits and time delays
- Test program for application software at manufacturer

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
Partially hidden

Test report: Type approval Test Procedure E 10231-Y1037-U017,
E10231-Y1066-U790 PGS –Type Approval FAT Protocol

Tests carried out
Applicable tests according to class guideline DNVGL-CG-0339, December 2019.
Functional Type Tests on a representative configuration E 10231-Y1037-U017

Marking of product
Each module shall be externally marked to enable identification in accordance with the documentation and be marked with the manufacturer's name. Software version to be available on equipment.

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 2.5 year and at renewal of this certificate.

END OF CERTIFICATE

ANNEX

Configuration

Power Management System comprising: 1 up to 8 S7 4xxX CPU´s
Power Management System controlling up to 16 generators and associated engines
Controlling up to 16 bus bar sections and the associated transfer lines
Central processing units: CPU S7-4xx or S7-4xxH or equal
Communication processor: CP443-1 or equal
IO based on ET200SP interface cards or equal

PLC Simatic	**Redundancy**	**TA Certificates**
S7-41x-5H	1	TAA00000GE
S7-41x-5H	2	TAA00000GE
S7-41x	1+1	TAA00001UJ
S7-4xxH	1	TAA00000GE
S7-4xxH	2	TAA00000GE
S7-ET 200SP		TAA0000227
Fiber Optic network	Ring network in Fiber or copper	
Synchronizer	Deif FAS 115 or equal	TAA0000022
Network	Fiber Optic / copper	n.a.
Touch Panel TP1x00	Up to 4 Panels	TAA00016S, TAA00000NB
S7 Application SW	PGS AS-LIB V 1.x	

Following Software modules are available:

Internal System coordination Single Station
Internal System coordination Hot Redundancy
Internal System coordination Multiple Hot Redundancy
Internal System coordination Software Redundancy
Power Management Functions Grid detection
Power Management Functions Heavy Consumer Control/Power Reserving
Power Management Functions Min/Max Set
Power Management Functions Unbalance Mode
Power Management Functions Load sharing
Power Management Functions Load Limitation
Power Management Functions Blackout Recovery with/without Ramp up Function
Power Management Functions Short Circuit coordination
Power Management Functions Start / Stop Priority by Operator or Running Hours
Power Management Functions Mode Selection
Power Management Functions Advanced Generator Protection
Diesel Generator Control Functions
Diesel Generator Protection Functions
Diesel Generator Dual Fuel Functionality
Tie breaker Control Functions
Tie breaker Protection Functions
Shore breaker Control Functions
Shore breaker Protection functions
Shaft Generator / Motor Control Functions
Shaft Generator / Motor Protection Functions
Steam Turbine Generator Control Functions
Steam Turbine Generator Protection Functions
Waste Heat Recovery Functions and Supervision
Multiple Control Level Coordination
Alarm Handling
Control and Visualization of Main Switchboard consumers
Control and Visualization of Distribution Network
User Interface for Control and Parameters
User Interface to PCS7 Environment or others
Data Interface with Ethernet, Profibus, Profinet, Modbus TCP/IP