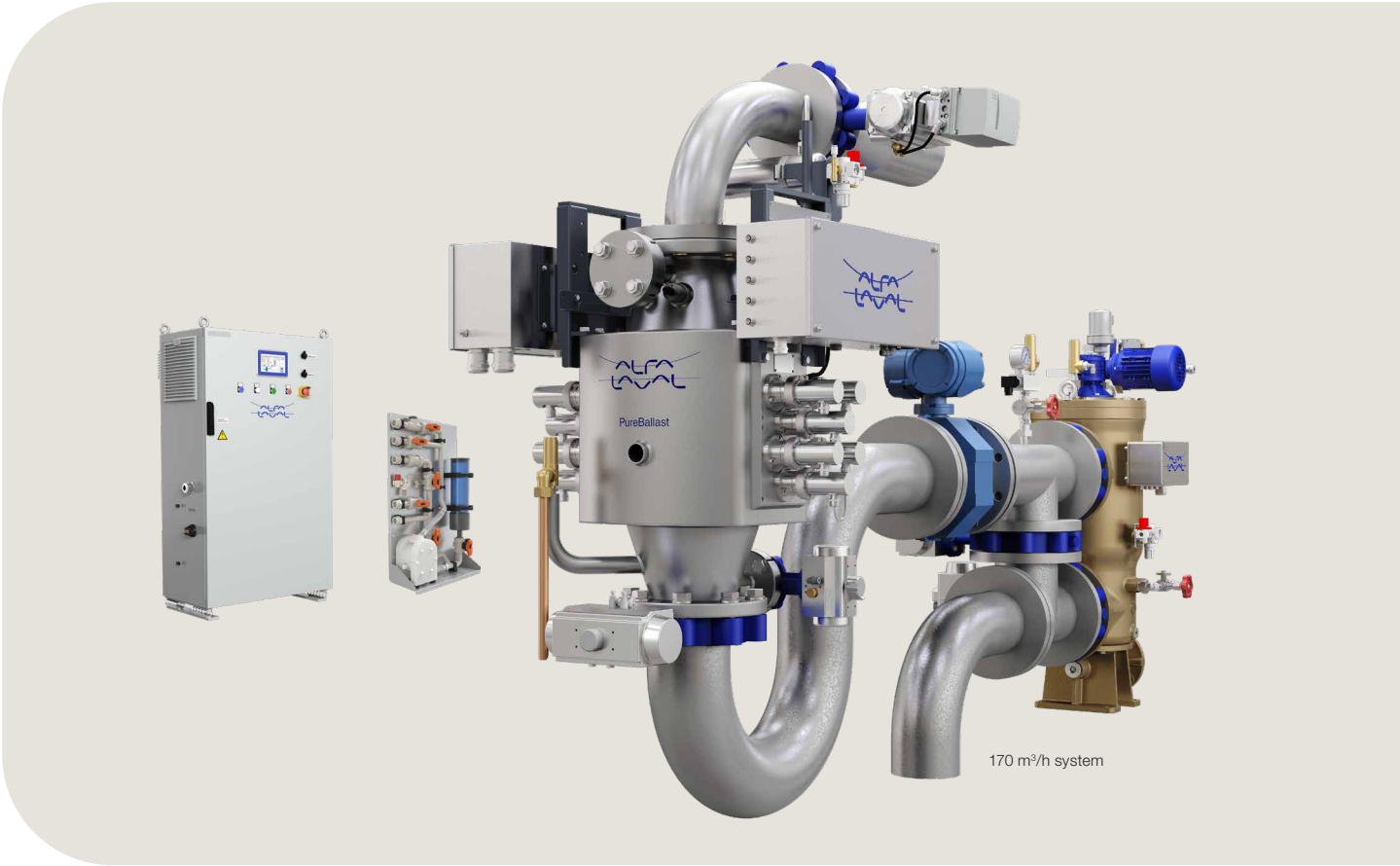
Alfa Laval PureBallast 3 Compact Flex

Ballast water management system with full installation flexibility and minimal footprint



Now in its third generation, Alfa Laval PureBallast is an automated inline treatment solution for the biological disinfection of ballast water. Operating without chemicals, it combines initial filtration with an enhanced form of UV treatment to remove organisms in accordance with stipulated limits.

The main component of the modular system is an enhanced UV reactor in which disinfection treatment occurs. The special design of the reactor's synthetic quartz lamp sleeves supports transmission of a broader wavelength spectrum, providing more UV light during disinfection. Combined with the reactor's internal design, this ensures optimal UV dosage and low energy consumption.

This leaflet covers PureBallast 3 Compact Flex, a system of loose components, designed for simple, plug-and-play installation where space is vital. The system offers space savings of up to 20% compared to PureBallast 3 Std.

Application

Type approved by IMO and the U.S. Coast Guard (USCG), PureBallast 3 Compact Flex is designed for ballast water management in all water salinities – fresh, brackish and marine – and is available for flows of 32–1000 m³/h.*

Due to its enhanced UV technology and power ramp-up capabilities, PureBallast 3 Compact Flex provides unmatched biological disinfection performance in low-clarity waters. When operating in IMO-regulated waters, full-flow treatment is possible where the UV transmittance is as low as 42%.

* *Larger capacities are possible with PureBallast 3 Std, which can be configured for flows up to 3000 m³/h with a single system or even higher with multiple systems (see separate leaflet).*

Benefits

Superior performance in all water salinities
PureBallast 3 Compact Flex offers unmatched biological disinfection performance in all water salinities: fresh, brackish and marine. This includes water in liquid form at frigid temperatures. In addition, the system excels in low-clarity water conditions. When operating in IMO-regulated waters, it performs at full flow where the UV transmittance is as low as 42%.

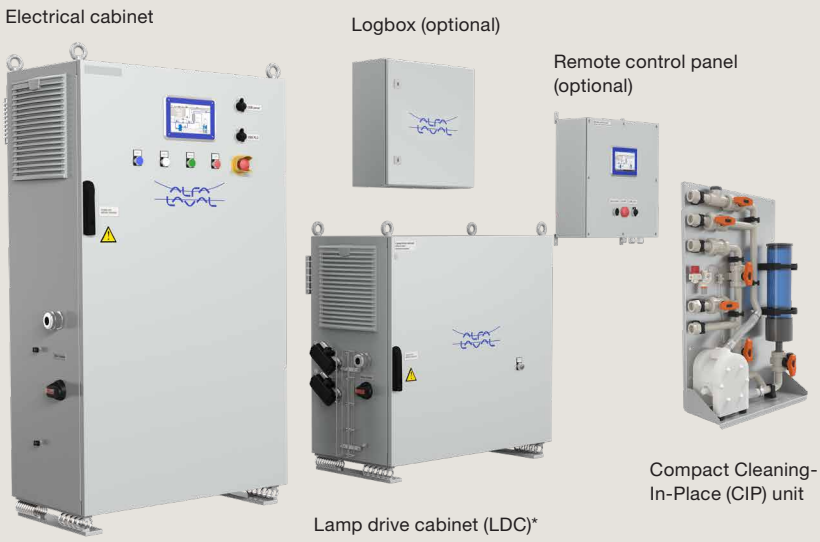
Ease of use
PureBallast 3 Compact Flex is automated, fully enclosed and thoroughly integrated with the ballast water system. Crews can spend their time and effort on other duties.

Effective power management
Automatic power management minimizes energy consumption in IMO-regulated waters, including when USCG-certified systems operate outside the United States. With this feature, PureBallast 3 Compact Flex runs at just 50% of its potential operating power in most situations. It can then ramp up to full power for the most challenging waters.

Flexible construction with minimized footprint
PureBallast 3 Compact Flex is an inline system in which the major components (filter and reactor) are incorporated into the ballast water piping. The reactor diameter, in particular, is only marginally larger than that of the piping itself.

Because PureBallast 3 Compact Flex is delivered as loose components, it offers the highest possible flexibility and space savings of up to 20% compared to PureBallast 3 Std. This makes it the answer to installation challenges, especially in retrofits and other situations where space is vital.

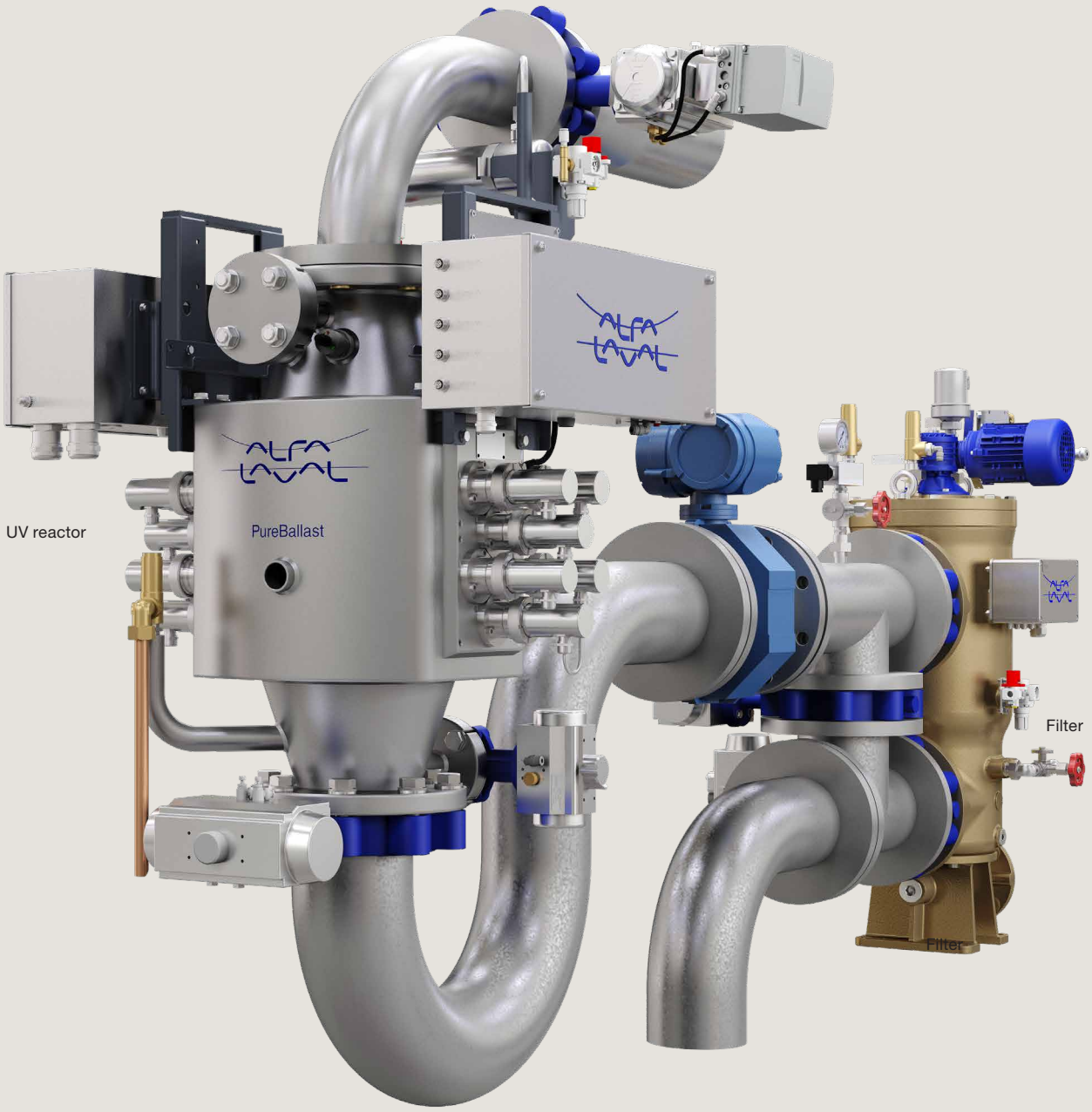
Chemical-free operation
PureBallast 3 Compact Flex meets biological disinfection requirements without the addition of salt or chemicals, even when operating in fresh water. No dosing is required, and there are no tanks or ventilation systems needed to manage consumables and residuals.



*One or two required for flows of 500–1000 m³/h

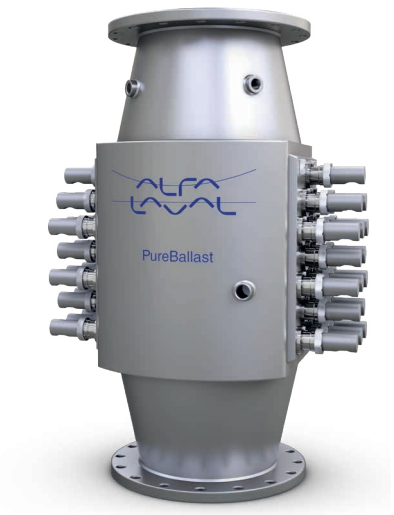
Complete worldwide support

Alfa Laval is a global supplier and an experienced partner in ballast water management, with a complete range of solutions for both newbuild and retrofit needs. Shipyards and engineering companies can expect clear and thorough documentation, as well as expert consultation. Shipowners have access to far-reaching ownership support, including a full range of dedicated services and agreements for cost-efficient peace of mind.



Treatment components

Biological disinfection comprises an initial filtration stage followed by enhanced UV treatment in a specially designed reactor. Both stages are integrated into the ballast water piping as inline components.



Filter

The filter is used during ballasting operations to block the intake of larger organisms and reduce sediment in the ballast water tanks. Bypassed during deballasting, the filter is cleaned via automatic backflushing using a small portion of the system flow. This not only improves backflushing efficiency, but also increases overall filter effectiveness by producing a higher net capacity.

In combination with the reactor, the effective basket filter design enables treatment of fresh, brackish and marine water in conditions with low UV transmittance.

UV reactor

The enhanced UV treatment stage occurs within a reactor. Four reactor sizes are available for PureBallast 3 Compact Flex, each with a flow-optimized interior that ensures high turbulence and the concentration of the UV dose. The reactor lamps employ specially designed lamp sleeves of synthetic quartz. These support transmission of a broader wavelength spectrum, thus providing more UV light during disinfection Temperature and level sensors within the reactor ensure its safety.

The reactor design, which draws on treatment technology from Wallenius Water, is specially developed for marine applications. The reactor construction is of super-austenitic stainless steel, which ensures a long lifetime without corrosion.

System components

The additional components are support systems that can be flexibly placed for an optimal design.

Electrical cabinet

In PureBallast 3 Compact Flex, the lamp drive cabinet and control cabinet are integrated into a single electrical cabinet that can be placed up to 30 m away from the UV reactor. This cabinet provides power to the UV lamps for flows up to 300 m^3/h and features a 7” display with a graphical user interface.

The control system can be integrated with onboard automation systems via Modbus, allowing access to all functions through the vessel’s Integrated Ship Control System.

Lamp drive cabinet (LDC) 1/2

For flows above 300 m^3/h, one or two additional lamp drive cabinets are required to power the UV lamps. Flows of 500–600 m^3/h require one additional cabinet (LDC1), while flows of 750–1000 m^3/h require two (LDC1 + LDC2). Each cabinet is physically separate from the UV reactor and may be placed up to 30 m cable length away.

Compact Cleaning-In-Place (CIP) unit

UV lamp performance is safeguarded by a CIP cycle that uses a non-toxic and biodegradable cleaning solution to remove any impairing build-up. Such build-up cannot be removed by wiping, which would also risk scratching the sleeve surface.

Auxiliary equipment

A broad range of auxiliary equipment is available to support integration into any vessel, including backflush pumps, sampling points, valve packages and remote control panels.

Operating sequence

Ballasting

The ballast water treatment process is fully automated. When initiated, the system undergoes a brief startup sequence.

When ballasting begins, the incoming ballast water first passes through the filter stage. This removes any larger organisms and particles, which improves the quality of the water for treatment. The filter stage is of benefit for operation in cloudy coastal waters and fresh water.

After filtration the water continues through the reactor stage, where it is disinfected by means of enhanced UV before entering the ballast water tanks.

Once ballasting is completed, the filter stage is filled with fresh water and a Cleaning-In-Place (CIP) cycle is prompted for the reactor stage. The CIP cycle should be performed within 30 hours. The reactor stage is rinsed with fresh water at the beginning of the CIP cycle and filled with fresh water upon its completion.

Deballasting

The deballasting process is essentially the same as the ballasting process. However, the filter stage is bypassed during deballasting since the water has already been filtered.

After leaving the ballast water tanks, the outgoing ballast water passes through the reactor stage to eliminate any regrowth of microorganisms that may have occurred in transit. Having thus been disinfected to the established limits, it is discharged into the receiving water at the deballasting site. The same startup and shutdown sequence, including CIP, is employed during both ballasting and deballasting.

Ex placement

PureBallast 3 Compact Flex is configured for installation within the safe zone. For placement in the hazardous zone, a PureBallast 3 Ex system is required (see separate leaflet).

Type approvals

IMO

PureBallast 3 Compact Flex systems have IMO revised G8 type approval. When operating in IMO-regulated waters, they make maximum use of their power management and other capabilities.

USCG

PureBallast 3 Compact Flex systems have USCG type approval and provide the option of minimized holding time when operating in USCG-regulated waters. The minimized holding time is just 2.5 hours and is only needed when crossing between Captain of the Port Zones.

Operation

Maintenance intervals:

- Filter inspection once per year
- Lamp replacement after up to 3000 hours of operation (a safe and easy procedure performed in minutes)
- CIP fluid replacement, typically every 3–12 months

The System Manual provides detailed information in electronic or printed format:

- Installation instructions
- Operating instructions
- Alarms and fault finding
- Service and spare parts

Commissioning and technical services are available from all Alfa Laval offices to start up the system and to provide advice about operation and maintenance. Onboard training for the crew is available upon request.

Optional equipment

- Remote control panels (max two per system)
- Backflush pump
- High-pressure system (up to 10 bar) for use with high-pressure ballast water pumps
- Sampling device
- Bypass valve
- Logbox
- Automatic Cleaning-In-Place (CIP) unit

Technical data

PureBallast 3 Compact Flex	
Power consumption, 170 m³/h reactor	11 kW (20 kW at full ramp-up*)
Power consumption, 300 m³/h reactor	17 kW (32 kW at full ramp-up*)
Power consumption, 600 m³/h reactor	33 kW (63 kW at full ramp-up*)
Power consumption, 1000 m³/h reactor	52 kW (100 kW at full ramp-up*)

** Power consumption can be increased to handle low-clarity water with low UV transmittance.*

Power supply: 400–440 VAC, 50/60 Hz
Working pressure: Max 6 bar (up to 10 bar optional)

Capacity range (flow in m³/h)

PureBallast 3 Compact Flex										
PureBallast 3 Compact Flex	(32*)	85	135	170	250	300	500	600	750	1000

** PureBallast 3 Compact Flex/85 system at reduced flow rate.*

Component dimensions

PureBallast 3 Compact Flex			
	Size (mm) (W×D×H)	Net/dry weight (kg)	Volume (L)
Reactor, 170 m³/h	663×807×1121	180	45
Reactor, 300 m³/h	734×807×1449	250	80
Reactor, 600 m³/h	800×801×1492	400	100
Reactor, 1000 m³/h	986×931×1568	540	190
Electrical cabinet for 32–1000 m³/h	900×570×1468	160	
LDC1 for 500/600 m³/h	1035×545×928	150	
LDC2 for 750/1000 m³/h	1035×545×928	150	
CIP unit	535×443×1186	63	Max 15
Basket filter, 85 m³/h	450×460×918	150	15
Basket filter, 135 m³/h	510×530×1061	180	25
Basket filter, 170 m³/h	510×530×1111	240	33
Basket filter, 250 m³/h	585×600×1259	390	61
Basket filter, 300 m³/h	600×600×1314	420	82
Basket filter, 500 m³/h	755×760×1394	664	146
Basket filter, 750 m³/h	855×830×1646	937	241
Basket filter, 1000 m³/h	900×950×1824	1141	370

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How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com