

TYPE APPROVAL CERTIFICATE**This is to certify:****That the Electrical Measuring and Protection Relay**

with type designation(s)

PPU Power Management (PPM), Multi-line PPU/GPU Generator controllers and protection

Issued to

**DEIF A/S
SKIVE, Denmark**

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.****Location classes:**

Type	Temperature	Humidity	Vibration	EMC	Enclosure
PPU Power Management (PPM)	B	B	A	A	B*
Multi-line PPU/GPU Generator controllers and protection	B	B	A	B	B*

*** for display unit only,****for other units required protection according to the Rules to be provided upon installation on board**This Certificate is valid until **2018-11-28**.Issued at **Høvik** on **2016-11-29**for **DNV GL**DNV GL local station: **Aalborg**Approval Engineer: **Bartosz Kabak**

Odd Magne Nesvåg
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.

Place of system modules manufacture

DEIF A/S

Skive
Denmark

Product description

PPU/GPU

A PPU/GPU consists of:

- DIN-rail or base-plate mounted CPU with wire terminations
- operator display plugged on top of the CPU or mounted separately in panel front

A GPU combines the following functions:

- multifunction generator protection
- AC metering

A PPU has the following additional functions:

- auto-synchronising
- power management (when several PPUs are interlinked)

There are several additional functions available as options. Reference is made to the manufacturer's documentation.

The software is identical regardless of unit type or optional functions. The current software is identified by version 2.42.2.

PPM

Three (3) alternative basic power system configurations may be controlled and monitored by a PPM system:

- System 01: 2-8 dieselgenerators for parallel operation
- System 02: above plus one shaft generator for short time parallel operation
- System 03: above with control and monitoring of a bus-tie breaker for split SG/DG operation

A system is built from the following components:

per controlled circuit breaker:

- one DIN-rail or base-plate mounted control unit with wire terminations
- 1-3 operator displays with LED, no. 1 plugged on top of the CPU or mounted separately in panel front (6m), no. 2-3 in remote desks via CAN bus (500m)

plus the following per system:

- one PM processor normally mounted in control unit no.1
- additional operator panels (AOP) with discrete lamps and pushbuttons for remote mounting (500m) (optional)

The following functions are provided

- multifunction circuit protection
- voltage and frequency monitoring for generators and busbars
- diesel engine protection
- AC metering
- power management including load dependent start/stop with priority, auto-synchronising, symmetrical/asymmetrical load sharing, trip of non-essential consumers, blackout sequence, heavy consumer control, etc.

There are several additional functions available as options. Reference is made to the manufacturer's documentation.

The PPM software is identified by the following versions:

- PPM Appl. SW vers. 2.5x.x
- Image SW vers. 1.0x.x
- PMS SW vers. 1.0x.x

Application/Limitation

1. The Type Approval is valid for systems made by production facilities listed under Place of Manufacture
2. The Type Approval covers hardware and software listed under Product description.
3. For PPM, none of the above listed basic power management system configurations are arranged with redundancy with respect to power management functions and hence they will not fulfil the requirements for vessels with redundant propulsion notations RP(2, x)+ and RP(3, x)+ (ref. Pt.6 Ch.2 Sec.7), dynamic positioning notations DYNPOS(AUTR) and DYNPOS(AUTRO) (ref. Pt.6 Ch.3 Sec.1 and Sec.2) or high speed vessel category B (ref. Pt.4 Ch.8 Sec.2 [6]) when more than one generator per busbar section is arranged.

Documentation requirement

For each delivery where the product is included (typically a control panel or a switchboard) the following PPM specific information is to be provided together with the documentation of the switchboard that is submitted for approval:

- Reference to this Type Approval Certificate
- System block diagram
- Power supply arrangement (may be part of the System block diagram)
- Functional description including unit option information (ref. data sheet page 9)
- Test program for commissioning test

Product certificate

As long as the delivered system is covered by the Type Approval, a product certificate according to Pt.4 Ch.9 Sec.1 [1.2.3] is not required. Correct configuration and set up for each delivery to be tested during commissioning after installation onboard.

Clause for application function control

All changes in software 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 GL for evaluation and approval. Major changes in the software are to be approved before being installed in the computer. Certification of Application Functions may be required.

Software update notification

When the type approved software is revised (affecting all future deliveries) DNV GL is to be informed by forwarding updated software version documentation. If the changes are judged to affect functionality for which rule requirements apply a new functional type test may be required and the certificate may have to be renewed to identify the new software version.

Type Approval documentation

Multi-line 2 Drawings:

- Measuring- and uP-Board (4157200343 rev. D + ref. IPG 0150)
- Power supply and relay board (4157200344 rev. D + ref. IPG 0146)
- Loadshare board (4157200345 rev. D)
- LED and interfaceboard (4157200353 rev. D + IPG 0147)
- Analog output (4157200347 rev. B + ref. IPG 0146)
- Relay output board (4157200346 rev. A)
- Backplane (4157200352 rev. A)
- Extension board (4157200355 rev. A)
- Display Unit (4157200341 rev. C)
- Governor board (ref. IPG 0146)
- RS232/RS485 board (ref. IPG 0146)
- Governor PWM 2 board (ref. IPG 0147)
- Engine I/F board w. VDO (ref. IPG 0147)

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Certificate No: **TAA00000VG**

Engine I/F board w. PT100 (ref. IPG 0147)

New documents for PPU Power Management (PPM):
Data Sheet (4921240291A), 9 pages
Designer's Reference Handbook (4189340408A), 94 pages
Installation Instructions (4189340409A), 64 pages
Operator's Manual (4189340410A), 64 pages
Factory Acceptance Test (4199400001A), 32 pages

Test reports

DEIF tests 3-4A, 6A, 9A, 11A, 13-15A, 1-2B, 5-7B, 13B, 15-16B
DEMCO letter dated 12.12.2000 for IP5x
DEIF: "IPG 0146 Multi-line 2 New HW" dated 20030213, "IPG 0147 Multi-line 2 Updated HW" dated 20020917, "IPG 0150 ML2 Galv. sep. measure board" dated 20031001, "IPA No.: 0215 LED I/F w/WebARM" dated 20060213.

TA assessment report by DNV GL Aalborg dated 2016-11-14

Tests carried out

Applicable tests according to Certification Notes 2.4, May 1995.
Functional Type Tests on representative 3 generator systems test bench at DEIF on 2001-08-13 and 2006-01-30.

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.

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