



Technical manual for 2x1 air conditioning systems

GB



COMPANY
WITH QUALITY SYSTEM
CERTIFIED BY DNV
=ISO 9001/2000=

TABLE OF CONTENTS

1	THE PATENT	3
2	CONSTRUCTIVE FEATURES	4
3	RATINGS AND TECHNICAL DATA	5
4	OVERALL DIMENSIONS	5
5	PERFORMANCE	6
5.1	COOLING - 2 PIPE SYSTEMS	6
5.2	COOLING - 4 PIPE SYSTEMS	7
5.3	HEATING - 2 PIPE SYSTEMS	8
5.4	HEATING - 4 PIPE SYSTEMS	9
5.5	SOUND LEVEL	10
6	WIRING DIAGRAMS	10
7	ACCESSORIES	11

DECLARATION OF CONFORMITY **CE**

Galletti S.p.A., whose main office is in via Romagnoli 12/a, 40010 Bentivoglio (Bologna) - Italy, hereby declares, under its sole responsibility, that the 2X1 units, indoor units for heating and air conditioning systems, conform to the specifications of EEC Directives 73/23, 89/392, 91/368, 93/44, 93/68, 89/336, 98/37 and subsequent amendments.

Bologna, 03.04.06

Luigi Galletti

President



OPERATING LIMITS

- > thermal carrier fluid: water
- > water temperature: from 5°C to 95°C
- > maximum water pressure during operation: 10 bar
- > air temperature: from 5°C to 43 °C
- > Supply voltage: +/- 10%

1 THE PATENT

2x1 by Galletti: Evolution in air conditioning

Only someone who has been designing and manufacturing heating and air conditioning units for 45 years could have conceived a product which transcends the limits of existing technology.

2x1 is an indoor unit for hydronic heating and cooling systems which combines two operating modes in a single unit.

Thanks to an exclusive patented design, 2x1 can function as a heater without the aid of a fan, exploiting instead the principle of natural convection.

In summertime 2x1 offers the advantages of the best fan coil units, cooling, dehumidifying and filtering the air inside the room.

The exclusive patent combines 2 different operating modes in a single unit:

2 different air flow routes inside the unit and 2 distinct heat exchangers make it possible to switch over from natural convection heating to ventilated cooling or heating.

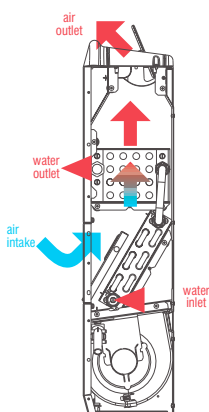


Heating: 3 operation mode, 5 thermal emission levels:

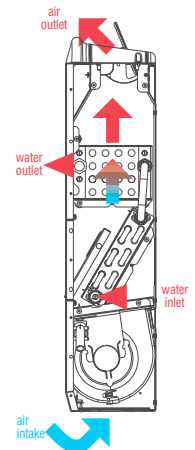
- > **1st level - convection heating mode**, fan off, flap open. The thermostat controls the room temperature by acting on the valve (optional), which interrupts the flow of water. The unit can be shut down immediately by positioning the air outlet flap in the closed position.
- > **2nd level - convection heating mode**, fan speed set on extra low, flap open. The thermostat controls the room temperature by acting on the fan and valve (optional), which interrupts the flow of water.
- > **3rd /4th /5th level - fan coil mode**, fan speed on low, medium or high, flap closed. The thermostat controls the room temperature by acting on the fan and valve (optional), which interrupts the flow of water.

COOLING: 1 OPERATING MODE, 4 LEVELS OF COOL AIR DELIVERY

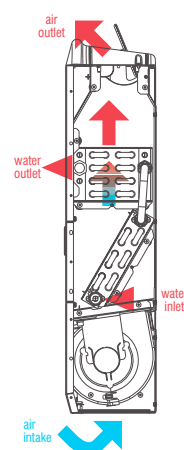
- > **1st /2nd /3rd /4th level - fan coil mode**, fan speed set on EXTRA-LOW, low, medium or high, flap closed. The thermostat controls the room temperature by acting on the fan and valve (optional), which interrupts the flow of water.



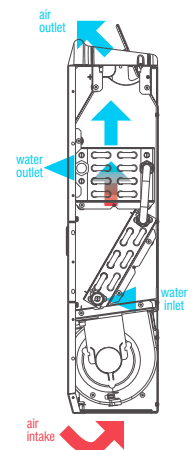
Heating
Static convector mode
Natural convection



Heating
Static convector mode
EXTRA-LOW operation



Heating
Fan coil mode
Maximum, medium, minimum operation



Cooling
Fan coil mode
Extra-low, maximum, medium, minimum operation

2 CONSTRUCTIVE FEATURES

- > CABINET WITH A REFINED DESIGN
 - Front panel made of sheet steel, colour RAL9010. The front panel incorporates an exclusive air flap which activates the convection heating mode. The flap is opened and closed manually.
 - Side panels manufactured from UV-stabilised ABS to maintain the colour intact over time.
 - Upper grill made of ABS (UV stabilised), adjustable louvers and flap. The flap features a microswitch that automatically shuts down the unit when the flap itself is closed. The side doors provide access to the control panel and compartment housing the plumbing connections. The doors may be secured by screws to prevent opening.
- > HEAT EXCHANGERS

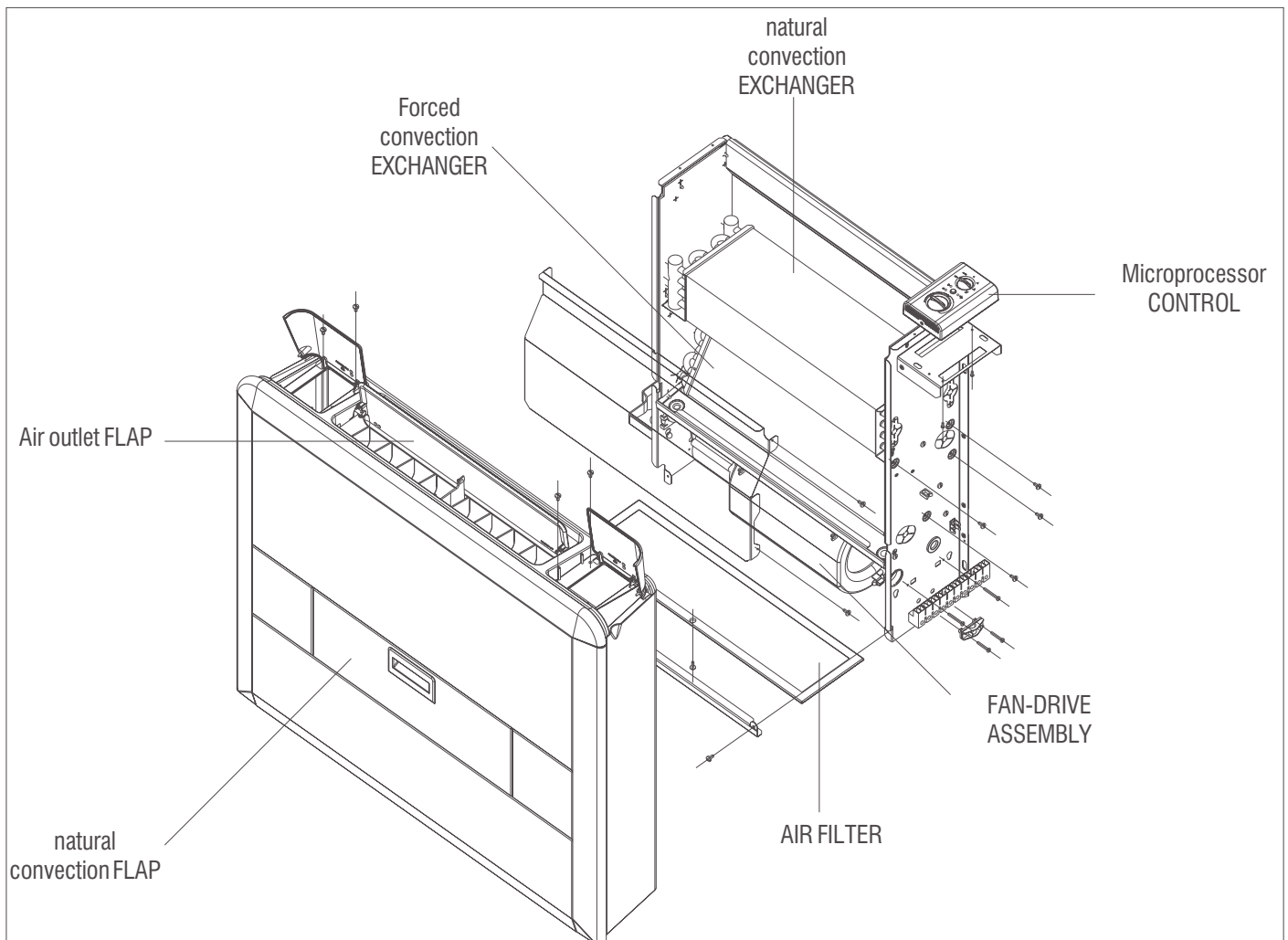
2X1 incorporates 2 heat exchangers for 2 distinct operating modes.

 - 4-row convector exchanger made up of copper tubing and aluminium fins secured to the tubing by mechanical expansion, complete with brass manifolds and air vent valve. The wide spacing between fins optimises the draught effect during natural convection.
 - Fan coil exchanger, made up of copper tubing and high-efficiency aluminium fins submitted to a hydrophilic surface treatment, secured to the tubing by mechanical expansion. The exchanger comes complete with air vent valves.
 - The heat exchangers are normally connected in series, so that the 2x1 unit will be ready for installation in 2-pipe systems. By removing the connecting pipe, 2x1 can be immediately converted for installation in a 4-pipe system, where the convector exchanger will be connected to the heating circuit and the fan coil exchanger to the cooling circuit.
 - The plumbing connections are normally provided on the left side but may be switched over to the other side (180°) during unit installation.
- > FAN ASSEMBLY

Including centrifugal fans with staggered airfoil-shaped blades, manufactured from anti-static ABS. The fans are housed in a low-noise ABS volute distinguished by a compact, high-efficiency profile. Four-speed electrical motor, mounted on vibration damping couplings, directly connected to the fans, with permanently activated capacitor and winding thermal protection .
- > BEARING STRUCTURE

Bearing structure built from galvanised sheet steel of adequate thickness, insulated by means of Class 1 self-extinguishing panels, supplied with an installation kit (wall screws). A support terminal board for electrical connections is located on the bearing structure, on the opposite side of the plumbing connections.
- > AIR FILTER

Honey-comb polypropylene washable air filter, mounted on a galvanised sheet frame protected by a net, easily removable for maintenance operations. The filter may be secured to the unit by means of screws.
- > ACCESSORIES
 - Speed switch
 - Microprocessor panel for automatic control of the unit and the connection to the ERGO control system
 - Base support panels which conceal the pipes leading up from the floor
 - Water flow regulating valves
 - BIOXIGEN ionisation and purification system



3 RATINGS AND TECHNICAL DATA

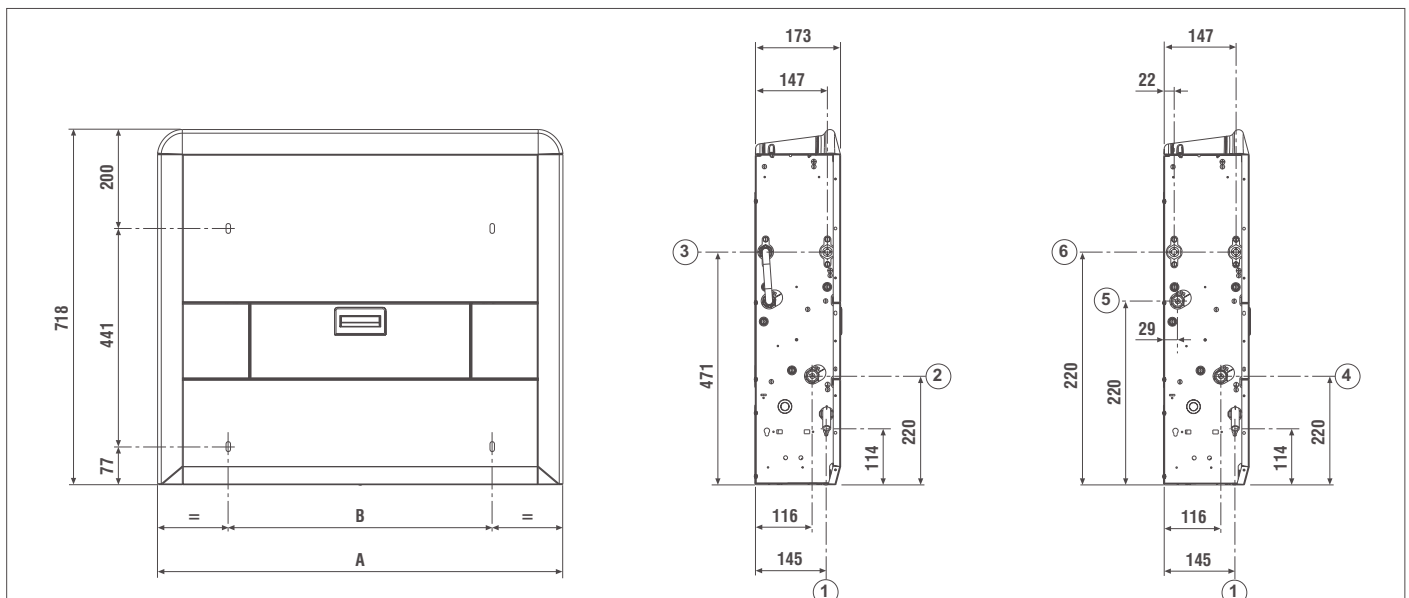
			COOLING water 7/12°C, air dry bulb 27°C humid bulb 19°C)					HEATING water 75/65°C, air 20°C)				
MODEL	Ventilation	Air flow rate	Total capacity	Sensible capacity	Dehum. Capacity	Water flow rate	Pressure drop	Capacity	water flow rate	Pressure drop	Electrical input	Sound power level
		m ³ /h	kW	kW	l/h	l/h	kPa	kW	l/h	kPa	watt	dB A
124	convection	-	-	-	-	-	-	0,93	80	0,5	-	-
	extra-low	80	0,56	0,39	0,24	95	1,5	1,74	80	0,5	11	27
	minimum	110	0,74	0,52	0,32	125	2,0	1,86	165	2,5	12	29
	medium	135	0,90	0,64	0,37	155	3,0	2,24	195	3,0	17	34
	maximum	170	1,17	0,95	0,32	200	5,0	2,89	255	3,5	23	40
224	convection	-	-	-	-	-	-	1,30	115	1,1	-	-
	extra-low	100	0,70	0,49	0,30	120	1,2	1,95	115	1,1	12	31
	minimum	135	0,87	0,64	0,34	150	1,9	2,30	205	3,0	14	33
	medium	170	1,14	0,80	0,49	190	2,6	2,85	250	4,5	20	37
	maximum	225	1,62	1,34	0,40	275	4,5	3,54	310	6,5	27	43
324	convection	-	-	-	-	-	-	1,49	130	1,1	-	-
	extra-low	140	1,04	0,70	0,48	175	2,7	2,74	130	1,1	22	32
	minimum	200	1,48	1,00	0,68	250	5,0	3,38	295	6,0	23	34
	medium	250	1,82	1,24	0,84	305	7,0	4,13	365	9,0	28	39
	maximum	340	2,38	1,82	0,80	410	13,5	5,10	450	13,0	37	46
424	convection	-	-	-	-	-	-	1,49	130	1,1	-	-
	extra-low	175	1,28	0,89	0,56	225	4,0	3,34	130	1,1	22	33
	minimum	250	1,82	1,17	0,94	305	7,0	4,13	365	9,0	25	34
	medium	310	2,17	1,50	0,97	375	10,0	5,00	440	13,0	31	40
	maximum	420	3,13	2,32	1,17	540	20,0	5,89	520	18,0	42	47

- 1 Water temperature 7-12°C, air temperature 27°C dry bulb, 19°C wet bulb (47% relative humidity).
- 2 Water inlet temperature 50°C, water flow rate same as in cooling mode, air inlet temperature 20°C
3. Water temperature 75 - 65°C; air temperature 20°C
4. Sound power measured according to standards ISO3741 and ISO3742

4 OVERALL DIMENSIONS

- 1 Drain outlet Ø 17 mm
- 2 Water inlet, 2-pipe systems, Ø 1/2" female gas
- 3 Water outlet, 2-pipe systems, Ø 1/2" female gas
- 4 Cooling circuit water inlet, 4-pipe systems, Ø 1/2" female gas
- 5 Cooling circuit water outlet, 4-pipe systems, Ø 1/2" female gas
- 6 Heating circuit water connections, Ø 1/2" female gas

2x1	A	B	Weight	Water content		
				Cooling exchanger	Heating exchanger	Total
	mm	mm	kg	dm ³	dm ³	dm ³
124	820	534	21	0,49	0,73	1,22
224	990	704	25	0,65	0,97	1,62
324	1160	874	29	0,81	1,20	2,01
424	1160	874	29	0,81	1,20	2,01



5 PERFORMANCE

5.3 HEATING - 2 PIPE SYSTEMS

Tbs₁ Air intake temperature (dry bulb)

Tw₁ Inlet water temperature

Tw₂ Water outlet temperature

Vr Fan speed

max maximum

med medium

min minimum

PT Heating capacity

Qw Water flow rate

Δpw Pressure drop, water side

Tbs ₁		20°C													
Tw ₁ / Tw ₂		Vr	FLAP	45 / 40°C			60°C / 50°C			70°C / 60°C			90°C / 70°C		
				PT	Qw	Δ pw	PT	Qw	Δ pw	PT	Qw	Δ pw	PT	Qw	Δ pw
				W	l/h	kPa	W	l/h	kPa	W	l/h	kPa	W	l/h	kPa
124	MAX	closed	1290	225	5,2	2040	178	3,3	2610	229	5,0	3560	157	2,5	
	MED	closed	1000	174	3,3	1570	137	2,1	2020	178	3,2	2750	121	1,6	
	MIN	closed	820	143	2,4	1300	113	1,5	1680	147	2,3	2260	100	1,1	
	extra-low	open	690	121	1,8	1090	95	1,1	1410	124	1,7	1910	84	0,8	
	convection	open	279	48	0,2	542	47	0,2	790	68	0,4	1216	52	0,2	
224	MAX	closed	1560	272	5,9	2460	215	3,7	3180	279	5,6	4290	189	2,7	
	MED	closed	1260	219	4,0	1990	173	2,5	2560	225	3,9	3470	153	1,9	
	MIN	closed	1020	177	2,8	1610	141	1,8	2070	182	2,7	2810	124	1,3	
	extra-low	open	820	142	1,9	1300	113	1,2	1660	146	1,8	2270	100	0,9	
	convection	open	399	69	0,4	767	66	0,4	1112	96	0,8	1703	73	0,5	
324	MAX	closed	2270	395	11,7	3570	312	7,3	4590	403	11,1	6190	273	5,4	
	MED	closed	1850	321	8,1	2910	254	5,1	3720	327	7,7	5060	223	3,8	
	MIN	closed	1510	262	5,7	2380	208	3,6	3040	267	5,4	4150	183	2,7	
	extra-low	open	1160	201	3,6	1830	160	2,3	2340	206	3,4	3200	141	1,7	
	convection	open	461	79	0,4	882	76	0,4	1276	110	0,8	1948	84	0,5	
424	MAX	closed	2620	456	15,5	4100	358	9,7	5300	465	14,7	7110	314	7,1	
	MED	closed	2230	388	11,7	3510	307	7,4	4500	395	11,1	6110	270	5,4	
	MIN	closed	1850	321	8,4	2910	254	5,3	3720	327	7,9	5060	223	3,9	
	extra-low	open	1410	246	5,3	2230	195	3,3	2860	251	5,0	3890	172	2,5	
	convection	open	461	79	0,4	882	76	0,4	1276	110	0,8	1948	84	0,5	

Tbs ₁		22°C													
Tw ₁ / Tw ₂		Vr	FLAP	45 / 40°C			60°C / 50°C			70°C / 60°C			90°C / 70°C		
				PT	Qw	Δ pw	PT	Qw	Δ pw	PT	Qw	Δ pw	PT	Qw	Δ pw
				W	l/h	kPa	W	l/h	kPa	W	l/h	kPa	W	l/h	kPa
124	MAX	closed	1170	204	4,4	1910	167	3,0	2480	218	4,5	3430	151	2,3	
	MED	closed	900	157	2,8	1470	129	1,9	1930	169	2,9	2640	117	1,5	
	MIN	closed	750	130	2,0	1220	106	1,3	1590	140	2,1	2180	96	1,0	
	extra-low	open	570	99	0,1	1020	90	1,0	1340	118	1,5	1840	81	0,8	
	convection	open	243	42	0,1	496	43	0,1	738	63	0,3	1156	50	0,2	
224	MAX	closed	1420	246	5,0	2300	201	3,3	3020	265	5,2	4130	182	2,6	
	MED	closed	1140	199	3,4	1860	163	2,3	2440	214	3,5	3340	147	1,8	
	MIN	closed	920	161	2,4	1510	132	1,6	1970	173	2,4	2710	120	1,2	
	extra-low	open	690	120	0,3	1220	106	1,1	1580	139	1,7	2190	96	0,8	
	convection	open	347	60	0,3	703	60	0,3	1040	89	0,7	1619	70	0,4	
324	MAX	closed	2060	359	9,9	3350	293	6,6	4370	384	10,2	5970	263	5,0	
	MED	closed	1680	291	6,9	2730	239	4,6	3540	311	7,0	4880	215	3,5	
	MIN	closed	1370	238	4,8	2230	195	3,2	2900	254	5,0	4000	176	2,5	
	extra-low	open	910	158	0,5	1720	150	2,0	2230	196	3,1	3080	136	1,6	
	convection	open	402	69	0,3	809	70	0,3	1194	103	0,7	1853	80	0,4	
424	MAX	closed	2380	413	13,1	3850	337	8,7	5040	442	13,5	6850	302	6,6	
	MED	closed	2030	353	9,9	3300	288	6,6	4290	376	10,2	5880	260	5,1	
	MIN	closed	1680	291	7,1	2730	239	4,7	3540	311	7,3	4880	215	3,7	
	extra-low	open	1080	188	0,7	2090	183	3,0	2720	239	4,6	3750	166	2,3	
	convection	open	402	69	0,3	809	70	0,3	1194	103	0,7	1853	80	0,4	

5 PERFORMANCE

5.4 HEATING - 4 PIPE SYSTEMS

Tbs₁ Air intake temperature (dry bulb)

Tw₁ Inlet water temperature

Tw₂ Water outlet temperature

Vr Fan speed

max maximum

med medium

min minimum

PT Heating capacity

Qw Water flow rate

Δpw Pressure drop, water side

Tbs ₁	20°C														
	Tw ₁ / Tw ₂	Vr	FLAP	45 / 40°C			60°C / 50°C			70°C / 60°C			90°C / 70°C		
				PT	Qw	Δpw	PT	Qw	Δpw	PT	Qw	Δpw	PT	Qw	Δpw
124		MAX	closed	920	160	0,3	1410	123	0,2	1930	170	0,3	2510	111	0,1
		MED	closed	800	138	0,2	1240	108	0,1	1650	145	0,2	2140	94	0,1
		MIN	closed	720	125	0,2	1120	98	0,1	1470	129	0,2	1920	85	0,1
		extra-low	open	630	109	0,1	980	86	0,1	1260	111	0,1	1690	74	0,1
		convection	open	279	48	0,2	542	47	0,2	790	68	0,4	1216	52	0,2
224		MAX	closed	1230	214	0,9	1900	166	0,5	2560	224	0,9	3350	148	0,4
		MED	closed	1010	176	0,6	1570	137	0,4	2120	186	0,6	2780	123	0,3
		MIN	closed	860	149	0,5	1340	117	0,3	1790	157	0,5	2350	104	0,2
		extra-low	open	760	132	0,4	1190	104	0,2	1560	137	0,4	2050	90	0,2
		convection	open	399	69	0,4	767	66	0,4	1112	96	0,8	1703	73	0,5
324		MAX	closed	1790	312	1,7	2790	244	1,1	3690	323	1,7	4870	215	0,8
		MED	closed	1470	256	1,2	2290	200	0,7	3030	266	1,2	4010	177	0,6
		MIN	closed	1260	219	0,9	1960	171	0,6	2590	227	0,9	3440	152	0,4
		extra-low	open	1010	176	0,6	1580	138	0,4	2090	184	0,6	2790	123	0,3
		convection	open	461	79	0,4	882	76	0,4	1276	110	0,8	1948	84	0,5
424		MAX	closed	2040	354	2,2	3160	276	1,4	4180	367	2,1	5510	243	1,0
		MED	closed	1690	295	1,6	2630	230	1,0	3480	305	1,6	4600	203	0,7
		MIN	closed	1470	256	1,3	2290	200	0,8	3030	266	1,2	4010	177	0,6
		extra-low	open	1200	209	0,9	1870	164	0,5	2480	217	0,9	3290	145	0,4
		convection	open	461	79	0,4	882	76	0,4	1276	110	0,8	1948	84	0,5

Tbs ₁	22°C														
	Tw ₁ / Tw ₂	Vr	FLAP	45 / 40°C			60°C / 50°C			70°C / 60°C			90°C / 70°C		
				PT	Qw	Δpw	PT	Qw	Δpw	PT	Qw	Δpw	PT	Qw	Δpw
124		MAX	closed	830	144	0,2	1330	116	0,2	1830	161	0,3	2400	106	0,1
		MED	closed	720	125	0,2	1160	101	0,1	1560	137	0,2	2050	90	0,1
		MIN	closed	650	113	0,2	1050	92	0,1	1390	122	0,2	1850	82	0,1
		extra-low	open	570	99	0,1	920	80	0,1	1200	105	0,1	1620	72	0,1
		convection	open	243	42	0,1	496	43	0,1	738	63	0,3	1156	50	0,2
224		MAX	closed	1100	191	0,7	1770	155	0,5	2430	213	0,8	3210	142	0,4
		MED	closed	910	158	0,5	1460	128	0,3	2010	176	0,6	2660	118	0,3
		MIN	closed	780	135	0,4	1260	110	0,3	1700	149	0,4	2250	99	0,2
		extra-low	open	690	120	0,3	1110	97	0,2	1480	130	0,3	1970	87	0,2
		convection	open	347	60	0,3	703	60	0,3	1040	89	0,7	1619	70	0,4
324		MAX	closed	1620	281	1,4	2600	228	0,9	3500	307	1,5	4680	207	0,7
		MED	closed	1320	230	1,0	2140	187	0,7	2880	252	1,1	3850	170	0,5
		MIN	closed	1130	197	0,8	1830	160	0,5	2460	216	0,8	3310	146	0,4
		extra-low	open	910	158	0,5	1470	128	0,3	1990	174	0,6	2680	118	0,3
		convection	open	402	69	0,3	809	70	0,3	1194	103	0,7	1853	80	0,4
424		MAX	closed	1830	319	1,8	2950	258	1,2	3970	349	2,0	5300	234	0,9
		MED	closed	1530	265	1,3	2460	215	0,9	3310	290	1,4	4420	195	0,7
		MIN	closed	1320	230	1,0	2140	187	0,7	2880	252	1,1	3850	170	0,5
		extra-low	open	1080	188	0,7	1750	153	0,5	2350	207	0,8	3160	140	0,4
		convection	open	402	69	0,3	809	70	0,3	1194	103	0,7	1853	80	0,4

5 PERFORMANCE

5.5 SOUND LEVEL

Vr Fan speed

3=maximum

2=medium

1=minimum

Lw Sound power level by octave band, not weighted

Lw_A Total sound power level, weighted A

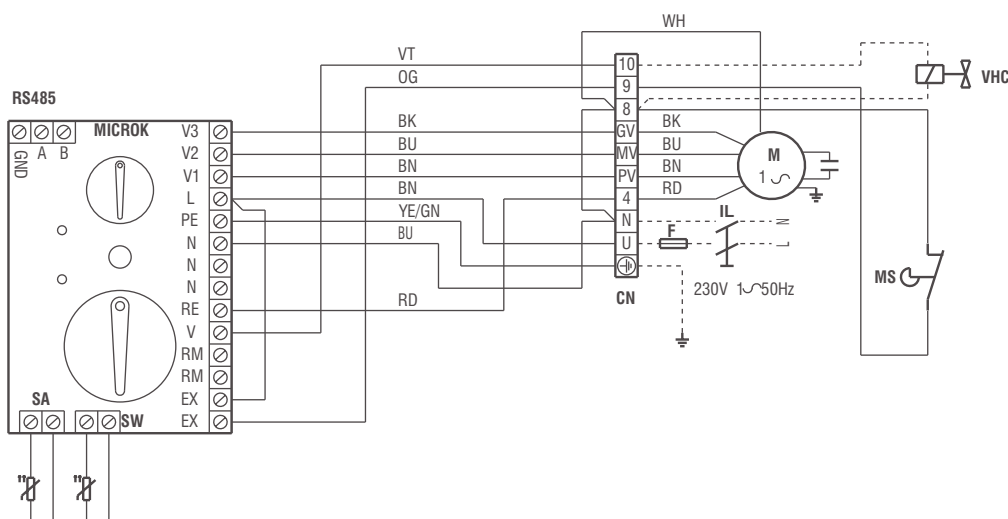
Lp_A Total sound pressure level, weighted A, measured in an open field, at a distance of 1 m, with a directivity factor of 4

	Vr	Lw							LwA	LpA
		125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz		
		dB	dB	dB	dB	dB	dB	dB	dB/A	dB/A
124	MAX	39,0	42,6	40,6	32,0	22,4	15,8	15,2	40	35
	MED	31,2	38,0	34,0	23,7	15,8	14,7	15,3	34	29
	MIN	29,1	33,9	28,8	17,0	13,8	14,4	16,3	29	24
	SMIN	27,6	31,3	26,8	15,0	11,0	14,3	16,3	27	22
224	MAX	36,5	44,6	43,1	34,4	28,9	29,3	20,0	43	38
	MED	32,7	40,7	35,6	26,6	24,9	27,1	18,4	37	32
	MIN	26,9	36,4	30,3	20,3	22,9	24,9	16,4	33	28
	SMIN	26,3	34,3	26,7	17,0	21,7	23,8	15,8	31	26
324	MAX	43,3	48,3	46,7	39,5	32,2	19,5	14,4	46	41
	MED	38,0	41,7	39,7	29,3	20,7	13,4	14,2	39	34
	MIN	36,9	38,6	33,7	22,5	13,7	13,1	15,2	34	29
	SMIN	35,4	36,2	30,2	19,9	10,0	13,1	15,2	32	27
424	MAX	44,3	49,3	47,7	40,5	33,2	20,5	15,4	47	42
	MED	39,0	42,7	40,7	30,3	21,7	13,4	15,2	40	35
	MIN	36,9	38,6	33,7	22,5	13,7	13,1	15,2	34	29
	SMIN	36,4	37,2	32,2	20,9	10,0	13,1	15,2	33	28

6 WIRING DIAGRAMS

Make the electrical connections with the mains power disconnected, in accordance with current safety regulations; strictly abide by the layout given in the appended diagram, which illustrates a 2x1 unit complete with **MICROK** microprocessor controller.

The electrical connections indicated must be made by the installer. For each fan coil an (IL) switch should be mounted on the power supply, with opening contacts at a distance of at least 3 mm and a suitable protection fuse (F).



Legend of wiring diagrams

BK	Black = High speed	MS	Air outlet FLAP w/microswitch
BN	Brown = Low speed	RS485	Serial port for connection to ERGO network
BU	Blue = Medium speed	OG	Orange
CN	Fast-on connector	RD	Red = extra-low speed
F	Safety fuse - not supplied	SA	Air temperature sensor for MICROK panel
GNYE	Yellow/green = ground	SW	Water temperature sensor for MICROK panel
IL	Circuit breaker - not supplied	VHC	3-way ON/OFF valve (230 V)
M	Motor	VT	Purple
MICROK	wall-mounted microprocessor control panel	WH	White = common

7 ACCESSORIES

CK Speed switch, installation on the unit.

Control panel for installation directly on the unit, featuring a selector for setting the fan speed (4 speeds) and shutting down the unit.

MICROK - advanced microprocessor control panel.

Microprocessor control panel to be installed on the wall or directly on the unit, complete with speed selector, electronic thermostat and cooling/heating changeover switch, suitable for connection to an ERGO supervision system.

It controls the fan speed and regulates the room temperature in the heating and cooling modes.

- Room temperature control in both the heating and cooling modes, achieved by switching the fan off and on, at the manually set speed.
- Room temperature control in both the heating and cooling modes, with automatic fan speed adjustment.
- Timer (where installed in the unit).
- Cooling/heating switching in the following modes:
 - manual, on the unit;
 - remote, manual (centralised);
 - automatic, depending on water temperature;
 - automatic, depending on air temperature.
- Control of ON/OFF valves.

MICROK is also equipped with

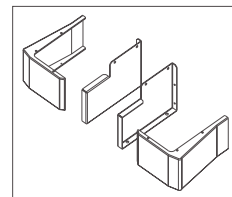
- input for remote enabling or disabling of unit operation
- input for remote enabling or disabling of the ECONOMY set point (only for systems controlled by ERGO software)
- Sensor for air and water temperature reading
- Optoisolated RS 485 communication port. No electricity supply required.
- Integrated MODBUS communication protocol
- INTEGRATED pull-up and pull-down resistors which may be activated via jumpers.



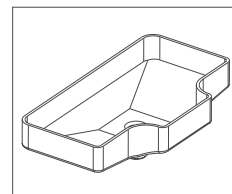
ZK - Two support covering feet

Supplied in pairs, they comprise supports for fastening to the base unit and outer coverings for fastening to the cabinet.

They are used to conceal the plumbing (pipes leading up from the floor) and in cases where the fan coil unit cannot be anchored to the wall. The height of the base support panels is 100 mm.



BV - Auxiliary water drip tray for vertical installation units, enabling collection of condensate from balancing/regulating valves.

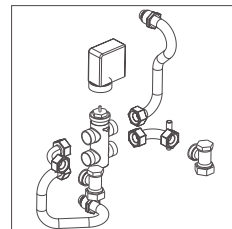


VK - ON-OFF 3-way motor driven valve, with hydraulic kit

The ON/OFF motor driven 3-way/4 collection VK valve kit controls the room temperature by stopping the water flow through the heat exchanger.

VK kit includes:

- Brass 3-way valve / 4 connections with built-in by-pass, maximum operating pressure 16 bar;
- Electrothermal actuator with the ON/OFF functions (total opening time 4 minutes), 230 V power supply.
- Plumbing kit for installing the valve on the heat exchanger, complete with 2 holders for balancing and regulating the fan coil unit.





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