DNV

TYPE APPROVAL CERTIFICATE

Certificate no.:
TAA00003H8
Revision No:
1

This is to certify:

that the Programmable Electronic System

with type designation(s)
iE 650 PLC & AMC 600

issued to
DEIF A/S
Skive, Denmark

is found to comply with

DNV 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.

Location classes:

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

Issued at **Hamburg** on **2025-12-10**

This Certificate is valid until **2030-12-09**.
DNV local unit: **Denmark CMC**

Approval Engineer: **Torsten Dzillak**

for **DNV**
Digitally signed by: Dariusz Lesniewski
Location: DNV SE, Germany

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

iE 650 PLC & AMC 600

AMC 600 and iE 650 PLC Programmable Automation Controller (PLC) with EtherCAT based I/O modules. It consists of the following modules:

Programmable Computer Modules

PCM6·1

Application:	C/C++ and CODESYS application
Digital input:	high with 13…30V and low with -30…+5V
Digital output:	solid state relay with external watchdog
Interface:	2 x Ethernet, 2 x CAN, 2 x RS-422/485, 1 x USB Host
Processor:	1.2 GHz dual core
Memory:	1 GB DDR3 RAM 64bit
Storage:	4 GB non-volatile

PCM6·2

Software:	iE 650 PLC
Application:	C/C++ and CODESYS application
Digital input:	high with 13…30 V and low with -30…+5 V
Digital output:	solid state relay with external watchdog
Interface:	4 x Ethernet (1 independent, 3 switched (managed)), 2 x CAN, 2 x RS-422/485, 1 x USB Host, 1 x DisplayPort
Processor:	1.6 GHz quad core
Memory:	4 GB DDR4 RAM 256 kB FRAM
Storage:	32 GB non-volatile (~8 GB user available)

Power Distribution Modules

PDM6·1

Power:	30W / 24 V (18…32 V) Black-out hold-up for 10 ms EMI filter: common mode EMI input filter Isolation: input galvanic isolated from other potentials, 500 V DC

PDM6·2

Power:	30 W / 24 V (18…32 V) Black-out hold-up for 10 ms+300 ms EMI filter: common mode EMI input filter Isolation: input galvanic isolated from other potentials, 500 V DC

Station Interface Modules

SIM6·1

Interface:	1 x EtherCAT OUT (optical – fibre glass 50µm) 1x EtherCAT IN (optical – fibre glass 50µm)

SIM6·2

Interface:	1x EtherCAT OUT (electrical – RJ45) 1x EtherCATOUT (optical – fibre glass 50µm)

SIM6·3

Interface:	1x EtherCAT IN (electrical –RJ45) 1x EtherCAT OUT (optical – fibre glass 50µm) 1x EtherCAT OUT (electrical – RJ45)

SIM6·4

Interface:	1x EtherCAT IN (Port 0)-LVDS 1x EtherCAT OUT (Port 3 >0.76µm gold plating) 1x EtherCAT OUT (Port 1 >0.76µm gold plating)

SIM6·5

Interface:	1x EtherCAT IN (Port 0)-LVDS

1x EtherCAT OUT (Port 2 optical – multi mode fibre glass 50µm)
1x EtherCAT OUT (Port 1 optical – multi mode fibre glass 50µm)

Digital Input/Output Modules

DIO6·1 10 digital outputs: max. 0.5 A per channel and max. total 2 A per group
16 digital inputs: high with 13…30 V and low with -30…+5 V

DIO6·2 16 digital outputs: max. 0.5 A per channel and max. total 2 A
16 digital input: high with 13…30 V and low with -30…+5 V

DIM6·1 32 digital input: high with 13…30 V and low with -30…+5 V

DOM6·1 32 digital output: max. 0.5 A per channel and max. total 2 A

DIM6·3 8 high voltage digital input.
High: 40 to 220 V DC (DC input) / 70 to 240 V AC (AC input)
Low: <40 V DC (DC input) / 40 V AC (AC input)

DOM6·3 8 high current digital output in 2 groups (4x4).
Max. 2 A per channel continues.
Maximum total for all outputs: 8 A per group
All 4 x DO max 2A continues in one group

Analogue Input/Output Modules

AIO6·1 2 analogue outputs:
Current mode 0…20mA, 4…20mA
Voltage mode -10…10V, 0-10V
Resolution 16 bit
16 analogue inputs:
-10…10V, 0…10V, -20…20mA, 0…20mA, 4…20mA
Impedance – current (50Ω), voltage (10kΩ)
Resolution 16 bit

AIO6·2 8 analogue outputs:
Current mode 0…20mA, 4…20mA, -20 to 20mA
Voltage mode -10…10V, 0-10V
Resolution 16 bit
8 analogue inputs:
Current mode 0…20mA, 4…20mA, -20 to 20mA
Voltage mode -10…10V, 0-10V
Impedance – current (50Ω), voltage (10kΩ)
Resolution 16 bit

AOM6·2 8 analogue outputs:
Current mode 0…20mA, 4…20mA, -20 to 20mA
Voltage mode -10…10V, 0-10V
Resolution 16 bit

AIM6·1 16 analogue inputs different input types
Current mode: 0 to 20 mA, 4 to 20 mA, -20 to 20 mA
Voltage mode: 0 to 10 V, -10 to 10 V

AIM6·2 8 analogue inputs different input types
Current mode: 0 to 20 mA, 4 to 20 mA, -20 to 20 mA
Voltage mode: 0 to 10 V, -10 to 10 V

Multifunctional Input Modules

TIM6·1 14 temperature inputs:
Pt100 (-50…200°C) – 2-wire (or 3-wire connection - 6 Input)

Open input and short circuit detectable

MIM6·1 16 (8) Multifunctional inputs
Voltage inputs : 0 to 10 V, -10 to +10 V
Current inputs : 0 to 20 mA, 4 to 20 mA, -20 to +20 mA
RMI : 0 to 4.5 kΩ
Pt100 : -200 to +300 °C
Pt1000 : -200 to +300 °C
Thermocouple : B, E, J, K N, R, S, T
Impedance – current (50Ω), voltage (10kΩ)

MIM6·2 8 (4) multifunctional inputs
Voltage inputs : 0 to 10 V, -10 to +10 V
Current inputs : 0 to 20 mA, 4 to 20 mA, -20 to +20 mA
RMI : 0 to 4.5 kΩ
Pt100 : -200 to +300 °C
Pt1000 : -200 to +300 °C
Thermocouple : B, E, J, K N, R, S, T
Impedance – current (50Ω), voltage (10kΩ)

Interface and Fieldbus Modules

IFM6·1
Interface: 2 x Profibus DP Master with max. 5 slaves per master
2 x RS-485 shielded twisted copper cable

IFM6·2
Interface: 2 x CAN (ISO11989) with termination open/120Ω
2 x RS-422 (SSI) shielded twisted copper cable
2 x Digital Input with frequency measurement

Relay Output Modules

ROM6·1 8 relay outputs (normally open)
Resistive load (continuously):
250 VAC @ 2 A
120 VAC @ 2 A
48 VAC @ 2 A
24 VAC @ 2 A
220 VDC @ 0.2 A
110 VDC @ 0.3 A
48 VDC @ 1 A 24
VDC @ 2 A
12 VDC @ 2 A

ROM6·2 4 relay outputs (change over)
Resistive load (continuously):
250 VAC @ 2 A
120 VAC @ 2 A
48 VAC @ 2 A
24 VAC @ 2 A
220 VDC @ 0.2 A
110 VDC @ 0.3 A
48 VDC @ 1 A 24
VDC @ 2 A
12 VDC @ 2 A

Software revisions valid for this approval are placed in DEIF Software Quality Plan documents. Project specific functions are achieved by setting limits for alarms and parameters.

Application/Limitation

- The Type Approval covers hardware under Product description
- The Type Approval does not cover functions implemented in Custom Logic. Any functions implemented therein shall be documented on case-by-case basis

Product certificate

Each system to be certified according to Pt.4 Ch.9 Sec.1. The certification test is to be performed before the system is installed onboard at the company defined as responsible for the system, typically at the switchboard manufacturer. The product certificate must identify this Type Approval Certificate and the parameter settings for the specific project. After the certification the clause for application software control will be in force.

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

- Reference to this Type Approval Certificate
- 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
- A document describing the specific functions for hybrid mode operation stating operating modes, hard- and software configuration and integration/ interfacing with other system
- List of implemented alarm and protection functions with proposed limits and time delays
- Software versions used in specific delivery
- Test program for the certification test

Type Approval documentation

Tests carried out

Applicable tests according to class guideline DNV-CG-0339, August 2021.
Functional Type Tests on a representative variation of EUTs at DEIF's test bench.

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 Assessement

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