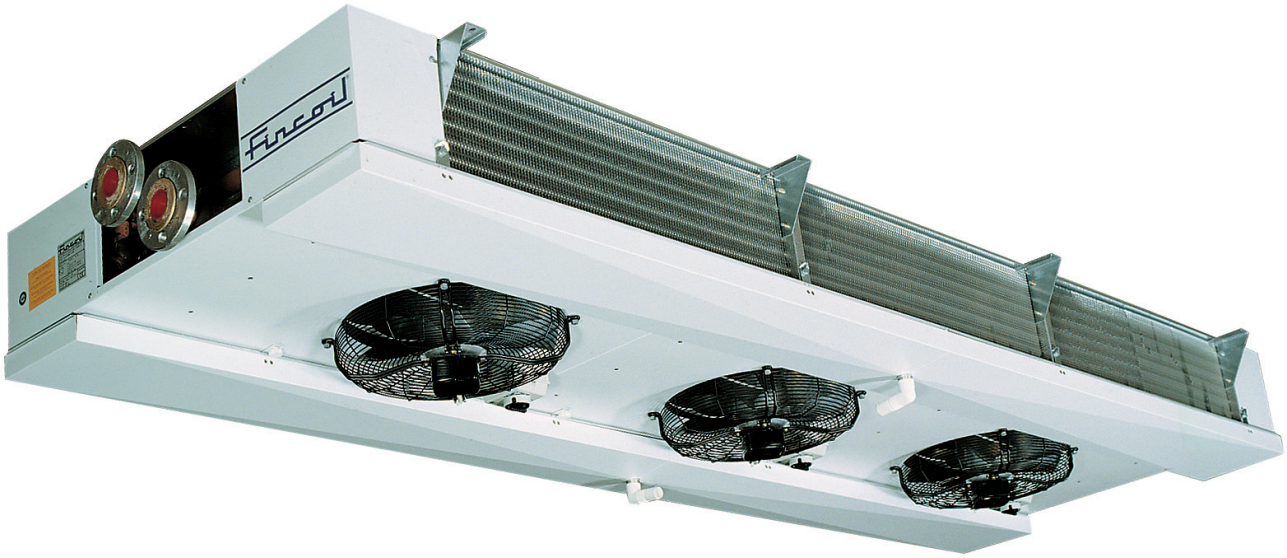
Fincoil FMP and FMPG

Air coolers and liquid circulated air coolers



FMP air coolers and FMPG liquid circulated air coolers are designed for cold rooms where low profile dual discharge air cooler is needed. Units are also suitable for cooling engine rooms and monitoring rooms. The range includes CA-models with copper tubes designed for refrigerants and liquids, which do not corrode copper and SA-models with stainless steel tubes suitable for NH_3 and for conditions requiring special corrosion protection. To applications, where adjustable air throw figure and isolated drip tray design is needed, we recommend Polar Bear Duo range and for special conditions AMK range air coolers with hot dip galvanized heat transfer section.

Features

– 12 sizes with nominal capacities from 3.06...73.1 kW (R404A, SC2, EN 328)
– Performance data of air coolers according to Eurovent Rating Standard 7/C/001
– Fan sizes Ø 450 mm and Ø 500 mm with four fan speed alternatives, fan size Ø 630 mm with two fan speed alternatives
– In evaporator use inside grooved Cross Hatch-tube, smooth tubes in liquid use
– Hygienic construction; the casing is made of polyester coated, hot dip galvanized steel. The unit can be tightly installed to the ceiling.
– Double, uninsulated drip trays, which are easy to open and remove
– Product selection with the FincoilSelect program

fincoil

ISO 9001 DNV CERTIFIED FIRM

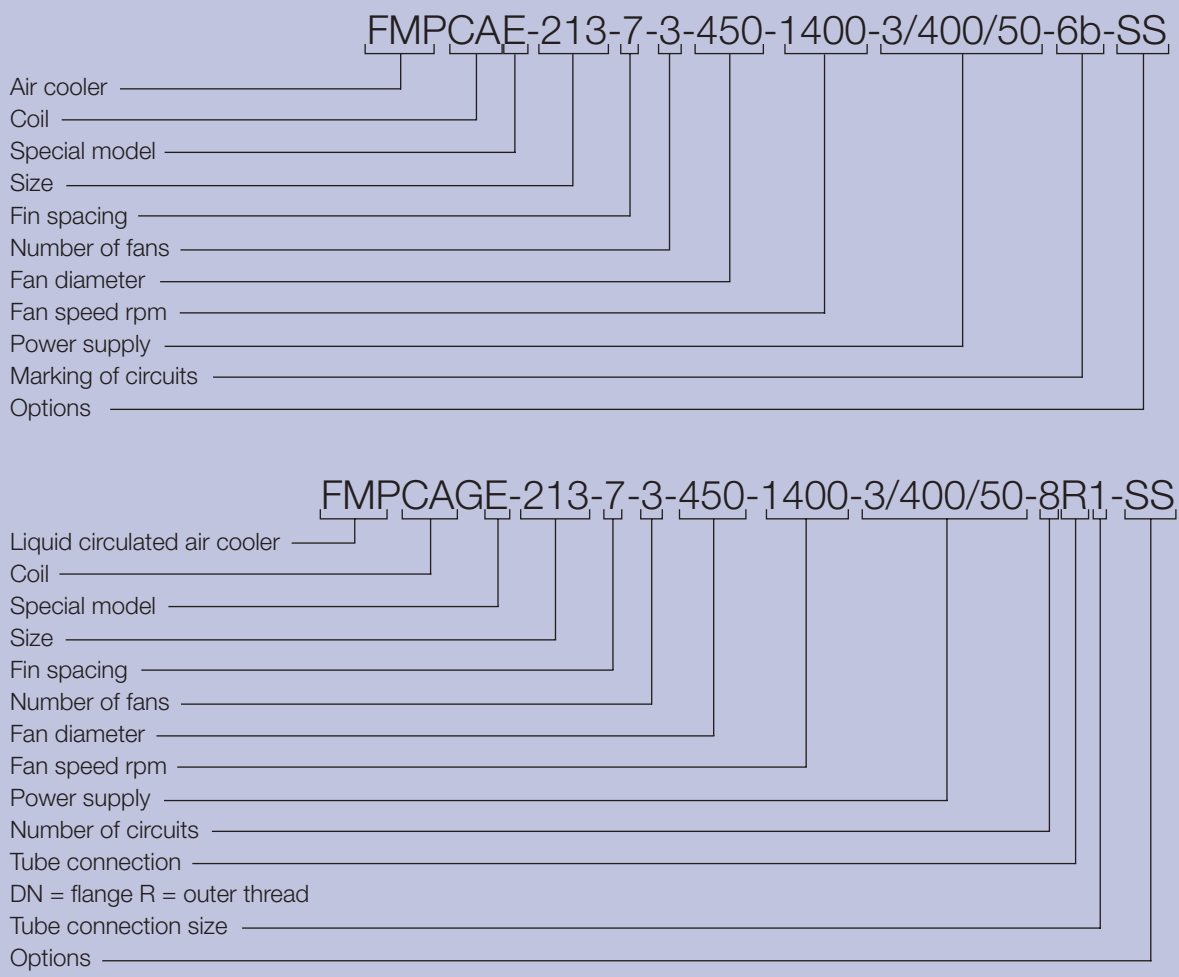
EUROVENT CERTIFIED PERFORMANCE CERTIFY-ALL Direct Expansion UNIT AIR COOLERS

Technical data

The heat transfer section is made of aluminium fins and copper tubes (CA) with 4 mm, 7 mm or 12 mm fin spacing or stainless steel tubes (SA) with 4 mm or 7 mm fin spacing. As an option, aluminium fins with epoxy coating are also available with 4 mm fin spacing (please check electric defrost capacity). The capacity correction factor for heat transfer capacity of epoxy-coated aluminium is 0.97. Casing material is polyester coated hot dip galvanized steel, colour white NCS 1002-4. CA-models are with direct expansion as standard and SA-models with pump circulation as standard. Double, uninsulated drip trays are easy to open and remove for cleaning. Units have electric defrost as well as hot gas defrost as alternative. A reliable, energy saving defrost heating element is used in the tray defrost.

A manual including installation and service instructions is shipped with each unit.

Product designation



Options

SS = electric defrost in coil and tray
SSA = electric defrost in tray only
KK-SSA = hot gas defrost in coil, electric defrost in tray
RSt = casing of stainless steel
Ep = epoxy coated fins, 4 mm fin spacing only
Q = fans' safety switches mounted beside fans
W = fans wired to the junction box at the cooler end
Pc = pump circulation (CA)
DX = direct expansion for R717 (SA)
A = air suction through the coil block, blowing direction downwards
Y = air suction from above, blowing sidewards (mounting minimum 300 mm from the ceiling)

Fans
The standard motors are suitable for 3/400 V/50 Hz power supply. Suitability for other power supplies has to be checked separately. The minimum operating temperature for fan motors is –50°C. In the standard model the air suction is from below and blowing sidewards. Technical information for other power supplies is available separately.

Fan power input in the performance data tables is given at +20°C temperature. Full load current (FLC) is given for temperature of –30°C. The current value changes according to air density. The data may also vary due to changes in motor types; therefore the overload protectors should have a +/–20% adjustment margin. Fan speed can be regulated by changing the voltage, excluding fan Ø 630 mm, which can be regulated by a frequency converter. The fan speed can be reduced by changing delta connection (D) into star connection (Y), excluding fan Ø 630 mm.

The fans have internal thermal protectors wired to fans' junction boxes. If they are connected to control the contactor, an external overload protector is not needed (excluding fan Ø 630 mm). The protection class of fans is IP54.

Performance data
The capacities and air flows shown in the Polar Power selection program and in the tables in this brochure are certified with the Eurovent Certify All-certification, and verified by tests (EN 328) in independent laboratories.

The performance data of the air coolers is given for the refrigerant R404A, with standard condition SC2 (t_e = -8 ºC, Δ_{T1} = 8 K, RH = 85%). The influence of humidity is included in the nominal capacities. The performance data is given at the sea level and with normal atmospheric pressure. Air throw is given with 7 mm fin spacing, 1400 rpm fan speed and final air velocity 0.5 m/s. The air throw realizes in isothermal conditions and with undisturbed flow. The air throw changes according to air current. The maximum air throw can vary from the middle line depending on for example location of shelves and lamps.

L_{wa} is the A-stressed sound power level [dB(A)]. Sound pressure level L_{pa} [dB(A)] is given in a room with absorption area of 100m^2 (Sabine), with observation point at a distance of 5 meters and 45º horizontally below the middle point of the fans.

Selection
The preliminary air cooler selection can be made using the tables in this leaflet. Capacities for the required refrigerant and temperature difference can be calculated with the help of the correction factors. The exact selection is made by FincoilSelect software, which is available either on CD-rom or on our web page www.fincoil.fi.

Selection of circuiting and liquid distributor for air coolers is made according to each specific dimensioning condition and refrigerant. If the circuiting is unknown, following information is needed: refrigerant, cooling capacity, evaporation temperature, air inlet temperature, relative humidity and incoming liquid temperature (if lower than +20ºC). In the selection of liquid circulated air coolers is following information needed: cooling capacity, liquid / concentration, liquid temperature in/ out, air inlet temperature / relative humidity, max. allowed liquid pressure drop and allowed sound level in a nominal point. Our sales department will help you with the selection, if the needed conditions are outside of the selection program's operations area.

Performance data FMP
R404A, SC2, EN 328 3/400 V/50 Hz

			Fin spacing 4 mm					Fin spacing 7 mm					Fin spacing 12 mm								
			1400 rpm		1150 rpm			1400 rpm		1150 rpm			1400 rpm		1150 rpm						
Size	Fan Ø	No. of fans	Capa-city kW	Air flow m³/s	Capa-city kW	Air flow m³/s	Sur-face area m²	Capa-city kW	Air flow m³/s	Capa-city kW	Air flow m³/s	Sur-face area m²	Capa-city kW	Air flow m³/s	Capa-city kW	Air flow m³/s	Sur-face area m²	L_{pa} dB(A) 1400 rpm	L_{pa} dB(A) 1150 rpm	L_{wa} dB(A) 1400 rpm	L_{wa} dB(A) 1150 rpm
201	450	1	8.86	1.46	7.76	1.18	32	6.46	1.47	5.62	1.20	20	4.46	1.48	4.03	1.21	13	64	59	79	73
211	450	1	11.2	1.41	9.45	1.14	48	8.52	1.44	7.16	1.17	29	6.08	1.45	5.31	1.18	19	64	59	79	73
221	500	1	13.7	1.75	11.0	1.31	60	10.5	1.78	8.61	1.35	37	7.62	1.79	6.16	1.37	24	70	61	85	76
202	450	2	18.1	2.91	15.8	2.36	64	12.5	2.95	11.0	2.40	39	8.75	2.96	7.67	2.42	25	67	62	82	76
212	450	2	22.7	2.82	19.1	2.27	97	17.2	2.88	14.6	2.33	59	12.4	2.90	10.5	2.36	38	67	62	82	76
231	630	1	25.4	3.25	-	-	101	19.3	3.33	-	-	62	13.6	3.37	-	-	39	80	-	94	-
222	500	2	27.8	3.49	22.3	2.63	121	21.4	3.56	17.4	2.70	73	15.3	3.59	12.2	2.73	47	73	64	88	79
213	450	3	33.8	4.23	27.6	3.41	145	25.3	4.31	22.1	3.50	88	18.6	4.35	16.2	3.54	56	68	63	83	77
223	500	3	42.0	5.24	34.0	3.94	181	32.2	5.33	26.3	4.04	110	22.6	5.38	18.9	4.10	71	75	66	89	81
232	630	2	51.5	6.50	-	-	203	38.8	6.66	-	-	123	27.3	6.74	-	-	79	83	-	97	-
224	500	4	53.1	6.98	43.8	5.25	242	42.1	7.11	35.0	5.39	147	30.9	7.17	25.6	5.46	94	76	67	90	72
233	630	3	73.1	9.75	-	-	304	57.9	10.0	-	-	185	42.0	10.1	-	-	119	85	-	99	-

			Fin spacing 4 mm					Fin spacing 7 mm					Fin spacing 12 mm								
			900 rpm		700 rpm			900 rpm		700 rpm			900 rpm		700 rpm						
Size	Fan Ø	No. of fans	Capa-city kW	Air flow m³/s	Capa-city kW	Air flow m³/s	Sur-face area m²	Capa-city kW	Air flow m³/s	Capa-city kW	Air flow m³/s	Sur-face area m²	Capa-city kW	Air flow m³/s	Capa-city kW	Air flow m³/s	Sur-face area m²	L_{pa} dB(A) 900 rpm	L_{pa} dB(A) 700 rpm	L_{wa} dB(A) 900 rpm	L_{wa} dB(A) 700 rpm
201	450	1	6.72	0.96	5.43	0.74	32	4.83	0.97	4.05	0.75	20	3.58	0.98	3.06	0.76	13	53	49	68	64
211	450	1	8.06	0.93	6.28	0.70	48	6.21	0.95	5.09	0.73	29	4.61	0.96	3.82	0.74	19	53	49	68	64
221	500	1	9.73	1.13	7.02	0.76	60	7.66	1.15	5.51	0.77	37	5.54	1.17	4.19	0.79	24	58	50	73	65
202	450	2	12.9	1.92	10.7	1.47	64	9.51	1.94	7.90	1.51	39	6.68	1.96	5.67	1.53	25	56	52	71	67
212	450	2	16.3	1.86	12.8	1.40	97	12.6	1.90	10.1	1.46	59	9.15	1.92	7.64	1.49	38	56	52	71	67
231	630	1	18.3	2.14	-	-	101	14.2	2.21	-	-	62	10.2	2.25	-	-	39	66	-	81	-
222	500	2	19.7	2.25	13.7	1.51	121	15.4	2.30	11.0	1.55	73	11.0	2.33	8.28	1.57	47	61	53	76	68
213	450	3	24.0	2.79	19.3	2.11	145	19.1	2.86	15.5	2.19	88	13.6	2.88	11.4	2.23	56	57	53	72	68
223	500	3	29.8	3.38	20.8	2.27	181	22.7	3.45	16.9	2.32	110	17.0	3.50	12.0	2.36	71	63	54	77	69
232	630	2	36.7	4.28	-	-	203	28.4	4.41	-	-	123	20.9	4.50	-	-	79	69	-	84	-
224	500	4	39.2	4.51	28.4	3.02	242	31.1	4.61	22.7	3.09	147	22.9	4.66	16.7	3.14	94	64	55	78	70
233	630	3	55.0	6.42	-	-	304	43.4	6.62	-	-	185	31.7	6.75	-	-	119	71	-	86	-

Correction factors for evaporating capacity R404A

T1 [K]	Evaporating temperature t_e [°C]											
	–40	–35	–30	–25	–20	–15	–10	–8	–5	0	5	10
5	0.56	0.56	0.56	0.57	0.59	0.60	0.62	0.63	0.67	0.73	0.73	0.73
6	0.67	0.67	0.67	0.68	0.70	0.72	0.74	0.75	0.80	0.88	0.88	0.88
7	0.78	0.78	0.79	0.80	0.82	0.84	0.87	0.88	0.93	1.03	1.03	1.03
8	0.90	0.90	0.90	0.91	0.94	0.96	0.99	1.00	1.06	1.17	1.17	1.17
9	1.01	1.01	1.01	1.02	1.05	1.08	1.11	1.13	1.20	1.32	1.32	1.32
10	1.12	1.12	1.12	1.14	1.17	1.20	1.24	1.25	1.33	1.47	1.47	1.47
11				1.25	1.29	1.32	1.36	1.38	1.46	1.61	1.61	1.61
12				1.37	1.40	1.44	1.48	1.50	1.60	1.76	1.76	1.76

Air throw with 7 mm fin spacing

Size	1400 rpm [m]
201	9
211	9
221	11
202	10
212	10
231	18
222	14
213	12
223	15
232	19
224	17
233	20

Air throw is given with final air velocity 0.5 m/s.

Influence of humidity on the capacity

Standard conditions	Evaporating temperature t_e [°C]	Temperature difference T1 [K]	Relative humidity	Fixed ratio
SC1	0	10	85%	1.35
SC2	–8	8	85%	1.15
SC3	–25	7	95%	1.05
SC4	–31	6	95%	1.01

Fixed ratios specified in the Eurovent Standard to convert the standard capacity (dry capacity), which is measured according to EN 328, into the nominal capacity (wet capacity) suitable for practical conditions.

Capacities for different refrigerants

Refrigerant	SC1	SC2	SC3	SC4
R134a	0.93	0.91	0.85	
R22	0.95	0.95	0.95	0.95
R404A/R507	1.00	1.00	1.00	1.00

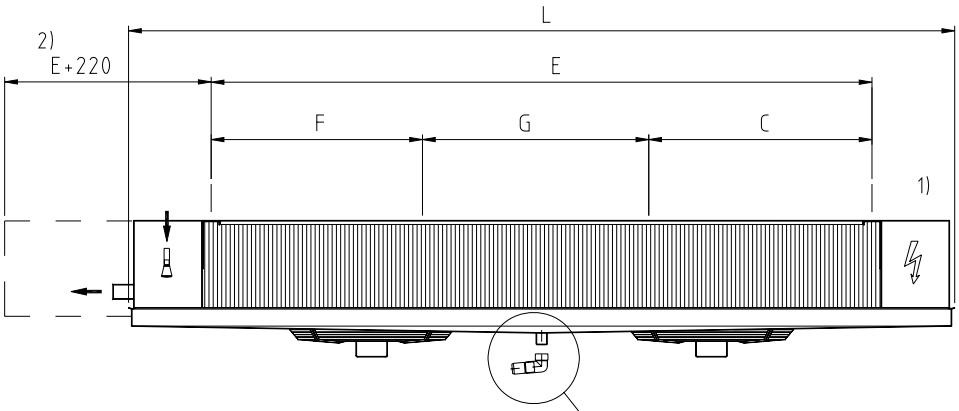
Technical data of fan motors 3/400 V/50 Hz

	1400 rpm		1150 rpm		900 rpm		700 rpm	
Fan Ø mm	Power input kW	FLC A	Power input kW	FLC A	Power input kW	FLC A	Power input kW	FLC A
450	0.55	1.38	0.42	0.86	0.21	0.73	0.14	0.37
500	0.77	1.62	0.54	1.13	0.29	0.90	0.16	0.47
630	1.60	4.13	-	-	0.60	1.98	-	-

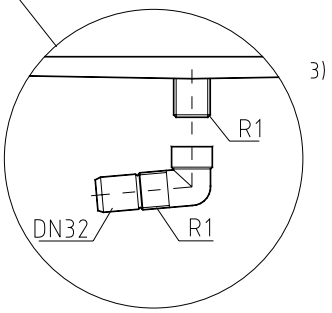
Electric defrost capacities for 3/400 V and 3/230 V

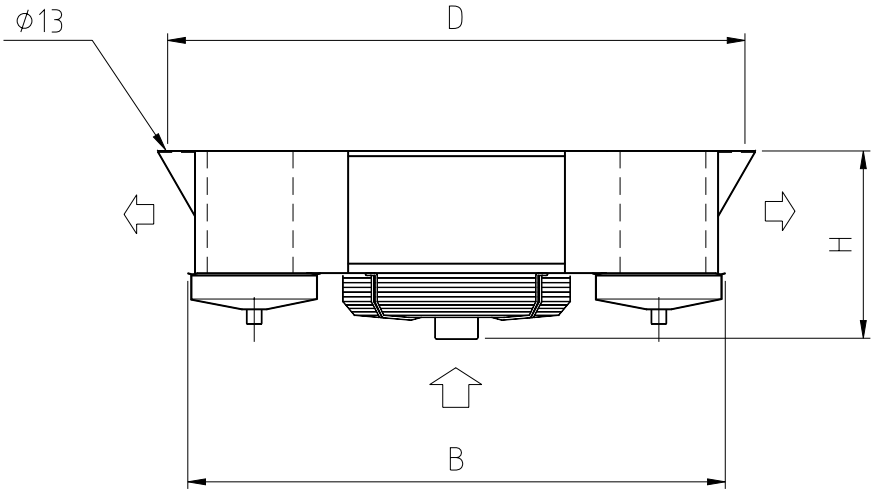
	SSA	SS	
Size	Drip tray kW	Coil kW	Total kW
201	0.55	2.56	3.11
211	0.55	3.84	4.39
221	0.55	3.84	4.39
202	1.10	3.20	4.30
212	1.10	6.40	7.50
231	0.55	5.76	6.31
222	1.10	9.60	10.7
213	1.50	9.60	11.1
223	1.50	14.4	15.9
232	1.10	11.5	12.6
224	2.00	16.8	18.8
233	1.50	17.3	18.8

Dimensional drawings



1) Junction boxes for electric defrost.
2) Space for exchanging defrost heaters. Defrost heaters can also be extracted from the opposite side by cutting their connecting lead.
3) FMP-213, -223, -224 and -233: drainage connection R2 without angle connection.





Dimensions and weight

	Dimensions mm				Fixing points mm				Internal volume CA	Net weight kg Fin spacing mm		
Size	L	B	H	E	F	G	C	D	1	4	7	12
201	1430	1140	400	945	-	-	-	1225	9	75	70	65
211	1430	1140	400	945	-	-	-	1225	13	85	80	75
221	1430	1140	170	945	-	-	-	1225	17	100	90	85
202	2430	1140	400	1945	-	-	-	1225	17	130	120	115
212	2430	1140	400	1945	-	-	-	1225	26	150	135	125
231	1630	1260	620	1145	-	-	-	1345	31	160	145	135
222	2430	1140	470	1945	-	-	-	1225	34	170	150	140
213	3430	1140	400	2945	932	1000	1013	1225	39	220	200	185
223	3430	1140	470	2945	932	1000	1013	1225	51	255	225	210
232	2830	1260	620	2345	1145	-	1200	1345	57	290	260	245
224	4430	1140	470	3945	932	2000	1013	1225	68	325	290	265
233	4030	1260	620	3545	1145	1200	1200	1345	82	425	380	350