

Type Approval Certificate

This certificate is issued to:

PRODUCER	Optimarin A/S Sjøveien 34, 4315 Sandnes Norway
PLACE OF PRODUCTION	Optimarin A/S Sjøveien 34, 4315 Sandnes Norway
DESCRIPTION	Filtration and Ultra-Violet ballast water management system
TYPE	Optimarin Ballast System Optimarin Ballast System Ex
APPLICATION	For treatment of ship's ballast water
STANDARD	Lloyd's Register Rules and Regulation for the Classification of Ships, Part 5 and Part 6 as applicable.

Certificate No. 18/00075
Issue Date 27 November 2018
Expiry Date 26 November 2023
Sheet 1 of 10


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LR031.1.2016.06

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RATINGS

Optimarin BWTS Model	OBS Flow Range B=Ballasting, Strip D=Deballasting	UV Unit Quantity/Capacity	Filter Model/Capacity
With Boll & Kirch Filters, MK1			
167/100BK	B: 50-100 m ³ /h D: 50-167 m ³ /h	1 UV Chamber Cap: 20-167 m ³ /h	Bollfilter 100 Cap: 24-100 m ³ /h
167/220BK	B: 94-167 m ³ /h D: 50-167 m ³ /h	1 UV Chamber Cap: 20-167 m ³ /h	Bollfilter 220 Cap: 74-220 m ³ /h
334/220BK	B: 114-220 m ³ /h D: 50-167 m ³ /h	2 UV Chamber Cap: 40-334 m ³ /h	Bollfilter 220 Cap: 74-220 m ³ /h
334/400BK	B: 150-334 m ³ /h D: 50-334 m ³ /h	2 UV Chamber Cap: 40-334 m ³ /h	Bollfilter 400 Cap: 24-100 m ³ /h
500/400BK	B: 170-400 m ³ /h D: 60-500 m ³ /h	3 UV Chamber Cap: 60-500 m ³ /h	Bollfilter 400 Cap: 110-400 m ³ /h
500/600BK	B: 184-500 m ³ /h D: 60-500 m ³ /h	3 UV Chamber Cap: 60-500 m ³ /h	Bollfilter 600 Cap: 124-600 m ³ /h
667/600BK	B: 204-600 m ³ /h D: 80-667 m ³ /h	4 UV Chamber Cap: 80-667 m ³ /h	Bollfilter 600 Cap: 124-600 m ³ /h
667/800BK	B: 230-667 m ³ /h D: 80-667 m ³ /h	4 UV Chamber Cap: 80-667 m ³ /h	Bollfilter 800 Cap: 150-800 m ³ /h
834/800BK	B: 250-800 m ³ /h D: 100-834 m ³ /h	5 UV Chamber Cap: 100-834 m ³ /h	Bollfilter 800 Cap: 150-800 m ³ /h
1000/1200BK	B: 302-1000 m ³ /h D: 120-1000 m ³ /h	6 UV Chamber Cap: 120-1000 m ³ /h	Bollfilter 1200 Cap: 182-1200 m ³ /h
1167/1200BK	B: 322-1167 m ³ /h D: 140-1167 m ³ /h	7 UV Chamber Cap: 140-1167 m ³ /h	Bollfilter 1200 Cap: 182-1200 m ³ /h
1334/1200BK	B: 342-1200 m ³ /h D: 160-1334 m ³ /h	8 UV Chamber Cap: 160-1334 m ³ /h	Bollfilter 1200 Cap: 182-1200 m ³ /h
1334/1600BK	B: 364-1334 m ³ /h D: 160-1334 m ³ /h	8 UV Chamber Cap: 160-1334 m ³ /h	Bollfilter 1600 Cap: 204-1600 m ³ /h
1500/1600BK	B: 384-1500 m ³ /h D: 180-1500 m ³ /h	9 UV Chamber Cap: 180-1500 m ³ /h	Bollfilter 1600 Cap: 204-1600 m ³ /h
1667/1600BK	B: 404-1600 m ³ /h D: 200-1667 m ³ /h	10 UV Chamber Cap: 200-1667 m ³ /h	Bollfilter 1600 Cap: 204-1600 m ³ /h
1667/2500BK	B: 471-1834 m ³ /h D: 200-1667 m ³ /h	10 UV Chamber Cap: 200-1667 m ³ /h	Bollfilter 2500 Cap: 271-2500 m ³ /h

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1834/2500BK	B: 491-1834 m ³ /h D: 220-1834 m ³ /h	11 UV Chamber Cap: 220-1834 m ³ /h	Bollfilter 2500 Cap: 271-2500 m ³ /h
2000/2500BK	B: 511-2000 m ³ /h D: 240-2000 m ³ /h	12 UV Chamber Cap: 240-2000 m ³ /h	Bollfilter 2500 Cap: 271-2500 m ³ /h
2167/2500BK	B: 531-2167 m ³ /h D: 260-2167 m ³ /h	13 UV Chamber Cap: 260-2167 m ³ /h	Bollfilter 2500 Cap: 271-2500 m ³ /h
2334/2500BK	B: 551-2334 m ³ /h D: 280-2334 m ³ /h	14 UV Chamber Cap: 280-2334 m ³ /h	Bollfilter 2500 Cap: 271-2500 m ³ /h
2500/2500BK	B: 571-2500 m ³ /h D: 300-2500 m ³ /h	15 UV Chamber Cap: 300-2500 m ³ /h	Bollfilter 2500 Cap: 271-2500 m ³ /h

Optimarin BWTS Model	OBS Flow Range B=Ballasting, Strip D=Deballasting	UV Unit Quantity/Capacity	Filter Model/Capacity
With Boll & Kirch Filters, MK2			
167/370BK2	B: 103-167 m ³ /h D: 50-167 m ³ /h	1 UV Chamber Cap: 20-167 m ³ /h	Bollfilter MK2 370 Cap: 83-370 m ³ /h
334/370BK2	B: 123-334 m ³ /h D: 50-334 m ³ /h	2 UV Chamber Cap: 40-334 m ³ /h	Bollfilter MK2 370 Cap: 83-370 m ³ /h
500/370BK2	B: 143-370 m ³ /h D: 60-500 m ³ /h	3 UV Chamber Cap: 60-500 m ³ /h	Bollfilter MK2 370 Cap: 83-370 m ³ /h
500/500BK2	B: 145-500 m ³ /h D: 60-500 m ³ /h	3 UV Chamber Cap: 60-500 m ³ /h	Bollfilter MK2 500 Cap: 85-500 m ³ /h
667/750BK2	B: 165-667 m ³ /h D: 80-667 m ³ /h	4 UV Chamber Cap: 80-667 m ³ /h	Bollfilter MK2 750 Cap: 85-750 m ³ /h
834/750BK2	B: 185-750 m ³ /h D: 100-834 m ³ /h	5 UV Chamber Cap: 100-834 m ³ /h	Bollfilter MK2 750 Cap: 85-750 m ³ /h
834/1400BK2	B: 268-834 m ³ /h D: 100-834 m ³ /h	5 UV Chamber Cap: 100-834 m ³ /h	Bollfilter MK2 1400 Cap: 168-1400 m ³ /h
1000/1400BK2	B: 288-1000 m ³ /h D: 120-1000 m ³ /h	6 UV Chamber Cap: 120-1000 m ³ /h	Bollfilter MK2 1400 Cap: 168-1400 m ³ /h
1167/1400BK2	B: 308-1167 m ³ /h D: 140-1167 m ³ /h	7 UV Chamber Cap: 140-1167 m ³ /h	Bollfilter MK2 1400 Cap: 168-1400 m ³ /h
1334/1400BK2	B: 328-1334 m ³ /h D: 160-1334 m ³ /h	8 UV Chamber Cap: 160-1334 m ³ /h	Bollfilter MK2 1400 Cap: 168-1400 m ³ /h
1500/1400BK2	B: 348-1400 m ³ /h D: 180-1500 m ³ /h	9 UV Chamber Cap: 180-1500 m ³ /h	Bollfilter MK2 1400 Cap: 168-1400 m ³ /h

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1500/2100BK2	B: 385-1500 m ³ /h D: 180-1500 m ³ /h	9 UV Chamber Cap: 180-1500 m ³ /h	Bollfilter MK2 2100 Cap: 205-2100 m ³ /h
1667/2100BK2	B: 405-1667 m ³ /h D: 200-1667 m ³ /h	10 UV Chamber Cap: 200-1667 m ³ /h	Bollfilter MK2 2100 Cap: 205-2100 m ³ /h
1834/2100BK2	B: 425-1834 m ³ /h D: 220-1834 m ³ /h	11 UV Chamber Cap: 220-1834 m ³ /h	Bollfilter MK2 2100 Cap: 205-2100 m ³ /h
2000/2100BK2	B: 445-2000 m ³ /h D: 240-2000 m ³ /h	12 UV Chamber Cap: 240-2000 m ³ /h	Bollfilter MK2 2100 Cap: 205-2100 m ³ /h
2167/2100BK2	B: 465-2100 m ³ /h D: 260-2167 m ³ /h	13 UV Chamber Cap: 260-2167 m ³ /h	Bollfilter MK2 2100 Cap: 205-2100 m ³ /h
2167/2500BK2	B: 474-2167 m ³ /h D: 260-2167 m ³ /h	13 UV Chamber Cap: 260-2167 m ³ /h	Bollfilter MK2 2500 Cap: 214-2500 m ³ /h
2334/2500BK2	B: 494-2334 m ³ /h D: 280-2334 m ³ /h	14 UV Chamber Cap: 280-2334 m ³ /h	Bollfilter MK2 2500 Cap: 214-2500 m ³ /h
2500/2500BK2	B: 514-2500 m ³ /h D: 300-2500 m ³ /h	15 UV Chamber Cap: 300-2500 m ³ /h	Bollfilter MK2 2500 Cap: 214-2500 m ³ /h
2667/3800BK2	B: 646-2667 m ³ /h D: 320-2667 m ³ /h	16 UV Chamber Cap: 320-2667 m ³ /h	Bollfilter MK2 3800 Cap: 326-3800 m ³ /h
2834/3800BK2	B: 666-2834 m ³ /h D: 340-2834 m ³ /h	17 UV Chamber Cap: 340-2834 m ³ /h	Bollfilter MK2 3800 Cap: 326-3800 m ³ /h
3000/3800BK2	B: 686-3000 m ³ /h D: 360-3000 m ³ /h	18 UV Chamber Cap: 360-3000 m ³ /h	Bollfilter MK2 3800 Cap: 326-3800 m ³ /h

Optimarin BWTS Model	OBS Flow Range B=Ballasting, Strip D=Deballasting	UV Unit Quantity/Capacity	Filter Model/Capacity
With FilterSafe Filters			
167/50FS	B: 50-50 m ³ /h D: 50-167 m ³ /h	1 UV Chamber Cap: 20-167 m ³ /h	BS-025H/V Cap: 10-50 m ³ /h
167/125FS (DN100)	B: 50-125 m ³ /h D: 50-167 m ³ /h	1 UV Chamber Cap: 20-167 m ³ /h	BS-050H/V Cap: 30-125 m ³ /h
167/125FS (DN150)	B: 50-125 m ³ /h D: 50-167 m ³ /h	1 UV Chamber Cap: 20-167 m ³ /h	BS-050H/V Cap: 30-125 m ³ /h
167/180FS (DN150)	B: 50-167 m ³ /h D: 50-167 m ³ /h	1 UV Chamber Cap: 20-167 m ³ /h	BS-070H/V Cap: 30-180 m ³ /h
167/180FS (DN200)	B: 50-167 m ³ /h D: 50-167 m ³ /h	1 UV Chamber Cap: 20-167 m ³ /h	BS-070H/V Cap: 30-180 m ³ /h

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334/180FS (DN200)	B: 70-180 m ³ /h D: 50-334 m ³ /h	2 UV Chamber Cap: 40-334 m ³ /h	BS-070H/V Cap: 30-180 m ³ /h
334/250FS	B: 80-250 m ³ /h D: 50-334 m ³ /h	2 UV Chamber Cap: 40-334 m ³ /h	BS-100H/V Cap: 40-250 m ³ /h
334/375FS	B: 90-334 m ³ /h D: 50-334 m ³ /h	2 UV Chamber Cap: 40-334 m ³ /h	BS-150H/V Cap: 50-375 m ³ /h
500/375FS	B: 110-375 m ³ /h D: 60-500 m ³ /h	3 UV Chamber Cap: 60-500 m ³ /h	BS-150H/V Cap: 50-375 m ³ /h
500/500FS	B: 120-500 m ³ /h D: 60-500 m ³ /h	3 UV Chamber Cap: 60-500 m ³ /h	BS-200H/V Cap: 60-500 m ³ /h
667/750FS	B: 140-667 m ³ /h D: 80-667 m ³ /h	4 UV Chamber Cap: 80-667 m ³ /h	BS-300H/V Cap: 60-750 m ³ /h
834/750FS	B: 160-750 m ³ /h D: 100-834 m ³ /h	5 UV Chamber Cap: 100-834 m ³ /h	BS-300H/V Cap: 60-750 m ³ /h
834/1000FS	B: 180-834 m ³ /h D: 100-834 m ³ /h	5 UV Chamber Cap: 100-834 m ³ /h	BS-400H/V Cap: 80-1000 m ³ /h
1000/1000FS	B: 200-1000 m ³ /h D: 120-1000 m ³ /h	6 UV Chamber Cap: 120-1000 m ³ /h	BS-400H/V Cap: 80-1000 m ³ /h

Optimarin BWTS Model	OBS Flow Range B=Ballasting, Strip D=Deballasting	UV Unit Quantity/Capacity	Filter Model/Capacity
With Filtrex Filters			
167/87FX	B: 50-87 m ³ /h D: 50-167 m ³ /h	1 UV Chamber Cap: 20-167 m ³ /h	ACB-906-100 Cap: 15-87 m ³ /h
167/135FX	B: 50-135 m ³ /h D: 50-167 m ³ /h	1 UV Chamber Cap: 20-167 m ³ /h	ACB-910-150 Cap: 25-135 m ³ /h
167/190FX	B: 55-167 m ³ /h D: 50-167 m ³ /h	1 UV Chamber Cap: 20-167 m ³ /h	ACB-915-150 Cap: 35-190 m ³ /h
334/190FX	B: 75-190 m ³ /h D: 50-334 m ³ /h	2 UV Chamber Cap: 40-334 m ³ /h	ACB-915-150 Cap: 35-190 m ³ /h
334/255FX	B: 75-255 m ³ /h D: 50-334 m ³ /h	2 UV Chamber Cap: 40-334 m ³ /h	ACB-935-200 Cap: 35-255 m ³ /h
334/340FX	B: 85-334 m ³ /h D: 50-334 m ³ /h	2 UV Chamber Cap: 40-334 m ³ /h	ACB-945-200 Cap: 45-340 m ³ /h
500/340FX	B: 105-340 m ³ /h D: 60-500 m ³ /h	3 UV Chamber Cap: 60-500 m ³ /h	ACB-945-200 Cap: 45-340 m ³ /h

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500/515FX	B: 110-500 m ³ /h D: 60-500 m ³ /h	3 UV Chamber Cap: 60-500 m ³ /h	ACB-955-250 Cap: 50-515 m ³ /h
667/515FX	B: 130-515 m ³ /h D: 80-667 m ³ /h	4 UV Chamber Cap: 80-667 m ³ /h	ACB-955-250 Cap: 50-515 m ³ /h
667/770FX	B: 145-667 m ³ /h D: 80-667 m ³ /h	4 UV Chamber Cap: 80-667 m ³ /h	ACB-985-300 Cap: 65-770 m ³ /h
834/770FX	B: 165-770 m ³ /h D: 100-834 m ³ /h	5 UV Chamber Cap: 100-834 m ³ /h	ACB-985-300 Cap: 65-770 m ³ /h
834/1040FX	B: 195-834 m ³ /h D: 100-834 m ³ /h	5 UV Chamber Cap: 100-834 m ³ /h	ACB-999-350 Cap: 95-1040 m ³ /h
1000/1040FX	B: 215-1000 m ³ /h D: 120-1000 m ³ /h	6 UV Chamber Cap: 120-1000 m ³ /h	ACB-999-350 Cap: 95-1040 m ³ /h
1167/1040FX	B: 235-1040 m ³ /h D: 140-1167 m ³ /h	7UV Chamber Cap: 140-1167 m ³ /h	ACB-999-350 Cap: 95-1040 m ³ /h

SPECIFICATIONS

Filter

Manufacturer Boll & Kirch
 Capacity range 100 / 220 / 400 / 600 / 800 / 1200 / 1600 / 2500 m³.hr⁻¹
 Filter models Bollfilter 100, Bollfilter 220, Bollfilter 400, Bollfilter 600, Bollfilter 800, Bollfilter 1200, Bollfilter 1600, Bollfilter 2500
 Mesh size 40 microns
 Maximum design pressure 10 bar
 Max. working temperature 60°C
 Filter housing material Steel P265GH

Manufacturer Boll & Kirch
 Capacity range 370 / 500 / 750 / 1400 / 2100 / 2500 / 3800 m³.hr⁻¹
 Filter models Bollfilter MK2 370, Bollfilter MK2 500, Bollfilter MK2 750, Bollfilter MK2 1400, Bollfilter MK2 2100, Bollfilter MK2 2500, Bollfilter MK2 3800

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Mesh size 40 microns
 Maximum design pressure 10 bar
 Max. working temperature 60°C
 Filter housing material Steel P265GH

Manufacturer Filtersafe
 Capacity range 50 / 125 / 180 / 250 / 375 / 500 / 750 / 1000 m³.hr⁻¹
 Filter models BS-025H/V, BS-050H/V, BS-070H/V, BS-100H/V, BS-150H/V, BS-200H/V, BS-300H/V, BS-400H/V

Mesh size 40 microns
 Maximum design pressure 10 bar (BS-025H/V, BS-050H/V, BS-070H/V, BS-100H/V, BS-150H/V, BS-200H/V);
 8 bar (BS-300H/V, BS-400H/V)
 Max. working temperature 55°C
 Filter housing material Carbon Steel

Manufacturer Filtrex
 Capacity range 87 / 135 / 190 / 255 / 340 / 515 / 770 / 1040 m³.hr⁻¹
 Filter models ACB-906-100, ACB-910-150, ACB-915-100, ACB-935-200, ACB-945-200, ACB-955-250, ACB-985-300, ACB-999-350

Mesh size 40 microns
 Maximum design pressure 10 bar
 Max. working temperature 55°C
 Filter housing material Ni-Al-Bz (Bronze-Aluminion Alloy)

UV Chamber

Manufacturer Optimarin A/S
 Type of lamps Medium pressure UV lamps
 No. of lamps per unit 1 lamp 167/100BK, 167/220BK, 167/370BK2, 167/50FS, 167/125FS, 167/180FS, 167/87FX, 167/135FX, 167/190FX

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2 lamps	334/220BK, 334/400BK, 334/370BK2, 334/180FS, 334/250FS, 334/250FS, 334/375FS, 334/190FX, 334/255FX, 334/340FX
3 lamps	500/400BK, 500/600BK, 500/370BK2, 500/500BK2, 500/500FS, 500/340FX, 500/515FX
4 lamps	667/600BK, 667/800BK, 667/750BK2, 667/750FS, 667/515FX, 667/770FX
5 lamps	834/800BK, 834/750BK2, 834/1400BK2, 834/750FS, 834/1000FS, 834/770FX, 834/1040FX
6 lamps	1000/1200BK, 1000/1400BK2, 1000/1000FS, 1000/1040FX
7 lamps	1167/1200BK, 1167/1400BK2, 1167/1040FX
8 lamps	1334/1200BK, 1334/1600BK, 1334/1400BK2
9 lamps	1500/1600BK, 1500/1400BK2, 1500/2100BK2
10 lamps	1667/1600BK, 1667/2500BK, 1667/2100BK2
11 lamps	1834/2500BK, 1834/2100BK2
12 lamps	2000/2500BK, 2000/2100BK2
13 lamps	2167/2500BK, 2167/2100BK2, 2167/2500BK2
14 lamps	2334/2500BK, 2334/2500BK2
15 lamps	2500/2500BK, 2500/2500BK2
16 lamps	2667/3800BK2
17 lamps	2834/3800BK2
18 lamps	3000/3800BK2

Material	SS 1.4404
Maximum design pressure	10 bar
UV intensity	0 to 2300 W.m ⁻²
Hazardous area certification	Gas group: IIC ; Temperature class : T4

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Control Equipment

Control Panel (+CP)
Filter Control (+FC)
Ex Sensor Box 1 (+EXSB1)
Ex Sensor Box x (+EXSBx)
Ex Terminal Box (+EXTBxx)
UV Power Cabinet (+UVPxx)
Fresh Water Panel (+FWP)
Interlock Panel (+IP)
Ex Interlock Panel (+EXIP)
Electrical Actuators Power Distribution Panel (+EAPDP)
Back Flush Cabinet (+BFC)

OTHER CONDITIONS

The intended installation location of the Optimarin Ballast Systems on board ship is to be suitable and in compliance with the requirements for such location. Its connection into the ship's system, including the electrical system, is to be shown on the ship's plans to be submitted for approval. Manufacturer's instructions are to be followed.

Where it is proposed to install equipment in areas of an explosive gas atmosphere may be present, it is generally to be of a type providing protection against ignition of the gases encountered, and certification details are to be submitted for consideration.

Components of the Optimarin Ballast Systems BWTS outside the scope of supply from Optimarin A/S are to be of type complying with Lloyd's Register Rules for Ships Part 5 and part 6 and submitted for approval prior to installation.

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The maximum treated rated capacity (TRC) of each Optimarin Ballast Systems is not to be exceeded. In the use of parallel modules, the flow is to be arranged to not exceed the TRC of the unit(s) concerned.

Installation survey and commissioning is to be conducted for each installation on board ship in accordance with IMO Res. MEPC.174 (58) Section 8 and Lloyd's Register 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. 18/00075 and its supplementary Type Approval Terms and Conditions form part of this Certificate.

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