



Industrial air coolers ZLA

Air coolers with galvanized steel coil

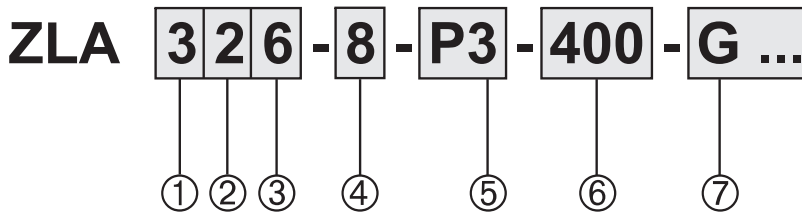




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Model indication



Pos.	Reference
1	Coil block module 1 - 7
2	Number of fans 1 - 4
3	Tube rows 4, 6 or 8 tube rows in air direction
4	Fin spacing 6, 8, 10 and 12
5	Circuiting design O, P2, P3, P4, Q, R
6	Current 400 = 400/50/3 230 = 230/50/1
7	Options For a full survey of all available options see page 4

Eurovent

Within Europe, a wide variety of published data on capacities are in use, generally depending on national standards. Most in use by the leading manufacturers are national and international standards like DIN, ENV, NEN-EN and ASHRAE. Due to this, customers have not been able to make objective product comparisons, since data published on capacities were based on DT_1 , DTM, dry or wet conditions, with or without certification, etc.



To meet the European requirements on EN standards, the European Refrigeration Industry embodied by Eurovent has set standards to guarantee an independent certification procedure for forced convection air cooled condensers based on NEN-EN 327 and unit air coolers based on NEN-EN 328. Being an active member of Eurovent, the capacities of Alfa Laval air coolers, as given in the technical documentation, are based on NEN-EN 328 (evaporating temperature $t_0 = -8$ °C, 8 K temperature difference between air-on temperature and evaporating temperature (DT_1)).

In order to enable air cooler selection for operating conditions, technical documentation should also give capacities for humid/frosted conditions. According to Eurovent these 'frosted conditions' are to be calculated by multiplying 'dry capacities' with a factor 1.15. These data can be found in the capacity tables, in the columns marked "frosted".

Capacities

Frosted conditions

- Lightly frosted coil.
- Relative humidity 85 %.
- Refrigerant ammonia (R-717), pumped system
- Refrigerant recirculation ratio 2

Evaporating temperature t_0

Evaporating temperature t_0 is the saturated temperature according to the pressure at the suction outlet of the cooler.

Dry conditions

Cooling capacity where no condensation or ice build-up occurs on the coil (100% sensible cooling). This condition is used by Eurovent to standardise capacity ratings but should not be used when selecting coolers. For cooler selection use the columns marked "frosted".



General Information

The ZLA series is a wide and flexible range of industrial air coolers. ZLA coolers are generally used in processing and storage, and can be employed over the temperature range of +5 down to -40 °C using ammonia or other refrigerants.

Nominal capacities 4 up to 125 kW.

Air flow 4,000 up to 63,000 m³/h.

All coolers and condensers produced by Alfa Laval comply with the EC Pressure Equipment Directive 97/23/EC.

In this respect all equipment is provided with extensive product information. EC declarations of conformity can be downloaded from www.helpman.com (standard products only).

Two-Year Guarantee

Because Alfa Laval has the fullest confidence in the product quality, a two-year full guarantee is given.

Product Configuration

- Finned coil
 - 7 coil block modules
 - 4, 6 or 8 tube rows deep
 - Steel tubing Ø 22 mm, wall thickness 1.0 mm
 - Tube pitch 60 x 60 mm square
 - Steel fins
 - Fin spacings 6, 8, 10, and 12 mm
 - Coil block galvanized acc. NEN-ISO 1461
- 1-4 Fans, drawing through the coil, available in a wide range of different executions. Diameters Ø 508 up to Ø 800 mm. Fan motors spray resistant, protection class IP55.
- Corrosion resistant casing material: Aluminium/Sendzimir.
- Hinged driptray with vertical drains 1¼" BSP male.
- Suitable for ammonia refrigerant, pumped system, DX or gravity flow.
- Refrigerant connections at right side (fan view).
- Stickers indicate fan direction and refrigerant in/out.
- Delivery in mounting position. Coolers are mounted on wooden beams. Installation can take place with use of a forklift.
- Design pressure 27 bar (ammonia) or 6 bar (brine). Higher design pressures on request. Each heat exchanger is leak tested with dry air and finally supplied with a nitrogen pre-charge.



Options

- Hot gas coil in drip tray** G2
The drip tray can be fitted with a defrost coil to bring it rapidly up to temperature by means of hot gas
- Drip tray insulation** I 2
 - Styropore 10 mm + cladding
 - Foamglass 25 mm + cladding
- Mounting feet for floor mounting** I 3
ZLA coolers can be equipped with hot dip galvanized steel mounting feet. The positioning of these is the same as the suspension brackets for ceiling mounting
- Mounting feet for floor mounting** MF
ZLA coolers can be equipped with hot dip galvanized steel mounting feet. The positioning of these is the same as the suspension brackets for ceiling mounting
- Fan ring heater** FRH
- Isolating switch (mounted)** ISM

Fan Ring Heater (FRH, 230 Volt)

incl. mounting gear

Cooler module	Fan diameter mm	Ring heater power W
1	508	500
2	508	500
3	508	500
4	560	500
5	630	325
6	710	350
7	800	400

Drip tray Insulation (I)

For specific operational conditions ZLA coolers can be fitted with drip tray insulation.

Insulation of the drip tray is recommended for air coolers with hot gas defrosting used at a room temperature below -5 °C. For areas with high relative humidity it may also be necessary to insulate other parts of the casing.

At extra cost this drip tray insulation can be combined with the usual epoxy coating.

Note :When selecting drip tray insulation the overall height "B" of the coolers increases by the thickness of the insulation material applied.

Non-standard executions *(on request only)*

- Shut up® system** S + SH
The system comprises a shut up sock and an inlet hood to enhance defrost efficiency. The use of a shut-up system may lead to a decline in cooling capacity up to max. 5 percent. Please take this into account during selection. When working conditions are such that condensation would freeze during the defrosting period, the inlet hood should be insulated.
-
- Electric defrost**
 - Special fan motors:**
 - Variable fan speed motors
 - EC fans
 - Alternative electrical supplies 380/60/3 or 460/60/3
 - Casing epoxy coated in any RAL colour** X
 - Horizontal drip tray drain(s)** H
 - Enclosed side panels** Z
 - Dry expansion** DX
 - Refrigerant connections at the left side (fan view)** L
 - Fans for extra external pressure (for ZLA models 5, 6 and 7 only)** P
 - Higher capacities**
 - Built in heater coil sections**
 - Stainless steel 304 casing**

Selection Example DT₁

Refrigerant	R-717 (NH ₃)
Selected fin spacing	10 mm
Required cooling capacity	45 kW
Air-on temperature	-17 °C
Evaporating temperature	-25 °C

- 1) $DT_1 = -17 - (-25) = 8 \text{ K}$
- 2) Correction factor $DT_1 / R-717 (\text{NH}_3) : 1.09$
- 3) Multiply required capacity
with correction factor : $45 \times 1.09 = 49.1 \text{ kW}$.
- 4) Cooler models can be selected in columns 'capacity /
frosted' on page 8 with a nominal capacity of 49.1 kW.

For the above mentioned conditions the following coolers can be selected :

- ZLA 348 - 10, nom. cap. 51.7 kW.
- ZLA 446 - 10, nom. cap. 50.6 kW.
- ZLA 536 - 10, nom. cap. 53.1 kW.
- ZLA 628 - 10, nom. cap. 49.7 kW.

Depending on parameters such as *air flow*, *number of fans* and *dimensions* (see tables) a final cooler model selection can take place.

Capacity values under 'Dry conditions' (selection tables, pages 6 - 9) are reference values for Eurovent conditions.

Standard condition	Air on temp. °C	Evaporating temperature °C	Factor dry/frosted
SC1	10	0	1.35
SC2	0	-8	1.15
SC3	-18	-25	1.05
SC4	-25	-31	1.01

SC 2 : Nominal capacity for cooling design.

Air-on temperature is the air temperature at the intake side of the coil block.

Correction factors

DT1 K	Evaporating temperature °C									
	+5	0	-5	-8	-10	-15	-20	-25	-30	-35
R-717 (NH₃) pumped										
6	1.24	1.33	1.40		1.45	1.48	1.50	1.51	1.51	1.52
7	1.01	1.08	1.15		1.19	1.23	1.25	1.27	1.28	1.29
8	0.84	0.90	0.96	1.00	1.01	1.04	1.07	1.09	1.11	1.13
9	0.71	0.77	0.82		0.86	0.90	0.93	0.95	0.97	1.00
10	0.61	0.66	0.71		0.75	0.78	0.81	0.84	0.86	0.89
11	0.53	0.58	0.62		0.66	0.69	0.72	0.75	0.78	0.81
R-717 (NH₃) flooded										
6	1.25	1.34	1.41		1.47	1.50	1.52	1.53	1.54	1.55
7	1.02	1.09	1.16		1.21	1.25	1.27	1.29	1.30	1.32
8	0.85	0.91	0.97		1.02	1.06	1.08	1.11	1.13	1.15
9	0.72	0.78	0.83		0.87	0.91	0.94	0.97	0.99	1.02
10	0.62	0.67	0.72		0.76	0.80	0.83	0.85	0.88	0.91
11	0.54	0.59	0.63		0.67	0.70	0.73	0.76	0.79	0.82
R-717 (NH₃) dry expansion										
6	1.29	1.38	1.44		1.50	1.54	1.57	1.59	1.62	1.65
7	1.06	1.13	1.19		1.24	1.28	1.31	1.34	1.37	1.40
8	0.89	0.95	1.00		1.05	1.09	1.12	1.15	1.18	1.22
9	0.76	0.81	0.86		0.90	0.94	0.97	1.00	1.04	1.08
10	0.66	0.70	0.75		0.79	0.82	0.86	0.89	0.92	0.96
11	0.57	0.62	0.66		0.69	0.73	0.76	0.79	0.83	0.87

Capacities

R-717 pumped

Cooler model	Capacities		Air flow m ³ /h	Coil surface m ²	Int. vol. dm ³	Weight kg	Dimensions			Fans			
	Frosted $t_0=-8^{\circ}\text{C}, DT_f=8\text{K}$ kW	Dry cond. $t_0=-8^{\circ}\text{C}, DT_f=8\text{K}$ kW					Length mm	Height mm	Width mm	Cap. kW	Nr	Air throw m	Sound press. dB(A)
Fin spacing 12 mm													
114 - 12	4.0	3.5	4490	15.7	8	76	1130	710	985	0.25	1	22	63
116 - 12	5.6	4.9	4440	23.5	12	113	1130	710	985	0.25	1	22	63
118 - 12	7.0	6.1	4390	31.4	16	145	1130	710	985	0.25	1	22	63
124 - 12	8.0	7.0	8990	31.4	16	129	1730	710	985	0.25	2	22	66
126 - 12	11.3	9.8	8890	47.1	24	184	1730	710	985	0.25	2	22	66
128 - 12	14.0	12.2	8790	62.8	32	234	1730	710	985	0.25	2	22	66
214 - 12	5.4	4.7	5880	20.9	11	104	1330	710	985	0.25	1	24	63
216 - 12	7.5	6.5	5820	31.4	16	155	1330	710	985	0.25	1	24	63
218 - 12	9.3	8.1	5750	41.8	21	201	1330	710	985	0.37	1	24	63
224 - 12	10.7	9.3	11770	41.8	21	185	2130	710	985	0.25	2	24	66
226 - 12	15.1	13.1	11640	62.8	32	268	2130	710	985	0.25	2	24	66
228 - 12	18.7	16.2	11510	83.7	42	346	2130	710	985	0.37	2	24	66
234 - 12	16.1	14.0	17660	62.8	32	261	2930	710	985	0.25	3	24	68
236 - 12	22.6	19.6	17460	94.1	48	377	2930	710	985	0.25	3	24	68
238 - 12	28.0	24.3	17260	125.5	63	487	2930	710	985	0.37	3	24	68
244 - 12	21.4	18.6	23550	83.7	42	341	3730	710	985	0.25	4	24	69
246 - 12	30.1	26.2	23280	125.5	63	490	3730	710	985	0.25	4	24	69
248 - 12	37.3	32.5	23020	167.4	84	632	3730	710	985	0.37	4	24	69
314 - 12	6.7	5.8	7380	26.1	13	115	1530	710	985	0.37	1	29	63
316 - 12	9.4	8.2	7300	39.2	20	170	1530	710	985	0.37	1	29	63
318 - 12	11.7	10.1	7220	52.3	26	221	1530	710	985	0.55	1	29	63
324 - 12	13.4	11.6	14770	52.3	26	203	2530	710	985	0.37	2	29	66
326 - 12	18.8	16.4	14600	78.4	40	293	2530	710	985	0.37	2	29	66
328 - 12	23.3	20.3	14440	104.6	53	379	2530	710	985	0.55	2	29	66
334 - 12	20.1	17.5	22160	78.4	40	284	3530	710	985	0.37	3	29	68
336 - 12	28.2	24.6	21910	117.7	59	412	3530	710	985	0.37	3	29	68
338 - 12	35.0	30.4	21660	156.9	79	534	3530	710	985	0.55	3	29	68
344 - 12	26.8	23.3	29550	104.6	53	372	4530	710	985	0.37	4	29	69
346 - 12	37.7	32.7	29210	156.9	79	536	4530	710	985	0.37	4	29	69
348 - 12	46.7	40.6	28880	209.2	106	692	4530	710	985	0.55	4	29	69
414 - 12	8.0	7.0	9250	31.4	16	138	1530	830	1060	0.75	1	33	66
416 - 12	11.3	9.8	9140	47.1	24	205	1530	830	1060	0.75	1	33	66
418 - 12	14.0	12.2	9040	62.8	32	267	1530	830	1060	0.75	1	33	66
424 - 12	16.1	14.0	18500	62.8	32	249	2530	830	1060	0.75	2	33	69
426 - 12	22.6	19.6	18290	94.1	48	363	2530	830	1060	0.75	2	33	69
428 - 12	28.0	24.3	18080	125.5	63	472	2530	830	1060	0.75	2	33	69
434 - 12	24.1	21.0	27750	94.1	48	354	3530	830	1060	0.75	3	33	71
436 - 12	33.9	29.5	27430	141.2	71	516	3530	830	1060	0.75	3	33	71
438 - 12	42.0	36.5	27120	188.3	95	673	3530	830	1060	0.75	3	33	71
444 - 12	32.1	27.9	37000	125.5	63	465	4530	830	1060	0.75	4	33	72
446 - 12	45.2	39.3	36580	188.3	95	675	4530	830	1060	0.75	4	33	72
448 - 12	56.0	48.7	36170	251.0	127	878	4530	830	1060	0.75	4	33	72
526 - 12	31.6	27.5	24500	131.8	67	580	2930	950	1305	1.20	2	39	69
528 - 12	39.2	34.1	24300	175.7	89	730	2930	950	1305	1.20	2	39	69
536 - 12	47.4	41.3	36800	197.7	100	850	4130	950	1305	1.20	3	39	71
538 - 12	58.8	51.1	36400	263.6	133	1080	4130	950	1305	1.20	3	39	71
626 - 12	36.1	31.4	28000	150.6	76	660	2930	1070	1355	1.20	2	41	69
628 - 12	44.8	38.9	27700	200.8	101	840	2930	1070	1355	1.20	2	41	69
636 - 12	54.2	47.2	42100	225.6	114	970	4130	1070	1355	1.20	3	41	71
638 - 12	67.2	58.4	41600	301.2	152	1240	4130	1070	1355	1.20	3	41	71
726 - 12	54.2	47.2	42100	225.9	114	890	3730	1190	1355	2.40	2	45	72
728 - 12	67.2	58.4	41600	301.2	152	1160	3730	1190	1355	2.40	2	45	72
736 - 12	81.3	70.7	63200	338.9	171	1310	5330	1190	1355	2.40	3	45	74
738 - 12	100.8	87.6	62400	451.9	228	1730	5330	1190	1355	2.40	3	45	74

Changes possible without prior notice



Fans

In view of its flexible construction, in principle ZLA coolers can be supplied with any desired fan. Depending on the application there is a standard series of fans which match ZLA perfectly.



When selecting at higher temperature conditions attention has to be paid to the risk of splashing.

Execution

Fans are executed with balanced aluminium or polyamide fan blades. Plate fans are fitted with robust electrolytically galvanized and epoxy coated fan guards according to DIN 31001. Fans are mounted in vibration dampers. Short case fans are executed with inox fan guards.

Enclosed design spray-tight motors, protection class IP-55. Motor windings 230 Volt.

All motors, with the exception of the 0.37 kW, 230/50/1 motor, are equipped with a thermal safety device built in the windings, connected to separate terminals in the box.

This safety device can therefore be integrated into the control circuit. The electrical control should be arranged preferably with a manual reset device in order to prevent continuous on/off switching (tripping) of the motors.

Cable inlet M20 x 1.5 ranges from 7 up to 12 mm.

Air throw

Air throws as given in the tables are for ceiling mounted coolers at $t = 20\text{ °C}$, an unrestrained air flow in the cold room and a minimal air velocity of 0.25 m/s at the end of the air throw.

Sound pressure dB(A)

Sound pressure as given in the tables are sound pressure levels in dB(A) according to EN 13487 at 5 m distance in free field conditions. Values may deviate depending on situations at site. The table below gives calculated sound pressure corrections at various distances.

Distance m	Correction dB(A)
1	+ 14
2	+ 8
3	+ 4
4	+ 2
5	0
10	- 6
20	-12
50	-20

Technical data 50 Hz fans

Fan motor W	Motor voltage* V	Electric capacity		Adj. values overload relays			Cable inlet
		nom. kW	abs. kW***	A			
				0 °C	-20 °C	-40 °C	
250	230/400/3	0.25	0.33	1.2	1.3	1.3	2 x M20 x 1.5
220	230/1	0.22	0.37	2.6	2.8	2.9	2 x M20 x 1.5
370	230/400/3	0.37	0.50	1.4	1.4	1.5	2 x M20 x 1.5
370	230/1**	0.37	0.50	2.4	2.5	-	2 x M20 x 1.5
550	230/400/3	0.55	0.70	1.7	1.8	2.0	2 x M20 x 1.5
550	230/1	0.55	0.70	3.0	3.1	3.5	2 x M20 x 1.5
750	230/400/3	0.75	0.70				2 x M20 x 1.5
1200	230/400/3	1.20	1.20				2 x M20 x 1.5
2400	230/400/3	2.40	2.80				2 x M20 x 1.5

* Motor windings 230 Volt.

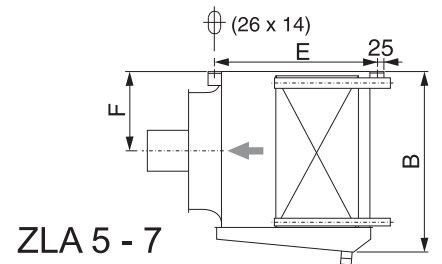
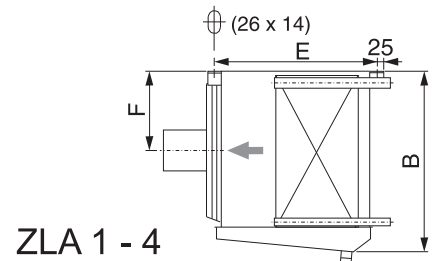
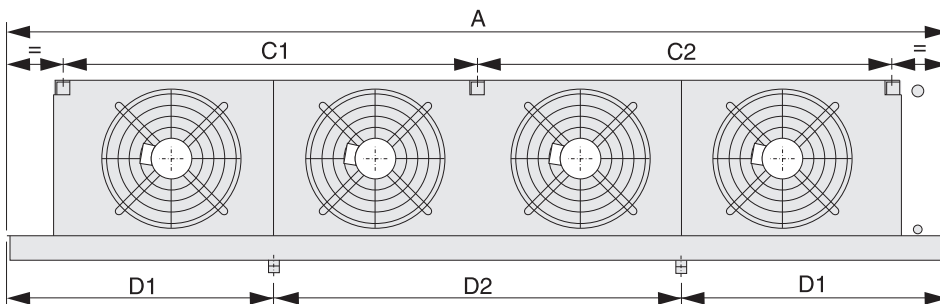
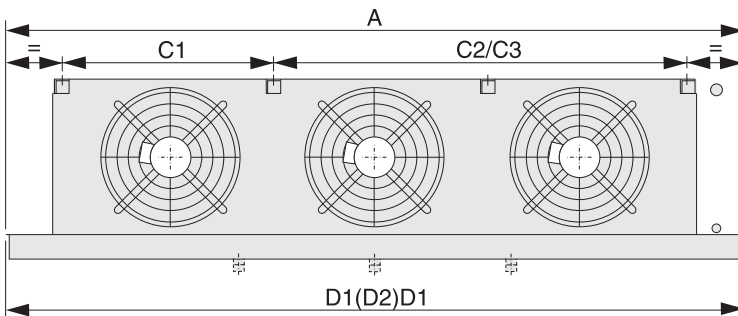
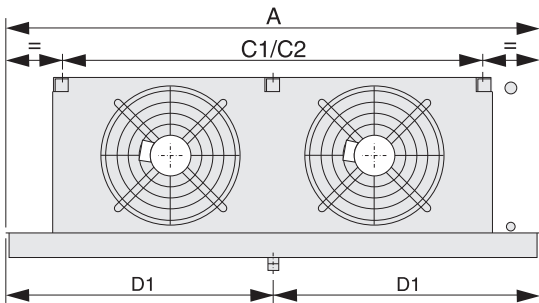
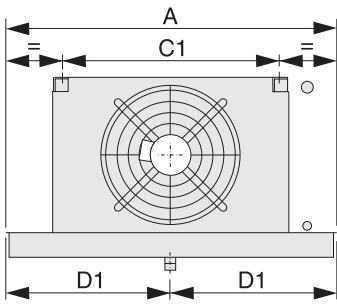
** These 230/50/1 motors are suitable for temperatures down to -20 °C and are not provided with a thermal safety device in the windings.

*** Absorbed fan motor energy is measured in under laboratory conditions at ambient temperature 20 °C. These values may vary depending on local conditions.



Dimensions

Cooler model	Dimensions (mm)								
	A	B	C1	C2	C3	D1	D2	E	F
ZLA 11*	1130	710	600			565		760	305
12*	1730	710	1200			865		760	305
21*	1330	710	800			665		760	305
22*	2130	710	1600			1065		760	305
23*	2930	710	800	1600		1465		760	305
24*	3730	710	1600	1600		1065	1600	760	305
31*	1530	710	1000			765		760	305
32*	2530	710	2000			1265		760	305
33*	3530	710	1000	2000		1015	1500	760	305
34*	4530	710	2000	2000		1265	2000	760	305
41*	1530	830	1000			765		760	370
42*	2530	830	2000			1265		760	370
43*	3530	830	1000	2000		1015	1500	760	370
44*	4530	830	2000	2000		1265	2000	760	370
52*	2930	950	2400			1465		880	430
53*	4130	950	1200	2400		1165	1800	880	430
62*	2930	1070	2400			1465		880	490
63*	4130	1070	1200	2400		1165	1800	880	490
72*	3730	1190	1600	1600		1065	1600	880	530
73*	5330	1190	1600	1600	1600	1465	2400	880	530



Changes possible without prior notice

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 to 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.

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