



TYPE APPROVAL CERTIFICATE

Certificate No:
TAP000028V
Revision No:
3

This is to certify:

That the **Ballast Water Management System**

with type designation(s)

NGT BWMS (models DL1-BK273 to D5XL18-BK750 and DL1-BWT80 to D5XL24-BWT500)

Issued to

Norwegian Greentech AS
Fosnavåg, Norway

is found to comply with

IMO Resolution MEPC.300(72) – Code for Approval of Ballast Water Management Systems (BWMS Code)
DNV rules for classification – Ships Pt.6 Ch.7 Sec.1 Ballast water management – BWM
DNV class programme DNV-CP-0209 – Type approval – Ballast water management systems
DNV class guideline DNV-CG-0339 – Environmental test specification for electrical, electronic and programmable equipment and systems

Application :

This is to certify that the Ballast Water Management System listed above has been examined and tested in accordance with the requirements of the specifications contained in the BWMS Code (MEPC.300(72)) and DNV rules stated above. This certificate is valid only for the Ballast Water Management System referred to above.

System Design Limitations / Limiting Operating Conditions imposed are described in this certificate.

For the compliance with the BWMS Code, the certificate is issued on behalf of the Norwegian Maritime Authority.

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV, unless otherwise instructed by relevant Maritime Administrations.

Issued at **Høvik** on **2023-07-12**

for **DNV**

This Certificate is valid until **2025-08-08**.

DNV local unit: **Ulsteinvik**

Approval Engineer: **Michael Lehmann**

Martin Olofsson
Senior Principal Engineer

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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



Name of ballast water management system (BWMS)

NGT BWMS

Ballast water management system manufactured by

Norwegian Greentech AS

Place of production

Norwegian Greentech AS, 6092 Fosnavåg, Norway

Type and model designations

NGT BWMS models with filters of the aquaBoll 6.18.3 series:

DL1-BK273, DL2-BK273, DL3-BK324, DL4-BK324, DL4-BK356, DXL6-BK356, DXL9-BK356, DXL9-BK419, DXL12-BK419, D4XL8-BK419, D4XL10-BK419, D4XL10-BK521, D4XL10-BK600, D4XL12-BK600, D4XL12-BK750, D5XL14-BK750, D5XL16-BK750 and D5XL18-BK750

NGT BWMS models with filters of the aquaBoll BWT series:

DL1-BWT80, DL2-BWT80, DL3-BWT100, DL4-BWT100, DL4-BWT150, DXL6-BWT150, DXL9-BWT150, DXL12-BWT150, DXL9-BWT200, DXL12-BWT200, D4XL8-BWT200, D4XL10-BWT200, D4XL10-BWT250, D4XL10-BWT300, D4XL12-BWT300, D4XL12-BWT350, D4XL12-BWT400, D5XL14-BWT350, D5XL14-BWT400, D5XL16-BWT350, D5XL16-BWT400, D5XL18-BWT350, D5XL18-BWT400, D5XL20-BWT350, D5XL20-BWT400, D5XL22-BWT350, D5XL22-BWT500 and D5XL24-BWT500

Equipment / Assembly drawings

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

Type	Title	Drawing no.	Revision
Operation, maintenance and safety manual (OMSM)	NGT BWMS user documentation Part I: Installation manual	IM	C
	NGT BWMS user documentation Part II: Operation, Safety & Maintenance manual	OSMM	F
Piping and instrumentation diagrams (P&ID)	P&ID for NGT BWMS	P0050 – P1200 and PW0050 – PW1500 ⁽¹⁾	
Bill of materials (BoM)	Bill of Materials for NGT BWMS	D0050 – D1200 and DW0050 – DW1500 ⁽¹⁾	
General arrangement (GA) drawings	Dimensional sketch for NGT BWMS	D0050-11-02 – D1200-11-02 and DW0050-11-02 – DW1500-11-02 ⁽¹⁾	
Electrical diagrams	Control cabinet	C3X00-04-700 (380-440V) ⁽¹⁾	
		C3X00-06-700 (690V) ⁽¹⁾	
Electrical diagrams	Wiring diagram	CW3X00-04-0700 (380-440V) ⁽¹⁾	
		C3X00-06-0700 (690V) ⁽¹⁾	
		E(W)3XX0-04-1800 (380-440V) ⁽¹⁾	
		E(W)3XX0-06-1800 (690V) ⁽¹⁾	

(1) Refer to Annex B for the drawing no. applicable for a specific BWMS model.

Other equipment manufactured by

The NGT BWMS applies UV chambers of the DeltaLine series manufactured by bestUV and filters of the aquaBoll 6.18.3 series or aquaBoll BWT series with 20 µm mesh screen manufactured by Boll & Kirch Filterbau (BOLLFILTER).

Treatment Rated Capacity

30 – 1 815 m³/h

Product description

Treatment sequence:

- Ballast water uptake: Filtration followed by UV radiation treatment
- Ballast water discharge: UV radiation treatment

System design limitations / Water quality parameters

Temperature & salinity

Temperature and salinity of the ballast water are not a limiting conditions for the NGT BWMS.

System design limitations / Operational parameters

Holding time

The NGT BWMS has demonstrated performance to the discharge standard with a minimum holding time between uptake and discharge of 24 hours in land-based testing in each of the three salinity ranges. UV treatment is instant and does not require any hold time in a ballast tank to render organisms non-viable. Therefore, holding time is not found to be a limiting condition for the BWMS.

UV dose

At high UV transmittance (UVT) levels, the BWMS reduces the power to the UV lamps in steps from 100% down to 60%.

At lower UVT levels, the BWMS monitors the UV intensity (UVI) and is designed to adjust the flow rate by controlling the ballast water pump(s).

The applicable UVI limits are listed in the table below. The regulated flow in fresh water (salinity <1 PSU) is lower than in brackish and marine water, and the BWMS is supplied with a conductivity transmitter (CTI) to measure the salinity of the ballast water to be treated.

The BWMS may be installed without any flow control. The low UVI limit is then the low UVI error limit calculated by the BWMS based on the ballasting flow rate. For installations without flow control, the TRC of the selected BWMS model must be equal or larger than the ballast water pump(s) capacity.

Land-based tests confirmed treatment in compliance with the discharge standard at a UVT down to 46% when reducing the flow rate to 37% of TRC.

UV chamber model by bestUV	UVI limit for power reduction [W/m ²]	UVI limit at full flow (TRC) ⁽¹⁾ [W/m ²]	Low UVI limit at minimum flow rate [W/m ²]	Minimum flow rate [m ³ /h]	
				Salinity ≥1 PSU	Salinity <1 PSU
DL1	2 033	1 369	450	10	7.4
DL2	N/A	6 505	3 200	28	20
DL3	4 042	2 722	2 066	37	26
DL4	21 004	14 144	7 443	71	51
DXL6	12 768	8 598	3 173	81	58
DXL9	27 346	18 415	8 694	92	65
DXL12	23 639	15 919	6 209	178	127
D4XL8	9 456	5 332	280	180	128
D4XL10	16 559	11 151	4 023	237	169
D4XL12	25 077	16 887	7 014	310	221
D5XL14	15 297	10 301	4 109	433	308
D5XL16	17 340	11 677	4 700	518	369
D5XL18	21 525	14 495	5 515	581	414
D5XL20	22 649	15 252	5 913	654	466
D5XL22	23 583	15 881	6 161	726	517
D5XL24	22 750	15 320	5 571	813	579

(1) As per the CFD analyses provided, this UVI limit corresponds to an UVT in the range of 64-67% depending on the UV chamber model.

Treatment Rated Capacity

The maximum flow rates of the UV chambers models and BOLLFILTER aquaBoll 6.18.3 filter models applied by the NGT BWMS are listed below. The Treatment Rated Capacities (TRC) of a specific NGT BWMS model is limited by the maximum flow rate of either the selected UV chamber or the BOLLFILTER aquaBoll 6.18.3 filter model, whichever is lower.

UV chamber model by bestUV	TRC [m ³ /h]
DL1	30
DL2	60
DL3	90
DL4	150
DXL6	200
DXL9	260
DXL12	350
D4XL8	460
D4XL10	600
D4XL12	750
D5XL14	1 005
D5XL16	1 180
D5XL18	1 323
D5XL20	1 475
D5XL22	1 645
D5XL24	1 815

BOLLFILTER aquaBoll 6.18.3 filter model	TRC [m ³ /h]
273	62
324	94
356	204
419	378
521	518
600	614
750	1274

BOLLFILTER aquaBoll BWT filter model	TRC [m ³ /h]
240x230 DN80	65
330x300 DN100	125
400x410 DN150	220
430x730 DN200	430
540x840 DN250	770
580x1150 DN300	1 000
700x1250 DN350	1 350
800x1235 DN400	1 900
1000x1535 DN500	2 600

The NGT BWMS may also be operated in a dedicated USCG Mode applying maximum flow rates lower than the ones listed above and UVI limits for operation at full flow different from the ones listed on page 4. Additional land-based testing confirmed that the NGT BWMS also complies with the D-2 standard when being operated in USCG Mode.

Pressure

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

Minimum ballast water inlet pressure	Maximum ballast water operating pressure	Filter differential pressure triggering backflushing	Maximum filter differential pressure
1.5 bar	10 bar	0.3 bar	1.0 bar

Control and monitoring equipment

Software version

The NGT BWMS is type approved with the system control software version 4.6.X. In the software version the “4” represents the major version number of the software. A major revision of the software will be any change to the control and operating philosophy of the NGT BWMS. The “6” represents the minor version number of the software and is reserved for new or changed features which do not affect core functionality. The “X” represents the patch level which is reserved for bug fixes and graphical user interface changes.

Any changes to the software are to be recorded as long as the system is in use onboard. Records of any software changes resulting in a revision of the major or minor version number or any changes to the hardware are to be forwarded to DNV for evaluation. Testing of the application functions of the revised software may be required.

Safety measures

The NGT 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:

- Pressure transducers PT-1 and PT-2 before and after the filter;
- Flow meter FT-1 (normally located before the filter, but may also be installed after the UV chamber);
- UV chamber temperature sensor TT1.

The flow rate is monitored by the main control cabinet, while the temperature is monitored by the UV control cabinet. Both systems can independently shut down the BWMS. Temperature monitoring is thus a safety function independent of the BWMS main control system.

Electrical and electronic components

The NGT BWMS is type approved with the electrical and electronic components (including the above listed instruments for monitoring safe operation of the BWMS) indicated on the P&ID and specified on the BoM. Except for the components listed below, alternate models to the ones specified on 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 a valid type approval certificate or technical documentation demonstrating that the selected component was subject to environmental testing as per IACS UR E10.

For the following electrical and electronic components only the models specified below shall be used:

Tag No.	Component name	Manufacturer	Model(s)
MC1	NGT BWMS Control Cabinet	NGT	-
UVPC1	UV Control Cabinet	bestUV	-
UVL1-18	UV lamps	bestUV	C1500, C3000, C3050
LT1	UV light intensity sensor	bestUV	Us3 Sensor Module

Hazardous area / Ex-proof

The NGT BWMS can be delivered with electrical components in compliance with DNV rules for classification of ships Pt.4 Ch.8 Sec.11. The NGT BWMS Control Cabinet and the UV Control Cabinet, however, must always be located in non-hazardous areas. The UV chamber (with pressurisation system), the filter, the flow meter, valves and sensors of the Ex version of the NGT BWMS model D5XL16-BK750 were found to be suitable for installation and use in hazardous area Zone 2. For other NGT BWMS models, a valid Ex-certificate issued by a notified/recognized Certification Body must be provided for the UV chamber model of the selected NGT BWMS model.

Installations in a hazardous area are 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. Ex-certification is not covered by this certificate.

Documents approval

The following documentation is to be submitted for approval for each BWMS installation:

- Piping and Instrumentation Diagram (P&ID) of the ballast system including the treatment system installation
- Functional test procedure (for BWMS commissioning)
- Interface description towards ship’s existing systems including alarms for failure

Type approval documentation

Test plan and reports:

- NIVA: Land-based testing of the Ballast Water Management System of Norwegian Greentech AS (Report Serial No. 7488-2020, Final report of 2020-11-18)
- NIVA: Shipboard testing of the Ballast Water Management System of Norwegian Greentech AS (Report Serial No. 7528-2020, Final report of 2020-11-09)
- NIVA: Full scale land-based testing of the Ballast Water Management System of Norwegian Greentech AS (Report Serial No. 7619-2021, Final report of 2021-04-21)
- Applica Test & Certification AS: Technical Report for Norwegian Greentech AS - Type testing of Ballast Water Management System – BWMS (Report no. 30484, rev 0)
- Applica Test & Certification AS: Technical Report for Norwegian Greentech AS - EMC and Environmental testing of Flowmeters (Report no. 30484 Flowmeter, rev 0)
- DELTA: Test for Marine Type Approval of MMC Ballast Water Management System – 300 m³/h (Report no. DANAK-19/12610, 15 November 2012)
- DHI: Biological comparison tests of three filters manufactured by BOLLFILTER in land-based test - Land-based test report, 11 November 2021

System documentation:

- Norwegian Greentech AS: NGT BWMS user documentation part I: Installation manual (Document id IM , rev C)
- Norwegian Greentech AS: NGT BWMS user documentation part II: Operation, Safety & Maintenance manual (Document id OSMM, rev F), including Appendices A-H
- bestUV: Control and operation of the UV system in NorwegianGT BWMS (01-2022)
- bestUV: Design model for NorwegianGT BWMS UV systems (03-05-2021)
- BOLLFILTER Nordic: Technical specifications for AquaBoll 6.18.3 with 20 µm fine sieve cylinder / pleated basket
- Norwegian Greentech AS: Functional test procedure (rev B)
- BOLLFILTER Nordic: Design study aquaBoll BWT, BWT RB (Rigid Basket) & aquaBoll 6.18.3 (2021-02-22)
- DNV: Evaluation test report - Equivalence of the aquaBoll BWT, BWT RB and 6.18.3 filter designs (Report No. 262.1-034941-J-3, Rev. 0)
- DNV: Evaluation test report – Increase of maximum flow rate for the aquaBoll BWT filter (Report No. 262.1-037442-J-5, Rev. 1)

Tests carried out

- Land-based testing with NGT BWMS model DXL9-BK419 (TRC of 260 m³/h)
- Shipboard testing with NGT BWMS model DXL12-BK419 (TRC of 345 m³/h)
- Function tests of the control and monitoring system witnessed by DNV
- Environmental testing in accordance with DNV class guidelines for Environmental test specification for electrical, electronic and programmable equipment and systems (DNV-CG-0339) and IACS UR E10 (rev. 6 or rev. 7)

Marking of product

For traceability of this type approval, each treatment system is to be marked with:

- Manufacturer's name or trademark
- Type designation
- Serial number

Periodical assessment

For retention of the Type Approval, DNV Surveyor shall perform periodical assessments to verify that the conditions of the TA are not altered since the certificate was issued.

The scope of periodical assessment includes:

- Review of the TA documentation and verification that the documentation is still used as basis for the production.
- Review of possible changes in design, material and performance of the product.
- Verification of the company’s production and quality systems ensuring continued consistent production of the type approved products to the required quality.
- Verification that the product marking for identification and traceability to the TA Certificate is not altered

Copy of type approval certificate

A copy of this type approval certificate should always be carried onboard a vessel fitted with this ballast water management system. An annex containing the summary reports of the test results of land-based and shipboard tests should be available for inspection onboard the vessel.

Revision history of this certificate

Revision No.	Date of Issuance	Description
-	2020-12-09	Initial certificate
1	2021-06-11	Update of certificate to refer to latest version of OMSM and associated drawings and correction of selected UVI limits
2	2022-03-18	Update of certificate to refer to latest version of OMSM which includes dedicated USCG Mode of operation
3	2023-07-12	Amendment of certificate to include the aquaBoll BWT filter series manufactured by BOLLFILTER, the UV chamber models D5XL20, D5XL22 and D5XL24 and the Ex version of the model D5XL16-BK750.

ANNEX A: SUMMARY OF TESTING

Land-based testing

Table 1 Test water conditions and operational parameters in land-based testing of the NGT BWMS model DXL9-BK419 (TRC of 260 m³/h) at NIVA's test facility at Solbergstrand, Drøbak, Norway, during the period of 3 April 2019 to 27 September 2019.

Test cycle / Salinity	Water temperature [°C]	Salinity [PSU]	UVT [%]	DOC [mg/L]	POC [mg/L]	TSS [mg/L]	Holding time [hours]	Average UV-I at ballasting [W/m ²]	Average flow rate before filtration [m ³ /h]
3 / MW	9	32	62	8.9	6.6	60	23	18 968	253
4 / MW	9	32	63	9.1	11.0	63	23	18 895	256
5 / MW	10	33	60	10.3	7.0	58	119	13 286	195
6 / MW	10	33	58	10.3	8.4	59	119	12 553	193
9 / MW	11	32	77	7.6	7.2	45	23	17 702	234
2 / BW	6	19	59	10.7	8.2	57	119	13 132	200
7 / BW	11	20	47	13.0	>5 ⁽¹⁾	57	22	9 271	98
8 / BW	11	20	46	12.6	>5 ⁽¹⁾	58	22	8 890	95
10 / BW	12	19	65	8.3	9.3	62	119	19 888	254
11 / BW	12	19	61	8.3	9.6	68	119	19 579	258
15 / FW	16	0.0	65	8.6	6.1	53	23	18 908	256
18 / FW	14	0.1	59	10.4	6.9	53	119	12 720	200
19 / FW	14	0.1	58	10.4	6.5	52	118	12 921	196
20 / FW	12	0.0	59	7.7	7.1	53	22	13 318	96
21 / FW	12	0.0	61	7.8	6.6	53	22	13 286	99

(1) The POC concentration reported by NIVA's laboratory were 2.6 and 3.4 mg/L for the two brackish water test cycles 7 and 8, respectively. However, these POC concentrations are the result of an analytical error. The POC concentrations measured prior to augmentation was 2.3 mg/L, and the augmentation with corn starch, as per normal procedure by NIVA, has resulted in POC concentrations exceeding the 5 mg/L required by MEPC.300(72). This is confirmed by the POC concentrations reported for the corresponding treated water samples and control water samples collected during ballasting, which were 5.9, 6.9 and 8.8 mg/L, respectively.

Table 2 Average numbers of live organisms in inlet and treated discharge water during land-based testing of the NGT BWMS model DXL9-BK419. Live organisms ≥ 10 and $< 50 \mu\text{m}$ in the inlet water were quantified by microscopy counting after staining with CMFDA/FDA. Viable organisms ≥ 10 and $< 50 \mu\text{m}$ in discharge water were quantified by MPN Dilution Culture + Motility. All counts of pathogenic bacteria (*E. coli*, Enterococci and *Vibrio cholerae*) in treated water were below the ballast water discharge standard.

Test cycle / Salinity	Organism densities in inlet water		Organism densities in discharge water			
	Organisms $\geq 50 \mu\text{m}$ [organisms/m ³]	Organisms ≥ 10 - $< 50 \mu\text{m}$ (CMFDA/FDA) [organisms/mL]	Organisms $\geq 50 \mu\text{m}$ [organisms/m ³]		Organisms ≥ 10 - $< 50 \mu\text{m}$ (MPN+Motility) [organisms/mL]	
			Treated	Control	Treated	Control
3 / MW	137 321	1 667	<1	170 704 ⁽¹⁾	<0.2	920 ⁽¹⁾
4 / MW	137 825	1 867	<1		<0.2	
5 / MW	4 154 908	1 143	<1	118 733 ⁽¹⁾	0.2	1 600 ⁽¹⁾
6 / MW	4 107 167	1 043	<1		<0.2	
9 / MW	138 458	3 017	0.3	126 433	0.2	>1 600
2 / BW	320 263	1 911	2.3	132 938	<0.2	>1 600
7 / BW	115 104	1 203	<1	104 979 ⁽¹⁾	0.2	>1 600 ⁽¹⁾
8 / BW	127 000	1 153	<1		<0.2	
10 / BW	127 346	3 717	0.3	76 125 ⁽¹⁾	<0.2	>1 600 ⁽¹⁾
11 / BW	140 883	3 783	0.6		<0.2	
15 / FW	166 929	1 158	5.7	180 483	1.0	1 100
18 / FW	389 421	1 808	<1	614 797 ⁽¹⁾	0.14	260 ⁽¹⁾
19 / FW	393 111	1 642	<1		0.39	
20 / FW	108 943	1 706	<1	86 325 ⁽¹⁾	0.21	2 700 ⁽¹⁾
21 / FW	126 768	1 733	<1		0.07	

(1) Two test cycles were performed on the same day using the same control water tank.

Shipboard testing

Table 3 Test water conditions and operational parameters in shipboard testing with the NGT BWMS model DXL12-BK419 (TRC of 345 m³/h) on board the general cargo ship FRI SEA (IMO 9229166) during the period of 28 November 2019 to 23 June 2020.

Test cycle	Water temperature [°C]	Salinity [PSU]	UVT [%]	DOC [mg/L]	POC [mg/L]	TSS [mg/L]	Holding time [hr]	Average UV-I at ballasting [W/m ²]	Average flow rate before filtration [m ³ /h]
1	17	36	97	1.1	0.3	5.0	26	29 227	156 ⁽¹⁾
3	22	22	88	2.8	0.4	<1.3	22	23 117	309
4	21	22	88	2.5	0.6	1.9	22	21 948	318
5	21	20	85	2.7	0.8	2.3	23	22 528	288
6	21	17	85	2.9	0.7	1.7	24	24 546	334

(1) The two ballast water pumps on the FRI SEA were not able to deliver a flow rate at the upper end of the BWMS TRC of 345 m³/h during test cycle 1. Prior to subsequent test cycles, one of the two ballast water pumps was replaced with a new pump, and a new third pump was temporarily installed for the purpose of shipboard testing.

Table 4 Average numbers of live organisms in inlet and treated discharge water during shipboard testing of the DXL12-BK419. Live organisms ≥10 and <50 μm were quantified by microscopy counting after staining with CMFDA/FDA. All counts of pathogenic bacteria (*E. coli*, Enterococci and *Vibrio cholerae*) in treated water were below the ballast water discharge standard.

Test cycle	Organisms ≥50 μm [organisms/m ³]		Organisms ≥10-50 μm (CMFDA/FDA) [organisms/mL]	
	Influent water	Treated discharge	Influent water	Treated discharge
1	13 998	3.0	230	2.5
3	387 237	1.3	8 016	6.5
4	337 396	4.2	8 345	5.3
5	525 406	3.5	46 028	1.8
6	42 291	1.4	2 692	1.8

ANNEX B: LIST OF DRAWINGS

Piping and instrumentation diagrams (P&ID)

BWMS models with aquaBoll 6.18.3 filters	Drawing no.	Revision
DL1-BK273	P0050	A
DL2-BK273	P0100	B
DL3-BK324	P0200	B
DL4-BK324	P0210	B
DL4-BK356	P0300	B
DXL6-BK356	P0400	B
DXL9-BK356	P0410	B
DXL9-BK419	P0420	B
DXL12-BK419	P0500	B
D4XL8-BK419	P0600	B
D4XL10-BK419	P0610	B
D4XL10-BK521	P0700	B
D4XL10-BK600	P0800	A
D4XL12-BK600	P0810	A
D4XL12-BK750	P0900	A
D5XL14-BK750	P1000	A
D5XL16-BK750	P1100	A
D5XL18-BK750	P1200	A

BWMS models with aquaBoll BWT filters	Drawing no.	Revision
DL1-BWT80	PW0050	-
DL2-BWT80	PW0100	-
DL3-BWT100	PW0200	-
DL4-BWT100	PW0210	-
DL4-BWT150	PW0300	-
DXL6-BWT150	PW0400	-
DXL9-BWT150	PW0410	-
DXL12-BWT150	PW0415	-
DXL9-BWT200	PW0420	-
DXL12-BWT200	PW0500	-
D4XL8-BWT200	PW0600	-
D4XL10-BWT200	PW0610	-
D4XL10-BWT250	PW0700	-
D4XL10-BWT300	PW0800	-
D4XL12-BWT300	PW0810	-
D4XL12-BWT350	PW0900	-
D4XL12-BWT400	PW0910	-
D5XL14-BWT350	PW1000	-
D5XL14-BWT400	PW1010	-
D5XL16-BWT350	PW1100	-
D5XL16-BWT400	PW1110	-
D5XL18-BWT350	PW1200	-
D5XL18-BWT400	PW1210	-
D5XL20-BWT350	PW1300	-
D5XL20-BWT400	PW1310	-
D5XL22-BWT350	PW1400	-
D5XL22-BWT500	PW1410	-
D5XL24-BWT500	PW1500	-

Bill of Materials (BoM)

BWMS models with aquaBoll 6.18.3 filters	Drawing no.	Revision
DL1-BK273	D0050	C
DL2-BK273	D0100	C
DL3-BK324	D0200	C
DL4-BK324	D0210	C
DL4-BK356	D0300	C
DXL6-BK356	D0400	C
DXL9-BK356	D0410	C
DXL9-BK419	D0420	C
DXL12-BK419	D0500	C
D4XL8-BK419	D0600	C
D4XL10-BK419	D0610	C
D4XL10-BK521	D0700	C
D4XL10-BK600	D0800	C
D4XL12-BK600	D0810	C
D4XL12-BK750	D0900	C
D5XL14-BK750	D01000	C
D5XL16-BK750	D01100	C
D5XL16-BK750 (Ex)	D01100	C
D5XL18-BK750	D01200	C

BWMS models with aquaBoll BWT filters	Drawing no.	Revision
DL1-BWT80	DW0050	-
DL2-BWT80	DW0100	-
DL3-BWT100	DW0200	-
DL4-BWT100	DW0210	-
DL4-BWT150	DW0300	-
DXL6-BWT150	DW0400	-
DXL9-BWT150	DW0410	-
DXL12-BWT150	DW0415	-
DXL9-BWT200	DW0420	-
DXL12-BWT200	DW0500	-
D4XL8-BWT200	DW0600	-
D4XL10-BWT200	DW0610	-
D4XL10-BWT250	DW0700	-
D4XL10-BWT300	DW0800	-
D4XL12-BWT300	DW0810	-
D4XL12-BWT350	DW0900	-
D4XL12-BWT400	DW0910	-
D5XL14-BWT350	DW1000	-
D5XL14-BWT400	DW1010	-
D5XL16-BWT350	DW1100	-
D5XL16-BWT400	DW1110	-
D5XL18-BWT350	DW1200	-
D5XL18-BWT400	DW1210	-
D5XL20-BWT350	DW1300	-
D5XL20-BWT400	DW1310	-
D5XL22-BWT350	DW1400	-
D5XL22-BWT500	DW1410	-
D5XL24-BWT500	DW1500	-

Control cabinets

BWMS models with aquaBoll 6.18.3 filters	380-440V	690V
DL1-BK273	C3050-04-0700	C3050-06-0700
DL2-BK273	C3100-04-0700	C3100-06-0700
DL3-BK324		
DL4-BK324		
DL4-BK356		
DXL6-BK356		
DXL9-BK356		
DXL9-BK419	C3200-04-0700	C3200-06-0700
DXL12-BK419		
D4XL8-BK419		
D4XL10-BK419		
D4XL10-BK521		
D4XL10-BK600		
D4XL12-BK600	C3300-04-0700	C3300-06-0700
D4XL12-BK750		
D5XL14-BK750		
D5XL16-BK750		
D5XL18-BK750		

BWMS models with aquaBoll BWT filters	380-440V	690V
DL1-BWT80	CW3100-04-0700	CW3100-06-0700
DL2-BWT80		
DL3-BWT100		
DL4-BWT100		
DL4-BWT150		
DXL6-BWT150		
DXL9-BWT150	CW3200-04-0700	CW3200-06-0700
DXL12-BWT150		
DXL9-BWT200		
DXL12-BWT200		
D4XL8-BWT200		
D4XL10-BWT200		
D4XL10-BWT250		
D4XL10-BWT300		
D4XL12-BWT300		
D4XL12-BWT350		
D4XL12-BWT400		
D5XL14-BWT350		
D5XL14-BWT400		
D5XL16-BWT350		
D5XL16-BWT400		
D5XL18-BWT350	CW3300-04-0700	CW3300-06-0700
D5XL18-BWT400		
D5XL20-BWT350		
D5XL20-BWT400		
D5XL22-BWT350		
D5XL22-BWT500		
D5XL24-BWT500		

Wiring diagrams

BWMS models with aquaBoll 6.18.3 filters	380-440V	690V
DL1-BK273	E3400-04-1800	E3400-06-1800
DL2-BK273	E3410-04-1800	E3410-06-1800
DL3-BK324	E3420-04-1800	E3420-06-1800
DL4-BK324	E3430-04-1800	E3430-06-1800
DL4-BK356	E3440-04-1800	E3440-06-1800
DXL6-BK356	E3450-04-1800	E3450-06-1800
DXL9-BK356	E3460-04-1800	E3460-06-1800
DXL9-BK419	E3470-04-1800	E3470-06-1800
DXL12-BK419	E3480-04-1800	E3480-06-1800
D4XL8-BK419	E3490-04-1800	E3490-06-1800
D4XL10-BK419	E3500-04-1800	E3500-06-1800
D4XL10-BK521	E3510-04-1800	E3510-06-1800
D4XL10-BK600	E3520-04-1800	E3520-06-1800
D4XL12-BK600	E3530-04-1800	E3530-06-1800
D4XL12-BK750	E3540-04-1800	E3540-06-1800
D5XL14-BK750	E3550-04-1800	E3550-06-1800
D5XL16-BK750	E3560-04-1800	E3560-06-1800
D5XL18-BK750	E3570-04-1800	E3570-06-1800

Wiring diagrams may have the drawing numbers E3XX0-0401-1800 or E3XX0-0601-1800 when the BWMS is equipped with the optional electrically actuated wiper system

BWMS models with aquaBoll BWT filters	380-440V	690V
DL1-BWT80	EW3400-04-1800	EW3400-06-1800
DL2-BWT80	EW3410-04-1800	EW3410-06-1800
DL3-BWT100	EW3420-04-1800	EW3420-06-1800
DL4-BWT100	EW3430-04-1800	EW3430-06-1800
DL4-BWT150	EW3440-04-1800	EW3440-06-1800
DXL6-BWT150	EW3450-04-1800	EW3450-06-1800
DXL9-BWT150	EW3460-04-1800	EW3460-06-1800
DXL12-BWT150	EW3470-04-1800	EW3470-06-1800
DXL9-BWT200	EW3480-04-1800	EW3480-06-1800
DXL12-BWT200	EW3490-04-1800	EW3490-06-1800
D4XL8-BWT200	EW3500-04-1800	EW3500-06-1800
D4XL10-BWT200	EW3510-04-1800	EW3510-06-1800
D4XL10-BWT250	EW3520-04-1800	EW3520-06-1800
D4XL10-BWT300	EW3530-04-1800	EW3530-06-1800
D4XL12-BWT300	EW3540-04-1800	EW3540-06-1800
D4XL12-BWT350	EW3550-04-1800	EW3550-06-1800
D4XL12-BWT400	EW3560-04-1800	EW3560-06-1800
D5XL14-BWT350	EW3570-04-1800	EW3570-06-1800
D5XL14-BWT400	EW3580-04-1800	EW3580-06-1800
D5XL16-BWT350	EW3590-04-1800	EW3590-06-1800
D5XL16-BWT400	EW3600-04-1800	EW3600-06-1800
D5XL18-BWT350	EW3610-04-1800	EW3610-06-1800
D5XL18-BWT400	EW3620-04-1800	EW3620-06-1800
D5XL20-BWT350	EW3630-04-1800	EW3630-06-1800
D5XL20-BWT400	EW3640-04-1800	EW3640-06-1800
D5XL22-BWT350	EW3650-04-1800	EW3650-06-1800
D5XL22-BWT500	EW3660-04-1800	EW3660-06-1800
D5XL24-BWT500	EW3670-04-1800	EW3670-06-1800

Dimensional sketches

BWMS models with aquaBoll 6.18.3 filters	Drawing no.	Revision
DL1-BK273	D0050-11-02	-
DL2-BK273	D0100-11-02	-
DL3-BK324	D0200-11-02	A
DL4-BK324	D0210-11-02	-
DL4-BK356	D0300-11-03	-
DXL6-BK356	D0400-11-02	-
DXL9-BK356	D0410-11-02	-
DXL9-BK419	D0420-11-01	-
DXL12-BK419	D0500-11-01	A
D4XL8-BK419	D0600-11-01	A
D4XL10-BK419	D0610-11-01	A
D4XL10-BK521	D0700-11-01	A
D4XL10-BK600	D0800-11-01	A
D4XL12-BK600	D0810-11-01	A
D4XL12-BK750	D900-11-01	-
D5XL14-BK750	D1000-11-01	-
D5XL16-BK750	D1100-11-01	-
D5XL18-BK750	D1200-11-01	-

BWMS models with aquaBoll BWT filters	Drawing no.	Revision
DL1-BWT80	DW0050-11-02	-
DL2-BWT80	DW0100-11-02	-
DL3-BWT100	DW0200-11-02	-
DL4-BWT100	DW0210-11-02	-
DL4-BWT150	DW0300-11-02	-
DXL6-BWT150	DW0400-11-02	-
DXL9-BWT150	DW0410-11-02	-
DXL12-BWT150	DW0415-11-02	-
DXL9-BWT200	DW0420-11-02	-
DXL12-BWT200	DW0500-11-02	-
D4XL8-BWT200	DW0600-11-02	-
D4XL10-BWT200	DW0610-11-02	-
D4XL10-BWT250	DW0700-11-02	-
D4XL10-BWT300	DW0800-11-02	-
D4XL12-BWT300	DW0810-11-02	-
D4XL12-BWT350	DW0900-11-02	-
D4XL12-BWT400	DW0910-11-02	-
D5XL14-BWT350	DW1000-11-02	-
D5XL14-BWT400	DW1010-11-02	-
D5XL16-BWT350	DW1100-11-02	-
D5XL16-BWT400	DW1110-11-02	-
D5XL18-BWT350	DW1200-11-02	-
D5XL18-BWT400	DW1210-11-02	-
D5XL20-BWT350	DW1300-11-02	-
D5XL20-BWT400	DW1310-11-02	-
D5XL22-BWT350	DW1400-11-02	-
D5XL22-BWT500	DW1410-11-02	-
D5XL24-BWT500	DW1500-11-02	-