

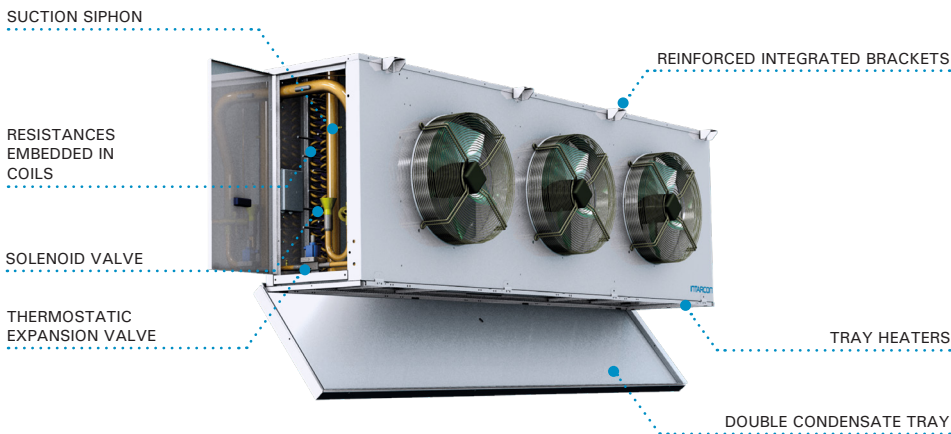
KH series – Industrial cubic type evaporating units



Industrial cubic type evaporating units, with built-in control valves, for positive, negative and high temperature cold rooms, built in galvanised steel structure and bodywork with thermosetting polyester coating.

Features

- ▶ 400V 3N 50Hz power supply. Available in 60Hz. Other voltages on request.
- ▶ Air defrost.
- ▶ Air-cooled high efficiency coils, in copper pipes and aluminium fins, with 4, 5, 7 and 10 mm fin spacing.
- ▶ Double stainless steel draining pan and insulation for negative temperature.
- ▶ Built-in solenoid valve in liquid line and thermostatic expansion valve.
- ▶ High-flow axial motor fans operating at 1300 rpm.
- ▶ Ready-to-solder refrigeration connections, with built-in suction oil trap.
- ▶ Flexible drain pipe heater (only for negative temperature models).



- ❄ High efficiency coils.
- ❄ Expansion and solenoid valves, and suction siphon integrated.
- ❄ 100 % factory tested and adjusted units for the highest performance.
- ❄ Double condensed liquid pan, insulated in low 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.

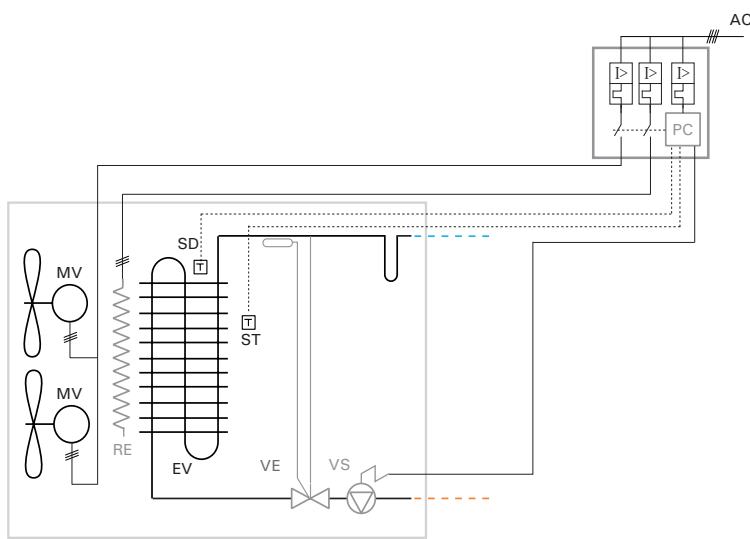


The system is only valid for mains water with conductivity between 125 and 1250 $\mu\text{S}/\text{cm}$, and total hardness between 50 and 400 mg/l CaCO_3 and more than twice the Cl content.

Options

- ▶ Electrical defrost heater inside the coil and over the drain pan.
- ▶ Hot gas defrosting.
- ▶ Electrical expansion valve.
- ▶ Control and power panel with electronic microcontroller and digital display, with differential protection 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 air stream fan.
- ▶ Fan collar heater.
- ▶ ATEX fans.
- ▶ Textile ducts Warm-up.

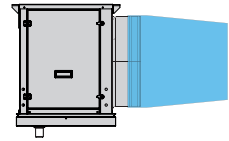
Refrigeration and electrical scheme



- | | |
|------------------------|--------------------------------|
| 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 | |

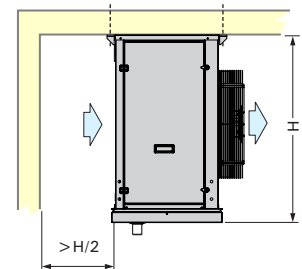
Textile ducts Warm-up

- Reduced defrosting time.
- Prevent heat dissipation from defrost toward the cold room.



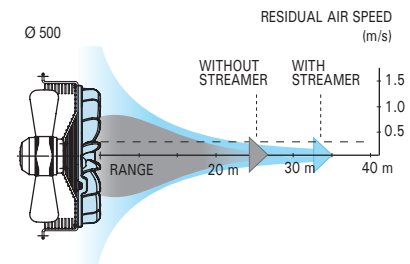
Ceiling installation (standard)

Evaporating units are ready to be fastened to the cold room roof panel.



Long-range fan streamer (optional)

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



Fan (mm)	Range without streamer (m)	Range with streamer (m)
Ø 450	22	28
Ø 500	26	34

400V 3N 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 10 °C 85 % RH DT1 = 10 K	SC2 0 °C 85 % RH DT1 = 8 K	SC3 -18 °C 95 % RH DT1 = 7 K	SC4 -25 °C 95 % RH DT1 = 6 K	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)
R-134a	High	AKH-NY-1 145	13 520	9 210			4	35	8	4 200	1x Ø 450	0.5	1.1	22	6x 700	6	1/2"- 1 1/8"	74
		AKH-NY-2 150	19 530	13 310			4	50	13	6 100	1x Ø 500	0.7	1.4	26	6x 700	6	1/2"- 1 3/8"	96
		AKH-NY-1 245	27 160	18 510			4	70	16	6 400	2x Ø 450	1.1	2.1	22	9x 800	10	1/2"- 1 5/8"	103
		AKH-NY-2 250	39 790	27 120			4	101	24	12 200	2x Ø 500	1.3	2.8	26	12x 800	14	5/8"- 2 1/8"	138
		AKH-NY-1 345	40 250	27 430			4	104	24	12 600	3x Ø 450	1.6	3.2	22	12x 1 000	17	5/8"- 2 1/8"	159
		AKH-NY-2 350	59 020	40 220			4	151	36	18 300	3x Ø 500	2.0	4.2	26	15x 1 000	22	7/8"- 2 1/8"	184
		AKH-NY-1 445	50 430	34 370			4	139	32	16 800	4x Ø 450	2.1	4.3	22	12x 1 250	22	7/8"- 2 1/8"	205
	AKH-NY-2 450	74 120	50 510			4	201	48	24 400	4x Ø 500	2.7	5.6	26	15x 1 250	27	7/8"- 2 1/8"	272	
	Positive	MKH-NY-1 145	12 550	8 550			5	27	8	4 400	1x Ø 450	0.5	1.1	22	6x 700	6	1/2"- 1 1/8"	72
		MKH-NY-2 150	18 060	12 310			5	39	13	6 400	1x Ø 500	0.7	1.4	26	6x 700	6	1/2"- 1 3/8"	94
		MKH-NY-1 245	25 220	17 190			5	54	16	8 800	2x Ø 450	1.0	2.1	22	9x 800	10	1/2"- 1 5/8"	100
		MKH-NY-2 250	37 020	25 230			5	79	24	12 800	2x Ø 500	1.3	2.8	26	12x 800	14	5/8"- 2 1/8"	134
		MKH-NY-1 345	37 200	25 350			5	82	24	13 200	3x Ø 450	1.5	3.2	22	12x 1 000	17	5/8"- 2 1/8"	154
		MKH-NY-2 350	54 690	37 270			5	118	36	19 200	3x Ø 500	2.0	4.2	26	15x 1 000	22	7/8"- 2 1/8"	177
MKH-NY-1 445		45 930	31 300			5	109	32	17 600	4x Ø 450	2.0	4.3	22	12x 1 250	22	7/8"- 2 1/8"	199	
MKH-NY-2 450	67 660	46 110			5	157	48	25 600	4x Ø 500	2.6	5.6	26	15x 1 250	27	7/8"- 2 1/8"	263		

400V 3N 50Hz | High temperature | Positive temperature | Negative temperature | Deep-freezing | R-449A

R-449A	High	AKH-NG-1 145	16 410	11 180			4	46	12	4 000	1x Ø 450	0.5	1.1	22	6x 700	6	1/2"- 1 1/8"	74
		AKH-NG-2 150	23 370	15 930			4	67	17	5 700	1x Ø 500	0.7	1.4	26	6x 700	6	5/8"- 1 3/8"	96
		AKH-NG-1 245	32 600	22 220			4	93	23	8 000	2x Ø 450	1.1	2.1	22	9x 800	10	5/8"- 1 3/8"	103
		AKH-NG-2 250	46 700	31 820			4	134	33	11 400	2x Ø 500	1.3	2.8	26	12x 800	14	7/8"- 1 5/8"	138
		AKH-NG-1 345	48 620	33 140			4	139	33	12 000	3x Ø 450	1.6	3.2	22	12x 1 000	17	7/8"- 1 5/8"	159
		AKH-NG-2 350	69 120	47 100			4	201	48	17 100	3x Ø 500	2.0	4.2	26	15x 1 000	22	7/8"- 2 1/8"	184
		AKH-NG-1 445	64 000	43 620			4	186	44	16 000	4x Ø 450	2.1	4.3	22	12x 1 250	22	7/8"- 2 1/8"	205
	AKH-NG-2 450	91 550	62 390			4	268	64	22 800	4x Ø 500	2.7	5.6	26	15x 1 250	27	1 1/8"- 2 1/8"	272	
	Positive	MKH-NG-1 145	15 580	10 620			5	36	12	4 200	1x Ø 450	0.5	1.1	22	6x 700	6	1/2"- 1 1/8"	72
		MKH-NG-2 150	22 460	15 300			5	52	17	6 100	1x Ø 500	0.7	1.4	26	9x 700	6	5/8"- 1 3/8"	93
		MKH-NG-1 245	30 900	21 060			5	73	23	8 400	2x Ø 450	1.0	2.1	22	9x 800	10	5/8"- 1 3/8"	99
		MKH-NG-2 250	44 840	30 560			5	105	33	12 200	2x Ø 500	1.3	2.8	26	12x 800	14	7/8"- 1 5/8"	132
		MKH-NG-1 345	46 040	31 370			5	109	33	12 600	3x Ø 450	1.5	3.2	22	12x 1 000	17	7/8"- 1 5/8"	153
		MKH-NG-2 350	66 270	45 160			5	157	48	18 300	3x Ø 500	2.0	4.2	26	15x 1 000	22	7/8"- 2 1/8"	175
MKH-NG-1 445		60 550	41 260			5	145	44	16 800	4x Ø 450	2.0	4.3	22	12x 1 250	22	7/8"- 2 1/8"	197	
MKH-NG-2 450	87 680	59 750			5	210	64	24 400	4x Ø 500	2.6	5.6	26	15x 1 250	27	1 1/8"- 2 1/8"	260		
Negative	BKH-NG-1 145	12 570	8 570	6 840	5 590	7	27	12	4 500	1x Ø 450	0.5	1.1	22	6x 700	6	1/2"- 1 1/8"	70	
	BKH-NG-2 150	17 990	12 260	9 800	8 000	7	39	17	6 500	1x Ø 500	0.6	1.4	26	6x 700	6	1/2"- 1 3/8"	90	
	BKH-NG-1 245	24 680	16 820	13 430	10 970	7	54	23	9 000	2x Ø 450	1.0	2.1	22	9x 800	10	1/2"- 1 3/8"	95	
	BKH-NG-2 250	35 670	24 310	19 420	15 850	7	79	33	13 000	2x Ø 500	1.3	2.8	26	12x 800	14	5/8"- 1 5/8"	127	
	BKH-NG-1 345	36 650	24 980	19 950	16 290	7	82	33	13 500	3x Ø 450	1.4	3.2	22	12x 1 000	17	5/8"- 1 5/8"	147	
	BKH-NG-2 350	52 220	35 580	28 430	23 210	7	118	48	19 500	3x Ø 500	1.9	4.2	26	15x 1 000	22	7/8"- 2 1/8"	167	
	BKH-NG-1 445	47 640	32 470	25 940	21 170	7	109	44	18 000	4x Ø 450	1.9	4.3	22	12x 1 250	22	7/8"- 2 1/8"	189	
BKH-NG-2 450	68 700	46 820	37 400	30 530	7	157	64	26 000	4x Ø 500	2.5	5.6	26	15x 1 250	27	7/8"- 2 1/8"	250		
Deep-freezing	UKH-NG-1 145	9 140	6 230	4 980	4 060	10	25	12	4 800	1x Ø 450	0.5	1.1	22	6x 700	6	3/8"- 1 1/8"	70	
	UKH-NG-2 150	13 710	9 350	7 470	6 100	10	37	17	6 750	1x Ø 500	0.6	1.4	26	6x 700	6	3/8"- 1 3/8"	90	
	UKH-NG-1 245	19 490	13 280	10 610	8 660	10	50	23	9 600	2x Ø 450	0.9	2.1	22	9x 800	10	1/2"- 1 3/8"	94	
	UKH-NG-2 250	29 230	19 920	15 920	12 990	10	75	33	13 500	2x Ø 500	1.2	2.8	26	12x 800	14	1/2"- 1 5/8"	126	
	UKH-NG-1 345	29 290	19 960	15 950	13 020	10	75	33	14 400	3x Ø 450	1.4	3.2	22	12x 1 000	17	5/8"- 2 1/8"	146	
	UKH-NG-2 350	43 530	29 660	23 700	19 350	10	112	48	20 250	3x Ø 500	1.8	4.2	26	15x 1 000	22	5/8"- 2 1/8"	166	
	UKH-NG-1 445	36 340	24 760	19 780	16 150	10	99	44	19 200	4x Ø 450	1.9	4.3	22	12x 1 250	22	5/8"- 2 1/8"	187	
UKH-NG-2 450	53 890	36 730	29 340	23 950	10	149	64	27 000	4x Ø 500	2.4	5.6	26	15x 1 250	27	7/8"- 2 1/8"	248		

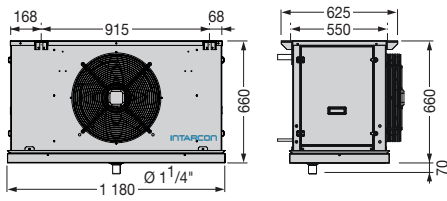
⁽¹⁾ Cooling capacity at room temperature and relative humidity, calculated from dry cooling capacity according to EN 328 standard, applying the following empirical factors:

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

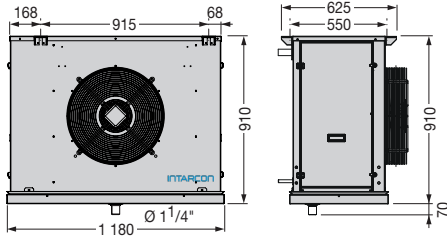
To take into account the slip in R-449A, the average evaporating temperature has been considered.

Dimensions

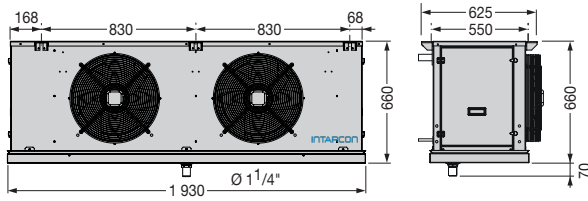
11 series



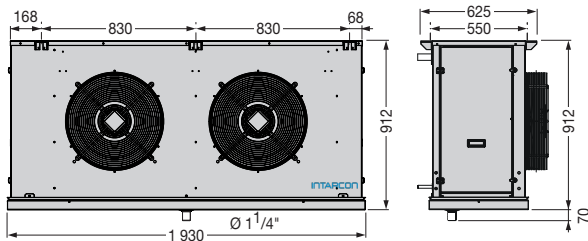
21 series



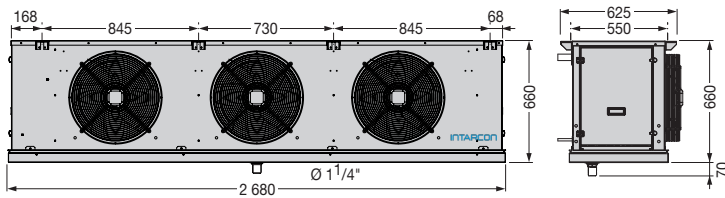
12 series



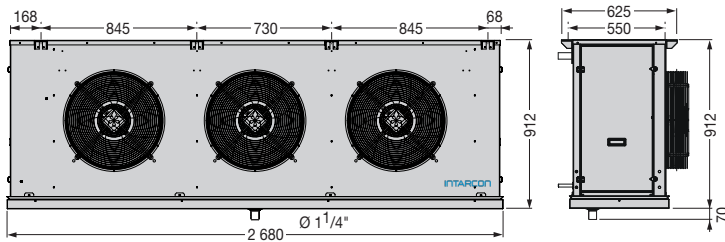
22 series



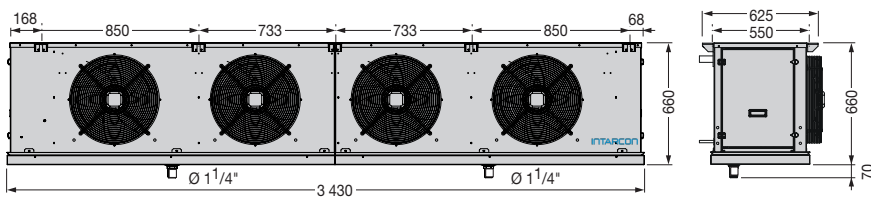
13 series



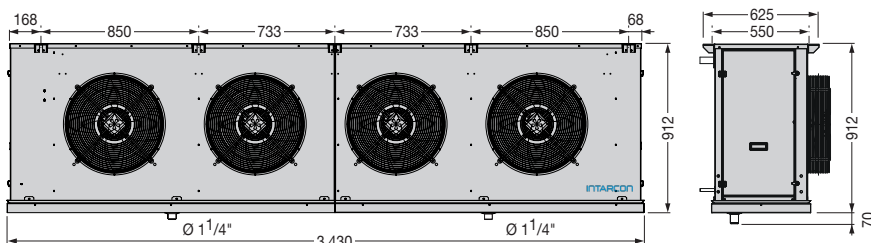
23 series



14 series



24 series



Dimensions in mm.

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.

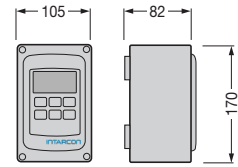
Features of the control panel

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

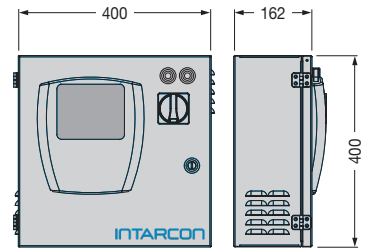
0 series



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.

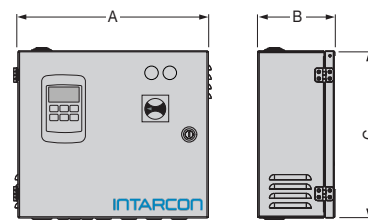
Features of humidity control panel (MHM models)

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.

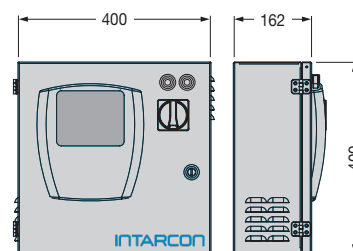
Control panel dimensions for AHM models

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

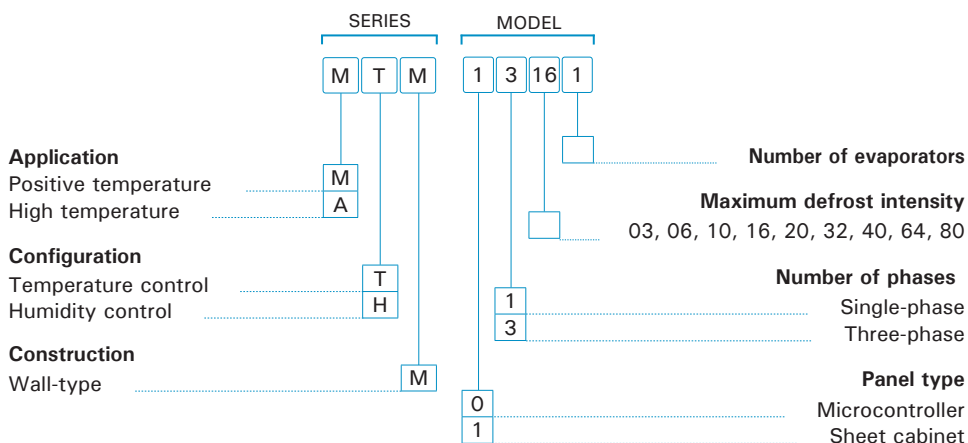
Options

- ▶ 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



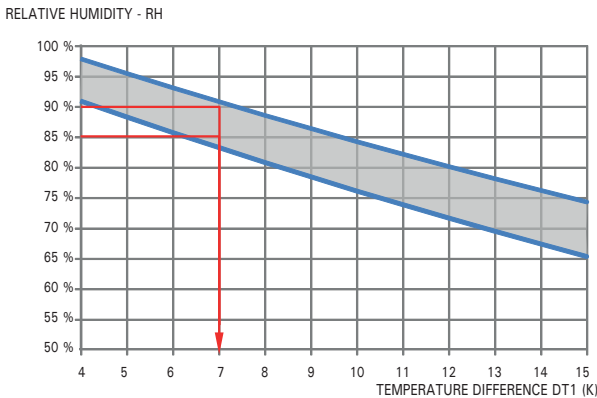
Method of calculation of evaporating units

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)



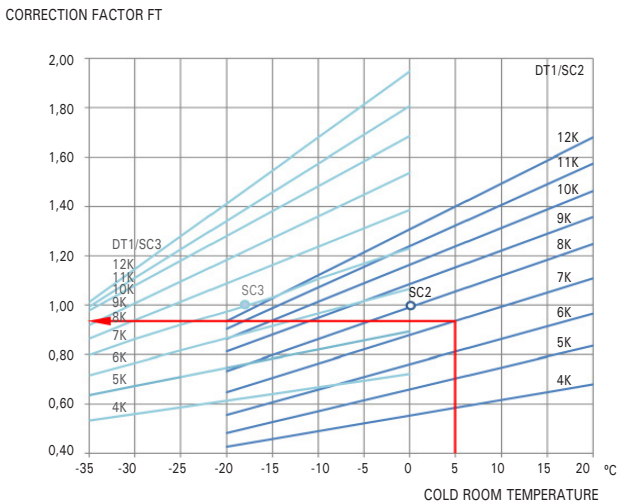
The Temperature Difference DT1 is defined as the difference between the temperature of the air entering the evaporator and the evaporating temperature of the refrigerant.

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/>