

The residential Fan Coil Unit



Fan coil unit Carisma CRR-ECM with Electronic Motor and Inverter Board

TECHNICAL MANUAL



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CRR-ECM controls

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Sabiana take part to the Eurovent program of fan coil performance certification. The official figures are published in the web site www.eurovent-certification.com. The tested performances are:

Total cooling emission at the following conditions:

• water temperature	+7 °C E.W.T.	+12 °C L.W.T.
• air temperature	+27 °C d.b.	+19 °C w.b.

Heating emission (2 pipe units) at the following conditions:

• water temperature	+45 °C E.W.T.	+40 °C L.W.T.
• air temperature	+20 °C	
Static pressure	Fan absorption	

Sensible cooling emission at the following conditions:

• water temperature	+7 °C E.W.T.	+12 °C L.W.T.
• air temperature	+27 °C d.b.	+19 °C w.b.

Heating emission (4 pipe units) at the following conditions:

• water temperature	+65 °C E.W.T.	+55 °C L.W.T.
• air temperature	+20 °C	
Water side pressure drop	Sound power	

INTRODUCTION

The **Carisma CRR-ECM** fan coils combine a beautiful design with very interesting performances in terms of sound level and energy consumption.

The **Carisma CRR-ECM** range includes the MV wall mounted model and the IV concealed one; the MV model combines a reduced dimension (183 mm depth only) with a modern aesthetic that perfectly suits with any kind of furnishing, while maintaining great performances in terms of sound and consumption.

The ECM range makes use of the excellent experience gained with the fan coil units with inverter board, first in the world in production since 2009, and which have had great success on all markets.

The innovative brushless and sensorless type synchronous electronic motor with permanent magnets, is controlled by an inverter board designed and developed in Italy.

The board is mounted on the unit, closed to the motor, without the need to be cooled down by the air flow.

The air flow can be varied continuously with a 1-10V signal.

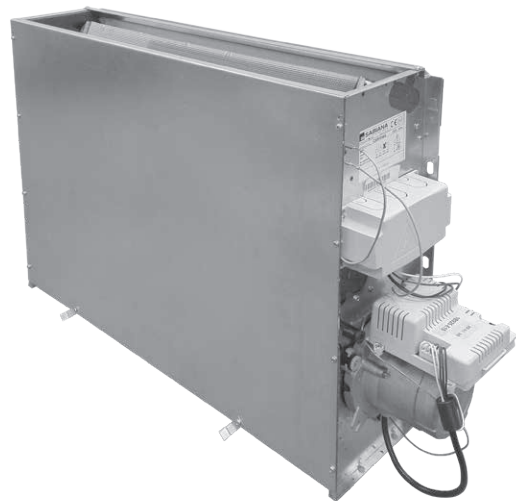
The continuous air flow control improves the acoustic comfort and allows a more punctual reply to the variation of the thermal loads and a greater stability of the requested ambient temperature.

The excellent values in terms of sound levels have been maintained in all working conditions, without any resonance phenomenon at any frequency.

The extreme efficiency, also at a low speed, makes possible a great reduction in electric consumption with absorption values, under normal operating conditions, that are no greater than 7 Watt.

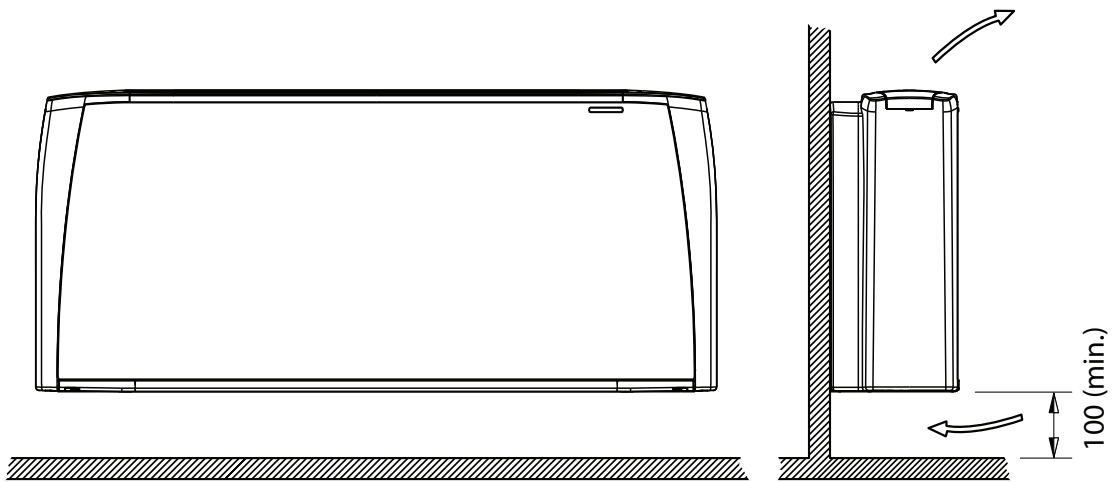
The **Carisma CRR-ECM** fan coil units take part to the Eurovent program of fan coil performance certification; the full compliance with the Electromagnetic Compatibility Directive and with the other strict Standards in force is certified by an independent institute.

IV concealed model

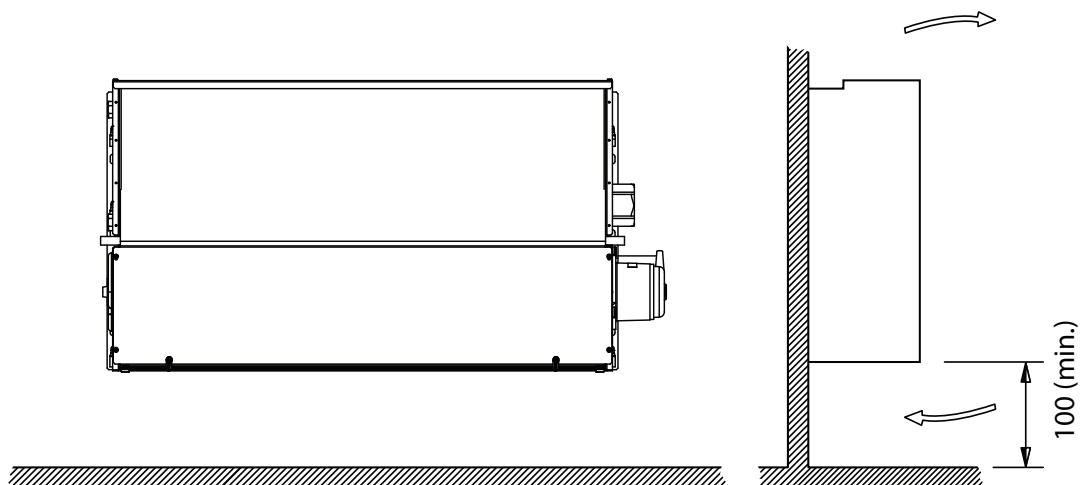


Versions

MV Vertical Casing - Wall Installation



IV Vertical concealed



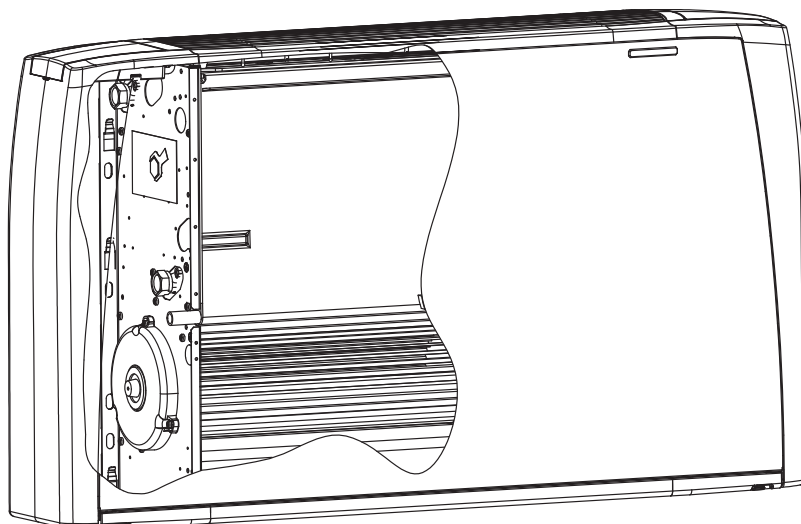
MAIN COMPONENTS

CRR-ECM range with tangential fan

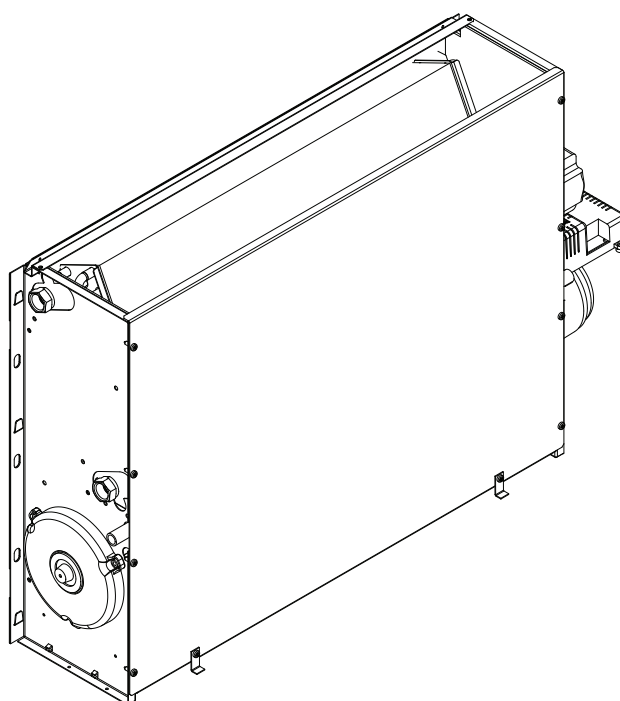
Range includes 4 air flow rates (from 90 to 550 m³/h) and 2 versions (for wall and concealed installation), each one equipped with 3 row coil.

The **CRR-ECM** range is perfect to meet all air-conditioning requirements of residential and work environments like offices, shops, restaurants and hotel rooms.

MV version



IV version



Outer casing

Made of strong synthetic lateral corners (ABS) and from galvanized and prepainted front steel panel. The plastic top grid has fixed louvres and is reversible in order to distribute the air in two different directions.

Standard colours :

- Lateral corners and top grid: **Pantone Cool Grey 1C (light grey)**
- Frontal panel : **RAL 9003 (white)**
- Other colours on request

Inner casing

Made of 1 mm galvanized steel, a rear panel and two lateral sides insulated with 3 mm polyolefin (PO) foam B-s2-d0 EN 13501-1.

Fan assembly

The fan has an external diameter of 120 mm and is the length of the coil. The fins are concave and are positioned in a spiral shape along the whole length of the fan.

The tangential fan assembly is composed of two fan shrouds: an external one in PVC and an internal one of holed, shaped steel.

Electronic motor

Three phase permanent magnet brushless electronic motor that is controlled with reconstructed current according to a BLAC sinusoidal wave. The inverter board that controls the motor operation is powered by 230 Volt, singlephase and, with a switching system, it generates a three-phase frequency modulated, wave form power supply. The electric power supply required for the machine is therefore single-phase with voltage of 230-240 V and frequency of 50-60 Hz.

Coil

It is manufactured from drawn copper tube and the aluminium fins are mechanically bonded onto the tube by an expansion process.

The coil has two Ø 1/2 inch BSP internal connections.

The coil has Ø 1/8" inch BSP air vent and drain.

The coil is not suitable for use in corrosive atmosphere or in environments where aluminium may be subject to corrosion.

Flow and return pipe connections are situated at the same end on the left side looking at the unit. On request we can deliver the unit with the connections on the right end side: this must be specified on the order as this operation can not be carried out on site during installation.

Condensate collection tray

Made of plastic (ABS UL94 HB) and fixed to the internal structure. The outside diameter of the condensate discharge pipe is Ø 15 mm.

Filter

Polypropylene cellular fabric regenerating filter. The filter frame of galvanized steel is inserted into special plastic sliding guides fastened to the internal structure for easy insertion and removal of the filter.

Filter presence is highlighted by a plastic front cover featuring the same colour as the top grid.



EUROVENT CERTIFICATION



The following standard rating conditions are used:

COOLING

Entering air temperature: + 27 °C d.b. + 19 °C w.b.

Water temperature: +7 °C E.W.T. +12 °C L.W.T.

HEATING

Entering air temperature: + 20 °C

Water temperature: +45 °C E.W.T. +40 °C L.W.T.

MODEL		CRR-ECM 1					CRR-ECM 2				
Inverter power		1	3	5	7,5	10	1	3	5	7,5	10
		MIN		MED		MAX	MIN		MED		MAX
Eurovent certified performances.		(E)	-	(E)	-	(E)	(E)	-	(E)	-	(E)
Air flow	m ³ /h	90	120	145	180	210	100	135	170	210	245
Cooling total emission (E)	kW	0,51	0,62	0,71	0,81	0,89	0,65	0,81	0,95	1,10	1,21
Cooling sensible emission (E)	kW	0,39	0,50	0,58	0,68	0,76	0,47	0,60	0,72	0,85	0,95
Heating emission (E)	kW	0,56	0,67	0,75	0,89	1,00	0,78	0,93	1,09	1,30	1,46
Dp Cooling (E)	kPa	0,9	1,3	1,6	2,1	2,4	1,6	2,4	3,2	4,2	5,0
Dp Heating (E)	kPa	1,1	1,5	1,9	2,5	3,1	1,8	2,5	3,3	4,5	5,6
Fan (E)	W	5	5	6	8	10	5	6	6	8	10
Sound power (Lw) (E)	dB(A)	32	36	40	44	48	32	36	39	43	47
Sound pressure (Lp) ⁽¹⁾	dB(A)	23	27	31	35	39	23	27	30	34	38

MODEL		CRR-ECM 3					CRR-ECM 4				
Inverter power		1	3	5	7,5	10	1	3	5	7,5	10
		MIN		MED		MAX	MIN		MED		MAX
Eurovent certified performances.		(E)	-	(E)	-	(E)	(E)	-	(E)	-	(E)
Air flow	m ³ /h	170	225	280	350	410	240	320	390	470	550
Cooling total emission (E)	kW	1,17	1,45	1,70	1,99	2,20	1,61	2,00	2,30	2,62	2,90
Cooling sensible emission (E)	kW	0,83	1,04	1,24	1,47	1,64	1,15	1,45	1,69	1,94	2,17
Heating emission (E)	kW	1,33	1,56	1,82	2,18	2,47	1,85	2,18	2,50	2,90	3,28
Dp Cooling (E)	kPa	6,2	9,1	12,2	16,2	19,4	4,4	6,5	8,5	10,7	12,8
Dp Heating (E)	kPa	6,3	8,4	11,2	15,5	19,4	4,6	6,2	7,9	10,3	12,9
Fan (E)	W	5	7	8	11	15	6	7	10	14	22
Sound power (Lw) (E)	dB(A)	34	38	42	46	50	34	38	43	48	51
Sound pressure (Lp) ⁽¹⁾	dB(A)	25	29	33	37	41	25	29	34	39	42

(E) Eurovent certified performance.

(1) The sound pressure levels are 9 dB (A) lower than the sound power levels, apply to the reverberant field of a 100 m³ room and a reverberation time of 0.5 sec.

COOLING EMISSION

Entering air temperature: 27 °C – R.H.: 50%

Model	Vdc	Qv m³/h	WT: 7 / 12 °C				WT: 8 / 13 °C				WT: 10 / 15 °C				WT: 12 / 17 °C			
			Pc kW	Ps kW	Qw l/h	Dp(c) kPa	Pc kW	Ps kW	Qw l/h	Dp(c) kPa	Pc kW	Ps kW	Qw l/h	Dp(c) kPa	Pc kW	Ps kW	Qw l/h	Dp(c) kPa
CRR-ECM 1	10	210	0,96	0,73	165	2,8	0,85	0,71	147	2,3	0,67	0,66	115	1,4	0,51	0,51	88	0,9
	7,5	180	0,88	0,66	151	2,4	0,78	0,63	134	1,9	0,61	0,59	104	1,2	0,46	0,46	79	0,7
	5	145	0,77	0,56	132	1,9	0,68	0,54	117	1,5	0,53	0,49	91	0,9	0,40	0,40	68	0,6
	3	120	0,68	0,49	116	1,5	0,60	0,46	103	1,2	0,46	0,42	79	0,7	0,35	0,35	59	0,4
	1	90	0,55	0,39	95	1,0	0,49	0,37	84	0,8	0,38	0,33	65	0,5	0,28	0,28	48	0,3
CRR-ECM 2	10	245	1,31	0,93	225	5,7	1,17	0,89	201	4,7	0,91	0,83	157	3,0	0,69	0,69	119	1,8
	7,5	210	1,19	0,84	205	4,8	1,06	0,79	183	3,9	0,82	0,73	142	2,5	0,62	0,62	107	1,5
	5	170	1,03	0,71	177	3,7	0,92	0,67	158	3,0	0,71	0,61	122	1,9	0,53	0,53	92	1,1
	3	135	0,87	0,60	150	2,7	0,78	0,56	134	2,3	0,60	0,51	103	1,4	0,45	0,45	77	0,8
	1	100	0,70	0,47	120	1,8	0,63	0,44	108	1,5	0,48	0,39	83	0,9	0,36	0,35	61	0,5
CRR-ECM 3	10	410	2,36	1,63	405	22,0	2,12	1,54	365	18,2	1,66	1,42	285	11,6	1,26	1,26	216	7,0
	7,5	350	2,13	1,46	366	18,3	1,92	1,37	331	15,2	1,50	1,25	257	9,6	1,13	1,13	194	5,8
	5	280	1,82	1,23	313	13,8	1,65	1,16	283	11,5	1,28	1,05	220	7,2	0,96	0,95	165	4,3
	3	225	1,55	1,04	266	10,3	1,40	0,98	242	8,6	1,09	0,87	188	5,4	0,81	0,79	140	3,2
	1	170	1,25	0,83	215	7,0	1,14	0,78	196	5,9	0,89	0,69	152	3,7	0,66	0,62	113	2,2
CRR-ECM 4	10	550	3,11	2,16	535	14,6	2,80	2,04	482	12,1	2,18	1,88	376	7,7	1,66	1,66	285	4,6
	7,5	470	2,81	1,93	484	12,1	2,54	1,82	436	10,0	1,97	1,66	340	6,3	1,49	1,49	257	3,8
	5	390	2,47	1,68	424	9,6	2,23	1,58	384	7,9	1,74	1,43	298	5,0	1,30	1,30	224	3,0
	3	320	2,14	1,44	368	7,4	1,94	1,36	333	6,2	1,51	1,22	259	3,9	1,13	1,11	194	2,3
	1	240	1,72	1,15	296	5,0	1,56	1,08	269	4,2	1,22	0,96	209	2,6	0,90	0,86	155	1,5

WT: Water temperature
Vdc: Inverter power
Qv: Air flow
Pc: Cooling total emission
Ps: Cooling sensible emission
Qw: Water flow rate
Dp(c): Dp Cooling

Entering air temperature 26 °C – R.H.: 50%

Model	Vdc	Qv m³/h	WT: 7 / 12 °C				WT: 8 / 13 °C				WT: 10 / 15 °C				WT: 12 / 17 °C			
			Pc kW	Ps kW	Qw l/h	Dp(c) kPa	Pc kW	Ps kW	Qw l/h	Dp(c) kPa	Pc kW	Ps kW	Qw l/h	Dp(c) kPa	Pc kW	Ps kW	Qw l/h	Dp(c) kPa
CRR-ECM 1	10	210	0,85	0,71	146	2,3	0,75	0,68	130	1,8	0,58	0,58	100	1,1	0,44	0,44	76	0,7
	7,5	180	0,78	0,63	134	1,9	0,69	0,61	118	1,5	0,53	0,53	91	1,0	0,40	0,40	69	0,6
	5	145	0,68	0,54	117	1,5	0,60	0,51	103	1,2	0,46	0,46	79	0,7	0,34	0,34	59	0,4
	3	120	0,60	0,46	103	1,2	0,53	0,44	91	0,9	0,40	0,40	69	0,6	0,30	0,30	51	0,3
	1	90	0,49	0,37	84	0,8	0,43	0,35	74	0,7	0,33	0,31	56	0,4	0,24	0,24	41	0,2
CRR-ECM 2	10	245	1,16	0,89	200	4,6	1,03	0,85	177	3,7	0,79	0,79	137	2,3	0,60	0,60	103	1,4
	7,5	210	1,06	0,80	182	3,9	0,94	0,76	161	3,1	0,72	0,70	123	1,9	0,54	0,54	92	1,1
	5	170	0,92	0,68	157	3,0	0,81	0,64	139	2,4	0,62	0,59	106	1,5	0,46	0,46	79	0,9
	3	135	0,78	0,56	134	2,2	0,69	0,53	118	1,8	0,52	0,48	90	1,1	0,39	0,39	66	0,6
	1	100	0,62	0,44	107	1,5	0,55	0,42	94	1,2	0,42	0,37	71	0,7	0,30	0,30	52	0,4
CRR-ECM 3	10	410	2,11	1,54	363	18,1	1,88	1,47	323	14,6	1,45	1,36	249	9,1	1,09	1,09	188	5,4
	7,5	350	1,91	1,38	328	15,1	1,70	1,31	292	12,2	1,31	1,20	225	7,5	0,98	0,98	168	4,5
	5	280	1,64	1,16	281	11,4	1,46	1,10	250	9,2	1,11	1,00	191	5,6	0,83	0,83	142	3,3
	3	225	1,39	0,98	240	8,5	1,24	0,92	214	6,9	0,95	0,83	163	4,2	0,70	0,70	120	2,4
	1	170	1,13	0,78	194	5,8	1,01	0,74	173	4,7	0,77	0,65	132	2,9	0,56	0,56	97	1,6
CRR-ECM 4	10	550	2,78	2,04	479	12,0	2,48	1,95	426	9,7	1,91	1,80	328	6,0	1,44	1,44	247	3,6
	7,5	470	2,52	1,83	434	10,0	2,24	1,74	386	8,0	1,72	1,59	296	5,0	1,29	1,29	222	3,0
	5	390	2,22	1,59	381	7,9	1,97	1,50	339	6,4	1,51	1,37	259	3,9	1,13	1,13	194	2,3
	3	320	1,92	1,36	331	6,1	1,71	1,29	295	4,9	1,31	1,16	225	3,0	0,97	0,97	167	1,7
	1	240	1,55	1,08	267	4,1	1,38	1,02	238	3,4	1,05	0,91	181	2,0	0,77	0,77	133	1,2

WT: Water temperature
 Vdc: Inverter power
 Qv: Air flow
 Pc: Cooling total emission
 Ps: Cooling sensible emission
 Qw: Water flow rate
 Dp(c): Dp Cooling

Entering air temperature: 25 °C – R.H.: 50%

Model	Vdc	Qv m³/h	WT: 7 / 12 °C				WT: 8 / 13 °C				WT: 10 / 15 °C				WT: 12 / 17 °C			
			Pc kW	Ps kW	Qw l/h	Dp(c) kPa	Pc kW	Ps kW	Qw l/h	Dp(c) kPa	Pc kW	Ps kW	Qw l/h	Dp(c) kPa	Pc kW	Ps kW	Qw l/h	Dp(c) kPa
CRR-ECM 1	10	210	0,75	0,68	129	1,8	0,66	0,66	114	1,4	0,51	0,51	88	0,9	0,44	0,44	75	0,7
	7,5	180	0,69	0,61	118	1,5	0,60	0,58	104	1,2	0,46	0,46	79	0,7	0,39	0,39	68	0,6
	5	145	0,60	0,51	103	1,2	0,53	0,49	90	0,9	0,40	0,40	69	0,6	0,34	0,34	58	0,4
	3	120	0,52	0,44	90	0,9	0,46	0,42	79	0,7	0,35	0,35	60	0,4	0,29	0,29	51	0,3
	1	90	0,43	0,35	73	0,7	0,37	0,33	64	0,5	0,28	0,28	48	0,3	0,23	0,23	40	0,2
CRR-ECM 2	10	245	1,03	0,85	177	3,7	0,91	0,82	156	3,0	0,69	0,69	119	1,8	0,56	0,56	96	1,2
	7,5	210	0,93	0,76	160	3,1	0,82	0,73	141	2,5	0,62	0,62	107	1,5	0,48	0,48	83	0,9
	5	170	0,81	0,64	139	2,4	0,71	0,61	122	1,9	0,53	0,53	92	1,1	0,40	0,40	68	0,7
	3	135	0,68	0,53	117	1,8	0,60	0,51	103	1,4	0,45	0,45	77	0,8	0,33	0,33	57	0,5
	1	100	0,55	0,42	94	1,2	0,48	0,39	82	0,9	0,36	0,35	61	0,6	0,26	0,26	45	0,3
CRR-ECM 3	10	410	1,87	1,47	322	14,6	1,65	1,41	284	11,6	1,26	1,26	217	7,1	0,94	0,94	162	4,2
	7,5	350	1,69	1,31	291	12,1	1,49	1,25	257	9,6	1,13	1,13	195	5,9	0,84	0,84	145	3,4
	5	280	1,45	1,10	249	9,2	1,27	1,05	219	7,2	0,96	0,95	166	4,4	0,71	0,71	123	2,5
	3	225	1,24	0,93	213	6,9	1,09	0,88	187	5,4	0,82	0,79	141	3,2	0,60	0,60	103	1,9
	1	170	1,00	0,74	172	4,7	0,88	0,69	151	3,7	0,66	0,62	113	2,2	0,48	0,48	83	1,2
CRR-ECM 4	10	550	2,47	1,95	424	9,6	2,18	1,87	374	7,7	1,66	1,66	286	4,7	1,25	1,25	214	2,8
	7,5	470	2,23	1,74	384	8,0	1,97	1,66	338	6,4	1,50	1,50	257	3,9	1,12	1,12	192	2,3
	5	390	1,96	1,51	338	6,3	1,73	1,43	297	5,0	1,31	1,30	225	3,0	0,97	0,97	167	1,8
	3	320	1,70	1,29	293	4,9	1,50	1,22	258	3,9	1,13	1,10	194	2,3	0,83	0,83	143	1,3
	1	240	1,38	1,02	237	3,3	1,21	0,96	208	2,6	0,91	0,86	156	1,6	0,66	0,66	114	0,9

WT: Water temperature
Vdc: Inverter power
Qv: Air flow
Pc: Cooling total emission
Ps: Cooling sensible emission
Qw: Water flow rate
Dp(c): Dp Cooling

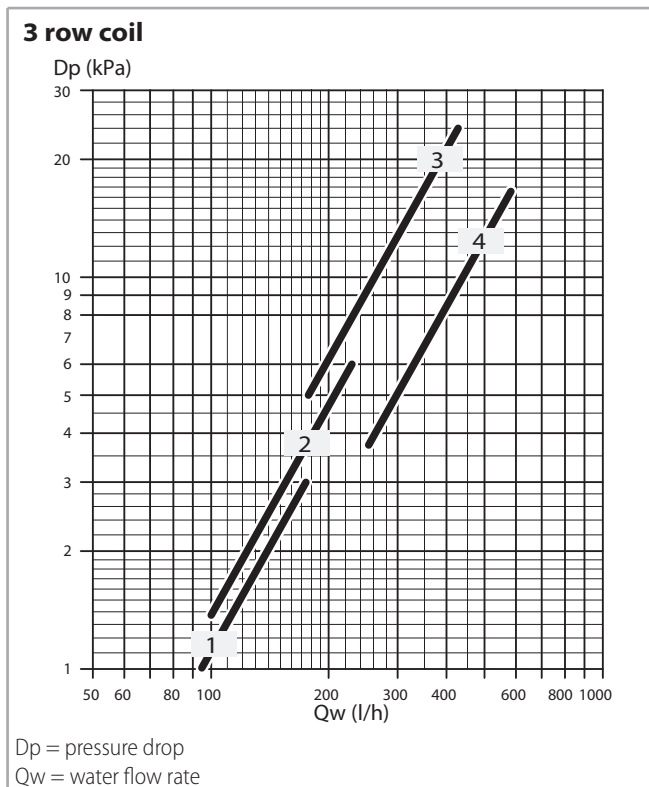
HEATING EMISSION

Entering air temperature : 20 °C

Model	Vdc	Qv m³/h	WT: 70 / 60 °C			WT: 60 / 50 °C			WT: 50 / 40 °C			WT: 50 / 45 °C			WT: 45 / 40 °C		
			Ph kW	Qw l/h	Dp(h) kPa	Ph kW	Qw l/h	Dp(h) kPa	Ph kW	Qw l/h	Dp(h) kPa	Ph kW	Qw l/h	Dp(h) kPa	Ph kW	Qw l/h	Dp(h) kPa
CRR-ECM 1	10	210	2,35	202	3,0	1,80	155	1,9	1,25	107	1,0	1,43	123	4,5	1,16	100	3,1
	7,5	180	2,09	180	2,4	1,60	138	1,5	1,11	96	0,8	1,27	109	3,6	1,03	89	2,5
	5	145	1,77	152	1,8	1,36	117	1,1	0,95	81	0,6	1,07	92	2,7	0,87	75	1,9
	3	120	1,55	134	1,4	1,20	103	0,9	0,84	72	0,5	0,94	81	2,1	0,77	66	1,5
	1	90	1,33	114	1,1	1,02	88	0,7	0,72	62	0,4	0,80	69	1,6	0,65	56	1,1
CRR-ECM 2	10	245	2,95	254	5,3	2,28	196	3,4	1,61	138	1,9	1,79	154	8,0	1,46	126	5,6
	7,5	210	2,62	225	4,3	2,02	174	2,8	1,43	123	1,5	1,59	137	6,4	1,30	111	4,5
	5	170	2,20	190	3,1	1,71	147	2,0	1,21	104	1,1	1,34	115	4,7	1,09	94	3,3
	3	135	1,87	161	2,3	1,45	125	1,5	1,03	89	0,9	1,13	97	3,5	0,93	80	2,5
	1	100	1,57	135	1,7	1,22	105	1,1	0,87	75	0,6	0,95	82	2,5	0,78	67	1,8
CRR-ECM 3	10	410	4,98	428	18,1	3,87	333	11,9	2,75	237	6,7	3,03	260	27,3	2,47	213	19,4
	7,5	350	4,39	378	14,5	3,42	294	9,5	2,44	210	5,4	2,67	229	21,8	2,18	188	15,5
	5	280	3,67	315	10,4	2,86	246	6,9	2,04	176	3,9	2,22	191	15,7	1,82	157	11,2
	3	225	3,14	270	7,9	2,45	211	5,2	1,75	151	3,0	1,90	163	11,8	1,56	134	8,4
	1	170	2,68	230	5,9	2,09	180	3,9	1,50	129	2,3	1,62	139	8,9	1,33	114	6,3
CRR-ECM 4	10	550	6,61	568	12,1	5,13	441	7,9	3,65	314	4,4	4,01	345	18,2	3,28	282	12,9
	7,5	470	5,84	502	9,7	4,54	391	6,4	3,23	278	3,6	3,54	305	14,6	2,90	249	10,3
	5	390	5,02	432	7,4	3,91	337	4,9	2,79	240	2,7	3,05	262	11,1	2,50	215	7,9
	3	320	4,38	376	5,8	3,41	294	3,8	2,44	210	2,2	2,65	228	8,7	2,18	187	6,2
	1	240	3,72	320	4,3	2,90	250	2,8	2,08	179	1,6	2,25	194	6,4	1,85	159	4,6

WT: Water temperature
Vdc: Inverter power
Qv: Air flow
Ph: Heating emission
Qw: Water flow rate
Dp(h): Dp Heating

WATER SIDE PRESSURE DROP



Pressure drop for mean water temperature of **10 °C**, for different temperatures multiply the pressure drop figure by the **K** correction factors in the table.

	Mean water temperature (°C)						
	20	30	40	50	60	70	80
K correction factor	0,94	0,90	0,86	0,82	0,78	0,74	0,70

OPERATION LIMITS

Description		UoM	Value
Water flow	Coil maximum working pressure	bars	16
		kPa	1600
	Lowest water inlet temperature	°C	+6 (*)
	Highest water inlet temperature	°C	+85
Power supply	Single-phase rated operating voltage	V/Hz	230/50

(*) for entering water temperatures below + 6 °C, contact the technical department

Coils water flow limits

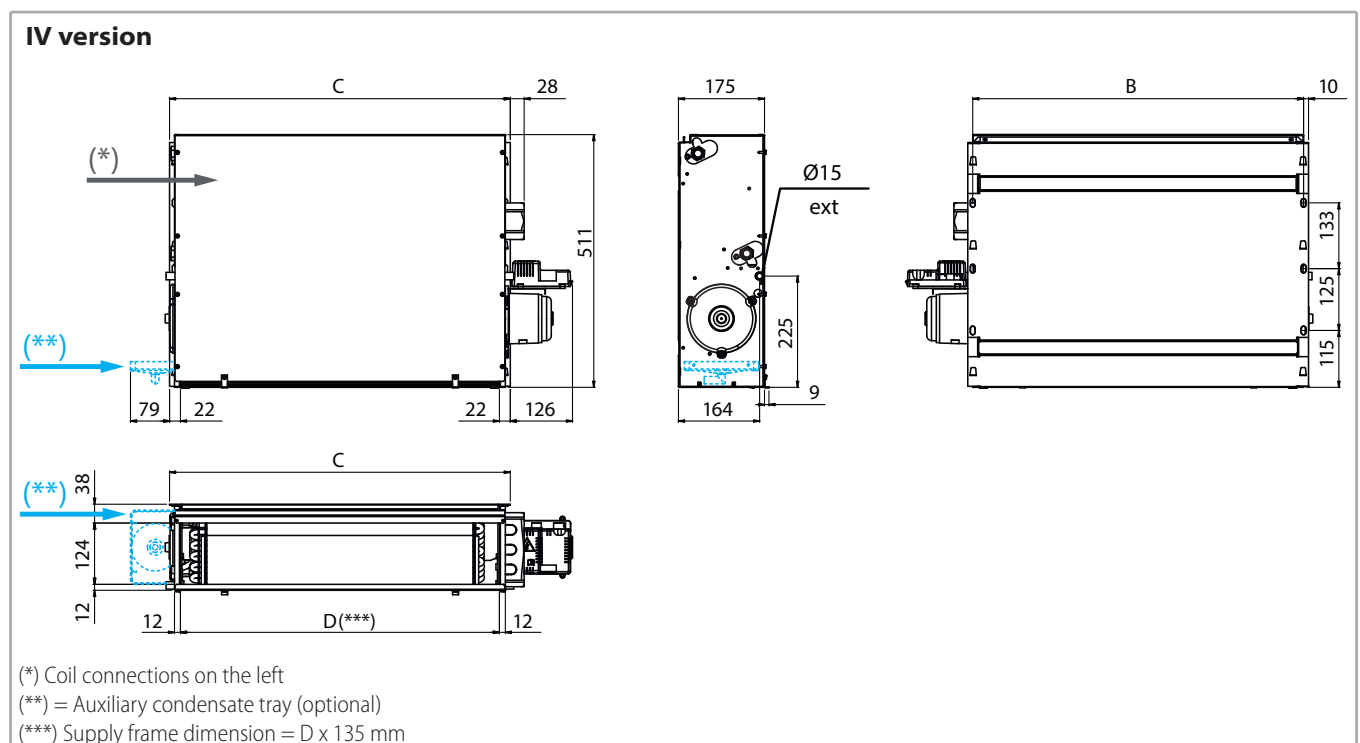
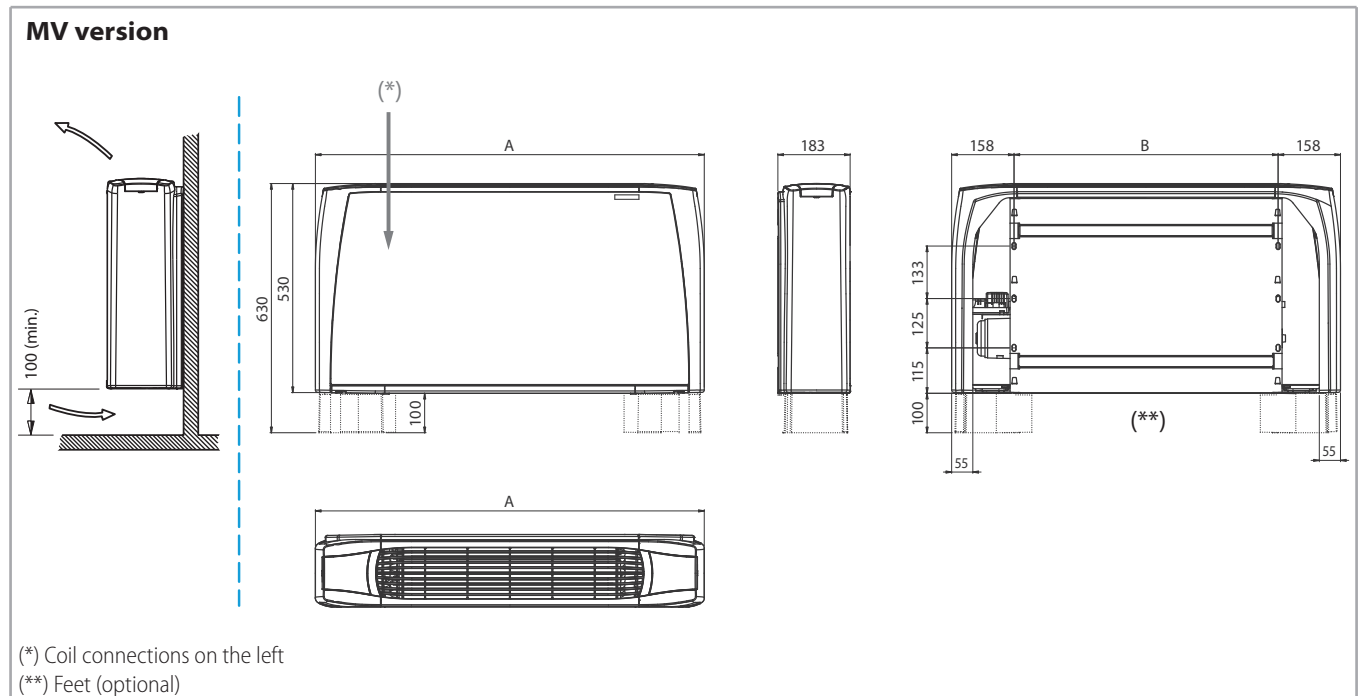
Model		1	2	3	4
Water flow rate Min.	l/h	80	100		150
Water flow rate Max.	l/h	300	500	700	

Motor electrical data - max. absorption

Model		1	2	3	4
Motor absorption	W	10		15	17
Current absorbed	A	0,11		0,15	0,17

DIMENSION, WEIGHT AND WATER CONTENT

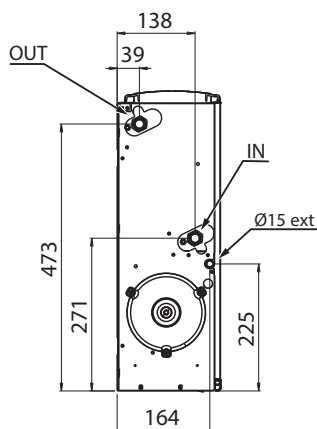
Dimensions



Model		1	2	3	4
A	mm	670	770	985	1200
B	mm	354	454	669	884
C	mm	374	474	689	904
D	mm	330	430	645	860

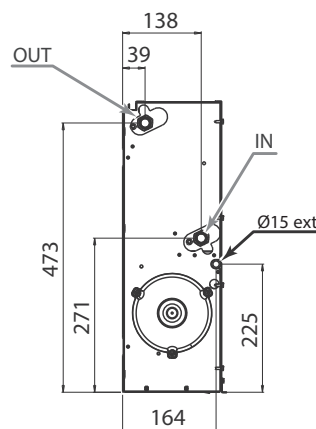
Coil connections

MV version



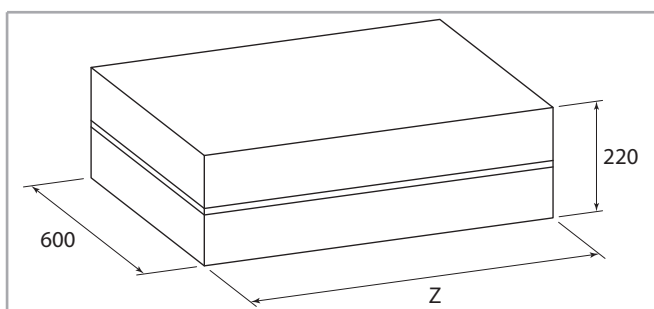
IN = Water inlet
OUT = Water outlet

IV version



IN = Water inlet
OUT = Water outlet

Packed unit



Model		1	2	3	4
Z	mm	720	820	1035	1250

Weight (kg)

Model		Weight with packaging				Weight without packaging			
		1	2	3	4	1	2	3	4
Version	MV	13,4	15,1	18,9	22,7	11,6	13,1	16,6	20,1
	IV	11,3	13,0	16,8	20,6	9,7	11,2	14,6	18,2

Water content (l)

Model		1	2	3	4
Version	MV-IV	0,5	0,6	0,9	1,3

CONTROLS FITTED ON THE UNIT

All the **Carisma CRR-ECM** units can be supplied with electronic controls fitted on the unit that allow managing one single unit.

The room temperature can be controlled through electronic room thermostats, with different solutions according to every ambient conditions.

The room temperature can be controlled through the Sabiana electronic room thermostats and are suitable when the user wants to set the fan speed.

The **CB-T-ECM** control allows the manual and automatic speed switch or with continuous variation. For the units equipped with the Crystall filter the **CB-T-ECM-IAQ** control is available

Note: all the controls are described in detail in the "Fan Coil Control Range literature".

Controls fitted on the unit

CB-T-ECM control



CB-T-ECM-IAQ control (only ECM version with Crystall filter)



CB-TOUCH CONTROL FITTED ON THE UNIT

Controls

All the CRR-ECM units can be supplied and managed with the **CB-Touch** control fitted on the unit with Bluetooth and Wi-Fi features (only version with casing; available mounted on site or with separate packaging)

The **CB-Touch** control fitted on the unit allows moreover the control with the "**Sabiana WiFi**" and "**Sabiana BLE**" APP. This makes this fan coil unit the ideal solution for the air-conditioning of all residential ambients.

The **CB-Touch** control is equipped with a microprocessor with BLE / WiFi feature, that allows to control at distance or remotely all the units installed in your home.

With the BLE / WiFi technology it is possible to manage all the fan coil operation modes.

It is moreover possible to manage each single unit or to create some groups; a weekly program can be created by setting, for each day of the week, until four different operation modes.

Sabiana WiFi



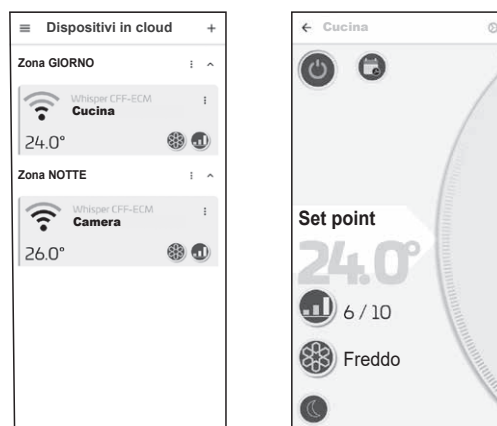
Sabiana WiFi is the App for the control at a distance of your Sabiana system of climatisation. Free and easy to use, it needs only a wireless network and a smartphone with internet connection. Using the "Cloud" it allows to manage, program and supervise the status of Your air conditioners wherever You are.

Sabiana BLE



Sabiana BLE is the new App for Android™ and iOS systems to set, manage and control Your climatisation system via Bluetooth Low Energy (BLE) transmission. Free and easy to configure and use, it needs only a smartphone with a Bluetooth connection (version 4.0 or later versions).

Our APP "**Sabiana WiFi**" and "**Sabiana BLE**" are compatible with iOS® e Android™ systems.



The **CB-Touch** controls fitted on the unit, whose characteristics are described on the next pages, can be supplied either fitted on the unit or with separate packaging; those controls fitted on the unit that are separately bought can be used only with UP power unit to buy separately.

The room temperature can be controlled through the Sabiana electronic room thermostats and are suitable when the user wants to set the fan speed.

CB-Touch control fitted on the unit features



The CB-Touch control allows to control and adjust the room temperature in a simple and intuitive way by means of a probe positioned in the lower part of the unit.

CB-Touch allows to select the desired operation mode, heat, cool or just ventilate the room, set a desired temperature set and adjust the fan operating speed according to your needs.


The maximum operation speed will be set to reach quickly the comfort temperature. Otherwise the minimum operation speed will be set when a noiseless operation is required, or the auto mode to optimise thermal and sound comfort.

With the low temperature cut-out thermostat (T3 sensor collocated between the coil fins; already wired for the units with fitted control, included together with the power unit and to wire for the versions without control) and according to the selected operation there will be as follows:

- winter cycle - the fan will only start operating if the water temperature is above 30 °C, thus preventing cold air from flowing out from the unit.
- summer cycle - the fan will only start operating if the water temperature is below 21 °C, thus preventing hot air from flowing out from the unit.

To improve comfort, it is also possible to select the night mode which minimises the fan speed and smartly changes the set temperature independently.

The control has a memory, so all settings will not be lost either in the event of switching off or power failure.

After a period of 3 minutes since the last action the brightness of the panel is reduced (SLEEPING mode) in order to increase the energy saving and the comfort during the night; only the symbol  is shown on the display.

By pressing the same button twice, the brightness is restored.

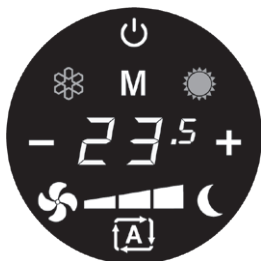
The control is designed to be managed at distance with the smart features of one's own telephone by using the bluetooth wireless connection or wifi via APP downloadable from the Web.

IMPORTANT!: the device supports Wi-Fi networks (IEEE 802.11) of b, g and n type (Wi-Fi 4) with the following security methods :

- WEP
- WPA-PSK
- WPA2-PSK
- WPA2-enterprise

CB-Touch control fitted on the unit

Fitted		Not Fitted	
ID	Code	ID	Code
CB-Touch-M	9066905	CB-Touch-S	9066903



The control must always be connected with the UP-Touch-M / UP-Touch-S power unit (to be ordered separately).

The main characteristics are:

- Set the unit ON or stand-by
- Operation mode (Summer/Winter/Ventilation)
- Set the fan speed
- Set the automatic fan speed
- Possibility to use the T1 sensor as return air probe (mounted on the power unit)
- Possibility to use the T3 sensor as low temperature cut-out thermostat (mounted on the power unit)
- It allows to use the T2 sensor as Change-over (mounted on the power unit).
- Night mode
- Alarm messages
- OFFSET regulation
- Button lock controller
- Regulation of LED brightness
- To be controlled by APP Sabiana, both locally (BLE)[®], and locally or at a distance via Cloud (WiFi)

Control power absorption: see the UP-Touch power unit



POWER UNITS AND PROBES

UP-Touch power unit

Fitted		Not Fitted	
ID	Code	ID	Code
UP-Touch-M	9066906	UP-Touch-S	9066904



Power unit for CB-Touch-M and CB-Touch-S controls

Power unit to be installed on the end unit (fan coil interface).

- It controls the motor/the fan and the fan coil valve.
- It is connected to the electric supply.
- It receives the information required to manage such parts from the CB-Touch control
- Possibility to use the T1 sensor (included) for the T1 function which allows the return air control.
- Possibility to use the T3 sensor (included) for the T3 function as water coil low temperature cut-out thermostat (summer and winter operation)
- Possibility to use the T2 probe (included) for the T2 function which controls the summer/winter switch (change-over).
- It allows to control up to 10 units (1 master and 9 slaves).
- Max. network length: 100 meters.
- Max cable length between control and first connected power unit: 20 meters.

Power unit absorption: 11 VA (6 W)

T2 probe

ID	Code
T2	9025310



NTC probe type, to be placed on the water supply pipe upstream of the valves (not to be used with 2 way valves).

The T2 probe is to be used as Change-Over for 2 pipe systems, for the automatic switch of the operation mode. If water temperature is lower than 20 °C, cooling mode is set; on the other hand, if water temperature exceeds 30 °C, heating mode is set.

CONFIGURATION AND ELECTRONIC CONTROLS

All the **CRR-ECM** units can be supplied with a wide range of electronic wall controls that allows managing one single unit or several units (by using the power units).

The room temperature can be controlled through wall electronic room thermostats, with different solutions according to every ambient conditions.

The **WM-AU**, **T-MB2**, **WM-503-AC-EC** and **WM-S-ECM** electronic thermostats control the room temperature precisely and are suitable when the user wants to set the fan speed.

Note: all the controls are described in detail in the "Fan Coil Control Range literature".

Configuration

For this fan coil configuration, the 1-10 Vdc signal, which controls the inverter, must be supplied by a controller with the following signal specifications:

Fan coil control signal

- Fan OFF = 0 Vdc
- Fan ON > 1 Vdc
- Max. speed = 10 Vdc

ECM Blac inverter board

- 0÷10 Vdc Circuit Input Impedance Value = 68 kOhm

Controls

WM-AU control (*)



230V 50-60Hz

WM-S-ECM control



230 V 50 Hz

T-MB2 control (*)



230V 50-60Hz

WM-503-AC-EC control (**)



230V 50 Hz

(*) To be used with **UPM-AU** or with **UP-AU**

(**) To be used with **UP-503-AC-EC** power unit only

Control systems

See from p. 23 for:

- the MB controls and units
- the KNX Bus System

CONTROLS AND UNITS MB VERSION

All the **CRR-ECM** units can be supplied with the T-MB2 control which allows managing one single unit or several units by using the Modbus RTU - RS 485 communication protocol.

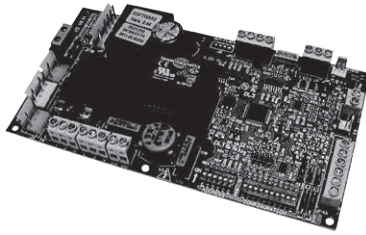
Units can be managed according to the Master/ Slave logic (up to 20 units).

The system consists in a **MB** (MB-ECM-S) **board** and the T-MB2 wall control.

Note: all the controls are described in detail in the "Fan Coil Control Range literature".

Controls

MB electronic board



T-MB2 control



KNX BUS SYSTEM

The KNX bus system is a building automation standard for controlling, managing and monitoring a wide range of products for:

- Heating, cooling, ventilation.
- Lighting.
- Alarm systems.
- Audio and video systems.
- Electricity and gas.

Since 2016, Sabiana is a certified member of the KNX association and the certified products can be added to this system in compliance with the tests carried out at KNX laboratories.



KNX devices

The Sabiana WM-KNX room thermostat controls and adjusts the temperature of a room or area in a building. In combination with one or several UP-KNX power units, the thermostat is able to control the operation of terminal units such as fan coils. The appliance consists of an

LCD display with adjustable backlight and a sensor for measuring the room temperature.

WM-KNX is suitable for installation in a wall recessed box (to be used with UP-KNX and with PL mounting plate only).

Note: all the controls are described in detail in the "Fan Coil Control Range literature".

Recessed thermostat WM-KNX



Power unit UP-KNX



WM-KNX with rectangular plate



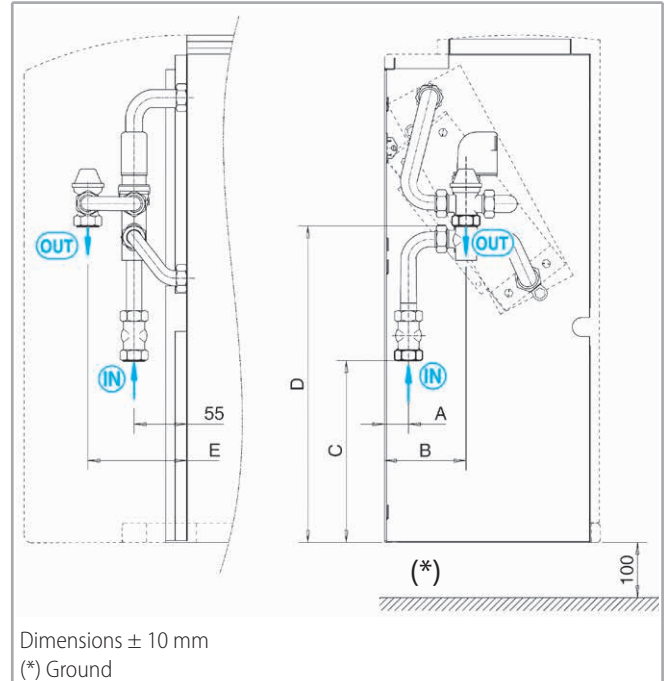
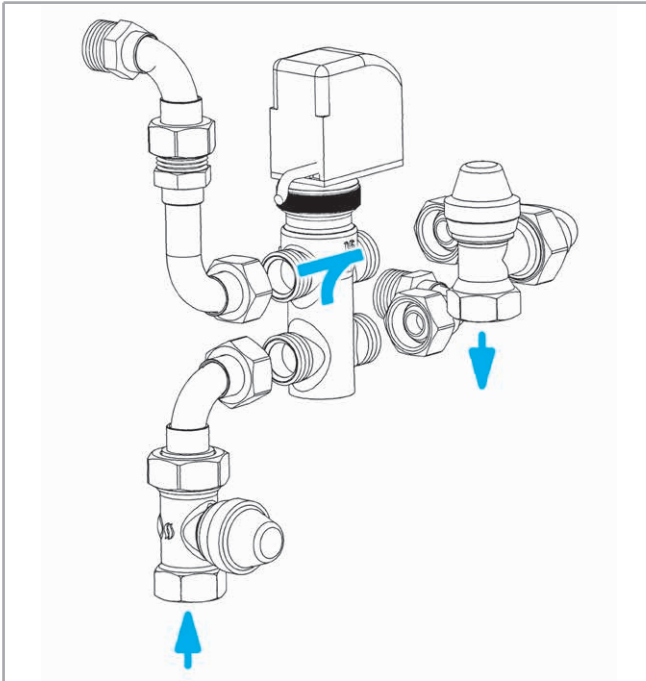
WM-KNX with square plate



ACCESSORIES

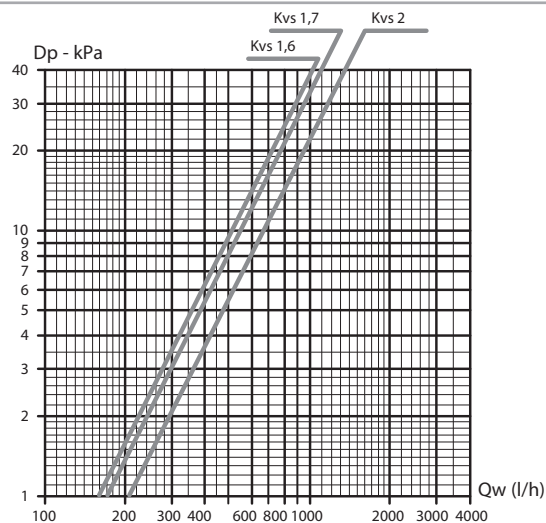
VBP 3 way valve

Control valve kit: 3 way valve, ON-OFF 230 V, with electric motor and mounting kit with micrometric lockshield valve.
For versions **MV / IV**.



Model	Fitted		Not Fitted		Valve			Micrometric lockshield valve		
	ID	Code	ID	Code	DN	(Ø)	Kvs	DN	(Ø)	Kvs
1 ÷ 4	VBPM-C G1-5	9066561	VBPS-C G1-5	9066560	15	1/2"	1,6	15	1/2"F	2

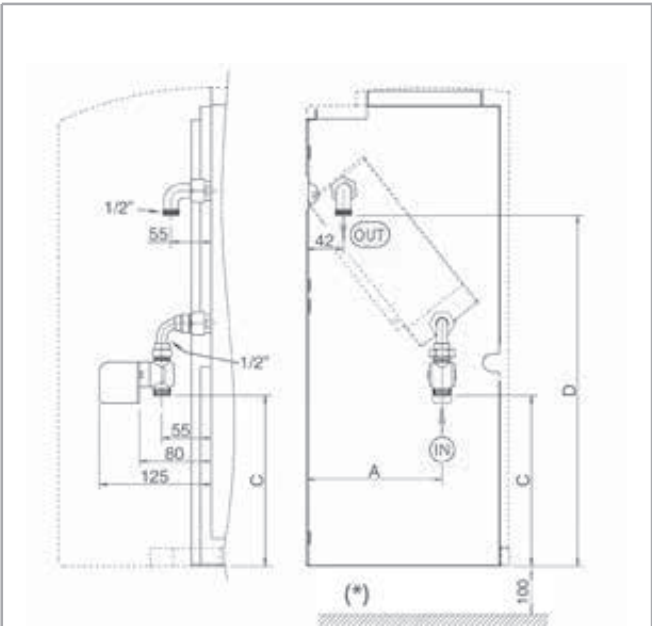
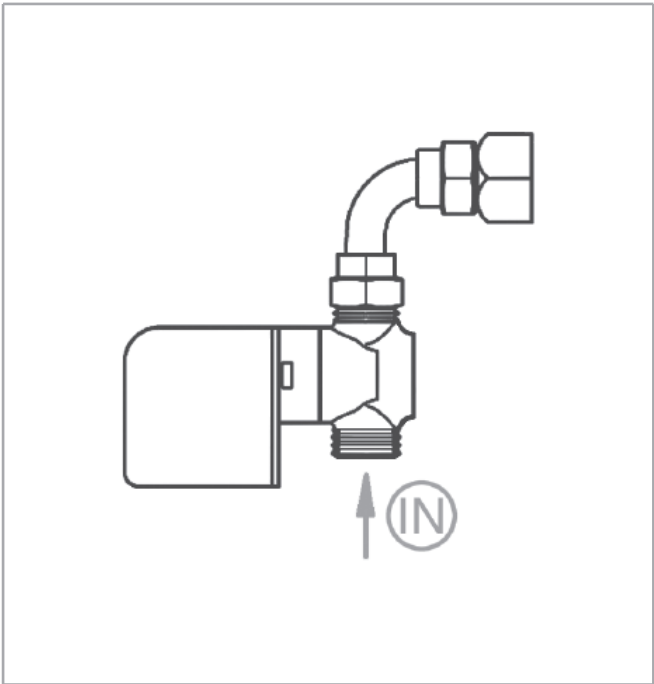
Model	Dimensions				
	A	B	C	D	E
1 ÷ 4	15	90	200	315	95



Dp = pressure drop
Qw = water flow rate

V2 2 way valve

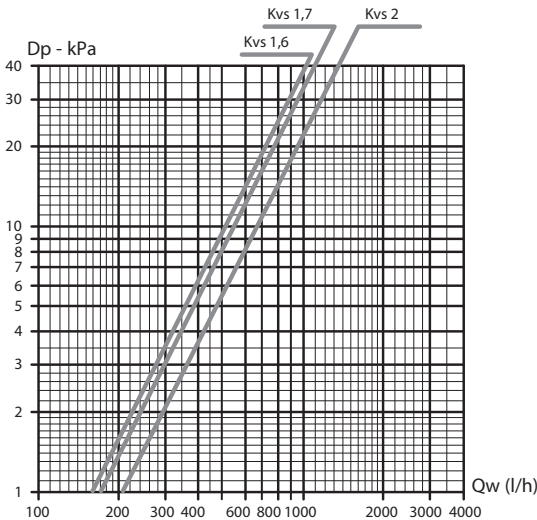
2 way valve ON-OFF 230 V.
For versions **MV** / **IV**.



Dimensions ± 10 mm
(*) Ground

Model	Fitted		Not Fitted		DN	(Ø)	Kvs
	ID	Code	ID	Code			
1 ÷ 4	V2M-C G1-5	9060476	V2S-C G1-5	9060478	15	1/2"	1,7

Model	Dimensions (mm)		
	A	C	D
1 ÷ 4	143	178	448



Dp = pressure drop
Qw = water flow rate

BREEZE frame kit for wall concealed installation

For **IV** versions.

The kit is available in 3 sizes and allows the wall installation of the recessed CRR-ECM fan coil units.

The kit includes a top closing panel that prevents the access to technical spaces and coil ensuring the safety of the end user.



Constructional features of the main components

The aesthetic frame includes:

- the closing frame;
- the air supply louvre;
- the front panel;
- the air intake grid.

Perimeter frame, front panel and air intake grid

made of steel painted with epoxy polyester coat, dried in a furnace at 180 °C, colour RAL 9003.

It is possible to repaint the entire frame of the same color as the wall.



The **Aesthetic frame kit** and the **Recessed box kit** have different codes as they are separately delivered with their own packaging and they must be assembled together.



The air supply louvre is made of extruded aluminum with satin finish.



These items are only suitable for CRR-ECM models, IV version, 2 ÷ 4 sizes.

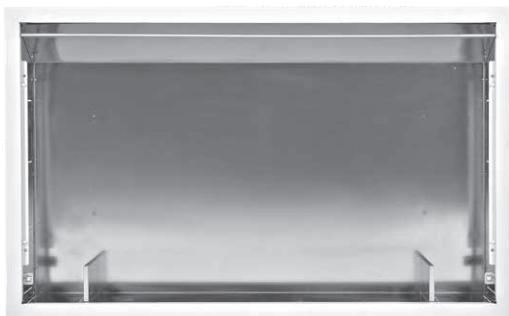
When the Fan Coil is equipped with the Recessed box kit, it must be connected to a remote control and it is not possible to use the built-in electronic controls.

The air intake grid is fixed to the frame by using a simple and fast connecting system and it can be easily removed to clean the filter and the inner casing.

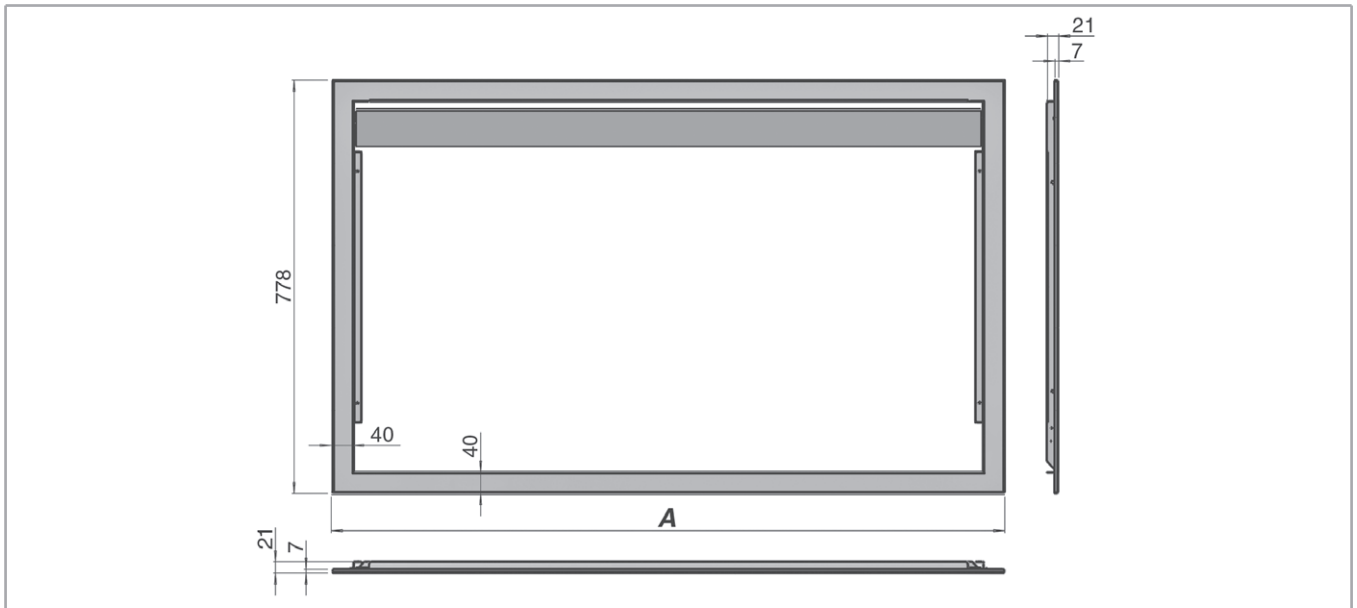
The grid can be easily removed to clean the filter and the inner casing.



The recessed box is made of galvanized steel with openings for the electrical and hydraulic connections. To fit in the unit easily, there are 4 grub screws.



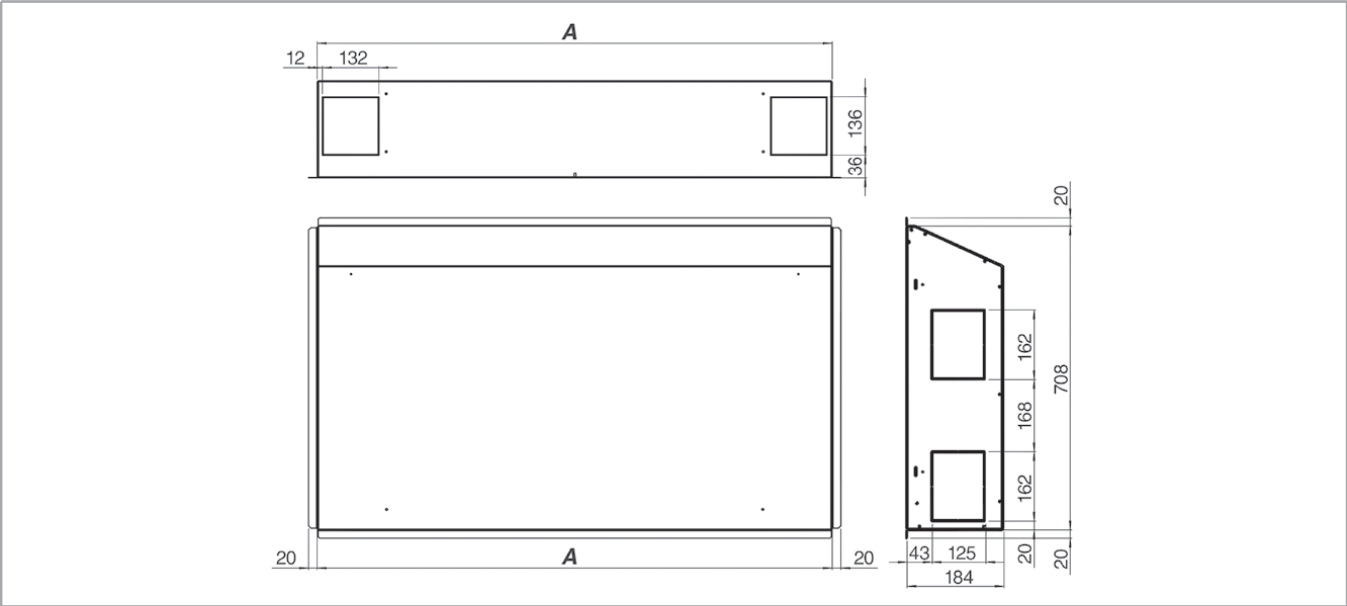
Aesthetic frame dimensions



Model	ID	Code	A	Aesthetic Frame Kit Weight (kg)
2	CBR-A	9076452	837	10,5
3	CBR-B	9076453	1052	12,5
4	CBR-C	9076455	1267	14,5



Recessed box dimensions

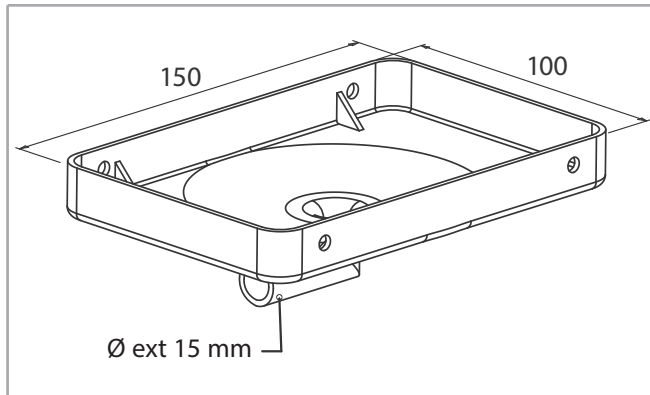


Model	ID	Code	A	Recessed Box Kit Weight (kg)
2	IBR-ECM 2	9076472	771	11,7
3	IBR-ECM 3	9076473	986	14,4
4	IBR-ECM 4	9076474	1201	16,2



BSV extension condensate collection tray to cover valve assembly

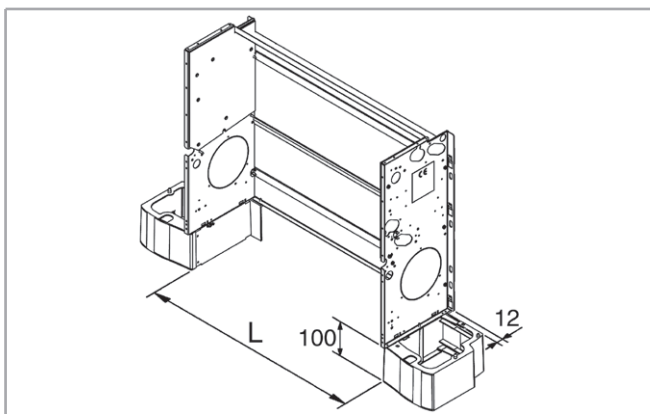
For vertical units **MV**.



Model	ID	Code
1 ÷ 4	BSV	6062125

PAP feet

For **MV** versions.



Model	ID	Code	L
1	PAP	9068101	330
2			430
3			645
4			860

CRYSTALL



Introduction

The Carisma Sabiana Fan Coils range equipped with the **Crystall** plate type electrostatic filter is the result of an extremely innovative project combining air treatment and purifying in a single product.

The fan coil unit is enriched with an electrostatic filter that is patented and certified (EN ISO 16890:2016), mounted on site, whose concept is total new and able to answer to the increasing need of better air handling and wellness within the working and residential ambients. 80% of the human life is spent within the closed environments. The (**"IAQ"**) Indoor Air Quality is the human-kind's continuous challenge of improving the own wellness during the next years and Sabiana joins it with the steady product innovation.



Technical specifications

The active electrostatic filter allows a consistent reduction of the fine particles existing in the environment thanks to the high efficiency filtration, performance certified in accordance to the Standard in force EN ISO 16890:2016.

It is also recalled that the WHO (World Health Organization) classified the PM (Particulate Matter) as certainly carcinogenic of group 1 as well as a vector of biological substances pathogenic to humans.

The particulate matters can be both solid and liquid : above all the liquid aerosols (droplets), like the ones produced during breathing and during other anthropomorphic activities, are the main vector of pathogenic Viruses and Bacteria and in some cases lethal to humans. It is now recognised by the world scientific community that all biological contaminants such as viruses and bacteria are mainly spread by the aerosol produced in the environment by infected people through breathing, coughing, sneezing or even simply speaking, with greater risk of spread indoors where we normally spend more than 80% of our time.

The most recent recommendations from WHO (Roadmap to improve and ensure good indoor ventilation in the context of COVID-19, March 1st, 2021) and the Prime Ministerial Decrees issued by the Italian Government (Guide Lines on Re-Opening Manufacturing) require, where possible, increasing the filtering efficiency of the equipment that handles indoor air and especially on air conditioning units in order to remove the smallest potentially infected particles from the air (containing pathogenic agents).

It is therefore suitable for different types of buildings, for example schools, hospitals and care homes, (hallways, waiting rooms, hospital ward rooms), doctor's offices, hotels and everywhere it is necessary to improve the quality of the indoor air.

Tests and Certifications

The Crystall solution has gone through numerous tests and efficiency and efficacy testing to assess its function and performance level in real conditions of use.

At various accredited agencies, efficiency and pressure drop tests were conducted, according to product standards EN ISO 16890:2016 and that are able to classify performance.

Sabiana's Crystall active electrostatic filter is able to guarantee a Most Penetrating Particle Size filtering efficiency level (MPPS - i.e. with an aerodynamic diameter between 0.2 and 0.4 μm) equal to semi-absolute filter E11 (MPPS \geq 95% - E11 @ EN 1822-1).

Also, the University of Ancona (the online scientific publication "Bacteria Removal and Viability Attenuation by Means of an Electrostatic Barrier" can be consulted by purchasing the Indoor and Built Environment magazine from the web-site) conducted more than 180 laboratory tests on microbiological substances (total airborne microbiological load), which include bacteria, mould, fungi, etc. and that confirmed, through the statistical processing of the data carried out with the specific Fischer test, the efficacy of the Crystall active electrostatic filter in reducing the bacterial load.

Benefits

- No impact over the thermal and aeraulic balance system
- Negligible pressure drop (also with dirty filter)
- Demonstrated bactericidal action (sustainable IAQ)
- Easy and chip maintenance
- Very low power consumption
- Efficiency performances certified according to the Product Standard EN ISO 16890:2016
- In accordance with the Standards in force for electro-magnetic compatibility and safety (by accredited institutions)
- Solution technologically sustainable and patented

Main components of the Crystall filtering assembly

The first element is the Crystall active electrostatic assembly with aluminium modular cells which is composed of two separate and distinct sections, one of which is active (polarisation section) attached to the load-bearing structure and the other is passive, with induced anode (collection or header section) that can be removed for maintenance.

The first section composed of electrodes and insulating parts does not require maintenance, while the second section, intended for the collection of organic and inorganic particulate, requires periodic cleaning.

Its extremely contained depth (just 50 mm) combined with its great dimensional flexibility, makes it suitable for satisfying the most diverse construction requirements, that have the aim of obtaining a high filtering level of the recirculation/secondary air (according to the definition provided by standard EN 16798.3).

The second component is the wired control and power box, available "fitted on the unit" or at a distance, that allows the management and the inspection of the Crystall filtering assembly operating status.

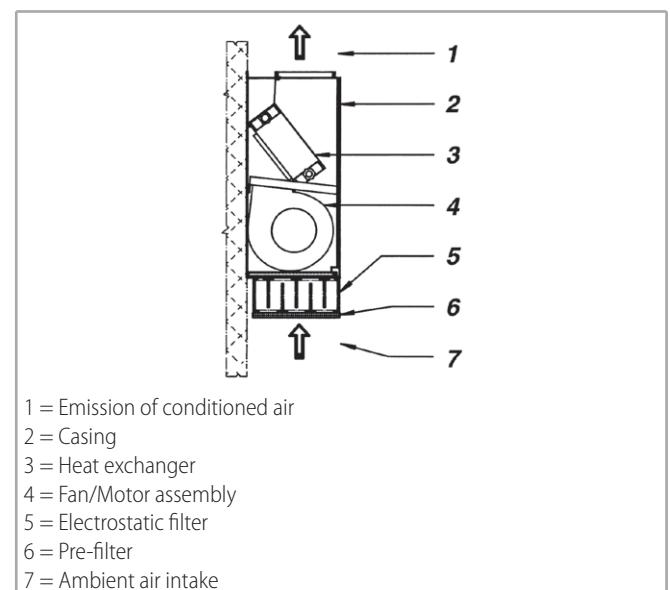
Operating principle of the CRYSTALL electrostatic filter

The air is aspirated and first passes a mechanical prefilter, which stops away particles of more than 50 μm (dust, insects, etc.).

Then the smallest particles ($50 \div 0.01 \mu\text{m}$) are exposed to an intensive ionic field and are polarized (Phase 1).

The charged particles passing through the second filter section, are pushed back by the anode and attracted to the collection surfaces by a strong, induced magnetic field (Phase 2).

The air which leaves the unit is free from polluting particles.

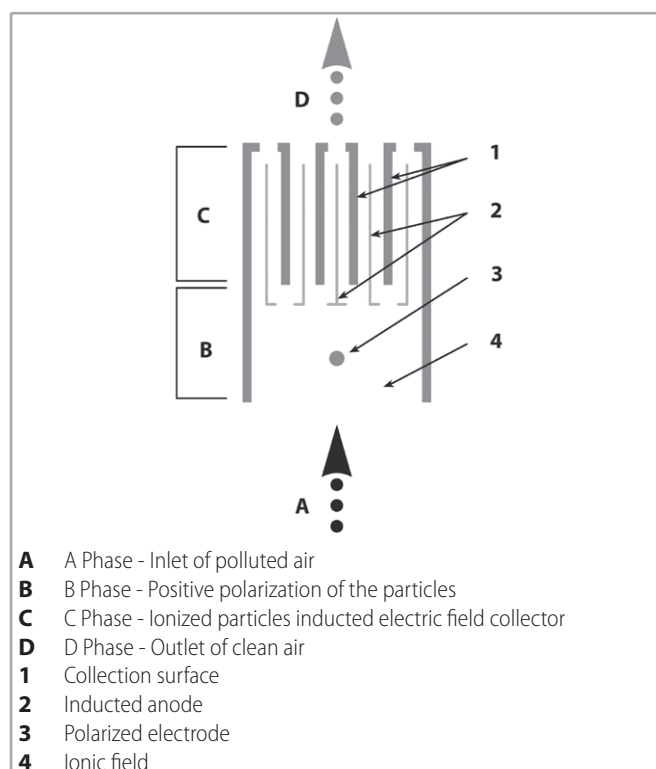


Active plate electrostatic filter of Femec type

The Crystall active electrostatic filter is based on the principle of separation of the particles contained in the air through electrical polarisation and their subsequent treatment on counterposed metal surfaces, with opposite polarity.

It is built with thin metal blades tapered together, forming numerous and intense electrical fields. The polluting particles that transit there, charged by a special electrode, are attracted and captured, as though by small magnets, on the counterposed surfaces of the blades. The power required for this process is low, approximately 4/7 W for every 1000 m^3/h of handled air.

Sabiana's patented Crystall solution makes it possible to achieve electrical fields on opposing surfaces without the need for additional electrical power supply, making every zone of the header (collection section) independent, there-by preventing the accidental short circuit of one section from compromising the operation of the entire filter.



Wired control and power box

The main element is the high voltage electronic power board required to feed the Crystall active electrostatic filter, an on/off disconnecting switch and a LED light to locally monitor the correct operating status.

The correct operation is possible at a distance also with a SPDT relay contact. The power supply is 230 Vca 50/60 Hz.

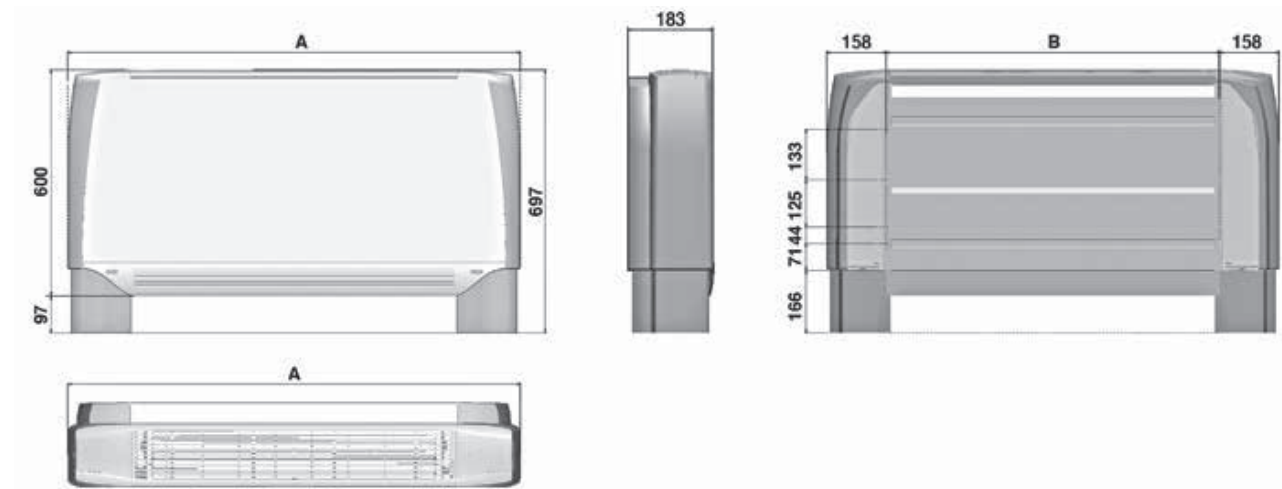
Model	Flow rate (m ³ /h)	Δpi Filter Electrostatic (**) (Pa)	Efficiency class (*)
CRR-ECM Size 1	160	3	ePM ₁ 95% - ePM _{2,5} 95% - ePM ₁₀ 95% - MPPS 96% (E11 @ UNI EN 1822-1)
	210	4	ePM ₁ 90% - ePM _{2,5} 90% - ePM ₁₀ 90% - MPPS 85% (E10 @ EN 1822-1)
CRR-ECM Size 2	215	3	ePM ₁ 95% - ePM _{2,5} 95% - ePM ₁₀ 95% - MPPS 96% (E11 @ UNI EN 1822-1)
	280	4	ePM ₁ 90% - ePM _{2,5} 90% - ePM ₁₀ 90% - MPPS 85% (E10 @ EN 1822-1)
CRR-ECM Size 3	325	3	ePM ₁ 95% - ePM _{2,5} 95% - ePM ₁₀ 95% - MPPS 96% (E11 @ UNI EN 1822-1)
	425	4	ePM ₁ 90% - ePM _{2,5} 90% - ePM ₁₀ 90% - MPPS 85% (E10 @ EN 1822-1)
CRR-ECM Size 4	440	3	ePM ₁ 95% - ePM _{2,5} 95% - ePM ₁₀ 95% - MPPS 96% (E11 @ UNI EN 1822-1)
	575	4	ePM ₁ 90% - ePM _{2,5} 90% - ePM ₁₀ 90% - MPPS 85% (E10 @ EN 1822-1)

(*) Performant test according to EN ISO 16890:2016

(**) Pressure drop evaluated on the basis of the efficiency performant test according to EN ISO 16890:2016

Dimension and weight MV version

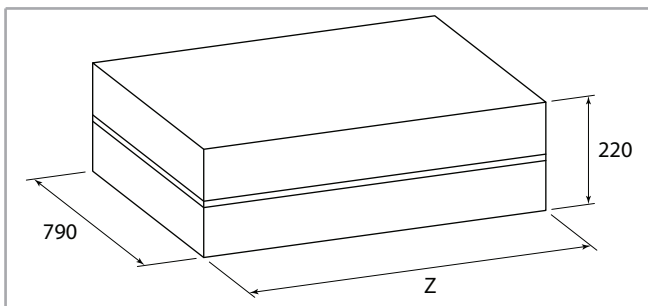
MV - Only vertical wall installation



MV version dimensions

Model		1	2	3	4
A	mm	670	770	985	1200
B	mm	354	454	669	884

Packed unit Crystall MV version



Model		1	2	3	4
Z	mm	720	820	1035	1250

Weight MV version

Weight with packaging

Model	1	2	3	4
kg	17,4	19,5	25,1	29,8

Weight without packaging

Model	1	2	3	4
kg	15,5	17,6	22,2	26,9



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Cert. n. 0545



Cert. n. 050153

Operative unit
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