CERTIFICATE NUMBER	20-1996239-PDA
EFFECTIVE DATE	23-Sep-2020
EXPIRY DATE	22-Sep-2025
ABS TECHNICAL OFFICE	Houston ESD - Offshore Equipment

CERTIFICATE OF

Product Design Assessment

This is to certify that a representative of this Bureau did, at the request of

BASLER ELECTRIC COMPANY

located at

12570 STATE ROUTE 143, HIGHLAND, IL, United States, 62249

assess design plans and data for the below listed product. This assessment is a representation by the Bureau as to the degree of compliance the design exhibits with applicable sections of the Rules. This assessment does not waive unit certification or classification procedures required by ABS Rules for products to be installed in ABS classed vessels or facilities. This certificate, by itself, does not reflect that the product is Type Approved. The scope and limitations of this assessment are detailed on the pages attached to this certificate.

Product **Controllers**

Model **DECS-450, DECS-450R**

This Product Design Assessment (PDA) Certificate remains valid until 22/Sep/2025 or until the Rules and/or Standards used in the assessment are revised or until there is a design modification warranting design reassessment (whichever occurs first).

Acceptance of product is limited to the "Intended Service" details prescribed in the certificate and as per applicable Rules and Standards.

This Certificate is valid for installation of the listed product on ABS units which exist or are under contract for construction on or previous to the effective date of the ABS Rules and standards applied at the time of PDA issuance. Use of the Product for non-ABS units is subject to agreement between the manufacturer and intended client.

American Bureau Of Shipping

Soheni Haque

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Tier: 2 - PDA Issued

Product: **Controllers**
Model: **DECS-450, DECS-450R**
Intended Service:
Marine and Offshore Applications - Use for excitation control and logic control for synchronous generators or motors in an integrated package.

Description:
The DECS-450 and DECS-450R are open microprocessor-based controllers. These devices do not directly control the excitation current, instead they provide an analog signal to control the firing circuit output of external power bridge(s) and monitor operating parameters to control and protect synchronous generator or motor from operating outside its capability.

The DECS-450 and DECS-450R consist of Analog Board Assembly, Digital Board Assembly, Power PC Processor Assembly, and Power Supply Assembly with a base panel, a top panel, a rear panel, and a front panel that attaches forming a completely enclosed device. The DECS-450R is a feature-reduced variant of the DECS-450, similar to the DECS-450 except that the DECS-450R lacks an RS-232 communications port from a hardware perspective.

The DECS-450 and DECS-450R provide five regulation modes - Automatic Voltage Regulation (AVR), Field Current Regulation (FCR), Field Voltage Regulation (FVR), Power Factor Regulation (PF) and Var Regulation (var) as well as the protections relating to machine voltage (overexcitation, undervoltage, overvoltage & loss of sensing), frequency (overfrequency and underfrequency), power (reverse power and loss of excitation), etc..

Rating:
Control Power Supply: Style L - 24/48 Vdc, 35W, battery input
Style C - 125 Vdc, 35W, battery input
120 Vac, 50/60 Hz, 50 VA
Voltage Sensing Input: 100/200 Vac (50 Hz), 120/240 Vac (60 Hz), <1 VA per phase, 1-phase or 3-phase,
Current Sensing Input: 1 Aac or 5 Aac, 50/60 Hz, <1 VA, 1-phase or 3-phase
Field Voltage and Current Sensing Input (from Field Isolation Transducer):
0.9 to 9.1 Vdc (5.0 Vdc = zero field voltage), 2.0 to 9.5 Vdc (2.0 Vdc = zero field current)
Operating Ambient Temperature: –25 to +60°C
Humidity: 93% relative humidity

Service Restriction:
- Unit Certification is not required for this product.

- If the manufacturer or purchaser request an ABS Certificate for compliance with a specification or standard, the specification or standard, including inspection standards and tolerances, must be clearly defined.

- The DECS-450 and DECS-450R are designed for use with Basler Electric's Interface Firing Module (IFM) and three- or six-SCR power bridges or other power bridges with a controller that is compatible with the output signal from the DECS-450 and DECS-450R.

- Installation of the products is to be limited in the general power distribution zone in the enclosed and non-hazardous areas.

Comments:
1) The Manufacturer has provided a declaration about the control of, or the lack of Asbestos in this product.

2) The specific functional and operational arrangements are to be specifically approved in connection with the design approval of particular generator or motor type and to be performance tested in the presence of a Surveyor in accordance with 4-9-9/15.7 Table 2 either in the manufacturer's shop or after installation onboard.

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3) The generators and motors equipped with the subject controllers are to be tested as per Marine Vessels Rules 4-8-3/3.15 & 4-8-5/3.13.1 and Mobile Offshore Units Rules 6-1-7/Table 2, as applicable.

4) A single failure of the controller shall not completely disable of power generation system or motor drive train of electrical propulsion system.

5) Optional integrated power system stabilizer (PSS), Optional CEM-2020 Contact Expansion Module provides and Optional AEM-2020 Analog Expansion Module for DECS-450 controller are not included in the assessment.

6) This PDA certificate does not cover the software for the controllers. When incorporated in Category I, II or III of the computer-based system, the software documentation and testing are to be submitted and carried out per Marine Vessel Rules 4-9-3/9.5 Table 2.

Notes/Drawing/Documentation:
Drawing No. 9597100400, Assembly Dwg, DECS-450, Revision: C
Drawing No. 9597100920, Outline Drawing, DECS-450, Revision: C
Drawing No. 9439701406, Power PC Processor Assembly, Revision: A
Drawing No. 9439701915, Power PC Processor, Revision: -
Drawing No. 9440301410, DECS/250/N/EC/450 Digital Board Assembly, Revision: -
Drawing No. 9440301914, DECS/250/N/EC/450 Digital Board Schematic, Revision: -
Drawing No. 9440302409, DECS-250/N/EC/450 Analog Assembly Drawing, Revision: D
Drawing No. 9440302914, DECS-250/N/EC/450 Analog Board Schematic, Revision: -
Drawing No. 9597100960, DECS-450 Interconnect, Revision: A
Drawing No. 9597103400, DECS-450 Power Supply Assembly, Revision: C
Drawing No. 9597103910, DECS-450 Power Supply Schematic, Revision: C
Drawing No. 9597100990, DECS-450 Digital Excitation Control System Instruction Manual, Revision A (September 2020)
Drawing No. 9610000990, DECS-450R Digital Excitation Control System Instruction Manual, Revision - (July 2020)
Drawing No. QAA-1, DECS-450 Digital Excitation Control System Bulletin (07-20)
Drawing No. QAB-1, DECS-450R Digital Excitation Control System Bulletin (07-20)
DECS-450 Bill of Materials
Major components List and Datasheets
Basler IACS E10 Regulator/Controller Test Plan - Maritime Approval, Revision C
Basler PSG Lab Book Document - IEC 61000-4-4 (ABS) Fast Transient SWC Immunity, Project No. 30091, Date: 7/29/20
Basler PSG Lab Book Document - EN 61000-4-5 Surge Immunity of DECS-450, Project No. 30091, Date: 7/29/20
Basler PSG Lab Book Document - EN 61000-4-2 ESD Immunity of DECS-450, Project No. 30091, Date: 7/24/20
Basler PSG Lab Book Document - EN 61000-4-6 Conducted Immunity of DECS-450, Project No. 30091, Date: 7/23/20
Basler PSG Lab Book Document - Vibration Tests Worksheet Relays, Project No. 30091, Date: 8/11/2020
Basler PSG Lab Book Document - Dry Heat, Cold, and Insulation Resistance Tests Power Systems Products, Project No. 30091, Date: 07/22/2020-07/30/2020
Basler PSG Lab Book Document - Damp Heat and Insulation Resistance Tests Power System Products, Project No. 30091, Date: 08/01/2020-08/03/2020
Basler PSG Lab Book Document - ABS Power Supply Failure & Variation, Project No. 30091, Date: 08/01/2020
Basler PSG Lab Book Document - ABS Performance Test, Project No. 30091, Date: 7/31/2020
Basler PSG Lab Book Document - High Voltage Test (ABS), Project No. 30091, Date: 08/03/2020
Drawing No. 9610000781, ABS Immunity Test Report of DECS-450, Rev. -
Drawing No. 9610000782, ABS Emissions Test Report of DECS-450, Rev. -
UL Certificate Of Participation - Client Test Data Program (CTDP), DA File: DA363, Issued: 2019-11-18, Expires: 2020-11-21
UL File E97035-Project 4788903703, Vol.1 Sec.36, REPORT on COMPONENT – ENGINE GENERATOR CONTROLS, , Issued: 2019-05-06, Revised: 2019-05-22
UL File E97035-Project 4789305329, Vol.1 Sec.37, REPORT on COMPONENT – ENGINE GENERATOR

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Tier: 2 - PDA Issued

CONTROLS, , Issued: 2020-08-10

Terms of Validity:
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STANDARDS

ABS Rules:
2020 Rules for Conditions of Classification, Part 1, 1-1-4/7.7, 1-1-A3, 1-1-A4, which covers the following:
2020 Marine Vessel Rules 4-8-3/1.7, 4-8-3/3.13.2, 4-8-3/3.13.3, 4-8-3/3.15, 4-8-5/3.13.1, 4-9-3/7, 4-9-3/9.5, 4-9-3/11.9, 4-9-9/13, 4-9-9/15

2020 Rules for Conditions of Classification, Part 1 - Offshore Units and Structures 1-1-4/9.7, 1-1-A2, 1-1-A3 which covers the following:
2020 Mobile Offshore Units Rules 4-3-4/5, 6-1-7/5, 6-1-7/Table 1 & Table 2

National:
ANSI/CAN/UL/ULC 6200 Standard for Controllers for Use in Power Production, Edition 1, May 31, 2019

International:
IEC 60068-2-1 Environmental Testing Part 2-1: Tests – Test A: Cold, 6th Edition, 2007-03
IEC 60068-2-2 Environmental Testing Part 2-2: Tests – Test B: Dry Heat, 5th Edition, 2007-07
IEC 60068-2-30 Environmental Testing Part 2-30 Tests – Test Db; Damp Heat, cyclic (12 h + 12 h cycle), 3rd Edition, 2005-08
IEC 60068-2-6 Environmental Testing Part 2-6: Tests - Test Fc: Vibration (sinusoidal), 7th Edition, 2007-12
IEC 61000-4-2 Electromagnetic Compatibility (EMC) - Part 4-2: Electrostatic Discharge Immunity Test, 2nd Edition, 2008-12
IEC 61000-4-4 Electromagnetic Compatibility (EMC) - Part 4-4: Electrical Fast Transient/Burst Immunity Test, 3rd Edition, 2012-04
IEC 61000-4-5 Electromagnetic Compatibility (EMC) - Part 4-5: Surge Immunity Test, 3.1 Edition, 2017-08
IEC 61000-4-6 Electromagnetic Compatibility (EMC) - Part 4-6: Immunity to Conducted Disturbances, Induced by Radio-frequency Fields, 4th Edition, 2013-10

Government:
NA

EUMED:
NA

OTHERS:
IACS E10 Test Specification for Type Approval, Rev. 7, Oct 2018