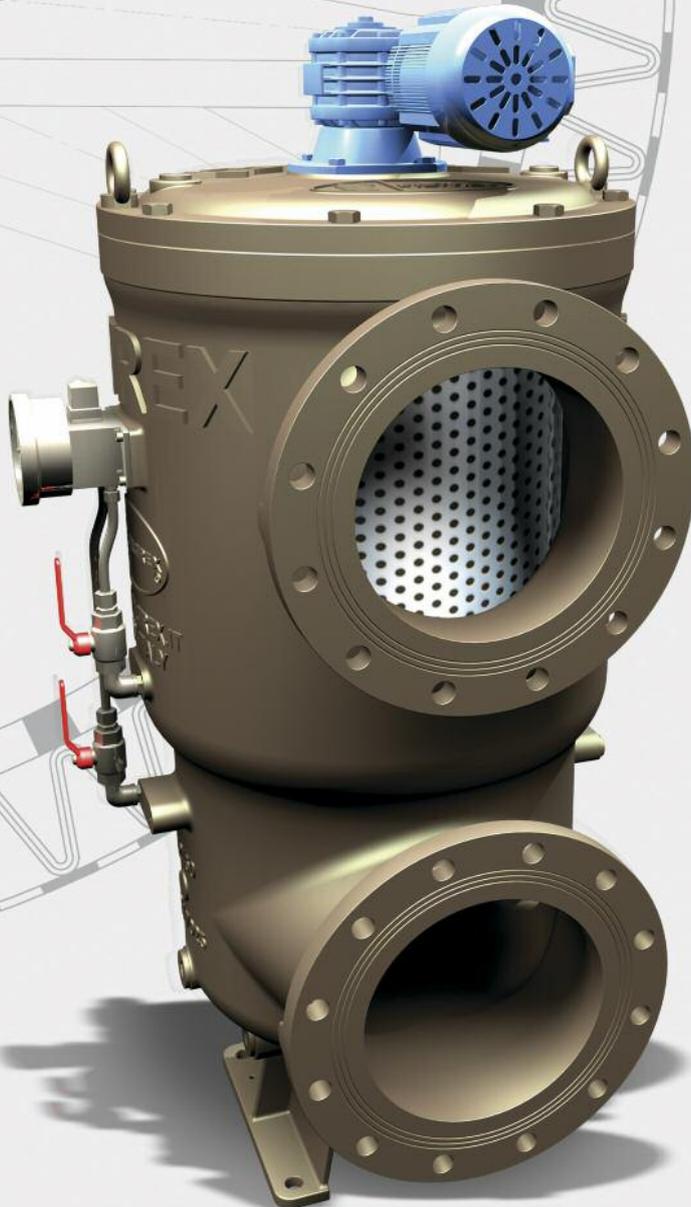




ACB[®]

*Automatic
Backwashing Filter*



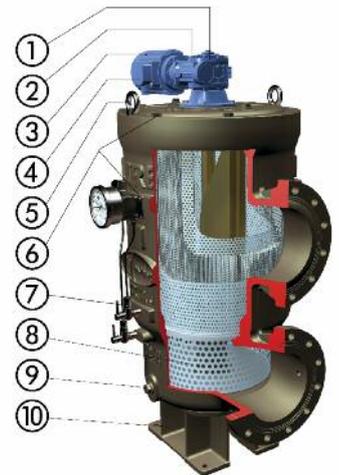
Ballast Water Filters

NO COMPETITION No other filter on the market is able to match or even come close to the performance of the ACB® filter for operation with high TSS, reliability, filtration and backwashing efficiency, durability, easy operation and maintenance. Since 1982 FILTREX has installed worldwide thousands of filters with the same operating principle.

NO WEAKNESSES The filter operates continuously, with a precise filtration degree (down to 6 µm). The armored filter element is made of stainless steel and is able to withstand high differential pressures without problems. The filter body and internal parts are built entirely of bronze-aluminium alloy ASTM B148 C95800 with a strict quality control system, approved by all major classification organizations.

MANY ADVANTAGES

- Ability to operate with high TSS
- Compact dimensions in both height and footprint, even in the presence of the backwashing pump, that is directly connected to the filter.
- The **bronze aluminum construction** guarantees a high durability, even with improper maintenance.
- No need for painting, which may get easily damaged.
- Simple: made of a few elements for easy, fast and accurate maintenance.
- Reduced flow of backwash.
- High regeneration capacity of the filter element, in just a few seconds.
- Long service life of the filter element.
- Great filtration efficiency (down to 6 µm).
- Completely manufactured by Filtrex in the Milano (Italy) factory.
- Large stock available.
- New application of an established technology with proven experience.



DETAILS MAKE THE DIFFERENCE

- 1 Electric Motor IE3 RAL 5010
- 2 Han-drive Connection
- 3 316L Gear shaft and keys
- 4 ATEX Gear reducer
- 5 316L Lifting eyes
- 6 316L Bolting
- 7 316L DP Valves, joints and piping
- 8 316L Pre-Filter
- 9 3 sides 316L socket head plugs
- 10 Orientable baseframe and backwash outlet

The comparative analysis carried out by approved certifying bodies, on samples collected during the IMO certification in diverse oceans, with varying degrees of filtration (in addition to the traditional 40 µm) demonstrated the high capacity of the ACB® filter to remove zooplankton, with an efficiency increase of 85%, from 40 µm (Average Zooplankton. inds./m³ 582) to 20 µm (Average Zooplankton. inds./m³ 87).

Zooplankton removal efficiency

40 µm Filtration degree
Testing Certificate

20 µm Filtration degree
Testing Certificate

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시험성적서 번호
Certificate No.: KOMERI-0906-12T1810-1

접수일자 : 2012. 11. 23 Date of Receipt
신청자 : FILTREX s.r.l. Applicant
주소 : Via Rubattino 94B, Milan - ITALY Address

시료명 Name of Product: Automatic Backwashing Filter (Filtering element : 40 µm filtration degree) | 모델 Model: ACB-999-300, 1 000 m³/h | 일련번호 Serial No: S/N16062-C27847/12

Certificate No.: KOMERI-0906-12T1810-1 **KOMERI**

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Certificate No.: KOMERI-0906-12T1810

접수일자 : 2012. 11. 23 Date of Receipt
신청자 : FILTREX s.r.l. Applicant
주소 : Via Rubattino 94B, Milan - ITALY Address

시료명 Name of Product: Automatic Backwashing Filter (Filtering element : 20 µm filtration degree) | 모델 Model: ACB-999-300, 1 000 m³/h | 일련번호 Serial No: S/N16062-C27847/12

Certificate No.: KOMERI-0906-12T1810 **KOMERI**

1.6 TEST RESULTS

1.6.1 Zooplankton

Sample Tag	Sampling Time (hh:mm)	Zooplankton density (inds./m ³)	Removal efficiency (%)	Survival rate (%)
Inlet water	15:00	23 667	97.54	2.46
Outlet water 1	14:30	495		
Outlet water 2	14:47	534		
Outlet water 3	14:56	717		

* Data indicates an arithmetic mean.

Average 582

1.6 TEST RESULTS

1.6.1 Zooplankton

Sample Tag	Sampling Time (hh:mm)	Zooplankton density (inds./m ³)	Removal efficiency (%)	Survival rate (%)
Inlet water	11:18	23 667	99.63	0.37
Outlet water 1	11:34	109		
Outlet water 2	11:51	72		
Outlet water 3	12:04	80		

* Data indicates an arithmetic mean.

Average 87

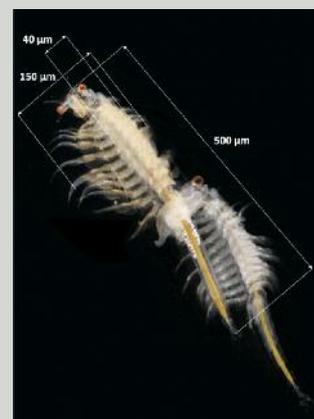
85%

Size	ND	m³/h (±5%) @ Δp ≤ 0.1 bar 40 μm	Backwash flow (lt/sec)	Footprint dimensions (without backwashing pump)			Volume (lt)	Installed Power (kW)		Weight (kg)
				m x m	m²	filter		pump		
902	50	25	1,70	0,36	0,36	0,13	4	0,12	1,10	61
903	65	35	2,15	0,36	0,36	0,13	4	0,12	1,10	62
904	80	55	2,66	0,36	0,36	0,13	10	0,12	1,10	73
906	100	87	4,09	0,36	0,36	0,13	12	0,12	1,10	104
910	150	135	6,82	0,45	0,45	0,20	27	0,12	1,50	164
915	150	190	9,55	0,50	0,50	0,25	37	0,12	2,20	198
935	200	255	9,55	0,55	0,55	0,30	46	0,18	2,20	232
945	200	340	12,82	0,55	0,55	0,30	75	0,18	3,00	330
955	250	515	12,82	0,70	0,70	0,49	140	0,25	3,00	440
985	300	770	19,22	0,80	0,80	0,64	210	0,37	4,00	653
999	350	1040	25,95	0,85	0,85	0,72	320	0,37	5,50	842
9100	400	1500	35,00	0,85	0,85	0,72	500	0,37	9,20	1020
9120	500	2100	35,00	1,00	1,00	1,00	890	0,75	9,20	1600
9200	600	3000	35,00	1,30	1,30	1,69	1700	0,75	9,20	2400

FILTREX ACB® Choice of the Configuration

Depending on the operational requirements, the ACB® filter can also be supplied with the following accessories:

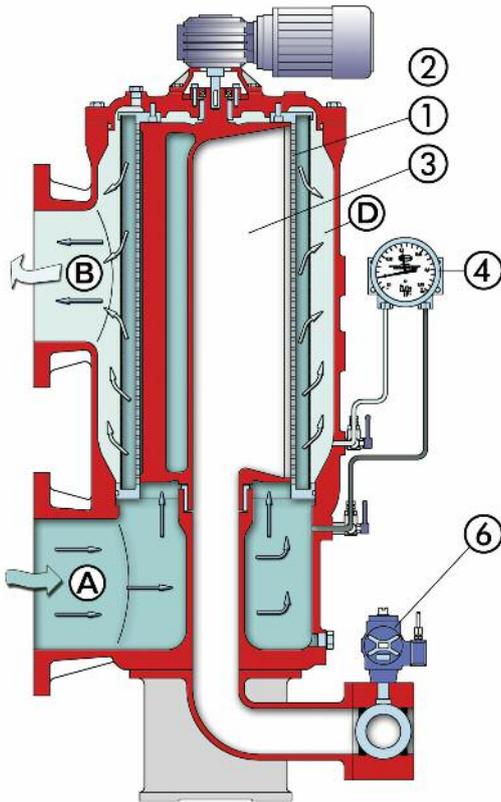
- Electric panel
- Backwash pump
- Bronze aluminium fittings for filter by-pass
- Automatic valves for venting, draining and refilling.



FILTREX ACB® Technical Information

Application	Ship ballast water treatment units, fresh, brackish and sea water
Type of filter	Automatic backwashing
Filtration	Continuous
Cleaning cycle	By differential pressure and/or timer
Cleaning system	Backwash by reverse flow, sector by sector
Cleaning fluid	Same filtered fluid
Power supply	Electric and pneumatic
Nominal Pressure	From 2 to 10 bar
Inlet/Outlet connections	From ND 50 to ND 600, NP 10
Nominal Temperature	60 deg C
Material	Bronze-Aluminium alloy ASTM B148 C95800
Building tolerances	EN 226768-1 class V
Gaskets	Buna
Type of filtering element	Armored pleated element
Filtering element material	Stainless Steel AISI 316L
Filtration degree	Down to 6 μm
Certification	ATEX/IECEX

PHASE 1 - FILTRATION

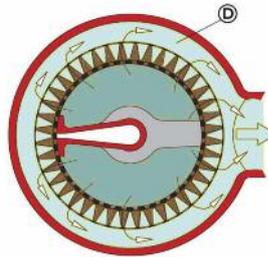


$\Delta p < \Delta p_{set}$

- Differential pressure gauge ④ in "clean" condition
- Electric motor ② in "off" position
- Backwashing shaft ③ "not rotating"
- Backwashing valve ⑥ "closed"

1 - FILTRATION: The fluid enters from ①, and flows through the sectors of the filter element ① (inside to outside filtration). The filtered fluid is conveyed into the chamber ④ and exits from ②.

During this phase, the filter operates as a static filter, and the cleaning of the filter element is not active. As the impurities accumulate in the filter element sectors, the differential pressure Δp indicated by the pressure gauge ④ gradually increases until it reaches the set value, starting phase 2 (cleaning during filtration).



PHASE 2 - FILTRATION and CLEANING

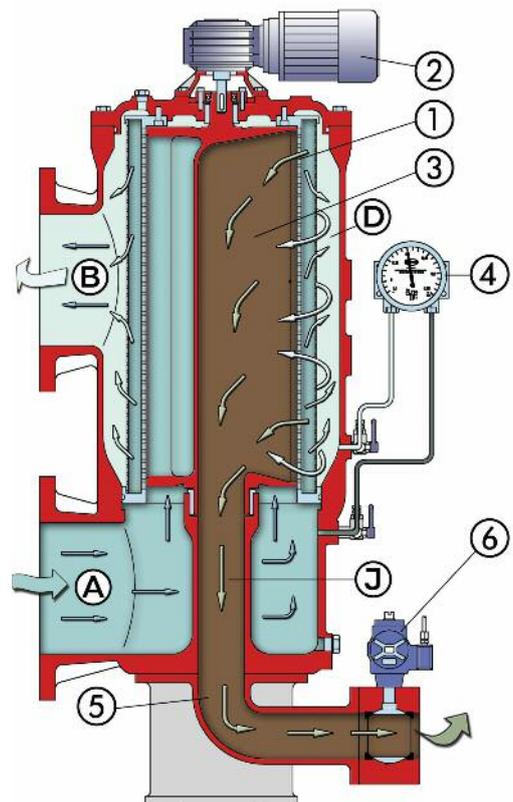
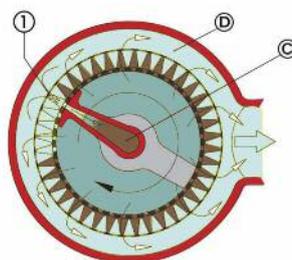
$\Delta p \geq \Delta p_{set}$

- Differential pressure gauge ④ reaches the set value
- Electric motor ② in "on" position
- Backwashing shaft ③ "rotating"
- Backwash valve ⑥ "open"

1 - FILTRATION: The filtration is carried on by the sectors of the filter element (filtration from inside to outside).

2 - CLEANING THE FILTER DURING FILTRATION: While all sectors of the filter element ensure normal filtration, the sector in front of the backwashing shaft is cleaned by the reverse flow drawn from the filtered fluid chamber ④ (outside to inside backwash). The impurities are transported by the backwashing fluid (filtered water), through the chamber ③ and the duct ⑤, before leaving from ⑥.

At the end of the backwashing cycle, the electric motor ② stops and the backwash valve ⑥ closes, thus bringing the filter back to the Phase 1 (static filtration).



ACB® filters have been tested and certified by the leading certifying organizations. Thanks to its small dimensions the automatic filter ACB® may be installed in tight spaces, on all new and existing ships



25 m³/h

3000 m³/h



Filter ACB-955 - tested at DHI, Denmark.



Filter ACB-9100 on test bench: Flowrates up to 4.200 m³/h



Very small footprint



ACB filters in operation



High production capacity



Short lead time



Filtrex Corporate Headquartes - Milano (Italy)

Filtrex s.r.l. with its headquarters and state of the art manufacturing facilities in Milano, Italy provides filtration solutions and technical services to many industries such as hydrocarbon, chemical, environment protection, power generation, water treatment, Navy and marine transport. Filtrex operates from its headquartes in Italy and through worldwide branches, and has received prestigious certifications for quality and standards of engineering and manufacturing.

Filtrex provides its customers with a comprehensive scope of work, services and supply, preparing the engineering design specifications and P&ID's, purchasing equipment and materials, fabricating and assembling the filters into module(s) in its fabrication shop, furnishing data books and operating manuals, and providing technical services for inspection, installation, commissioning, start up and after start up.



Filtrex Manufacturing Unit #4 - Vignate (Italy)

ACB® is only one of the comprehensive range of filters manufactured by FILTREX.
Please contact us for details and documentation

FILTREX s.r.l.

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Certified Quality:



ISO 9001 - ISO 14001



AD-HP0



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