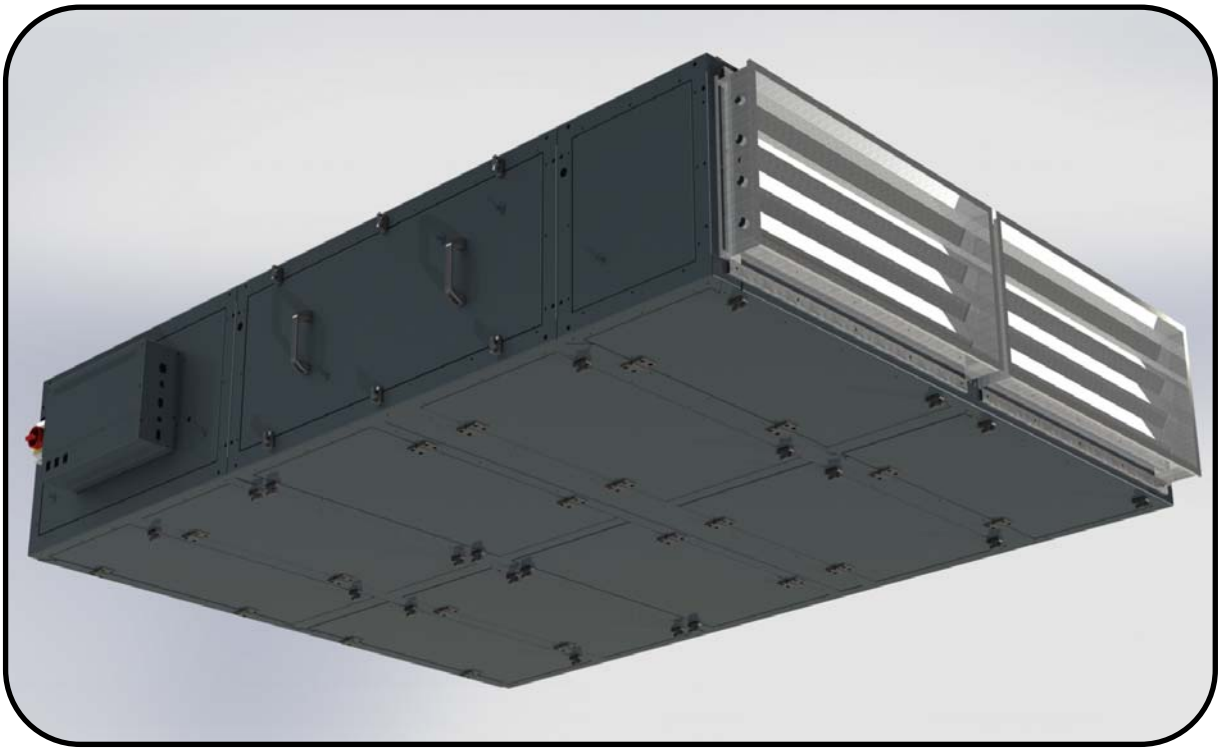
biddle
INNOVATIVE KLIMATECHNIK

# HR3500 HEAT RECOVERY UNIT

## INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS



**PLEASE READ THESE INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING INSTALLATION**

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English

# Biddle HR3500 Heat Recovery Unit

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# Heat Recovery Unit System Schematics

The HR3500 Heat Recovery Unit can be used in one of the following two systems to provide a fresh air system with heat recovery and heating of the supermarket:

**System 1.** with Biddle NOZ25V-W6-E-D0-HR Unit Heaters
**System 2.** with Biddle CC90V-H3-D0-HR Cassette Heaters

## System 1. HR3500 - NOZ25 Heat Recovery System

Ductwork and Controls Schematic:-

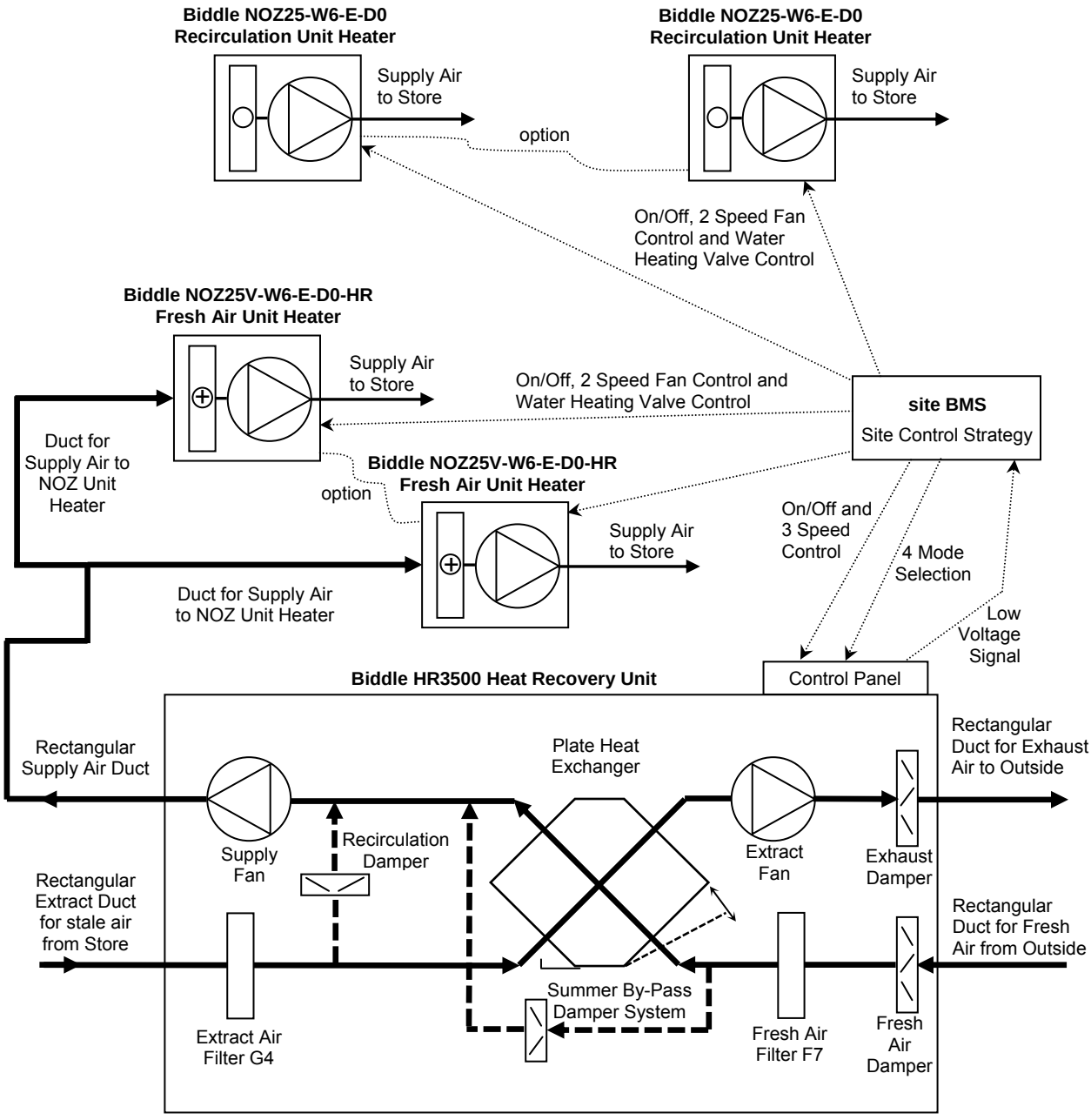



**Figure 1**

# System 2. HR3500 - CC90 Heat Recovery System

Ductwork and Controls Schematic :-

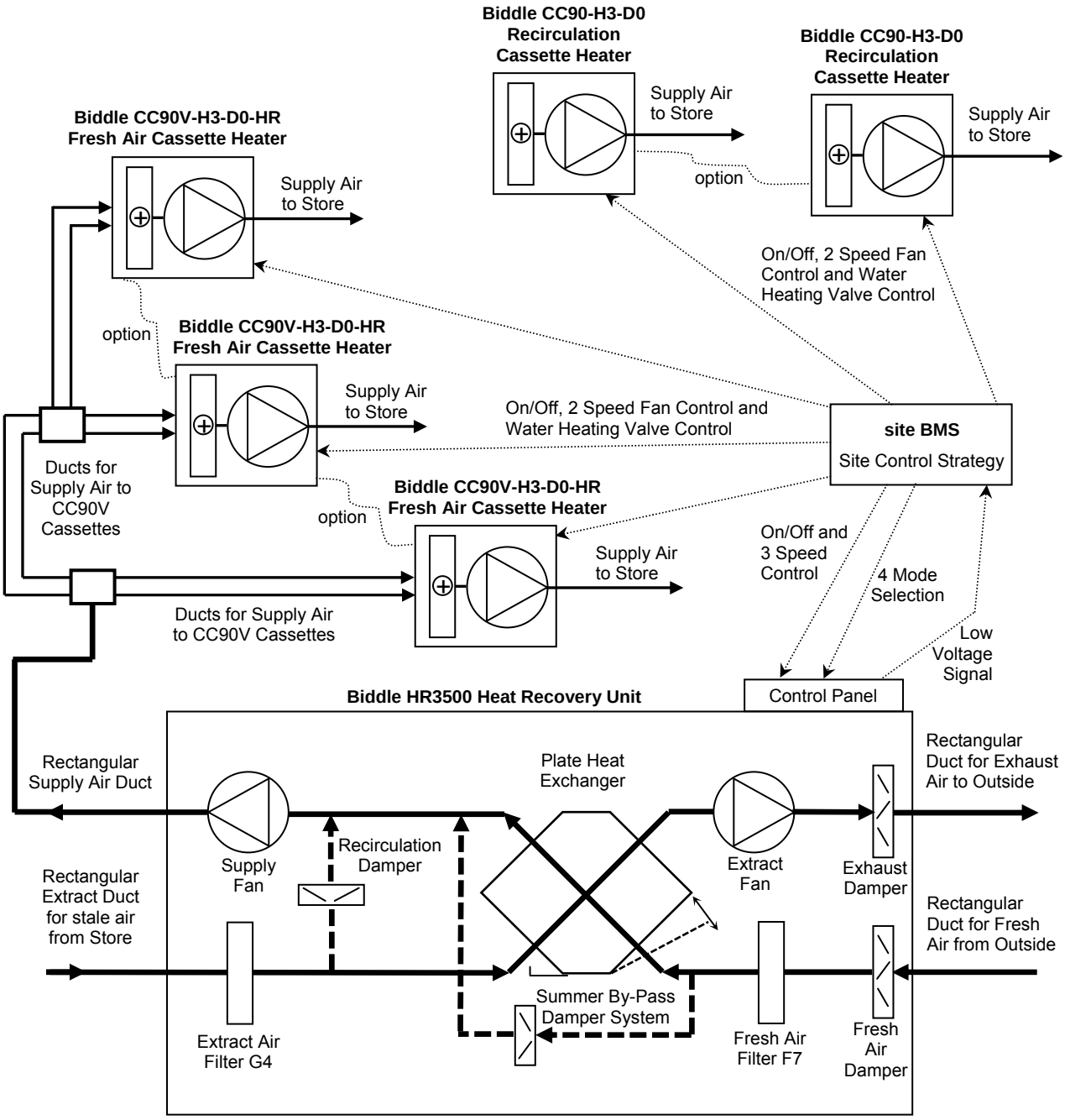



**Figure 2**

# DESIGN INFORMATION

The HR3500 Heat Recovery Unit is an air handling unit containing fans, filters, air-to-air plate heat exchanger, dampers, controls and ductwork connections. It is designed to integrate into the fresh air and extract air systems that serve a supermarket and recover waste heat from the extract air coming from the supermarket that would otherwise have been lost to outdoors.

The HR3500 Heat Recovery Unit can be used with:

1. Biddle NOZ25V-W6-E-D0-HR Unit Heaters in stores where Biddle NOZ unit heaters are used for heating the store. See Figure 1.
2. Biddle CC90V-H3-D0-HR Cassette Heaters in stores where Biddle CC unit heaters are used for heating the store. See Figure 2.

The control strategy and fan speed selection of the Heat Recovery Unit is carried out automatically by the site BMS controller which is located in the offices of the store. 24V AC control signals are sent via hard-wired cables from the site BMS to the electric control box on the Heat Recovery Unit to provide the following modes of operation with fan speed selection:

**Mode 1 – Full Heat Recovery** with fresh air and room extract air passing through the heat exchanger

| Supply Fan | Extract Fan | Fresh Air Damper | Exhaust Damper | Recirculation Damper | Summer By-Pass Damper |
|---|---|---|---|---|---|
| ON<br>High, Medium or Low fan speed | ON<br>High or Low fan speed | OPEN | OPEN | CLOSED | CLOSED<br>to By-Pass |

**Mode 2 – Full Recirculation**, no fresh air or exhaust air to outside

| Supply Fan | Extract Fan | Fresh Air Damper | Exhaust Damper | Recirculation Damper | Summer By-Pass Damper |
|---|---|---|---|---|---|
| ON<br>High, Medium or Low fan speed | OFF | CLOSED | CLOSED | OPEN | CLOSED<br>to By-Pass |

**Mode 3 – Night Cooling** in warm weather periods to reduce air temperatures in the supermarket during the next day

| Supply Fan | Extract Fan | Fresh Air Damper | Exhaust Damper | Recirculation Damper | Summer By-Pass Damper |
|---|---|---|---|---|---|
| ON<br>Medium fan speed only | ON<br>Medium fan speed only | OPEN | OPEN | CLOSED | OPEN<br>to By-Pass |

**Mode 4 – Smoke Extract** (not always programmed in the site BMS)

| Supply Fan | Extract Fan | Fresh Air Damper | Exhaust Damper | Recirculation Damper | Summer By-Pass Damper |
|---|---|---|---|---|---|
| OFF | ON<br>High fan speed only | CLOSED | OPEN | CLOSED | CLOSED<br>to By-Pass |

**Please Note**. The unit and its components are not temperature rated for smoke extract so will only provide a limited period of operation under smoke conditions.

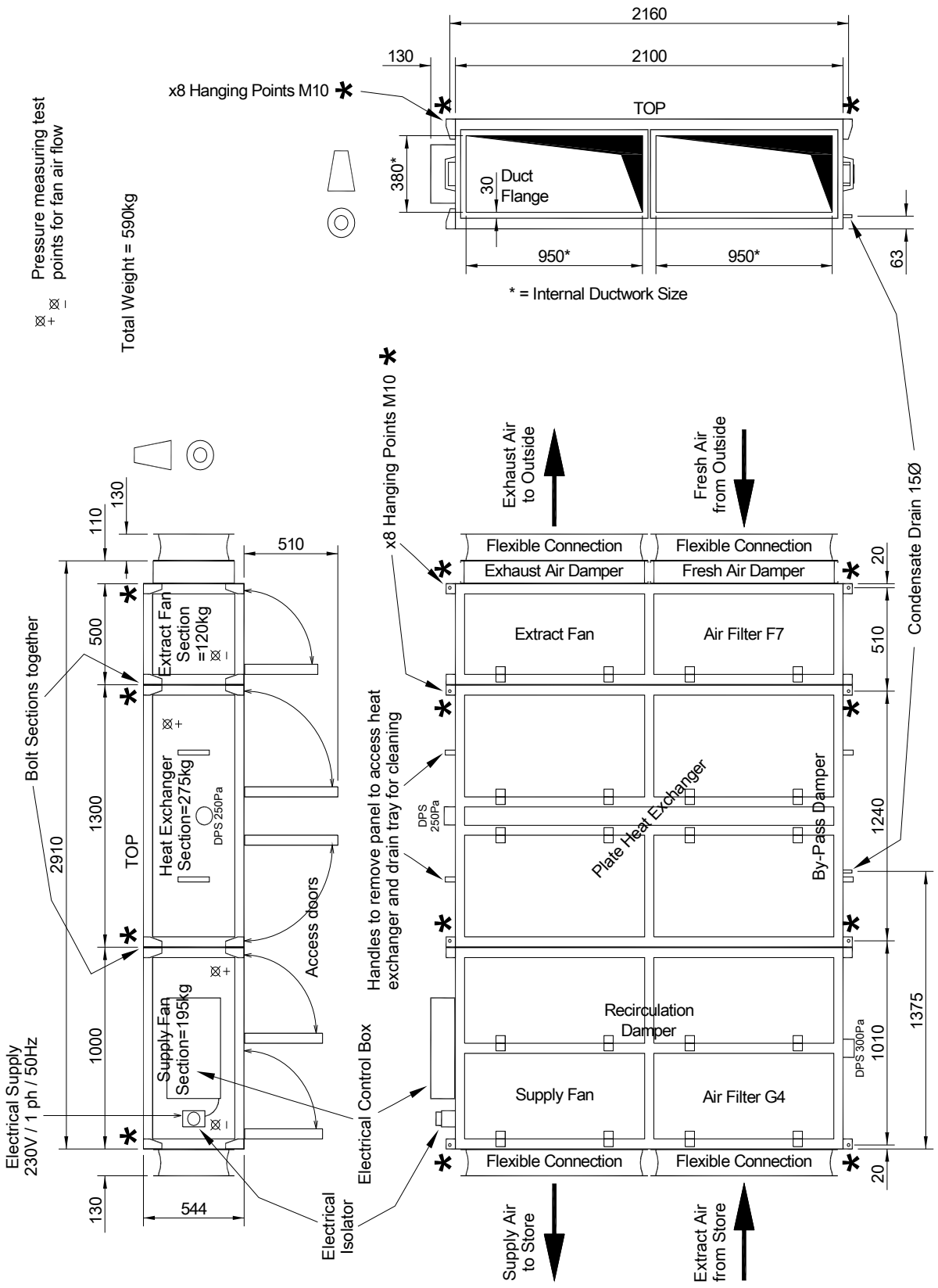



**FIGURE 3 – DIMENSIONS OF HR3500 HEAT RECOVERY UNIT**

## Fan Speed Voltage and Airflow Performance Data

There are two EC fans in the HR3500 Heat Recovery Unit, a Supply Fan and an Extract Fan. Figures 4 and 5 show the airflow performance of these two fans at different DC control voltages. The design system curve for 3500m$^3$/h is also shown for each fan.

**Figure 4**

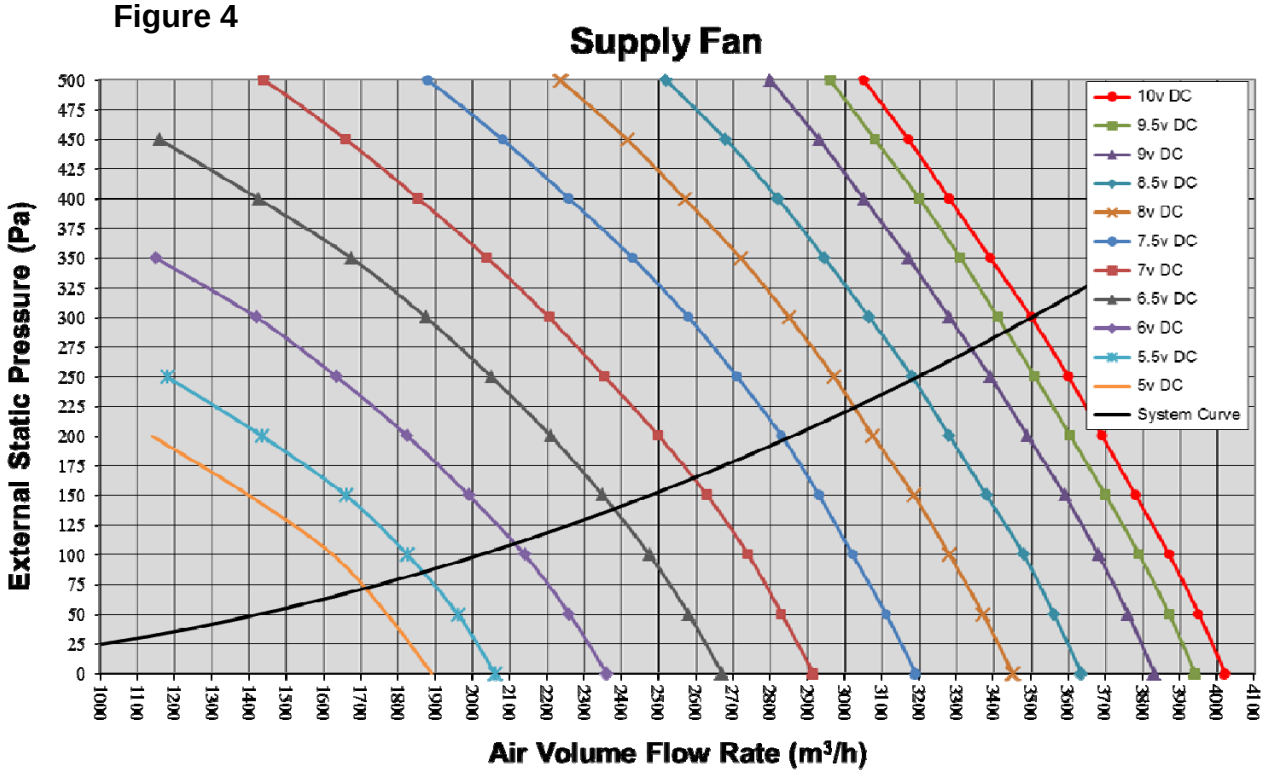
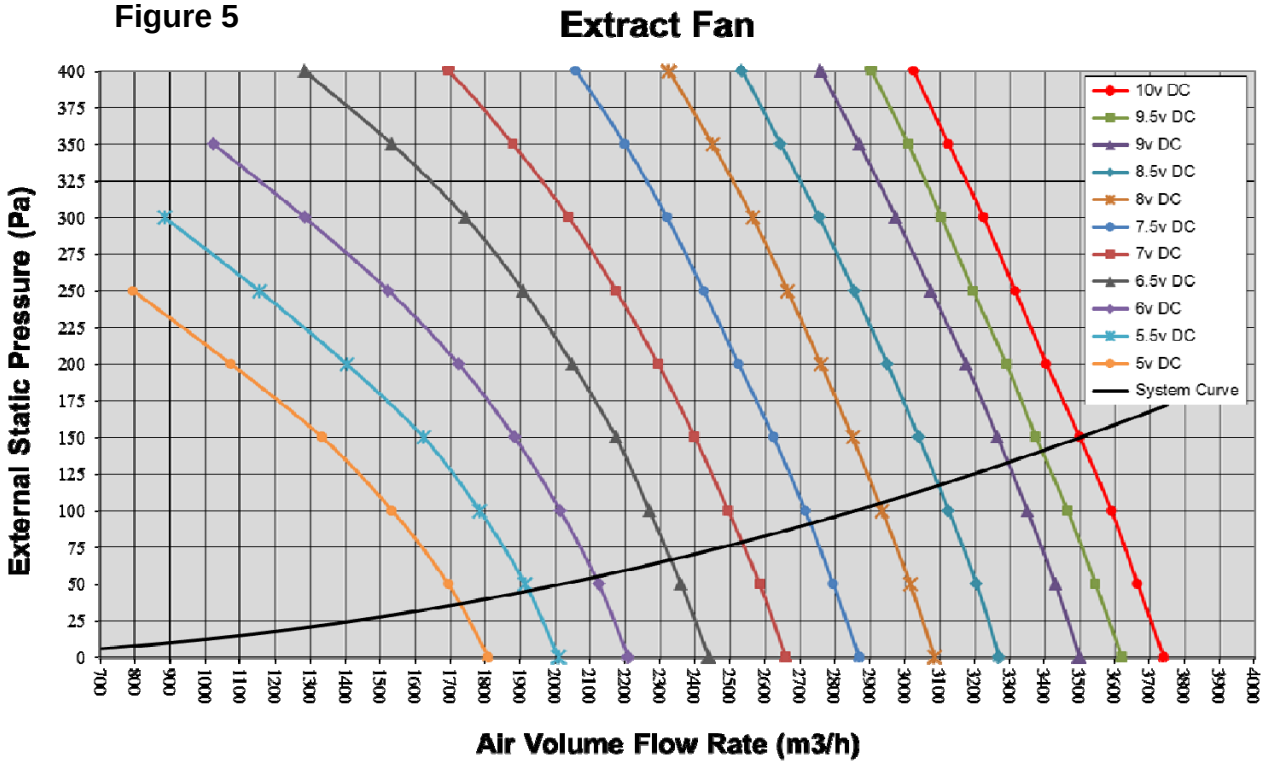



**Figure 5**



## Electrical Supply and electrical data

The HR3500 Heat Recovery Unit operates on a 1 phase electrical supply (1L+N+E) from a local switched spur which provides electrical power for fans and control equipment in the unit. The electrical installation should be sized in accordance with the following:

Electrical Supply = 230v / 1ph / 50Hz
Rated Electrical Power Input = 2760 W (with both fans on maximum speed - 10V DC)
Rated Current = 12.0 A (with both fans on maximum speed - 10V DC)

There are two fans in the unit, a Supply Fan and an Extract Fan, and during commissioning the High, Medium and Low speed settings for each fan is set by the commissioning Engineer. Figure 4 and Figure 5 show the air volume flow rate against the external static pressure for both fans for a range of DC control voltages from 5v to 10v. The commissioning engineer will set the control voltage on site to achieve the air volume flow rate they require from each fan. It is preferable to aim for the same airflow from each fan as this then gives the highest heat exchange efficiency.

As an indication, Tables 1 and 2 give electrical data for each fan operating along its design system curve, see also Figures 4 and 5.

**Table 1** - Supply Fan on the 3500$m^3$/h - 300Pa system curve (see Figure 4)

| Control Voltage (DC Volts) | Air Volume Flow Rate ($m^3$/h) | Power Input (W) | Current (A) | SFP (W/$m^3$/s) |
|---|---|---|---|---|
| 10.0 high | 3500 (at 300Pa) | 1350 | 5.56 | 1370 |
| 9.5 | 3430 | 1245 | 5.20 | 1300 |
| 9.0 | 3335 | 1155 | 4.92 | 1250 |
| 8.5 | 3185 | 1005 | 4.24 | 1140 |
| 8.0 medium | 3025 | 875 | 3.68 | 1040 |
| 7.5 | 2830 | 740 | 3.10 | 930 |
| 7.0 | 2595 | 605 | 2.58 | 840 |
| 6.5 | 2380 | 495 | 2.12 | 760 |
| 6.0 low | 2110 | 360 | 1.56 | 610 |
| 5.5 | 1870 | 285 | 1.28 | 570 |
| 5.0 | 1710 | 245 | 1.13 | 510 |

**Table 2** - Extract Fan on the 3500$m^3$/h - 150Pa system curve (see Figure 5)

| Control Voltage (DC Volts) | Air Volume Flow Rate ($m^3$/h) | Power Input (W) | Current (A) | SFP (W/$m^3$/s) |
|---|---|---|---|---|
| 10.0 high | 3500 (at 150Pa) | 1290 | 5.14 | 1320 |
| 9.5 | 3390 | 1200 | 4.98 | 1270 |
| 9.0 | 3295 | 1090 | 4.50 | 1190 |
| 8.5 | 3095 | 955 | 3.97 | 1110 |
| 8.0 medium | 2920 | 815 | 3.38 | 1010 |
| 7.5 | 2720 | 705 | 2.96 | 930 |
| 7.0 | 2530 | 590 | 2.52 | 840 |
| 6.5 | 2325 | 475 | 2.00 | 740 |
| 6.0 low | 2110 | 370 | 1.62 | 630 |
| 5.5 | 1920 | 295 | 1.34 | 560 |
| 5.0 | 1720 | 230 | 1.07 | 480 |

high/medium/low as set in software, can be changed during commissioning.

## Heat Recovery

The unit operates in heat recovery when it is in Mode 1 to recover the waste heat energy in the extract air path. Figure 6 shows how much heat energy is recovered for different air volume flow rates and Figure 7 shows the efficiency of the heat exchanger. Both the supply fan and extract fan have the same air volume flow rates in Figure 6 and 7 as this gives the maximum heat recovery and efficiency for each volume flow rate.

**Figure 6**

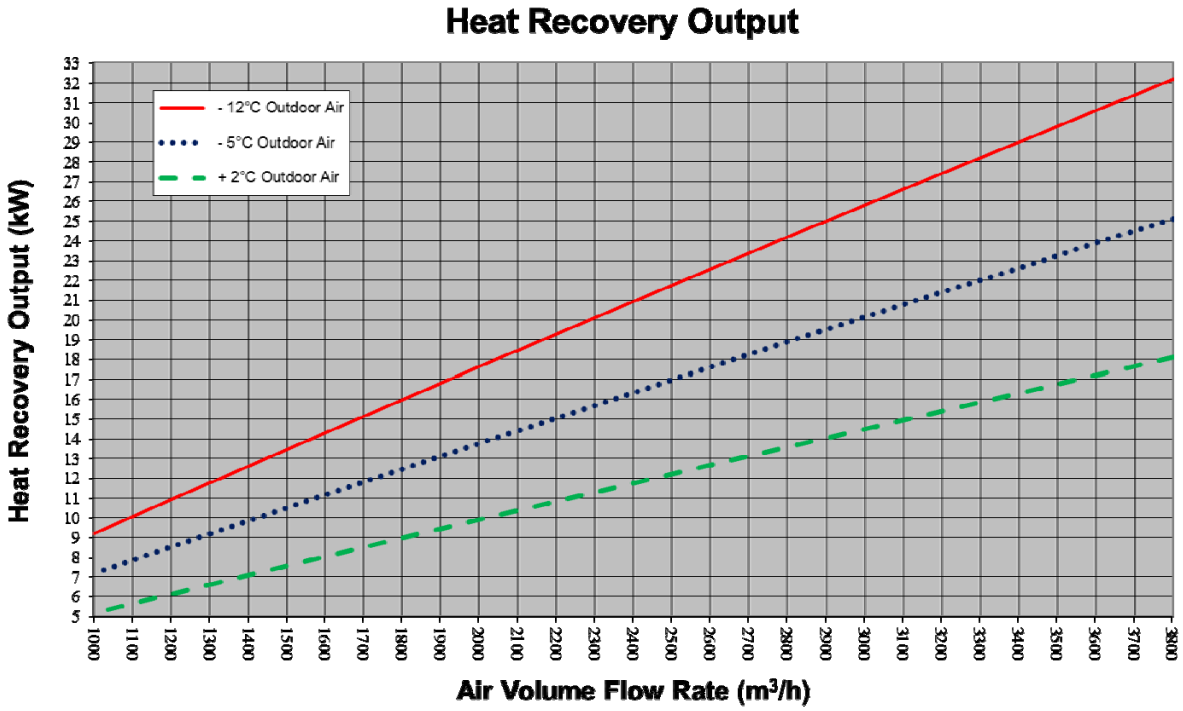
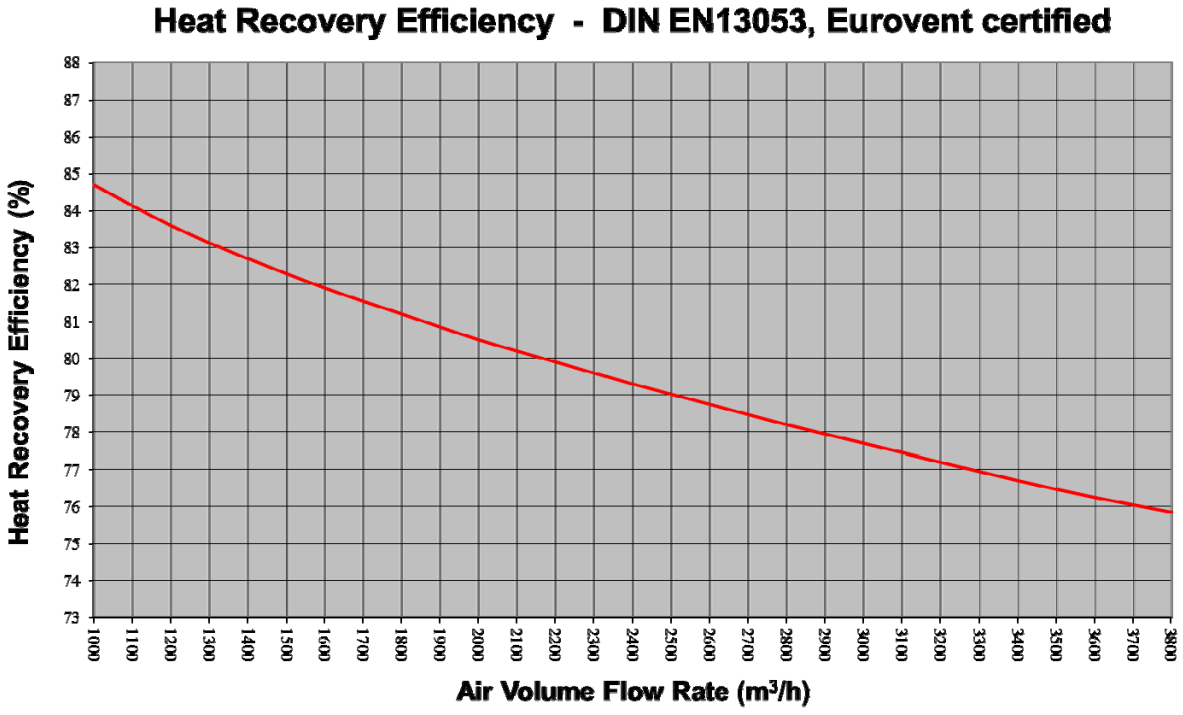



**Figure 7**



## Noise Level Data

Table 3 gives the maximum In-Duct Sound Power Levels ($L_W$) for when the Supply Fan is operating at 3500m3/h at 300Pa external static pressure and when the Extract Fan is operating at 3500m3/h at 150Pa external static pressure.

**Table 3 – Maximum In-Duct Sound Power levels, Mode 1**

| Sound Power Level ($L_W$ re. $10^{-12}$ W) | Octave Band Centre Frequency (Hz) | | | | | | | | $L_{WA}$ dB(A) |
|---|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | |
| Supply Air to Store | 75.8 | 70.7 | 78.6 | 78.4 | 81.3 | 81.2 | 78.3 | 75.4 | 86.6 |
| Extract Air from Store | 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 |

Casing Sound Power Level, dB(A) ($L_{WA}$ re. $10^{-12}$ W):
10V DC (High Speed) = 74 dB(A)
8V DC = 69 dB(A)
6V DC = 64 dB(A)
5V DC = 60 dB(A)

For a typical Store:
Sound Pressure Level, dB(A) ($L_{PA}$ re. 2 x $10^{-5}$ N/m$^2$) measured at 1m from underside of unit: 10V DC (High Speed) = 66 dB(A)
8V DC = 61 dB(A)
6V DC = 56 dB(A)
5V DC = 52 dB(A)

## Ecodesign (ErP) Ventilation Units – product information

**Manufacturer:** Biddle Air Systems Ltd.
**Model:** HR3500
**Type:** Non Residential Ventilation Unit – Bidirectional Ventilation Unit (NRVU-BVU)
**Drive:** Variable Speed Drive (VSD)
**Heat Recovery System:** Regenerative Plate Heat Exchanger
**Thermal Efficiency of Heat Recovery** ($\eta_{t_nrvu}$)**:** 89.3%
**Nominal Flow Rate** ($q_{nom}$)**:** 0.97m$^3$/s Maximum
**Effective Electric Power Input:** 1.35 kW Maximum
**Specific Fan Power** ($SFP_{int}$)**:** 1370 W/m$^3$/s Maximum
**Filter Face Velocity:** 2.1m/s Typical; 2.4m/s Maximum
**Nominal External Pressure** ($\Delta p_{s,\,ext}$)**:** 300Pa Maximum
**Internal Pressure Drop** ($\Delta p_{s,\,int}$)**:** 440Pa Maximum
**Static Fan Efficiency** ($\eta_{es}$)**:** 59.4%
**Maximum External Leakage Rate:** 3.3 l/s
**Maximum Internal Leakage Rate:** 0.92 l/s
**Filter Energy Performance:** 779kWh/year Typical; 1906kWh/year Maximum
**Visual Filter Warning:** Indicator light on unit + BACnet Comms alarm
**IMPORTANT:** Regularly change filters for performance and energy efficiency of unit
**Casing Sound Power Level** ($L_{WA}$)**:** 64dB(A) Typical; 74dB(A) Maximum
**Internet Address for disassembly instructions:** http://www.biddle-air.co.uk

## Condensate Drainage

The Heat Recovery Unit is supplied with an integral condensate drain tray fitted inside the unit to catch condensate that will form within the heat exchanger during operation in cold weather. The drain tray feeds into a 15mm condensate drain pipe that projects from one side of the unit (see Figure 3). The Installer should fit a condensate drain trap and condensate pipework to the 15mm drain pipe and extend it to a suitable drain, see pictures on Page 17. The condensate drain trap and pipework are the responsibility of the installer and the trap must be designed as shown in Figure 8.

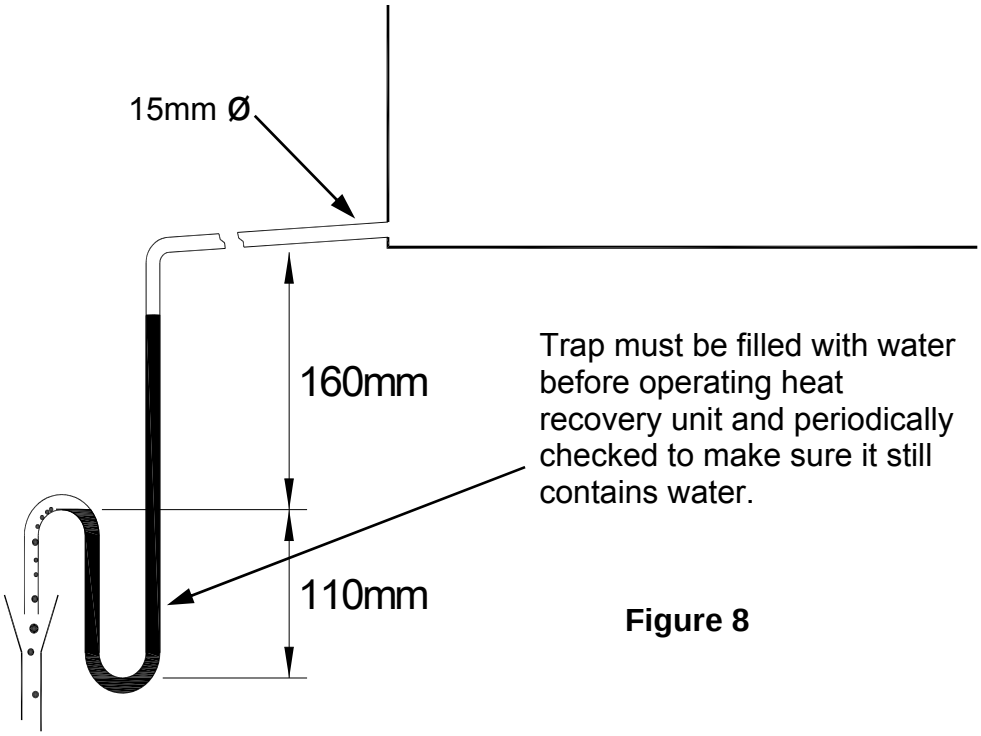



**Figure 8**

It is normal to drain the condensate by gravity and the condensate disposal system should be extended at a suitable gradient (1 im 50) to a convenient drain in the store room, normally adjacent to the condensing boiler.

**Warning:** The condensate collection system is designed to remove condensate with the Heat Recovery Unit operating during normal winter weather conditions in countries with a temperate climate. In case of extreme weather conditions, blockage of the drain tray or condensate trap, which are conditions that can occur, it is vital that the design of the floor beneath the Heat Recovery Unit and its surface is such that it will not become slippery or damaged if it became wet. Do not store items under the unit that could be damaged by condensate water if this were to occur. Ceiling tiles could also be damaged by condensate water if this were to occur.

## Dirty Filter Indication System

A dirty filter indication system is incorporated into the Heat Recovery Unit to show when the air filters need cleaning or replacing. The dirty filter indicator light is fitted near the hinged door on the edge of the supply fan section, see Figure 9.

**Figure 9**

If used, the BACnet comms. will also indicate an alarm when the dirty filter indication system triggers.

Once the dirty filter indication system triggers to show dirty filters the indicator light will stay on until the filters are changed and the indication system is reset. Reset is done by switching electrical power to the unit Off and back On again.

IMPORTANT: Dirty air filters waste energy. Regular air filter changes are important for the correct performance and energy efficiency of the unit

If the Heat Recovery Unit operates during cold weather in Mode 1 (Heat Recovery) cold fresh air will enter the fresh air intake and ice could form in some sections of the unit particularly the plate heat exchanger. There is a differential pressure switch that detects the air pressure across the heat exchanger, if it gets too high because of ice blocking the airways the controller in the unit will go into defrost mode for approximately 10 minutes so that warm air from the building can defrost the sections of the unit where ice may be building up.

Any frost protection strategy to protect the water heating coil in the Biddle NOZ25 or CC90V Heater must be done by the Site BMS. The Heat Recovery Unit is unable to frost protect the heating coil in the NOZ25 or the CC90V Heater.

The Heat Recovery Unit is designed only for use in Stores as designated for a Biddle heat recovery system. The complete Biddle heat recovery system, including ductwork, condensate drain system, water pipework, wiring, controls, etc. must be installed only by an approved contractor.

Persons using the Heat Recovery Unit must be given adequate instruction and supervision concerning the use of the appliance by a person responsible for their safety. The Heat Recovery Unit is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities.

These instructions must be read in conjunction with the separate Biddle instructions that come with other components of the heat recovery/heating system, e.g. NOZ25 Unit Heater, CC90V Cassette Heater and other Biddle ancilliary equipment. All instructions should be kept by the building facilities manager for future reference.

# UNPACKING THE HEAT RECOVERY UNIT

Unpack as shown:-

**1**

**Extract Fan Section**
120kg

**Supply Fan Section**
195kg

**Heat Exchanger Section**
275kg

The following items are supplied with the HR3500 Heat Recovery Unit:-

**2**

**M8 x 30mm Bolts, Washers and Nuts**

**3**

**Self-Adhesive Mini Trunking**

If anything is missing or damaged please contact your place of purchase immediately.

The Installer will also need to supply and install the following:-

**Condensate Drain System**

**Condensate Drain Trap**

Must have drain trap here or somewhere in the condensate drain system

The complete Biddle heat recovery system, including ductwork, condensate drain system, water pipework, wiring, controls, etc. must be installed only by a competent contractor.

**IMPORTANT**

**The heat recovery unit is intended only for use in stores as part of a Biddle heat recovery system.**

**These instructions must be read in conjunction with the separate Biddle instructions that come with other components of the heat recovery/heating system, e.g. NOZ25 Unit Heater, CC90V Cassette Heater and other Biddle ancilliary equipment.**

**All instructions should be kept by the building facilities manager for future reference.**

For your records:

Date of Purchase……..

Place of Purchase…….

Serial Number……

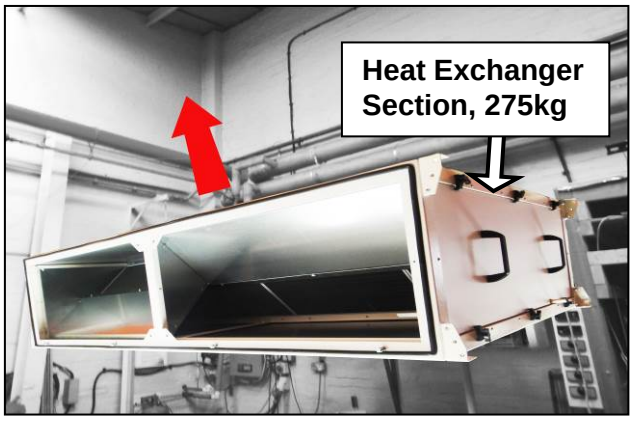
For warranty purposes proof of purchase is necessary so please keep a copy of your invoice.

# INSTALLATION OF THE HEAT RECOVERY UNIT

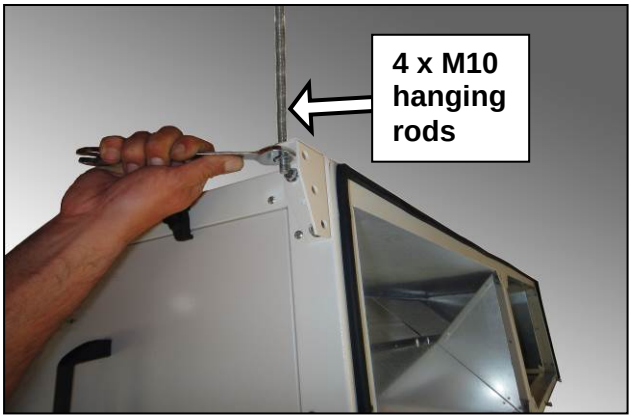
**The heat recovery unit is designed to be mounted inside the stock room of a retail store suspended from the ceiling on hanging rods. It must not be installed on the outside of the building or in any other location.**

Determine the mounting position and location for the heat recovery unit.
See Figure 3 for dimensions of the unit.

Lift the Heat Exchanger Section (275kg*) into position, see picture

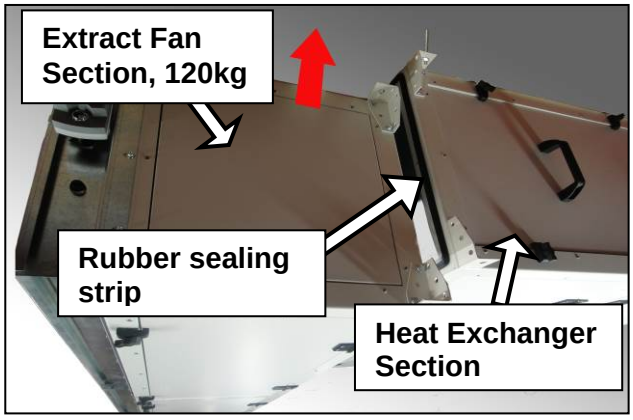



Attach the Heat Exchanger Section to the ceiling using 4 x M10 threaded hanging rods fixed to 4 x hanging brackets on the unit.
Suitable ceiling fixings need to be used to fix the M10 threaded hanging rods, taking into account the type of fixing and the weight of the unit, see picture.
All 4 suspension points must be used.




Lift the Extract Fan Section (120kg*) into position adjacent to the Heat Exchanger Section as shown in the picture. Make sure there is rubber sealing strip fitted between each Section.

The Extract Section is attached to the ceiling with 2 x M10 threaded hanging rods and by bolting to the heat exchanger section. Both of

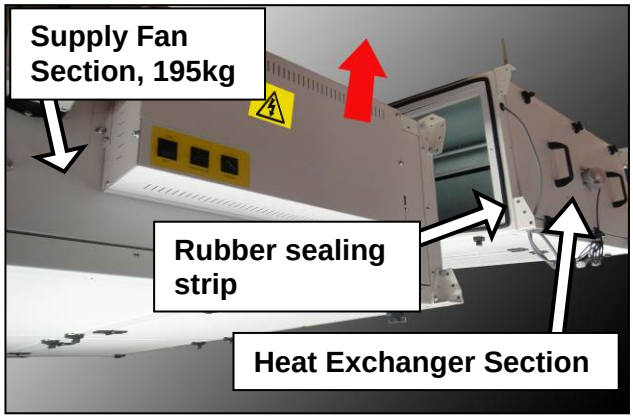



Bring the Extract Fan Section together towards the Heat Exchanger section, see picture.

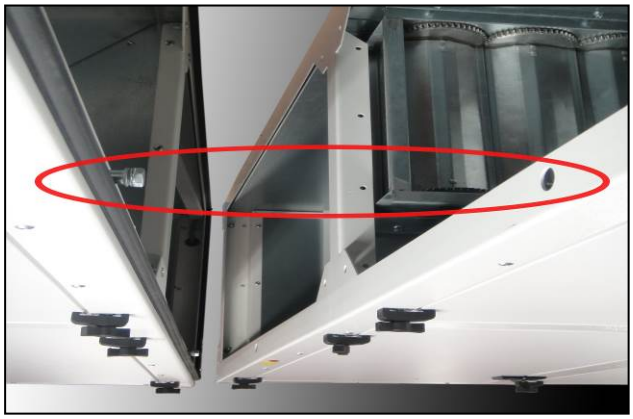
Ensure the four alignment bolts, which are fitted along the bottom edge of the Heat Exchanger Section correctly line up with the corresponding holes on the bottom edge of the Extract Fan Section.

With the Heat Exchanger and Extract Fan Sections secure, lift and position the Supply fan Section (195kg*) into place, see picture. Make sure there is rubber sealing strip between each Section.

The Supply Fan Section is attached to the ceiling with 2 x M10 threaded hanging rods and by bolting to the Heat Exchanger Section. Both of the suspension points must be used.




Ensure the two bottom alignment bolts, which are fitted along the bottom edge of the Heat Exchanger Section, line up with the corresponding holes on the Supply Fan Section, see picture.



* It is the sole responsibility of the installer to ensure that the building fixing locations and suspension system used are suitable for the weight of the Heat Recovery Unit.

Using the brackets bolt all three sections together using the nuts and bolts supplied, see picture.

With all three sections of the HR3500 Heat Recovery Unit joined together and suspended from the ceiling, adjust the hanging rods so the bottom of the whole unit is level. The unit must be installed level or condensate may leak out during cold weather.

Picture shows the complete unit installed ready for connection of ductwork, electrical power and control wiring.

## Condensate Disposal System

**Condensate Drain System**

**Condensate Drain Trap**

Must have drain trap here or somewhere in the condensate drain system

Install the condensate drain system from the 15mm condensate drain trap

It is normal to drain the condensate by gravity and the condensate disposal system should be extended at a suitable gradient (1 in 50) to a convenient drain in the store room, normally adjacent to the condensing boiler. It is important that the condensate trap is filled with water or condensate may not drain away and cause water damage inside the unit or leak out of the unit, see section Commissioning, Page 21.

The condensate drain trap and pipework are the responsibility of the installer and the trap must be designed as shown in Figure 10.

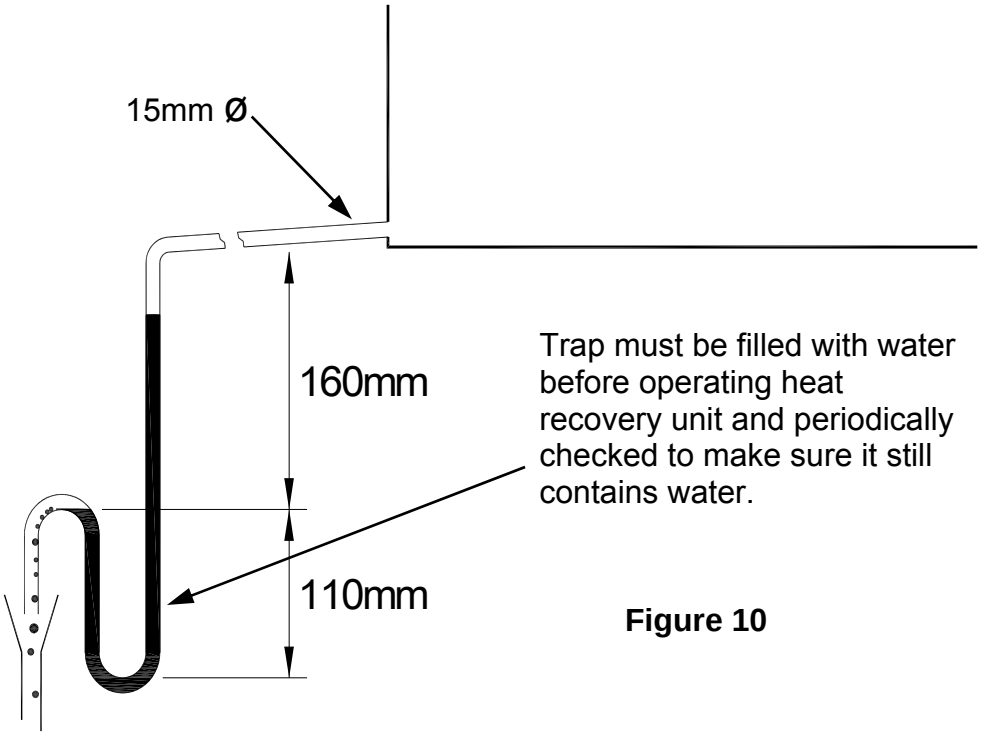



**Figure 10**

## Electrical Supply and Control Wiring to the Heat Recovery Unit

***All electrical wiring and connections MUST be carried out by a competent qualified electrician in accordance with the latest edition of wiring regulations and/or local statutory regulations. (see also Wiring Diagram 1 on Page 20)***

A 230V, 15 Amp rated, 1 phase electrical supply (1L + N + E) must be connected to the input terminals of the local 2-pole isolator switch that is pre-fitted to the side of the heat recovery unit, The unit must have an Earth connection.

Remove the red handle, as shown in picture, then the yellow collar and then the white case from the electrical isolator switch.

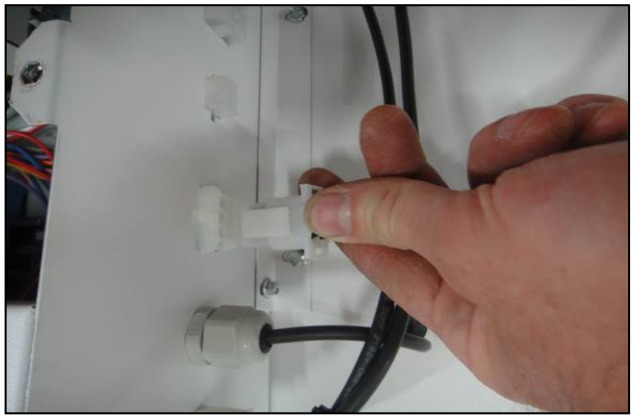
Connect electrical supply:
- Blue Neutral wire – Terminal 1
- Brown Live wire – Terminal 3
- Green/Yellow wire – Earth Terminal

Replace case, collar and handle of isolator and leave switch in the OFF position.

Ensure that electrical supply cables, circuit breakers and other electrical installation equipment are correctly sized for the 12 Amp rating of the unit.

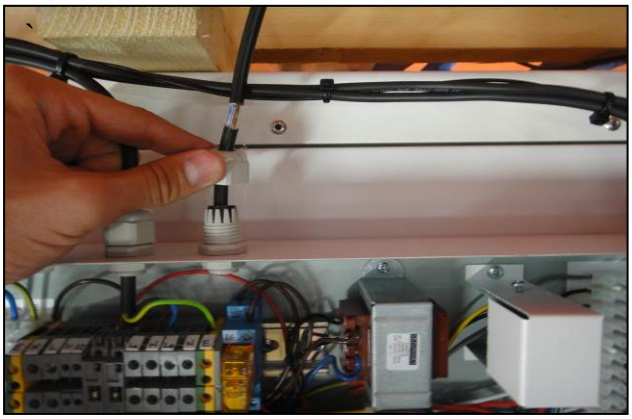
Make electrical connections to the side of the control box using the plug-in connectors:

6-way connector – Heat Exchanger Section
2-way connector – Pressure Switch
9-way connector – Extract Fan Section



Remove the lid of the control box to access electrical connections within the control box.

Feed the 3-core electrical supply cable for the Extract Fan through the 16mm cable gland, see adjacent picture.



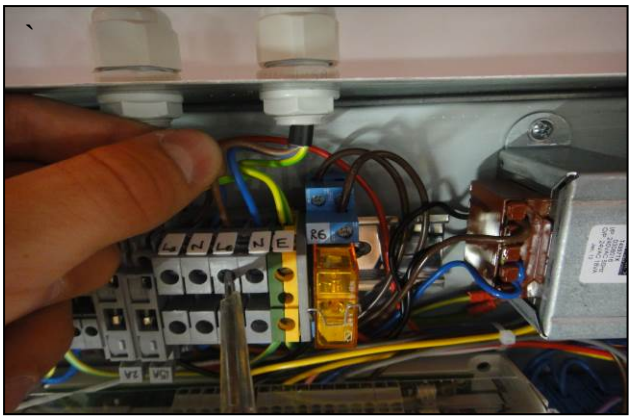
Connect cables from the Extract Fan as shown in the picture:

Brown live wire – Terminal $L_E$

Blue neutral wire – Terminal N

Green/Yellow wire – Terminal E

See Wiring Diagram 1 for details.

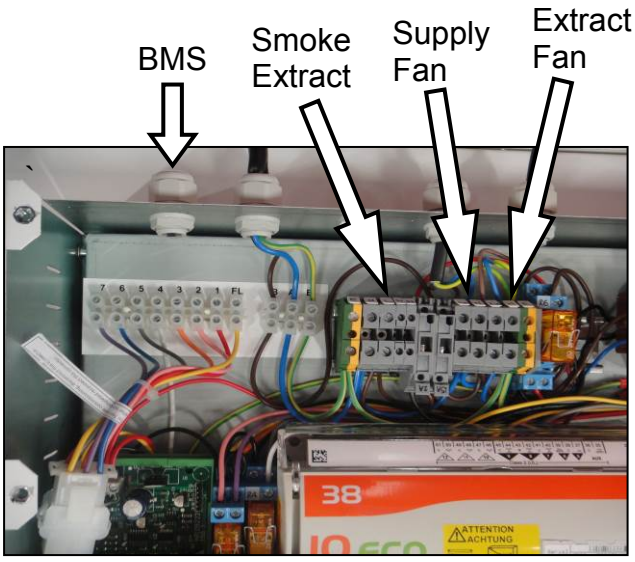


Wire 5 core cable from the Smoke Extract unit located on the duct to terminals E, N, L, S1, S2 in the electric box.

The Supply Fan is pre-wired at the factory to the electric box and will not need any site wiring.

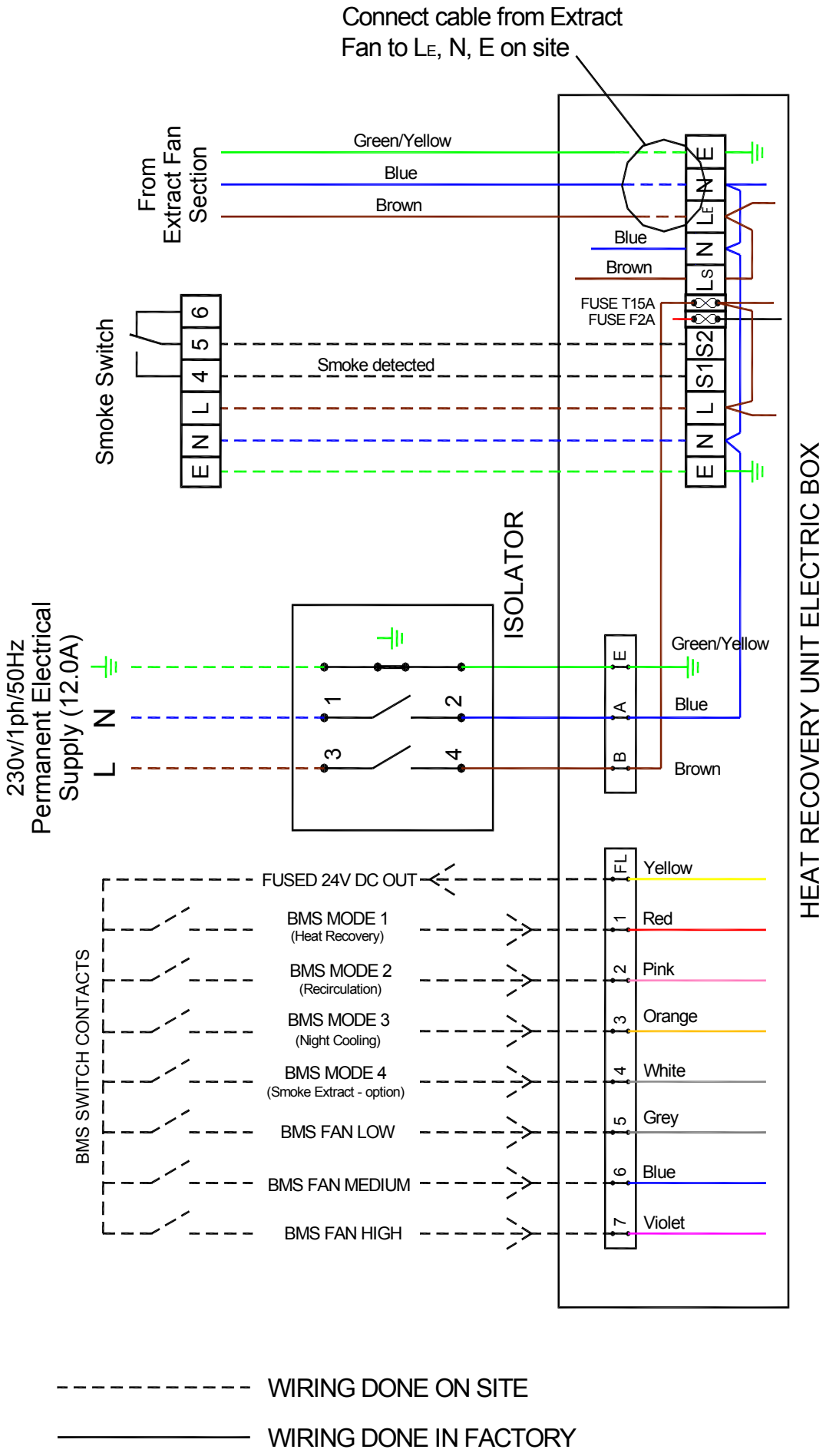
The 16mm size cable gland at the left hand end of the control box, see picture, should be used for wiring the control cables from the site BMS Switch Contacts.

See Wiring Diagram 1 for details.




Recommended wire sizes for electrical connections are as follows:

| Electrical Connection | Wire Size |
|---|---|
| 1-phase electrical supply into local isolator on side of unit | 1.5mm$^2$ max. for access |
| 24V control cables from Site BMS for Mode and Fan speed | 0.75mm$^2$ |




**WIRING DIAGRAM 1 – HR3500 HEAT RECOVERY UNIT (SITE WIRING)**

# COMMISSIONING THE HEAT RECOVERY UNIT

**Ensure that the local electrical supply to the Heat Recovery Unit is switched off.**

## Inspect the outside of the Heat Recovery Unit

Make sure that ductwork is properly fitted to the unit and the correct ducts have been fitted to the correct inlet and outlet spigots on the unit. Check this against Figure 3.

- Fresh Air from Outside (Außenluft) – Duct bringing fresh air from intake louvre in external wall.
- Supply Air to Store (Zuluft) – Duct feeding supply air to Biddle NOZ25 or CC90V unit(s).
- Extract Air from Store (Abluft) – Duct bringing return air back from supermarket.
- Exhaust air to Outside (Fortluft) – Duct taking exhaust air to outlet louvre in external wall.

Make sure that the electrical power cables and the site BMS control cables have been correctly terminated in the control box on the side of the unit. Check this against Wiring Diagram 1. Check that plug-in connectors are plugged into the control box correctly.

## Check the inside of the Heat Recovery Unit

Open all hinged doors to gain access inside the unit to carry out commissioning.

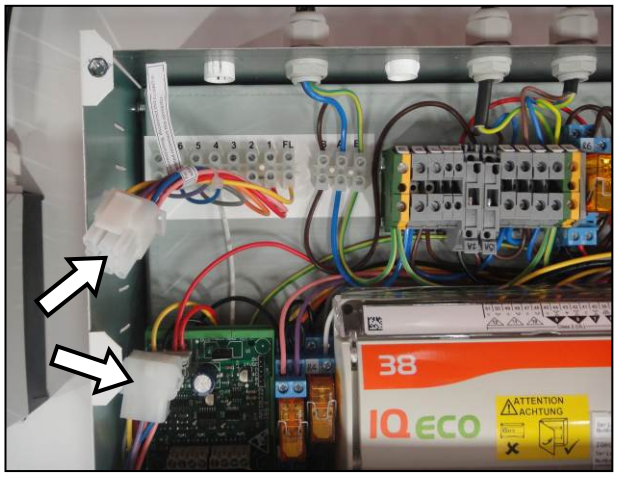
Check that all components inside the Heat Recovery Unit are fitted in place and that all fixing bolts and screws are tight. Check that:

- fan wheels spin freely,
- dampers are closed, they cannot be opened by hand and the rubber gasket seals on damper blades are not damaged,
- air filters are fitted correctly and air direction arrows on air filters are pointing the correct way,
- Differential pressure switches are set correctly, see below:

## Make sure the condensate trap is filled with water.

For commissioning disconnect the BMS 9-way connector fitted inside the control box so the unit can operate in test mode, see arrows in picture.

Switch ON the electrical isolator mounted on the side of the Heat Recovery Unit.



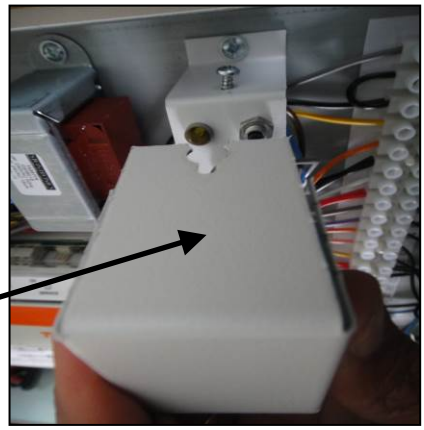

To carry out commissioning tests all the doors on the unit should be closed, except for the recirculation damper access door in the Supply Fan Section and the Summer By-pass access panel in the Heat Exchanger Section. These should be open to see the dampers operating, see pictures:

## Setting Fan Speeds

Refer to graph “k factor = 116”, Figure 11 for setting fan speeds using the pressure tapping readings across the fans

To set the fan speeds 1st remove the metal cover

see pictures



Set control box switches to Mode 1, Fan Speed III (High) and Test.
Switch ON the electrical isolator on the side of the Heat Recovery Unit.

### SETTING SUPPLY FAN SPEEDS

Put pressure gauge across + and – pressure tappings of Supply Fan

Press Button A once – LED A will flash rapidly

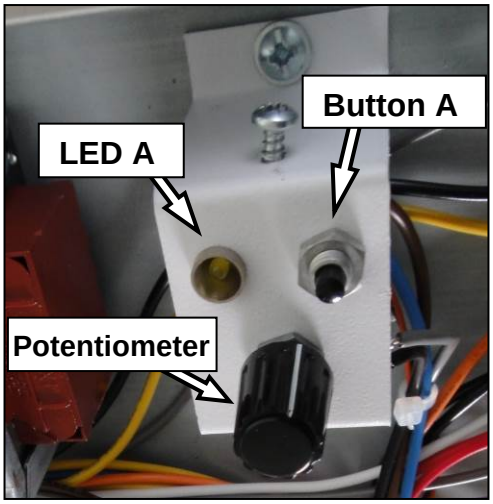
Adjust Supply Fan, High Speed with potentiometer

Set Fan Speed Switch to II (Medium)

Adjust Supply Fan, Medium Speed with potentiometer

Set Fan Speed Switch to I (Low)

Adjust Supply Fan, Low Speed with potentiometer




### SETTING EXTRACT FAN SPEEDS

Put pressure gauge across + and – pressure tappings of Extract Fan

Press Button A once – LED A will flash 3 times every 2 seconds

Adjust Extract Fan, Low Speed with potentiometer

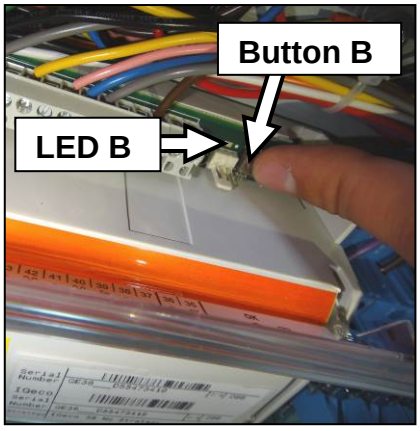
Set Fan Speed Switch to II (Medium)

Adjust Extract Fan, Medium Speed with potentiometer

Set Fan Speed Switch to III (High)

Adjust Extract Fan, High Speed with potentiometer

Press Button A once – LED A will stop flashing




### SAVING FAN SPEED SETTINGS

Push Button B (on IQeco Controller) for between 2 and 5 seconds

LED B (on IQeco Controller) will then flash rapidly for 1 second

LED B will then flash once every 3 seconds

LED B will then flash rapidly for 3 seconds – Press Button B during this 3 second period and fan speed settings are saved into IQeco Controller

Once the fan speeds have been calibrated refit potentiometer cover.

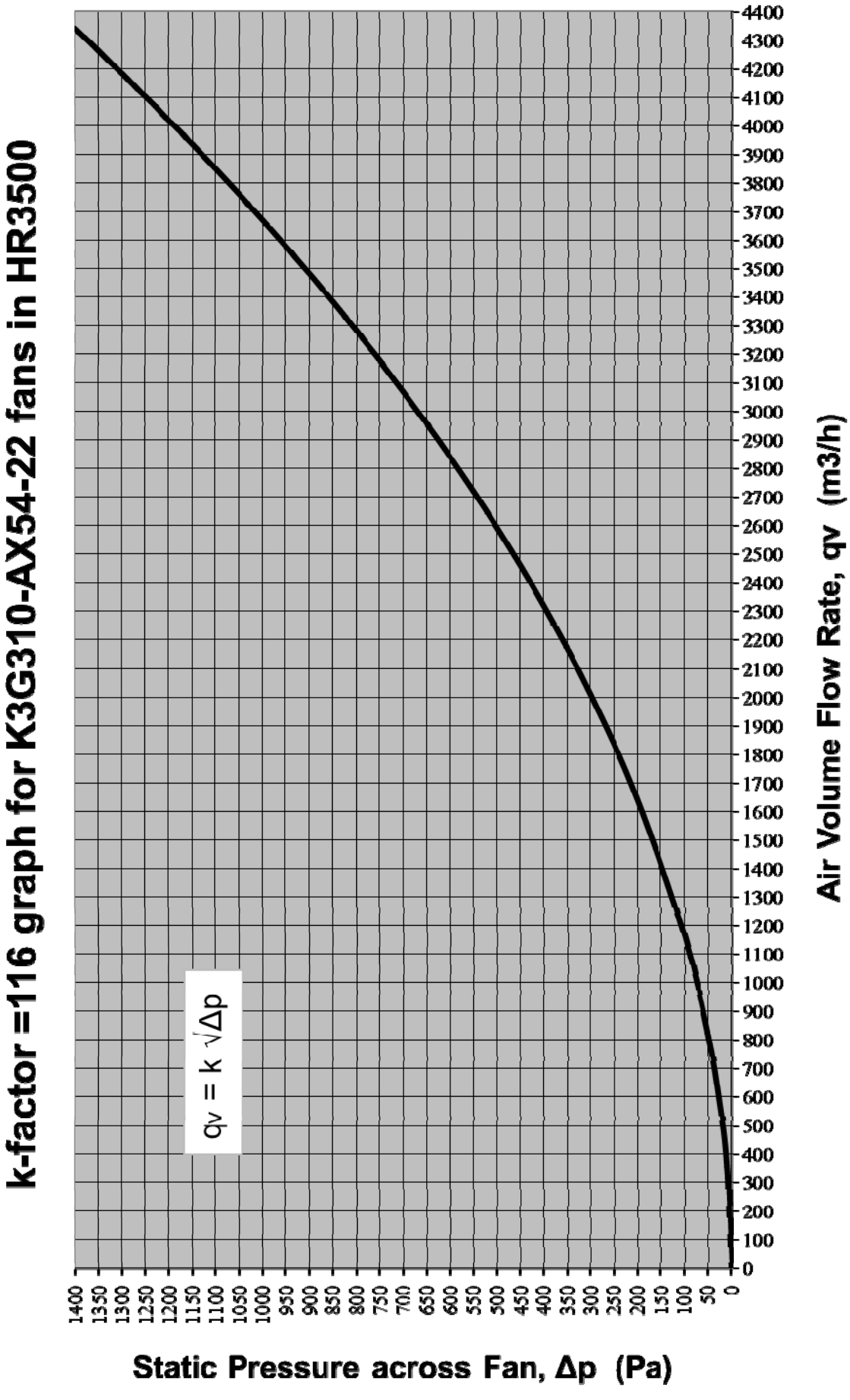



FIGURE 11 – SETTING FAN SPEEDS USING PRESSURE TAPPING READINGS

With the BMS 9-way connector still disconnected, set switches on the front of the control panel to TEST, Fan Speed Low and Mode 1.

Switch on the isolator and check that the Fresh Air and Exhaust dampers slowly open. Ensure both the Supply and Extract fans operate at low speed spinning the correct direction (DANGER - BEWARE OF FAN ROTATING). Ensure the Recirculation damper is closed with the larger Summer By-Pass damper open and the small Summer By-Pass damper closed.

Once the position of all dampers has been verified, turn on the Fan Medium Speed Switch and check that both Supply and Extract Fans operate at medium speed. Similarly turn on the Fan High Speed Switch and check that both Fans operate at high speed.

Using the Fan and Mode switches operate the Heat Recovery Unit in Mode 2 and Mode 3. Refer to Page 5 and check that the fans and dampers respond correctly to each Mode selected. Ensure that there is no mechanical noise or vibration from the fans at any speed. Test the three doors switches operate correctly by briefly opening either Supply Fan (x2) or Extract Fan doors and check all fans and dampers have stopped operating.

## Site BMS

If all the Modes are operating correctly switch the local isolator OFF. With no Modes or fan speeds selected on the BMS reconnect the BMS 9-way connector and switch the Left Hand TEST/GLT Switch to position GLT (downwards position).

Switch on the isolator and make sure 24V DC is present on terminal FL in the control box and see if there is 24V DC on any of the terminals 1 to 7 (see Wiring Diagram 1, Page 20). If possible, get the Site BMS to test each mode and fan speeds and confirm correct fans and dampers operate.

After checking that the unit is operating correctly, refit Condensate access panel and close the air filter door, making sure safety catches and latches are secured properly.

At the end of the tests ensure the TEST/GLT Switch is left in the GLT position to allow the Site BMS to control the Heat Recovery Unit.

## Hand-over to End-User

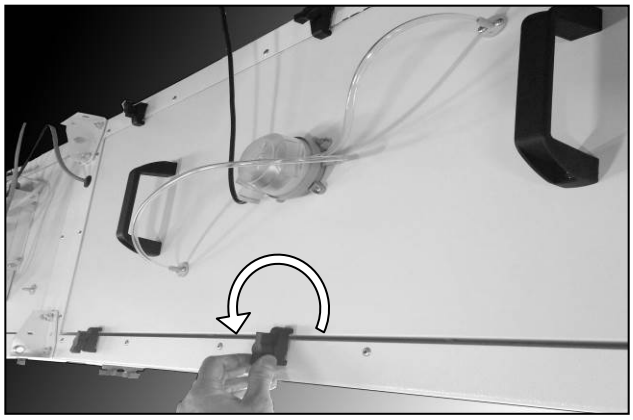
Before leaving site it is important that there is a 'Hand-Over Meeting' to pass-over the heat recovery system to the end user or their representative. This should include a full and clear explanation of how the system operates with the site BMS and a demonstration showing the heat recovery system running. Be sure to explain that the unit must be serviced annually. See “Servicing the Heat Recovery Unit”, Page 26. Explain the operation of the dirty filter light.

Ensure that all instructions and manuals are handed to the end user or their representative.

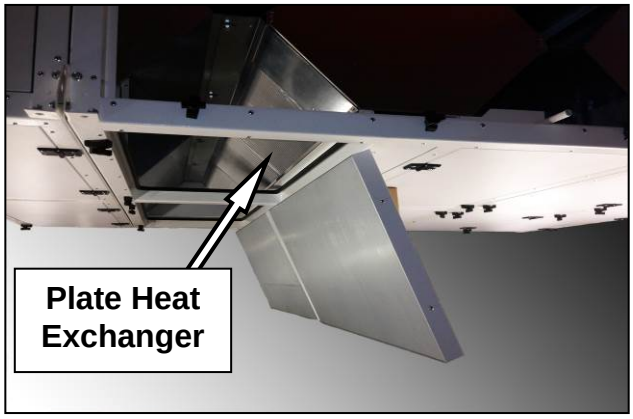
# SERVICING THE HEAT RECOVERY UNIT

**Report to the store manager before working on the Heat Recovery Unit. Ensure that the electrical supply to the Heat Recovery Unit is switched off at the local isolator before starting any servicing work.**

Remove 2-way plug by pressing the locking clips and pulling plug away from the control box.

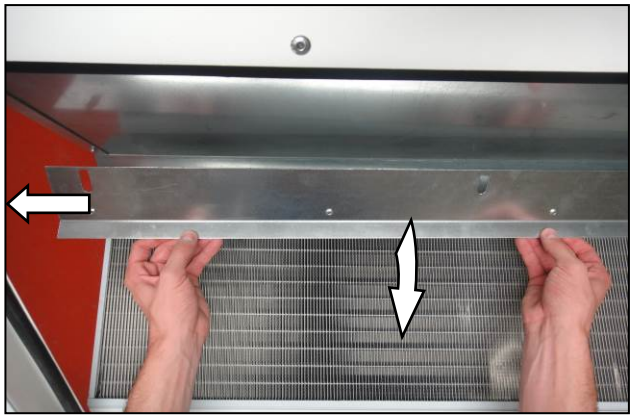


Release six clamps and by gripping the handles lift and pull away the access panel away from the Heat Recovery Unit.

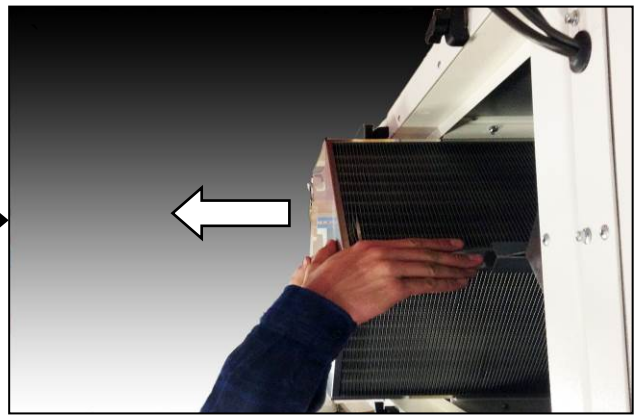



Release plate heat exchanger door clamps and open the two doors (see Picture) to access 13mm bolts holding plate heat exchanger sections in place. Beware, doors will swing down to open and are heavy!

Remove 6 x 13mm bolts form the air separator slide plate that hold the three plate heat exchanges sections together.

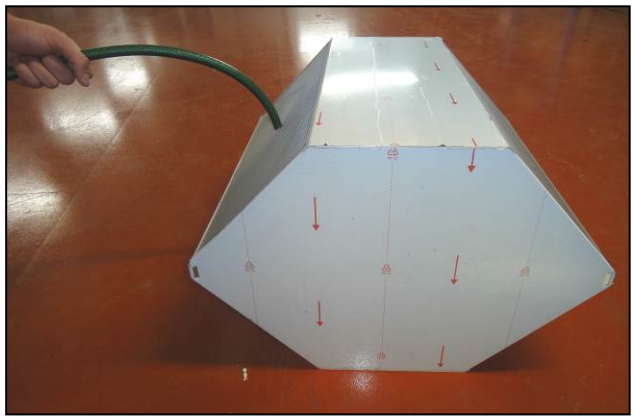


Pull air separator plate away from the plate heat exchanger sections and slide plate out from the Heat Recovery Unit.



Slide the first plate heat exchanger section out from the unit then slide out remaining plate heat exchanger section(s).

Using a hose pipe clean all plate heat exchangers with water.



Unscrew 2 wing-nuts to release metal clamps at each side of the air filter that hold the air filter inside the unit.

There are two separate air filters in the unit, a fresh air filter type F7 and an extract air filter type G4. See Figure 3 to see where in the unit these two air filters are located.

Remove the dirty air filter from the unit.

We recommend replacing the air filters with a clean new set of filters at every service.

Dirty air filters waste energy. Regular air filter changes are important for the correct performance and energy efficiency of the unit.

For replacement air filters:

x1, Fresh Air Filter HR3500, F7
x1, Extract Air Filter HR3500, G4
} HR3500 FILTER SET
Biddle Part No.9C033500

Vacuum clean and brush to remove any build-up of dust, dirt and debris within the Heat Recovery Unit, especially on the fans.

Thoroughly clean all metal surfaces inside of the Heat Recovery Unit using warm water, detergent and a cloth.

*Note: Fan motors are permanently lubricated and require no additional lubrication.*

Clean the condensate drain tray within the unit and check the drain tray spout and condensate pipe drain system is clear by flushing water through from the unit to the drain in the boiler room. Check the condensate drain in the boiler room is not blocked. Make sure the condensate trap is clean and filled with water or condensate may splash within the unit damaging it and leaking out of panels.

Once the Heat Recovery Unit has been cleaned, visually inspect all components and repair or replace if necessary. Check all electrical connections and terminals within the electric box on the side of the unit are tight and that crimp connections have not become loose.

Re-assemble the Heat Recovery Unit by replacing all components in reverse order.

Follow the procedure in Section – Commissioning, Page 21 and fully function test the unit to ensure correct operation.

## Fault Finding for the Heat Recovery Unit

If the Heat Recovery Unit does not operate as expected refer to the fault finding table below:

| Symptom | Possible Cause | Action Required |
|---|---|---|
| Unit does not operate at all | Electrical power is not switched on at the electrical supply or at the local electrical isolator on the side of the Heat Recovery Unit | Switch on electrical power at the electrical supply and the local electrical isolator on the side of the unit |
| | Door switch(s) is not operating | Check doors are shut and door switch operates correctly |
| Fan or Damper in Heat Recovery Unit does not operate (switch is in TEST position) | The wrong Mode switch has been operated | Check on Page 5 which fan or damper should operate with the corresponding Mode switch |
| | Wiring fault inside Electric Box | Refer to separate electric box wiring diagram and rectify fault |
| | Fault with fan motor, motor capacitor, damper motor or damper | Repair or replace fan, capacitor, damper motor or damper |
| Fan or Damper in Heat Recovery Unit does not operate correctly (switch is in GLT position) | BMS is not operating | Make sure BMS is switched on and functioning. Check the operation of fans and dampers first with switch in TEST position to ensure fans and dampers all operate correctly. |
| | The wrong Operating Mode is being called for by the BMS | Check site wiring between the BMS and the Heat Recovery Unit is correct (see Commissioning – Page 21, Site Wiring Diagram - Page 20, Mode explanation - Page 5) |
| | Wiring fault inside Electric Box | Refer to separate electric box wiring diagram and rectify fault |
| Airflow is low | Problem with installation:-<br>Ductwork is high resistance – duct too small, bends are too tight, blockages<br>Outside air louvres are high resistance<br>Obstructions in ductwork system | Correct the problem with the bad installation that is making the air resistance too high for the Heat Recovery Unit. |
| | Fan in NOZ25 or CC90V heater is not operating when the Heat Recovery Unit is operating. | Check the operation of the NOZ25 or CC90V heater and the BMS |
| | Fresh air intake louvre is blocked by debris | Remove debris from fresh air intake louvre and clean |
| | Air filters and/or heat exchanger is dirty. See if Dirty Filter Light shows continuously. | Service Heat Recovery Unit as described in Section – Servicing, Pages 26 to 28 |
| | Damper is not opening when it should | Tighten clamp on shaft. Repair or replace damper motor or damper |
| Heat Recovery Unit sounds noisy | Doors not shut properly | Shut door latches properly |
| | Defective rubber seal on doors | Repair rubber seal on doors |
| | Air filters and/or heat exchanger is dirty | Service unit – see Pages 26-28 |
| | Fan has a mechanical fault | Repair fan |

If the Heat Recovery Unit system is still not operating correctly call for an approved Biddle service agent.

## Warranty

If any problems are encountered with the Heat Recovery Unit please contact your Biddle Service Agent.

Care has been taken in compiling these instructions to ensure they are correct, although Biddle GmbH disclaims all liability for damage resulting from any inaccuracies and/or deficiencies in this documentation. Biddle GmbH retain the right to change the specifications stated in these instructions.

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biddle
CLIMATE SOLUTIONS

# EC DECLARATION OF CONFORMITY

as defined by the EC Council Directive on Machinery 2006/42/EC, the Low Voltage Directive 2006/95/EC, Electromagnetic Compatibility Directive 2004/108/EC, the Energy related Products Directive 2009/125/EC

Herewith we declare that the air movement equipment designated below, on the basis of its design and construction in the form brought onto the market by us in accordance with the relevant safety, health and performance requirements of the Machinery.

If alterations are made to the machinery without prior consultations with us, this declaration becomes invalid.

| | |
|---|---|
| Designation of Equipment : | BIDDLE HEAT RECOVERY UNIT |
| Series Type : | HR2500, HR3500 |
| Relevant EC Council Directives : | the Machinery Directive (2006/42/EC)<br>the Low Voltage Directive (2006/95/EC)<br>the Electromagnetic Compatibility Directive (2004/108/EC)<br>the Energy related Products Directive (2009/125/EC) |
| Applied Harmonised Standards : | Machinery - EN ISO 14121-1:2007, EN 294:1992, EN 414:2000<br>LVD - EN 60335-1:2002, EN 60335-2-30:2003, EN 60335-2-40:2003<br>EMC - EN 61000-6-1:2007, EN 61000-6-3:2007,<br>EN 61000-3-2:2006 + A2:2009, EN 61000-3-3:2008<br>ErP - ISO 5801:2007, ISO 12759:2010 |
| Basis of Self Attestation : | Quality Assurance to BS EN ISO 9001 : 2008<br>B.S.I. Registered Firm Certificate Number FM 02234<br>SGS Test Report DUR 43908/2/R/RG/05<br>Wemtech Test Report 6660 |
| Responsible Person : | Mr. P.Casey, Site Managing Director, Thermoscreens Ltd. |
| Date : | 1st June 2015 |
| Signed : | |