

air2air

With Heat Recovery

Biddle



PROVEN TECHNOLOGY

In recent years, commercial buildings of all types have become increasingly well insulated to maximise energy efficiency. This makes them more cost effective to heat and run. However, it can have a negative effect on the indoor air quality. Good ventilation is essential to prevent this, but if it is not carefully controlled, it can lead to heat loss and increased energy consumption. Biddle's proven ventilation system with heat recovery pre-heats clean, fresh air as it enters the building using the energy/warmth from the air that is vented out. As a result, it is not only highly energy efficient, but also very cost effective.

BUILT TO THE HIGHEST STANDARDS



Fully compliant with the latest UK and European legislation, the Biddle system can reduce CO2 emissions associated with heating and ventilation by more than 90%. When used in conjunction with a renewable heat source, such as a heat pump, our products also cut energy generated from fossil fuels to zero, even during periods of peak demand.

FULL SCALE DESIGN SERVICE

Our business is all about collaboration. We work in partnership with leading specialists to optimise the efficiency of our systems. We work closely with your design team to create a best practice solution, that will meet the exact requirements of your project. And, we work side-by-side with your installers, providing professional training and customised products, plus expert support at every stage of the installation process, where it is needed. Our full-scale design service includes everything from calculations, master planning and templates, to project management and ongoing continuous improvement.

EFFICIENT HEAT RECOVERY



APPLICATIONS

Suitable for all types of commercial buildings, Biddle's heat recovery technology has been proven at hundreds of sites throughout Europe. From supermarkets, hypermarkets, department stores and DIY outlets, to hotels, schools, restaurants, sports halls, logistic centres and warehouses.

HOW IT WORKS

The Biddle unit improves air quality and reduces energy consumption using counterflow heat recovery technology. Waste heat is extracted from warm, polluted air as it leaves the building and transferred to cool fresh air as it flows in. The unit can work in isolation or in combination with the Building Management System Controller, or BMS system on site to automatically adjust the fan speed to maintain optimum air quality, based on data from CO₂ sensors located within the building. With an air-to-air heat exchanger recovery efficiency rates of up to 90% can be achieved.



COMPLETE CLIMATE CONCEPT

Four models are available, the air2airHR12 (1200m³/h), HR25 (2500m³/h), HR35 (3500m³/h) and the HR45 (4500m³/h). All these units can be used as a standalone solution in conjunction with a duct system in the building, or as part of a complete Biddle climate system together with:

- ◉ The NOZ Range of energy-efficient air heater & coolers, which provide comfort in large rooms with high ceilings
- ◉ Comfort Circle Cassettes, which combine heating, cooling & ventilation in one ceiling unit are ideal where a false ceiling is in place
- ◉ The Biddle range of air curtains and fan coils

NOZ₂



Comfort Circle Cassettes



SR Comfort





COMPACT, MODULAR DESIGN

The modular design of Biddle's air2air units make them a fitting solution for all types of application. No matter how limited the space, you are assured of maximum performance.

FEATURES AND BENEFITS

- Fits into very compact spaces
- Can be recessed or fitted below the ceiling
- High-performance stepless EC fans
- Low installation height (minimum 2.7m to underside of unit)
- Easy to clean and replace components
- Plug & play site wiring
- Easy to install

OPERATING MODES AVAILABLE*

The air2air HR12, 25, 35 and 45 units have a number of operating modes available:



FULL HEAT RECOVERY

Warm, polluted air is drawn through the system to be exhausted to the outside and cold, fresh air is distributed throughout the building.

Heat from the outgoing air is transferred to the incoming air, saving energy and CO2.

A constant temperature is maintained with the HC6 heating and cooling module.



SMOKE EXTRACTION

In the event of a fire, the unit will extract smoke for a limited period***



FREE COOLING

Cool fresh air from the outside is drawn into the building, bypassing the heat exchanger to cool the building.



RECIRCULATION

When CO2 levels are low and fresh air is not required, air is recirculated rather than extracted.



HEATING & COOLING

Heating and cooling available, based on room temperature or supply temperature control.



NIGHT COOLING

During periods of hot weather, cool fresh air from outside is drawn into the building at night reducing the temperature for the next day.



AUTOMATIC MODE**

The units use the temperature and CO2 inputs to determine the operating mode. Additionally, the units can be programmed remotely, allowing users to regulate the available modes such as heating/cooling, recirculation, free cooling, heat recovery, etc.



CO2 CONTROL**

Heat recovery is controlled by the CO2 level measured in the extract air. When the level is high, the unit will run at high speed. The speed will then be automatically adjusted as the CO2 level falls.

*Operating modes depend on the model **Accessories *** This is not its designed use and prolonged use with smoke may cause irreparable damage to the unit.

MAINTENANCE AND CLEANING

Biddle units are easy to maintain with access from the side, or the bottom of the unit.

CONTROL FEATURES

B-TOUCH



The user-friendly b-touch control panel can be used to switch the unit on and off, adjust the room temperature and change situation specific settings. air2air units feature built-in intelligence, which means they can also function without the b-touch control. When this is the case, the control panel is only required for servicing purposes.

KEY FEATURES:

- Manual and auto mode
- Programmable timer
- Touchscreen control
- Status display
- Multi-language navigation menu (11 languages)
- Screen security with personal PIN code
- Personalised branding

○ ANALYSIS TOOL

The b-touch's built-in USB port allows users to import and export settings, carry out software updates and export unit specific data for performance monitoring.

○ MODBUS

The automatically regulated Heat Recovery can communicate using the Modbus protocol for remote control with a BMS system. The Modbus and the b-touch can also be used in parallel, allowing local control and remote control to take place at the same time.

○ SYSTEM CONTROL

A single b-touch can be used to manage your air2air system, allowing you to control the Heat Recovery alongside the heating and cooling of the space.

air2air

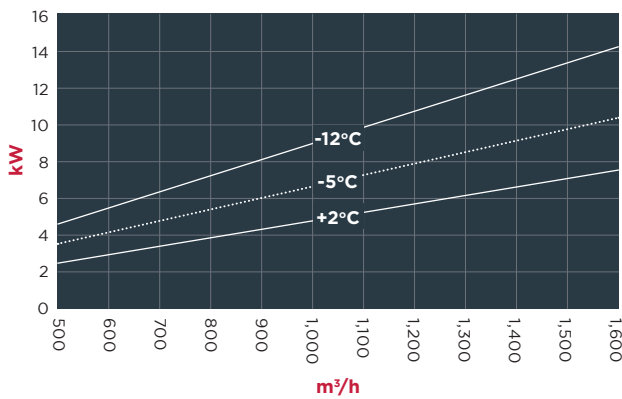
Technical Details



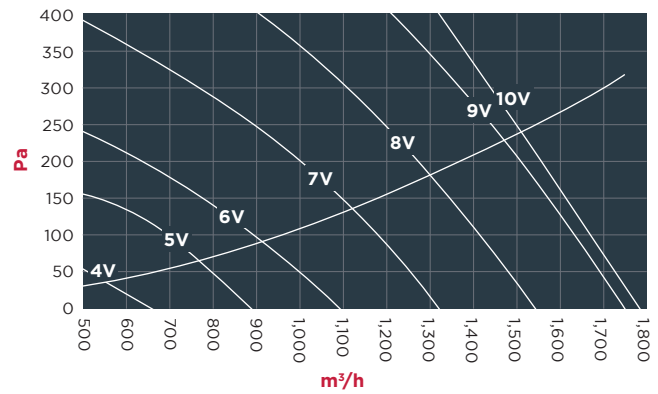
SAVINGS AND EFFICIENCY

The air2airHR12 contains two energy saving EC fans – a Supply fan and an Extract fan. You can see the airflow performance of the fans below. The airflow performance is a combination of air volume (m³/h) and external pressure (Pa). Using these graphs you can select the control voltages of the fans for the units.

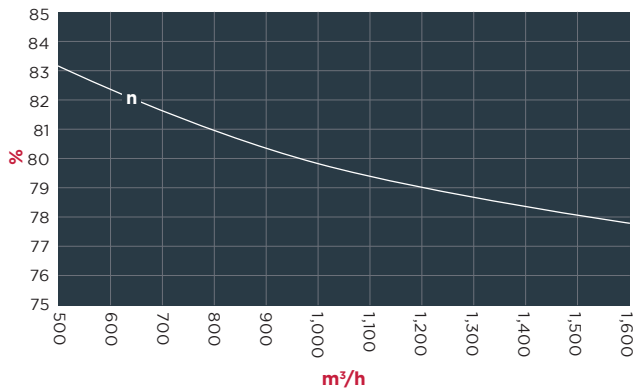
HEAT RECOVERY OUTPUT



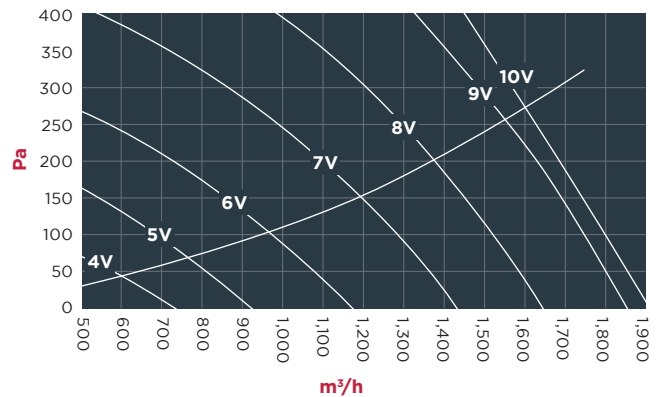
SUPPLY FAN



HEAT RECOVERY EFFICIENCY - DIN EN13053 EUROVENT CERTIFIED



EXTRACT FAN



m³/h: Air volume kW: Heat energy saving %: Efficiency Pa: External pressure.

CALCULATION BASIS

Air volume:
1200 m³/h
External static pressure:
150 Pa
Outside temperature:
-12 °C

RESULTS

Fan speed:
7V (supply)
7.5V (extract fan)
Heat recovery savings:
10.5 kW
Heat recovery efficiency:
79%

| | | | |
|---|------------|-----|------|
| Electrical supply (V) | 230 | | |
| Maximum input current (A) | 4.55 | | |
| Maximum fan power (kW) | 1.05 | | |
| Weight & size | | | |
| Extract fan section (kg) | - | | |
| Supply fan section (kg) | - | | |
| Heat exchanger section (kg) | - | | |
| Total (kg) | 215 | | |
| Size (mm) | 2371 x 968 | | |
| Height (mm) | 480 | | |
| Filter | | | |
| Fresh air filter | F7 | | |
| Extract air filter | M5 | | |
| Speed | | | |
| | 1 | 2 | 3 |
| Supply air volume (m ³ /h) | 780 | 970 | 1200 |
| Extract air volume (m ³ /h) | 780 | 970 | 1200 |
| Sound pressure level at 1m (dB(A)) | 41 | 47 | 49 |
| Efficiency (%) | 81 | 80 | 79 |
| External air pressure loss (supply) (Pa) | 65 | 100 | 150 |
| Operating modes | | | |
| Heat recovery | * | * | * |
| Recirculation | | | |
| Night cooling | | * | |
| Free cooling | | * | * |
| Heating/cooling with room temperature control | | | |
| Heating/cooling with supply air temperature control | | | |
| Automatic mode | * | * | * |
| Smoke extraction | | | * |

MAXIMUM IN-DUCT SOUND POWER LEVELS

| Heating/cooling | Per octave band in the medium frequency, in dB (Hz) | | | | | | | | L _W |
|------------------------|---|------|------|------|------|------|------|------|----------------|
| | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | |
| Supply air to room | 73.8 | 74.8 | 81.3 | 62.4 | 65.3 | 65.1 | 56.8 | 49.9 | 74.5 |
| Extract air from room | 69.9 | 63.3 | 72 | 52 | 49.5 | 43.1 | 36.4 | 25.4 | 64 |
| Exhaust air to outside | 73.8 | 74.8 | 81.3 | 62.4 | 65.3 | 65.1 | 56.8 | 49.9 | 74.5 |
| Fresh air from outside | 69.9 | 63.3 | 72 | 52 | 49.5 | 43.1 | 36.4 | 25.4 | 64 |

- Sound power level dB(A) (L_W re. 10⁻¹²W) • Supply fan operating at 1200m³/h at 300Pa external static pressure.
- Extract fan operating at 1200m³/h at 150Pa external static pressure

CASING SOUND POWER LEVEL (L_{WA} RE. 10⁻¹² W)

| Speed | |
|-----------------------------|----|
| 10V DC (high speed) (dB(A)) | 61 |
| 8V DC (dB(A)) | 59 |
| 6V DC (dB(A)) | 55 |
| 5V DC (dB(A)) | 49 |

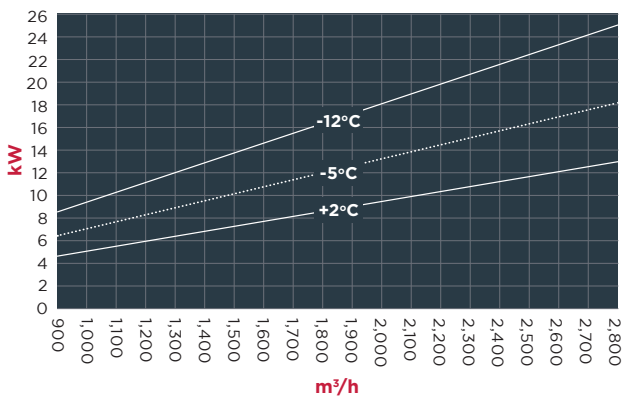
SOUND PRESSURE LEVEL FOR A TYPICAL ROOM (L_{PA} RE. 2 X 10⁻⁵ N/M²)

| Speed | |
|-----------------------------|----|
| 10V DC (high speed) (dB(A)) | 53 |
| 8V DC (dB(A)) | 51 |
| 6V DC (dB(A)) | 47 |
| 5V DC (dB(A)) | 41 |

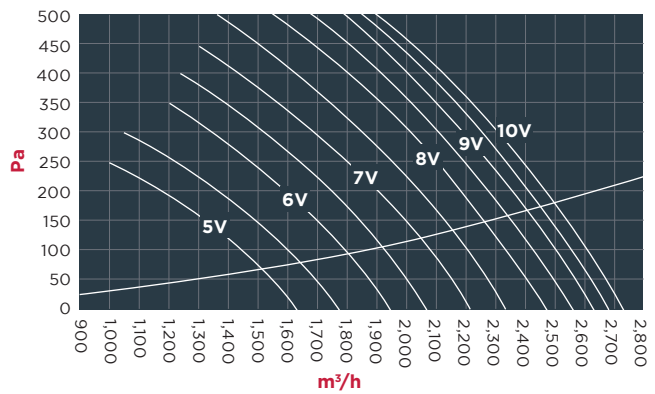
SAVINGS AND EFFICIENCY

The air2airHR25 contains two energy saving EC fans - a Supply fan and an Extract fan. You can see the airflow performance of the fans below. The airflow performance is a combination of air volume (m³/h) and external pressure (Pa). Using these graphs you can select the control voltages of the fans for the units.

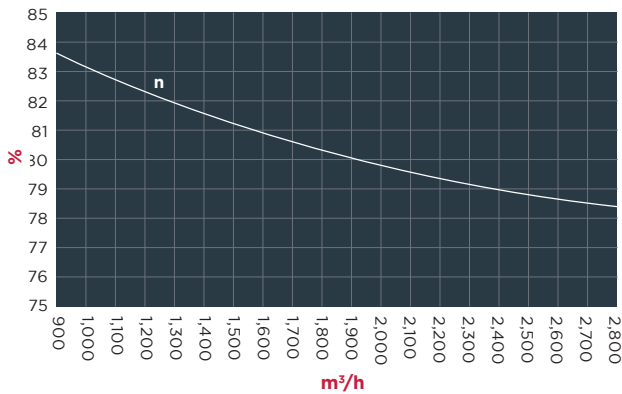
HEAT RECOVERY OUTPUT



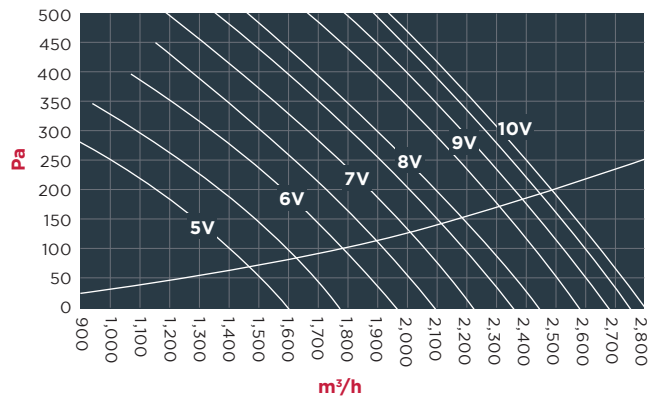
SUPPLY FAN



HEAT RECOVERY EFFICIENCY - DIN EN13053 EUROVENT CERTIFIED



EXTRACT FAN



m³/h: Air volume kW: Heat energy saving %: Efficiency Pa: External pressure.

CALCULATION BASIS

Air volume:
2500 m³/h
External static pressure:
200 Pa
Outside temperature:
-12 °C

RESULTS

Fan speed:
10V (supply)
10V (extract fan)
Heat recovery savings:
22.5 kW
Heat recovery efficiency:
78.8%

| | | | |
|---|-------------|------|------|
| Electrical supply (V) | 230 | | |
| Maximum input current (A) | 6.8 | | |
| Maximum fan power (kW) | 1.56 | | |
| Weight & size | | | |
| Extract fan section (kg) | 53 | | |
| Supply fan section (kg) | 43 | | |
| Heat exchanger section (kg) | 216 | | |
| Fresh air filter (kg) | 46 | | |
| Extract air filter (kg) | 39 | | |
| Recirculation damper (kg) | 52 | | |
| Total (kg) | 449 | | |
| Size (mm) | 3211 x 1558 | | |
| Height (mm) | 544 | | |
| Filter | | | |
| Fresh air filter | F7 | | |
| Extract air filter | M5 | | |
| Speed | | | |
| | 1 | 2 | 3 |
| Supply air volume (m ³ /h) | 1795 | 2190 | 2500 |
| Extract air volume (m ³ /h) | 1810 | 2280 | 2500 |
| Sound pressure level at 1m (dB(A)) | 55 | 60 | 66 |
| Efficiency (%) | 80.3 | 79.4 | 78.8 |
| External Air pressure loss (supply) (Pa) | 100 | 150 | 200 |
| Operating modes | | | |
| Heat recovery | * | * | * |
| Recirculation | * | * | * |
| Night cooling | | * | |
| Free cooling | | * | * |
| Heating/cooling with room temperature control | * | * | * |
| Heating/cooling with supply air temperature control | * | * | * |
| Automatic mode | * | * | * |
| Smoke extraction | | | * |

MAXIMUM IN-DUCT SOUND POWER LEVELS

| Heating/cooling | Per octave band in the medium frequency, in dB (Hz) | | | | | | | | L _W |
|------------------------|---|------|------|------|------|------|------|------|----------------|
| | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | |
| Supply air to room | 69.8 | 65.6 | 76.4 | 75.1 | 78.8 | 80.4 | 78.5 | 74.1 | 85.5 |
| Extract air from room | 65.7 | 60.5 | 70.6 | 69.9 | 67.4 | 70.8 | 70.9 | 66.7 | 76.6 |
| Exhaust air to outside | 69.8 | 65.6 | 76.4 | 75.1 | 78.8 | 80.4 | 78.5 | 74.1 | 85.5 |
| Fresh air from outside | 65.7 | 60.5 | 70.6 | 69.9 | 67.4 | 70.8 | 70.9 | 66.7 | 76.6 |

- Sound power level dB(A) (L_W re. 10⁻¹²W) • Supply fan operating at 2500m³/h at 300Pa external static pressure.
- Extract fan operating at 2500m³/h at 150Pa external static pressure

CASING SOUND POWER LEVEL (L_{WA} RE. 10⁻¹² W)

| Speed | |
|-----------------------------|----|
| 10V DC (high speed) (dB(A)) | 74 |
| 8V DC (dB(A)) | 68 |
| 6V DC (dB(A)) | 63 |
| 5V DC (dB(A)) | 58 |

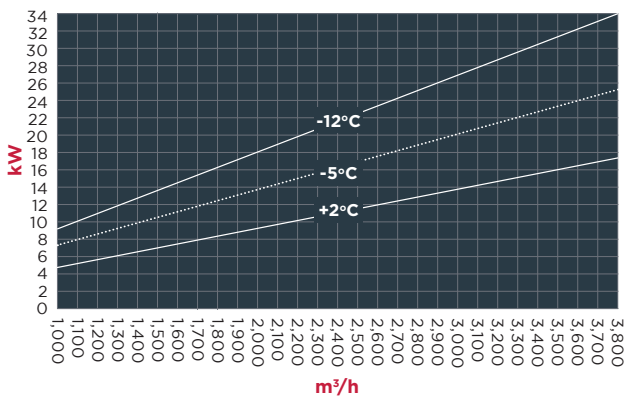
SOUND PRESSURE LEVEL FOR A TYPICAL ROOM (L_{PA} RE. 2 X 10⁻⁵ N/M²)

| Speed | |
|-----------------------------|----|
| 10V DC (high speed) (dB(A)) | 66 |
| 8V DC (dB(A)) | 60 |
| 6V DC (dB(A)) | 55 |
| 5V DC (dB(A)) | 50 |

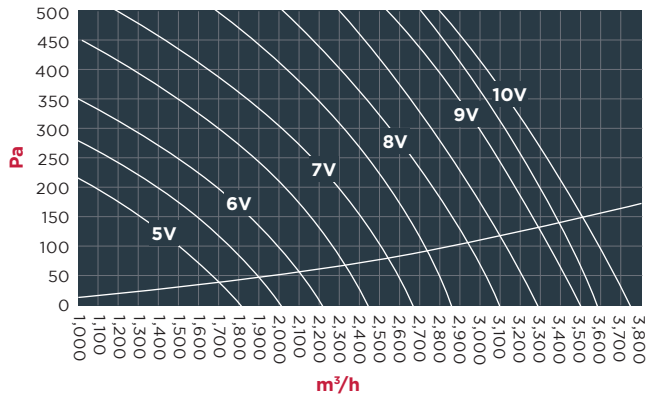
SAVINGS AND EFFICIENCY

The air2airHR35 contains two energy saving EC fans – a Supply fan and an Extract fan. You can see the airflow performance of the fans below. The airflow performance is a combination of air volume (m³/h) and external pressure (Pa). Using these graphs you can select the control voltages of the fans for the units.

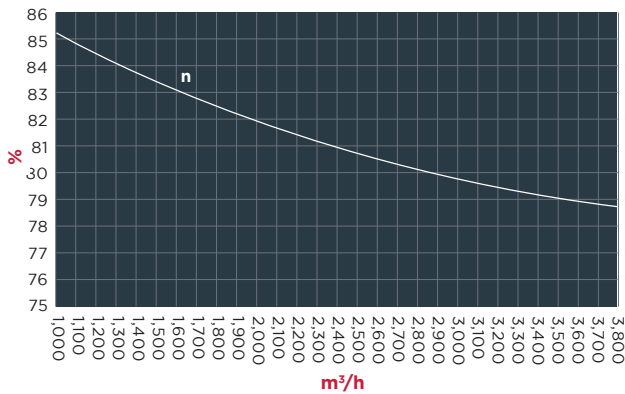
HEAT RECOVERY OUTPUT



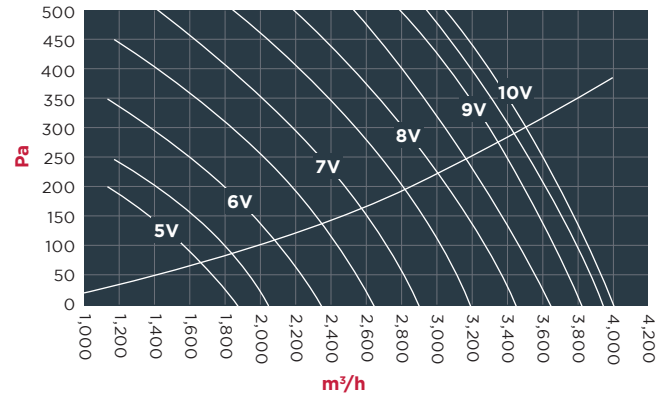
SUPPLY FAN



HEAT RECOVERY EFFICIENCY - DIN EN13053 EUROVENT CERTIFIED



EXTRACT FAN



m³/h: Air volume kW: Heat energy saving %: Efficiency Pa: External pressure.

CALCULATION BASIS

Air volume:
3500 m³/h
External static pressure:
300 Pa
Outside temperature:
-12 °C

RESULTS

Fan speed:
10V (supply)
10V (extract fan)
Heat recovery savings:
31 kW
Heat recovery efficiency:
79.2%

| | | | |
|---|-------------|------|------|
| Electrical supply (V) | 230 | | |
| Maximum input current (A) | 11.2 | | |
| Maximum fan power (kW) | 2.64 | | |
| Weight & size | | | |
| Extract fan section (kg) | 70 | | |
| Supply fan section (kg) | 62 | | |
| Heat exchanger section (kg) | 287 | | |
| Fresh air filter (kg) | 57 | | |
| Extract air filter (kg) | 48 | | |
| Recirculation damper (kg) | 66 | | |
| Total (kg) | 590 | | |
| Size (mm) | 3211 x 2158 | | |
| Height (mm) | 544 | | |
| Filter | | | |
| Fresh air filter | F7 | | |
| Extract air filter | M5 | | |
| Speed | | | |
| | 1 | 2 | 3 |
| Supply air volume (m ³ /h) | 2110 | 3025 | 3500 |
| Extract air volume (m ³ /h) | 2110 | 2920 | 3500 |
| Sound pressure level at 1m (dB(A)) | 56 | 61 | 66 |
| Efficiency (%) | 81.5 | 79.8 | 79.2 |
| External air pressure loss (supply) (Pa) | 110 | 225 | 300 |
| Operating modes | | | |
| Heat recovery | * | * | * |
| Recirculation | * | * | * |
| Night cooling | | * | |
| Free cooling | | * | * |
| Heating/cooling with room temperature control | * | * | * |
| Heating/cooling with supply air temperature control | * | * | * |
| Automatic mode | * | * | * |
| Smoke extraction | | | * |

MAXIMUM IN-DUCT SOUND POWER LEVELS

| Heating/cooling | Per octave band in the medium frequency, in dB (Hz) | | | | | | | | L _W |
|------------------------|---|------|------|------|------|------|------|------|----------------|
| | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | |
| Supply air to room | 75.8 | 70.7 | 78.6 | 78.4 | 81.3 | 81.2 | 78.3 | 75.4 | 86.6 |
| Extract air from room | 68.6 | 65.8 | 75.5 | 72.3 | 69.2 | 70.2 | 68.2 | 67.2 | 76.7 |
| Exhaust air to outside | 75.8 | 70.7 | 78.6 | 78.4 | 81.3 | 81.2 | 78.3 | 75.4 | 86.6 |
| Fresh air from outside | 68.6 | 65.8 | 75.5 | 72.3 | 69.2 | 70.2 | 68.2 | 67.2 | 76.7 |

- Sound power level dB(A) (L_W re. 10⁻¹²W) • Supply fan operating at 3500m³/h at 300Pa external static pressure.
- Extract fan operating at 3500m³/h at 150Pa external static pressure

CASING SOUND POWER LEVEL (L_{WA} RE. 10⁻¹² W)

| Speed | |
|-----------------------------|----|
| 10V DC (high speed) (dB(A)) | 74 |
| 8V DC (dB(A)) | 69 |
| 6V DC (dB(A)) | 64 |
| 5V DC (dB(A)) | 60 |

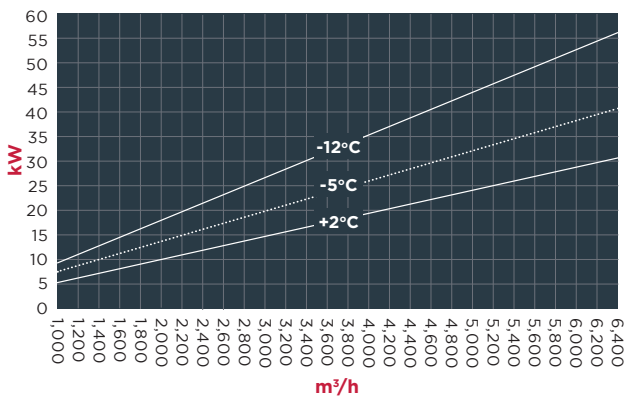
SOUND PRESSURE LEVEL FOR A TYPICAL ROOM (L_{PA} RE. 2 X 10⁻⁵ N/M²)

| Speed | |
|-----------------------------|----|
| 10V DC (high speed) (dB(A)) | 66 |
| 8V DC (dB(A)) | 61 |
| 6V DC (dB(A)) | 56 |
| 5V DC (dB(A)) | 52 |

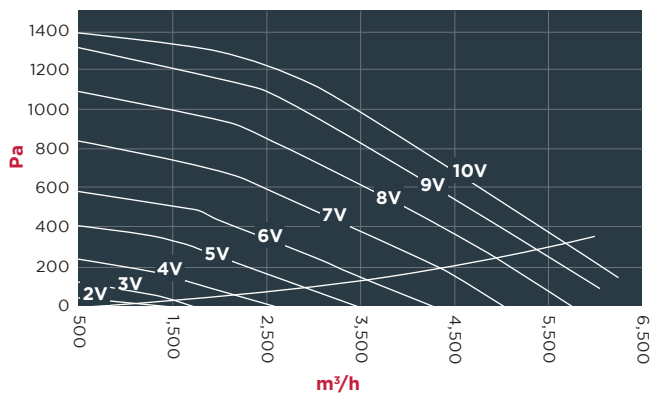
SAVINGS AND EFFICIENCY

The air2airHR45 has four energy-efficient EC fans: Two supply fans and two discharge fans. The graphs below show the airflow capacity of both fans based on a combination of the air volume (m³/h) and the external static pressure (Pa). The energy savings (kW) and efficiency (%) in both illustrations are based on the unit operating in full heat recovery mode.

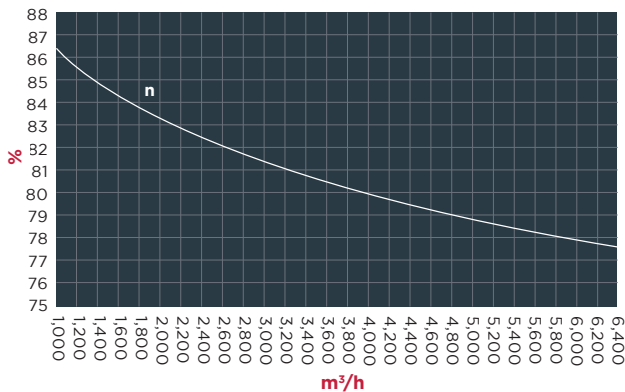
HEAT RECOVERY OUTPUT



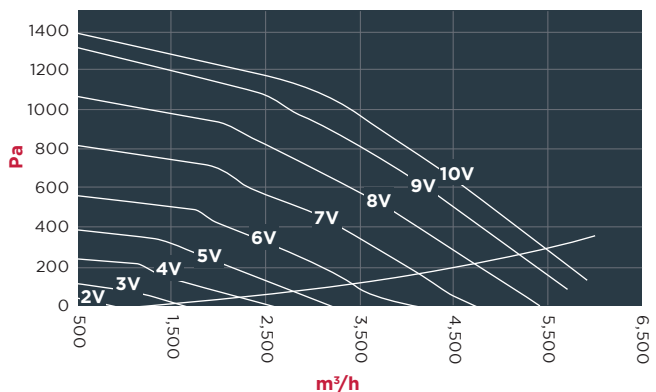
SUPPLY FAN



HEAT RECOVERY EFFICIENCY - DIN EN13053 EUROVENT CERTIFIED



EXTRACT FAN



m³/h: Air volume **kW:** Heat energy saving **%:** Efficiency **Pa:** External pressure.

CALCULATION BASIS

Air volume:
4500 m³/h
External static pressure:
200 Pa
Outside temperature:
-12 °C

RESULTS

Fan speed:
7.6V (supply)
7.2V (extract fan)
Heat recovery savings:
40 kW
Heat recovery efficiency:
79.3%

| | | | |
|---|-------------|------|------|
| Electrical supply (V/ph/Hz) | 230 | | |
| Maximum input current (A) | 31.7 | | |
| Maximum fanpower (kW) | 6.6 | | |
| Weight & size | | | |
| Extract fan section (kg) | 96 | | |
| Supply fan section (kg) | 87 | | |
| Heat exchanger section (kg) | 365 | | |
| Fresh air filter (kg) | 63 | | |
| Extract air filter (kg) | 54 | | |
| Recirculation damper (kg) | 75 | | |
| Total (kg) | 740 | | |
| Size (mm) | 3211 x 2758 | | |
| Height (mm) | 544 | | |
| Filter | | | |
| Fresh air filter | F7 | | |
| Extract air filter | M5 | | |
| Speed | | | |
| | 1 | 2 | 3 |
| Supply air volume (m ³ /h) | 1475 | 2785 | 4500 |
| Extract air volume (m ³ /h) | 1575 | 2950 | 4500 |
| Sound pressure level at 1m (dB(A)) | 40 | 53 | 65 |
| Efficiency (%) | 84.4 | 81.5 | 79.3 |
| External air pressure loss (supply) (Pa) | 22 | 77 | 200 |
| Operating modes | | | |
| Heat recovery | * | * | * |
| Recirculation | * | * | * |
| Night cooling | | * | |
| Free cooling | | * | * |
| Heating/cooling with room temperature control | | | |
| Heating/cooling with supply air temperature control | | | |
| Automatic mode | * | * | * |
| Smoke extraction | | | * |

MAXIMUM IN-DUCT SOUND POWER LEVELS

| Heating/cooling | Per octave band in the medium frequency, in dB (Hz) | | | | | | | | L _W |
|------------------------|---|------|------|------|------|------|------|------|----------------|
| | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | |
| Supply air to room | 71.9 | 74 | 86.7 | 78.8 | 80.3 | 79.8 | 77.5 | 71.5 | 86.2 |
| Extract air from room | 69.1 | 70.3 | 81.8 | 74.1 | 68.7 | 70.1 | 67.8 | 62.8 | 78 |
| Exhaust air to outside | 71.9 | 74 | 86.7 | 78.8 | 80.3 | 79.8 | 77.5 | 71.5 | 86.2 |
| Fresh air from outside | 69.1 | 70.3 | 81.8 | 74.1 | 68.7 | 70.1 | 67.8 | 62.8 | 78 |

- Sound power level dB(A) (L_W re. 10⁻¹²W) • Supply fan operating at 4500m³/h at 300Pa external static pressure.
- Extract fan operating at 4500m³/h at 150Pa external static pressure

CASING SOUND POWER LEVEL (L_{WA} RE. 10⁻¹² W)

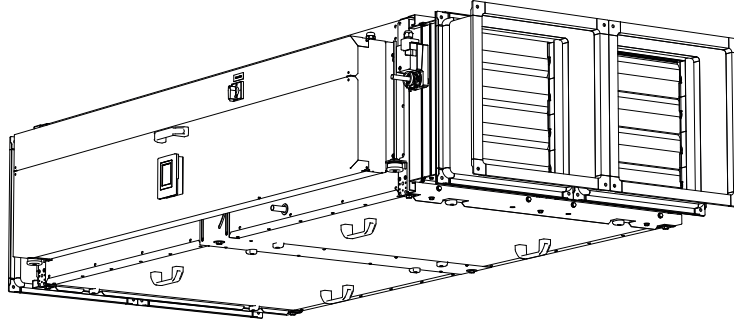
| Speed | |
|-----------------------------|----|
| 10V DC (high speed) (dB(A)) | 78 |
| 8V DC (dB(A)) | 75 |
| 6V DC (dB(A)) | 68 |
| 5V DC (dB(A)) | 62 |

SOUND PRESSURE LEVEL FOR A TYPICAL ROOM (L_{PA} RE. 2 X 10⁻⁵ N/M²)

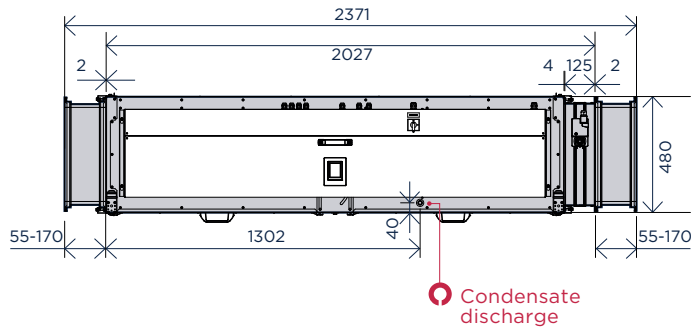
| Speed | |
|-----------------------------|----|
| 10V DC (high speed) (dB(A)) | 70 |
| 8V DC (dB(A)) | 67 |
| 6V DC (dB(A)) | 60 |
| 5V DC (dB(A)) | 54 |

DRAWINGS

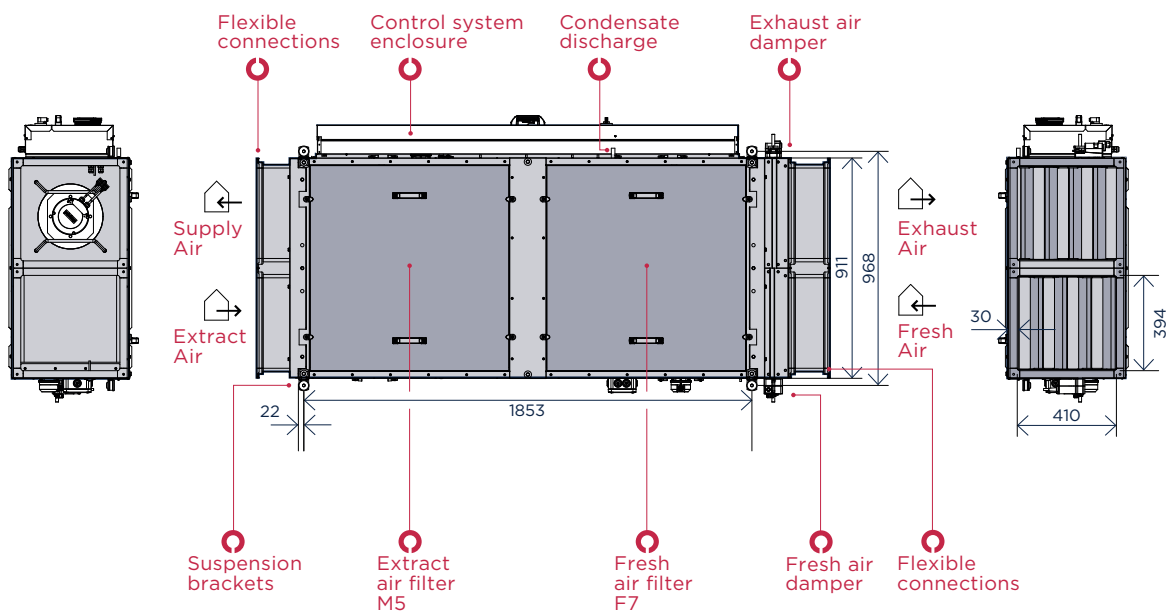
air2air HR12



UNIT OVERVIEW

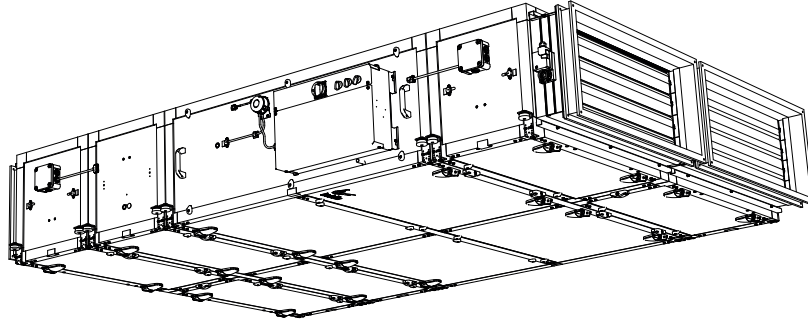


UNIT DESCRIPTION

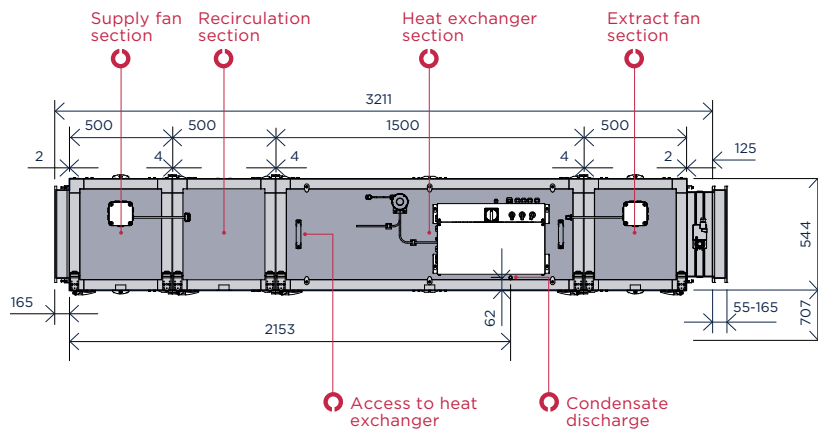


View from the bottom of the unit.

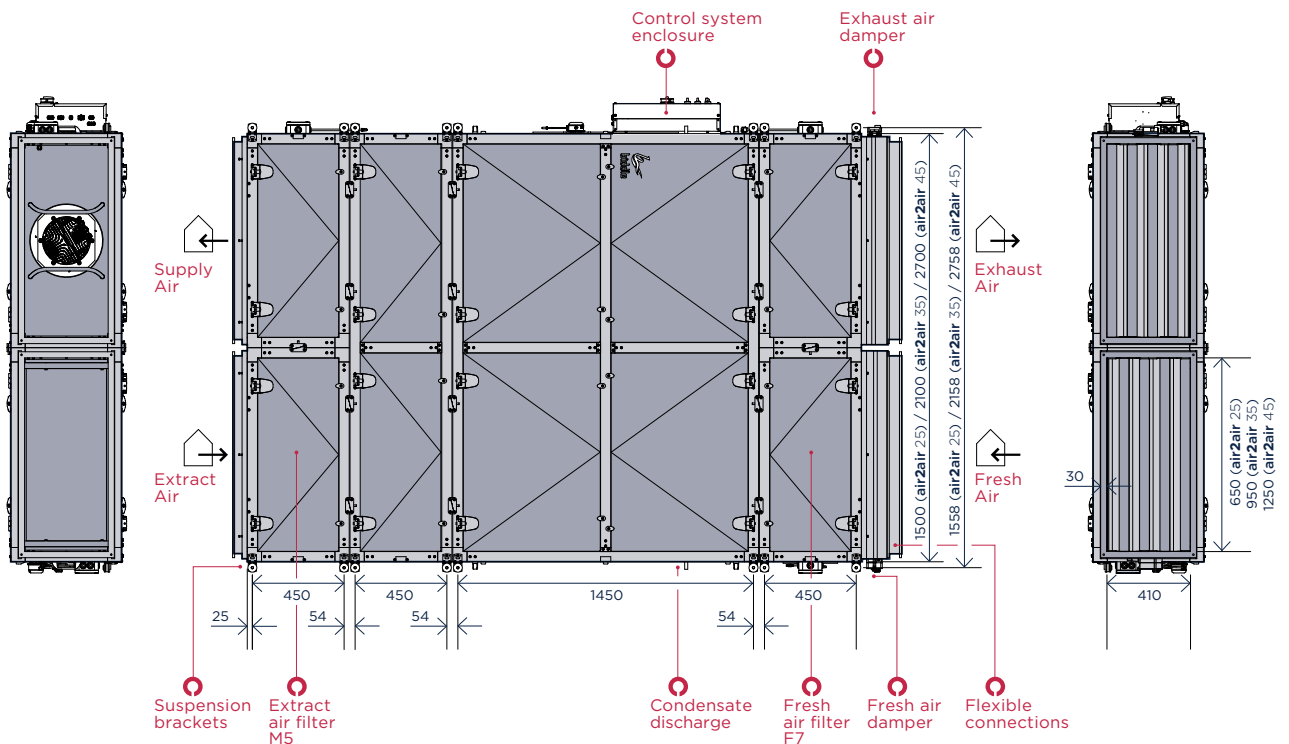
Please note the drawing is for description purposes only and does not include options



UNIT OVERVIEW



UNIT DESCRIPTION



View from the bottom of the unit.
Please note the drawing is for description purposes only and does not include options

SPECIFICATIONS

CASING

Zinc plated sheet steel with insulated panels.

COLOURS

air2air HR12/25/35/45 are supplied in stainless steel. (other RAL colours available on request).

MOTOR / FAN ASSEMBLY

air2air HR12/25/35 have two fans : Supply and extract. Both radial backward curved with an aluminium impeller and external rotor motor with EC technology. air2air HR45 - Four fans: Two supply and two extract. All are radial backward curved with an aluminium impeller and external rotor motor with EC technology. Thermal contacts automatically break the electric circuit in the event of the motor overheating.

COUNTERFLOW PLATE HEAT EXCHANGER

Eurovent certified, high efficiency, counterflow plate heat exchanger. Made from thin aluminium plates arranged cross-wise to form parallel air passages.

AIR FILTERS

Fresh air filter type F7. Extract air filter type M5.

The b-touch controller provides an error when the air filter needs to be replaced or cleaned. An indicator light is available as an accessory if the b-touch controller is not specified.

ELECTRICAL CONNECTIONS

1 phase electrical supply (1L+N+E) from an integral switched spur provides power for fans and control equipment. Installation should be sized in accordance with the following:

- ⊕ Electrical supply = 230V / 1ph / 50Hz
- ⊕ Rated electrical power input =
1040W (air2air HR12), 1660W (air2air HR25)
or 2760W (air2air HR35), 6744W (air2air HR45)
- with both fans on maximum speed (10V DC control voltage)
- ⊕ Rated current = 4.8 A (air2air HR12),
7.2 A (air2air HR25) or 12 A (air2air HR35),
32.42 A (air2air HR45) - with both fans on
maximum speed (10V DC control voltage)

HEATING & COOLING MODULE

The heating & cooling module is available for the **air2air**HR25 and **air2air**HR35. The capacities are based on six selected air flows. The actual capacity is dependent on the ventilation indicated in the pressure/volume graph and can be roughly calculated using the formula below:

$$Q2 = 0.5 \cdot Q1 (1+V2/V1) \text{ [kW]}$$

Q1 = capacity of table (kW)

Q2 = desired capacity (kW)

V1 = air displacement of table [m³/h]

V2 = desired air displacement [m³/h]

The module is available with two different cooling coils - DX and water.

WATER (HC6)

| | | air2airHR25 HC6 | | | | | air2airHR35 HC6 | | | | | | |
|-------------------------------|-----|-----------------|------|------|------|------|-----------------|------|------|------|------|------|------|
| | | 500 | 1000 | 1500 | 2000 | 2500 | 500 | 1000 | 1500 | 2000 | 2500 | 3000 | 3500 |
| Heating 50/30°C 50% RH | | | | | | | | | | | | | |
| Air inlet temperature | °C | 15 | | | | | 15 | | | | | | |
| Heating capacity | kW | 4.61 | 8 | 10.9 | 13.4 | 15.6 | 4.79 | 8.5 | 11.7 | 14.5 | 17.1 | 19.5 | 21.7 |
| Discharge air temperature | °C | 41.9 | 38.3 | 36.1 | 34.5 | 33.2 | 42.9 | 39.8 | 37.8 | 36.2 | 35 | 33.9 | 33.1 |
| Waterflow rate | l/h | 199 | 346 | 469 | 577 | 674 | 207 | 367 | 505 | 628 | 739 | 841 | 936 |
| Water pressure drop | kPa | 0.27 | 0.74 | 1.29 | 1.87 | 2.48 | 0.07 | 0.19 | 0.35 | 0.52 | 0.69 | 0.88 | 1.07 |
| Cooling 6/12°C 48% RH | | | | | | | | | | | | | |
| Air inlet temperature | °C | 27 | | | | | 27 | | | | | | |
| Cooling capacity total | kW | 4.23 | 7.29 | 9.76 | 11.8 | 13.6 | 4.41 | 7.78 | 10.7 | 13.1 | 15.3 | 17.2 | 19 |
| Cooling capacity sensible | kW | 2.88 | 5.17 | 7.16 | 8.94 | 10.6 | 2.97 | 5.44 | 7.64 | 9.62 | 11.5 | 13.2 | 14.9 |
| Discharge air temperature | °C | 9.53 | 11.3 | 12.5 | 13.4 | 14.2 | 8.95 | 10.5 | 11.5 | 12.4 | 13.1 | 13.7 | 14.1 |
| Waterflow rate | l/h | 606 | 1045 | 1398 | 1693 | 1951 | 632 | 1115 | 1528 | 1873 | 2190 | 2470 | 2727 |
| Water pressure drop | kPa | 2.37 | 6.35 | 10.7 | 15.2 | 19.7 | 0.6 | 1.68 | 2.99 | 4.34 | 5.77 | 7.19 | 8.62 |

The KV's value of the valve is:

Kvs for the 2-way valve = 5.7

Kvs for the 3-way valve = 5.12

DIRECT EXPANSION (DX R410A)

| | | air2air HR25 DX410A | | | | | air2air HR35 DX410A | | | | | | |
|---------------------------|-----|---------------------|------|------|------|------|---------------------|------|------|------|------|------|------|
| | | 500 | 1000 | 1500 | 2000 | 2500 | 500 | 1000 | 1500 | 2000 | 2500 | 3000 | 3500 |
| Heating 50% RH | | | | | | | | | | | | | |
| Air inlet temperature | °C | 15 | | | | | 15 | | | | | | |
| Heating capacity | kW | 4.19 | 7.97 | 11.3 | 4.3 | 16.9 | 4.25 | 8.3 | 12.1 | 15.5 | 18.8 | 21.7 | 24.5 |
| Discharge air temperature | °C | 39.5 | 38.3 | 37 | 35.8 | 34.7 | 39.8 | 39.2 | 38.5 | 37.7 | 36.9 | 36.2 | 35.5 |
| Cooling 48% RH | | | | | | | | | | | | | |
| Air inlet temperature | °C | 27 | | | | | 27 | | | | | | |
| Cooling capacity total | kW | 4.67 | 8.47 | 11.6 | 14.1 | 16.3 | 4.8 | 9 | 12.6 | 15.7 | 18.3 | 20.6 | 22.7 |
| Cooling capacity sensible | kW | 3.15 | 5.82 | 8.08 | 10 | 11.8 | 3.23 | 6.13 | 8.68 | 10.9 | 13 | 14.9 | 16.6 |
| Discharge air temperature | °C | 5.98 | 7.46 | 8.76 | 9.85 | 10.8 | 1.53 | 2.87 | 4.02 | 5 | 5.85 | 6.58 | 7.23 |
| Gas velocity | m/s | 1.49 | 2.7 | 3.69 | 4.51 | 5.2 | 2.28 | 4.18 | 5.68 | 6.84 | 7.73 | 8.38 | 8.86 |
| Condensed water | l/h | 2.2 | 3.86 | 5.06 | 5.91 | 6.53 | 2.28 | 4.18 | 5.68 | 6.84 | 7.73 | 8.38 | 8.86 |

| | |
|---|-------------|
| Condensing gas superheating delta temperature | 25°C |
| Liquid side condensing temperature | 40°C |
| Delta of liquid subcooling | 2K |
| Gas side evaporating temperature | 5°C |
| Evaporating gas superheating delta temperature | 5K |

- ⓘ During heating, the Biddle control system limits the maximum discharge temperature to 50°C. The minimum discharge temperature can be programmed for both cooling and heating. These limits are not included in the above details.
- ⓘ The water pressure loss does not include the valve.

CORRECTION FACTORS HEATING CAPACITY

The heating capacities stated in the tables are based on a water temperature range of 50/30°C. The air inlet temperature is 15°C. If water and air inlet temperatures differ, the maximal heating capacity is to be multiplied by the correction factors from the tables below.

HEATING air2air 25/35 HC6

| Water range | Air inlet temperature | | | | | |
|-------------|-----------------------|------|------|------|------|------|
| | -10°C | 0°C | 10°C | 15°C | 18°C | 20°C |
| 90/70 °C | 4.27 | 3.70 | 3.16 | 2.90 | 2.75 | 2.64 |
| 82/71 °C | 4.10 | 3.53 | 2.99 | 2.74 | 2.59 | 2.49 |
| 80/60 °C | 3.77 | 3.22 | 2.69 | 2.44 | 2.29 | 2.18 |
| 70/50 °C | 3.28 | 2.73 | 2.22 | 1.97 | 1.82 | 1.72 |
| 60/40 °C | 2.78 | 2.25 | 1.74 | 1.49 | 1.34 | 1.25 |
| 50/40 °C | 2.56 | 2.04 | 1.54 | 1.30 | 1.16 | 1.07 |
| 50/30 °C | 2.27 | 1.75 | 1.25 | 1 | 0.85 | 0.75 |

COOLING CAPACITY

The cooling capacities for the HC6 coils are based on a water temperature range of 6/12°C with an air inlet temperature of 27°C and a relative humidity of 48%. If water and air inlet temperatures differ, the maximal cooling capacity is to be multiplied by the correction factors from the tables below.

COOLING air2airHR25/35 HC6

| Water range | Inlet conditions | Relative humidity | | | | | | | |
|-------------|------------------|-------------------|-----|-----|-----|-----|-----|-----|-----|
| | | 40% | | 48% | | 50% | | 60% | |
| | | Qt | Qs | Qt | Qs | Qt | Qs | Qt | Qs |
| 6/12 °C | 22 °C | 0.6 | 0.8 | 0.6 | 0.7 | 0.6 | 0.7 | 0.7 | 0.7 |
| | 23 °C | 0.6 | 0.8 | 0.7 | 0.8 | 0.7 | 0.8 | 0.8 | 0.7 |
| | 24 °C | 0.7 | 0.9 | 0.7 | 0.8 | 0.8 | 0.8 | 0.9 | 0.8 |
| | 27 °C | 0.9 | 1 | 1 | 1 | 1 | 1 | 1.3 | 1 |
| | 28 °C | 1 | 1.1 | 1.1 | 1 | 1.1 | 1 | 1.4 | 1 |
| 8/14 °C | 22 °C | 0.5 | 0.6 | 0.5 | 0.6 | 0.5 | 0.6 | 0.5 | 0.6 |
| | 23 °C | 0.5 | 0.7 | 0.5 | 0.7 | 0.5 | 0.7 | 0.6 | 0.6 |
| | 24 °C | 0.6 | 0.8 | 0.6 | 0.7 | 0.6 | 0.7 | 0.7 | 0.7 |
| | 27 °C | 0.7 | 0.9 | 0.8 | 0.9 | 0.8 | 0.9 | 1 | 0.8 |
| | 28 °C | 0.8 | 1 | 0.9 | 0.9 | 0.9 | 0.9 | 1.2 | 0.9 |
| 10/16 °C | 22 °C | 0.4 | 0.5 | 0.4 | 0.5 | 0.4 | 0.5 | 0.4 | 0.5 |
| | 23 °C | 0.4 | 0.6 | 0.4 | 0.6 | 0.4 | 0.6 | 0.5 | 0.5 |
| | 24 °C | 0.5 | 0.6 | 0.5 | 0.6 | 0.5 | 0.6 | 0.5 | 0.6 |
| | 27 °C | 0.6 | 0.8 | 0.7 | 0.8 | 0.7 | 0.8 | 0.8 | 0.7 |
| | 28 °C | 0.7 | 0.9 | 0.7 | 0.8 | 0.8 | 0.8 | 0.9 | 0.8 |
| 12/16 °C | 22 °C | 0.4 | 0.5 | 0.4 | 0.5 | 0.4 | 0.5 | 0.4 | 0.5 |
| | 23 °C | 0.4 | 0.5 | 0.4 | 0.5 | 0.4 | 0.5 | 0.4 | 0.5 |
| | 24 °C | 0.5 | 0.6 | 0.5 | 0.6 | 0.5 | 0.6 | 0.5 | 0.6 |
| | 27 °C | 0.6 | 0.8 | 0.6 | 0.8 | 0.6 | 0.8 | 0.8 | 0.7 |
| | 28 °C | 0.7 | 0.8 | 0.7 | 0.8 | 0.7 | 0.8 | 0.9 | 0.8 |
| 12/18 °C | 22 °C | 0.3 | 0.4 | 0.3 | 0.4 | 0.3 | 0.4 | 0.3 | 0.4 |
| | 23 °C | 0.3 | 0.4 | 0.3 | 0.4 | 0.3 | 0.4 | 0.3 | 0.4 |
| | 24 °C | 0.4 | 0.5 | 0.4 | 0.5 | 0.4 | 0.5 | 0.4 | 0.5 |
| | 27 °C | 0.5 | 0.7 | 0.5 | 0.7 | 0.5 | 0.7 | 0.6 | 0.6 |
| | 28 °C | 0.6 | 0.8 | 0.6 | 0.8 | 0.6 | 0.7 | 0.7 | 0.7 |

Qt = total cooling capacity Qs= sensible cooling capacity

WATER FLOW RATE

The water flow rate displayed in the tables are based on water temperature ranges of 50/30°C and 6/12°C. If the valves are different then the water flow rate can be calculated roughly using the formula below. To do this the capacity must be recalculated: **Mw = Q/PwCpw tw •3600[l/h]**

| | |
|------------|--|
| Mw | = Water flow rate [l/h] |
| Q | = Capacity [kW] |
| Pw | = Density of Water [kg/l] |
| Cpw | = Specific Heat of Water = (4.18)[kJ/kg°C] |
| tw | = Temperature Difference Water [°C] |

WATER-SIDE PRESSURE LOSS

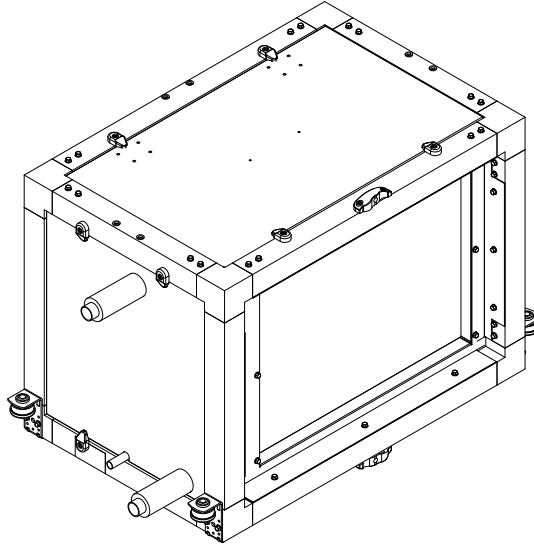
If the water temperatures are different to those displayed in the table, then the water side pressure can be roughly calculated using the formula below. To do this the water volume must first be calculated:

$$Pw2 = Pw1 (Mw2/mw1)^2 \text{ [kPa]}$$

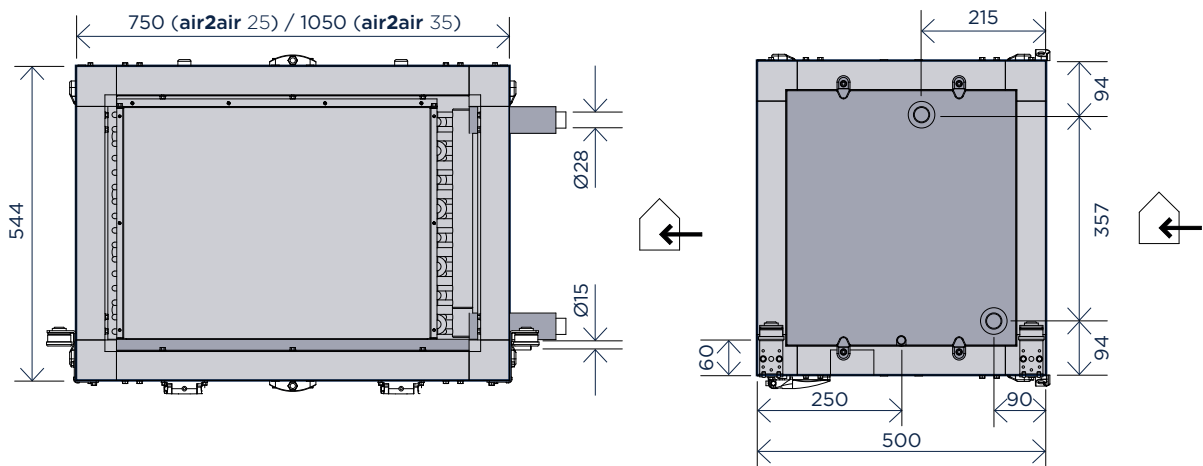
| | |
|------------|--|
| Pw1 | = Water Pressure Loss Table Values [kPa] |
| Pw2 | = Water Pressure Loss [kPa] |
| Mw1 | = Water Flow Rate Table Values [l/h] |
| Mw2 | = Water flow rate calculated using formula [l/h] |

HC6 HEATING MODULE DRAWINGS

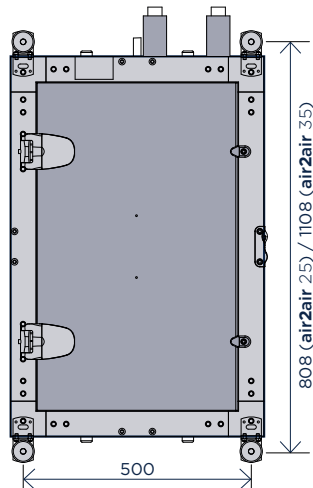
air2air HR25/35



UNIT OVERVIEW

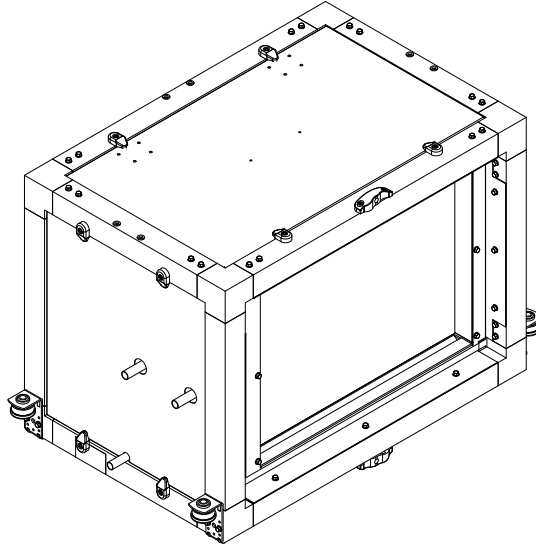


UNIT DESCRIPTION

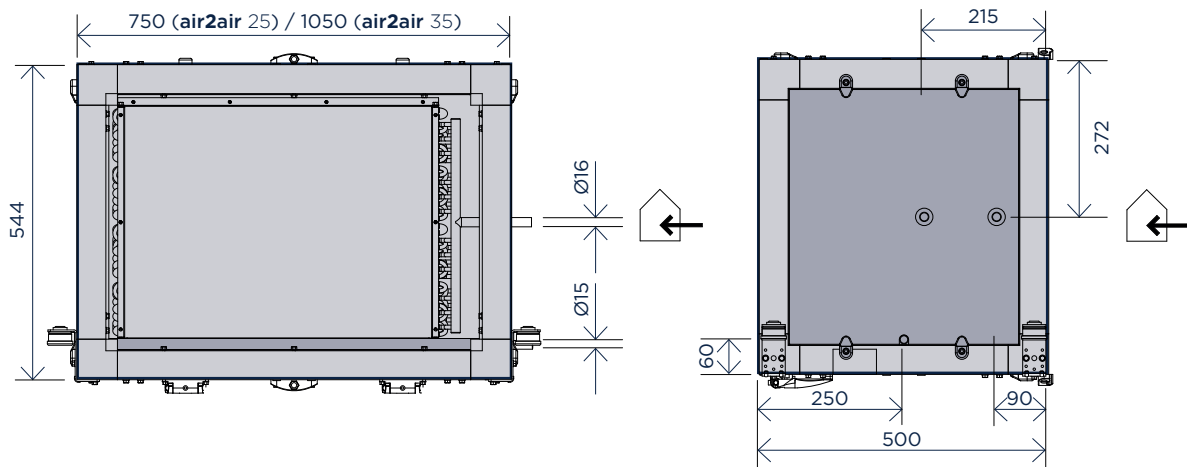


DX MODULE DRAWINGS

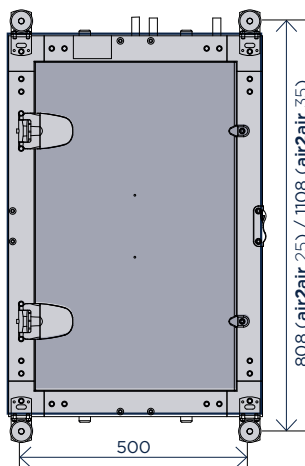
air2air HR25/35



UNIT OVERVIEW



UNIT DESCRIPTION



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Biddle

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