

# COMFORT CIRCLE<sub>2</sub>

Cassette Unit



**Biddle**





## ALL ROUND COMFORT

With today's energy prices, building owners are increasingly aware of the need for an efficient climate system to heat, cool, ventilate commercial offices and retail areas. A comfortable indoor climate creates a pleasant working environment for employees, clients and customers. For energy efficient heating, cooling and increased ventilation in shops, supermarkets and offices, the space-saving Biddle Comfort Circle<sub>2</sub> cassette unit is the perfect candidate.





## COMFORT CIRCLE<sub>2</sub> RANGE

The Comfort Circle<sub>2</sub> allows you to heat, cool and increase ventilation the indoor space exactly as you wish, in a short period of time. For maximum comfort, the circular air discharge pattern ensures an even distribution of air throughout the room. Heating and cooling can be done separately or combined within one unit. Using a combined unit has the advantage of reducing the number of installed units required.

Climate equipment should preferably take up as little space as possible in your building. With the compact Comfort Circle<sub>2</sub>, floor and wall surfaces remain available for shelves, racks and other furniture. The unit can quickly and easily be installed in a suspended ceiling system; only the stylish circular air discharge grille is visible.

### FEATURES AND BENEFITS:

- Heating and/or cooling in one unit
- Space saving and unobtrusive
- Even air and temperature distribution
- Stylish air discharge grille
- Can be used with heat recovery units for added ventilation.
- Compact and low noise
- Suitable for lower water temperatures
- Option to reutilise residual waste heat
- User friendly and low maintenance
- Side discharge duct connection

### ENERGY-SAVING AND EFFICIENT

The Comfort Circle<sub>2</sub> has been designed for use with a water based heating and cooling system. Nowadays, increasing emphasis is being placed on energy-efficient and sustainable climate units, which incorporate low water temperature ranges. This can be achieved, for instance, by utilising the waste heat of a cooling unit or heat pump. The Comfort Circle<sub>2</sub> is compatible for use with this kind of system. It is also possible to deploy a cooling unit for heating; the so-called changeover system. For optimum coordination between the cassette unit and the heat and cold sources, an optional changeover sensor can be fitted.

### APPLICATIONS

The unobtrusive appearance and low noise emission make the unit ideally suited for use in shops, offices, showrooms, reception areas, museums, banks and libraries. Together with the automatic SR air curtain, the Comfort Circle<sub>2</sub> forms a complete climate solution (for rooms with a maximum height of 4 metres).

For ventilation, the Comfort Circle<sub>2</sub> (ventilation models CC<sub>2</sub>60V and CC<sub>2</sub>90V) can also be used in combination with the air2air heat recovery unit.



Heating

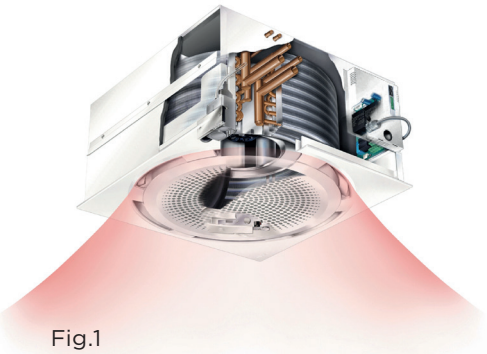


Fig.1

Cooling



Fig. 2

Ventilation

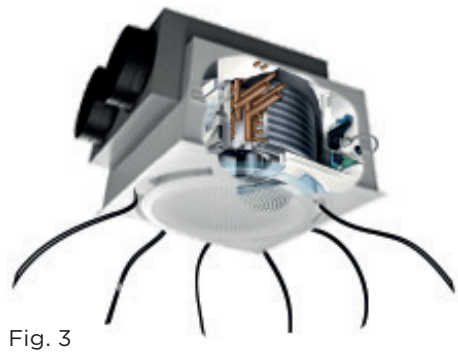


Fig. 3

## HOW IT WORKS

The bottom of the cassette unit consists of a panel with a circular air discharge grille. With recirculation units, the air intake and discharge take place via the same grille panel. The air is drawn in through the perforated pattern in the middle of the panel. After the air has been heated or cooled, it is blown evenly into the room across 360° via the air discharge openings on the side of the grille. The circular air discharge pattern generates an optimal and even air distribution, which ensures optimal penetration and air circulation even at low air speeds.

Warm air is discharged at a fixed 45° angle towards the floor, to achieve good downward penetration of the air into the room (fig. 1). When cooling, cold air is discharged horizontally along the ceiling to create an optimal draught free climate. This Coanda effect (fig. 2) gives a better distribution of the cooled air throughout the room.

### AUTO-ADJUSTABLE RING

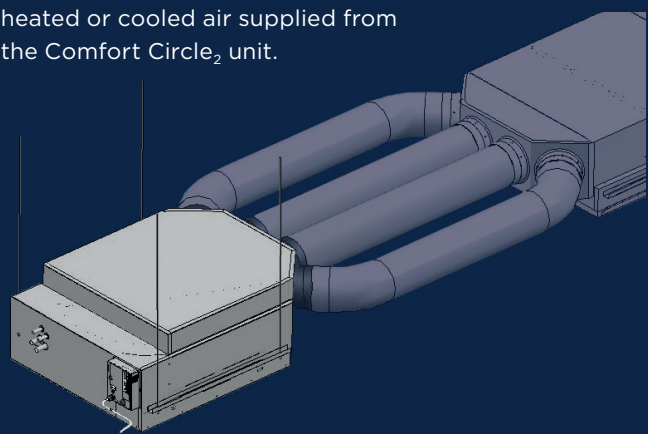
The air discharge grille of units that can both heat and cool is fitted with a patented adjustable discharge ring. The unit adjusts the ring automatically and in doing so selects the air discharge angle that best fits the particular heating (fig. 1) or cooling (fig. 2). Consequently, the downward penetration and distribution of the air are always guaranteed.

### FIXED SETTING AIR DISCHARGE ANGLE

Units that either heat or cool only have a fixed setting for the discharge angle and do not have an adjustable ring.

### VENTILATION

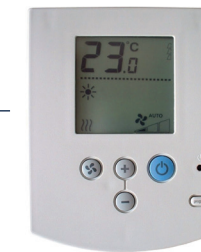
When connected to a heat recovery unit the stale air is extracted and replaced by heated or cooled air supplied from the Comfort Circle<sub>2</sub> unit.



## CONTROLS

In commercial offices and retail areas quick and easy adjustment of the climate is essential for users. Therefore, Biddle's Comfort Circle<sub>2</sub> comes with up to four different control options for a user-friendly solution for every situation. The client can set the desired room temperature via the control panel, quickly and easily bringing the indoor climate to the most comfortable level.

Both Biddle controls (thermostatic and modulating) are controlled by a well-designed and user-friendly control panel.



The control panel has various soft-touch keys and a handy LCD display. The desired room temperature is easily set via the control panel, after which time the control maintains the climate at the correct level. The keys can be locked with a 'key lock'.

One control panel can be connected to and operate a maximum of ten units. The units are then linked together. The maximum length of the control cables in a control system is 100 metres.

The control panel has various menus for several settings, such as use, installation, service and setting the week timer.

### THREE CONTROL OPTIONS:

#### 1. BASIC UNIT WITHOUT CONTROLLER (B0)

The cassette unit is equipped with a speed selector to allow single speed operation. Should variable speed be required, the selector can be replaced with an external 0-10V signal. Zero volt connections can also be connected to the unit to allow it to run.

This unit can also be used as the follower unit for the Thermostatic Air-Side Biddle Control.

#### 2. THERMOSTATIC AIR-SIDE BIDDLE CONTROL (S0/S1)

This plug & play control regulates the fan speed (three speeds) to obtain the desired room temperature. The control can be delivered with a fixed (S0) or an auto-adjustable discharge angle (S1).

#### 3. MODULATING AIR AND WATER-SIDE BIDDLE CONTROL (M0/M1)

The most comprehensive plug & play control for the cassette unit regulates both the fan speed and the discharge air temperature, to achieve precisely the desired temperature. This control can be delivered with a fixed (M0) or an auto-adjustable discharge angle (M1).

#### Automatic or manual operation

The control panel allows the user to choose between automatic or manual operation of the cassette unit. In the automatic mode, the correct fan speed is set on the basis of the temperature difference between the actual room temperature and the desired room temperature.

#### Automatic on and off control

The control panel features a week timer for switching the unit on and off automatically, each day of the week.

### MAXIMUM CONVENIENCE

If you choose one of the two integrated Biddle controls, the units will be delivered completely ready to use: plug & play. For connection to the mains, the units are equipped with a fixed cable and a moulded plug. The control panel, any extra units, inputs and outputs can be connected via the connector plate.

### PROJECT SPECIFIC MODIFICATIONS

The Comfort Circle<sub>2</sub> comes with 0-10 volt signals (fans speeds) as factory default. By using a built-in transformer it is possible to adjust the standard speeds to the specific situation.





## SELECTION & OPTIONS

The Comfort Circle<sub>2</sub> is suitable for either recirculation or ventilation and can either heat, cool, or do both. The circular air discharge pattern generates an even air distribution throughout the room. Air is extracted from the room via the small openings at the bottom of the unit. After the air has been heated or cooled, it is blown into the room through 360° via the air discharge opening on the side of the grille.

### THE COMFORT CIRCLE<sub>2</sub> IS AVAILABLE IN FOUR MODELS:

#### CC<sub>2</sub> 60

Max. air flow is 950 m<sup>3</sup>/h, suitable for heating rooms of 100 m<sup>2</sup>

#### CC<sub>2</sub> 60 V

Max. air flow is 926 m<sup>3</sup>/h, suitable extended ventilation in rooms of 100 m<sup>2</sup>

#### CC<sub>2</sub> 90

Max. air flow is 1410 m<sup>3</sup>/h, suitable for heating rooms of max. 200 m<sup>2</sup>

#### CC<sub>2</sub> 90 V

Max. air flow is 1468 m<sup>3</sup>/h, suitable extended ventilation in rooms of max. 200 m<sup>2</sup>

Specific criteria apply to cooling. This requires a cooling load calculation. The cassette unit is suitable for a maximum installation height of 4m.

### OPTIONS:

- Recessed ceiling model
- Free hanging model available
- Conditioned air inlet
- Recirculation: heating and/or cooling

### CONTROL OPTIONS:

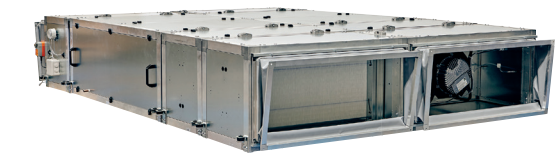
- Basic unit without control (B0)
- Thermostatic air-side control (S0/S1)
- Modulating air and water-side control (M0/M1)

### STANDARD COLOURS:

- RAL 9016
- Other RAL colours are available on request

### VENTILATION MODEL

The cassette unit is available as a ventilation model, but only in combination with heat recovery, model **air2air** HR. Information about the ventilation model is available on request.



HEAT RECOVERY • MODEL **air2air** HR

### TYPE CODE: CC<sub>2</sub> 60-H1C2-M1 EC

CC <sub>2</sub>	Comfort Circle <sub>2</sub>
<b>Model size</b>	
60	60 x 60 ventilation
90	90 x 90 ventilation
60v	60 x 60 ventilation and recirculation
90v	90 x 90 ventilation and recirculation
<b>Coil type</b>	
H2	Hot water heating, 2-row
H3	Hot water heating, 3-row
C2	Cooling 2-row or change-over
C3	Cooling 3-row or change-over
H1C2	Heating 1-row, cooling 2-row
<b>Control</b>	
B0	Basic unit, excl. control
S0	Thermostatic airside control, excl. valve
S1	Thermostatic airside control with automatic angle adjustment, excl. valve
M0	Modulating air and waterside control, incl. valve
M1	Modulating air and waterside control with automatic angle adjustment, incl. valve



## DELIVERY & ACCESSORIES

Various control and assembly accessories are available for the Comfort Circle<sub>2</sub>.

### STANDARD DELIVERY

- Two suspension brackets
- Two covering strips to adjust the air discharge pattern
- External condensation drain pump (for cooling)
- External condensation tray (for cooling)

### CONTROL / OPERATION

If one of the two Biddle controls (S0/S1 or M0/M1) is used, these two accessories are always required:

- Control panel
- Low voltage cables (various lengths)

### ACCESSORIES

- Suspension set
- Change-over-sensor
- CC<sub>2</sub> 90 adaptor plate to suit ceiling tile



## SMART SUSPENSION SYSTEM



Biddle cassette units can be installed either before or after fitting a suspended ceiling. The adjustable mounting system allows the unit to be moved in any direction. This means the unit can be positioned accurately, with minimal effort, and therefore easily integrated into the ceiling.

- Using an adaptor plate, the CC<sub>2</sub> 90 is suitable for mounting in a suspended 600mm grid ceiling.

## SPECIFICATIONS

### CASING

The casing is made from zinc-plated sheet steel, additionally reinforced to minimise deformations and vibrations. The underside of the unit has a rotatable plastic air inlet and discharge grille. The casing is fitted with sound absorbing, heat insulating material. The complete unit is delivered as standard in the colour RAL 9016 (white). Other RAL colours are available at an additional charge.

### FAN / MOTOR ASSEMBLY

The radial backward curved EC fans are mounted in the casing and cause minimal vibration. The fan is driven by an external rotor motor on ball bearings. With a plastic impeller to increase noise absorption, the motor is manufactured in accordance with DIN 40050 and rated to IP44. The motor features a built in motor driver circuit with soft start technology to reduce wear and temperature monitoring to ensure it doesn't overheat.

### HEATING /COOLING COIL (LPHW / LPCW)

The coil is manufactured with 3/8" copper tubes and aluminium fins. The coils are available in rows of 2 or 3. The operating pressure is max. 8 bar at max. 90°C. The diameter of the pipe work connections for coil type H1 is DN 15 (15 mm). For coil types H2, H3, C2 and C3 this is DN 20 (22 mm).

The maximum water range of an H2 coil with:

- Thermostatic air-side control (S0/S1) = 60/40°C
- Modulating air and water-side control (M0/M1) = 90/70°C

The maximum water range of an H3 coil with:

- Thermostatic air-side control (S0/S1) = 60/40°C
- Modulating air and water-side control (M0/M1) = 90/70°C

The maximum permissible operating pressure is 8 bar at a water inlet temperature of max. 90°C. The maximum permissible discharge air temperature is 50°C. If a unit has to be connected to a water range with higher temperatures, please consult Biddle for advice.



# TECHNICAL EXPLANATION

## SOUND REFERENCE ROOM

In the tables, a sound pressure level in the reverberation sound field is given for all speeds. These sound pressure level values are based on the use of one unit in a reference room. The sound pressure in the room is determined dependent on the installation and the speed of the fan. The sound data are applicable to each unit and measured at a distance of 5 m from the unit.

Unit	reference room	
	Volume room	Reverberation time
CC <sub>2</sub> 60	300 m <sup>3</sup>	0.5 s
CC <sub>2</sub> 90	600 m <sup>3</sup>	0.6 s

Example calculation: What is the sound pressure level in the reverberation field when two CC<sub>2</sub> 60 units at speed 2 are used in a room with a reverberation time of 0.7 sec and a volume of 600 m<sup>3</sup>

## SOUND IN A DEVIATING ROOM AND WITH MULTIPLE UNITS

If a unit is used in a deviating room, or if multiple devices are used in a single room, the sound pressure level must be recalculated. This can be done using the formula below. The relevant table value can be found in the tables (general data).

- L<sub>p</sub>** = sound pressure [dB(A)]
- T** = reverberation time in deviating room [s]
- T<sub>0</sub>** = reverberation time [s] (see table)
- V** = volume deviating room [m<sup>3</sup>]
- V<sub>0</sub>** = volume reference room [m<sup>3</sup>] (see table)
- n** = number of units

$$L_p = \text{table value} + \left( 10 \log \left( \frac{T}{T_0} \right) - 10 \log \left( \frac{V}{V_0} \right) + 10 \log \left( \frac{d_0^2}{d^2} \right) + 10 \log (n) \right) [\text{dB(A)}]$$

$$47 + \left( 10 \cdot \log \left( \frac{0,7}{0,5} \right) - 10 \cdot \log \left( \frac{600}{300} \right) + 10 \cdot \log (2) \right)$$

$$47 + 1,5 - 3 + 3 = 48,5 \text{ dB(A)}$$

## SOUND POWER LEVEL IN dB

### CC<sub>2</sub>60

Speed	Sound pressure level dB(A)	Sound power level Per octave band in the medium frequency, in dB (Hz)								Lw dB(A)
		63	125	250	500	1000	2000	4000	8000	
1	35.9	42.4	52.2	49.0	44.7	44.0	42.9	28.6	24.9	49.1
2	45.9	51.1	59.5	58.1	54.9	54.0	52.3	47.3	35.6	59.1
3	52.3	55.7	64.7	64.8	60.7	60.2	58.2	56.5	46.2	65.5

### CC<sub>2</sub>90

Speed	Sound pressure level dB(A)	Sound power level Per octave band in the medium frequency, in dB (Hz)								Lw dB(A)
		63	125	250	500	1000	2000	4000	8000	
1	34.3	45.1	55.6	51.4	48.3	43.1	34.3	23.1	11.8	49.3
2	44.9	52.3	63.9	61.2	56.6	56.1	49.2	40.7	28.8	60.0
3	52.4	56.1	69.8	67.2	63.3	63.6	59.2	50.7	40.7	67.4

# COMFORT CIRCLE<sub>2</sub>

## Technical Details





# HEATING CAPACITY

## WATER FLOW RATE

When water and room temperatures other than the values represented in the tables are used, the water flow rate can be roughly calculated using the formula below. Before doing so, the total cooling capacity must be recalculated based on the tables with correction factors.

- $m_w$  = water flow rate [l/h]
- $Q$  = capacity [kW]
- $C_{pw}$  = specific heat of water (=4.18) [kJ/kg°C]
- $\Delta T_w$  = temperature difference water [°C]
- $\rho_w$  = density of water at 90°C (=0.984) [kg/l]

$$m_w = \frac{Q}{C_{pw} \Delta T_w \rho_w} 3600 \text{ [l/h]}$$

The heating capacities shown in the tables for coil types H1 and H2 are based on a water range of 80/60°C. The heating capacity for coil type H3 is based on a water range of 60/40°C. In both cases an air inlet temperature of 20°C is assumed. With different water temperatures and/or air inlet temperatures, the heating capacity must be multiplied by the correction factors given below.

# CORRECTION FACTORS

## CORRECTION FACTORS HEATING CAPACITY COIL TYPES H1 AND H2

### CC<sub>2</sub> H2/H1C2

Water range	Air inlet temperature					
	-10°C	0°C	10°C	15°C	18°C	20°C
90/70 °C	1.95	1.69	1.44	1.33	1.26	1.21
82/71 °C	1.87	1.61	1.37	1.25	1.18	1.14
80/60 °C	1.72	1.47	1.23	1.11	1.05	1.0
70/50 °C	1.5	1.25	1.01	0.9	0.83	0.79
60/40 °C	1.27	1.03	0.8	0.68	0.62	0.57
50/40 °C	1.17	0.93	0.71	0.6	0.53	0.49
50/30 °C	1.04	0.8	0.58	0.46	0.39	0.35

## CORRECTION FACTORS HEATING CAPACITY COIL TYPE H3

### CC<sub>2</sub> H3

Water range	Air inlet temperature					
	-10°C	0°C	10°C	15°C	18°C	20°C
90/70 °C	3.3	2.86	2.44	2.24	2.12	2.05
82/71 °C	3.13	2.7	2.29	2.09	1.97	1.9
80/60 °C	2.92	2.5	2.09	1.89	1.78	1.7
70/50 °C	2.55	2.13	1.73	1.54	1.43	1.36
60/40 °C	2.18	1.77	1.38	1.19	1.07	1.0
50/40 °C	1.98	1.58	1.2	1.01	0.91	0.84
50/30 °C	1.8	1.4	1.01	0.82	0.7	0.62

## WATER PRESSURE DROP

When water temperatures other than the values represented in the tables are used, the water pressure drop can be calculated using this formula. To do so, the water flow rate must first be calculated.

- $\Delta P_{w1}$  = water pressure loss, table values [kPa]
- $\Delta P_{w2}$  = water pressure loss [kPa]
- $m_{w1}$  = water flow rate, table values [l/h]
- $m_{w2}$  = water flow rate calculated using formula [l/h]

$$\Delta P_{w2} = \Delta P_{w1} \left( \frac{m_{w2}}{m_{w1}} \right)^2 \text{ [kPa]}$$

# COOLING CAPACITY

The cooling capacities shown in the tables for coil types C2 and C3 are based on a water range of 6/12°C and air inlet conditions of 27°C / 48% R.H. With different water temperatures and/or air inlet conditions, the cooling capacity must be multiplied by the correction factors given below. Data relating to other deviating refrigerants are available on request.

## CORRECTION FACTORS COOLING CAPACITY COIL TYPES C2 AND C3

### CC<sub>2</sub> C2/C3

Water range	Inlet conditions	Relative humidity							
		40%		48%		50%		60%	
		Qt	Qs	Qt	Qs	Qt	Qs	Qt	Qs
6/12 °C	22 °C	0.56	0.75	0.58	0.74	0.59	0.73	0.7	0.7
	23 °C	0.61	0.81	0.65	0.79	0.67	0.78	0.81	0.75
	24 °C	0.66	0.87	0.72	0.84	0.75	0.84	0.93	0.81
	27 °C	0.86	1.03	1.0	1.0	1.05	1.0	1.29	0.98
	28 °C	0.94	1.08	1.11	1.06	1.16	1.05	1.42	1.03
8/14 °C	22 °C	0.47	0.62	0.47	0.62	0.47	0.62	0.53	0.59
	23 °C	0.52	0.69	0.52	0.68	0.53	0.68	0.62	0.65
	24 °C	0.56	0.75	0.58	0.74	0.6	0.73	0.72	0.7
	27 °C	0.72	0.93	0.81	0.89	0.85	0.89	1.07	0.86
	28 °C	0.79	0.98	0.91	0.95	0.96	0.94	1.2	0.92
10/16 °C	22 °C	0.37	0.5	0.37	0.5	0.37	0.5	0.38	0.49
	23 °C	0.42	0.56	0.42	0.56	0.42	0.56	0.45	0.54
	24 °C	0.47	0.63	0.47	0.63	0.47	0.63	0.53	0.59
	27 °C	0.61	0.81	0.65	0.79	0.67	0.78	0.84	0.75
	28 °C	0.66	0.87	0.73	0.84	0.76	0.84	0.97	0.8
12/18 °C	22 °C	0.28	0.37	0.28	0.37	0.28	0.37	0.28	0.37
	23 °C	0.33	0.43	0.33	0.43	0.33	0.43	0.33	0.43
	24 °C	0.37	0.5	0.37	0.5	0.37	0.5	0.38	0.49
	27 °C	0.52	0.69	0.52	0.69	0.53	0.68	0.63	0.64
	28 °C	0.56	0.75	0.58	0.74	0.6	0.73	0.74	0.7



# HEATING CC<sub>2</sub> 60 EC BASIC DATA

## CC<sub>2</sub> 60

Electrical supply	V/ph/Hz	230/1/50										
Max. Input current	A	1.2										
Max. Fan power	W	155										
Speed		1	2	3	4	5	6	7	8	9	10	
Voltage	v	230	230	230	230	230	230	230	230	230	230	
Air volume	m <sup>3</sup> /h	100	200	290	390	480	570	690	770	870	950	
Air volume	l/s	28	54	81	107	134	158	191	214	243	263	
Sound pressure level at 5m	dB(A)	-	18.7	28.4	35.9	41.2	45.9	49.3	52.3	54.8	56.5	

## CC<sub>2</sub> 60-H2

Air inlet temperature	°C	20										
Weight	kg	28										
Water range	°C	80/60										
Speed		1	2	3	4	5	6	7	8	9	10	
Air volume	m <sup>3</sup> /h	100	200	290	390	480	570	690	770	870	950	
Air volume	l/s	28	54	81	107	134	158	191	214	243	263	
Heating capacity	kW	1.9	3.5	4.9	6.2	7.3	8.3	9.6	10.5	11.4	12.1	
Discharge air temperature	°C	74	70	68	65	63	61	59	58	57	56	
Water flow rate	l/h	85	155	215	270	320	365	420	460	500	530	
Water flow rate	l/s	0.02	0.04	0.06	0.08	0.09	0.10	0.12	0.13	0.14	0.15	
Water pressure drop	kPa	0.2	0.7	1.3	2.0	2.7	3.4	4.4	5.2	6.1	6.8	
Water pressure drop with 3-port valve	kPa	0.1	1.1	2.0	3.2	4.4	5.6	7.3	8.6	10.1	11.3	
Water pressure drop with 2-port valve	kPa	0.1	1.1	2.0	3.2	4.4	5.6	7.0	8.6	10.1	11.3	

## CC<sub>2</sub> 60-H3

Air inlet temperature	°C	18										
Weight	kg	31										
Water range	°C	60/40										
Speed		1	2	3	4	5	6	7	8	9	10	
Air volume	m <sup>3</sup> /h	100	200	290	390	480	570	690	770	870	950	
Air Volume	l/s	28	54	81	107	134	158	191	214	243	263	
Heating capacity	kW	1.3	2.4	3.4	4.3	5.1	5.8	6.7	7.4	8.1	8.6	
Discharge air temperature	°C	56	54	52	51	49	48	47	46	45	45	
Water flow rate	l/h	55	105	145	185	220	255	295	320	350	370	
Water flow rate	l/s	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.10	0.10	0.10	
Water pressure drop	kPa	0.1	0.2	0.4	0.6	0.9	1.1	1.5	1.7	2.0	2.2	
Water pressure drop with 3-port valve	kPa	0.1	0.4	0.8	1.2	1.7	2.1	2.8	3.3	4.0	4.5	
Water pressure drop with 2-port valve	kPa	0.1	0.4	0.8	1.2	1.7	2.1	2.8	3.3	4.0	4.3	

○ The air discharge temperature of units with modulating control is limited to 50°C.

# HEATING CC<sub>2</sub> 90 EC BASIC DATA

## CC<sub>2</sub> 90

Electrical supply	V/ph/Hz	230/1/50										
Max. Input current	A	1.4										
Max. Fan power	W	168										
Speed		1	2	3	4	5	6	7	8	9	10	
Voltage	v	238	238	238	240	239	240	239	238	238	239	
Air volume	m <sup>3</sup> /h	160	300	450	610	770	980	1130	1270	1410	1410	
Air volume	l/s	43	84	124	170	214	271	313	352	392	392	
Sound pressure level at 5m	dB(A)	6	18	26	33	39	44	49	52	54	54	

## CC<sub>2</sub> 90-H2

Air inlet temperature	°C	18										
Weight	kg	49										
Water range	°C	80/60										
Speed		1	2	3	4	5	6	7	8	9	10	
Air volume	m <sup>3</sup> /h	160	300	450	610	770	980	1130	1270	1410	1410	
Air volume	l/s	43	84	124	170	214	271	313	352	392	392	
Heating capacity	kW	3.0	5.5	7.8	10.1	12.3	14.7	16.4	17.9/	19.4	19.4	
Discharge air temperature	°C	75	72	69/	67	65	62	61	60	59	59	
Water flow rate	l/h	135	240	340	445	540	645	720	785	850	850	
Water flow rate	l/s	0.04	0.07	0.09	0.12	0.15	0.18	0.20	0.22	0.24	0.24	
Water pressure drop	kPa	0.2	0.5	0.9	1.5	2.1	3.0	3.6	4.3	4.9	4.9	
Water pressure drop with 3-port valve	kPa	0.3	0.9	1.6	2.7	3.9	5.5	6.8	8.1	9.5	9.5	
Water pressure drop with 2-port valve	kPa	0.3	1.0	1.9	3.1	4.5	6.3	7.8	9.3	10.8	10.8	

## CC<sub>2</sub> 90-H3

Air inlet temperature	°C	18										
Weight	kg	52										
Water range	°C	60/40										
Speed		1	2	3	4	5	6	7	8	9	10	
Air volume	m <sup>3</sup> /h	160	300	450	610	770	980	1130	1270	1410		
Air Volume	l/s	43	84	124	170	214	271	313	352	392	392	
Heating capacity	kW	2.1	2.4	3.4	4.3	5.1	5.8	6.7	7.4	8.1	8.6	
Discharge air temperature	°C	57	54	52	51	49	48	47	46	45	45	
Water flow rate	l/h	90	105	145	185	220	255	295	320	350	370	
Water flow rate	l/s	0.03	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.10	
Water pressure drop	kPa	0.0	0.2	0.4	0.6	0.9	1.1	1.5	1.7	2.0	2.2	
Water pressure drop with 3-port valve	kPa	0.1	0.4	0.8	1.2	1.7	2.1	2.8	3.3	4.0	4.5	
Water pressure drop with 2-port valve	kPa	0.1	0.4	0.8	1.2	1.7	2.1	2.8	3.3	4.0	4.5	

○ The air inlet conditions are in compliance with Eurovent standards.

○ The air discharge temperature of units with modulating control is limited to 50°C.



## COOLING CC<sub>2</sub> 60 EC BASIC DATA

### CC<sub>2</sub> 60

Electrical supply	V/ph/Hz	230/1/50										
Max. Input current	A	1.2										
Max. Fan power	W	155										
Speed		1	2	3	4	5	6	7	8	9	10	
Voltage	v	230	230	230	230	230	230	230	230	230	230	
Air volume	m <sup>3</sup> /h	100	200	290	390	480	570	690	770	870	950	
Air volume	l/s	28	54	81	107	134	158	191	214	243	263	
Sound pressure level at 5m	dB(A)	-	18.7	28.4	35.9	41.2	45.9	49.3	52.3	54.8	56.5	

### CC<sub>2</sub> 60-C2

Air inlet temperature	°C/%	27/48										
Weight	kg	29										
Water range	°C	6/12										
Speed		1	2	3	4	5	6	7	8	9	10	
Air volume	m <sup>3</sup> /h	100	200	290	390	480	570	690	770	870	950	
Total cooling capacity	kW	0.9	1.6	2.1	2.6	3.1	3.5	3.9	4.2	4.6	4.8	
Sensible cooling capacity	kW	0.6	1.1	1.5	1.9	2.2	2.5	2.9	3.2	3.5	3.7	
Discharge air temperature	°C	9	10	11	12	13	14	14	15	15	15	
Condensate	l/h	0.4	0.7	0.9	1.1	1.2	1.4	1.5	1.5	1.6	1.6	
Water flow rate	l/h	130	225	305	375	440	495	560	605	655	685	
Water pressure drop	kPa	0.7	1.8	3.2	4.6	6.2	7.6	9.5	10.9	12.6	13.7	
Water pressure drop with 3-port valve	kPa	0.9	2.6	4.6	6.9	9.3	11.5	14.6	16.8	19.4	21.3	
Water pressure drop with 2-port valve	kPa	0.9	2.6	4.6	6.9	9.3	11.5	14.6	16.8	19.4	21.3	

### CC<sub>2</sub> 60-C3

Air inlet temperature	°C/%	27/48										
Weight	kg	32										
Water range	°C	6/12										
Speed		1	2	3	4	5	6	7	8	9	10	
Air volume	m <sup>3</sup> /h	100	200	290	390	480	570	690	770	870	950	
Total cooling capacity	kW	1	1.7	2.4	3	3.6	4.1	4.7	5.1	5.5	5.8	
Sensible cooling capacity	kW	0.6	1.2	1.7	2.1	2.5	2.9	3.4	3.7	4.1	4.3	
Discharge air temperature	°C	8	9	10	10	11	12	12	12	13	13	
Condensate	l/h	0.5	0.8	1.1	1.3	1.5	1.7	1.9	2	2.1	2.1	
Water flow rate	l/h	140	250	345	435	515	580	670	725	785	830	
Water pressure drop	kPa	0.5	1.3	2.3	3.5	4.8	6	7.7	8.9	10.4	11.5	
Water pressure drop with 3-port valve	kPa	0.8	2.3	4.3	6.5	9.0	11.4	14.9	17.3	20.3	22.5	
Water pressure drop with 2-port valve	kPa	0.8	2.3	4.3	6.5	9.0	11.4	14.9	17.3	20.3	22.5	

○ The air inlet conditions are in compliance with Eurovent standards.

## COOLING CC<sub>2</sub> 90 EC BASIC DATA

### CC<sub>2</sub> 90

Electrical supply	V/ph/Hz	230/1/50										
Max. Input current	A	1.4										
Max. Fan power	W	168										
Speed		1	2	3	4	5	6	7	8	9	10	
Voltage	v	230	230	230	230	230	230	230	230	230	230	
Air volume	m <sup>3</sup> /h	160	300	450	610	770	980	1130	1270	1410	1410	
Air volume	l/s	43	84	124	170	214	271	313	352	392	392	
Sound pressure level at 5m	dB(A)	-	18.8	26.8	34.3	39.8	44.9	49.3	52.4	55.1	55.1	

### CC<sub>2</sub> 90-C2

Air inlet temperature	°C/%	27/48										
Weight	kg	50										
Water range	°C	6/12										
Speed		1	2	3	4	5	6	7	8	9	10	
Air volume	m <sup>3</sup> /h	160	300	450	610	770	980	1130	1270	1410	1410	
Total cooling capacity	kW	1.4	2.5	3.4	4.4	5.2	6.2	6.8	7.4	7.9	7.9	
Sensible cooling capacity	kW	1	1.7	2.4	3.1	3.7	4.5	5	5.4	5.9	5.9	
Discharge air temperature	°C	8	10	11	12	12	13	14	14	14	14	
Condensate	l/h	0.7	1.2	1.5	1.9	2.2	2.5	2.7	2.8	3	3	
Water flow rate	l/h	205	360	495	630	750	885	980	1060	1135	1135	
Water pressure drop	kPa	0.5	1.3	2.3	3.5	4.9	6.6	7.9	9.2	10.4	10.4	
Water pressure drop with 3-port valve	kPa	0.7	2.1	3.8	6	8.4	11.5	13.9	16.2	18.5	18.5	
Water pressure drop with 2-port valve	kPa	0.8	2.3	4.2	6.8	9.5	13	15.7	18.3	21	21	

### CC<sub>2</sub> 90-C3

Air inlet temperature	°C/%	27/48										
Weight	kg	53										
Water range	°C	6/12										
Speed		1	2	3	4	5	6	7	8	9	10	
Air volume	m <sup>3</sup> /h	160	300	450	610	770	980	1130	1270	1410	1410	
Total cooling capacity	kW	1.6	2.8	4	5.2	6.2	7.5	8.4	9.2	9.9	9.9	
Sensible cooling capacity	kW	1	1.9	2.7	3.5	4.3	5.2	5.9	6.5	7.1	7.1	
Discharge air temperature	°C	7	8	9	10	10	11	11	11	12	12	
Condensate	l/h	0.8	1.4	1.9	2.4	2.8	3.3	3.6	3.9	4.2	4.2	
Water flow rate	l/h	225	405	565	740	895	1075	1200	1315	1420	1420	
Water pressure drop	kPa	0.2	0.7	1.4	2.2	3.1	4.4	5.3	6.3	7.3	7.3	
Water pressure drop with 3-port valve	kPa	0.6	1.7	3.4	5.6	8.1	11.6	14.4	17.1	19.9	19.9	
Water pressure drop with 2-port valve	kPa	0.7	2.1	4.0	6.7	9.6	13.9	17.1	20.4	23.8	23.8	

○ The air inlet conditions are in compliance with Eurovent standards.

# HEATING & COOLING CC<sub>2</sub> 60 EC BASIC DATA

## CC<sub>2</sub> 60

Electrical supply	V/ph/Hz	230/1/50										
Max. input current	A	1.2										
Max. fan power	W	155										
Speed		1	2	3	4	5	6	7	8	9	10	
Voltage	v	230	230	230	230	230	230	230	230	230	230	
Air volume	m <sup>3</sup> /h	28	54	81	107	134	158	191	214	243	263	
Air volume	l/s	100	200	290	390	480	570	690	770	870	950	
Sound pressure level at 5m	dB(A)	-	18.7	28.4	35.9	41.2	45.9	49.3	52.3	54.8	56.5	

## CC<sub>2</sub> 60-H1C2 - HEATING

Air inlet temperature	°C	18										
Weight	kg	32										
Water range	°C	80/60										
Speed		1	2	3	4	5	6	7	8	9	10	
Air volume	m <sup>3</sup> /h	100	200	290	390	480	570	690	770	870	950	
Air volume	l/s	28	54	81	107	134	158	191	214	243	263	
Heating capacity	kW	1.2	1.9	2.5	3	3.5	3.9	4.4	4.7	5.1	5.4	
Discharge air temperature	°C	52	46	43	41	39	38	37	36	35	35	
Water flow rate	l/h	50	85	110	135	155	170	195	210	225	235	
Water flow rate	l/s	0.01	0.02	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07	
Water pressure drop	kPa	0.1	0.3	0.5	0.7	0.9	1.0	1.3	1.5	1.7	1.9	
Water pressure drop with 3-port valve	kPa	0.2	0.5	0.9	1.3	1.8	2.2	2.7	3.2	3.7	4.0	
Water pressure drop with 2-port valve	kPa	0.4	1.0	1.7	2.4	3.2	4.0	5.0	5.8	6.7	7.4	

## CC<sub>2</sub> 60-H1C2 - COOLING

Air inlet conditions	°C/%	27/48										
Weight	kg	32										
Water range	°C/%	6/12										
Speed		1	2	3	4	5	6	7	8	9	10	
Air volume	m <sup>3</sup> /h	100	200	290	390	480	570	690	770	870	950	
Total cooling capacity	kW	0.9	1.6	2.1	2.6	3.1	3.5	3.9	4.2	4.6	4.8	
Sensible cooling capacity	kW	0.6	1.1	1.5	1.9	2.2	2.5	2.9	3.2	3.5	3.7	
Discharge air temperature	°C	9	10	11	12	13	14	14	15	15	15	
Condensate	l/h	0.4	0.7	0.9	1.1	1.2	1.4	1.5	1.5	1.6	1.6	
Water flow rate	l/h	130	225	305	375	440	495	560	605	655	685	
Water pressure drop	kPa	0.7	1.8	3.2	4.6	6.2	7.6	9.5	10.9	12.6	13.7	
Water pressure drop with 3-port valve	kPa	0.9	2.6	4.6	6.9	9.3	11.5	14.6	16.8	19.4	21.3	
Water pressure drop with 2-port valve	kPa	0.9	2.6	4.6	6.9	9.3	11.5	14.6	16.8	19.4	21.3	

- The air inlet conditions are in compliance with Eurovent standards.
- The air discharge temperature of units with modulating control is limited to 50°C.

# HEATING & COOLING CC<sub>2</sub> 90 EC BASIC DATA

## CC<sub>2</sub> 90

Electrical supply	V/ph/Hz	230/1/50										
Max. Input current	A	1.4										
Max. Fan power	W	168										
Speed		1	2	3	4	5	6	7	8	9	10	
Voltage	v	238	238	238	240	239	240	239	238	238	239	
Air volume	m <sup>3</sup> /h	160	300	450	610	770	980	1130	1270	1410	1410	
Air volume	l/s	43	84	124	170	214	271	313	352	392	392	
Sound pressure level at 5m	dB(A)	-	18.8	26.8	34.3	39.8	44.9	49.3	52.4	55.1	55.1	

## CC<sub>2</sub> 90-H1C2 - HEATING

Air inlet temperature	°C	18										
Weight	kg	53										
Water range	°C	80/60										
Speed		1	2	3	4	5	6	7	8	9	10	
Air volume	m <sup>3</sup> /h	100	200	290	390	480	570	690	770	870	950	
Air volume	l/s	43	84	124	170	214	271	313	352	392	392	
Heating capacity	kW	1.1	1.8	2.4	2.9	3.3	3.7	4.2	4.5	4.9	5.1	
Discharge air temperature	°C	52	47	44	42	41	39	38	37	37	36	
Water flow rate	l/h	50	80	105	125	145	165	185	200	215	225	
Water flow rate	l/s	0.01	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.06	0.06	
Water pressure drop	kPa	0.1	0.3	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.7	
Water pressure drop with 3-port valve	kPa	0.2	0.5	0.8	1.2	1.6	2.0	2.5	2.9	3.3	3.7	
Water pressure drop with 2-port valve	kPa	0.3	0.9	1.5	2.2	2.9	3.6	4.6	5.3	6.1	6.8	

## CC<sub>2</sub> 90-H1C2 - COOLING

Air inlet temperature	°C/%	27/48										
Weight	kg	53										
Water range	°C/%	6/12										
Speed		1	2	3	4	5	6	7	8	9	10	
Air volume	m <sup>3</sup> /h	160	300	450	610	770	980	1130	1270	1410	1410	
Total cooling capacity	kW	1.4	2.5	3.5	4.5	5.3	6.3	6.9	7.5	8.1	8.1	
Sensible cooling capacity	kW	1.0	1.7	2.4	3.1	3.7	4.5	5.0	5.5	5.9	5.9	
Discharge air temperature	°C	8	10	11	12	12	13	13	14	14	14	
Condensate	l/h	0.7	1.2	1.6	1.9	2.2	2.6	2.8	2.9	3.1	3.1	
Water flow rate	l/s	205	360	500	640	760	900	990	1075	1155	1155	
Water pressure drop	kPa	0.5	1.3	2.4	3.7	5.1	6.9	8.3	9.6	11.0	11.0	
Water pressure drop with 3-port valve	kPa	0.7	2.1	3.9	6.2	8.7	12.0	14.4	16.8	19.3	19.3	
Water pressure drop with 2-port valve	kPa	0.8	2.4	4.4	7.0	9.8	13.5	16.3	19.0	21.8	21.8	

- The air inlet conditions are in compliance with Eurovent standards.



## HEATING & COOLING CC<sub>2</sub> 60V EC BASIC DATA

### CC<sub>2</sub> 60V EC

Electrical supply	V/ph/Hz	230/1/50									
Max. input current	A	0.91									
Max. fan power	W	135									
Speed		1	2	3	4	5	6	7	8	9	10
Air volume	m <sup>3</sup> /h	80	181	279	390	499	592	688	781	873	926
Air volume	l/s	22	50	77	108	138	164	191	216	242	257
Sound pressure level at 5m	dB(A)	-	17.4	26.9	34.6	40.6	45.8	49.5	53.0	55.4	56.8

## HEATING & COOLING CC<sub>2</sub> 90V EC BASIC DATA

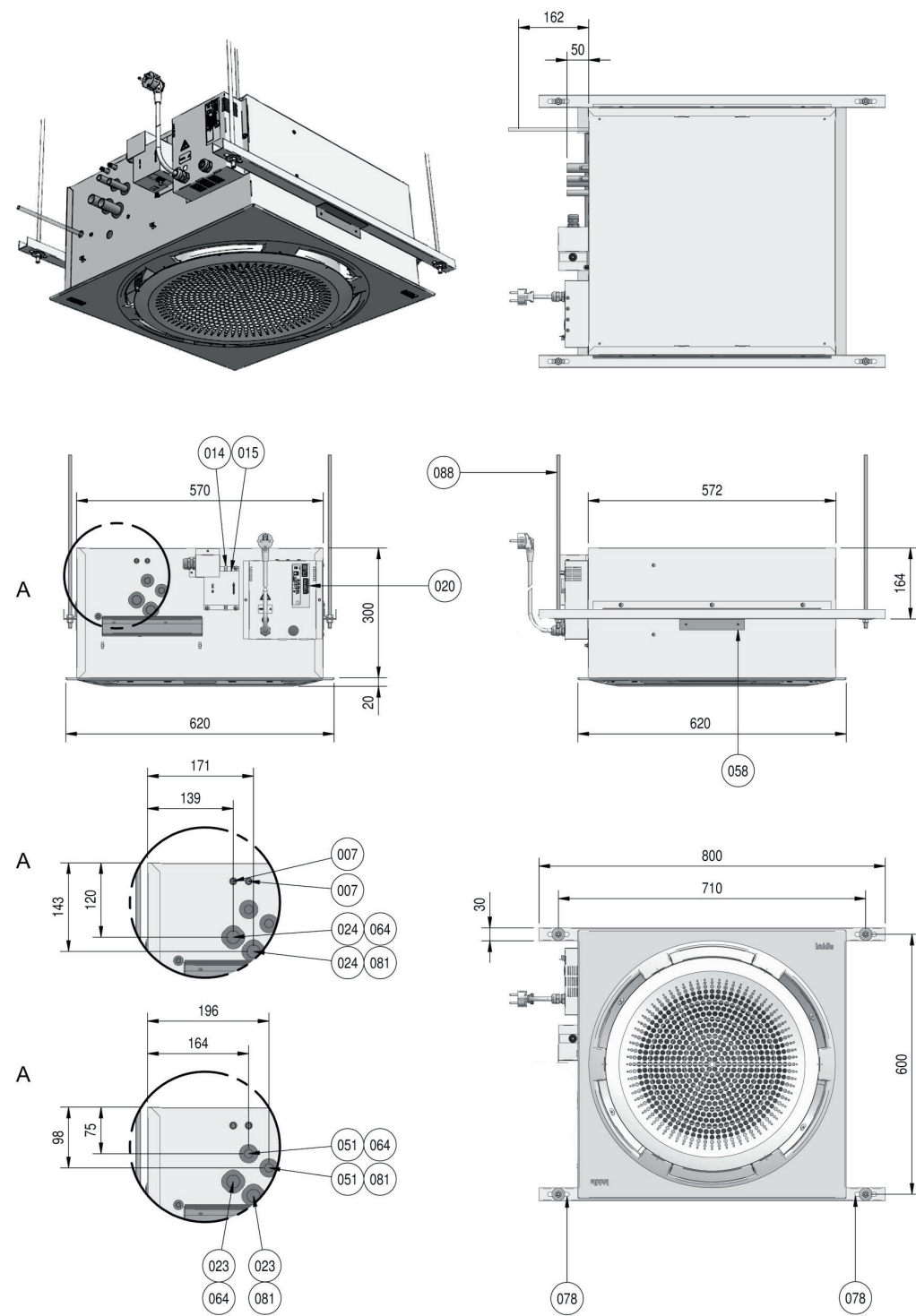
### CC<sub>2</sub> 90V EC

Electrical supply	V/ph/Hz	230/1/50									
Max. input current	A	1.2									
Max. fan power	W	155									
Speed		1	2	3	4	5	6	7	8	9	10
Air volume	m <sup>3</sup> /h	N/A	313	483	604	745	951	1103	1264	1383	1468
Air volume	l/s	N/A	87	134	168	207	264	306	351	384	408
Sound pressure level at 5m	dB(A)	-	14.9	25.0	32.3	38.4	43.6	47.7	51.0	53.3	54.8





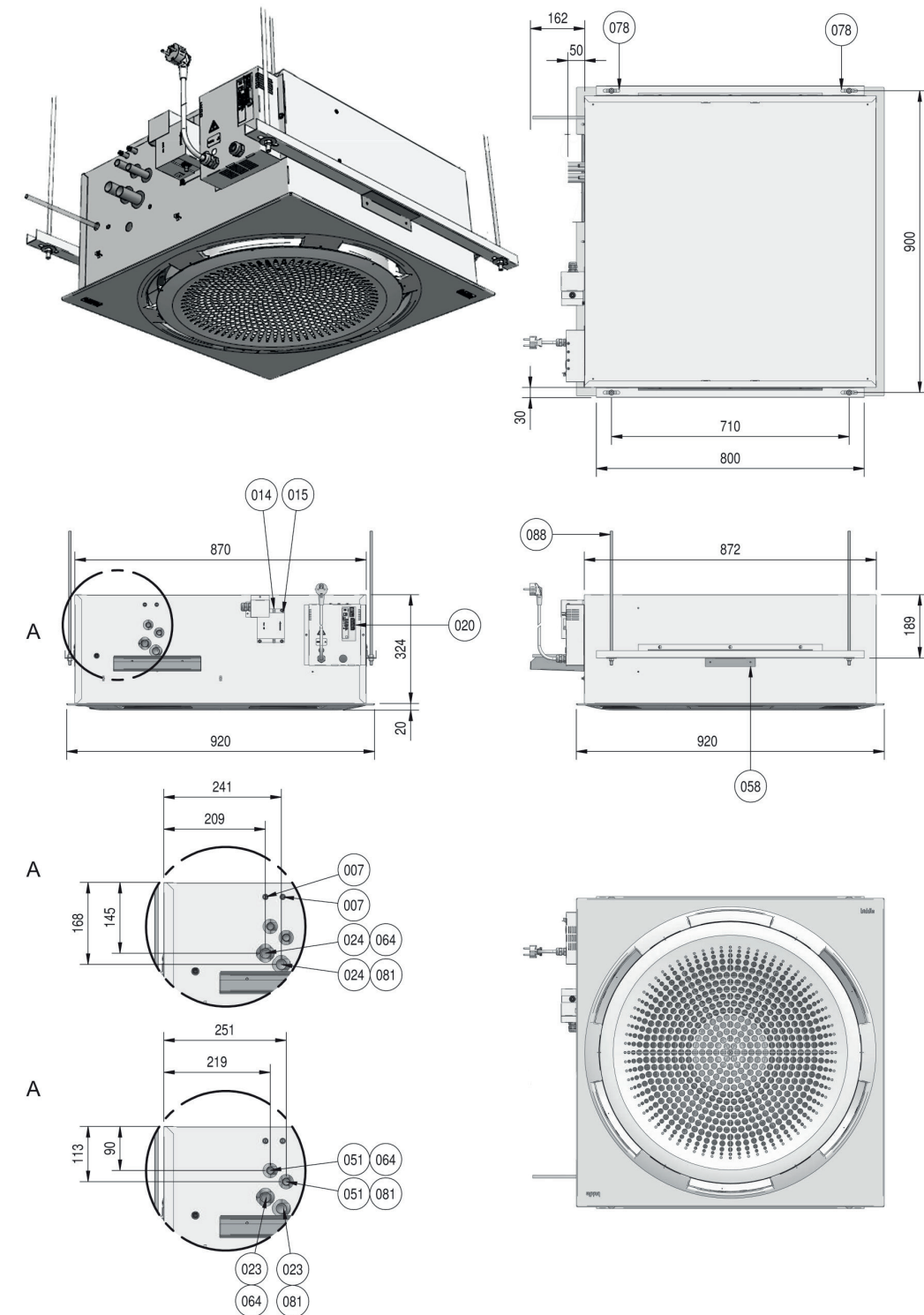
# CC<sub>2</sub> 60 EC DRAWING



**INDEX**  
The corresponding numbers in the dimensional sketches are explained here: **7**-Air vent. **14**-Condensate discharge (only for cooling). **15**-Condensation pump (only for cooling). **20**-Connection plate. **23**-Cooling for 4-pipes H1C3. **24**-Cooling or heating for 2-pipes. **51**-Heating for 4-pipes H1C3. **58**-Locking. **64**-Return. **78**-Slotted holes. **81**-Supply. **88**-Threaded rods (M8) are not supplied as a standard.

**EXPLANATION DIMENSIONAL SKETCHES**  
 ○ All dimensions in mm  
 ○ A = detail water connections  
 The diameter of the pipework connections for coil type H1 is DN 15 (15 mm).  
 For coil types H2, H3, C2 and C3 this is DN 20 (22 mm).

# CC<sub>2</sub> 90 EC DRAWING

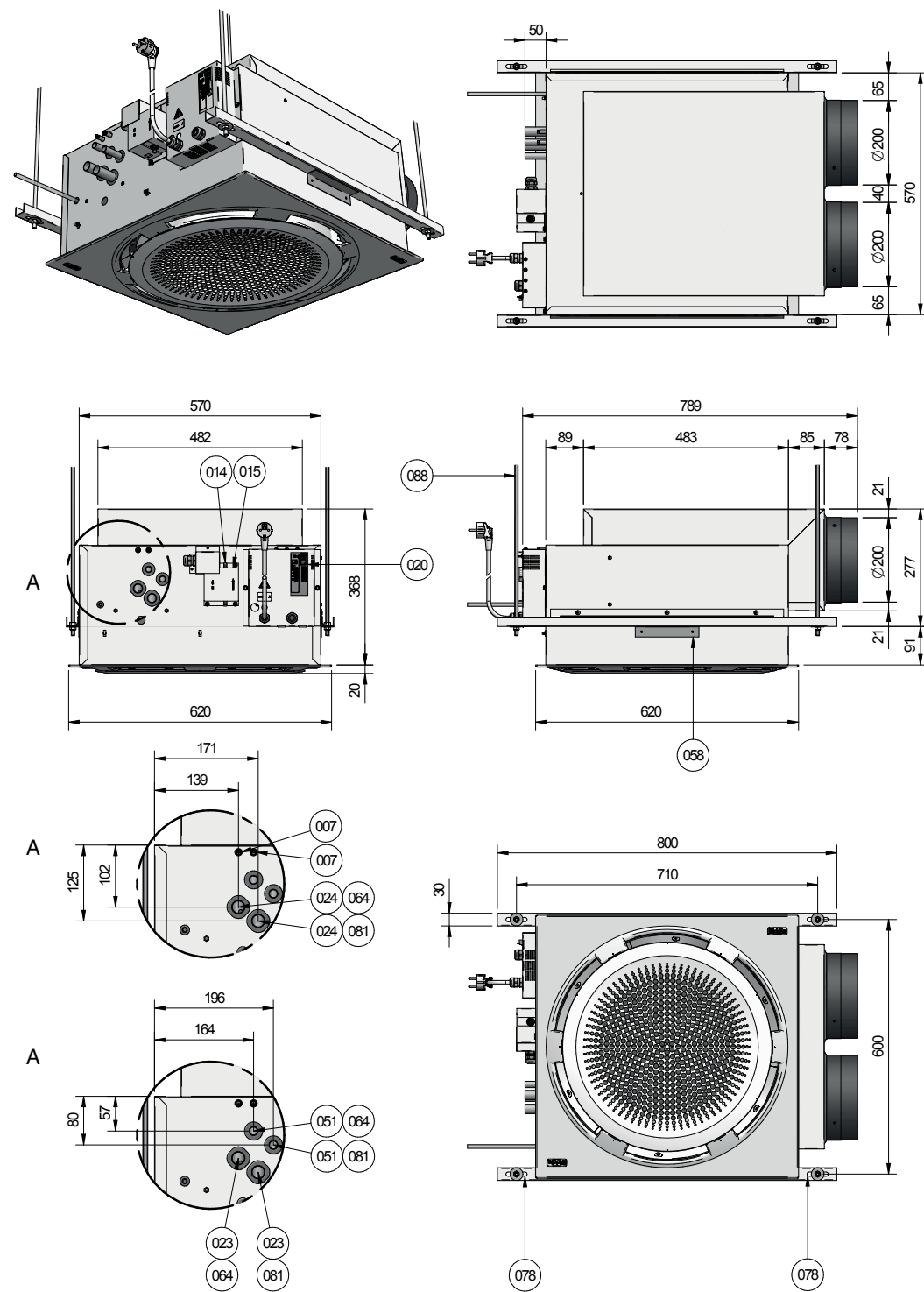


**INDEX**  
The corresponding numbers in the dimensional sketches are explained here: **7**-Air vent. **14**-Condensate discharge (only for cooling). **15**-Condensation pump (only for cooling). **20**-Connection plate. **23**-Cooling for 4-pipes H1C3. **24**-Cooling or heating for 2-pipes. **51**-Heating for 4-pipes H1C3. **58**-Locking. **64**-Return. **78**-Slotted holes. **81**-Supply. **88**-Threaded rods (M8) are not supplied as a standard.

**EXPLANATION DIMENSIONAL SKETCHES**  
 ○ All dimensions in mm  
 ○ A = detail water connections  
 The diameter of the pipework connections for coil type H1 is DN 15 (15 mm).  
 For coil types H2, H3, C2 and C3 this is DN 20 (22 mm).



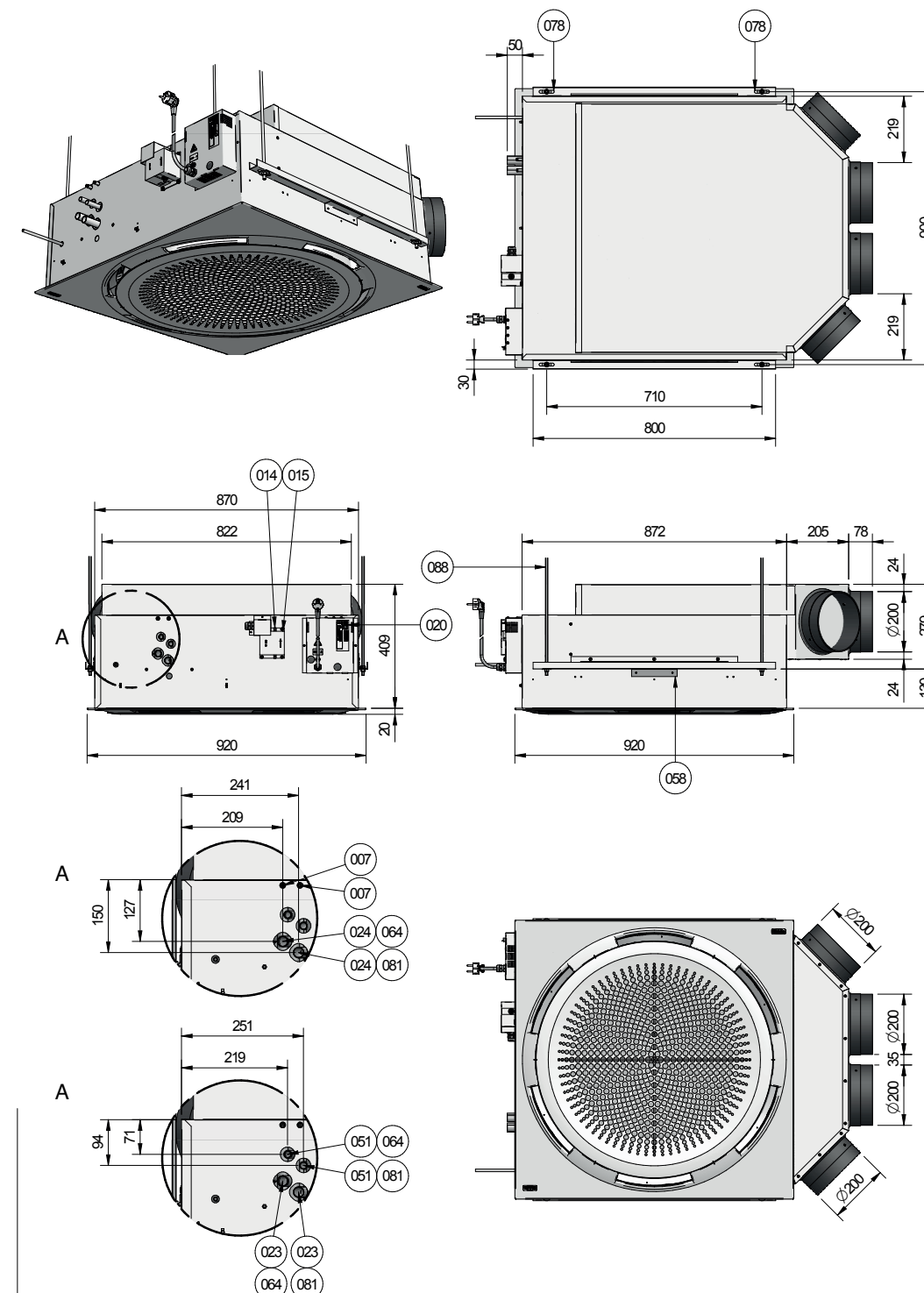
# CC<sub>2</sub> 60 V DRAWING



**INDEX**  
The corresponding numbers in the dimensional sketches are explained here: **7**-Air vent. **14**-Condensate discharge (only for cooling). **15**-Condensation pump (only for cooling). **20**-Connection plate. **23**-Cooling for 4-pipes H1C3. **24**-Cooling or heating for 2-pipes. **51**-Heating for 4-pipes H1C3. **58**-Locking. **64**-Return. **78**-Slotted holes. **81**-Supply. **88**-Threaded rods.

**EXPLANATION DIMENSIONAL SKETCHES**  
 ○ All dimensions in mm  
 ○ A = detail water connections  
 The diameter of the pipework connections for coil type H1 is DN 15 (15 mm).  
 For coil types H2, H3, C2 and C3 this is DN 20 (22 mm).

# CC<sub>2</sub> 90 V DRAWING



**INDEX**  
The corresponding numbers in the dimensional sketches are explained here: **7**-Air vent. **14**-Condensate discharge (only for cooling). **15**-Condensation pump (only for cooling). **20**-Connection plate. **23**-Cooling for 4-pipes H1C3. **24**-Cooling or heating for 2-pipes. **51**-Heating for 4-pipes H1C3. **58**-Locking. **64**-Return. **78**-Slotted holes. **81**-Supply. **88**-Threaded rods.

**EXPLANATION DIMENSIONAL SKETCHES**  
 ○ All dimensions in mm  
 ○ A = detail water connections  
 The diameter of the pipework connections for coil type H1 is DN 15 (15 mm).  
 For coil types H2, H3, C2 and C3 this is DN 20 (22 mm).

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Every effort has been made to ensure descriptions are correct at the time of print.  
Errors and omissions excepted. COMFORTCIRCLE\_V3|12|2022