



## Industrial air coolers ZLA

Air coolers with galvanized steel coil

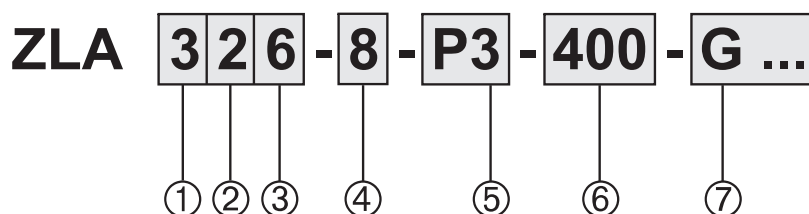




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## Model indication



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 m<sup>3</sup>/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](http://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 DT<sub>1</sub>

Refrigerant .....	R-717 (NH <sub>3</sub> )
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
<b>R-717 (NH<sub>3</sub>) pumped</b>										
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
<b>R-717 (NH<sub>3</sub>) flooded</b>										
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
<b>R-717 (NH<sub>3</sub>) dry expansion</b>										
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 <sup>3</sup> /h	Coil surface m <sup>2</sup>	Int. vol. dm <sup>3</sup>	Weight kg	Dimensions			Fans			
	Frosted <i>t<sub>0</sub></i> =-8°C, <i>DT<sub>F</sub></i> =8K kW	Dry cond. <i>t<sub>0</sub></i> =8°C, <i>DT<sub>F</sub></i> =8K kW					Length mm	Height mm	Width mm	Cap. kW	Nr	Air throw m	Sound press. dB(A)
<b>Fin spacing 10 mm</b>													
114 - 10	4.5	3.9	4380	18.5	8	84	1130	710	985	0.25	1	22	63
116 - 10	6.3	5.5	4330	27.7	12	125	1130	710	985	0.25	1	22	63
118 - 10	7.8	6.7	4280	37.0	16	160	1130	710	985	0.25	1	22	63
124 - 10	9.1	7.9	8760	37.0	16	144	1730	710	985	0.25	2	22	66
126 - 10	12.6	11.0	8660	55.4	24	208	1730	710	985	0.25	2	22	66
128 - 10	15.5	13.5	8560	73.9	32	265	1730	710	985	0.25	2	22	66
214 - 10	6.0	5.2	5730	24.6	11	112	1330	710	985	0.25	1	24	63
216 - 10	8.4	7.3	5670	37.0	16	167	1330	710	985	0.25	1	24	63
218 - 10	10.3	9.0	5610	49.3	21	216	1330	710	985	0.37	1	24	63
224 - 10	12.1	10.5	11470	49.3	21	200	2130	710	985	0.25	2	24	66
226 - 10	16.9	14.7	11340	73.9	32	292	2130	710	985	0.25	2	24	66
228 - 10	20.7	18.0	11220	98.6	42	377	2130	710	985	0.37	2	24	66
234 - 10	18.1	15.7	17210	73.9	32	284	2930	710	985	0.25	3	24	68
236 - 10	25.3	22.0	17020	110.9	48	411	2930	710	985	0.25	3	24	68
238 - 10	31.0	27.0	16830	147.8	63	533	2930	710	985	0.37	3	24	68
244 - 10	24.1	21.0	22950	98.6	42	372	3730	710	985	0.25	4	24	69
246 - 10	33.7	29.3	22690	147.8	63	536	3730	710	985	0.25	4	24	69
248 - 10	41.4	36.0	22440	197.1	84	693	3730	710	985	0.37	4	24	69
314 - 10	7.5	6.6	7190	30.8	13	126	1530	710	985	0.37	1	28	63
316 - 10	10.5	9.2	7110	46.2	20	187	1530	710	985	0.37	1	28	63
318 - 10	12.9	11.2	7030	61.6	26	243	1530	710	985	0.55	1	28	63
324 - 10	15.1	13.1	14390	61.6	26	225	2530	710	985	0.37	2	28	66
326 - 10	21.1	18.3	14230	92.4	40	327	2530	710	985	0.37	2	28	66
328 - 10	25.9	22.5	14070	123.2	53	424	2530	710	985	0.55	2	28	66
334 - 10	22.6	19.7	21590	92.4	40	318	3530	710	985	0.37	3	28	68
336 - 10	31.6	27.5	21350	138.6	59	463	3530	710	985	0.37	3	28	68
338 - 10	38.8	33.7	21110	184.8	79	602	3530	710	985	0.55	3	28	68
344 - 10	30.2	26.2	28790	123.2	53	417	4530	710	985	0.37	4	28	69
346 - 10	42.1	36.6	28470	184.8	79	603	4530	710	985	0.37	4	28	69
348 - 10	51.7	45.0	28150	246.4	106	783	4530	710	985	0.55	4	28	69
414 - 10	9.1	7.9	9010	37.0	16	149	1530	830	1060	0.75	1	33	66
416 - 10	12.6	11.0	8910	55.4	24	222	1530	830	1060	0.75	1	33	66
418 - 10	15.5	13.5	8810	73.9	32	289	1530	830	1060	1.20	1	33	66
424 - 10	18.1	15.7	18030	73.9	32	271	2530	830	1060	0.75	2	33	69
426 - 10	25.3	22.0	17820	110.9	48	397	2530	830	1060	0.75	2	33	69
428 - 10	31.0	27.0	17620	147.8	63	517	2530	830	1060	1.20	2	33	69
434 - 10	27.2	23.6	27040	110.9	48	388	3530	830	1060	0.75	3	33	71
436 - 10	37.9	33.0	26740	166.3	71	567	3530	830	1060	0.75	3	33	71
438 - 10	46.6	40.5	26430	221.8	95	741	3530	830	1060	1.20	3	33	71
444 - 10	36.2	31.5	36060	147.8	63	510	4530	830	1060	0.75	4	33	72
446 - 10	50.6	44.0	35650	221.8	95	742	4530	830	1060	0.75	4	33	72
448 - 10	62.1	54.0	35250	295.7	127	969	4530	830	1060	1.20	4	33	72
526 - 10	35.4	30.8	23900	155.2	67	620	2930	950	1305	1.20	2	38	69
528 - 10	43.5	37.8	23600	207.0	89	800	2930	950	1305	1.20	2	38	69
536 - 10	53.1	46.2	35900	232.8	100	920	4130	950	1305	1.20	3	38	71
538 - 10	65.2	56.7	35500	310.5	133	1180	4130	950	1305	1.20	3	38	71
626 - 10	40.4	35.2	27300	177.4	76	710	2930	1070	1355	1.20	2	40	69
628 - 10	49.7	43.2	27000	236.5	101	910	2930	1070	1355	1.20	2	40	69
636 - 10	60.7	52.8	41000	266.1	114	1050	4130	1070	1355	1.20	3	40	71
638 - 10	74.5	64.8	40600	354.8	152	1350	4130	1070	1355	1.20	3	40	71
726 - 10	60.7	52.8	41000	266.1	114	970	3730	1190	1355	2.40	2	45	72
728 - 10	74.5	64.8	40500	354.8	152	1270	3730	1190	1355	2.40	2	45	72
736 - 10	91.0	79.1	61500	399.2	171	1430	5330	1190	1355	2.40	3	45	74
<b>738 - 10</b>	<b>111.8</b>	<b>97.2</b>	<b>60800</b>	<b>532.2</b>	<b>228</b>	<b>1870</b>	<b>5330</b>	<b>1190</b>	<b>1355</b>	<b>2.40</b>	<b>3</b>	<b>45</b>	<b>74</b>

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.

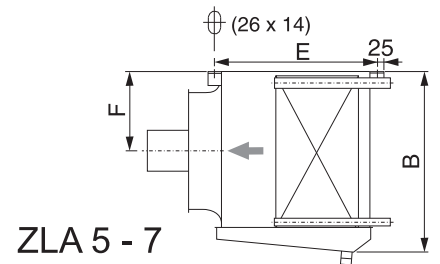
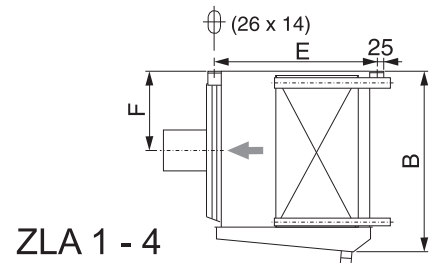
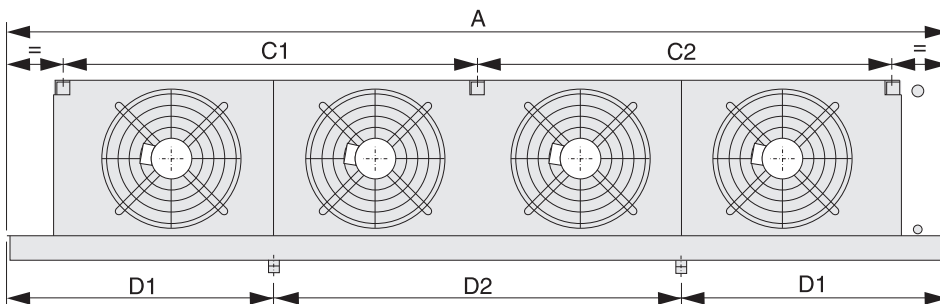
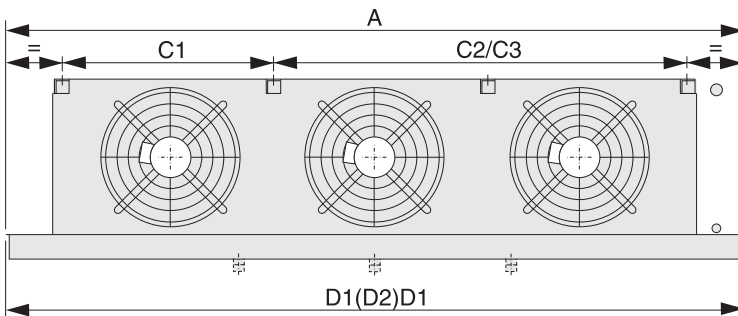
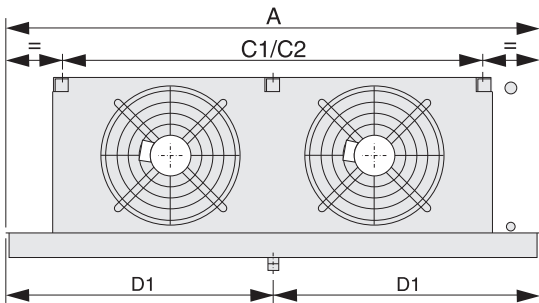
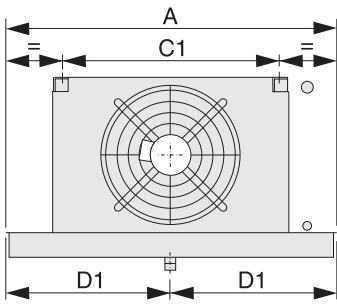
\*\* These 230/50/1 motors are suitable for temperatures down to -20 °C and are not provided with a thermal safety device in the windings.

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