



# Alfa Laval Alfa-V ACV/ANV

## Industrial condensers V-type

### General information & application

The Alfa Laval Alfa-V series is a wide range of heavy duty V-type condensers for air conditioning and refrigeration applications. Alfa-V air-cooled condensers provide high capacities at a modest footprint.

Refrigerants	all halocarbon (ACV) or ammonia (ANV)
Capacities H(C)FC*	115 up to 1850 kW
Capacities NH <sub>3</sub> *	97 up to 1890 kW

\* Nominal capacities (T<sub>air</sub> = 25°C, T<sub>cond</sub> = 40°C, T<sub>subcool</sub> < 3K, T<sub>superheating</sub> = 25K).

### Coil

An innovative coil design provides excellent heat transfer at minimal refrigerant charge. Depending on the application, condensers are fitted with cross-fin copper (ACV) or smooth stainless steel tubing (ANV). Standard fin spacing 2.1 mm, available with two Alu-fin types:

Turbo fins	maximized capacity
Industrial fins	long lasting performance

Separate connections provide the opportunity for independent operation of both condenser coils.

### Casing

Frame construction provides high rigidity for protection against vibration and thermal expansion. Casing, supports and frame made of corrosion resistant galvanized steel (class C4-H). Separated fan sections and removable fan rings.

### Fan motors

ErP compliant fan AC & EC motors, available in three fan diameters (800, 910 & 1000 mm) and five noise levels. Motors with external rotor, protection class IP 54 according to DIN 40050.

AC power supplies 400/50/3, 400/60/3 and 460/60/3 with integrated thermo contacts to provide reliable protection against thermal overload. EC power supply 380-480/50-60/3.



Alfa-V ACV

### Design pressure

Design pressure 33 bar (ACV) or 30 bar (ANV). Each heat exchanger is leak tested with dry air and finally supplied with a nitrogen pre-charge.

### Benefits

- Heavy duty design with high corrosion resistance.
- Favorable capacity/footprint ratio.
- Available with easily cleanable industrial fins.
- Excellent sound characteristics.
- Reliable performance, Eurovent certified (ACV only).
- Easy installation & maintenance.
- Energy efficient - low total cost of ownership.
- Two-year product guarantee.
- Easy access to additional on-line product information (QR code).



ACV

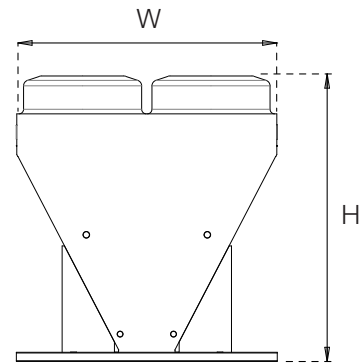
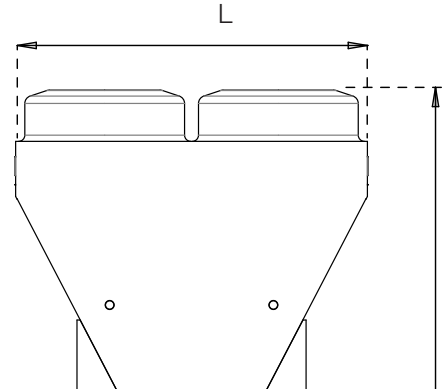


ANV

## Options

- Sub-cooling circuit (SC)
- Non-standard fin spacing (up to 3.2 mm)
- Coil corrosion protection
  - Epoxy coated aluminium fins (EP)
  - F-coat (FC)
  - Blygold coating (BY)
  - Seawater resistant aluminium AlMg (SWR)
- Coil protection grid (GR)
- Spray water device kit (KW)
- Casing coated RAL 9002
- Container skid (SK)
- Vibration dampers (VD)
- Special fan motors
  - Protection class IP55
  - High-temperature motors
- Electrical options
  - Isolating switch (SW)
  - Motors wired to a common terminal box (CB)
  - Switchboard IP55 (B)
  - Fan step control cabinet (BP/BSP)
  - EC fan speed control cabinet (IMC)

Nr. of fan pairs	Dimensions mm		
	L	H	W
2	2940	2500	2230
3	4250	2500	2230
4	5560	2500	2230
5	6870	2500	2230
6	8190	2500	2230
7	9490	2500	2230
8	10800	2500	2230
9	12100	2500	2230



## Code description

<b>ACV</b>	<b>S(E)</b>	<b>80</b>	<b>3</b>	<b>.1</b>	<b>B</b>	<b>D</b>	<b>SK</b>	<b>*</b>	-	<b>AL</b>	<b>2.1</b>	<b>CU</b>	<b>*</b>
1	2	3	4	5	6	7	8	9		10	11	12	13

- Alfa Laval Alfa-V condenser (ACV=halocarbon, ANV=ammonia)
- Sound level/fan code (T=turbo, S-standard, L=low, Q=quiet, R=residential, E=EC fan motor)
- Fan diameter (80=800 mm, 90=910, 100=1000 mm)
- Number of fan pairs (2 to 9)
- Alfa-V series II
- Tube rows code (A, B, C, D)
- Fan motor connection (D=delta, Y=star)
- Packing (SK=container skid)
- Electrical options
- Fin material/coating (AL=aluminium, IF=industrial fins, SWR=AlMg, EP=epoxy coated aluminium, FC=F-coat, BY=Blygold)
- Fin spacing (2.1, 2.3, 2.5, 3.0 and 3.2 mm)
- Tube material (CU=copper, SS=stainless steel)
- Options

## Selection

Selection and pricing is to be performed with our Alfa Laval air heat exchanger selection software. Selection output includes all relevant technical data and dimensional drawings.

## Certifications

All ACV condenser models are "Eurovent Certify All" certified. The Alfa Laval quality system is in accordance with ISO 9001 and ISO 14001. All products are manufactured according to PED regulations.



AHE00015EN 1703

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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](http://www.alfalaval.com)



# Alfa Laval Blue BC & BN

## Air-cooled condensers

### General information & application

The Alfa Laval Blue series is a wide range of heavy-duty air cooled condensers for air conditioning and refrigeration applications. Alfa Laval Blue condensers are available for both horizontal and vertical air direction. Available both in single (M) or dual (D) fan row: separate connections in the dual fan row (D) models provide the opportunity for independent operation of both condenser coils. Dedicated serie for R290 (BCP) and R410A (BCH).

Refrigerants	all HFO and HFC (BC) or ammonia (BN)
Capacities BC*	56 up to 1069 kW
Capacities BN*	50 up to 960 kW

\*Nominal capacities (T<sub>air</sub> = 25°C, T<sub>cond</sub> = 40°C, T<sub>subcool</sub> < 3K, T<sub>superheating</sub> = 25K).

### Finned coil

An innovative coil design provides excellent heat transfer at minimal refrigerant charge. Depending on the application, condensers are fitted with cross-fin copper (BC) or smooth stainless steel tubing (BN). Available with two Alu-fin types:

Turbo fins	maximized capacity
Industrial power fins (IF)	long lasting performance

Available in different fin thicknesses and fin spacings.

### Construction

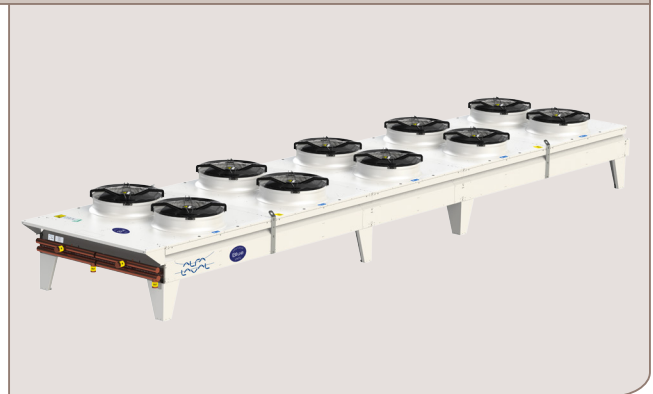
Frame construction provides high rigidity for protection against vibration and thermal expansion. Casing and frame made of corrosion resistant pre-galvanized sheet steel, epoxy coated white RAL 9002 on both sides. Separated fan sections.

### Fan motors

High efficiency AC or EC fan motors, available in different fan diameters (800, 910 & 1000 mm) and noise levels, power supply 400/50/3. Motors with external rotor, protection class IP 54 according to DIN 40050. Integrated thermo contacts provide reliable protection against thermal overload.

### Options

- Mounting feet for vertical airflow available in 3 heights: 500, 850, 1200 mm
- Sub-cooling circuit (SC)
- Spray water kit (KW)
- Vibration dampers (VD)
- Hinged fan panels (HF)



Alfa Laval Blue condensers

- Upon request fan motor options
  - 400V/3ph/60Hz
  - 480V/3ph/60Hz (IP54)
  - Protection class IP55
  - High-temperature motors
- Coil corrosion protection
  - Fins epoxy coated (EP)
  - Fins seawater resistant (SWR)
  - Blygold treatment (BY)
  - F-coat treatment (FC)
  - Copper fins (CU)
- Packing options
  - Pallet (P)
  - Protection pallet (PP) *for dual fan row models*
  - Crate (CR) *for single fan row models*

### Benefits

- Heavy duty design with high corrosion resistance
- Reduced refrigerant charge
- Available with easily cleanable industrial power fins
- Excellent sound characteristics, suitable for residential applications
- Reliable performance, Eurovent certified (only for models included in Eurovent scope)
- Easy installation & maintenance.
- Energy efficient: low total cost of ownership.
- Two-year product guarantee.
- Easy access to additional on-line product information (QR code)



## Dimensions

type	L*	W	H
B*M 801s	1880	1450	1270
B*M 802s	3280	1450	1270
B*M 803s	4680	1450	1270
B*M 804s	6080	1450	1270
B*M 805s	7480	1450	1270
B*M 801	2230	1450	1270
B*M 802	3980	1450	1270
B*M 803	5730	1450	1270
B*M 804	7480	1450	1270
B*M 805	9230	1450	1270
B*M 901	2580	1450	1314
B*M 902	4680	1450	1314
B*M 903	6780	1450	1314
B*M 904	8880	1450	1314
B*M 1001	2580	1450	1320
B*M 1002	4680	1450	1320
B*M 1003	6780	1450	1320
B*M 1004	8880	1450	1320
B*D 802	3980	2250	1270
B*D 803	5730	2250	1270
B*D 804	7480	2250	1270
B*D 805	9230	2250	1270
B*D 806	10980	2250	1270
B*D 902	4680	2250	1314
B*D 903	6780	2250	1314
B*D 904	8880	2250	1314
B*D 905	10980	2250	1314
B*D 1002	4680	2250	1320
B*D 1003	6780	2250	1320
B*D 1004	8880	2250	1320
B*D 1005	10980	2250	1320

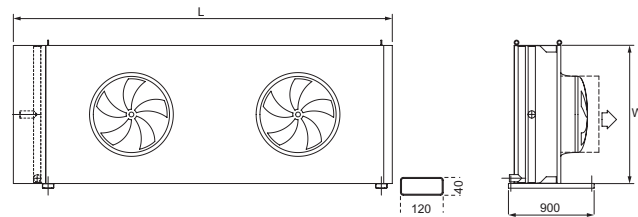
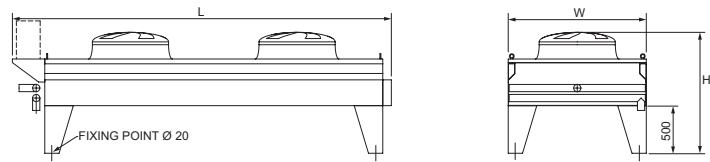
\*: +60 mm for BN models

## Code description

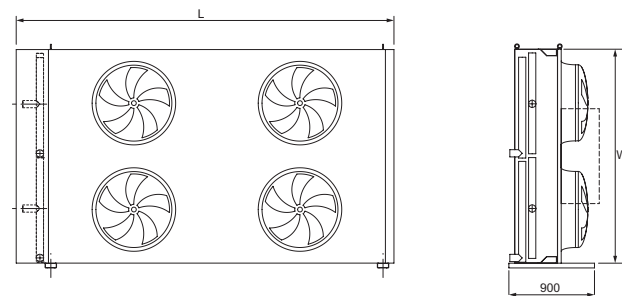
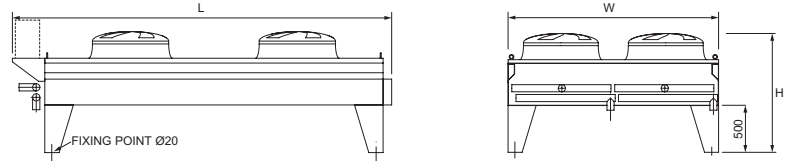
BC	MH	SE	80	4	s	-	A	-	DCR	Feet	-	*	AL	2.1	CU	*	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

- 1 Alfa Laval Blue condenser
- 2 Refrigerant: C=HFO/HFC, N=ammonia
- 3 Number fan rows: M=1, D=2
- 4 Dedicated series: blank=default, P=propane (R290), H=R410A,
- 5 Sound level/fan code: T=turbo, S=standard, L=low, Q=quiet, R=residential
- 6 EC fan: blank=AC fan, E=EC fan
- 7 Fan diameter: 80=800 mm, 90=910 mm, 100=1000 mm
- 8 Number of fans per row: 1 to 6
- 9 Short coil module: blank=default, s= short coil module
- 10 Tube rows code: A, B,C
- 11 Fan motor connection: D=delta, Y=star
- 12 Packing: P=pallet, PP=pallet with protection for headers and coil, CR=crate
- 13 Feet=mounting feet supplied mounted (type of feet according to airflow selected); Blank=mounting feet supplied loose
- 14 Electrical accessories
- 15 Fin material/coating: AL=aluminium, IF=industrial fins, SWR=seawater resistant fins, EP=epoxy coated alu, FC=F-coat, BY=Blygold
- 16 Fin spacing: 2.1, 2.3, 2.5, 3.0 and 3.2 mm
- 17 Tube material: CU=copper, SS=stainless steel
- 18 Options

## Dimensions B\*M



## Dimensions B\*D



## Electrical accessories

- Switch on/off (SW)
- Connection box: for AC fans (CB), for EC fans (CBP), for EC fans including master controller and pressure probe (CBMP)
- Basic switchboard for AC fans (BS)
- Basic switchboard for AC fans and step controller (BSP)
- Basic switchboard for EC fans (ECCB)
- Basic switchboard for EC fans and master controller (ECCBM)
- EC fans full management system (ICM)

## Certifications

The Alfa Laval quality system is in accordance with ISO 9001. All products are manufactured according to PED rules. Eurovent certified performance for models included in the scope of the programme.

## Design pressure

Design pressure 33 bar for BC and BCP, 30 bar for BN and 45 bar for BCH. Each heat exchanger is leak tested with dry air and finally supplied with a nitrogen pre-charge.

## Selection

Selection and pricing is to be performed with our Alfa Laval air heat exchanger selection software. Selection output includes all relevant technical data and dimensional drawings.

## How to contact Alfa Laval

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#### Alfa Laval in brief

Alfa Laval is a leading global provider of specialized products and engineered solutions.

Our equipment, systems and services are dedicated to helping customers optimize the performance of their processes. Time and time again.

We help our customers to heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuffs, starch and pharmaceuticals.

Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

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## Efficient design, optimized performance

### Alfa Laval Blue – Enhanced design for outdoor duty



# Alfa Laval Blue – Range



## Alfa Laval Blue BC & BN

### Condensers

Alfa Laval Blue BC condensers are optimized for HFO, HFC and blends. The range also includes a dedicated series for propane (BCP), R410A (BCH) and ammonia (BN) with stainless steel tubing.

- Optimized for new refrigerants
- Reduced refrigerant charge thanks to low internal volume
- Sub cooling available



## Enhanced design for outdoor duty

Introducing Alfa Laval Blue, the new generation of heavy-duty condensers, gas coolers and liquid coolers for refrigeration and air conditioning applications, from Alfa Laval.

Alfa Laval Blue delivers improved efficiency for optimal sustainability and performance. Developed with an application-led approach, the Alfa Laval Blue range is available in a number of combinations, with dedicated selection software features that allow easy customization and integration.

Available for both vertical and horizontal airflow, Alfa Laval Blue is suitable for exterior installation, with easy integration into any environment. The compact footprint of the unit makes it ideal for tight spaces. The modular range also features nestable mounting feet for easy installation and system customization. Furthermore, its unique lifting system, designed with four lifting points, offers the advantage of easier handling on-site.

### Alfa Laval Blue - At a glance

- Improved energy efficiency
- Nestable mounting feet in 3 different heights
- Each series is optimized according to refrigerants
- EC and AC fans
- Reliable performance, Eurovent certified
- Easy selection
- Rigorously tested against vibration, thermal expansion and external loads
- FEM tested against snow, wind and earthquake loads

## Alfa Laval Blue BX

### Gas coolers

Alfa Laval Blue BX is designed and optimized specifically for CO<sub>2</sub> as a single refrigerant.

- Design pressure 120 bar
- Tested with dry nitrogen at 172 bar
- Connections available in copper or stainless steel

## Alfa Laval Blue BD

### Liquid coolers

Alfa Laval Blue BD industrial dry coolers are suitable for fluids in refrigeration and air conditioning installations, as well as for the closed-circuit cooling of various process liquids.

- Reliable performance
- Dedicated series for compressor oil coolers (BDO)
- Available with copper or stainless steel tubes



# Alfa Laval Blue standard features



## Compact and modular with increased capabilities

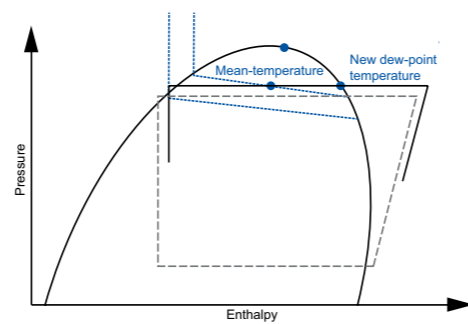
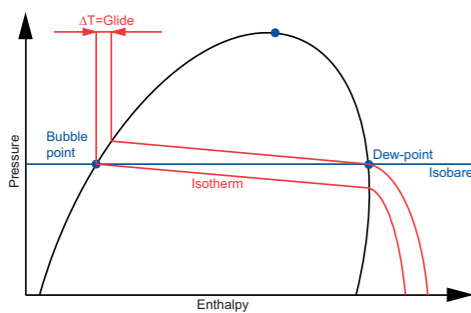
With the advantages of compact, modular design, a variety of fan sizes and combinations and nestable mounting feet, Alfa Laval Blue offers a wide range of fully customized solutions.

### Optimized for new refrigerants

The Alfa Laval Blue BC series of condensers is optimized for new refrigerants (HFO & HFO/HFC blends). New refrigerants can display considerable temperature glide - the change in temperature at condensing or evaporating point between bubble-point and dew-point at constant pressure. This is caused by the variable composition of the refrigerant. The least volatile component condenses first at dew-point, while the temperature decreases, until the most volatile components condensate and no vapor is left at the so-called bubble-point.

Traditional condenser design is based on condensing temperature being the refrigerant dew-point temperature. This is however,

only effective when used in combination with azeotropic or nearly azeotropic refrigerants. In the case of high glide refrigerants, a design based on the dew-point approach results in oversized units. To overcome this, the concept of mean condensing temperature defined as the mean between dew-point and bubble-point temperature has been introduced. A design based on the mean-temperature approach results in the same condenser size compared to azeotropic (glide-free) refrigerants, although with higher condensing pressures.



Future-proof and with modularity in mind, units in the Alfa Laval Blue series are built for optimal performance, reduced refrigerant charge and are suitable for a variety of refrigerant applications. The result is the most effective condenser and liquid cooler platform, delivering improved performance and energy efficiency, combined with the most compact and modular design.

### Easy tailoring

The versatility of Alfa Laval Blue renders it ideal for any application. Thanks to its fully customizable, modular design concept and easy integration, units can be tailored to suit a wide range of environments and functions.

- Unit footprint doubles as input for selection software
- Nestable mounting feet available in 500, 850 and 1200 mm height
- High efficiency EC or AC fan motors
- Number of fan sizes and combinations available
- State-of the art electrical accessories
- Wide range of fin materials and anti-corrosion treatments

### Improved capacity

For improved capacity, modules are tested in our thermal chamber. This testing enables us to provide modules with the ideal footprint and maximum capacity for any application. Factors such as: module size, type of tubes, coil pitch and the distance between the fan and heat exchanger are taken into account, to ensure optimal efficiency and capabilities.

### Application expertise

Alfa Laval's application expertise enable us to create a platform with specially developed solutions for even the most common applications. In addition, the series features specific materials and design pressures, which have been selected to best fit the market's needs.

Series	Refrigerant application	Design pressure	Tubes material
BC	HFO & HFC	33 bar	Copper
BCP	Propane	33 bar	Copper
BCH	R410A	45 bar	Copper
BN	Ammonia	30 bar	Stainless steel
BD	Water Glycol	10 bar	Copper
BDY	Water glycol	10 bar	Stainless steel
BDO	Compressor oil cooler	30 bar	Copper
BX	CO <sub>2</sub>	120 bar	Copper-iron alloy (K65)

Model	Module length [mm]	Module number for single row models				Module number for dual row models		
		BCM BCMP BCMH BNM	BDM BDMY	BDMO	BXM	BCD BCDP BCDH BND	BDD BDD6 BDDY	BXD
800s	1400	1-5	1-5	1-3	1-5	Na	Na	Na
800	1750	1-5	1-5	1-3	1-4	2-6	2-6	2-4
900	2100	1-4	1-6	1-3	1-4	2-5	2-6	2-4
1000	2100	1-4	1-6	1-3	1-4	2-5	2-6	2-4

# Alfa Laval Blue standard features



Exclusive design of Alfa Laval Blue

## Easy lifting

Each model in the Alfa Laval Blue series is fitted with four lifting points for easy and enhanced lifting and handling. Models with up to 3 modules are fitted with heavy duty eyebolts. Models with 4 to 6 modules are fitted with lifting stirrups.



Eyebolt: 1 to 3 modules



Lifting stirrups: 4 to 6 modules

## Design that's outside the box

### Frame and casing

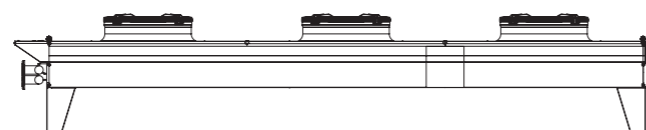
Constructed from heavy duty, corrosion resistant, pre-galvanized sheet steel. The casing is epoxy powder coated with white RAL9002 on both sides. Corrosion protective coating and alternative colour finishes are available upon request.

The frame construction of Alfa Laval Blue provides high rigidity for protection against vibration and thermal expansion, rendering it ideal for industrial refrigeration installations.

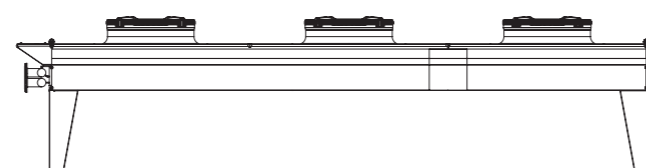
- Heavy duty design with high corrosion resistance
- Easy installation and maintenance
- Construction provides protection against vibration and thermal expansion
- Made of pre-galvanized sheet steel
- Powder coated on both sides

### Mounting feet

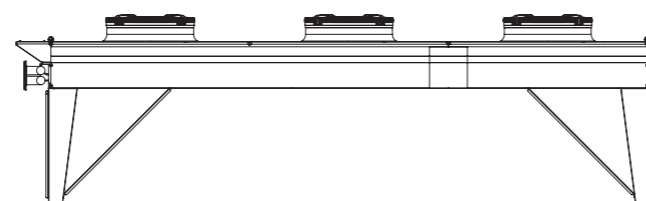
When vertical airflow is selected, the Alfa Laval Blue series features nestable mounting feet for vertical airflow installation. Feet are available in three different height options: 500 mm, 850 mm and 1200 mm.



Mounting feet: 500 mm



Mounting feet: 850 mm



Mounting feet: 1200 mm

## You can trust Alfa Laval's sound data

### Complete units

Air heat exchangers sound power values are often supplied per fan. Alfa Laval, however, supplies reliable sound power data for the complete heat exchanger. Sound specification is crucial for air heat exchangers, since they are often used in areas with human presence, and adequate sound levels are required for compatibility with the surrounding environment. There are a few methods used in the refrigeration industry to address sound values, each with different specific advantages or disadvantages. The basic issue is whether to refer to sound power ( $L_wA$ ) or sound pressure ( $L_pA$ ).

### Sound power $L_wA$

Sound power is the sound energy that is generated per time unit ( $W=Nm/s$ ). Sound power is not dependent on the distance from the sound source and other situational circumstances, which makes it the only correct value to compare different sound sources.

Sound power cannot be measured directly (we measure the sound pressure  $L_p$ ) so sound power is the result of a complex calculation involving many different parameters. Sound power values are usually given in dB(A).

### Sound pressure $L_pA$

Sound pressure is the sound force/surface ( $P=N/m^2$ ), the force N being the alternating pressure generated by acoustic oscillation of the air. Sound pressure values can be directly measured under laboratory conditions according to strictly formalized standards (free field conditions, fixed distances etc.). Sound pressure values are also given in dB(A). Sound pressure values for Alfa Laval air heat exchangers are calculated according to EN13487 in free field conditions.

Sound pressure values given in a brochure or data sheet are no clear indication of the actual sound characteristics in the working situation. There are numerous acoustic determinants to consider during actual operation of air heat exchangers, such as the number of reflection planes, the presence of additional units, and installation construction. This needs to be calculated based on the provided sound power values in combination with all relevant situational parameters. This is primarily a responsibility of the contractor or plant designer.





# Alfa Laval Blue standard features



## Reality based innovation

### Enhanced design

The enhanced design of Alfa Laval Blue offers greater capabilities. Improved features, such as optimized coil design, length of circuits based on refrigerants for condensers and a choice of louvered aluminium or industrial fins deliver increased performance and versatility.

The improved frame design has been specially developed to support and drive the thermal expansion of the heat exchanger. Both frame and casing are built for improved handling and installation, and to withstand extreme climate conditions.

- Selectable fin design
- Robust casing for safety and reliability
- Optimized circuit lengths based on refrigerants for condensers

### Reliable performance – Eurovent

Alfa Laval participates in the Eurovent Certify-all programmes for all products within our heat exchanger series. Eurovent is Europe's Industry Association for indoor climate (HVAC), refrigeration and process cooling. Eurovent certification programmes provide criteria for the rating of products, which includes evaluation of manufacturer's performance data by Eurovent and testing of selected units by independent laboratories. All models



in the Alfa Laval Blue series included in the Eurovent scope have been tested and have undergone checks by independent specialists, ensuring optimal reliability and accurate ratings for the following characteristics:

- Fan power output
- Energy ratio & energy class
- Air volume flow
- A-weighted sound power & pressure level

### Tried and tested

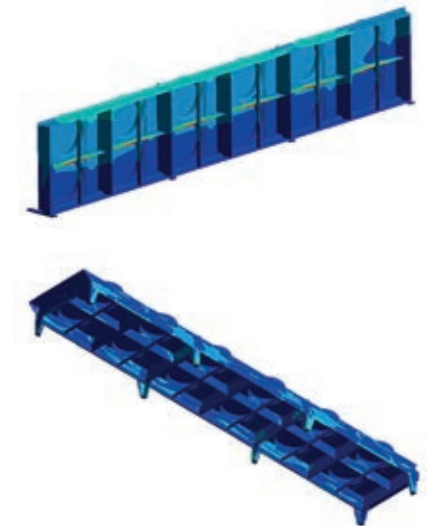
Reliability is paramount. To ensure full reliability of Alfa Laval products, performance data and extensive testing, including regular performance checks of both existing product ranges and in-development products are carried out in Alfa Laval's R&D Thermal Laboratory. Our in-house testing facility is one of the best in the industry and complies with EN requirements. With two test plant rigs we are able to test HFC, HFO and blends and CO<sub>2</sub>. Our second rig is specially designed to test CO<sub>2</sub> units for both air coolers and gas coolers up to the maximum thermal test pressure (120 bar) for total safety and reliability.

Alfa Laval's in-depth understanding of heat transfer technology ensures optimal design. All models within the new Alfa Laval Blue range have been tested in our climatic chamber in temperatures

between -40° C and 40° C, enabling us to develop a range of air-cooled condensers with the highest performance.

### Tested against

- Vibration
- Noise
- Earthquake, snow and wind load through FEM analysis



<b>B</b>	<b>D</b>	<b>M</b>	<b>Y</b>	<b>S</b>	<b>E</b>	<b>80</b>	<b>s</b>	<b>4</b>	<b>-</b>	<b>B</b>	<b>-</b>	<b>D</b>	<b>14</b>	<b>-</b>	<b>PP</b>	<b>Feet</b>	<b>-</b>	<b>*</b>	<b>-</b>	<b>AL</b>	<b>-</b>	<b>2,1</b>	<b>CU</b>	<b>*</b>		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19								

- Alfa Laval Blue platform
- Family: C=condenser, D=dry cooler, N=ammonia condenser, X=CO<sub>2</sub> gas cooler
- Number of fan rows: M=1, D=2
- Dedicated series: blank=default, Y=SS tubes, 6=5/8" Cu tubes, P=propane (R290) condenser, H=R410A, O=compressor oil cooler
- Sound level: T=turbo, S=standard, L=low, Q=quiet, R=residential
- EC fan: blank=AC fan, E=EC fan
- Fan diameter: 80=800 mm, 90=910 mm, 100=1000 mm
- Short coil module: blank=default, s=short coil module
- Number of fans per row: 1 to 6
- Tube rows code: A, B, C, D, E
- Fan motor connection: D=delta, Y=star
- Number of circuits (only for gas coolers and dry coolers)
- Packing: P=pallet, PP=pallet with protection for headers and coil, CR=crate
- Feet=Mounting feet supplied mounted (type of feet according to airflow selected); Blank=Mounting feet supplied loose
- Electrical options (see electrical options sheet for details)
- Fin material/coating: Al=aluminium, IF=industrial fins, SWR=seawater resistant fins, EP=epoxy coated alu, FC=F-coat, BY=Blygold, ED=E-coat
- Fin spacing: 2.1, 2.3, 2.5, 3.0 and 3.2 mm
- Tube material: CU=copper, SS=stainless steel, K65=copper K65
- Options

# Optional and on-demand features

## Customized options for optimal performance

Thanks to a wide range of optional features, Alfa Laval Blue can be easily customized and optimized to specification during the design process, for improved and efficient installation.

### Mounting feet for vertical airflow

Improved easy-to-fit, nestable mounting feet, which are available in three different heights: 500 mm, 850 mm and 1200 mm.

### Vibration dampers **VD**

Dampers provide passive isolation of fan vibrations and reduce noise transmission. Alfa Laval strictly recommends the installation of vibration dampers on all outdoor air heat exchanger equipment. Vibration dampers should be positioned between the unit feet and the mounting base.

### Sub-cooling circuit **SC**

The Alfa Laval Blue series features a dedicated sub-cooling circuit, which can be calculated and selected in our selection software.

### Spray water kit **KW**

The Spray Water Kit, developed by Alfa Laval, consists of a stainless steel pipe system fitted with several spraying nozzles that nebulize water, saturating the air next to the suction side of the coil. Its design is based on the Adiabatic Saturation concept. A smart solution for overcoming heat peaks; liquid coolers and condensers can be designed for lower entering air temperature, thus obtaining a smaller dimension unit with a smaller heat exchanger.

### Upon request fan motor options

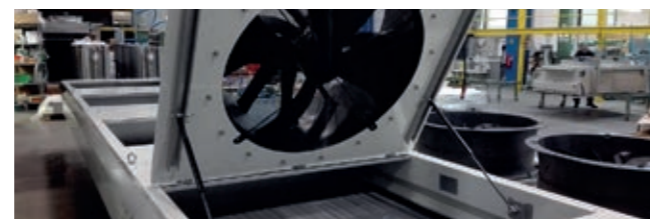
- 400 V/3 ph/60 Hz
- 480 V/3 ph/60 Hz
- Protection class IP55
- High temperature fan motor
- ATEX fan motor

### Packing options

- Pallet **P**  
Wooden pallet suitable for lifting the unit with a forklift
- Protection Pallet **PP**  
Wooden pallet with protection for headers and coil. Available for dual fan row models
- Crate **CR**  
Wooden crate. Available for single fan row models

### Hinged fan panels **HF**

Hinged fan panels for easy inspection, cleaning and maintenance.



### Casing colour

By default, the Alfa Laval Blue series comes in a white powder coated casing (RAL 9002). Alternative painted colour options are also available, upon request.

### Corrosion-protective coatings

For installation in aggressive climates and environments, corrosion-resistant painted protective coatings are available: C4-H as optional, up to C5-H upon request.

### Stainless steel tubes

Stainless steel tubes available as optional.

### Coils for every application

The Alfa Laval Blue series is available with a wide variety of coil and fin options to suit every application, ensuring optimal performance.

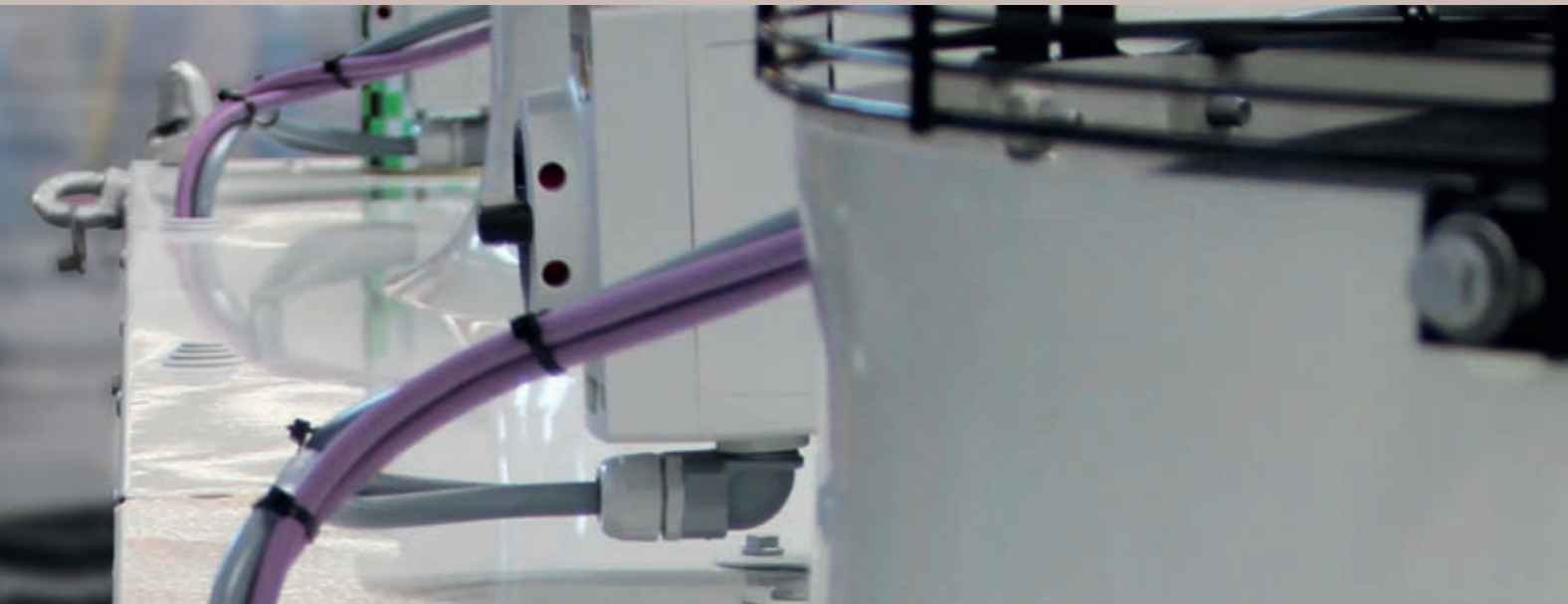
- Industrial fins **IF**  
For reduced fouling and optimal performance
- Seawater-resistant fins AIMg **SWR**
- Copper fins **CU**
- Epoxy coated fins **EP**  
Epoxy pre-painted aluminium fins
- E-coat **ED**  
Full coil epoxy coating including fins, tubes, manifolds and frame. C5M and C5I high durability certified for the whole coil.
- F-coat **FC**  
Polyurethane fin coating
- Blygold **BY**  
Polyurethane + Al pigment fin coating

### Installation areas and suggested materials and treatments

Installation area		Coil			Casing	Electrical components	Fans	Note
		Fins	Treatment	Fin spacing				
Up to medium corrosivity areas	Urban and industrial atmospheres with moderate sulfur dioxide pollution. Coastal areas with low salinity.	Al	-	-	HDG painted	IP54	-	-
		Standard	Standard	Standard	Standard	Standard	Standard	
High corrosivity areas	Industrial polluted environments	Industrial fin +treatment	Epoxy coating	> 2.3 mm	C4-H coating	IP54	C4-H coating	Regular cleaning and maintenance required
			F-coat					
			Blygold					
	Optional	Optional	Optional	Optional	Standard	Upon request		
	Coastal areas with moderate salinity	Industrial fin +treatment	Epoxy coating	> 2.3 mm	C4-H coating	IP54	C4-H coating	
			F-coat					
Blygold								
SWR	-	-	-	-	-			
Optional	Optional	Optional	Optional	Optional	Standard	Upon request		
Very high corrosivity areas	Industrial areas with high humidity and aggressive atmosphere and coastal areas with very high salinity	Industrial fin +treatment	E-coat	> 2.3 mm	C5-H coating	IP55	C5-H coating	Regular cleaning and maintenance required
			Optional	Upon request	Optional	Upon request	Upon request	

To be used as quick reference, when in doubt please contact Alfa Laval.

# Controls and electrical accessories



## Enhanced electrical accessories

The Alfa Laval Blue series features optimized controls and electrical accessories for both EC and AC fans, for greater performance and control.

### EC and AC fans

Both options are available for all Alfa Laval Blue units. EC motors are direct current motors, with electronics replacing collector and brushes. EC fan motors are equipped with integrated electronic commutation speed control. The result is a highly efficient and extremely compact speed controlled fan.

#### Benefits of EC fans compared to AC fans

- Absence of slip and friction losses
- Less noise
- Greater efficiency at any speed
- Lower power consumption
- Longer lifespan
- Fan speed independent of power supply frequency and number of poles
- Excellent electromagnetic compatibility (EMC) according to EN 50082-2, with no shielded motor cabling required

#### ErP

All Alfa Laval AC and EC fans comply with the Energy-related Products (ErP) directive, which aims to increase the total share of renewable energy by 20% by 2020, while increasing energy efficiency by 20%.



### Electrical accessories for EC fans

#### Switch **SW**

Wired to the fan, the safety switch is an on/off switch that allows easy maintenance. One fan may be switched off while the others continue, enabling continuous operation. Units feature one switch per fan.

#### Connection box **CBP**

Fans are wired to a connection box for common power connection (one per fan row) and the signal is wired to a different smaller connection box. EC fans are supplied connected and are provided with specific settings. The main input signal is 0–10 V from the customer.

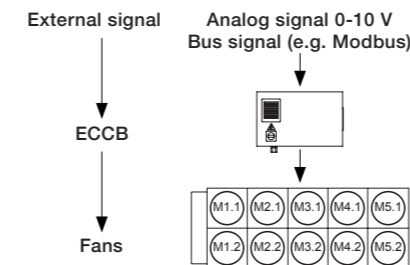
#### Connection box and master controller **CBM**

Fans are wired to a connection box for common power connection (one per fan row). The fans are supplied connected and the master controller is provided within the scope of supply. The input signal for the fans is supplied by the master controller. Master controllers for EC fans are available in a variety of configurations.

#### Basic switchboard **ECCB**

ECCB is a basic switchboard, featuring a main switch and protection for each fan (circuit breakers). Terminals are available for input signal and cumulative fan alarm.

By default, fans are driven by a 0–10 V signal and can be monitored via Modbus. To drive fans via Modbus a dedicated setting is available on request. ECCB can be used in combination with the master controller for optimal control.



#### Master controller

The master controller features a signal converter which converts the probe signal to 0–10 V to drive the EC fans, enabling control. This solution includes additional features, such as: dual speed (night mode), unit remote on/off and spray system activation (on units where spray system is available).

Available configurations:

- Master controller for external customer signal
- Master controller and temperature probe (for liquid coolers)
- Master controller and pressure probe (for condensers)

The master controller can be supplied in combination with either CBM or ECCB. The control is managed by the master controller, while the CBM acts as the "power box". The ECCB acts as both a power box and protection for the unit.

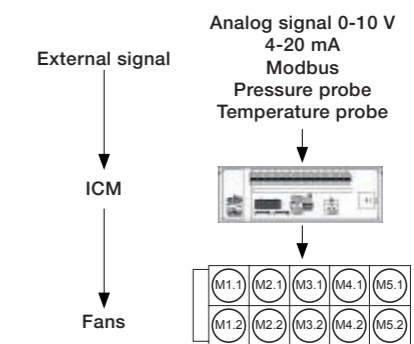


#### ICM premium controller

ICM is Alfa Laval's solution for complete fan management, developed in close cooperation with leading fan suppliers. It consists of a switchboard featuring a main switch, protection for each fan (circuit breakers) and a PLC with high level communication system. All fans come with Serial Modbus communication (0–10 V, temperature probe and/or pressure probe). An internal bus system enables it to be connected to any supervision network. ICM allows the heat exchangers to function independently or fully controlled via Modbus.

Available configurations:

- ICM for external customer signal **ICM**
- ICM with temperature probe for liquid coolers **ICMT**
- ICM with pressure probe for condensers **ICMP**



Terminals for cumulative fan alarm are available. Corrosion resistant metallic casing painted white (RAL9002) and a special solution for independent fan row management are also available upon request.



### Electrical accessories for AC fans

#### Switch **SW**

Wired to the fan, the safety switch is an on/off switch that allows easy maintenance. One fan may be switched off while the others continue, enabling continuous operation of the unit. Units feature one switch per fan.

#### Connection box **CB**

Fans are wired to a connection box for common power connection (one per fan row).

#### Basic switchboard **BS**

Basic switchboard cabinet fitted with AC fan protection, main switch and terminals for fan alarm and input signal. The basic switchboard can be used in combination with the step controller.



#### Step controller **BSP** **BST**

The switchboard includes fan protection and an automatic multistage step controller, which allows control of the fluid outlet temperature (BST, for liquid coolers) or the refrigerant pressure (BSP, for condensers). On/off regulation of fans is according to the input signal.



## Product selection and information

### AlfaSelect Air

Our computer selection software, AlfaSelect Air, offers separate modules for mechanical and thermal configuration, as well as instant access to selection and pricing of optional extras. It also offers a fully sortable selection output, and an interface that offers multiple language options.

### Data sheets

The AlfaSelect data sheet printout provides all relevant technical specifications for the selected cooler model, including detailed dimensional drawings.

- Thermal and air flow specification
- Mechanical configuration
- Pricing information
- Detailed dimensional drawings

### Alfa Laval Anytime

Alfa Laval Anytime is a new eBusiness solution with product catalogue and configurator integrated for greater convenience. Find, configure and order your Alfa Laval products with just a few simple clicks, anytime. Alfa Laval Anytime also enables you to manage quotes and orders with net prices, view your order status and follow up on your order history, 24/7. In addition, you can find information on a wide variety of Alfa Laval products.

### Product information

Comprehensive product information is available at [www.alfalaval.com/blue](http://www.alfalaval.com/blue) including product leaflets, manuals, certificates and brochures. Our website also offers CAD drawings, high-resolution images and electrical connections available for download.

### Selection features in AlfaSelect Air

For optimal heat exchanger configuration, AlfaSelect offers Alfa Laval Blue-specific selection parameters:

- Maximum unit dimension
- Noise level
- Coil material
- EC or AC fans
- RPM modulation for EC fans
- Number of circuits (dry coolers and gas coolers)
- Power supply



### Alfa Laval commercial air coolers

The Alfa Laval Optigo range contains the following models: Optigo CS (low silhouette), Optigo CD (dual discharge) and Optigo CC and CCB (single discharge) air coolers for general application in cooling, freezing, storage, working and processing rooms.

A wide range of models are fitted with energy-efficient EC fans (as standard on the low silhouette range Optigo CS), making them especially suitable for refrigerated working, processing and storage rooms. Optigo offers dedicated ranges for HFO & HFC refrigerants, brine and CO<sub>2</sub> applications.



### Alfa Laval industrial air coolers

The Arctigo industrial air cooler platform offers an extremely wide and flexible range of single (IS) and dual discharge (ID) industrial air coolers and dedicated ranges for agricultural

storage (ISF), shock cooling (IST), banana ripening (HRCD) and data center cooling (LSV). The Arctigo range offers a wide variety of cooler configurations and options.



### Commercial condensers, gas coolers and liquid coolers

AlfaBlue Junior is a competitive gas cooler, condenser and liquid cooler platform. AlfaBlue Junior offers excellent performance, allowing easy installation on site and easy integration with other components. Highly efficient fan motors combine excellent sound characteristics and low energy consumption. The range includes: XG gas coolers specifically designed for

CO<sub>2</sub> refrigerant systems, AG condensers and DG liquid coolers for commercial refrigeration and air-conditioning installations. The Alfa-V Single Row is designed to reject small to medium heat loads with a modest footprint in commercial refrigeration and air conditioning installations. It offers many features to meet the highest demands in state-of-the-art refrigeration installations.



### Industrial liquid coolers

The Alfa-V, Blue, FBL and Solar ranges cover dry coolers for HVAC & REF applications, for heavy industrial cooling applications in process and power industries and dedicated ranges for transformer oil cooling.

Our industrial liquid coolers are available with either copper or stainless steel tubing. We supply both standardized and fully customized industrial liquid coolers. The Alfa Laval industrial product portfolio includes a variety of design options and accessories.



# Alfa Laval SWS

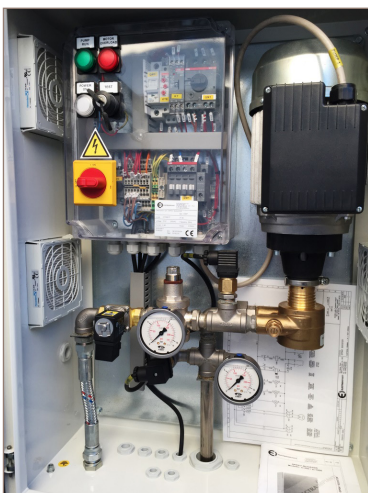
## Spray Water System

### General information & application

Alfa Laval SWS is a full spray water system, including pump and electrical cabinet, for air cooled condensers and liquid coolers. Air heat exchangers are normally selected to accomplish performance requirements in the hot season peaks. As a consequence, units are often oversized and thus more expensive. In such cases a spray water system can help in selecting correctly sized units. Benefits of increased global energy efficiency, sound reduction etc are now combined in a simple Alfa Laval solution.

### Features

- Available in three sizes: 500 l/h, 1000 l/h, 2000 l/h to cover all air heat exchanger range needs
- Power supply 230 V/1 ph/50 Hz
- 6 bar pump
- Draining valve for complete water discharge
- Stainless steel piping with spray nozzles
- Application temperatures from +4 °C to +40 °C
- Protection Class IP55
- Switchboard with pump protection and signals (remote ON/OFF and fault alarm)
- Metal casing in painted galvanized steel (RAL9002) or stainless steel (optional).



Alfa Laval SWS - Spray Water System

### Benefits

- Optimized heat exchanger selection
- Reduced footprint
- Reduced transport costs
- VDI 2047 Part 2 compliant
- Fully integrated with Alfa Laval control systems
- Energy saving

### Integration with control systems

Alfa Laval SWS is perfectly integrated with Alfa Laval control solutions. ICM and master controller (PTec), can easily manage the complete spray water system. According to various parameters (such as pressure or temperature) the spray system is activated to increase capacity and face peak loads.

### Selection

SWS spray water systems can be selected with Alfa Laval air heat exchanger selection software. A calculation sheet for detailed water flow calculation is available via the Alfa Laval sales organization.

### Application

With standard aluminum fins, operating time of the spray water system is limited to 200 h/year. For longer usage periods and optimal corrosion resistance fin coating is advised. For details, contact your local Alfa Laval representative.

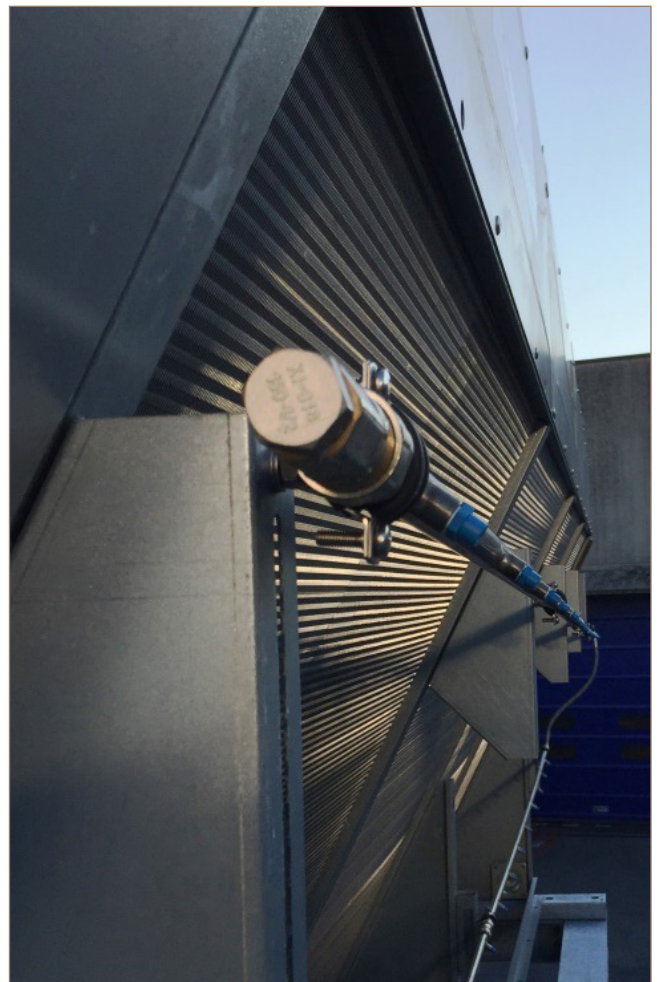
### Water quality

Tap water (according to EC Directive 98/93) normally complies with the requirements for water quality as listed below.

- $6 < \text{pH} < 8$
- Conductivity  $< 500 \mu\text{S}/\text{cm}$
- Chlorides  $< 50 \text{ ppm}$
- Sulphates  $< 50 \text{ ppm}$
- Hardness  $2\text{--}4 \text{ }^\circ\text{f}$
- Total bacterial count  $< 1,000 \text{ cfu}/\text{ml}$

### Certification

The Alfa Laval quality system is in accordance with ISO 9001 and ISO 14001. All SWS spray water systems are manufactured according to CE regulations and VDI 2047 Part 2.



AHE00092EN 1703

### 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](http://www.alfalaval.com)

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# Alfa Laval Arctigo LSV

## Data center air cooler

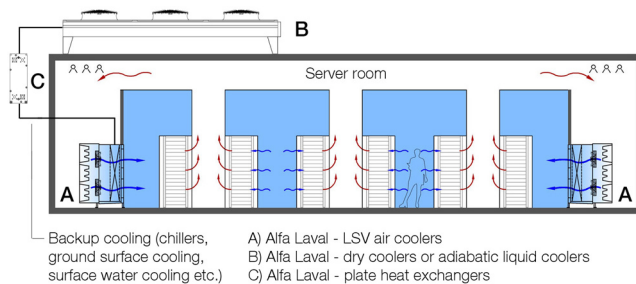
### General information & application

Alfa Laval Arctigo LSV air coolers are heavy duty industrial air coolers specifically designed for cooling down server heat production in data centers that have been built according to "Low Speed Ventilation".

LSV air coolers operate with low fan speed, low air velocities and minimal pressure differences along the route of the air flow, achieved by the building itself being part of the system. For this reason all Arctigo LSV air coolers have been designed with a 0.002 psi air-sided pressure drop and a sensible heat factor of 1.0.

Refrigerant	Water
Nom. capacities	25,250 - 1,061,132 BTU/hr*
Air volume	65,835 - 2,744,575 ft <sup>3</sup> /hr

\* Models with higher/lower capacities available on request.



### Hot & cold containment

Arctigo LSV air coolers are applicable for both hot and cold containment systems, with or without raised floor and the optional use of outside air.

### Standard configuration

- Modular cooler coil with Cu tubing Ø 5/8", tube pitch 1.9x1.9 in. triangular. Corrugated aluminium fins, fin spacing 0.2 in.
- 1 to 10 energy efficient EC fans, Ø 15.7 up to 31.5 in.; blowing through the coil. Fans with elevated external pressure. Fan current 230/50/1 or 400/50/3.
- Corrosion-resistant casing: aluminium/senzimir, white epoxy coated (RAL 9003)



Arctigo LSV

### Customization

Arctigo LSV is based on a flexible design concept. In addition to the standard range, Arctigo LSV air coolers can be fully customized to meet any client specifications.

### Options

- Filter frame for mounting of compact air filters (23.3x23.3x11.4 in.)
- Modbus communication for precise fan control.
- Fin-sided safety grid for hot containment applications



### Air cooler selection

Please contact our sales organization for air cooler selection and full technical details.

### Benefits

- Application-based air cooler design to ensure optimized operation in LSV cooling systems.
- Heavy duty coil and casing materials, resulting in a long operational product life.
- Operational fine tuning thanks to EC fans.
- Coil air-sided pressure drop only 0.002 psi.
- Low total cost of ownership.
- Two-year product guarantee.
- On-line product information (QR code)



Arctigo LSV

Arctigo LSV	Nom. cap.*	Air volume	Liquid flow	Press. drop	Int. vol.	Weight	Coil surface	Dimensions (in)			Connections in/out	Fan data				
								Length	Height	Width		Power per fan nom.	abs.** 90Pa	fan speed nom./40Pa	Sound power per fan 40Pa	
Type	BTU/h	ft3/h	ft3/h	psi	ft <sup>3</sup>	lbs	ft <sup>2</sup>	Length	Height	Width	Connections	Nr.	hp	hp	rpm	dB(A)**
114-5	25,249	65,835	39	1.9	282	243	248	44	35	51	1"	1	0.7	0.2	1,760/1,200	68
124-5	50,839	131,669	74	3.6	494	353	495	68	35	51	1"	2	0.7	0.2	1,760/1,200	68
144-5	102,360	263,338	152	3.3	953	551	990	115	35	51	1 1/2"	4	0.7	0.2	1,760/1,200	68
164-5	150,128	395,007	222	1.6	1,377	705	1,485	162	35	51	DN40	6	0.7	0.2	1,760/1,200	68
184-5	201,308	526,676	300	3.3	1,800	926	1,981	209	35	51	DN40	8	0.7	0.2	1,760/1,200	68
1104-5	252,488	658,345	374	5.9	2,259	1,168	2,476	256	35	51	DN40	10	0.7	0.2	1,760/1,200	68
214-5	51,180	131,669	78	2.0	565	397	495	44	57	51	1"	2	0.7	0.2	1,760/1,200	68
224-5	100,654	263,338	148	1.6	988	529	990	68	57	51	1 1/2"	4	0.7	0.2	1,760/1,200	68
244-5	203,014	526,676	304	3.5	1,906	794	1,981	115	57	51	DN50	4	1.1	0.4	1,450/1,000	71
264-5	300,256	790,014	445	1.6	2,753	1,190	2,971	162	57	51	DN65	6	1.1	0.4	1,450/1,000	71
284-5	406,028	1,053,352	604	3.3	3,601	1,521	3,961	209	57	51	DN65	8	1.1	0.4	1,450/1,000	71
2104-5	508,388	1,316,690	755	5.9	4,518	1,852	4,951	256	57	51	DN65	10	1.1	0.4	1,450/1,000	71
314-5	80,182	208,623	120	6.5	883	639	786	44	84	51	1"	3	0.7	0.2	1,760/1,200	68
324-5	160,364	417,246	240	5.7	1,589	838	1,572	68	84	51	DN40	6	0.7	0.2	1,760/1,200	68
344-5	320,728	834,492	477	3.3	2,965	1,720	3,143	115	84	51	DN50	4	1.7	0.5	1,200/830	73
364-5	470,856	1,251,738	699	1.6	4,377	2,469	4,715	162	84	51	DN80	6	1.7	0.5	1,200/830	73
384-5	641,456	1,668,984	953	3.3	5,754	3,219	6,286	209	84	51	DN80	8	1.7	0.5	1,200/830	73
3104-5	805,232	2,086,230	1,197	5.9	7,131	3,968	7,858	256	84	51	DN80	10	1.7	0.5	1,200/830	73
414-5	105,772	274,458	159	4.6	1,165	750	1,023	44	106	51	1"x2	4	0.7	0.2	1,760/1,200	68
424-5	211,544	548,915	314	6.7	2,083	1,014	2,045	68	106	51	1 1/2"x2	8	0.7	0.2	1,760/1,200	68
444-5	423,088	1,097,830	628	3.8	3,918	2,822	4,090	115	106	51	DN50x2	4	3.5	0.7	1,020/650	70
464-5	620,984	1,646,745	921	1.6	5,754	4,101	6,135	162	106	51	DN65x2	6	3.5	0.7	1,020/650	70
484-5	842,764	2,195,660	1,253	3.3	7,554	5,379	8,181	209	106	51	DN65x2	8	3.5	0.7	1,020/650	70
4104-5	1,061,132	2,744,575	1,578	5.9	9,390	6,658	10,226	256	106	51	DN65x2	10	3.5	0.7	1,020/650	70

\* Nominal capacities for  $T_{air\ in} = 36.5^{\circ}C$  (97.7°F),  $T_{air\ out} = 24^{\circ}C$  (75.5°F),  $T_{water\ in} = 17^{\circ}C$  (62.6°F),  $T_{water\ out} = 23^{\circ}C$  (73.4°F, 100% water).

\*\* Sound power per fan in working conditions.

Water in-out temperature °C (°F)	Capacity %	Water volume %	Pressure drop %
13-19 (55-66)	124	124	148
14-20 (57-68)	118	118	135
15-21 (59-70)	112	112	12
16-22 (61-72)	106	106	111
17-23 (63-73)	100	100	100
18-24 (64-75)	94	94	91
19-25 (66-77)	88	88	81
20-26 (68-79)	82	82	72
21-27 (70-81)	76	76	62

DT K	Capacity %	Water volume %	Pressure drop %
10	85	51	32
9	89	59	41
8	93	70	54
7	97	83	73
6	100	100	100
5	103	124	145
4	106	159	234

Calculation example for temperature water in-out 13-17°C(DT=4)

13-17°C (55-63°F) 1.24\*1.06=1.31 1.24\*1.9=1.97 1.48\*2.34=3.46

## Code description

Arctigo	LSV	3	4	4	-	0.2	-	230
1	2	3	4	5		6		7

- 1 Alfa Laval industrial air cooler
- 2 Low Speed Ventilation range
- 3 Number of coil modules in height (1, 2, 3 or 4)
- 4 Number of coil modules in length (1 to 10)
- 5 Tube rows in air direction
- 6 Fin spacing (0.2 in)
- 7 Current (230=230/60/1, 440=440/60/3)

## Design pressure

Design pressure 145 psi. Each heat exchanger is leak tested with dry air and finally supplied with a nitrogen pre-charge.

## Certifications

The Alfa Laval quality system is in accordance with ISO 9001 and ISO 14001. All products are manufactured according to CE and PED regulations.



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## How to contact Alfa Laval

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