

## Type Approval Certificate

*This is to certify that Certificate No. 19/0007 for the undernoted products is extended and renumbered as shown. All have been tested with satisfactory results in accordance with the relevant requirements of the Lloyd's Register Type Approval System.*

This certificate is issued to:

<b>PRODUCER</b>	DESMI Ocean Guard A/S Lufthavnsvej 12 DK-9400 Nørresundby Denmark	
<b>PLACE OF PRODUCTION</b>	DESMI Pumping Technology A/S Tagholm 1 DK-9400 Nørresundby Denmark	DESMI Pumping Technology (Suzhou) Co., Ltd. No. 740 Fengting Avenue Weiting Sub District 215122 SIP Suzhou, P. R. China
<b>DESCRIPTION</b>	Desmi Ocean Guard ballast water treatment system using Mechanical Filtration in combination with Ultra Violet -C Radiation.	
<b>TYPE</b>	CompactClean and CompactClean EX models 35 to 3000	
<b>APPLICATION</b>	For treatment of ship's ballast water	
<b>SPECIFIED STANDARDS</b>	Lloyd's Register Rules and Regulation for the Classification of Ships, July 2018, Part 5 and Part 6 as applicable.  Environmental category ENV2 as defined in Lloyd's Register Test Specification No. 1: 2002.	
<b>HAZARDOUS AREA CERTIFICATION</b>	CompactClean EX (excl. the main panel and the frequency converter) is suitable for operation in Zone 1 and 2 as defined in IEC 60079-10-1.	
<b>Certificate No.</b>	19/ 00007(E1)	
<b>Issue Date</b>	12 December 2019	
<b>Expiry Date</b>	11 December 2024	
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## RATINGS

BWMS Model	TRC <sup>1)</sup> Flow Rate (Discharge) <sup>2,4)</sup> (m3/h)	Primary Treatment		Secondary Treatment	
		Filter		UV Reactor	
		Filtrex	Unit No(s)	DESMI Ocean Guard	Unit No(s)
CC-35	8 - 35 (5 - 135)	ACB-903-65	1	UV-UNIT 135	1
CC-55	10 - 55 (5 - 135)	ACB-904-80	1	UV-UNIT 135	1
CC-87	15 - 87 (5 - 135)	ACB-906-100	1	UV-UNIT 135	1
CC-135	25 - 135 (5 - 135)	ACB-910-150	1	UV-UNIT 135	1
CC-190	35 - 190 (9 - 340)	ACB-915-150	1	UV-UNIT 340	1
CC-255	35 - 255 (9 - 340)	ACB-935-200	1	UV-UNIT 340	1
CC-340	45 - 340 (9 - 340)	ACB-945-200	1	UV-UNIT 340	1
CC-500	50 - 500 (13 - 500)	ACB-955-250	1	UV-UNIT 500	1
CC-750	65 - 750 (19 - 750)	ACB-985-300	1	UV-UNIT 750	1
CC-1000	95 - 1000 (26 - 1000)	ACB-999-350	1	UV-UNIT 1000	1
CC-1500	126 - 1500 (38 - 1500)	ACB-9100-400	1	UV-UNIT 1500	1
CC-2000	126 - 2000 (52 - 2000)	ACB-9120-500	1	UV-UNIT 1000	2 <sup>3)</sup>
CC-2500	126 - 2500 (64 - 2500)	ACB-9200-600	1	UV-UNIT 1000	1
				UV-UNIT 1500	1
CC-3000	126 - 3000 (76 - 3000)	ACB-9200-600	1	UV-UNIT 1500	2 <sup>3)</sup>

1) TRC is the max Inlet flow to the BWMS, a flow exceeding the given value implies that the ballast water is not treated in accordance with this certificate.

2) Value in brackets are given if flow rate limits differ between Ballast Water Intake and Ballast Water Discharge, as defined by either Filter and/or UV-unit flow capacities.

3) UV Units are to be mounted in parallel.

4) The flowrate limitations for Ballast Water Stripping operation corresponds to the flowrate limitations for Ballast Water Discharge.

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## SPECIFICATIONS

<b>Filter</b>	LCD / BOM Identification Tag -W1-H1-HQ1 /MA2
Manufacturer	Flitrex
Models	ACB-903-65 ; ACB-904-80 ; ACB-906-100 ; ACB-910-150 ; ACB-915-150 ; ACB-935-200 ; ACB-945-200 ; ACB-955-250 ; ACB-985-300 ; ACB-999-350 ; ACB-9100-400 ; ACB-9120-500 ; ACB-9200-600
Inlet Flange Sizes	DN 65 ; 80 ; 100 ; 150 ; 200 ; 250 ; 300 ; 350 ; 400 ; 500 ; 600
Capacity ranges	35 – 3000 m3/h
Mesh size	20 µ
Maximum design pressure	10 bar
Max. working temperature	55°C
Filter Housing Material	Bz-Al ASTM B148 C95800 Alloy
<b>UV Unit</b>	LCD / BOM Identification Tag -W1-V1 ; -W1-V2
Manufacturer	DESMI Ocean Guard
Models	CC-135 ; CC-340 ; CC-500 ; CC-750 ; CC-1000 ; CC-1500
Inlet Flange Sizes	DN 150 ; 200 ; 250 ; 300 ; 350 ; 400
Treatment Capacity of Single Unit	135 ; 340 ; 500 ; 750 ; 1000 ; 1500 m3/h
Mounting	Vertical
Components	UV Body, UV Lamp, UV Intensity sensor, Temperature sensor, Quartz sleeves
Max operating pressure	10 bar
Max. working temperature	-2 – 50 °C
<b>UV Body</b>	LCD / BOM Identification Tag -W1-V1-VP1 ; -W1-V2-VP1
Unit Housing Material	CC333G
Design sub identification	FDA
<b>UV Lamp</b>	LCD / BOM Identification Tag -W1-V1-EA* , -W1-V2-EA*
Manufacturer	eta plus electronic GmbH
UV Lamp models	UV LAMP DESMI 4kW SYNTHETIC QUARTZ UV LAMP DESMI 6kW SYNTHETIC QUARTZ
Type of Lamp	standard medium pressure mercury discharge, undoped
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Quantity and Type of lamps	CC-135 = 6 pce / 4 kW ; CC-340 = 8 pce / 6 kW ; CC-500 = 12 pce / 6 kW ; CC-750 = 18 pce / 6 kW ; CC-1000 = 24 pce / 6 kW ; CC-1500 = 36 pce / 6 kW
Power input	4000 W ; 6000 W
Lamp input current	10 A ; 10,9 A
Lamp Voltage	400 V ; 550 V
<b>Temperature Sensor</b>	LCD / BOM Identification Tag -W1-V1-BT1 ; -W1-V2-BT1(component)
Manufacturer	Uteco Abee
Model	UBMR1 1XPT100
Measuring principle	Positive Temperature resistance
Measuring ranges	-0 – 100 °C (DNV Marine range)
Coefficient A	0,385 Ohm/0oC
Description	Analogue output 4 - 20 mA (passive)
<b>UV Intensity sensor</b>	LCD / BOM Identification Tag -W1-V1-BR1 ; -W1-V2-BR1
Manufacturer	UV-Technik
Model	DVGW-Type SUV 20.2 A2 Y2 C
Measuring principle	Radiochemical analysis
Measuring range	0 to 200 W/m <sup>2</sup>
Accuracy	± 5 % of end value
Description	Analogue output 4 - 20 mA
<b>Flowmeter</b>	LCD / BOM Identification Tag -W1-BF1 ; W1-BF2 ; -W3-BF1
Manufacturer	Endress + Hauser Flowtec AG
Models	Promag 50W65 ; 50W80 ; 50W1H ; 50W1F ; 50W2H ; 50W2F ; 50W3H ; 50W3F ; 50W4F ; 50W4H
Inlet Flange Sizes	DN 65 ; 80 ; 100 ; 150 ; 200 ; 250 ; 300 ; 350 ; 400 ; 450 ;
Measuring principle	Magnetic - inductive
Measuring ranges	20 to 600 m/s ; 35 to 1100 m/s ; 55 to 1700 m/s ; 80 to 2400 m/s ; 110 to 3300 m/s ; 180 to 5400 m/s
Accuracy	±1 % of reading / ±0,02 % of full scale
Description	Analogue output 4 - 20 mA
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**Pressure Transmitters** LCD / BOM Identification Tag -W1-H1-BP1 ; -W1-H1-BP2  
 Manufacturer Danfoss A/S  
 Model MBS3100  
 Measuring principle Piezoelectric  
 Measuring ranges 0 to 16 bar (gauge)  
 Accuracy  $\pm 0.5$  of full scale  
 Description Analogue output 4 - 20 mA (passive)

**Water Level Switch** LCD / BOM Identification Tag -W1-BL1 ; -W1-BL2  
 Manufacturer Endress+Hauser  
 Model FTL31-3W91/0  
 Measuring principle Vibration in liquid PNP-Level switch  
 Description 10-30 VDC

**Stripping Black Flush Pump / Motor** LCD / BOM Identification Tag -W3-GP1 ; -W3-MA3  
 Manufacturer DESMI / BEVI A/S  
 Models, Sizes and Power S70-50-175/11, 155mm 7,5/9kW 40 Hz ; S70-50-175/11, 155mm 7,5/9kW 42 Hz ; S70-50-175/11, 155mm 7,5/9kW 45 Hz ; S70-50-175/11, 155mm 7,5/9kW 60 Hz ; S80-70-175/11, 175mm 15kW 60 Hz ; S100-80-175/11N/D-02, 175mm 15kW 50 Hz ; 100-80-175/11N/D-02, 175mm 15kW 50 Hz ;  
 Inlet Flange Sizes DN 50 ; 65 ; 80 ; 100 ; 125  
 Capacity ranges 7 - 130 m<sup>3</sup>/h  
 Maximum design pressure 10 bar / 50 Hz ; 15 bar / 60 Hz

**Frequency Converter** LCD / BOM Identification Tag -W3-TA1  
 Manufacturer Danfoss A/S  
 Model VLT@ AQUA Drive FC=Series 202  
 Operation range 380 - 480 VAC / 3 Phases  
 Power Ratings  $\pm 1$  % of reading /  $\pm 0,02$  % of full scale  
 11 kW  
 18,5 kW  
 Description Analogue output 4 - 20 mA

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**Cleaning In Place system** LCD / BOM Identification Tag -W5-CM1  
 Operation Method Manual operated CIP  
 CIP interval (recommended) Before each ballast water operation  
 CIP fluid approx. 1 litre ; 2,5 litres, 32% Citric Acid  
 Material Hot dip galvanized mild steel

**Main Panel** LCD / BOM Identification Tag -UC01 ; -V2-UC01  
 Manufacturer DESMI Ocean Guard A/S

Models	System	Nominal Power	Nominal Current
	<b>135</b>	35 kW	51 A
	<b>340</b>	67 kW	104 A
	<b>500</b>	92 kW	136 A
	<b>750</b>	130 kW	192 A
	<b>1000</b>	167 kW	247 A
	<b>1500</b>	243 kW	358 A

Voltage 440 VAC , 3 Phases

**External Control Box** LCD / BOM Identification Tag -UC03 ; V2-UC03

Manufacturer DESMI Ocean Guard A/S  
 Model Assembled acc.to circuit diagram No.: 441510  
 Operation ranges 380 - 480 VAC / 3 Phases  
 $\pm 1$  % of reading /  $\pm 0,02$  % of full scale  
 11 kW  
 18,5 kW

Description Analogue output 4 - 20 mA

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## OTHER CONDITIONS

The intended installation location of the **CompactClean and CompactClean EX - 35 to 3000** is to be suitable and in compliance with the requirements for said location. The integration of the BWMS into the ship's systems, including piping, mechanical and electrical components and control engineering aspects, are to be shown on the ship's plans and submitted for approval. Manufacturer's instructions are to be followed.

The quoted specification for each discrete model is based on technical documentation submitted by the manufacturer. Any deviations require submitting to Lloyd's Register for approval. This approval is subject to valid Type Approval Certificates as listed in the DAD Doc. no. 19/00007, Issue 1.

All components outside the scope of this Certificate are to be of type complying with LR Rules and submitted for consideration prior to installation.

Gas detection as requested by Lloyd's Register Rules and Regulation Part 5 Chapter 25, Section 9.1.3, 9.1.4 and 9.1.10 has to be considered in a project specific appraisal.

Installation in the ship including by-pass and isolation arrangement, fresh water supply, drain and back flush connection is to be in accordance with the according P&ID system and the manufacturer's installation instructions.

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By-pass and isolation valves are to be provided with remote means of operation and are to comply with Part 5, Chapter 12, 6.1.3 and 6.1.4.

By-pass and isolation valves are to be provided with position indicators to give remote indication of valve position.

The bypass alarm of the ballast water treatment system needs to be verified at all control stations including the navigation bridge to the local surveyor's satisfaction. Part 5, Chapter 25, Section 9.1.9 refers.

Pipe thickness for steel pipes DN 40 (48,3 mm) is required to be at least 3,6 mm.

Installation, survey and commissioning are to be conducted for each installation in accordance with applicable relevant statutory and LR specific survey requirements.

*"This Certificate is not valid for equipment, the design, ratings or operating parameters of which have been varied from the specimen tested. The manufacturer should notify Lloyd's Register EMEA of any modification or changes to the equipment in order to obtain a valid certificate."*

*The Design Appraisal Document No. 19/00007, issue 1, and its supplementary Type Approval Terms and Conditions form part of this Certificate.*

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