



**TYPE APPROVAL CERTIFICATE**  
No. MAC047024XP

This is to certify that the product identified below is in compliance with the regulations herewith specified.

<i>Description</i>	<b>BALLAST WATER TREATMENT</b>
<i>Type</i>	<b>Optimarin Ballast System (OBS)</b>
	<b>Optimarin Ballast System Ex (OBS Ex)</b>
<i>Applicant</i>	<b>Optimarin AS</b>
	<b>Sjøveien 34</b>
	<b>4315 Sandnes</b>
	<b>NORWAY</b>
<i>Manufacturer</i>	<b>Optimarin AS</b>
<i>Place of manufacture</i>	<b>Sjøveien 34</b>
	<b>4315 Sandnes</b>
	<b>NORWAY</b>
<i>Reference standards</i>	<b>IMO Res. MEPC.300(72); Part C Chapter 1 Section 10 &amp; Section 3 of RINA Rules; Part C Chapter 2 &amp; Chapter 3 of RINA Rules</b>

Issued in RINA Poland Approval Centre on April 17, 2024. This Certificate is valid until April 16, 2029

  
RINA Services S.p.A.  
Jaroslaw Kondracki

This certificate consists of this page and 1 enclosure



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**Optimarin Ballast System (OBS)**  
**Optimarin Ballast System Ex (OBS Ex)**

**Product Description:**

Optimarin Ballast System (OBS) and Optimarin Ballast System Ex (OBS Ex) are automated in-line treatment systems for the biological disinfection of ballast water. Systems operate without chemicals and combine initial filtration with a form of UV treatment to remove organisms.

Each system consists of the following main components: filter, back flush pump, filter control cabinet, flowmeter, UV chamber(s), control panel.

In addition, Optimarin Ballast System Ex (OBS Ex) is prepared for installation in hazardous areas because electrical components are provided with appropriate Ex Certificates.

OBS BWMS model designation:

xxxx/yyyyBK3, xxxx/yyyyBK4 or xxxx/yyyyFX2, where xxxx designates the below listed UV model and yyyy the below listed filter model of either the filter series manufactured by Boll & Kirch (BK3 or BK4) or the filter series manufactured by Filtrex (FX2).

UV models:

167, 334, 500, 667, 834, 1000, 1167, 1334, 1500, 1667, 1834, 2000, 2167, 2334, 2500, 2667, 2834 and 3000.

BK3 filter models:

72, 94, 204, 378, 518, 614, 1274, 1384, 2040 and 3100

BK4 filter models:

65, 125, 220, 430, 770, 1000, 1350, 1900 and 2600

FX2 filter models, which can be delivered in variants S, X and L:

87, 135, 190, 255, 300, 340, 515, 770, 1040, 1500, 2100 and 3000

A OBS BWMS model suitable for installation in hazardous area are designated with the suffix EX (e.g. xxxx/yyyyBK3EX).

**Technical characteristics:**

The treatment sequence:

- Ballast water uptake: Filter and UV disinfection
- Ballast water discharge: UV disinfection

The treatment rated capacity:

- 65 – 3000 m<sup>3</sup>/h

The system may be fitted with the following self-cleaning screen filters:

- aquaBoll 6.18.3 filter series with 25 im mesh manufactured by Boll & Kirch (BK3 or BK3 EX).
- aquaBoll BWT filter series with 25 im mesh manufactured by Boll & Kirch (BK4 or BK4 EX).
- ACB filter series with 20 im mesh manufactured by Filtrex (FX2 or FX2 EX) (available in variants S, X and L).

Temperature and Salinity:

Temperature and salinity of the ballast water are not a limiting condition for the ballast water treatment system.

Holding time:

The OBS BWMS has demonstrated performance to the discharge standard with a minimum holding time between uptake and discharge of 24 hours in land-based testing for the IMO mode. UV treatment is instant and does not require any hold time in a ballast tank to render organisms inviable. Therefore, holding time is not found to be a limiting condition for the ballast water management system.



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Dosing:

The BWMS has demonstrated performance to the discharge standard when the UV intensity (UVI) and flow rate is measured above the below parameters.

Operation mode	TRC [m <sup>3</sup> /h]	UVI lower limit at 24% of full flow [W/m <sup>2</sup> ]	UVI lower limit at full flow (TRC) [W/m <sup>2</sup> ]
IMO	167 per chamber	150 *	400 **

\* UVI below lower limit implies that the ballast water is not treated in accordance with this certificate. When targeting this UVI limit in land-based testing, the measured UVT was 45-46%. UVT may vary depending on the water quality parameters, i.e. particles and dissolved organic carbon

\*\* When targeting this UVI limit in land-based testing, the measured UVT was 54-56%.

The system has also includes UV-lamp power optimization control based on measured UV-intensity. Lamp power can be reduced when UVI measures above 800 W/m<sup>2</sup>.

The system has a USCG mode of operation which applies a higher UV dose than the described IMO mode above. This type approval therefore also applies to operation in USCG mode.

Treatment Rated Capacity (TRC) of the BWMS:

The Treatment Rated Capacities (TRC) of the designated OBS BWMS models during ballasting is limited to either the maximum flow rate (TRC) of the UV system or the maximum flow rate of the selected filter model, whichever is lowest.

During de-ballasting, the TRC is limited to the maximum flow rate of the UV system only.

The minimum flow rate at which designated OBS BWMS model can be operated is the minimum flow rate of the selected filter model + (10m<sup>3</sup>/h\*number of UV chambers).

The OBS BWMS controls the flow rate in the ballast water line by using a flow control valve to ensure that flow rates are kept within the TRC.

The UV system is formed by several UV chambers installed in parallel configuration using specific manifolds with the TRC as listed below.

Manifold model	Number of UV chambers	TRC [m <sup>3</sup> /h]	Manifold model	Number of UV chambers	TRC [m <sup>3</sup> /h]
Type 1, DN150	1	167	Type 2, DN200	2	334
Type 1, DN200	2	334	Type 2, DN250	3	500
Type 1, DN250	3	500	Type 2, DN300	4	667
Type 1, DN300	4	667	Type 2, DN300	5	834
Type 1, DN300	5	834	Type 2, DN350	6	1000
Type 1, DN350	6	1000	Type 2, DN400	7	1167
Type 1, DN400	7	1167	Type 2, DN400	8	1334
Type 1, DN400	8	1334	Type 2, DN400	9	1500
Type 1, DN400	9	1500	Type 2, DN500	10	1667
Type 1, DN500	10	1667	Type 2, DN500	11	1834
Type 1, DN500	11	1834	Type 2, DN500	12	2000
Type 1, DN500	12	2000	Type 2, DN500	13	2167
Type 1, DN500	13	2167	Type 2, DN500	14	2334
Type 1, DN500	14	2334	Type 2, DN500	15	2500
Type 1, DN500	15	2500	Type 2, DN500	16	2667
Type 2, DN600	17	2834	Type 2, DN600	18	3000



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The flow range (minimum to maximum flow rate) of all the filter models are listed in the tables below.

<b>Boll &amp; Kirch aquaBoll BWT</b>	<b>Model designation</b>	<b>Flow range [m<sup>3</sup>/h]</b>	<b>Boll &amp; Kirch aquaBoll 6.18.3</b>	<b>Model designation</b>	<b>Flow range [m<sup>3</sup>/h]</b>
aquaBoll BWT 240x230 DN80	65BK MK4	8 - 65	aquaBoll 273	72BK MK3 (EX)	19-72
aquaBoll BWT 330x300 DN100	125BK MK4	15 - 125	aquaBoll 324	94BK MK3 (EX)	19-94
aquaBoll BWT 400x410 DN150	220BK MK4	23 - 200	aquaBoll 356	204BK MK3 (EX)	24-204
aquaBoll BWT 430x730 DN200	430BK MK4	51 - 430	aquaBoll 419	378BK MK3 (EX)	33-378
aquaBoll BWT 540x840 DN250	770BK MK4	59 - 770	aquaBoll 521	518BK MK3 (EX)	33-518
aquaBoll BWT 580x1150 DN300	1000BK MK4	88 - 1000	aquaBoll 600	614BK MK3 (EX)	34-614
aquaBoll BWT 700x1250 DN350	1350BK MK4	109 - 1350	aquaBoll 750	1274BK MK3 (EX)	50-1274
aquaBoll BWT 800x1235 DN400	1900BK MK4	136 - 1900	aquaBoll 900	1384BK MK3 (EX)	47-1384
aquaBoll BWT 1000x1535 DN500	2600BK MK4	152 - 2600	aquaBoll 1000	2040BK MK3(EX)	47 - 2040
			aquaBoll 1100	3100BK MK3(EX)	69 - 3100
<b>Filtrex ACB</b>	<b>Model designation</b>	<b>Flow range [m<sup>3</sup>/h]</b>	<b>Filtrex ACB</b>	<b>Model designation</b>	<b>Flow range [m<sup>3</sup>/h]</b>
ACB-906-100	87FX MK2 S (EX)	15 - 87	ACB-906-100X	87FX MK2 X (EX)	15 - 87
ACB-910-150	135FX MK2 S (EX)	25 - 135	ACB-910-150X	135FX MK2 X (EX)	25 - 135
ACB-915-150	190FX MK2 S (EX)	35 - 190	ACB-915-150X	190FX MK2 X (EX)	35 - 190
ACB-935-200	255FX MK2 S (EX)	35 - 255	ACB-935-200X	255FX MK2 X (EX)	35 - 255
			ACB-940-200X	300FX MK2 X (EX)	42 - 300
ACB-945-200	340FX MK2 S (EX)	47 - 340	ACB-945-200X	340FX MK2 X (EX)	47 - 340
ACB-955-250	515FX MK2 S (EX)	47 - 515	ACB-955-250X	515FX MK2 X (EX)	47 - 515
			ACB-960-250X	600FX MK2 X (EX)	54 - 600
ACB-985-300	770FX MK2 S (EX)	70 - 770	ACB-985-300X	770FX MK2 X (EX)	70 - 770
ACB-999-350	1040FX MK2 S (EX)	94 - 1040	ACB-999-350X	1040FX MK2 X (EX)	94 - 1040
ACB-9100-400	1500FX MK2 S (EX)	126 - 1500	ACB-9100-400L	1500FX MK2 L (EX)	126 - 1500
ACB-9120-500	2100FX MK2 S (EX)	126 - 2100	ACB-9120-500L	2100FX MK2 L (EX)	126 - 2100
ACB-9200-600	3000FX MK2 S (EX)	126 - 3000	ACB-9200-600L	3000FX MK2 L (EX)	126 - 3000



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Pressure:

The minimum and maximum system operating pressure and the differential pressure triggering backflushing are listed below.

Filter Type	Minimum inlet pressure (back-pressure)	Differential pressure triggering backflushing	Maximum operating pressure
Filtrex Type ACB, FX2	1.5 bar	≥0.3 bar	10 bar
aquaBoll 6.18.3, BK3 aquaBoll BWT, BK4	1.5 bar	≥0.38 bar	10 bar

Control and monitoring equipment:

Software version:

The OBS BWMS is type approved with system control software version: 2.3x or a newer approved version. Any change to the software is to be recorded as long as the system is in use on board. Major changes in the software, as defined in the Optimarin checklist, OM-C-59, require approval. Testing of the application functions of a revised software may be required.

Safety measures:

The OBS BWMS is type approved with the following instruments for monitoring the safe operation of the BWMS and for activating, as necessary, an automatic shutdown of the BWMS:

- Temperature sensor (TTxx) installed in each UV chamber
- For non-Ex systems: Temperature switch (TSxx) installed in each UV chamber and arranged with safety function independent of BWMS control
- For Ex systems: Flow interlock panel (+FIP) acts as additional safety function independent of BWMS control
- Pressure sensors (PT01) installed after the filter
- Flow meter (FM01) installed after the filter

Electrical and electronic components:

The OBS BWMS is type approved with the electrical and electronic components indicated on the P&ID and as specified in the BOM.

Except for the components listed in the table below, alternate components of the ones given in the BOM, may be used, provided that information regarding the selected components is part of the documentation related to the specific installation, by providing either a reference to valid type approval certificate or technical documentation demonstrating that the selected component was subject to environmental testing as per IACS UR E10.

Hazardous area / Ex-proof:

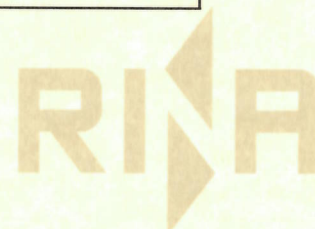
The OBS Ex BWMS has been evaluated and found to be in compliance with RINA Rules for hazardous area installations. Electrical and electronic components with an Ex-certification can be installed in hazardous area zone 1, gas group IIB and temperature class T4. Ex-certification is not covered by this certificate. Installation in a hazardous area is to be approved in each case according to the Rules and Ex-certification / Special Condition for Safe Use, listed in a valid Ex-certificate issued by a notified/recognized Certification Body.



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For the following electrical and electronic components, the models specified in the these tables shall be used:

Tag ID	Description	Item	Manufacturer
+CP	CONTROL PANEL MK3	150876	Optimarin AS
+SCP	SUB-CONTROL PANEL MK3	152052	Optimarin AS
+FC	FILTER CONTROL MK3	150737	Optimarin AS
	FILTER CONTROL EX MK3	151199	Optimarin AS
	FILTER CONTROL EX MK3 MTL	152706	Optimarin AS
+SBx	SENSOR BOX 0VA MK3	151128	Optimarin AS
	SENSOR BOX 250VA MK3	151114	Optimarin AS
	SENSOR BOX 700VA MK3	151058	Optimarin AS
	SENSOR BOX MK3	151135	Optimarin AS
	SENSOR BOX 0VA EX MK3	151215	Optimarin AS
	SENSOR BOX 250VA EX MK3	151231	Optimarin AS
	SENSOR BOX 700VA EX MK3	151763	Optimarin AS
	SENSOR BOX EX MK3	151207	Optimarin AS
	SENSOR BOX 0VA EX MK3 MTL	152695	Optimarin AS
	SENSOR BOX 250VA EX MK3 MTL	152700	Optimarin AS
	SENSOR BOX 700VA EX MK3 MTL	152702	Optimarin AS
	SENSOR BOX EX MK3 MTL	152704	Optimarin AS
+EXIP	EX INTERFACE PANEL MK3	151142	Optimarin AS
+IP	INTERLOCK PANEL MK3	151859	Optimarin AS
	FLOW INTERLOCK PANEL MK3	155943	Optimarin AS
+FWP	FRESH WATER PANEL MK3	151779	Optimarin AS
	FRESH WATER PANEL EX MK3	159680	Optimarin AS
+ACP	ACTUATOR CONTROL PANEL 700VA MK3	151822	Optimarin AS
	ACTUATOR CONTROL PANEL 1600VA MK3	151813	Optimarin AS
	ACTUATOR CONTROL PANEL 3600VA MK3	151804	Optimarin AS
+PDP	POWER DISTRIBUTION PANEL SMALL MK3	152053	Optimarin AS
+GPS	GPS JUNCTION BOX MK3	152057	Optimarin AS
	GPS JUNCTION BOX 230VAC MK3	152058	Optimarin AS
+UVPxx	UV POWER CABINET TYPE NED MK3	145923	Nedap N.V.
	UV POWER CABINET TYPE ETA	145128	Eta plus electronic GmbH
	UV POWER CABINET TYPE UVA	150431	Uvantech AS
	UV POWER CABINET TINY TYPE ETA VER	157849	Eta plus electronic GmbH
	UV POWER CABINET TINY TYPE ETA HOR	157850	Eta plus electronic GmbH
+TBxx	TERMINAL BOX MK3	148644	Optimarin AS
	TERMINAL BOX MK2 TYPE TRA	148540	R. Stahl Tranberg AS
	TERMINAL BOX MK2 EX TYPE TRA	145956	R. Stahl Tranberg AS
+EXJBxx	JUNCTION BOX EX TYPE TRA	148640	R. Stahl Tranberg AS
	JUNCTION BOX EX TYPE BAR	145466	Bartec Technor AS
UVxx	UV SENSOR 2300W_m2 TYPE ILM	117079	IL Metronic Sensortechnik GmbH
	UV SENSOR 2300W_m2 EX2C EX TYPE ILM	149352	IL Metronic Sensortechnik GmbH
	LAMP CONNECTION BOX KIT	155639	Ex-Tech
	LAMP CONNECTION BOX KIT EX	160541	Ex-Tech



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Tag ID	Description	Item	Manufacturer
UV lamp	UV LAMP 35KW 1260V	142145	
		157567	
		154921	
		159137	
	UV LAMP 35KW 2150V	145130	
		157572	
		154922	
		159138	

**Reference documents:**

The OBS BWMS shall be installed in accordance with the documents listed below.

Type	Title	Dwg No.	Rev.
Piping and instrumentation diagram (P&ID)	Optimarin Ballast Treatment System Flow Diagram	Flow Diagram	300000(1) Rev 8/ 27.09.2023
		Flow Diagram EX	
		Flow Diagram (stripping with filter)	
		Flow Diagram (stripping without filter)	
		Flow Diagram CIP	
		Flow Diagram CIP EX	
Electrical wiring diagram	Internal Wiring Diagram	Wiring diagram with UV POWER CABINET TYPE ETA	500000(2) Rev 7/ 27.09.2027
		Wiring diagram with UV POWER CABINET TYPE NED MK3	
		Wiring diagram with UV POWER CABINET TYPE ETA TINY	
		Wiring diagram with UV POWER CABINET TYPE UVA	
		Wiring diagram with UV POWER CABINET TYPE GLE	
General arrangement (GA) drawings	Filter BK MK3 (10 sizes): FILTER 72M³H DN80 PN10 TYPE BK MK3 to FILTER 3100M³H 600A 10K TYPE BK MK3	1xxxxx(3)	See BOM
	Filters BK MK3 Ex (10 sizes): FILTER 72M³H DN80 PN10 IIB EX TYPE BK MK3 to FILTER 3100M³H 600A 10K IIB EX TYPE BK MK3		
	Filters BK MK4 (9 sizes): FILTER 65M³H DN80 PN10 TYPE BK MK4 to FILTER 2060M³H DN500 PN10 TYPE BK MK4		
	Filter BK MK4 Ex (9 sizes): FILTER 65M³H DN80 PN10 EX TYPE BK MK4 to FILTER 2600M³H DN500 PN10 EX TYPE BK MK4		



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Type	Title	Dwg No.	Rev.
General arrangement (GA) drawings	<p>Filters FX MK2 variant S (11 sizes):            FILTER 87M<sup>3</sup>H DN100 PN10 TYPE FX MK2            to FILTER 3000M<sup>3</sup>H DN600 PN10 TYPE FX MK2</p> <p>Filters FX MK2 EX variant S (11 sizes):            FILTER 87M<sup>3</sup>H DN100 PN10 IIB EX TYPE FX MK2            to FILTER 3000M<sup>3</sup>H DN600 PN10 IIB EX TYPE FX MK2</p> <p>Filters FX MK2, variant X (10 sizes):            FILTER 87M<sup>3</sup>H DN100 PN10 X TYPE FX MK2 to            FILTER 1040M<sup>3</sup>H DN350 PN10 X TYPE FX MK2</p> <p>Filters FX MK2 Ex, variant X (10 sizes):            FILTER 87M<sup>3</sup>H DN100 PN10 IIB EX TYPE X FX MK2 to            FILTER 1040M<sup>3</sup>H DN350 PN10 IIB EX TYPE X FX MK2</p> <p>Filters FX MK2, variant L (3 sizes):            FILTER 1500M<sup>3</sup>H DN400 PN10 L TYPE FX MK2 to            FILTER 3000M<sup>3</sup>H DN600 PN10 L TYPE FX MK2</p> <p>Filters FX MK2 Ex, variant L (3 sizes):            FILTER 1500M<sup>3</sup>H DN400 PN10 IIB EX L TYPE FX MK2 to            FILTER 3000M<sup>3</sup>H DN600 PN10 IIB EX L TYPE FX MK2</p> <p>Manifolds system 1 (13 sizes): MANIFOLD DN150 PN10 SYSTEM1-1            to MANIFOLD DN500 PN10 SYSTEM1-15</p> <p>Manifolds system 2 (13 sizes) MANIFOLD DN200 PN10 SYSTEM2-2            to MANIFOLD 600A 10K SYSTEM2-18</p> <p>UV chambers (8 variants):            UV CHAMBER DN150 4 SOCKETS to UV CHAMBER DN150            4 SOCKETS WELDED EX MK2</p> <p>Flow pressure valve (3 variants):            FLOW PRESSURE VALVE DN100 PN10 TYPE GA to FLOW            PRESSURE VALVE DN500 PN10 TYPE GA</p> <p>FLOW PRESSURE VALVE DN100 PN10 TYPE GA EX to FLOW            PRESSURE VALVE DN500 PN10 TYPE GA EX</p> <p>FLOW PRESSURE VALVE DN100 PN10 TYPE BER to FLOW            PRESSURE VALVE DN400 PN10 TYPE BER</p> <p>FLOW PRESSURE VALVE DN150 PN10 WAF or LUG TYPE ELT            to FLOW PRESSURE VALVE DN600 PN10 WAF or LUG TYPE ELT</p> <p>FLOW PRESSURE VALVE DN150 PN10 WAF or LUG TYPE ELT EX            to FLOW PRESSURE VALVE DN500 PN10 WAF or LUG TYPE ELT EX</p>	1xxxxx(3)	See BOM





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Type	Title		Dwg No.	Rev.
Bill of materials (BoM)	OBS complete BOM		-	Rev. 5/ 29.09.2023
Operation, maintenance and safety manual (OMSM)	Operation, maintenance and safety manual for Optimarin Ballast System	Template OMS for BK3	3xxxx-xx-xx-xx (4)	Rev. 9/ 29.09.2023
		Template OMS for BK3 EX		
		Template OMS for BK4		
		Template OMS for BK4 EX		
		Template OMS for FX2		
		Template OMS for FX2 EX		

(1) This is a template Dwg No. Project specific P&ID will be numbered 3xxxx. Each project specific document shall reference back to the template Dwg No and Rev. as listed in this table.

(2) This is a template Dwg No. Project specific electrical wiring will be numbered 5xxxx. Number of cabinets in project specific may vary from template. Each project specific document shall reference back to the template Dwg No and Rev. as listed in this table.

(3) All GA drawings have a unique sequence number (1xxxx) automatically generated by the Optimarin PDM system.

(4) All project specific manuals will be indexed with a unique project number (3xxx-xx-xx-xx) automatically generated by the ERP system. Revision of project specific manuals will start at Rev. 1, and each manual will reference back to the template revision as listed in this table.

**Type Approval documentation:**

**Biological test reports:**

NIVA, Land-based testing of OBS 334 Ballast Water Management system of Optimarin AS – Final Report, Report SNO 6921-2015, Final report v2.1, June 2016

NIVA, Shipboard testing of the Ballast Water Management System OBS1000 of Optimarin AS, Report SNO 7063-2016, Final report v2.0, June 2016

NIVA, Land-based testing of OBS 334 Ballast Water Management system of Optimarin AS – Final Report, Report SNO 7523-2020, Final report, August 2020

DHI, Biological comparison tests of three filters manufactured by BollFilter in land-based test - Land-based test report, project 11824919, Final test report, 11 January 2021

**Environmental test reports:**

Applica EMC and Environmental testing of Gönheimer Elektronik GmbH Control unit F850S and power supply for Optimarin AS, Report 20226, Rev. 1

Applica Technical Report Optimarin AS Environmental testing of Temperatures Switches, Report No. 21250 Rev 1

Applica Technical Report Optimarin AS Environmental testing of Sensor Box +EXSB01 and temperature transmitter TR-34, Report No. 21356 Rev 0

Applica Technical Report Optimarin AS Environmental testing, Report No. 20597 Rev 0

Applica Technical Report Optimarin AS Environmental testing of Environmental testing of TB (Terminal Boxes) Report No. 20984 Rev 0

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Applica Technical Report Optimarin AS EMC and Environmental testing of new components to Optimarin BWMS, Report No. 30486 Rev 0

DNV GL Type Approval Certificate TAE000037U issued to UVANTECHAS for UV Power Cabinet Type UVA.

Applica Technical Report, Optimarin AS EMC and Environmental testing of Optilink Panel 4G, Report No. 30732 Rev. 0

Applica Technical Report, Optimarin AS Environmental testing of Lamp connection box, Report No. 30906 Rev. 1

Applica Technical Report, Optimarin AS EMC and Environmental testing of Flow interlock panel, Report No. 30972 Rev. 0

Phoenix Technical Reports, Optimarin AS EMC and Environmental testing of Flow interlock panel, Report No. U211234E1, Rev. 0 Report No E211234E1 Rev. 0

Treco Laboratory Test Report – Inclination test of X36B Tiny Cabinet, 22-04-26/Rev. 1.

Thales Report, Additional EMC test for UV POWER CABINET, Report No. 0026~H0203~0000243785 version 00

Applica Technical Report, Additional testing of UV Sensor and Cable Rapport for UV sensor, Report No. 30912 Rev. 0

Shanghai Marine Auxiliary Mechanical & Electric Equipment Performance Environment Test Centre, Test report, Report No. S139A-2023

Applica Technical Report, Optimarin AS Vibration testing of UV lamps for Ballast Water Management System, Technical Report 31182

**System descriptive documentation:**

Installation Manual for Optimarin Ballast System, Rev. 8, Template dated 2022-05-16. This manual is prepared specific to BK MK3, BK MK4, FX MK2, BK MK3 EX or FX MK2 EX filters

Optimarin, OBS, PLC revision history, v2-20

Optimarin, OM-C-59 Software maintenance and development checklist, Rev. 3

Optimarin, UV chamber with instrumentation, Illustration for DNVGL dual safety layer requirement, Drawing No. 100000, Rev –

DNV GL report; flow balance calculation, Flow Distribution in Parallell UV chambers, 2015-0885, Rev. 1, 25.09.2015

DNV GL, Filter comparison of Boll & Kirch filter model 6.18.2 and 6.18.3, 385FIST130315-2

Optimarin, Filter Comparison Data Type BK, 2020

Optimarin, Filter Comparison Data Type FX, 2020

Optimarin, Flow pressure valve replacement report, Rev.1

DNV, Evaluation test report, Equivalence of the aquaBoll BWT, BWT RB and 6.18.3 filter designs, file 262.1-034941-J-3, Rev. 0

DNV, Evaluation test report, - Increase of maximum flow rate for the aquaBoll BWT filter, 262.1-037442-1, Rev.1

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**Optimarin Ballast System Ex (OBS Ex)**

**Commissioning procedure:**

Class survey checklist for Optimarin Ballast System, Rev. 9 Template dated 28.09.2023

**Tests carried out:**

- Land-based testing in accordance with Resolution MEPC.279(70) and 46 CFR 162.060-26 using Optimarin OBS model 334 and Boll & Kirch 6.18.2 filter with 40  $\mu\text{m}$  mesh
- Shipboard testing in accordance with Resolution MEPC.279(70) and 46 CFR 162.060-28 using Optimarin OBS model 1000 and Boll & Kirch 6.18.2 filter with a 40  $\mu\text{m}$  mesh
- Additional Land-based testing in accordance with Resolution MEPC.300(72) and 46 CFR 162.060-26 using Optimarin OBS model 334 and Boll & Kirch 6.18.3 aquaBoll filter with 25  $\mu\text{m}$  mesh filter
- Additional Land-based testing in accordance with Resolution MEPC.300(72) and 46 CFR 162.060-26 using Optimarin OBS model 334 and Filtrex filter ACB 945-200 with 20  $\mu\text{m}$  mesh
- Biological comparison testing using Boll & Kirch aquaBoll 6.18.3 and aquaBoll BWT filter with 25  $\mu\text{m}$  mesh filter
- Type tests of the control and automation system witnessed by DNV GL
- Testing in accordance with environmental test specification for instrumentation and automation equipment, DNVGL Standard for Certification no DNVGL-CG-0339 (December 2019) and Resolution MEPC.300(72) and 46 CFR 162.060-30
- Additional testing of Optimarin OBS model in accordance with environmental test specification for instrumentation and automation equipment, DNVGL-CG-0339 Environmental test specification for electrical, electronic and programmable equipment and systems (Jan, 2020) and Resolution MEPC.174(58)
- Type test of the control and automation system for optimized flow control, witnessed by DNV GL

**Fields of application:**

Treatment of ballast water according to MEPC.300(72).

Ballast water temperature is not limiting condition for this system.

UV intensity below 150 W/m<sup>2</sup> implies that the ballast water is not treated in accordance with this Certificate.

**Acceptance Conditions:**

For each installation the following drawings are to be submitted for approval:

- P&I diagram of the ballast system including the integration of treatment system
- Power supply wiring diagram
- Alarms list with shutdown functions and interface with IAS of ship
- Description confirming the arrangement of alarms for bypass of the BWMS system
- List and copy of Ex certificates for equipment in hazardous area

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**TYPE APPROVAL CERTIFICATE**  
**No. MAC047024XP**  
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**Optimarin Ballast System (OBS)**  
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**Remarks:**

- Installation on board is to be carried out in accordance with Manufacturer's Instructions.
- This Certificate has not been issued on behalf of any Flag Administration.
- All changes in software are to be recorded and installation shall be carried out according to manufacturer's instructions.
- This Certificate has replaced the previous Type Approval Certificate No. MAC104222XP.

**Marking of product:**

Each treatment system is to be marked with:

- Manufacturer's name or trade mark
- Type designation
- Serial number

**RINA Poland Approval Centre**  
**April 17, 2024**

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