

# TYPE APPROVAL CERTIFICATE

**This is to certify:****That the Power Management System**with type designation(s)  
**DGM-02 THESEUS**

Issued to

**Heinzmann GmbH & Co. KG**  
**Schönau/Schwarzwald, 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.**

<b>Temperature</b>	<b>B</b>
<b>Humidity</b>	<b>B</b>
<b>Vibration</b>	<b>A</b>
<b>EMC</b>	<b>A</b>
<b>Enclosure</b>	<b>Required protection according to DNV Rules shall be provided onboard</b>

Issued at **Hamburg** on **2018-01-31**for **DNV GL**This Certificate is valid until **2020-01-30**.DNV GL local station: **Augsburg**Approval Engineer: **Jens Dietrich**

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**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.



## Product description

The THESEUS DGM-02 appliance is the platform of four available main variants determined by the firmware. The variants BASIC, MEDIUM, EXTENDED fulfil the requirements of Generator Management as well as the variant GROUP the requirements of Bus Tie Management. The DGM-02 platform includes all components of measurement, I/O and communication to interface with analogue/digital control equipment as well as to do the communication of all THESEUS systems and higher control of a plant. A wide range of implemented control functions of common and power station specific nature allow to meet the required functionality by user configuration via the DcDesk 2000 communication software. All but the economic BASIC variant, which is partially pre-configured, allow the development of custom-engineered solutions to meet the specific needs.

### Digital Generator Management Units:

#### THESEUS Basic

- Low Voltage Genset
- Economic Solution

#### THESEUS Medium

- Low Voltage Genset
- Variable Connections
- Variable Functions

#### THESEUS Extended

- High Voltage Genset
- Variable Connections
- Variable Functions

#### Standard Functions for all:

- Synchronizing
- kW Load Sharing
- Voltage-Matching
- kVAr Load Sharing
- Automatic Sequencing

### Digital Bus Tie Management Unit:

#### THESEUS Group

- Low/High Voltage Application
- Group-To-Group Control
- Synchronizing
- kW Load Sharing
- Voltage-Matching
- kVAr Load Sharing
- Soft Load Transfer
- Automatic Sequencing

Depending on device type some or all of the following alarm and protection functions as defined by ANSI are available:

ANSI no.	Function / description
24Q	Overexcitation
25	Automatic synchronizing
27	Undervoltage
32	Overload
32R	Reverse power
37	Undercurrent
40Q	Excitation loss
50	Overcurrent, instantaneous

<b>ANSI no.</b>	<b>Function / description</b>
51	Overcurrent, time
59	Overvoltage
60	Current balance
60	Voltage balance
78	Vector shift
81	Frequency supervision
81R	Rate of change of frequency supervision

## **Approval conditions**

The Type Approval covers hardware listed under Product description.

### Case-by-case:

For each delivery where the product is included (typically a switchboard) the following information related to the THESEUS 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, preferably covering all functions of the switchboard
- If applicable, list of implemented circuit alarm and protection functions with proposed limits and time delays and test reports verifying performance according to the applicable IEC standard, 60255-6 or 60947-6-2
- 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 DNV GL 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 control unit.

## **Application/Limitation**

The present THESEUS system does not constitute a full power management system since it lacks a human-machine-interface. This has to be arranged with other facilities, i.e. an integrated alarm, control and monitoring system.

The THESEUS is adapted to a specific application by parameter setting. Thus, besides the software version the parameter checksum is to be identified to allow tracking of changes. This means that both are to be noted in each vessel specific product certificate.

An external dead bus detection circuit with input to each generator module is required unless the busbar may only be energised by generators controlled by THESEUS modules.

Job Id: **262.1-004847-5**  
Certificate No: **TAA00001MR**

### **Generator Instrumentation:**

When THESEUS modules are used for generator protection/control, additional instruments will be required to be fitted in the switchboard as required in DNV GL Rules, Pt.4 Ch.8, Electrical Installations.

### **Power Management functions**

The sufficiency of power management functions stated under product description has to be checked for the respective application with regard to the intended class notation.

### **Type Approval documentation**

System Specification rev. 02 dated 2008-04  
Hardware Specification V3 dated 11.2012  
Engineering change request PCB Mainboard for THESEUS DGM-02 HWM00226 dated 09-03-2012  
HWM00226 translation into English dated 09-03-2012  
Hardware Description rev. 02 dated 04.08  
Functional Description rev. 01 dated 2008-04  
Software Description rev. 02 dated 2008-04  
Program Flow Charts rev. 01 dated 2008-04  
Fault Tree Analysis rev. 01 dated 2008-04  
Installation & Commissioning Guide rev. Manual DG 05 001-e / 05-12  
Product Leaflet DZ\_the\_001\_07\_03\_E\_1\_2007

#### Test reports:

TÜV SÜD Product Service GmbH No. 71315753 dated 2007-01-03 (physical environment)  
Appendix to above by Heinzmann dated 07.03.07  
EMC Test NRW No. P06-Z-00486-001 dated 26. February 2007  
Heinzmann dated 29.01.2007 Repeat of Surge Test of the AC-Voltage Inputs  
Surge-and Burst-Test on the DC-Supply Input of the THESEUS DGM-02 using the Diode IXYS DSEI 2x30-06 as reverse polarity protection dated 27.07.2012

DNV GL Augsburg periodical assessment report, dated 2017-10-23.

### **Tests carried out**

Applicable test according to DNV GL Class Guideline CG-0339, November 2016.  
Representative 3 generator system Functional Type Test at maker 2008.09.08-09.

### **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 renewal of this certificate.

END OF CERTIFICATE