

KC series – Cubic type evaporating units



Cubic type evaporating unit, with built-in control valves, for high, positive and negative temperature cold rooms, built in galvanised steel shell with polyester coating.

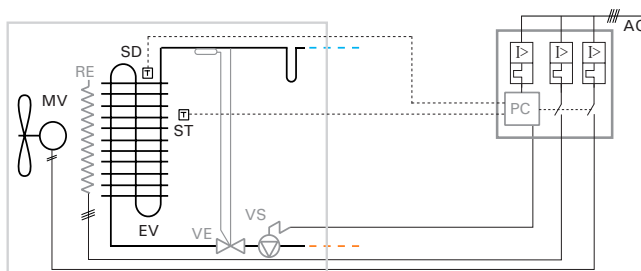
Features

- ▶ 230V 50Hz power supply. Available in 60Hz. Other voltages on request.
- ▶ High efficiency coils, in copper pipes and aluminium fins, with 4 or 6 mm fin spacing.
- ▶ Double stainless steel draining pan and insulation for negative temperature.
- ▶ Solenoid valve in liquid line and thermostatic expansion valve as standard.
- ▶ Air defrost.
- ▶ Motor fans axial with high air flow.
- ▶ Ready-to-solder refrigeration connections, with built-in suction trap.
- ▶ Flexible drain pipe heater (only for negative temperature models).

Options

- ▶ Electrical heater defrost with heaters inside the coil (change to 400V 3N 50Hz power supply).
- ▶ Hot gas defrosting.
- ▶ Electrical expansion valve.
- ▶ Control and power board with electronic microcontroller and digital display, with MCB switch for heaters and fans, 6 relays for control, cold room and defrost temperature probes, and operation LEDs.
- ▶ Built-in humidification / deshumidification / heating kit.
- ▶ Anti-corrosion coil coating.
- ▶ Long-range fan streamer.
- ▶ Fan collar heater.
- ▶ ATEX fans.

Refrigeration and electrical schema



MV: MOTOR FAN	PC: CONTROL PANEL (OPTIONAL)
EV: EVAPORATOR	VS: SOLENOID VALVE (OPTIONAL)
AC: ELECTRICITY SUPPLY	VE: EXPANSION VALVE (OPTIONAL)
ST: THERMOSTAT PROBE	RE: DEFROST HEATER (OPTIONAL)
SD: DEFROST PROBE	

- ❄ High efficiency coils.
- ❄ Integrated expansion valve, solenoid valve and suction siphon.
- ❄ Factory set equipment for optimum cooling performance.
- ❄ Double insulated defrost tray in negative temperature models.

Electronic control panel (optional)

All equipment can be controlled by means of an advanced multi-function controller, consisting of an electronic board integrated in the electrical panel and digital control unit.



Electronic expansion valve

The evaporator units are optionally equipped with an electronic expansion valve.

Humidification kit (optional)

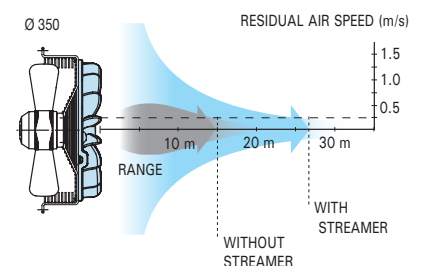
Steam humidification kit with a capacity of 3 kg/h, consisting of: steam lances integrated in the evaporator unit, a submerged electrode generator cylinder, with water supply and drain valves, and electronic relative humidity controller in the cold room.



The system is only valid for mains water with conductivity between 125 and 1250 $\mu\text{S}/\text{cm}$, and total hardness between 50 and 400 mg/l CaCO_3 and more than twice the Cl content.

Long-range fan streamer (optional)

Optionally, a streamer is installed on the fan outlet to get a longer range.



230V 50Hz | High temperature | Positive temperature | R-134a

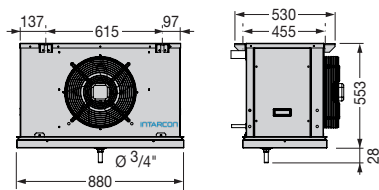
Refrigerant	Application	Series / Model	Cooling capacity (W) according to cold room temperature ⁽¹⁾				Coil			Fans				Electrical defrost		Liq-Gas Cooling Connection	Weight (kg)	
			SC1	SC2	SC3	SC4	Fin spacing (mm)	Area (m ²)	Vol. (litres)	Air flow (m ³ /h)	Nx Ø (mm)	Power (W)	I max. (A)	Air Range (m)	Power (W)			Intensity (A)
			10 °C 85 % RH T1 = 10 K	0 °C 85 % RH DT1 = 8 K	-18 °C 95 % RH DT1 = 7 K	-25 °C 95 % RH DT1 = 6 K												
R-134a	High	AKC-NY-0 135	6 070	4 130			4	15.8	3.2	2 000	1x Ø 350	160	0.7	15	6x 450	3.9	3/8"-7/8"	43
		AKC-NY-1 135	7 110	4 840			4	25.2	5.4	2 500	1x Ø 350	160	0.7	15	6x 700	6.1	3/8"-7/8"	56
		AKC-NY-2 235	12 280	8 370			4	34.8	7.4	4 000	2x Ø 350	325	1.4	15	6x 800	7.0	1/2"-1 1/8"	72
		AKC-NY-3 235	14 010	9 550			4	47.8	9.6	5 000	2x Ø 350	320	1.4	15	9x 800	10.4	1/2"-1 3/8"	89
		AKC-NY-3 335	16 780	11 440			4	47.8	9.6	6 000	3x Ø 350	490	2.2	15	9x 800	10.4	1/2"-1 3/8"	94
	AKC-NY-4 435	22 160	15 100			4	63.2	12.8	8 000	4x Ø 350	650	2.9	15	9x 1 000	13.0	5/8"-1 5/8"	118	
	Positive	MKC-NY-0 135	5 210	3 550			6	9.6	3.2	2 100	1x Ø 350	165	0.7	15	6x 450	3.9	3/8"-7/8"	42
		MKC-NY-1 135	6 450	4 400			6	17.1	5.4	2 700	1x Ø 350	160	0.7	15	6x 700	6.1	3/8"-7/8"	54
		MKC-NY-2 235	10 550	7 190			6	21.2	7.4	4 150	2x Ø 350	325	1.4	15	6x 800	7.0	1/2"-1 1/8"	69
		MKC-NY-3 235	12 250	8 350			6	31.8	9.6	5 200	2x Ø 350	315	1.4	15	9x 800	10.4	1/2"-1 3/8"	86
MKC-NY-3 335		14 250	9 710			6	31.8	9.6	6 200	3x Ø 350	485	2.2	15	9x 800	10.4	1/2"-1 3/8"	91	
MKC-NY-4 435	18 890	12 870			6	42.4	12.8	8 300	4x Ø 350	645	2.9	15	9x 1 000	13.0	5/8"-1 5/8"	114		

230V 50Hz | High temperature | Positive temperature | Negative temperature | R-449A

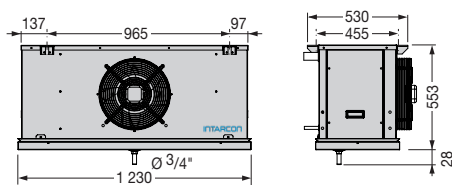
R-449A	High	AKC-NG-0 135	6 460	4 400			4	15.8	3.2	2 000	1x Ø 350	160	0.7	15	6x 450	3.9	3/8"-7/8"	43
		AKC-NG-1 135	7 990	5 450			4	25.2	5.4	2 500	1x Ø 350	160	0.7	15	6x 700	6.1	3/8"-7/8"	56
		AKC-NG-2 235	13 800	9 410			4	34.8	7.4	4 000	2x Ø 350	325	1.4	15	6x 800	7.0	1/2"-1 1/8"	72
		AKC-NG-3 235	16 180	11 020			4	47.8	9.6	5 000	2x Ø 350	320	1.4	15	9x 800	10.4	1/2"-1 3/8"	89
		AKC-NG-3 335	19 690	13 420			4	47.8	9.6	6 000	3x Ø 350	490	2.2	15	9x 800	10.4	1/2"-1 3/8"	94
	AKC-NG-4 435	26 180	17 840			4	63.2	12.8	8 000	4x Ø 350	650	2.9	15	9x 1 000	13.0	5/8"-1 5/8"	118	
	Positive / Negative	MKC-NG-0 135	5 410	3 690			6	9.6	3.2	2 100	1x Ø 350	165	0.7	15	6x 450	3.9	3/8"-7/8"	42
		BKC-NG-0 135			2 750	2 240												
		MKC-NG-1 135	7 170	4 890			6	17.1	5.4	2 700	1x Ø 350	160	0.7	15	6x 700	6.1	3/8"-7/8"	54
		BKC-NG-1 135			3 600	2 940												
MKC-NG-2 235		11 650	7 940			6	21.2	7.4	4 150	2x Ø 350	325	1.4	15	6x 800	7.0	1/2"-1 1/8"	69	
BKC-NG-2 235				5 810	4 740													
MKC-NG-3 235		13 950	9 510			6	31.8	9.6	5 200	2x Ø 350	315	1.4	15	9x 800	10.4	1/2"-1 3/8"	86	
BKC-NG-3 235				6 880	5 620													
MKC-NG-3 335		16 580	11 300			6	31.8	9.6	6 200	3x Ø 350	485	2.2	15	9x 800	10.4	1/2"-1 3/8"	91	
BKC-NG-3 335				7 970	6 510													
MKC-NG-4 435	22 150	15 090			6	42.4	12.8	8 300	4x Ø 350	645	2.9	15	9x 1 000	13.0	5/8"-1 5/8"	114		
BKC-NG-4 435			10 590	8 640														

Dimensions

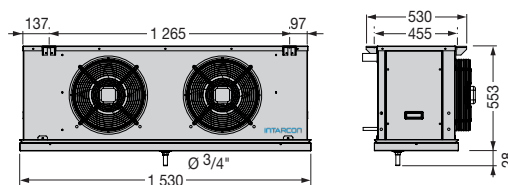
0 series



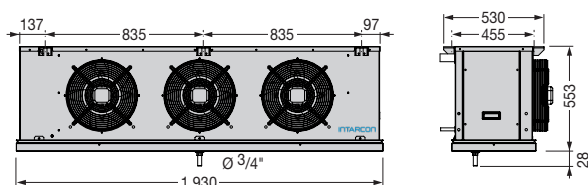
1 series



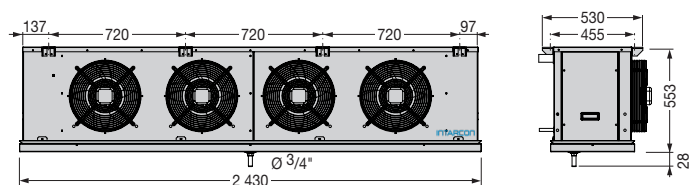
2 series



3 series



4 series



Dimensions in mm.

⁽¹⁾ Cooling capacity at room temperature and relative humidity, calculated from dry cooling capacity according to EN 328 standard, applying the following empirical factors:

Conditions	Reference	Rate
10 °C 85 % HR	EN 328 SC1	1.35
0 °C 85 % HR	EN 328 SC2	1.15
-18 °C 95 % HR	EN 328 SC3	1.05
-25 °C 95 % HR	EN 328 SC4	1.00

To take into account the slip in R-449A, the average evaporating temperature has been considered.

Control and power panel

Microcontroller

Compact control board to control evaporating units up to 3600 W defrost power. Optional for JB, JD and JC series.

- ▶ Electronic microprocessor control unit with digital display, with three control relays for solenoid valve, defrost and fans.
- ▶ Configurable digital input.
- ▶ Compact surface mounting.
- ▶ Supplied with 5 m electrical interconnections and 3 m power supply cable.

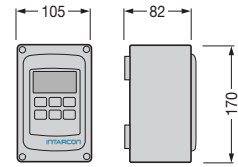
Features of the control panel

Control and power panel for evaporators in high, medium and low temperature applications, with electronic controller and digital display. Optional for JD (3 to 5), KD, KC, KH and KV series.

- ▶ White painted galvanised sheet steel cabinet with key.
- ▶ Electronic control microprocessor with digital display, with six control relays for solenoid, defrost, fans, light, alarm, and configurable auxiliary relay; temperature and defrost probes,
- ▶ General cut-off switch, differential switch, three-pole contactors and magnetothermic switches for heating elements and fans.
- ▶ Operation indicator lights.
- ▶ Connection terminal block.
- ▶ Independent control for 1 or 2 evaporator units.
- ▶ Electronics with LAN BUS communication for synchronisation of up to 8 devices (except ATM-N-01031 and MTM-N-01161).

Microcontroller dimensions

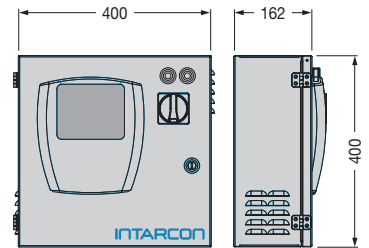
0 series



Dimensions in mm.

Control panel dimensions

1 series



Dimensions (mm)	A	B	C
size 1	400	162	400
size 2	600	162	400
size 3	650	162	550
size 4	650	162	750

Dimensions in mm.

Table of features for temperature control panel

	Model	Power supply	Max. defrost power (kW)	Max. defrost intensity (A)	Max. fans intensity (A)	VEE ⁽¹⁾	Application to evaporators	Control panel size ⁽²⁾
For temperature control 1 evaporating unit	ATM-N-01031	230V	ventilated	--	3	-	JB, JD, JC	0
	ATM-N-11031	230V	ventilated	--	3	•	KC, JD 3-5	1
	ATM-N-13101	400V 3N	ventilated	--	10	•	KD, KH, KV 31,41,32,42	1
	ATM-N-13161	400V 3N	ventilated	--	16	•	KV 43,33,44	1
	MTM-N-01161	230V	3,6	16	3	-	JB, JD 1-2, JC	0
	MTM-N-11161	230V	3,6	16	3	•	JB, JD 1-2, JC	1
	MTM-N-13161	400V 3N	10	16	10	•	JD 3-5, KD 12, KC, KH 11-21-12, KV 31	1
	MTM-N-13201	400V 3N	12	20	10	•	KH 22, KV 41	1
	MTM-N-13321	400V 3N	20	32	10	•	KD 22-33, KH 13-23-14, KV 3256	1
	MTM-N-13401	400V 3N	25	40	10	•	KV 3263-4263, KH 24	1
For temperature control 2 evaporating units	MTM-N-13641	400V 3N	2x 20	64	16	•	KV 43,33,44	2
	ATM-N-11122	230V	ventilated	--	2x 6	•	JB, JD, JC, KC, KD 12	1
	ATM-N-13202	400V 3N	ventilated	--	2x 10	•	KH, KV 31-41-32	2
	ATM-N-13322	400V 3N	ventilated	--	2x 16	•	KV 43-33-44	2
	MTM-N-11322	230V	2x 3,6	2x 16	2x 6	•	JB, JD 1-2, JC	2
	MTM-N-13322	400V 3N	2x 10	2x 16	2x 10	•	KC, JD 3-5, KD 12, KH 11-21-12, KV 31	3
	MTM-N-13402	400V 3N	2x 12	2x 20	2x 10	•	KH 22, KV 41	3
	MTM-N-13642	400V 3N	2x 20	2x 32	2x 10	•	KD 22-33, KH 13-23-14-24, KV 3256-4263	3
	MTM-N-13802	400V 3N	2x 25	2x 40	2x 16	•	KV 3263	3

Options

- ▶ Control panel available in 60Hz.

⁽¹⁾ Optional electronic expansion valve.

⁽²⁾ Optionals, such as electronic expansion valve, may modify the control panel size.

Temperature and humidity control panel (AHM models)

Cuadro de control y potencia para controlar temperatura y humedad, con controlador electrónico y display digital.

- ▶ White painted galvanised sheet steel cabinet with key.
- ▶ Electronic control microprocessor with digital display, with six control relays for solenoid, defrost, fans, light, alarm, and configurable auxiliary relay; temperature and defrost and humidity probes.
- ▶ General cut-off switch.
- ▶ Operation indicator lights.
- ▶ Connection terminal block.
- ▶ Configurable digital input.

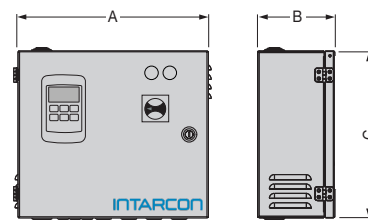
Features of humidity control panel (MHM models)

Control and power panel for evaporators in high, medium and low temperature applications, with electronic controller and digital display.

- ▶ White painted galvanised sheet steel cabinet with key.
- ▶ Electronic control microprocessor with digital display, with six control relays for solenoid, defrost, fans, light, alarm, and configurable auxiliary relay; temperature and defrost probes, and humidity
- ▶ General cut-off switch, differential switch, three-pole contactors and magnetothermic switches for heating elements and fans.
- ▶ Operation indicator lights.
- ▶ Connection terminal block.
- ▶ Configurable digital input and digital input for door microswitch.

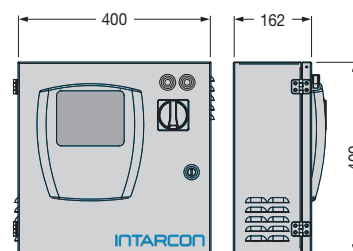
Control panel dimensions for AHM models

1 series



Control panel dimensions for MHM models

1 series



Dimensions (mm)	A	B	C
size 1	400	162	400
size 2	600	162	400
size 3	650	162	550
size 4	650	162	750

Dimensions in mm.

Table of features for para de humidity control panel

	Model	Power supply	Max. defrost power (kW)	Max. defrost intensity (A)	Max. fans intensity (A)	VEE ⁽¹⁾	Application to evaporators	Control panel size ⁽²⁾
For humidity control 1 evaporating unit	AHM-E-11031	230V	ventilated	--	3	•	JB, JD, JC, KC	1
	AHM-E-13101	400V 3N	ventilated	--	10	•	KD, KH, KV 31,41,32,42	1
	MHM-N-11161	230V	3,6	16	3	•	JB, JD 1-2, JC	1
	MHM-N-13161	400V 3N	10	16	10	•	JD 3-5, KD 12, KC, KH 11-21-12, KV 31	1
	MHM-N-13201	400V 3N	12	20	10	•	KH 22, KV 41	1
	MHM-N-13321	400V 3N	20	32	10	•	KD 22-33, KH 13-23-14, KV 3256	1
	MHM-N-13401	400V 3N	25	40	10	•	KV 3263-4263, KH 24	1

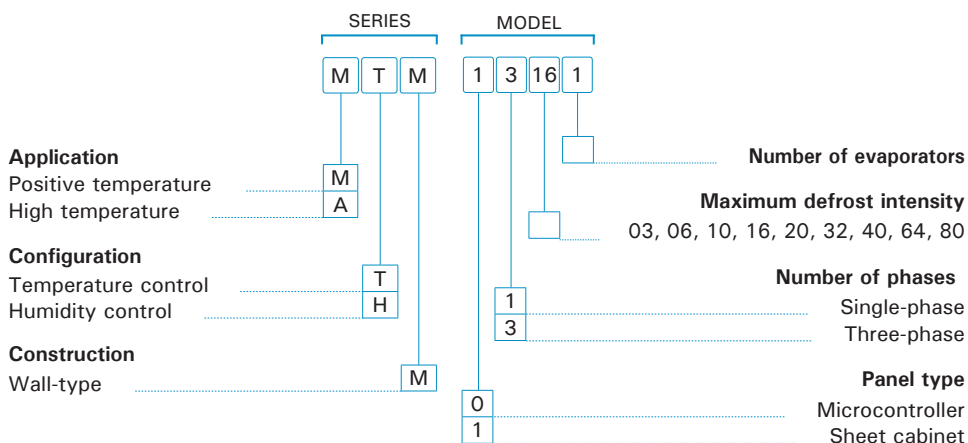
Options

- ▶ Control panel available in 60Hz.
- ▶ Control for heating resistances, or dehumidification and heating, only HM models (3 kW, 9 kW, 12 kW, 18 kW, 24 kW and 30 kW).

⁽¹⁾ Optional electronic expansion valve.

⁽²⁾ Optionals, such as electronic expansion valve, may modify the control panel size.

Nomenclature of temperature and humidity control panels



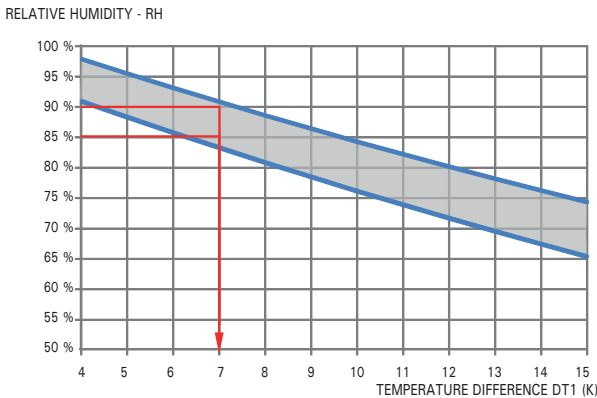
Method of calculation of evaporating units

Condiciones estándares de cálculo

Condition	Cool room temperature	Relative humidity	DT1	Superheating	Liquid temperature
SC1	10 °C	85 %	10 K	6,5 K	30 °C
SC2	0 °C	85 %	8 K	5,2 K	30 °C
SC3	-18 °C	95 %	7 K	4,5 K	20 °C
SC4	-25 °C	95 %	6 K	3,9 K	20 °C
SC5	-34 °C	95 %	6 K	3,9 K	20 °C

The cooling capacities have been calculated using standard conditions according to standard EN 328.

Choice of Temperature Difference (DT1)



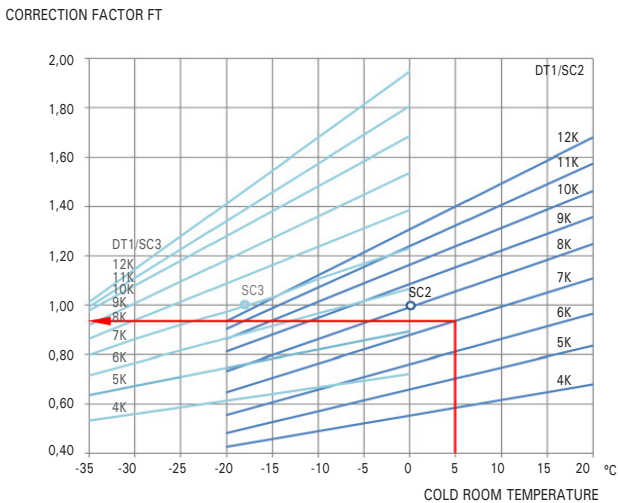
The Temperature Difference DT1 is defined as the difference between the temperature of the air entering the evaporator and the evaporating temperature of the refrigerant.

In positive temperature conservation cold rooms, the Temperature Difference in the evaporator has a great influence on the degree of humidity in the environment, in addition to other factors such as the design of the cold room, the rate of ventilation and the transpiration of the stored product.

In negative temperature cold rooms, the DT1 has little influence on the relative humidity, while an excessive DT1 will imply a lower evaporation temperature and lower performance of the compressors.

The attached graphic will allow you to choose the most suitable DT1 for sizing of the evaporator. Depending on the desired relative humidity, we look for the intersection point with the curve, obtaining the value of the new thermal jump:

Correction factor for calculation condition (FT)



To obtain the cooling capacity at another cold rooms temperatures and thermal jump, you must use the correction factor FT.

The attached graph will allow you to obtain, based on the ambient temperature and the Temperature Difference DT1, said factor, taking as reference the standard power level SC2 or SC3:

Calculation example: it is desirable to store vegetables at temperature of 5 °C and relative humidity between 85 and 90 %, with estimated refrigeration needs of 38 kW and using refrigerant R-449A in direct expansion.

To obtain the degree of relative humidity, we choose a Temperature Difference 7 K the cold room, and we can see that this calculation condition corresponds to a correction factor FT = 0.94.

We can calculate the corrected cooling capacity:

We choose the evaporating unit MKH-NG-2350 with a cooling capacity SC2 = 45.2 kW

$$Q_c = \frac{38 \text{ kW}}{0,94} = 40,42 \text{ kW}$$

Evaporator selection

To select an evaporator, you must calculate the corrected refrigeration capacity using the following formula:

$$Q_c = \frac{Q_o}{FT}$$

Online selection and calculation of evaporators with the Calcooling software

The cooling calculator includes an advanced calculation method for refrigeration systems, based on calculation rules suggested by ASHRAE, refrigerant properties by REFPROP from the NIST and updated thermodynamic correlations for the calculation of heat transfer coefficient.



<https://intarcon.calcooling.com/>