



# AIR HANDLING UNIT & MVHR TECHNICAL SUBMISSION

Highgate Newtown Community Centre, Camden

TS-ME- 041  
REV 01

|                                 |                                                                                                                                                                                                                                                                                                             |                  |  |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--|
| PROJECT NAME                    | Highgate Newtown Community Centre                                                                                                                                                                                                                                                                           |                  |  |
| PROJECT NO                      | M1104 / E1418                                                                                                                                                                                                                                                                                               |                  |  |
| SUBMISSION No                   | TS-ME-041                                                                                                                                                                                                                                                                                                   |                  |  |
| DESCRIPTION                     | Air Handling Unit & MVHR Technical Submittal                                                                                                                                                                                                                                                                |                  |  |
| MAIN CONTRACTOR                 | Farrans Construction                                                                                                                                                                                                                                                                                        |                  |  |
| CONSULTING ENGINEER             | FLOH                                                                                                                                                                                                                                                                                                        |                  |  |
| HARVEY GROUP SUBMITTED BY:      | MM                                                                                                                                                                                                                                                                                                          | Date: 08.02.2022 |  |
| HARVEY GROUP REVIEWED BY:       | JB                                                                                                                                                                                                                                                                                                          | Date: 08.02.2022 |  |
| HARVEY GROUP APPROVED BY:       | BH                                                                                                                                                                                                                                                                                                          | Date: 08.02.2022 |  |
| CLIENT APPROVAL SECTION BELOW   |                                                                                                                                                                                                                                                                                                             |                  |  |
| DATE COMMENTS DUE               |                                                                                                                                                                                                                                                                                                             |                  |  |
| CONSULTANTS COMMENTS            | <p>Ensure all equipment is in accordance with outline specification.</p> <p>Ensure all equipment is accessible for maintenance and replacement</p> <p>Ensure units are all mounted with sufficient anti vibration mounting and provided with attenuation to meet requirements of outline specification.</p> |                  |  |
| Indicate appropriate box below: |                                                                                                                                                                                                                                                                                                             | Date:            |  |
| <b>A</b>                        | <b>B</b>                                                                                                                                                                                                                                                                                                    | <b>C</b>         |  |

## **Technical submission**

### **Contents**

**1.0 Equipment selection information**

**2.0 Manufacturers information**

## 1.0 Equipment Selection Information

## **Highgate Newtown Community Centre**

### **AHU, MHVR, Supply & Extract Fan Schedules**

**Status: S4 Issued for Stage Approval**



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## Document History

| Version | Issued     | Comments                                |
|---------|------------|-----------------------------------------|
| P01     | 02/03/2021 | Preliminary Issue                       |
| P02     | 09/07/2021 | Revised as Per Schedule                 |
| P03     | 16/07/2021 | Revised as Per Schedule                 |
| P04     | 23/07/2021 | Schedules Separated                     |
| P05     | 10/08/2021 | Internal / External Mounting Identified |

## Mechanical Ventilation Heat Recovery Units

**TYPE** Packaged Type

**APPLICATION** General Supply and Extract Ventilation

| Reference               | Serving                                            | Efficiency (%) | SFP  | Supply Duty |     | Extract Duty |     |
|-------------------------|----------------------------------------------------|----------------|------|-------------|-----|--------------|-----|
|                         |                                                    |                |      | m³/sec      | Pa  | m³/sec       | Pa  |
| 00-HRU-01<br>(INTERNAL) | GF - B.0.21, B.0.22,<br>B.0.22 (Activity<br>Rooms) | 84             | 0.84 | 0.18        | 150 | 0.18         | 150 |

HRU shall come c/w integral control, 3-port valve, temp sensors, room controller and service controller. HRU shall have Plate heat exchanger, M5/F7 filters, frost coil (2KW) & LPHW Coil (3KW). Temperature & Co2 sensors shall be inputted via the BMS.

| Reference               | Serving                 | Efficiency (%) | SFP  | Supply Duty |     | Extract Duty |     |
|-------------------------|-------------------------|----------------|------|-------------|-----|--------------|-----|
|                         |                         |                |      | m³/sec      | Pa  | m³/sec       | Pa  |
| 00-HRU-02<br>(INTERNAL) | GF – B.0.01<br>(Office) | 84             | 0.84 | 0.06        | 100 | 0.06         | 100 |

HRU shall come c/w integral control, 3-port valve, temp sensors, room controller and service controller. HRU shall have Plate heat exchanger, M5/F7 filters, frost coil (1.5KW) & LPHW Coil (1.5KW). The HRU shall have variable control and shall run on a time clock.

| Reference               | Serving                              | Efficiency (%) | SFP  | Supply Duty |     | Extract Duty |     |
|-------------------------|--------------------------------------|----------------|------|-------------|-----|--------------|-----|
|                         |                                      |                |      | m³/sec      | Pa  | m³/sec       | Pa  |
| 03-HRU-01<br>(INTERNAL) | TF – B.3.06<br>(Recording<br>Studio) | 84             | 0.84 | 0.06        | 100 | 0.06         | 100 |

HRU shall come c/w integral control, 3-port valve, temp sensors, room controller and service controller. HRU shall have Plate heat exchanger, M5/F7 filters, frost coil (1.5KW) & LPHW Coil (1.5KW). Temperature & Co2 sensors shall be inputted via the BMS.

| Reference               | Serving                    | Efficiency (%) | SFP  | Supply Duty |     | Extract Duty |     |
|-------------------------|----------------------------|----------------|------|-------------|-----|--------------|-----|
|                         |                            |                |      | m³/sec      | Pa  | m³/sec       | Pa  |
| 03-HRU-02<br>(EXTERNAL) | TF – B.3.02<br>(Juice Bar) | 89             | 0.84 | 0.25        | 150 | 0.25         | 150 |

HRU shall come c/w integral control, temp sensors, room controller and service controller. HRU shall have Plate heat exchanger, M5/F7 filters. The HRU shall operate on a time clock controlled via the BMS.

| Reference                 | Serving       | Efficiency (%) | SFP  | Supply Duty         |     | Extract Duty        |     |
|---------------------------|---------------|----------------|------|---------------------|-----|---------------------|-----|
|                           |               |                |      | m <sup>3</sup> /sec | Pa  | m <sup>3</sup> /sec | Pa  |
| D-00-HRU-01<br>(INTERNAL) | Block D - Gym | 84             | 0.84 | 0.08                | 100 | 0.08                | 100 |

HRU shall come c/w integral control, 3-port valve, temp sensors, room controller and service controller. HRU shall have Plate heat exchanger, M5/F7 filters, frost coil (1.5KW) & LPHW Coil (1.5KW). Temperature & Co2 sensors shall be inputted via the BMS.

#### Note

The following shall be controlled and monitored via the BMS:

- Motorised valves which control the LTHW volume into the AHU's frost coil.
- The motorised valve to be controlled via a temperature sensor within the air stream.
- Motorised valves which controls the LTHW volume into the AHU's heating coil.
- The motorised valve to be controlled via a temperature sensor within the air stream.
- The AHU's variable motors.
- Pressure differential set points inputted by the BMS which shall control the fans.
- Monitor and raise any alarms if there are any faults or out of range values.
- Monitor and set points on temperature and CO2 sensors which control AHUs.

## Air Handling Unit

**TYPE** Packaged Type

**APPLICATION** General Supply and Extract Ventilation

| Reference               | Serving                    | Efficiency (%) | SFP | Supply Duty         |     | Extract Duty        |     |
|-------------------------|----------------------------|----------------|-----|---------------------|-----|---------------------|-----|
|                         |                            |                |     | m <sup>3</sup> /sec | Pa  | m <sup>3</sup> /sec | Pa  |
| RF-AHU-01<br>(EXTERNAL) | Sports / Community<br>Hall | 73             | 1.8 | 0.85                | 200 | 0.85                | 200 |

AHU shall come c/w integral control, 3-port valve, temp sensors, room controller and service controller. HRU shall have thermal wheel heat exchanger, M5/F7 filters, frost coil (5KW) & LPHW Coil (15KW)

All HRU / AHU units shall be connected to the BMS system for enable / fault & monitoring functionality. Temperature & Co2 sensors shall be inputted via the BMS.

### Note

The following shall be controlled and monitored via the BMS:

- Motorised valves which control the LTHW volume into the AHU's frost coil.
- The motorised valve to be controlled via a temperature sensor within the air stream.
- Motorised valves which controls the LTHW volume into the AHU's heating coil.
- The motorised valve to be controlled via a temperature sensor within the air stream.
- The AHU's variable motors.
- Pressure differential set points inputted by the BMS which shall control the fans.
- Monitor and raise any alarms if there are any faults or out of range values.
- Monitor and set points on temperature and CO2 sensors which control AHUs.

Project: Ventilation Design Calculations  
 Project No: 2760  
 By: Kevin Brady  
 Date: 18/01/2022  
 Revision: P01



### Block B - Ventilation Design Calculations

| 00-EF-02               |            |           |                            |          |       |                |
|------------------------|------------|-----------|----------------------------|----------|-------|----------------|
| Room                   | Length (m) | Width (w) | Height (h)                 | Vol (m3) | ACH   | Air Flow (l/s) |
| B-GF-13 Laundry        | 1.8        | 2         | 2.4                        | 8.64     | 6     | 14             |
| B-GF-34 Unisex WC      | 1.7        | 1         | 2.4                        | 4.08     | 6     | 7              |
| B-GF-35 Acc WC         | 1.9        | 2.3       | 2.4                        | 10.488   | 6     | 17             |
| B-GF-21 WC             | 1.7        | 1.2       | 2.4                        | 4.896    | 6     | 8              |
| B-GF-20 WC             | 1.7        | 1         | 2.4                        | 4.08     | 6     | 7              |
| B-GF-19 WC             | 1.7        | 1         | 2.4                        | 4.08     | 6     | 7              |
| B-GF-18 WC             | 1.7        | 1         | 2.4                        | 4.08     | 6     | 7              |
| B-GF-17 WC             | 1.7        | 1         | 2.4                        | 4.08     | 6     | 7              |
| B-GF-16 WC             | 1.7        | 1         | 2.4                        | 4.08     | 6     | 7              |
| B-GF-15 WC             | 1.7        | 1         | 2.4                        | 4.08     | 6     | 7              |
| B-GF-11 Cleaners Store | 5.4        | 1.3       | 2.4                        | 16.848   | 6     | 28             |
|                        |            |           |                            |          |       |                |
|                        |            |           |                            |          | Total | 116            |
|                        |            |           | Supply at 80% Extract Duty |          | Total | 93             |

| 00-SF-01  |                  |                    |                        |
|-----------|------------------|--------------------|------------------------|
| Room      | Flow Rate per kW | Boiler Output (kW) | Supply Flow Rate (l/s) |
| Plantroom | 2.8              | 500                | 389                    |

| 00-EF-01  |                  |                    |                              |                             |
|-----------|------------------|--------------------|------------------------------|-----------------------------|
| Room      | Flow Rate per kW | Boiler Output (kW) | Diff Extract Flow Rate (l/s) | Act Extract Flow Rate (l/s) |
| Plantroom | 2.07             | 500                | 288                          | 101                         |

| 01-EF-02       |            |           |            |          |       |                |
|----------------|------------|-----------|------------|----------|-------|----------------|
| Room           | Length (m) | Width (w) | Height (h) | Vol (m3) | ACH   | Air Flow (l/s) |
| B-01-27 Store  | 2.4        | 1         | 2.4        | 5.76     | 6     | 10             |
| B-01-28 WC     | 1.1        | 2.2       | 2.4        | 5.808    | 6     | 10             |
| B-01-29 ACC WC | 1.5        | 2.2       | 2.4        | 7.92     | 6     | 13             |
|                |            |           |            |          | Total | 32             |

| 01-SF-01              |            |           |            |          |     |                |
|-----------------------|------------|-----------|------------|----------|-----|----------------|
| Room                  | Length (m) | Width (w) | Height (h) | Vol (m3) | ACH | Air Flow (l/s) |
| B-01-25 Activity Room | 54         | 1         | 3          | 162      | 2   | 90             |

| 01-EF-01              |            |           |            |          |     |                |
|-----------------------|------------|-----------|------------|----------|-----|----------------|
| Room                  | Length (m) | Width (w) | Height (h) | Vol (m3) | ACH | Air Flow (l/s) |
| B-01-25 Activity Room | 54         | 1         | 3          | 162      | 2   | 90             |

| 02-EF-01       |            |           |            |          |       |                |
|----------------|------------|-----------|------------|----------|-------|----------------|
| Room           | Length (m) | Width (w) | Height (h) | Vol (m3) | ACH   | Air Flow (l/s) |
| B-02-36 Store  | 2.4        | 1         | 2.4        | 5.76     | 6     | 10             |
| B-02-37 WC     | 1.1        | 2.2       | 2.4        | 5.808    | 6     | 10             |
| B-02-38 ACC WC | 1.5        | 2.2       | 2.4        | 7.92     | 6     | 13             |
|                |            |           |            |          | Total | 32             |

| 03-EF-01       |            |           |            |          |       |                |
|----------------|------------|-----------|------------|----------|-------|----------------|
| Room           | Length (m) | Width (w) | Height (h) | Vol (m3) | ACH   | Air Flow (l/s) |
| B-03-45 Store  | 2.4        | 1         | 2.4        | 5.76     | 6     | 10             |
| B-03-46 WC     | 1.1        | 2.2       | 2.4        | 5.808    | 6     | 10             |
| B-03-47 ACC WC | 1.5        | 2.2       | 2.4        | 7.92     | 6     | 13             |
|                |            |           |            |          | Total | 32             |

**00-HRU-01 SUPPLY**

| Section reference | Length (m) | Volume<br>(m <sup>3</sup> /s) | Rate of<br>PD | Velocity<br>(m) | Duct size<br>(mm) | VP<br>(pa/m) | Zeta<br>factor | Resistance (Pa) |          |       |                      |
|-------------------|------------|-------------------------------|---------------|-----------------|-------------------|--------------|----------------|-----------------|----------|-------|----------------------|
|                   |            |                               | (pa/m)        |                 |                   |              |                | straight        | fittings | Total | Cumulati<br>ve total |
| Supply Grille     |            | 0.06                          |               | 1.9             | 160               | 2.2          |                | 0.0             | 20.0     | 20.0  | 20.0                 |
| Duct              | 0.3        | 0.06                          | 1.42          | 1.9             | 160               | 2.2          |                | 0.4             | 0.0      | 0.4   | 20.4                 |
| Reducer           |            | 0.06                          |               | 1.9             | 200/160           | 2.2          | 0.05           | 0.0             | 0.1      | 0.1   | 20.5                 |
| Duct              | 0          | 0.06                          | 0.28          | 1.9             | 200               | 2.2          |                | 0.0             | 0.0      | 0.0   | 20.5                 |
| VCD               |            | 0.06                          |               | 1.9             | 200               | 2.2          |                | 0.0             | 5.0      | 5.0   | 25.5                 |
| Duct              | 0          | 0.06                          | 0.28          | 1.9             | 200               | 2.2          |                | 0.0             | 0.0      | 0.0   | 25.5                 |
| Bend-90           |            | 0.06                          |               | 1.9             | 200               | 2.2          | 0.343          | 0.0             | 0.7      | 0.7   | 26.3                 |
| Duct              | 0          | 0.06                          | 0.28          | 1.9             | 200               | 2.2          |                |                 | 0.0      | 0.0   | 26.3                 |
| Tap               |            | 0.06                          |               | 1.9             | 200/200           | 2.2          | 0.712          | 0.0             | 1.5      | 1.5   | 27.8                 |
| Duct              | 0.3        | 0.12                          |               | 3.8             | 200               | 8.7          |                | 0.0             | 0.0      | 0.0   | 27.8                 |
| Duct              | 1.9        | 0.12                          | 0.98          | 3.8             | 200               | 8.7          |                | 1.9             | 0.0      | 1.9   | 29.7                 |
| Reducer           |            | 0.12                          |               | 2.4             | 250/200           | 3.5          | 0.05           | 0.0             | 0.2      | 0.2   | 29.9                 |
| Duct              | 0.4        | 0.12                          | 0.33          | 2.4             | 250               | 3.5          |                | 0.1             | 0.0      | 0.1   | 30.0                 |
| Duct              | 0.3        | 0.18                          |               | 3.7             | 250               | 8.2          | 0.002          | 0.0             | 0.0      | 0.0   | 30.0                 |
| Duct              | 0.1        | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                |                 | 0.0      | 0.0   | 30.0                 |
| Bend-90           |            | 0.18                          |               | 3.7             | 250               | 8.2          | 0.332          | 0.0             | 2.7      | 2.7   | 32.8                 |
| Duct              | 0          | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 0.0             | 0.0      | 0.0   | 32.8                 |
| Fire Damper       |            | 0.18                          |               | 3.7             | 250               | 8.2          |                | 0.0             | 0.0      | 0.0   | 32.8                 |
| Duct              | 0.1        | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 0.1             | 0.0      | 0.1   | 32.8                 |
| Bend-45           |            | 0.18                          |               | 3.7             | 250               | 8.2          | 0.122          | 0.0             | 1.0      | 1.0   | 33.8                 |
| Duct              | 0.1        | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 0.1             | 0.0      | 0.1   | 33.9                 |
| Bend-45           |            | 0.18                          |               | 3.7             | 250               | 8.2          | 0.122          | 0.0             | 1.0      | 1.0   | 34.9                 |
| Duct              | 0.6        | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 0.4             | 0.0      | 0.4   | 35.3                 |
| Bend-90           |            | 0.18                          |               | 3.7             | 250               | 8.2          | 0.332          | 0.0             | 2.7      | 2.7   | 38.1                 |
| Duct              | 2          | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 1.4             | 0.0      | 1.4   | 39.4                 |
| Attenuator        |            | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 0.0             | 23.0     | 23.0  | 62.4                 |
| HRU               | -          | -                             | -             | -               | -                 | -            | -              |                 |          | 0.0   | 62.4                 |
| Duct              | 0.1        | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 0.1             | 0.0      | 0.1   | 62.5                 |
| Attenuator        |            | 0.18                          |               | 3.7             | 250               | 8.2          |                | 0.0             | 5.0      | 5.0   | 67.5                 |
| Duct              | 0.8        | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 0.6             | 0.0      | 0.6   | 68.1                 |
| Bend-90           |            | 0.18                          |               | 3.7             | 250               | 8.2          | 0.332          | 0.0             | 2.7      | 2.7   | 70.8                 |
| Duct              | 1.3        | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 0.9             | 0.0      | 0.9   | 71.7                 |
| Bend-45           |            | 0.18                          |               | 3.7             | 250               | 8.2          | 0.122          | 0.0             | 1.0      | 1.0   | 72.7                 |
| Duct              | 0.1        | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 0.1             | 0.0      | 0.1   | 72.8                 |
| Bend-45           |            | 0.18                          |               | 3.7             | 250               | 8.2          | 0.122          | 0.0             | 1.0      | 1.0   | 73.8                 |
| Duct              | 0          | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 0.0             | 0.0      | 0.0   | 73.8                 |
| Fire Damper       |            | 0.18                          |               | 3.7             | 250               | 8.2          |                | 0.0             | 0.0      | 0.0   | 73.8                 |
| Duct              | 0.4        | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 0.3             | 0.0      | 0.3   | 74.0                 |
| Bend-90           |            | 0.18                          |               | 3.7             | 250               | 8.2          | 0.332          | 0.0             | 2.7      | 2.7   | 76.8                 |
| Duct              | 0.8        | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 0.6             | 0.0      | 0.6   | 77.3                 |
| Bend-90           |            | 0.18                          |               | 3.7             | 250               | 8.2          | 0.332          | 0.0             | 2.7      | 2.7   | 80.1                 |
| Duct              | 0          | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 0.0             | 0.0      | 0.0   | 80.1                 |
| Bend-45           |            | 0.18                          |               | 3.7             | 250               | 8.2          | 0.122          | 0.0             | 1.0      | 1.0   | 81.1                 |
| Duct              | 2          | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 1.4             | 0.0      | 1.4   | 82.5                 |
| Weather Hood      |            | 0.18                          |               | 3.7             | 250               | 8.2          |                | 0.0             | 20.0     | 20.0  | 102.5                |

**00-HRU-01 EXTRACT**

| Section reference | Length<br>(m) | Volume<br>(m <sup>3</sup> /s) | Rate of<br>PD | Velocity<br>(m) | Duct size<br>(mm) | VP<br>(pa/m) | Zeta<br>factor | Resistance (Pa) |          |       |                     |
|-------------------|---------------|-------------------------------|---------------|-----------------|-------------------|--------------|----------------|-----------------|----------|-------|---------------------|
|                   |               |                               | (pa/m)        |                 |                   |              |                | straight        | fittings | Total | Cumulative<br>total |
| Extract Grille    |               | 0.06                          |               | 1.9             | 160               | 2.2          |                | 0.0             | 20.0     | 20.0  | 20.0                |
| Duct              | 0.4           | 0.06                          | 1.42          | 1.9             | 160               | 2.2          |                | 0.6             | 0.0      | 0.6   | 20.6                |
| Reducer           |               | 0.06                          |               | 1.9             | 200/160           | 2.2          | 0.087          | 0.0             | 0.2      | 0.2   | 20.8                |
| Duct              | 2.1           | 0.06                          | 0.28          | 1.9             | 200               | 2.2          |                | 0.6             | 0.0      | 0.6   | 21.3                |
| VCD               |               | 0.06                          |               | 1.9             | 200               | 2.2          |                | 0.0             | 5.0      | 5.0   | 26.3                |
| Duct              | 0.1           | 0.06                          | 0.28          | 1.9             | 200               | 2.2          |                | 0.0             | 0.0      | 0.0   | 26.4                |
| Attenuator        |               | 0.06                          |               | 1.9             | 200               | 2.2          |                | 0.0             | 5.0      | 5.0   | 31.4                |
| Duct              | 0.2           | 0.06                          | 0.28          | 1.9             | 200               | 2.2          |                | 0.1             | 0.0      | 0.1   | 31.4                |
| Duct              | 0.3           | 0.12                          |               | 3.8             | 200               | 8.7          | 0.348          | 0.0             | 3.0      | 3.0   | 34.5                |
| Duct              | 0.3           | 0.12                          | 0.98          | 3.8             | 200               | 8.7          |                | 0.3             | 0.0      | 0.3   | 34.8                |
| Bend-45           |               | 0.12                          |               | 3.8             | 200               | 8.7          | 0.115          | 0.0             | 1.0      | 1.0   | 35.8                |
| Duct              | 0.1           | 0.12                          | 0.98          | 3.8             | 200               | 8.7          |                | 0.1             | 0.0      | 0.1   | 35.8                |
| Bend-45           |               | 0.12                          |               | 3.8             | 200               | 8.7          | 0.115          | 0.0             | 1.0      | 1.0   | 36.8                |
| Duct              | 1.3           | 0.12                          | 0.98          | 3.8             | 200               | 8.7          |                | 1.3             | 0.0      | 1.3   | 38.1                |
| Attenuator        |               | 0.12                          |               | 3.8             | 200               | 8.7          |                | 0.0             | 5.0      | 5.0   | 43.1                |
| Duct              | 0             | 0.12                          | 0.98          | 3.8             | 200               | 8.7          |                | 0.0             | 0.0      | 0.0   | 43.1                |
| Reducer           |               | 0.12                          |               | 2.4             | 250/200           | 3.5          | 0.087          | 0.0             | 0.3      | 0.3   | 43.4                |
| Duct              | 0.1           | 0.12                          | 0.33          | 2.4             | 250               | 3.5          |                | 0.0             | 0.0      | 0.0   | 43.5                |
| Bend-90           |               | 0.12                          |               | 2.4             | 250               | 3.5          | 0.343          | 0.0             | 1.2      | 1.2   | 44.6                |
| Duct              | 0             | 0.12                          | 0.33          | 2.4             | 250               | 3.5          |                | 0.0             | 0.0      | 0.0   | 44.6                |
| Duct              | 0.3           | 0.18                          |               | 3.7             | 250               | 8.2          | 0.27           | 0.0             | 2.2      | 2.2   | 46.9                |
| Duct              | 2.8           | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 1.9             | 0.0      | 1.9   | 48.8                |
| Fire Damper       |               | 0.18                          |               | 3.7             | 250               | 8.2          |                | 0.0             | 0.0      | 0.0   | 48.8                |
| Duct              | 0.1           | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 0.1             | 0.0      | 0.1   | 48.9                |
| Bend-45           |               | 0.18                          |               | 3.7             | 250               | 8.2          | 0.111          | 0.0             | 0.9      | 0.9   | 49.8                |
| Duct              | 0.1           | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 0.1             | 0.0      | 0.1   | 49.9                |
| Bend-45           |               | 0.18                          |               | 3.7             | 250               | 8.2          | 0.122          | 0.0             | 1.0      | 1.0   | 50.9                |
| Duct              | 1.2           | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 0.8             | 0.0      | 0.8   | 51.7                |
| Bend-90           |               | 0.18                          |               | 3.7             | 250               | 8.2          | 0.332          | 0.0             | 2.7      | 2.7   | 54.4                |
| Duct              | 3             | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 2.1             | 0.0      | 2.1   | 56.5                |
| Attenuator        |               | 0.06                          |               | 1.9             | 200               | 2.2          |                | 0.0             | 5.0      | 23.0  | 79.5                |
| Fan               | -             | -                             | -             | -               | -                 | -            | -              |                 |          | 0.0   | 79.5                |
| Duct              | 0.1           | 0.18                          | 0.69          | 3.7             | 250               | 8.2          |                | 0.1             | 0.0      | 0.1   | 79.6                |
| Attenuator        |               | 0.18                          |               | 3.7             | 251               | 8.2          |                | 0.0             | 0.0      | 5.0   | 84.6                |
| Duct              | 0.1           | 0.18                          | 0.69          | 3.7             | 252               | 8.2          |                | 0.1             | 0.0      | 0.1   | 84.6                |
| Bend-90           |               | 0.18                          |               | 3.7             | 253               | 8.2          | 0.332          | 0.0             | 2.7      | 2.7   | 87.4                |
| Duct              | 0.7           | 0.18                          | 0.69          | 3.7             | 254               | 8.2          |                | 0.5             | 0.0      | 0.5   | 87.9                |
| Bend-45           |               | 0.18                          |               | 3.7             | 255               | 8.2          | 0.122          | 0.0             | 1.0      | 1.0   | 88.9                |
| Duct              | 0.1           | 0.18                          | 0.69          | 3.7             | 256               | 8.2          |                | 0.1             | 0.0      | 0.1   | 88.9                |
| Bend-45           |               | 0.18                          |               | 3.7             | 257               | 8.2          | 0.111          | 0.0             | 0.9      | 0.9   | 89.9                |
| Duct              | 0             | 0.18                          | 0.69          | 3.7             | 258               | 8.2          |                | 0.0             | 0.0      | 0.0   | 89.9                |
| Fire Damper       |               | 0.18                          |               | 3.7             | 259               | 8.2          |                | 0.0             | 0.0      | 0.0   | 89.9                |
| Duct              | 0.4           | 0.18                          | 0.69          | 3.7             | 260               | 8.2          |                | 0.3             | 0.0      | 0.3   | 90.1                |
| Bend-90           |               | 0.18                          |               | 3.7             | 261               | 8.2          | 0.332          | 0.0             | 2.7      | 2.7   | 92.9                |
| Duct              | 0.8           | 0.18                          | 0.69          | 3.7             | 262               | 8.2          |                | 0.6             | 0.0      | 0.6   | 93.4                |
| Bend-90           |               | 0.18                          |               | 3.7             | 263               | 8.2          | 0.332          | 0.0             | 2.7      | 2.7   | 96.2                |
| Duct              | 0.4           | 0.18                          | 0.69          | 3.7             | 264               | 8.2          |                | 0.3             | 0.0      | 0.3   | 96.4                |
| Weather Hood      |               | 0.18                          |               | 3.7             | 250               | 8.2          |                | 0.0             | 20.0     | 20.0  | 116.4               |

**00-HRU-02 SUPPLY**

| Section reference | Length (m) | Volume (m <sup>3</sup> /s) | Rate of PD | Velocity (m) | Duct size (mm) | VP (pa/m) | Zeta factor | Resistance (Pa) |          |       |                  |
|-------------------|------------|----------------------------|------------|--------------|----------------|-----------|-------------|-----------------|----------|-------|------------------|
|                   |            |                            | (pa/m)     |              |                |           |             | straight        | fittings | Total | Cumulative total |
| Supply Grille     |            | 0.06                       |            | 1.9          | 160            | 2.2       |             | 0.0             | 20.0     | 20.0  | 20.0             |
| Duct              | 0.2        | 0.06                       | 1.42       | 1.9          | 160            | 2.2       |             | 0.3             | 0.0      | 0.3   | 20.3             |
| Reducer           |            | 0.06                       |            | 1.9          | 200/160        | 2.2       | 0.05        | 0.0             | 0.1      | 0.1   | 20.4             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 21.1             |
| Duct              | 0.3        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.1             | 0.0      | 0.1   | 21.2             |
| Reducer           |            | 0.06                       |            | 1.1          | 275x200/200    | 0.7       | 0.05        | 0.0             | 0.0      | 0.0   | 21.3             |
| Attenuator        |            | 0.06                       |            | 1.1          | 275x200        | 0.7       |             | 0.0             | 20.0     | 20.0  | 41.3             |
| Reducer           |            | 0.06                       |            | 1.9          | 275x200/200    | 2.2       | 0.111       | 0.0             | 0.2      | 0.2   | 41.5             |
| Duct              | 0.2        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.1             | 0.0      | 0.1   | 41.6             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 42.3             |
| Duct              | 0.4        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.1             | 0.0      | 0.1   | 42.4             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 43.2             |
| Duct              | 0.5        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.1             | 0.0      | 0.1   | 43.3             |
| Fire Damper       |            | 0.06                       |            | 1.9          | 200            | 2.2       |             | 0.0             | 0.0      | 0.0   | 43.3             |
| Duct              | 0.4        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.1             | 0.0      | 0.1   | 43.4             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 44.2             |
| Duct              | 0.4        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.1             | 0.0      | 0.1   | 44.3             |
| Fan               | -          | -                          | -          | -            | -              | -         | -           |                 |          | 0.0   | 44.3             |
| Duct              | 0          | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.0             | 0.0      | 0.0   | 44.3             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 45.0             |
| Duct              | 0.1        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.0             | 0.0      | 0.0   | 45.0             |
| Fire Damper       |            | 0.06                       |            | 1.9          | 200            | 2.2       |             | 0.0             | 0.0      | 0.0   | 45.0             |
| Duct              | 0.4        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.1             | 0.0      | 0.1   | 45.2             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 45.9             |
| Duct              | 0.1        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.0             | 0.0      | 0.0   | 45.9             |
| Attenuator        |            | 0.06                       |            | 1.9          | 200            | 2.2       |             | 0.0             | 5.0      | 5.0   | 50.9             |
| Duct              | 0.5        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.1             | 0.0      | 0.1   | 51.1             |
| Weather Hood      |            | 0.18                       |            | 3.7          | 250            | 8.2       |             | 0.0             | 20.0     | 20.0  | 71.1             |

**00-HRU-02 EXTRACT**

| Section reference | Length (m) | Volume (m <sup>3</sup> /s) | Rate of PD | Velocity (m) | Duct size (mm) | VP (pa/m) | Zeta factor | Resistance (Pa) |          |       |                  |
|-------------------|------------|----------------------------|------------|--------------|----------------|-----------|-------------|-----------------|----------|-------|------------------|
|                   |            |                            | (pa/m)     |              |                |           |             | straight        | fittings | Total | Cumulative total |
| Extract Grille    |            | 0.06                       |            | 1.9          | 160            | 2.2       |             | 0.0             | 20.0     | 20.0  | 20.0             |
| Duct              | 0.1        | 0.06                       | 1.42       | 1.9          | 160            | 2.2       |             | 0.1             | 0.0      | 0.1   | 20.1             |
| Reducer           |            | 0.06                       |            | 1.9          | 200/160        | 2.2       | 0.087       | 0.0             | 0.2      | 0.2   | 20.3             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 21.1             |
| Duct              | 1.2        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.3             | 0.0      | 0.3   | 21.4             |
| Fire Damper       |            | 0.06                       |            | 1.9          | 200            | 2.2       |             | 0.0             | 0.0      | 0.0   | 21.4             |
| Duct              | 0.8        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.2             | 0.0      | 0.2   | 21.6             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 22.4             |
| Duct              | 0.1        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.0             | 0.0      | 0.0   | 22.4             |
| Attenuator        |            | 0.06                       |            | 1.9          | 275x200/200    | 2.2       |             | 0.0             | 20.0     | 20.0  | 42.4             |
| Fan               | -          | -                          | -          | -            | -              | -         | -           |                 |          | 0.0   | 42.4             |
| Duct              | 0          | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.0             | 0.0      | 0.0   | 42.4             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 43.2             |
| Duct              | 0.2        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.1             | 0.0      | 0.1   | 43.2             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 44.0             |
| Duct              | 0.5        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.1             | 0.0      | 0.1   | 44.1             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 44.8             |
| Duct              | 0.1        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.0             | 0.0      | 0.0   | 44.9             |
| Fire Damper       |            | 0.06                       |            | 1.9          | 200            | 2.2       |             | 0.0             | 0.0      | 0.0   | 44.9             |
| Duct              | 0.4        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.1             | 0.0      | 0.1   | 45.0             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 45.7             |
| Attenuator        |            | 0.06                       |            | 1.9          | 200            | 2.2       |             | 0.0             | 5.0      | 5.0   | 50.7             |
| Duct              | 0.1        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.0             | 0.0      | 0.0   | 50.8             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 51.5             |
| Duct              | 0.6        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.2             | 0.0      | 0.2   | 51.7             |
| Cowl              |            | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.0             | 20.0     | 20.0  | 71.7             |

**RF-AHU-01 SUPPLY**

| Section reference | Length (m) | Volume (m <sup>3</sup> /s) | Rate of PD | Velocity (m) | Duct size (mm)  | VP (pa/m) | Zeta factor | Resistance (Pa) |          |       |                  |
|-------------------|------------|----------------------------|------------|--------------|-----------------|-----------|-------------|-----------------|----------|-------|------------------|
|                   |            |                            | (pa/m)     |              |                 |           |             | straight        | fittings | Total | Cumulative total |
| Supply Grille     |            | 0.17                       |            | 1.8          | 671x137         | 2.0       |             | 0.0             | 20.0     | 20.0  | 20.0             |
| Duct              | 0          | 0.17                       | 0.22       | 1.8          | 671x137         | 2.0       |             | 0.0             | 0.0      | 0.0   | 20.0             |
| Vcd               |            | 0.17                       |            | 1.8          | 671x137         | 2.0       |             | 0.0             | 0.0      | 0.0   | 20.0             |
| Duct              | 0          | 0.17                       | 0.22       | 1.8          | 671x137         | 2.0       |             | 0.0             | 0.0      | 0.0   | 20.0             |
| Tap               |            | 0.17                       |            | 1.8          | 137x671         | 2.0       | 0.83        | 0.0             | 1.6      | 1.6   | 21.6             |
| Duct              | 0.7        | 0.85                       |            | 4.9          | 350x500         | 14.5      |             | 0.0             | 0.0      | 0.0   | 21.6             |
| Duct              | 0.7        | 0.85                       | 0.63       | 4.9          | 350x500         | 14.5      |             | 0.4             | 0.0      | 0.4   | 22.1             |
| Fire Damper       |            | 0.85                       |            | 4.9          | 350x500         | 14.5      |             | 0.0             | 0.0      | 0.0   | 22.1             |
| Duct              | 0.8        | 0.85                       | 0.63       | 4.9          | 350x500         | 14.5      |             | 0.5             | 0.0      | 0.5   | 22.6             |
| Bend-90           |            | 0.85                       |            | 4.9          | 500x350         | 14.5      | 0.802       | 0.0             | 11.6     | 11.6  | 34.2             |
| Duct              | 1.6        | 0.85                       | 0.63       | 4.9          | 350x500         | 14.5      |             | 1.0             | 0.0      | 1.0   | 35.2             |
| Reducer           |            | 0.85                       |            | 4.9          | 500x350         | 14.5      |             | 0.0             | 0.0      | 0.0   | 35.2             |
| Bend-90           |            | 0.85                       |            | 4.9          | 350x500         | 14.5      | 0.574       | 0.0             | 8.3      | 8.3   | 43.5             |
| Duct              | 0.6        | 0.85                       | 0.63       | 4.9          | 500x350         | 14.5      |             | 0.4             | 0.0      | 0.4   | 43.9             |
| Bend-90           |            | 0.85                       |            | 4.9          | 500x350         | 14.5      | 0.802       | 0.0             | 11.6     | 11.6  | 55.5             |
| Duct              | 6.6        | 0.85                       | 0.63       | 4.9          | 500x350         | 14.5      |             | 4.2             | 0.0      | 4.2   | 59.6             |
| Reducer           |            | 0.85                       |            | 2.8          | 600x500/500x350 | 4.7       | 0.05        | 0.0             | 0.2      | 0.2   | 59.9             |
| Attenuator        |            | 0.85                       |            | 2.8          | 600x500/500x350 | 4.7       |             | 0.0             | 30.0     | 30.0  | 89.9             |
| Reducer           |            | 0.85                       |            | 4.9          | 600x500/500x350 | 14.5      | 0.122       | 0.0             | 1.8      | 1.8   | 91.6             |
| Duct              | 0.2        | 0.85                       | 0.63       | 4.9          | 500x350         | 14.5      |             | 0.1             | 0.0      | 0.1   | 91.7             |
| Bend-90           |            | 0.85                       |            | 4.9          | 500x350         | 14.5      | 0.802       | 0.0             | 11.6     | 11.6  | 103.3            |
| Duct              | 0.1        | 0.85                       | 0.63       | 4.9          | 500x350         | 14.5      |             | 0.1             | 0.0      | 0.1   | 103.4            |
| Fan               | -          | -                          | -          | -            | -               | -         | -           |                 |          | 0.0   | 103.4            |
| Duct              | 0.1        | 0.85                       | 0.17       | 2.8          | 600x500         | 4.7       |             | 0.0             | 0.0      | 0.0   | 103.4            |
| Attenuator        |            | 0.85                       |            | 2.8          | 600x500/500x350 | 4.7       |             | 0.0             | 30.0     | 30.0  | 133.4            |
| Reducer           |            | 0.85                       |            | 4.9          | 600x500/500x350 | 14.5      | 0.122       | 0.0             | 1.8      | 1.8   | 135.2            |
| Duct              | 0.1        | 0.85                       | 0.63       | 4.9          | 500x350         | 14.5      |             | 0.1             | 0.0      | 0.1   | 135.3            |
| Bend-90           |            | 0.85                       |            | 4.9          | 500x350         | 14.5      | 0.802       | 0.0             | 11.6     | 11.6  | 146.9            |
| Duct              | 1.2        | 0.85                       | 0.63       | 4.9          | 500x350         | 14.5      |             | 0.8             | 0.0      | 0.8   | 147.6            |
| Weather Hood      |            | 0.85                       | 0.63       | 4.9          |                 | 14.5      |             | 0.0             | 20.0     | 20.0  | 167.6            |

**RF-AHU-01 EXTRACT**

| Section reference | Length (m) | Volume (m <sup>3</sup> /s) | Rate of PD | Velocity (m) | Duct size (mm)  | VP (pa/m) | Zeta factor | Resistance (Pa) |          |       |                  |
|-------------------|------------|----------------------------|------------|--------------|-----------------|-----------|-------------|-----------------|----------|-------|------------------|
|                   |            |                            | (pa/m)     |              |                 |           |             | straight        | fittings | Total | Cumulative total |
| Extract Grille    |            | 0.425                      |            | 1.8          | 600x400         | 2.0       |             | 0.0             | 20.0     | 20.0  | 20.0             |
| Duct              | 0          | 0.425                      | 0.08       | 1.8          | 600x400         | 2.0       |             | 0.0             | 0.0      | 0.0   | 20.0             |
| Fire Dmaper       |            | 0.425                      |            | 1.8          | 600x400         | 2.0       |             | 0.0             | 0.0      | 0.0   | 20.0             |
| Duct              | 0.7        | 0.425                      | 0.08       | 1.8          | 600x400         | 2.0       |             | 0.1             | 0.0      | 0.1   | 20.1             |
| Reducer           |            | 0.425                      |            | 4.3          | 600x400/500x200 | 11.1      | 0.049       | 0.0             | 0.5      | 0.5   | 20.6             |
| Duct              | 0          | 0.425                      | 0.77       | 4.3          | 500x200         | 11.1      |             | 0.0             | 0.0      | 0.0   | 20.6             |
| Bend-90           |            | 0.425                      |            | 4.3          | 200x500         | 11.1      | 0.45        | 0.0             | 5.0      | 5.0   | 25.6             |
| Duct              | 1.7        | 0.425                      | 0.77       | 4.3          | 200x500         | 11.1      |             | 1.3             | 0.0      | 1.3   | 26.9             |
| Bend-90           |            | 0.425                      |            | 4.3          | 200x500         | 11.1      | 0.45        | 0.0             | 5.0      | 5.0   | 31.9             |
| Duct              | 0.9        | 0.425                      | 0.77       | 4.3          | 500x200         | 11.1      |             | 0.7             | 0.0      | 0.7   | 32.6             |
| Bend-90           |            | 0.425                      |            | 4.3          | 500x200         | 11.1      | 0.85        | 0.0             | 9.5      | 9.5   | 42.1             |
| Duct              | 2.1        | 0.425                      | 0.77       | 4.3          | 500x200         | 11.1      |             | 1.6             | 0.0      | 1.6   | 43.7             |
| VCD               |            | 0.425                      |            | 4.3          | 500x200         | 11.1      |             | 0.0             | 5.0      | 5.0   | 48.7             |
| Duct              | 0.3        | 0.425                      | 0.77       | 4.3          | 500x200         | 11.1      |             | 0.2             | 0.0      | 0.2   | 48.9             |
| Reducer           |            | 0.425                      |            | 2.4          | 500x350/500x200 | 3.5       | 0.128       | 0.0             | 0.4      | 0.4   | 49.4             |
| Duct              | 0.1        | 0.425                      | 0.18       | 2.4          | 500x350         | 3.5       |             | 0.0             | 0.0      | 0.0   | 49.4             |
| Duct              | 0.5        | 0.85                       |            | 4.9          | 500x350         | 14.5      | 0.4         | 0.0             | 5.8      | 5.8   | 55.2             |
| Duct              | 0.8        | 0.85                       | 0.63       | 4.9          | 500x350         | 14.5      |             | 0.5             | 0.0      | 0.5   | 55.7             |
| Reducer           |            | 0.85                       |            | 2.8          | 600x500/500x350 | 4.7       | 0.122       | 0.0             | 0.6      | 0.6   | 56.3             |
| Attenuator        |            | 0.85                       |            | 2.8          | 600x500/500x350 | 4.7       |             | 0.0             | 30.0     | 30.0  | 86.3             |
| Reducer           |            | 0.85                       |            | 4.9          | 600x500/500x350 | 14.5      | 0.05        | 0.0             | 0.7      | 0.7   | 87.0             |
| Duct              | 0.3        | 0.85                       | 0.63       | 4.9          | 500x350         | 14.5      |             | 0.2             | 0.0      | 0.2   | 87.2             |
| Bend-90           |            | 0.85                       |            | 4.9          | 500x350         | 14.5      | 0.802       |                 | 11.6     | 11.6  | 98.8             |
| Duct              | 0.5        | 0.85                       | 0.63       | 4.9          | 500x350         | 14.5      |             | 0.3             | 0.0      | 0.3   | 99.1             |
| Fan               | -          | -                          | -          | -            | -               | -         |             |                 |          | 0.0   | 99.1             |
| Duct              | 0          | 0.85                       | 0.17       | 2.8          | 600x500         | 4.7       |             | 0.0             | 0.0      | 0.0   | 99.1             |
| Attenuator        |            | 0.85                       |            | 2.8          | 600x500         | 4.7       |             | 0.0             | 30.0     | 30.0  | 129.1            |
| Reducer           |            | 0.85                       |            | 4.9          | 600x500/500x350 | 14.5      | 0.122       | 0.0             | 1.8      | 1.8   | 130.9            |
| Duct              | 1          | 0.85                       | 0.63       | 4.9          | 500x350         | 14.5      |             | 0.6             | 0.0      | 0.6   | 131.5            |
| Weather Hood      |            | 0.85                       | 0.63       | 4.9          |                 | 14.5      |             | 0.0             | 20.0     | 20.0  | 151.5            |

**03-HRU-01 SUPPLY**

| Section reference | Length (m) | Volume (m <sup>3</sup> /s) | Rate of PD | Velocity (m) | Duct size (mm) | VP (pa/m) | Zeta factor | Resistance (Pa) |          |       |                  |
|-------------------|------------|----------------------------|------------|--------------|----------------|-----------|-------------|-----------------|----------|-------|------------------|
|                   |            |                            | (pa/m)     |              |                |           |             | straight        | fittings | Total | Cumulative total |
| Supply Griile     |            | 0.06                       |            | 1.9          | 160            | 2.2       |             | 0.0             | 20.0     | 20.0  | 20.0             |
| Duct              | 0.2        | 0.06                       | 1.42       | 1.9          | 160            | 2.2       |             | 0.3             | 0.0      | 0.3   | 20.3             |
| Reducer           |            | 0.06                       |            | 1.9          | 200/160        | 2.2       | 0.05        | 0.0             | 0.1      | 0.1   | 20.4             |
| Duct              | 0          | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.0             | 0.0      | 0.0   | 20.4             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 21.1             |
| Duct              | 0.7        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.2             | 0.0      | 0.2   | 21.3             |
| Reducer           |            | 0.06                       |            | 1.1          | 275x200/200    | 0.7       | 0.05        | 0.0             | 0.0      | 0.0   | 21.4             |
| Attenuator        |            | 0.06                       |            | 1.1          | 275x200        | 0.7       |             | 0.0             | 14.0     | 14.0  | 35.4             |
| Reducer           |            | 0.06                       |            | 1.9          | 275x200/200    | 2.2       | 0.111       | 0.0             | 0.2      | 0.2   | 35.6             |
| Duct              | 0.4        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.1             | 0.0      | 0.1   | 35.7             |
| Fan               | -          | -                          | -          | -            | -              | -         | -           |                 |          | 0.0   | 35.7             |
| Duct              | 0          | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.0             | 0.0      | 0.0   | 35.7             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 36.5             |
| Duct              | 0.8        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.2             | 0.0      | 0.2   | 36.7             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 37.4             |
| Duct              | 0          | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.0             | 0.0      | 0.0   | 37.4             |
| Attenuator        |            | 0.06                       |            | 1.9          | 200            | 2.2       |             | 0.0             | 5.0      | 5.0   | 42.4             |
| Duct              | 0.2        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.1             | 0.0      | 0.1   | 42.5             |
| Weather Hood      |            | 0.06                       | 0.28       | 1.9          |                | 2.2       |             | 0.0             | 10.0     | 10.0  | 52.5             |

**03-HRU-01 EXTRACT**

| Section reference | Length (m) | Volume (m <sup>3</sup> /s) | Rate of PD | Velocity (m) | Duct size (mm) | VP (pa/m) | Zeta factor | Resistance (Pa) |          |       |                  |
|-------------------|------------|----------------------------|------------|--------------|----------------|-----------|-------------|-----------------|----------|-------|------------------|
|                   |            |                            | (pa/m)     |              |                |           |             | straight        | fittings | Total | Cumulative total |
| Extract Grille    |            | 0.06                       |            | 1.9          | 160            | 2.2       |             | 0.0             | 20.0     | 20.0  | 20.0             |
| Duct              | 0.5        | 0.06                       | 1.42       | 1.9          | 160            | 2.2       |             | 0.7             | 0.0      | 0.7   | 20.7             |
| Reducer           |            | 0.06                       |            | 1.9          | 200/160        | 2.2       | 0.087       | 0.0             | 0.2      | 0.2   | 20.9             |
| Duct              | 0.1        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.0             | 0.0      | 0.0   | 20.9             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 21.7             |
| Duct              | 0          | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.0             | 0.0      | 0.0   | 21.7             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 22.4             |
| Duct              | 0.1        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.0             | 14.0     | 14.0  | 36.4             |
| Reducer           |            | 0.06                       |            | 1.1          | 275x200/200    | 0.7       | 0.111       | 0.0             | 0.1      | 0.1   | 36.5             |
| Attenuator        |            | 0.06                       |            | 1.1          | 275x200        | 0.7       |             | 0.0             | 15.0     | 15.0  | 51.5             |
| Reducer           |            | 0.06                       |            | 1.9          | 275x200/200    | 2.2       | 0.05        |                 |          | 0.0   | 51.5             |
| Duct              | 0.6        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.2             | 0.0      | 0.2   | 51.7             |
| Fan               | -          | -                          | -          | -            | -              | -         | -           |                 |          | 0.0   | 51.7             |
| Duct              | 0          | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.0             | 0.0      | 0.0   | 51.7             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 52.4             |
| Duct              | 0.6        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.2             | 0.0      | 0.2   | 52.6             |
| Bend-90           |            | 0.06                       |            | 1.9          | 200            | 2.2       | 0.343       | 0.0             | 0.7      | 0.7   | 53.4             |
| Duct              | 0.2        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.1             | 0.0      | 0.1   | 53.4             |
| Attenuator        |            | 0.06                       |            | 1.9          | 200            | 2.2       |             | 0.0             | 5.0      | 5.0   | 58.4             |
| Duct              | 0.2        | 0.06                       | 0.28       | 1.9          | 200            | 2.2       |             | 0.1             | 0.0      | 0.1   | 58.5             |
| Weather Hood      |            | 0.06                       | 0.28       | 1.9          |                | 2.2       |             | 0.0             | 10.0     | 10.0  | 68.5             |

**03-HRU-02 SUPPLY**

| Section reference | Length (m) | Volume (m <sup>3</sup> /s) | Rate of PD | Velocity (m) | Duct size (mm)  | VP (pa/m) | Zeta factor | Resistance (Pa) |          |       |                  |
|-------------------|------------|----------------------------|------------|--------------|-----------------|-----------|-------------|-----------------|----------|-------|------------------|
|                   |            |                            | (pa/m)     |              |                 |           |             | straight        | fittings | Total | Cumulative total |
| Supply Grille     |            | 0.23                       |            | 2.3          | 315             | 3.2       |             | 0.0             | 20.0     | 20.0  | 20.0             |
| Reducer           |            | 0.23                       |            | 2.3          | 315/300         | 3.2       |             | 0.0             | 0.0      | 0.0   | 20.0             |
| Duct              | 0.9        | 0.23                       | 0.44       | 3.3          | 300             | 6.6       | 0.087       | 0.4             | 0.6      | 1.0   | 21.0             |
| Bend-90           |            | 0.23                       |            | 3.3          | 300             | 6.6       |             | 0.0             | 0.0      | 0.0   | 21.0             |
| Duct              | 0.5        | 0.23                       | 0.44       | 3.3          | 300             | 6.6       | 0.343       | 0.2             | 2.3      | 2.5   | 23.4             |
| Bend-90           |            | 0.23                       |            | 3.3          | 300             | 6.6       |             | 0.0             | 0.0      | 0.0   | 23.4             |
| Duct              | 0.4        | 0.23                       | 0.44       | 3.3          | 300             | 6.6       | 0.343       | 0.2             | 2.3      | 2.4   | 25.9             |
| Reducer           |            | 0.23                       |            | 1.6          | 400x350/300     | 1.5       | 0.139       | 0.0             | 0.2      | 0.2   | 26.1             |
| Attenuator        |            | 0.23                       |            | 1.6          | 400x350         | 1.5       |             | 0.0             | 30.0     | 30.0  | 56.1             |
| Reducer           |            | 0.23                       |            | 0.8          | 861x348/400x350 | 0.4       | 0.221       |                 |          | 0.0   | 56.1             |
| Duct              | 0.6        | 0.23                       |            | 3.3          | 300             | 6.6       |             | 0.0             | 0.0      | 0.0   | 56.1             |
| Fan               | -          | -                          | -          | -            | -               | -         | -           |                 |          | 0.0   | 56.1             |
| Duct              |            | 0.23                       | 0.44       | 3.3          | 300             | 6.6       |             | 0.0             | 0.0      | 0.0   | 56.1             |
| Attenuator        |            | 0.23                       |            | 3.3          | 300             | 6.6       |             | 0.0             | 5.0      | 5.0   | 61.1             |
| Duct              |            | 0.23                       | 0.44       | 3.3          | 300             | 6.6       |             | 0.0             | 0.0      | 0.0   | 61.1             |
| Bend-90           |            | 0.23                       |            | 3.3          | 300             | 6.6       | 0.295       | 0.0             | 1.9      | 1.9   | 63.0             |
| Duct              |            | 0.23                       | 0.44       | 3.3          | 300             | 6.6       |             | 0.0             | 0.0      | 0.0   | 63.0             |
| Bend-90           |            | 0.23                       |            | 3.3          | 300             | 6.6       | 0.295       | 0.0             | 1.9      | 1.9   | 64.9             |
| Duct              |            | 0.23                       | 0.44       | 3.3          | 300             | 6.6       |             | 0.0             | 0.0      | 0.0   | 64.9             |
| Weather Hood      |            | 0.23                       | 0.44       | 3.3          | 300             | 6.6       |             | 0.0             | 20.0     | 20.0  | 84.9             |

**03-HRU-02 EXTRACT**

| Section reference | Length (m) | Volume (m <sup>3</sup> /s) | Rate of PD | Velocity (m) | Duct size (mm)  | VP (pa/m) | Zeta factor | Resistance (Pa) |          |       |                  |
|-------------------|------------|----------------------------|------------|--------------|-----------------|-----------|-------------|-----------------|----------|-------|------------------|
|                   |            |                            | (pa/m)     |              |                 |           |             | straight        | fittings | Total | Cumulative total |
| Extract Grille    |            | 0.23                       |            | 2.3          | 315             | 3.2       |             | 0.0             | 20.0     | 20.0  | 20.0             |
| Reducer           |            | 0.23                       |            | 2.3          | 315/300         | 3.2       | 0.05        | 0.0             | 0.2      | 0.2   | 20.2             |
| Duct              | 2.3        | 0.23                       | 0.44       | 3.3          | 300             | 6.6       |             | 1.0             | 0.0      | 1.0   | 21.2             |
| Bend-90           |            | 0.23                       |            | 3.3          | 300             | 6.6       | 0.295       | 0.0             | 1.9      | 1.9   | 23.1             |
| Duct              | 0.9        | 0.23                       | 0.44       | 3.3          | 300             | 6.6       |             | 0.4             | 0.0      | 0.4   | 23.5             |
| Bend-90           |            | 0.23                       |            | 3.3          | 300             | 6.6       | 0.295       | 0.0             | 1.9      | 1.9   | 25.4             |
| Duct              | 0.9        | 0.23                       | 0.44       | 3.3          | 300             | 6.6       |             | 0.4             | 0.0      | 0.4   | 25.8             |
| Bend-90           |            | 0.23                       |            | 3.3          | 300             | 6.6       | 0.295       | 0.0             | 1.9      | 1.9   | 27.8             |
| Duct              | 0.5        | 0.23                       | 0.44       | 3.3          | 300             | 6.6       |             | 0.2             | 27.0     | 27.2  | 55.0             |
| Reducer           |            | 0.23                       |            | 1.6          | 400x350/300     | 1.5       | 0.139       | 0.0             | 0.2      | 0.2   | 55.2             |
| Attenuator        |            | 0.23                       |            | 1.6          | 400x350         | 1.5       |             | 0.0             | 30.0     | 30.0  | 85.2             |
| Reducer           |            | 0.23                       |            | 0.8          | 861x348/400x350 | 0.4       | 0.221       |                 |          | 0.0   | 85.2             |
| Duct              | 0          | 0.23                       | 0.02       | 0.8          | 861x348         | 0.4       |             | 0.0             | 0.0      | 0.0   | 85.2             |
| Fan               | -          | -                          | -          | -            | -               | -         | -           |                 |          | 0.0   | 85.2             |
| Duct              | 0          | 0.23                       | 0.44       | 3.3          | 300             | 6.6       |             | 0.0             | 0.0      | 0.0   | 85.2             |
| Attenuator        |            | 0.23                       |            | 3.3          | 300             | 6.6       |             | 0.0             | 5.0      | 5.0   | 90.2             |
| Duct              | 0          | 0.23                       | 0.44       | 3.3          | 300             | 6.6       |             | 0.0             | 0.0      | 0.0   | 90.2             |
| Bend-90           |            | 0.23                       |            | 3.3          | 300             | 6.6       | 0.295       | 0.0             | 1.9      | 1.9   | 92.1             |
| Duct              | 0.2        | 0.23                       | 0.44       | 3.3          | 300             | 6.6       |             | 0.1             | 0.0      | 0.1   | 92.2             |
| Weather Hood      |            | 0.23                       | 0.44       | 3.3          | 300             | 6.6       |             | 0.0             | 20.0     | 20.0  | 112.2            |

## 2.0 Manufacturers Information

From our supplier.

A base stock of spare parts is kept in our warehouse in Lisburn, Northern Ireland. Any items which would need to be ordered direct from manufacturer would have a lead time of around 4 weeks, however we would not envisage any replacement parts being required that are not kept in stock"

## Technical data for item 1

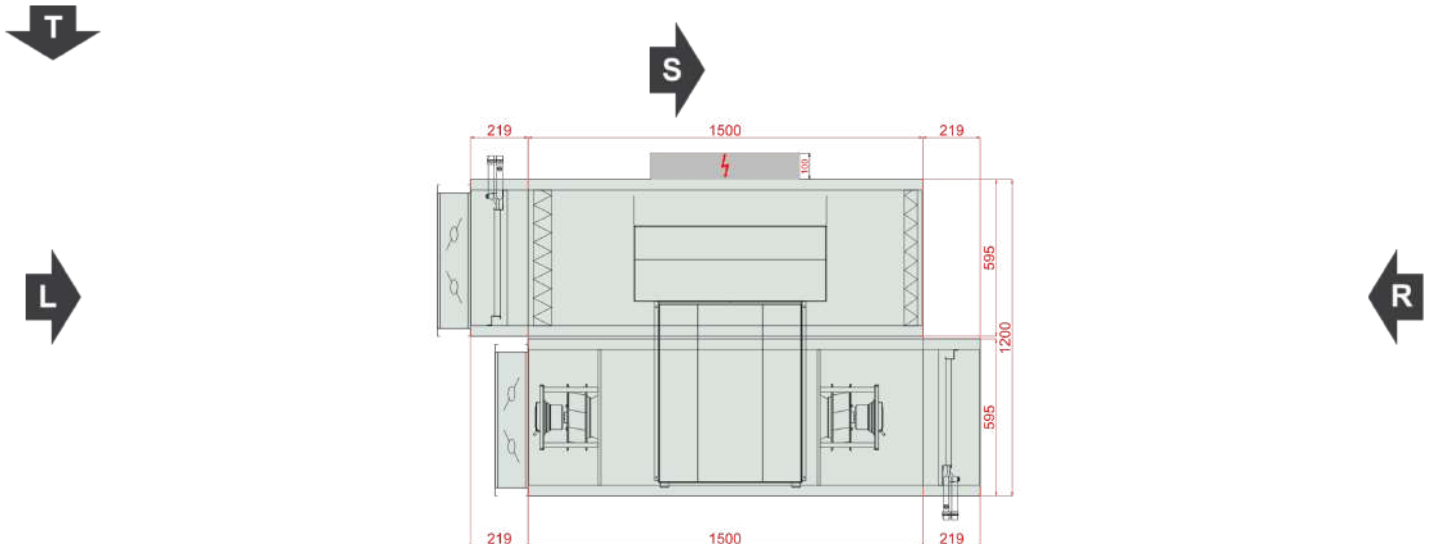
Offer number 166/LIVE.EUR/GB/2021

Project name Highgate Newton Community  
Centre /1DP.CER.004.001/

|                                  |                                  |
|----------------------------------|----------------------------------|
| Type                             | RecoveryHexHorizontal            |
| Application                      | Indoor                           |
| Project Tag                      | 00-HRU-01                        |
| Size                             | VVS010s                          |
| Set                              | VVS010s-R-HFPVH/VVS010s-L-FPV_cd |
| Insulation thickness             | 40 mm                            |
| Insulation                       | Mineral Wool                     |
| Weight of the set (+/- 10%)*     | 230 Kg                           |
| Supply airflow 2                 | 198.00 L/s                       |
| External pressure                | 175 Pa                           |
| Exhaust airflow 2                | 198.00 L/s                       |
| External pressure                | 175 Pa                           |
| SFP Winter                       | 0.84 kW/m³/s                     |
| SFP Summer                       | 0.84 kW/m³/s                     |
| Ecodesign                        | Yes (2018 +)                     |
| Eurovent Energy efficiency class | A+ 2016                          |



## Top View

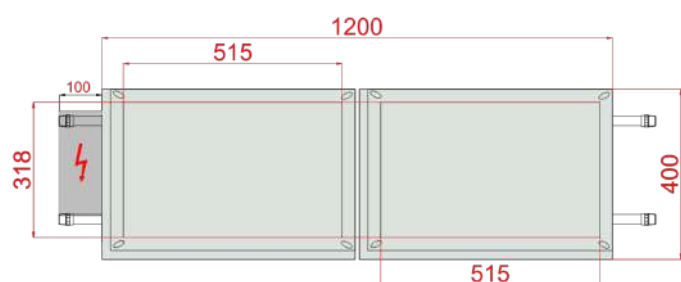


Comment 1:

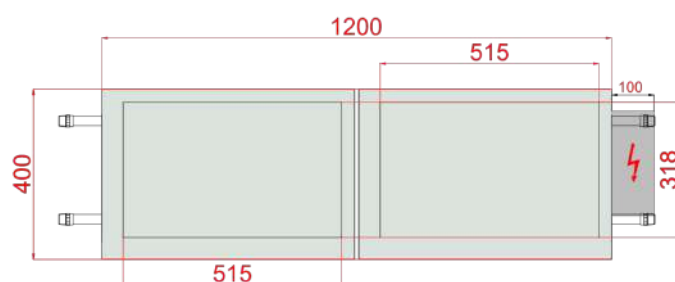
Technical data for item 1

Offer number 166/LIVE.EUR/GB/2021

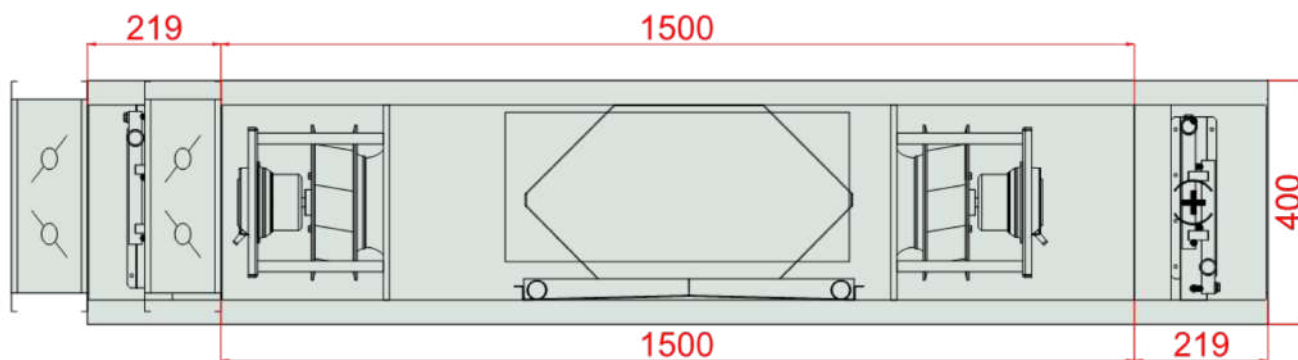
Front View (left)



Front View (right)



Inspection Panels



#### Sizes [mm]

|                    |    |         |          |        |         |
|--------------------|----|---------|----------|--------|---------|
| Air intake Supply  | FF | 515x318 | Lt 1938  | Hi 320 | Wi 515  |
| Air outlet Supply  | FF | 515x318 | LtA 2063 | H 400  | W 595   |
|                    |    |         | L1 1719  |        | W2 1200 |
| Air inlet Exhaust  | FF | 515x318 | L2 1719  |        |         |
| Air outlet Exhaust | FF | 515x318 | L11 219  |        |         |
|                    |    |         | L22 219  |        |         |

#### Unit design

Walls filled with MW 30mm, double skin made of steel, excluding silencer and electric heater sections

**Technical data for item 1****Offer number 166/LIVE.EUR/GB/2021**

Down base unit inspection  
 Casing anti-corrosion protection: Aluzinc AZ 150.  
 Base unit with pre-configured EC motors drives  
 Energy recovery efficiency meet EC 1253/2014 requirements

**Temperature Conditions****Reference atmospheric pressure 101325 Pa****Winter outdoor reference temperature -4.0 °C**

|        | External air |      |              | Return air |      |              |
|--------|--------------|------|--------------|------------|------|--------------|
|        | DBT          | RH   | DA           | DBT        | RH   | DA           |
| Summer | 27.2 °C      | 56 % | 1.2000 kg/m³ | 20.0 °C    | 76 % | 1.2000 kg/m³ |
| Winter | -4.0 °C      | 80 % | 1.2000 kg/m³ | 22.0 °C    | 37 % | 1.2000 kg/m³ |

**Supply****+ Hot Water Coil**

| <b>Type WCL VVS010s 1R DT SH.St.St.Std</b> |                 | <b>Number of rows 1</b>     | <b>Connection Supply/Return: 3/4"/22</b> |
|--------------------------------------------|-----------------|-----------------------------|------------------------------------------|
| Standard Circuits                          |                 | 0,56 [dm³]                  |                                          |
| Medium                                     | Ethylene        | Maximum working pressure    | 16 bar                                   |
| Glycole concentration                      | 10.00 %         | Maximum medium temperature  | 160.0 °C                                 |
| <b>Winter operation</b>                    |                 | <b>Summer operation</b>     |                                          |
| Intake air DBT / RH                        | -4.0 °C / 80 %  | Intake air DBT / RH         | 27.2 °C / 56 %                           |
| Discharge air DBT / RH                     | 5.0 °C / 40 %   | Discharge air DBT / RH      | 27.2 °C / 56 %                           |
| Air velocity                               | 1.46 m/s        | Air velocity                | 1.46 m/s                                 |
| Pressure drop Wet / Dry Wet                | 9 Pa            | Pressure drop Wet / Dry Wet | 9 Pa                                     |
| Air Pressure                               | 101325 Pa       | Air Pressure                | 101325 Pa                                |
| Air Density                                | 1.2000 kg/m³    | Air Density                 | 1.2000 kg/m³                             |
| Air Volume Flow                            | 198.00 L/s      | Air Volume Flow             | 198.00 L/s                               |
| Total heating capacity                     | 2.2 kW          | Total heating capacity      | 0.0 kW                                   |
| Medium temperature                         | 70.0 °C/40.0 °C | Medium temperature          | 70.0 °C/40.0 °C                          |
| Medium flow rate                           | 0.06 m³/h       | Medium flow rate            | 0.00 m³/h                                |
| Medium pressure drop                       | 0.80 kPa        | Medium pressure drop        | 0.00 kPa                                 |

**Panel Filter**

**Type F7/50.EU7MPleat.Int.Sld**  
 ePM2,5 65% (ISO16890) - EFF CLASS E Flat Mini-Pleat Filter[27.0]

Filter Energy Performance Class E

**Winter operation**

|                              |          |
|------------------------------|----------|
| 50% Dirty Air Pressure Drop  | 118 Pa   |
| Initial Air Pressure Drop    | 36 Pa    |
| 100% Dirty Air Pressure Drop | 200 Pa   |
| Air velocity                 | 1.24 m/s |

**Filter Sizes**

P,FLT F7 513x320x48 (1-2-0301-0244) 1 x Pcs

**Summer operation**

|                              |          |
|------------------------------|----------|
| 50% Dirty Air Pressure Drop  | 118 Pa   |
| Initial Air Pressure Drop    | 36 Pa    |
| 100% Dirty Air Pressure Drop | 200 Pa   |
| Air velocity                 | 1.24 m/s |



Technical data for item 1

Offer number 166/LIVE.EUR/GB/2021

**Counter-Flow Recuperator (Hexagonal)****Type** PCR VVS010s Hex

HIPS or AL 3.0 (SR)

Rated voltage //

**Winter operation****Supply**

|                                                          |                |
|----------------------------------------------------------|----------------|
| Intake air DBT / RH                                      | 5.0 °C / 40 %  |
| Discharge air DBT / RH                                   | 18.0 °C / 17 % |
| Air velocity                                             | 1.63 m/s       |
| Pressure drop Wet / Dry Wet                              | 41 Pa          |
| Air Pressure                                             | 101325 Pa      |
| Air Density                                              | 1.2000 kg/m³   |
| Air Volume Flow                                          | 198.00 L/s     |
| Recovery capacity Sensible / Total Total                 | 3.1 kW         |
| Actual efficiency / at balanced flow Real / BalancedFlow | 76 % / 76 %    |
| Dry efficiency in winter                                 | 76 %           |

**Winter operation****Exhaust**

|                             |                |
|-----------------------------|----------------|
| Intake air DBT / RH         | 22.0 °C / 37 % |
| Discharge air DBT / RH      | 10.3 °C / 78 % |
| Air velocity                | 1.63 m/s       |
| Pressure drop Wet / Dry Wet | 47 Pa          |
| Air Pressure                | 101325 Pa      |
| Air Density                 | 1.2000 kg/m³   |
| Air Volume Flow             | 198.00 L/s     |
| Recovery Bypass             | Yes            |
| Air Damper                  | No             |

Counter-Flow (Hex)

Max Internal Leakage 0.25%

**Summer operation****Supply**

|                             |                |
|-----------------------------|----------------|
| Intake air DBT / RH         | 27.2 °C / 56 % |
| Discharge air DBT / RH      | 27.2 °C / 56 % |
| Air velocity                | 1.63 m/s       |
| Pressure drop Wet / Dry Wet | 41 Pa          |
| Air Pressure                | 101325 Pa      |
| Air Density                 | 1.2000 kg/m³   |
| Air Volume Flow             | 198.00 L/s     |

**Summer operation****Exhaust**

|                             |                |
|-----------------------------|----------------|
| Intake air DBT / RH         | 20.0 °C / 76 % |
| Discharge air DBT / RH      | 20.0 °C / 76 % |
| Air velocity                | 1.63 m/s       |
| Pressure drop Wet / Dry Wet | 47 Pa          |
| Air Pressure                | 101325 Pa      |
| Air Density                 | 1.2000 kg/m³   |
| Air Volume Flow             | 198.00 L/s     |
| Eco Design Class            | Eco Design     |

**Plug-Fan Set****Fan Section** PLUG\_DD\_225\_0,38\_1.64

EC\_IE4\_F\_IMB14\_71\_1.64p\_T 771.3.550-3 225|0.38kW|1.64x1

Fan System Main Fan Qty in section x 1

Fan Set Assembly Type FLX1 (Gasket)

Fan Set Designed for wet operating conditions

The Fan System Effects Is Taken Into Account In The Fan Performances

**Fan** PLUG\_VS\_225\_AF\_Px 1

**Technical data for item 1****Offer number 166/LIVE.EUR/GB/2021**

|                         |            |
|-------------------------|------------|
| Total Static Pressure   | 351 Pa     |
| Dynamic pressure        | 12 Pa      |
| External pressure       | 175 Pa     |
| Total Pressure          | 363 Pa     |
| <b>Winter operation</b> |            |
| Air Volume Flow         | 198.00 L/s |

|                                     |               |
|-------------------------------------|---------------|
| Impeller efficiency: Static / Total | 70 %/73 %     |
| Shaft power                         | 0.10 kW x 1   |
| Working revolutions                 | 2370 1/min    |
| Fans Connection Standard            | FLX1 (Gasket) |
| <b>Summer operation</b>             |               |
| Air Volume Flow                     | 198.00 L/s    |

**Motor** EC\_IE4\_F\_71\_IMB14\_1.64p\_0.38\_50x 1  
EC\_IE4\_F\_IMB14\_71\_1.64p\_T

|                         |                  |
|-------------------------|------------------|
| Motor enclosure         | IMB14            |
| IEC Size                | 71               |
| Operational Voltage     | 230 V/1 ph       |
| Fan Motor Rated Voltage | 230 V/1 ph/50 Hz |

|                   |             |
|-------------------|-------------|
| Rated Current     | 2.1 A x 1   |
| Rated revolutions | 3650 1/min  |
| Rated Power       | 0.38 kW x 1 |
| Motor Version     | Standard    |

**EC Motor Controller**

|                                 |          |
|---------------------------------|----------|
| EC Controller                   | Yes      |
| EC Controller Qty in section    | 1        |
| EC Controller Settings          | 32 Hz    |
| EC Controller in selection      | Included |
| EC Controller Optional Nema KIT | No       |

|                              |                  |
|------------------------------|------------------|
| Connecting Point             | CP Excluded      |
| EC Controller Voltage Supply | 230/1/50 V/ph/Hz |
| EC Controller Rated Power    | 0.75 kW x 1      |

**Winter operation**

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.11 kW      |
| EPC for clean filters             | 0.09 kW      |
| SFP for clean filters             | 0.44 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

**Summer operation**

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.11 kW      |
| EPC for clean filters             | 0.09 kW      |
| SFP for clean filters             | 0.44 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

**Hot Water Coil**

|                                            |                         |                                          |
|--------------------------------------------|-------------------------|------------------------------------------|
| <b>Type</b> WCL VVS010s 1R DT SH.St.St.Std | <b>Number of rows</b> 1 | <b>Connection Supply/Return:</b> 3/4"/22 |
| Standard Circuits                          | 0,56 [dm³]              |                                          |

|                             |                 |
|-----------------------------|-----------------|
| Medium                      | Water           |
| Glycole concentration       | 0.00 %          |
| <b>Winter operation</b>     |                 |
| Intake air DBT / RH         | 15.0 °C / 80 %  |
| Discharge air DBT / RH      | 21.0 °C / 55 %  |
| Air velocity                | 1.55 m/s        |
| Pressure drop Wet / Dry Wet | 9 Pa            |
| Air Pressure                | 101325 Pa       |
| Air Density                 | 1.2000 kg/m³    |
| Air Volume Flow             | 198.00 L/s      |
| Total heating capacity      | 1.5 kW          |
| Medium temperature          | 70.0 °C/40.0 °C |
| Medium flow rate            | 0.04 m³/h       |
| Medium pressure drop        | 0.48 kPa        |

|                             |                 |
|-----------------------------|-----------------|
| Maximum working pressure    | 16 bar          |
| Maximum medium temperature  | 160.0 °C        |
| <b>Summer operation</b>     |                 |
| Intake air DBT / RH         | 27.2 °C / 56 %  |
| Discharge air DBT / RH      | 27.2 °C / 56 %  |
| Air velocity                | 1.55 m/s        |
| Pressure drop Wet / Dry Wet | 9 Pa            |
| Air Pressure                | 101325 Pa       |
| Air Density                 | 1.2000 kg/m³    |
| Air Volume Flow             | 198.00 L/s      |
| Total heating capacity      | 0.0 kW          |
| Medium temperature          | 70.0 °C/40.0 °C |
| Medium flow rate            | 0.00 m³/h       |
| Medium pressure drop        | 0.00 kPa        |





Technical data for item 1

Offer number 166/LIVE.EUR/GB/2021

## Acoustic data

| Acoustic power level [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lw [dB(A)] |
|------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
| Inlet                        | [dB(A)]   | 45.7     | 45.6     | 22.7     | 22.1      | 14.1      | 20.4      | 18.4      | 48.7       |
| Outlet                       | [dB(A)]   | 43.9     | 51.0     | 36.2     | 41.0      | 34.8      | 33.0      | 28.3      | 52.3       |
| Environment                  | [dB(A)]   | 28.0     | 39.4     | 37.3     | 31.6      | 23.9      | 16.4      | 2.8       | 42.1       |

| Acoustic pressure level at 1 meter distance [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lp [dB(A)] |
|-----------------------------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
|                                                     | [dB(A)]   | 21.0     | 32.4     | 30.3     | 24.6      | 16.9      | 9.4       | 2.0       | 35.1       |

## Exhaust airflow 3

## Panel Filter

Type M5/50.EU5MPleat.Int.Sld

ePM10 40% - ISO 16890 - EFF CLASS Flat Mini-Pleat Filter[26.0]  
E

Filter Energy Performance Class E

## Winter operation

50% Dirty Air Pressure Drop 113 Pa  
 Initial Air Pressure Drop 27 Pa  
 100% Dirty Air Pressure Drop 200 Pa  
 Air velocity 1.24 m/s

## Filter Sizes

P,FLT M5 513x320x48 (1-2-0301-0246) 1 x Pcs

## Summer operation

50% Dirty Air Pressure Drop 113 Pa  
 Initial Air Pressure Drop 27 Pa  
 100% Dirty Air Pressure Drop 200 Pa  
 Air velocity 1.24 m/s

## Plug-Fan Set

Fan Section PLUG\_DD\_225\_0,38\_1.64

EC\_IE4\_F\_IMB14\_71\_1.64p\_T 771.3.550-3 225|0.38kW|1.64x1

Fan System Main Fan Qty in section x 1

Fan Set Assembly Type FLX1 (Gasket)

Fan Set Designed for wet operating conditions

The Fan System Effects Taken Into Account In The Fan Performances

Fan PLUG\_VS\_225\_AF\_Px 1

|                       |        |                                     |               |
|-----------------------|--------|-------------------------------------|---------------|
| Total Static Pressure | 335 Pa | Impeller efficiency: Static / Total | 70 %/73 %     |
| Dynamic pressure      | 12 Pa  | Shaft power                         | 0.09 kW x 1   |
| External pressure     | 175 Pa | Working revolutions                 | 2327 1/min    |
| Total Pressure        | 347 Pa | Fans Connection Standard            | FLX1 (Gasket) |

|                         |            |                         |            |
|-------------------------|------------|-------------------------|------------|
| <b>Winter operation</b> |            | <b>Summer operation</b> |            |
| Air Volume Flow         | 198.00 L/s | Air Volume Flow         | 198.00 L/s |

Motor EC\_IE4\_F\_71\_IMB14\_1.64p\_0.38\_50x 1





## Technical data for item 1

Offer number 166/LIVE.EUR/GB/2021

EC\_IE4\_F\_IMB14\_71\_1.64p\_T

|                         |                  |                   |             |
|-------------------------|------------------|-------------------|-------------|
| Motor enclosure         | IMB14            | Rated Current     | 2.1 A x 1   |
| IEC Size                | 71               | Rated revolutions | 3650 1/min  |
| Operational Voltage     | 230 V/1 ph       | Rated Power       | 0.38 kW x 1 |
| Fan Motor Rated Voltage | 230 V/1 ph/50 Hz | Motor Version     | Standard    |

## EC Motor Controller

|                                 |          |                              |                  |
|---------------------------------|----------|------------------------------|------------------|
| EC Controller                   | Yes      | Connecting Point             | CP Excluded      |
| EC Controller Qty in section    | 1        | EC Controller Voltage Supply | 230/1/50 V/ph/Hz |
| EC Controller Settings          | 32 Hz    | EC Controller Rated Power    | 0.75 kW x 1      |
| EC Controller in selection      | Included |                              |                  |
| EC Controller Optional Nema KIT | No       |                              |                  |

## Winter operation

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.11 kW      |
| EPC for clean filters             | 0.08 kW      |
| SFP for clean filters             | 0.40 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

## Summer operation

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.11 kW      |
| EPC for clean filters             | 0.08 kW      |
| SFP for clean filters             | 0.40 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

## Acoustic data

| Acoustic power level [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lw [dB(A)] |
|------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
| Inlet                        | [dB(A)]   | 39.9     | 53.2     | 59.2     | 59.5      | 57.8      | 52.4      | 46.8      | 64.4       |
| Outlet                       | [dB(A)]   | 42.6     | 55.9     | 61.9     | 62.2      | 60.5      | 56.0      | 50.4      | 67.2       |
| Environment                  | [dB(A)]   | 27.6     | 38.9     | 36.9     | 31.2      | 23.5      | 16.0      | 2.4       | 41.7       |

| Acoustic pressure level at 1 meter distance [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lp [dB(A)] |
|-----------------------------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
|                                                     | [dB(A)]   | 20.6     | 31.9     | 29.9     | 24.2      | 16.5      | 9.0       | 2.0       | 34.7       |

## Air Inlet Outlet ACCESSORIES

## Supply

## Exhaust

## Controls Selection Mode: Functional set

| Inlet Outlet Holes | Supply        | Exhaust       |
|--------------------|---------------|---------------|
| Air Inlet          | Front 515x318 | Front 515x318 |
| Air Outlet         | Front 515x318 | Front 515x318 |
| AirDamper          | Supply        | Exhaust       |
| Air Inlet          | Yes 485x288   | No            |
| Air Outlet         | No            | Yes 485x288   |

## Control application

|                         |                                  |
|-------------------------|----------------------------------|
| Functional Code         | AP 1 0 0 1 0 0 0 6 1 0 0 0 0 0 1 |
| APP Code                | uPC3 (AP-289)                    |
| Main Temp. Sensor       | Duct Supply                      |
| Human Machine Interface | Options                          |



**Technical data for item 1****Offer number 166/LIVE.EUR/GB/2021**

|                         |     |                                  |     |
|-------------------------|-----|----------------------------------|-----|
| BMS                     | Yes | Differential Pressure Transducer | CAV |
| HMI Advanced (Settings) | Yes | CO2 Control                      | Yes |
| HMI Basic (User)        | Yes |                                  |     |
| Control Box             | Yes |                                  |     |

**Air damper actuators**

| Name                              | Code                       | Set |
|-----------------------------------|----------------------------|-----|
| Air Damper Actuator ON-OFF S 10Nm | ADMP.ACT.SET ON-OFF S 10Nm | 1   |
| Air Damper Actuator ON-OFF 10Nm   | ADMP.ACT.SET ON-OFF 10Nm   | 1   |
| Air Damper Actuator 0-10 2Nm      | ADMP.ACT.SET 0-10 2Nm      | 1   |

**Temperature sensor**

| Name                                                    | Code                           | Set |
|---------------------------------------------------------|--------------------------------|-----|
| Duct temperature sensor NTC 10k                         | Temp. Sensor NTC10k (Duct)     | 2   |
| Resp_Controls_TempSensors_Temp. Sensor NTC10k (Outdoor) | Temp. Sensor NTC10k (Outdoor)  | 3   |
| Strap-on temperature sensor NTC 10k                     | Temp. Sensor NTC10k (Strap-on) | 2   |

**Hydronic Coils Controls**

| Name        | Code           | Set |
|-------------|----------------|-----|
| 3-way Valve | VLV.SET-3W-2,5 | 2   |

**Transducers and Switches**

| Name                                 | Code          | Set |
|--------------------------------------|---------------|-----|
| Frost Switch                         | FRST.SWCH     | 2   |
| Differential Pressure Transducer CAV | PRSS.TRDC_CAV | 1   |
| CO2 Transducer                       | CO2.TRDC      | 1   |

**AHU Connection Box****AHU Connection Box**

|                  |                    |                |                         |
|------------------|--------------------|----------------|-------------------------|
| Rated Power      | 0.76 kW            | Full Load Amps | 2.1 A                   |
| Power Connection | 1x230V AC<br>+N+PE | Power Cord     | 3 x 1,5 mm <sup>2</sup> |

**DECLARATION OF PERFORMANCE - Product information - (EU) 1253/2014 annex V as referred to in art. 4(2)**

| No. | Parameter                                                               | Unit                | Value                     |
|-----|-------------------------------------------------------------------------|---------------------|---------------------------|
| 1   | Manufacturer's name                                                     |                     | VTS sp. z o.o.            |
| 2   | Manufacturer's product code                                             |                     | VVS010s-H-F-P-V-H         |
| 3   | Declared type                                                           |                     | NRVU, BVU                 |
| 4   | Type of drive installed                                                 |                     | VFD(AC) or Controller(EC) |
| 5   | Type of energy recovery                                                 |                     | Other                     |
| 6   | Thermal efficiency of heat recovery                                     | %                   | 77.00                     |
| 7   | Nominal NRVU flow rate                                                  |                     | 0.20 / 0.20               |
| 8   | Effective electric power input                                          | kW                  | 0.11 / 0.11               |
| 9   | Internal Specific Fan Power (SFPint)                                    | w/m <sup>3</sup> /s | 126.19 / 120.90           |
| 10  | Face velocity                                                           | m/s                 | 1.32                      |
| 11  | Nominal external pressure                                               | Pa                  | 175.00 / 175.00           |
| 12  | Internal Pressure Drop of ventilation components $\Delta p_{s,int}$     | Pa                  | 76.61 / 73.61             |
| 13  | Internal pressure drop of non-ventilation components $\Delta p_{s,add}$ | Pa                  | 99.48 / 86.57             |
| 14  | Maximum Leakage Rate                                                    | %                   | 0.01 / 0.01               |



Technical data for item 1

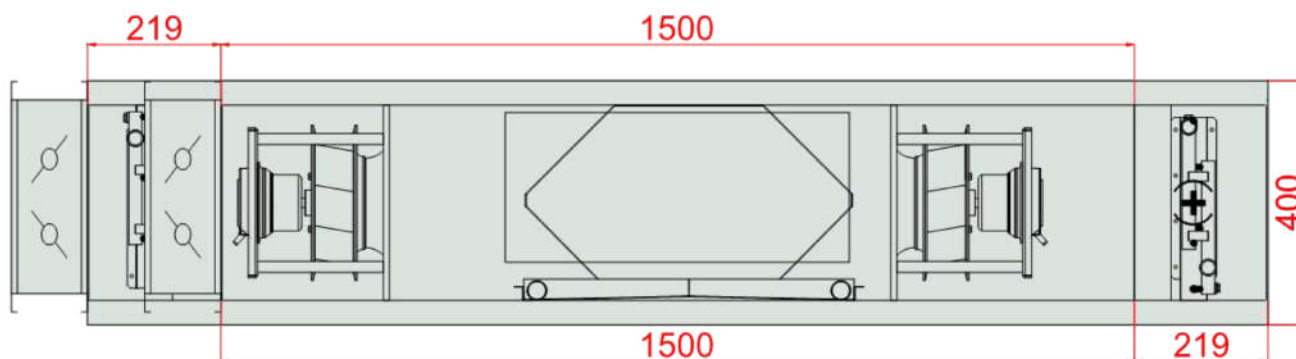
Offer number 166/LIVE.EUR/GB/2021

|    |                                                                                                     |    |                                                               |
|----|-----------------------------------------------------------------------------------------------------|----|---------------------------------------------------------------|
| 15 | Energy performance of filters (declared information about the calculated annual energy consumption) |    | EU7MPleat / F7 / - / EU5MPleat / M5 / -                       |
| 16 | Description of visual filter warning for NRVUs                                                      |    | Supported by control application                              |
| 17 | Casing sound power level LWA                                                                        | dB | 50                                                            |
| 18 | Internet address for disassembly instructions                                                       |    | <a href="http://www.vtsgroup.com">http://www.vtsgroup.com</a> |
| 19 | Ecodesign Compliance                                                                                |    | Yes (2018 +)                                                  |

## Section splits

| Transport Sections | Mass [Kg] | LENGTH [mm] | WIDTH [mm] | HEIGHT [mm] |
|--------------------|-----------|-------------|------------|-------------|
| 1                  | 18        | 219         | 595        | 400         |
| 2                  | 186       | 1500        | 1200       | 400         |
| 3                  | 18        | 219         | 595        | 400         |

Transport Sections Dims



## Technical data for item 2

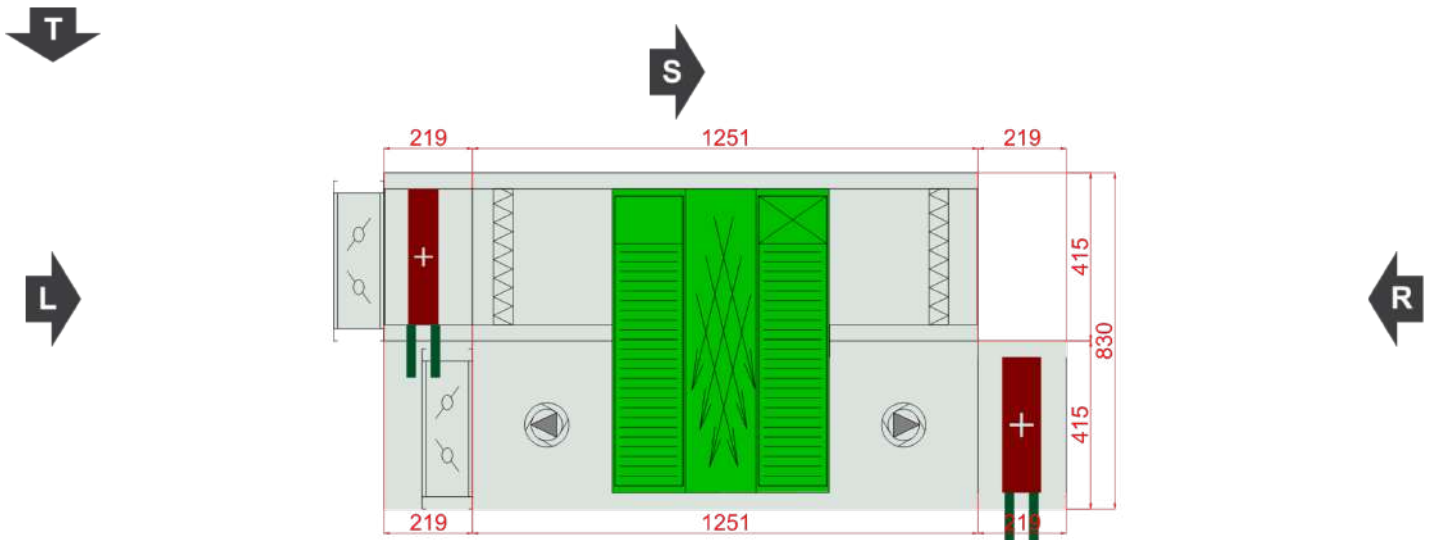
Offer number 166/LIVE.EUR/GB/2021

Project name Highgate Newton Community  
Centre /1DP.CER.004.001/

|                                  |                                  |
|----------------------------------|----------------------------------|
| Type                             | RecoveryHexHorizontal            |
| Application                      | Indoor                           |
| Project Tag                      | 00-HRU-02                        |
| Size                             | VVS005s                          |
| Set                              | VVS005s-R-HFPVH/VVS005s-L-FPV_cd |
| Insulation thickness             | 40 mm                            |
| Insulation                       | Mineral Wool                     |
| Weight of the set (+/- 10%)*     | 164 Kg                           |
| Supply airflow 2                 | 66.00 L/s                        |
| External pressure                | 150 Pa                           |
| Exhaust airflow 2                | 66.00 L/s                        |
| External pressure                | 150 Pa                           |
| SFP Winter                       | 0.95 kW/m³/s                     |
| SFP Summer                       | 0.95 kW/m³/s                     |
| Ecodesign                        | Yes (2018 +)                     |
| Eurovent Energy efficiency class | A+ 2016                          |

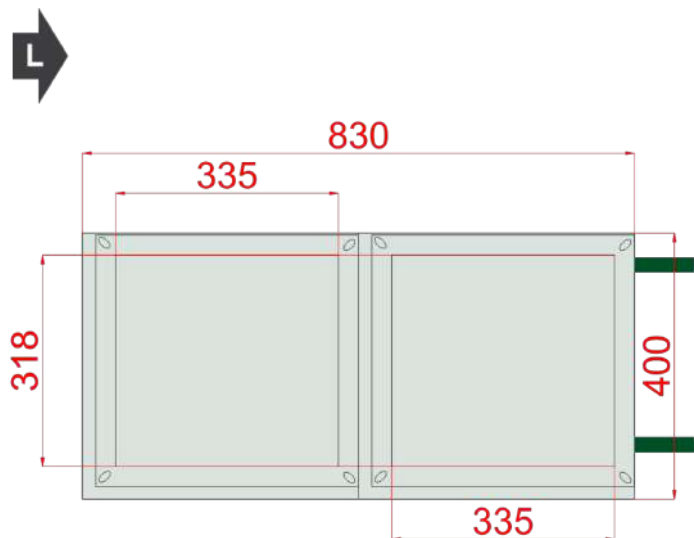


## Top View

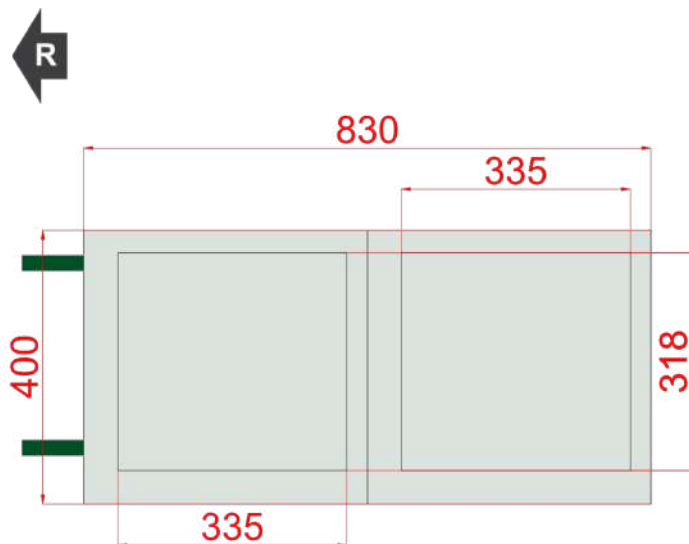


Comment 1:

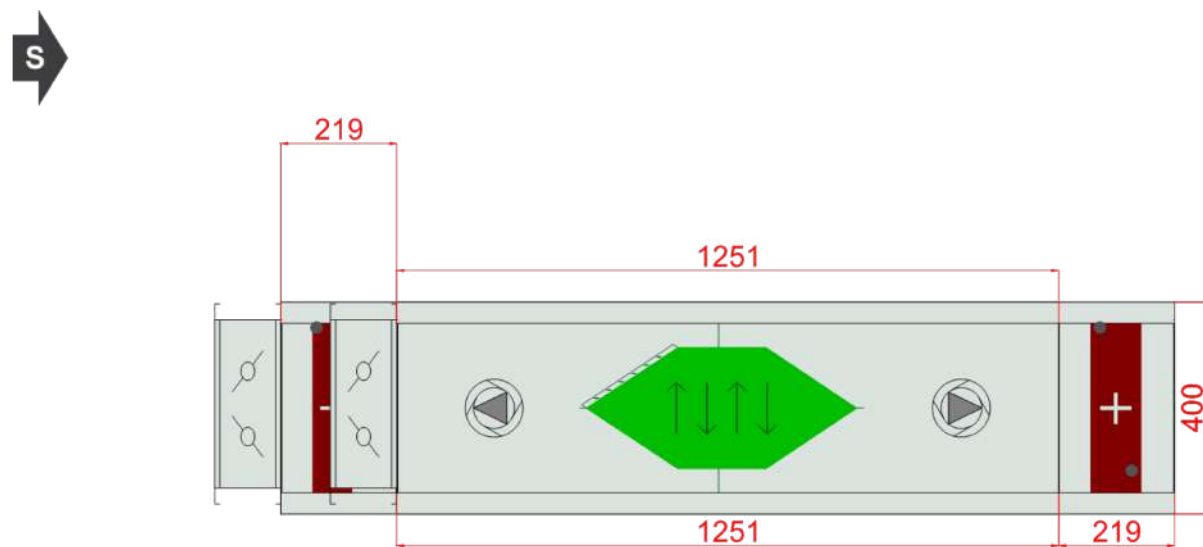
Front View (left)



Front View (right)



Inspection Panels



Sizes [mm]

|                    |    |         |          |        |        |
|--------------------|----|---------|----------|--------|--------|
| Air intake Supply  | FF | 335x318 | Lt 1689  | Hi 320 | Wi 335 |
| Air outlet Supply  | FF | 335x318 | LtA 1814 | H 400  | W 415  |
|                    |    |         | L1 1470  |        | W2 830 |
| Air inlet Exhaust  | FF | 335x318 | L2 1470  |        |        |
| Air outlet Exhaust | FF | 335x318 | L11 219  |        |        |
|                    |    |         | L22 219  |        |        |

Unit design

Walls filled with MW 30mm, double skin made of steel, excluding silencer and electric heater sections

**Technical data for item 2****Offer number 166/LIVE.EUR/GB/2021**

Down base unit inspection  
 Casing anti-corrosion protection: Aluzinc AZ 150.  
 Base unit with pre-configured EC motors drives  
 Energy recovery efficiency meet EC 1253/2014 requirements

**Temperature Conditions****Reference atmospheric pressure 101325 Pa****Winter outdoor reference temperature -4.0 °C**

|        | External air |      |              | Return air |      |              |
|--------|--------------|------|--------------|------------|------|--------------|
|        | DBT          | RH   | DA           | DBT        | RH   | DA           |
| Summer | 27.2 °C      | 56 % | 1.2000 kg/m³ | 20.0 °C    | 76 % | 1.2000 kg/m³ |
| Winter | -4.0 °C      | 80 % | 1.2000 kg/m³ | 22.0 °C    | 37 % | 1.2000 kg/m³ |

**Supply****+ Hot Water Coil**

| <b>Type WCL VVS005s 1R DT SH.St.St.Std</b> |                 | <b>Number of rows 1</b>     | <b>Connection Supply/Return: 3/4"/22</b> |
|--------------------------------------------|-----------------|-----------------------------|------------------------------------------|
| Standard Circuits                          |                 | 0,39 [dm³]                  |                                          |
| Medium                                     | Ethylene        | Maximum working pressure    | 16 bar                                   |
| Glycole concentration                      | 10.00 %         | Maximum medium temperature  | 160.0 °C                                 |
| <b>Winter operation</b>                    |                 | <b>Summer operation</b>     |                                          |
| Intake air DBT / RH                        | -4.0 °C / 80 %  | Intake air DBT / RH         | 27.2 °C / 56 %                           |
| Discharge air DBT / RH                     | 5.0 °C / 40 %   | Discharge air DBT / RH      | 27.2 °C / 56 %                           |
| Air velocity                               | 1.00 m/s        | Air velocity                | 1.00 m/s                                 |
| Pressure drop Wet / Dry Wet                | 4 Pa            | Pressure drop Wet / Dry Wet | 4 Pa                                     |
| Air Pressure                               | 101325 Pa       | Air Pressure                | 101325 Pa                                |
| Air Density                                | 1.2000 kg/m³    | Air Density                 | 1.2000 kg/m³                             |
| Air Volume Flow                            | 66.00 L/s       | Air Volume Flow             | 66.00 L/s                                |
| Total heating capacity                     | 1.7 kW          | Total heating capacity      | 0.0 kW                                   |
| Medium temperature                         | 70.0 °C/40.0 °C | Medium temperature          | 70.0 °C/40.0 °C                          |
| Medium flow rate                           | 0.05 m³/h       | Medium flow rate            | 0.00 m³/h                                |
| Medium pressure drop                       | 0.47 kPa        | Medium pressure drop        | 0.00 kPa                                 |

**Panel Filter**

**Type F7/50.EU7MPleat.Int.Sld**  
 ePM2,5 65% (ISO16890) - EFF CLASS E Flat Mini-Pleat Filter[27.0]

Filter Energy Performance Class E

**Winter operation**

|                              |          |
|------------------------------|----------|
| 50% Dirty Air Pressure Drop  | 104 Pa   |
| Initial Air Pressure Drop    | 9 Pa     |
| 100% Dirty Air Pressure Drop | 200 Pa   |
| Air velocity                 | 0.60 m/s |

**Filter Sizes**

P,FLT F7 332x320x48 (1-2-0301-0274) 1 x Pcs

**Summer operation**

|                              |          |
|------------------------------|----------|
| 50% Dirty Air Pressure Drop  | 104 Pa   |
| Initial Air Pressure Drop    | 9 Pa     |
| 100% Dirty Air Pressure Drop | 200 Pa   |
| Air velocity                 | 0.60 m/s |





Technical data for item 2

Offer number 166/LIVE.EUR/GB/2021

## Counter-Flow Recuperator (Hexagonal)

## Type PCR VVS005s Hex

HIPS or AL 3.0 (SR)

Rated voltage //

## Winter operation

## Supply

|                                                          |                |
|----------------------------------------------------------|----------------|
| Intake air DBT / RH                                      | 5.0 °C / 40 %  |
| Discharge air DBT / RH                                   | 18.8 °C / 16 % |
| Air velocity                                             | 0.90 m/s       |
| Pressure drop Wet / Dry Wet                              | 2 Pa           |
| Air Pressure                                             | 101325 Pa      |
| Air Density                                              | 1.2000 kg/m³   |
| Air Volume Flow                                          | 66.00 L/s      |
| Recovery capacity Sensible / Total Total                 | 1.1 kW         |
| Actual efficiency / at balanced flow Real / BalancedFlow | 81 % / 81 %    |
| Dry efficiency in winter                                 | 81 %           |

## Winter operation

## Exhaust

|                             |                |
|-----------------------------|----------------|
| Intake air DBT / RH         | 22.0 °C / 37 % |
| Discharge air DBT / RH      | 9.6 °C / 82 %  |
| Air velocity                | 0.90 m/s       |
| Pressure drop Wet / Dry Wet | 5 Pa           |
| Air Pressure                | 101325 Pa      |
| Air Density                 | 1.2000 kg/m³   |
| Air Volume Flow             | 66.00 L/s      |
| Recovery Bypass             | Yes            |
| Air Damper                  | No             |

Counter-Flow (Hex)

Max Internal Leakage 0.25%

## Summer operation

## Supply

|                             |                |
|-----------------------------|----------------|
| Intake air DBT / RH         | 27.2 °C / 56 % |
| Discharge air DBT / RH      | 27.2 °C / 56 % |
| Air velocity                | 0.90 m/s       |
| Pressure drop Wet / Dry Wet | 2 Pa           |
| Air Pressure                | 101325 Pa      |
| Air Density                 | 1.2000 kg/m³   |
| Air Volume Flow             | 66.00 L/s      |

## Summer operation

## Exhaust

|                             |                |
|-----------------------------|----------------|
| Intake air DBT / RH         | 20.0 °C / 76 % |
| Discharge air DBT / RH      | 20.0 °C / 76 % |
| Air velocity                | 0.90 m/s       |
| Pressure drop Wet / Dry Wet | 5 Pa           |
| Air Pressure                | 101325 Pa      |
| Air Density                 | 1.2000 kg/m³   |
| Air Volume Flow             | 66.00 L/s      |
| Eco Design Class            | Eco Design     |



## Plug-Fan Set

## Fan Section PLUG\_DD\_190\_0,18\_4.00

EC\_IE4\_F\_IMB14\_71\_4.00p\_T EC072-B190 190|0.18kW|4.00x1

Fan System Main Fan Qty in section x 1

Fan Set Assembly Type FLX1 (Gasket)

Fan Set Designed for wet operating conditions

The Fan System Effects Is Taken Into Account In The Fan Performances

## Fan PLUG\_VS\_190\_AF\_Px 1

**Technical data for item 2****Offer number 166/LIVE.EUR/GB/2021**

|                         |           |
|-------------------------|-----------|
| Total Static Pressure   | 270 Pa    |
| Dynamic pressure        | 3 Pa      |
| External pressure       | 150 Pa    |
| Total Pressure          | 273 Pa    |
| <b>Winter operation</b> |           |
| Air Volume Flow         | 66.00 L/s |

|                                     |               |
|-------------------------------------|---------------|
| Impeller efficiency: Static / Total | 37 %/37 %     |
| Shaft power                         | 0.05 kW x 1   |
| Working revolutions                 | 2798 1/min    |
| Fans Connection Standard            | FLX1 (Gasket) |
| <b>Summer operation</b>             |               |
| Air Volume Flow                     | 66.00 L/s     |

**Motor EC\_IE4\_F\_71\_IMB14\_4.00p\_0.18\_50x 1**  
**EC\_IE4**

|                         |                  |
|-------------------------|------------------|
| Motor enclosure         | IMB14            |
| IEC Size                | 71               |
| Operational Voltage     | 230 V/1 ph       |
| Fan Motor Rated Voltage | 230 V/1 ph/50 Hz |

|                   |             |
|-------------------|-------------|
| Rated Current     | 0.7 A x 1   |
| Rated revolutions | 4490 1/min  |
| Rated Power       | 0.18 kW x 1 |
| Motor Version     | Standard    |

**EC Motor Controller**

|                                 |          |
|---------------------------------|----------|
| EC Controller                   | Yes      |
| EC Controller Qty in section    | 1        |
| EC Controller Settings          | 31 Hz    |
| EC Controller in selection      | Included |
| EC Controller Optional Nema KIT | No       |

|                              |                  |
|------------------------------|------------------|
| Connecting Point             | CP Excluded      |
| EC Controller Voltage Supply | 230/1/50 V/ph/Hz |
| EC Controller Rated Power    | 0.18 kW x 1      |

**Winter operation**

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.06 kW      |
| EPC for clean filters             | 0.03 kW      |
| SFP for clean filters             | 0.50 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

**Summer operation**

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.06 kW      |
| EPC for clean filters             | 0.03 kW      |
| SFP for clean filters             | 0.50 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

**Hot Water Coil**

|                                            |                         |                                          |
|--------------------------------------------|-------------------------|------------------------------------------|
| <b>Type</b> WCL VVS005s 2R DT SH.St.St.Std | <b>Number of rows</b> 2 | <b>Connection Supply/Return:</b> 3/4"/22 |
| Standard Circuits                          | 0,59 [dm³]              |                                          |

|                             |                 |
|-----------------------------|-----------------|
| Medium                      | Water           |
| Glycole concentration       | 0.00 %          |
| <b>Winter operation</b>     |                 |
| Intake air DBT / RH         | 15.0 °C / 80 %  |
| Discharge air DBT / RH      | 21.0 °C / 55 %  |
| Air velocity                | 1.09 m/s        |
| Pressure drop Wet / Dry Wet | 9 Pa            |
| Air Pressure                | 101325 Pa       |
| Air Density                 | 1.2000 kg/m³    |
| Air Volume Flow             | 66.00 L/s       |
| Total heating capacity      | 2.2 kW          |
| Medium temperature          | 70.0 °C/40.0 °C |
| Medium flow rate            | 0.06 m³/h       |
| Medium pressure drop        | 1.10 kPa        |

|                             |                 |
|-----------------------------|-----------------|
| Maximum working pressure    | 16 bar          |
| Maximum medium temperature  | 160.0 °C        |
| <b>Summer operation</b>     |                 |
| Intake air DBT / RH         | 27.2 °C / 56 %  |
| Discharge air DBT / RH      | 27.2 °C / 56 %  |
| Air velocity                | 1.09 m/s        |
| Pressure drop Wet / Dry Wet | 9 Pa            |
| Air Pressure                | 101325 Pa       |
| Air Density                 | 1.2000 kg/m³    |
| Air Volume Flow             | 66.00 L/s       |
| Total heating capacity      | 0.0 kW          |
| Medium temperature          | 70.0 °C/40.0 °C |
| Medium flow rate            | 0.00 m³/h       |
| Medium pressure drop        | 0.00 kPa        |



Technical data for item 2

Offer number 166/LIVE.EUR/GB/2021

## Acoustic data

| Acoustic power level [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lw [dB(A)] |
|------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
| Inlet                        | [dB(A)]   | 43.6     | 43.5     | 20.6     | 20.0      | 12.0      | 18.3      | 16.3      | 46.6       |
| Outlet                       | [dB(A)]   | 41.8     | 48.9     | 34.1     | 38.9      | 32.7      | 30.9      | 26.2      | 50.2       |
| Environment                  | [dB(A)]   | 25.9     | 37.3     | 35.2     | 29.5      | 21.8      | 14.3      | 2.0       | 40.0       |

| Acoustic pressure level at 1 meter distance [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lp [dB(A)] |
|-----------------------------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
|                                                     | [dB(A)]   | 18.9     | 30.3     | 28.2     | 22.5      | 14.8      | 7.3       | 2.0       | 33.0       |

## Exhaust airflow 3

 Panel Filter

Type M5/50.EU5MPleat.Int.Sld

ePM10 40% - ISO 16890 - EFF CLASS Flat Mini-Pleat Filter[26.0]  
E

Filter Energy Performance Class E

## Winter operation

50% Dirty Air Pressure Drop 103 Pa  
 Initial Air Pressure Drop 7 Pa  
 100% Dirty Air Pressure Drop 200 Pa  
 Air velocity 0.60 m/s

## Filter Sizes

P,FLT M5 332x320x48 (1-2-0301-0272) 1 x Pcs

## Summer operation

50% Dirty Air Pressure Drop 103 Pa  
 Initial Air Pressure Drop 7 Pa  
 100% Dirty Air Pressure Drop 200 Pa  
 Air velocity 0.60 m/s

 Plug-Fan Set

Fan Section PLUG\_DD\_190\_0,18\_4.00

EC\_IE4\_F\_IMB14\_71\_4.00p\_T EC072-B190 190|0.18kW|4.00x1

Fan System Main Fan Qty in section x 1

Fan Set Assembly Type FLX1 (Gasket)

Fan Set Designed for wet operating conditions

The Fan System Effects Taken Into Account In The Fan Performances

Fan PLUG\_VS\_190\_AF\_Px 1

|                         |           |                                     |               |
|-------------------------|-----------|-------------------------------------|---------------|
| Total Static Pressure   | 258 Pa    | Impeller efficiency: Static / Total | 37 %/38 %     |
| Dynamic pressure        | 3 Pa      | Shaft power                         | 0.05 kW x 1   |
| External pressure       | 150 Pa    | Working revolutions                 | 2738 1/min    |
| Total Pressure          | 261 Pa    | Fans Connection Standard            | FLX1 (Gasket) |
| <b>Winter operation</b> |           | <b>Summer operation</b>             |               |
| Air Volume Flow         | 66.00 L/s | Air Volume Flow                     | 66.00 L/s     |

Motor EC\_IE4\_F\_71\_IMB14\_4.00p\_0.18\_50x 1



Technical data for item 2

Offer number 166/LIVE.EUR/GB/2021

EC\_IE4

|                         |                  |                   |             |
|-------------------------|------------------|-------------------|-------------|
| Motor enclosure         | IMB14            | Rated Current     | 0.7 A x 1   |
| IEC Size                | 71               | Rated revolutions | 4490 1/min  |
| Operational Voltage     | 230 V/1 ph       | Rated Power       | 0.18 kW x 1 |
| Fan Motor Rated Voltage | 230 V/1 ph/50 Hz | Motor Version     | Standard    |

**EC Motor Controller**

|                                 |          |                              |                  |
|---------------------------------|----------|------------------------------|------------------|
| EC Controller                   | Yes      | Connecting Point             | CP Excluded      |
| EC Controller Qty in section    | 1        | EC Controller Voltage Supply | 230/1/50 V/ph/Hz |
| EC Controller Settings          | 30 Hz    | EC Controller Rated Power    | 0.18 kW x 1      |
| EC Controller in selection      | Included |                              |                  |
| EC Controller Optional Nema KIT | No       |                              |                  |

**Winter operation**

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.05 kW      |
| EPC for clean filters             | 0.03 kW      |
| SFP for clean filters             | 0.45 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

**Summer operation**

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.05 kW      |
| EPC for clean filters             | 0.03 kW      |
| SFP for clean filters             | 0.45 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

**Acoustic data**

| Acoustic power level [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lw [dB(A)] |
|------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
| Inlet                        | [dB(A)]   | 37.7     | 51.1     | 57.0     | 57.3      | 55.6      | 50.2      | 44.6      | 62.2       |
| Outlet                       | [dB(A)]   | 40.4     | 53.8     | 59.7     | 60.0      | 58.3      | 53.8      | 48.2      | 65.0       |
| Environment                  | [dB(A)]   | 25.4     | 36.8     | 34.7     | 29.0      | 21.3      | 13.8      | 2.0       | 39.5       |

| Acoustic pressure level at 1 meter distance [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lp [dB(A)] |
|-----------------------------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
|                                                     | [dB(A)]   | 18.4     | 29.8     | 27.7     | 22.0      | 14.3      | 6.8       | 2.0       | 32.6       |

**Air Inlet Outlet ACCESSORIES****Supply****Exhaust****Controls Selection Mode: Functional set**

| Inlet Outlet Holes | Supply        | Exhaust       |
|--------------------|---------------|---------------|
| Air Inlet          | Front 335x318 | Front 335x318 |
| Air Outlet         | Front 335x318 | Front 335x318 |
| AirDamper          | Supply        | Exhaust       |
| Air Inlet          | Yes 305x288   | No            |
| Air Outlet         | No            | Yes 305x288   |

**Control application**

|                         |                                  |
|-------------------------|----------------------------------|
| Functional Code         | AP 1 0 0 1 0 0 0 6 1 0 0 0 0 0 1 |
| APP Code                | uPC3 (AP-289)                    |
| Main Temp. Sensor       | Duct Supply                      |
| Human Machine Interface | Options                          |





## Technical data for item 2

Offer number 166/LIVE.EUR/GB/2021

|                  |     |                                  |     |
|------------------|-----|----------------------------------|-----|
| BMS              | Yes | Differential Pressure Transducer | CAV |
| HMI Basic (User) | Yes | CO2 Control                      | Yes |
| Control Box      | Yes |                                  |     |

## Air damper actuators

| Name                              | Code                       | Set |
|-----------------------------------|----------------------------|-----|
| Air Damper Actuator ON-OFF S 10Nm | ADMP.ACT.SET ON-OFF S 10Nm | 1   |
| Air Damper Actuator ON-OFF 10Nm   | ADMP.ACT.SET ON-OFF 10Nm   | 1   |
| Air Damper Actuator 0-10 2Nm      | ADMP.ACT.SET 0-10 2Nm      | 1   |

## Temperature sensor

| Name                                                    | Code                           | Set |
|---------------------------------------------------------|--------------------------------|-----|
| Duct temperature sensor NTC 10k                         | Temp. Sensor NTC10k (Duct)     | 2   |
| Resp_Controls_TempSensors_Temp. Sensor NTC10k (Outdoor) | Temp. Sensor NTC10k (Outdoor)  | 3   |
| Strap-on temperature sensor NTC 10k                     | Temp. Sensor NTC10k (Strap-on) | 2   |

## Hydronic Coils Controls

| Name        | Code           | Set |
|-------------|----------------|-----|
| 3-way Valve | VLV.SET-3W-2,5 | 2   |

## Transducers and Switches

| Name                                 | Code          | Set |
|--------------------------------------|---------------|-----|
| Frost Switch                         | FRST.SWCH     | 2   |
| Differential Pressure Transducer CAV | PRSS.TRDC_CAV | 1   |
| CO2 Transducer                       | CO2.TRDC      | 1   |

## AHU Connection Box

## AHU Connection Box

|                  |                    |                |                       |
|------------------|--------------------|----------------|-----------------------|
| Rated Power      | 0.36 kW            | Full Load Amps | 1.2 A                 |
| Power Connection | 1x230V AC<br>+N+PE | Power Cord     | 3 x 0 mm <sup>2</sup> |

## DECLARATION OF PERFORMANCE - Product information - (EU) 1253/2014 annex V as referred to in art. 4(2)

| No. | Parameter                                                               | Unit                | Value                     |
|-----|-------------------------------------------------------------------------|---------------------|---------------------------|
| 1   | Manufacturer's name                                                     |                     | VTS sp. z o.o.            |
| 2   | Manufacturer's product code                                             |                     | VVS005s-H-F-P-V-H         |
| 3   | Declared type                                                           |                     | NRVU, BVU                 |
| 4   | Type of drive installed                                                 |                     | VFD(AC) or Controller(EC) |
| 5   | Type of energy recovery                                                 |                     | Other                     |
| 6   | Thermal efficiency of heat recovery                                     | %                   | 82.00                     |
| 7   | Nominal NRVU flow rate                                                  |                     | 0.07 / 0.07               |
| 8   | Effective electric power input                                          | kW                  | 0.06 / 0.05               |
| 9   | Internal Specific Fan Power (SFPint)                                    | w/m <sup>3</sup> /s | 34.84 / 35.94             |
| 10  | Face velocity                                                           | m/s                 | 0.66                      |
| 11  | Nominal external pressure                                               | Pa                  | 150.00 / 150.00           |
| 12  | Internal Pressure Drop of ventilation components $\Delta p_{s,int}$     | Pa                  | 11.12 / 11.60             |
| 13  | Internal pressure drop of non-ventilation components $\Delta p_{s,add}$ | Pa                  | 108.82 / 96.64            |
| 14  | Maximum Leakage Rate                                                    | %                   | 0.01 / 0.01               |



Technical data for item 2

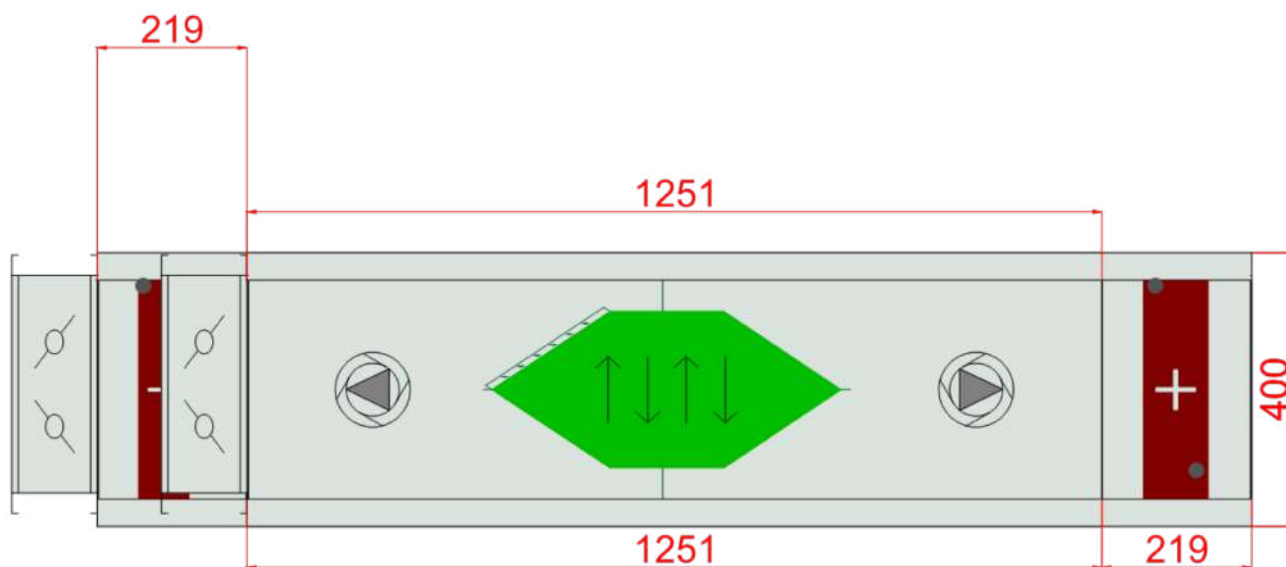
Offer number 166/LIVE.EUR/GB/2021

|    |                                                                                                     |    |                                                               |
|----|-----------------------------------------------------------------------------------------------------|----|---------------------------------------------------------------|
| 15 | Energy performance of filters (declared information about the calculated annual energy consumption) |    | EU7MPleat / F7 / - / EU5MPleat / M5 / -                       |
| 16 | Description of visual filter warning for NRVUs                                                      |    | Supported by control application                              |
| 17 | Casing sound power level LWA                                                                        | dB | 48                                                            |
| 18 | Internet address for disassembly instructions                                                       |    | <a href="http://www.vtsgroup.com">http://www.vtsgroup.com</a> |
| 19 | Ecodesign Compliance                                                                                |    | Yes (2018 +)                                                  |

## Section splits

| Transport Sections | Mass [Kg] | LENGTH [mm] | WIDTH [mm] | HEIGHT [mm] |
|--------------------|-----------|-------------|------------|-------------|
| 1                  | 14        | 219         | 415        | 400         |
| 2                  | 126       | 1251        | 830        | 400         |
| 3                  | 15        | 219         | 415        | 400         |

Transport Sections Dims



## Technical data for item 3

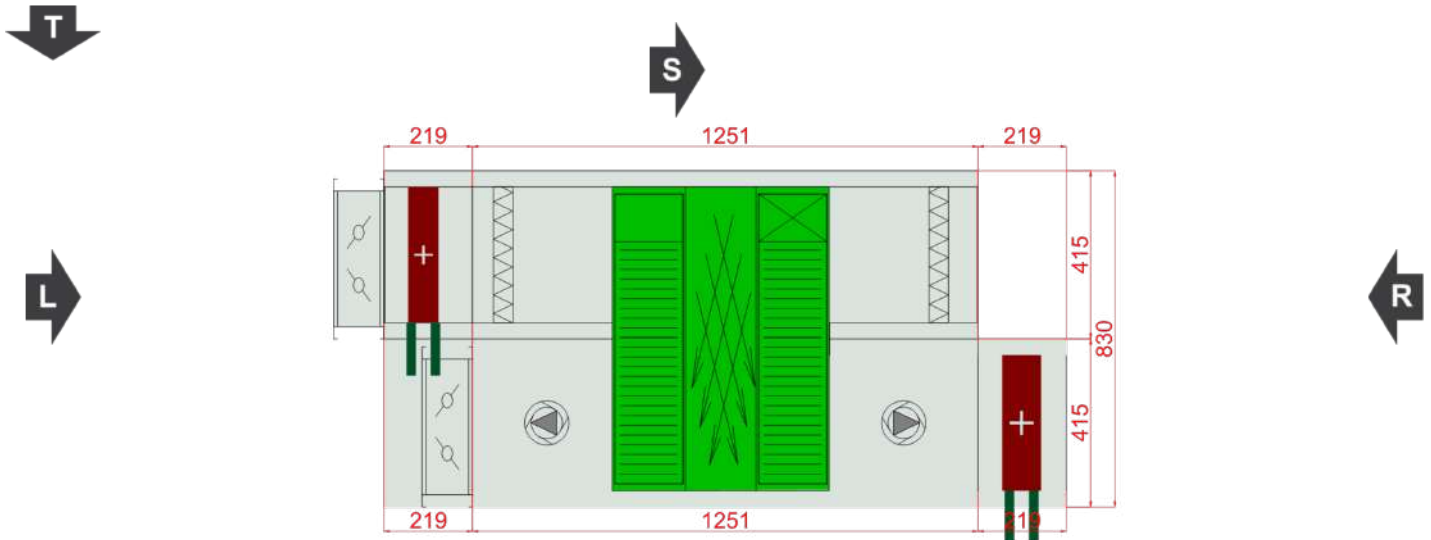
Offer number 166/LIVE.EUR/GB/2021

Project name Highgate Newton Community  
Centre /1DP.CER.004.001/

|                                  |                                  |
|----------------------------------|----------------------------------|
| Type                             | RecoveryHexHorizontal            |
| Application                      | Indoor                           |
| Project Tag                      | 03-HRU-01                        |
| Size                             | VVS005s                          |
| Set                              | VVS005s-R-HFPVH/VVS005s-L-FPV_cd |
| Insulation thickness             | 40 mm                            |
| Insulation                       | Mineral Wool                     |
| Weight of the set (+/- 10%)*     | 164 Kg                           |
| Supply airflow 2                 | 66.00 L/s                        |
| External pressure                | 150 Pa                           |
| Exhaust airflow 2                | 66.00 L/s                        |
| External pressure                | 150 Pa                           |
| SFP Winter                       | 0.95 kW/m³/s                     |
| SFP Summer                       | 0.95 kW/m³/s                     |
| Ecodesign                        | Yes (2018 +)                     |
| Eurovent Energy efficiency class | A+ 2016                          |



## Top View

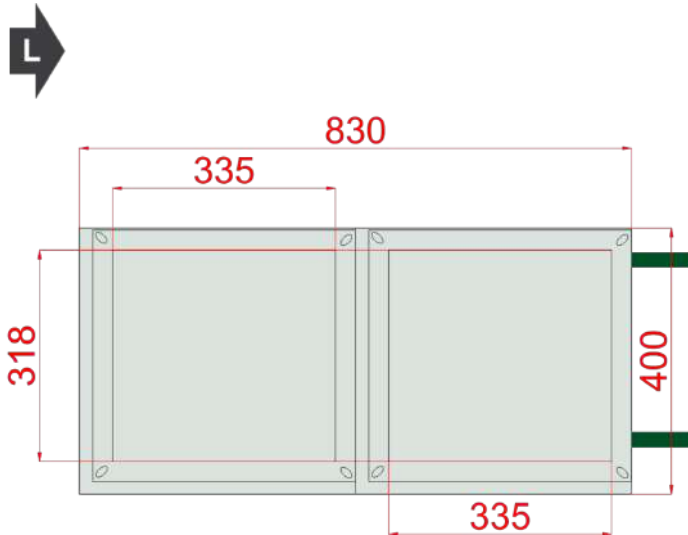


Comment 1:

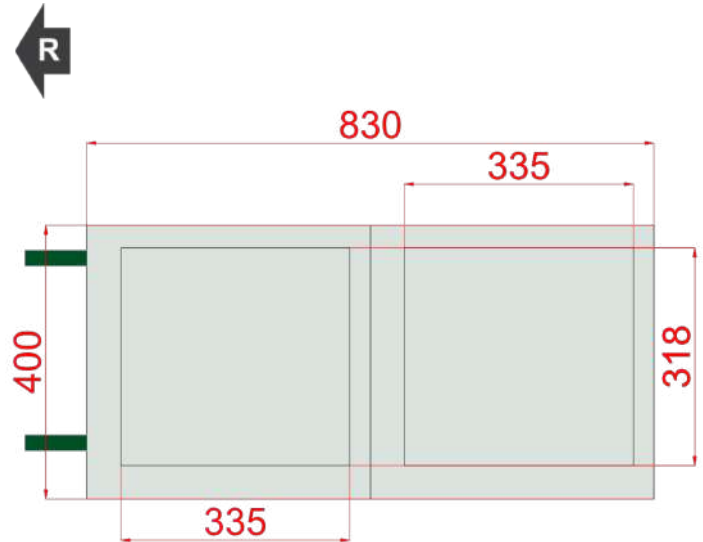
Technical data for item 3

Offer number 166/LIVE.EUR/GB/2021

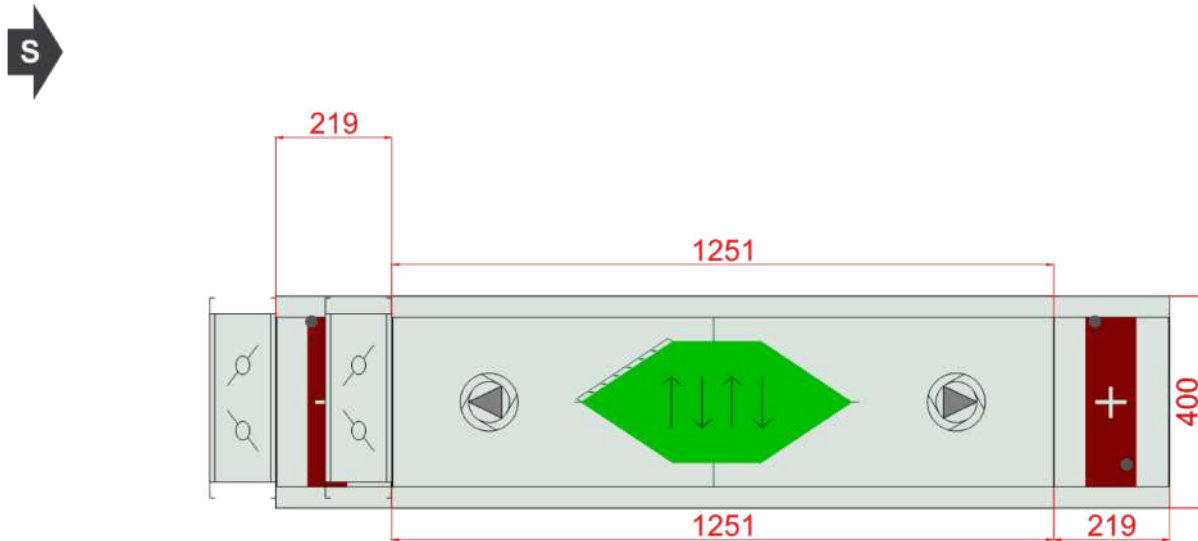
Front View (left)



Front View (right)



Inspection Panels



Sizes [mm]

|                    |    |         |     |      |    |     |    |     |
|--------------------|----|---------|-----|------|----|-----|----|-----|
| Air intake Supply  | FF | 335x318 | Lt  | 1689 | Hi | 320 | Wi | 335 |
| Air outlet Supply  | FF | 335x318 | LtA | 1814 | H  | 400 | W  | 415 |
|                    |    |         | L1  | 1470 |    |     | W2 | 830 |
| Air inlet Exhaust  | FF | 335x318 | L2  | 1470 |    |     |    |     |
| Air outlet Exhaust | FF | 335x318 | L11 | 219  |    |     |    |     |
|                    |    |         | L22 | 219  |    |     |    |     |

Unit design

Walls filled with MW 30mm, double skin made of steel, excluding silencer and electric heater sections

**Technical data for item 3****Offer number 166/LIVE.EUR/GB/2021**

Down base unit inspection  
 Casing anti-corrosion protection: Aluzinc AZ 150.  
 Base unit with pre-configured EC motors drives  
 Energy recovery efficiency meet EC 1253/2014 requirements

**Temperature Conditions****Reference atmospheric pressure 101325 Pa****Winter outdoor reference temperature -4.0 °C**

|        | External air |      |              | Return air |      |              |
|--------|--------------|------|--------------|------------|------|--------------|
|        | DBT          | RH   | DA           | DBT        | RH   | DA           |
| Summer | 27.2 °C      | 56 % | 1.2000 kg/m³ | 20.0 °C    | 76 % | 1.2000 kg/m³ |
| Winter | -4.0 °C      | 80 % | 1.2000 kg/m³ | 22.0 °C    | 37 % | 1.2000 kg/m³ |

**Supply****+ Hot Water Coil**

| <b>Type WCL VVS005s 1R DT SH.St.St.Std</b> |                 | <b>Number of rows 1</b>     | <b>Connection Supply/Return: 3/4"/22</b> |
|--------------------------------------------|-----------------|-----------------------------|------------------------------------------|
| Standard Circuits                          |                 | 0,39 [dm³]                  |                                          |
| Medium                                     | Ethylene        | Maximum working pressure    | 16 bar                                   |
| Glycole concentration                      | 10.00 %         | Maximum medium temperature  | 160.0 °C                                 |
| <b>Winter operation</b>                    |                 | <b>Summer operation</b>     |                                          |
| Intake air DBT / RH                        | -4.0 °C / 80 %  | Intake air DBT / RH         | 27.2 °C / 56 %                           |
| Discharge air DBT / RH                     | 5.0 °C / 40 %   | Discharge air DBT / RH      | 27.2 °C / 56 %                           |
| Air velocity                               | 1.00 m/s        | Air velocity                | 1.00 m/s                                 |
| Pressure drop Wet / Dry Wet                | 4 Pa            | Pressure drop Wet / Dry Wet | 4 Pa                                     |
| Air Pressure                               | 101325 Pa       | Air Pressure                | 101325 Pa                                |
| Air Density                                | 1.2000 kg/m³    | Air Density                 | 1.2000 kg/m³                             |
| Air Volume Flow                            | 66.00 L/s       | Air Volume Flow             | 66.00 L/s                                |
| Total heating capacity                     | 1.7 kW          | Total heating capacity      | 0.0 kW                                   |
| Medium temperature                         | 70.0 °C/40.0 °C | Medium temperature          | 70.0 °C/40.0 °C                          |
| Medium flow rate                           | 0.05 m³/h       | Medium flow rate            | 0.00 m³/h                                |
| Medium pressure drop                       | 0.47 kPa        | Medium pressure drop        | 0.00 kPa                                 |

**Panel Filter**

**Type F7/50.EU7MPleat.Int.Sld**  
 ePM2,5 65% (ISO16890) - EFF CLASS E Flat Mini-Pleat Filter[27.0]

Filter Energy Performance Class E

**Winter operation**

|                              |          |
|------------------------------|----------|
| 50% Dirty Air Pressure Drop  | 104 Pa   |
| Initial Air Pressure Drop    | 9 Pa     |
| 100% Dirty Air Pressure Drop | 200 Pa   |
| Air velocity                 | 0.60 m/s |

**Filter Sizes**

P,FLT F7 332x320x48 (1-2-0301-0274) 1 x Pcs

**Summer operation**

|                              |          |
|------------------------------|----------|
| 50% Dirty Air Pressure Drop  | 104 Pa   |
| Initial Air Pressure Drop    | 9 Pa     |
| 100% Dirty Air Pressure Drop | 200 Pa   |
| Air velocity                 | 0.60 m/s |





Technical data for item 3

Offer number 166/LIVE.EUR/GB/2021

## Counter-Flow Recuperator (Hexagonal)

## Type PCR VVS005s Hex

HIPS or AL 3.0 (SR)

Rated voltage //

## Winter operation

## Supply

|                                                          |                |
|----------------------------------------------------------|----------------|
| Intake air DBT / RH                                      | 5.0 °C / 40 %  |
| Discharge air DBT / RH                                   | 18.8 °C / 16 % |
| Air velocity                                             | 0.90 m/s       |
| Pressure drop Wet / Dry Wet                              | 2 Pa           |
| Air Pressure                                             | 101325 Pa      |
| Air Density                                              | 1.2000 kg/m³   |
| Air Volume Flow                                          | 66.00 L/s      |
| Recovery capacity Sensible / Total Total                 | 1.1 kW         |
| Actual efficiency / at balanced flow Real / BalancedFlow | 81 % / 81 %    |
| Dry efficiency in winter                                 | 81 %           |

## Winter operation

## Exhaust

|                             |                |
|-----------------------------|----------------|
| Intake air DBT / RH         | 22.0 °C / 37 % |
| Discharge air DBT / RH      | 9.6 °C / 82 %  |
| Air velocity                | 0.90 m/s       |
| Pressure drop Wet / Dry Wet | 5 Pa           |
| Air Pressure                | 101325 Pa      |
| Air Density                 | 1.2000 kg/m³   |
| Air Volume Flow             | 66.00 L/s      |
| Recovery Bypass             | Yes            |
| Air Damper                  | No             |

Counter-Flow (Hex)

Max Internal Leakage 0.25%

## Summer operation

## Supply

|                             |                |
|-----------------------------|----------------|
| Intake air DBT / RH         | 27.2 °C / 56 % |
| Discharge air DBT / RH      | 27.2 °C / 56 % |
| Air velocity                | 0.90 m/s       |
| Pressure drop Wet / Dry Wet | 2 Pa           |
| Air Pressure                | 101325 Pa      |
| Air Density                 | 1.2000 kg/m³   |
| Air Volume Flow             | 66.00 L/s      |

## Summer operation

## Exhaust

|                             |                |
|-----------------------------|----------------|
| Intake air DBT / RH         | 20.0 °C / 76 % |
| Discharge air DBT / RH      | 20.0 °C / 76 % |
| Air velocity                | 0.90 m/s       |
| Pressure drop Wet / Dry Wet | 5 Pa           |
| Air Pressure                | 101325 Pa      |
| Air Density                 | 1.2000 kg/m³   |
| Air Volume Flow             | 66.00 L/s      |
| Eco Design Class            | Eco Design     |



## Plug-Fan Set

## Fan Section PLUG\_DD\_190\_0,18\_4.00

EC\_IE4\_F\_IMB14\_71\_4.00p\_T EC072-B190 190|0.18kW|4.00x1

Fan System Main Fan Qty in section x 1

Fan Set Assembly Type FLX1 (Gasket)

Fan Set Designed for wet operating conditions

The Fan System Effects Is Taken Into Account In The Fan Performances

## Fan PLUG\_VS\_190\_AF\_Px 1

**Technical data for item 3****Offer number 166/LIVE.EUR/GB/2021**

|                       |        |
|-----------------------|--------|
| Total Static Pressure | 270 Pa |
| Dynamic pressure      | 3 Pa   |
| External pressure     | 150 Pa |
| Total Pressure        | 273 Pa |

**Winter operation**

|                 |           |
|-----------------|-----------|
| Air Volume Flow | 66.00 L/s |
|-----------------|-----------|

|                                     |               |
|-------------------------------------|---------------|
| Impeller efficiency: Static / Total | 37 %/37 %     |
| Shaft power                         | 0.05 kW x 1   |
| Working revolutions                 | 2798 1/min    |
| Fans Connection Standard            | FLX1 (Gasket) |

**Summer operation**

|                 |           |
|-----------------|-----------|
| Air Volume Flow | 66.00 L/s |
|-----------------|-----------|

**Motor EC\_IE4\_F\_71\_IMB14\_4.00p\_0.18\_50x 1 EC\_IE4**

|                         |                  |
|-------------------------|------------------|
| Motor enclosure         | IMB14            |
| IEC Size                | 71               |
| Operational Voltage     | 230 V/1 ph       |
| Fan Motor Rated Voltage | 230 V/1 ph/50 Hz |

|                   |             |
|-------------------|-------------|
| Rated Current     | 0.7 A x 1   |
| Rated revolutions | 4490 1/min  |
| Rated Power       | 0.18 kW x 1 |
| Motor Version     | Standard    |

**EC Motor Controller**

|                                 |          |
|---------------------------------|----------|
| EC Controller                   | Yes      |
| EC Controller Qty in section    | 1        |
| EC Controller Settings          | 31 Hz    |
| EC Controller in selection      | Included |
| EC Controller Optional Nema KIT | No       |

**Winter operation**

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.06 kW      |
| EPC for clean filters             | 0.03 kW      |
| SFP for clean filters             | 0.50 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

|                              |                  |
|------------------------------|------------------|
| Connecting Point             | CP Excluded      |
| EC Controller Voltage Supply | 230/1/50 V/ph/Hz |
| EC Controller Rated Power    | 0.18 kW x 1      |

**Summer operation**

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.06 kW      |
| EPC for clean filters             | 0.03 kW      |
| SFP for clean filters             | 0.50 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

**+ Hot Water Coil**

|                                            |                         |                                          |
|--------------------------------------------|-------------------------|------------------------------------------|
| <b>Type</b> WCL VVS005s 2R DT SH.St.St.Std | <b>Number of rows</b> 2 | <b>Connection Supply/Return:</b> 3/4"/22 |
| Standard Circuits                          | 0,59 [dm³]              |                                          |

|                             |                 |
|-----------------------------|-----------------|
| Medium                      | Water           |
| Glycole concentration       | 0.00 %          |
| <b>Winter operation</b>     |                 |
| Intake air DBT / RH         | 15.0 °C / 80 %  |
| Discharge air DBT / RH      | 21.0 °C / 55 %  |
| Air velocity                | 1.09 m/s        |
| Pressure drop Wet / Dry Wet | 9 Pa            |
| Air Pressure                | 101325 Pa       |
| Air Density                 | 1.2000 kg/m³    |
| Air Volume Flow             | 66.00 L/s       |
| Total heating capacity      | 2.2 kW          |
| Medium temperature          | 70.0 °C/40.0 °C |
| Medium flow rate            | 0.06 m³/h       |
| Medium pressure drop        | 1.10 kPa        |

|                             |                 |
|-----------------------------|-----------------|
| Maximum working pressure    | 16 bar          |
| Maximum medium temperature  | 160.0 °C        |
| <b>Summer operation</b>     |                 |
| Intake air DBT / RH         | 27.2 °C / 56 %  |
| Discharge air DBT / RH      | 27.2 °C / 56 %  |
| Air velocity                | 1.09 m/s        |
| Pressure drop Wet / Dry Wet | 9 Pa            |
| Air Pressure                | 101325 Pa       |
| Air Density                 | 1.2000 kg/m³    |
| Air Volume Flow             | 66.00 L/s       |
| Total heating capacity      | 0.0 kW          |
| Medium temperature          | 70.0 °C/40.0 °C |
| Medium flow rate            | 0.00 m³/h       |
| Medium pressure drop        | 0.00 kPa        |



Technical data for item 3

Offer number 166/LIVE.EUR/GB/2021

## Acoustic data

| Acoustic power level [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lw [dB(A)] |
|------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
| Inlet                        | [dB(A)]   | 43.6     | 43.5     | 20.6     | 20.0      | 12.0      | 18.3      | 16.3      | 46.6       |
| Outlet                       | [dB(A)]   | 41.8     | 48.9     | 34.1     | 38.9      | 32.7      | 30.9      | 26.2      | 50.2       |
| Environment                  | [dB(A)]   | 25.9     | 37.3     | 35.2     | 29.5      | 21.8      | 14.3      | 2.0       | 40.0       |

| Acoustic pressure level at 1 meter distance [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lp [dB(A)] |
|-----------------------------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
|                                                     | [dB(A)]   | 18.9     | 30.3     | 28.2     | 22.5      | 14.8      | 7.3       | 2.0       | 33.0       |

## Exhaust airflow 3

## Panel Filter

Type M5/50.EU5MPleat.Int.Sld

ePM10 40% - ISO 16890 - EFF CLASS Flat Mini-Pleat Filter[26.0]  
E

Filter Energy Performance Class E

## Winter operation

50% Dirty Air Pressure Drop 103 Pa  
 Initial Air Pressure Drop 7 Pa  
 100% Dirty Air Pressure Drop 200 Pa  
 Air velocity 0.60 m/s

## Filter Sizes

P,FLT M5 332x320x48 (1-2-0301-0272) 1 x Pcs

## Summer operation

50% Dirty Air Pressure Drop 103 Pa  
 Initial Air Pressure Drop 7 Pa  
 100% Dirty Air Pressure Drop 200 Pa  
 Air velocity 0.60 m/s

## Plug-Fan Set

Fan Section PLUG\_DD\_190\_0,18\_4.00

EC\_IE4\_F\_IMB14\_71\_4.00p\_T EC072-B190 190|0.18kW|4.00x1

Fan System Main Fan Qty in section x 1

Fan Set Assembly Type FLX1 (Gasket)

Fan Set Designed for wet operating conditions

The Fan System Effects Taken Into Account In The Fan Performances

Fan PLUG\_VS\_190\_AF\_Px 1

|                         |           |                                     |               |
|-------------------------|-----------|-------------------------------------|---------------|
| Total Static Pressure   | 258 Pa    | Impeller efficiency: Static / Total | 37 %/38 %     |
| Dynamic pressure        | 3 Pa      | Shaft power                         | 0.05 kW x 1   |
| External pressure       | 150 Pa    | Working revolutions                 | 2738 1/min    |
| Total Pressure          | 261 Pa    | Fans Connection Standard            | FLX1 (Gasket) |
| <b>Winter operation</b> |           | <b>Summer operation</b>             |               |
| Air Volume Flow         | 66.00 L/s | Air Volume Flow                     | 66.00 L/s     |

Motor EC\_IE4\_F\_71\_IMB14\_4.00p\_0.18\_50x 1





Technical data for item 3

Offer number 166/LIVE.EUR/GB/2021

EC\_IE4

|                         |                  |                   |             |
|-------------------------|------------------|-------------------|-------------|
| Motor enclosure         | IMB14            | Rated Current     | 0.7 A x 1   |
| IEC Size                | 71               | Rated revolutions | 4490 1/min  |
| Operational Voltage     | 230 V/1 ph       | Rated Power       | 0.18 kW x 1 |
| Fan Motor Rated Voltage | 230 V/1 ph/50 Hz | Motor Version     | Standard    |

**EC Motor Controller**

|                                 |          |                              |                  |
|---------------------------------|----------|------------------------------|------------------|
| EC Controller                   | Yes      | Connecting Point             | CP Excluded      |
| EC Controller Qty in section    | 1        | EC Controller Voltage Supply | 230/1/50 V/ph/Hz |
| EC Controller Settings          | 30 Hz    | EC Controller Rated Power    | 0.18 kW x 1      |
| EC Controller in selection      | Included |                              |                  |
| EC Controller Optional Nema KIT | No       |                              |                  |

**Winter operation**

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.05 kW      |
| EPC for clean filters             | 0.03 kW      |
| SFP for clean filters             | 0.45 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

**Summer operation**

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.05 kW      |
| EPC for clean filters             | 0.03 kW      |
| SFP for clean filters             | 0.45 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

**Acoustic data**

| Acoustic power level [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lw [dB(A)] |
|------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
| Inlet                        | [dB(A)]   | 37.7     | 51.1     | 57.0     | 57.3      | 55.6      | 50.2      | 44.6      | 62.2       |
| Outlet                       | [dB(A)]   | 40.4     | 53.8     | 59.7     | 60.0      | 58.3      | 53.8      | 48.2      | 65.0       |
| Environment                  | [dB(A)]   | 25.4     | 36.8     | 34.7     | 29.0      | 21.3      | 13.8      | 2.0       | 39.5       |

| Acoustic pressure level at 1 meter distance [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lp [dB(A)] |
|-----------------------------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
|                                                     | [dB(A)]   | 18.4     | 29.8     | 27.7     | 22.0      | 14.3      | 6.8       | 2.0       | 32.6       |

**Air Inlet Outlet ACCESSORIES****Supply****Exhaust****Controls Selection Mode: Functional set**

| Inlet Outlet Holes | Supply        | Exhaust       |
|--------------------|---------------|---------------|
| Air Inlet          | Front 335x318 | Front 335x318 |
| Air Outlet         | Front 335x318 | Front 335x318 |
| AirDamper          | Supply        | Exhaust       |
| Air Inlet          | Yes 305x288   | No            |
| Air Outlet         | No            | Yes 305x288   |

**Control application**

|                         |                                  |
|-------------------------|----------------------------------|
| Functional Code         | AP 1 0 0 1 0 0 0 6 1 0 0 0 0 0 1 |
| APP Code                | uPC3 (AP-289)                    |
| Main Temp. Sensor       | Duct Supply                      |
| Human Machine Interface | Options                          |





## Technical data for item 3

Offer number 166/LIVE.EUR/GB/2021

|                  |     |                                  |     |
|------------------|-----|----------------------------------|-----|
| BMS              | Yes | Differential Pressure Transducer | CAV |
| HMI Basic (User) | Yes | CO2 Control                      | Yes |
| Control Box      | Yes |                                  |     |

## Air damper actuators

| Name                              | Code                       | Set |
|-----------------------------------|----------------------------|-----|
| Air Damper Actuator ON-OFF S 10Nm | ADMP.ACT.SET ON-OFF S 10Nm | 1   |
| Air Damper Actuator ON-OFF 10Nm   | ADMP.ACT.SET ON-OFF 10Nm   | 1   |
| Air Damper Actuator 0-10 2Nm      | ADMP.ACT.SET 0-10 2Nm      | 1   |

## Temperature sensor

| Name                                                    | Code                           | Set |
|---------------------------------------------------------|--------------------------------|-----|
| Duct temperature sensor NTC 10k                         | Temp. Sensor NTC10k (Duct)     | 2   |
| Resp_Controls_TempSensors_Temp. Sensor NTC10k (Outdoor) | Temp. Sensor NTC10k (Outdoor)  | 3   |
| Strap-on temperature sensor NTC 10k                     | Temp. Sensor NTC10k (Strap-on) | 2   |

## Hydronic Coils Controls

| Name        | Code           | Set |
|-------------|----------------|-----|
| 3-way Valve | VLV.SET-3W-2,5 | 2   |

## Transducers and Switches

| Name                                 | Code          | Set |
|--------------------------------------|---------------|-----|
| Frost Switch                         | FRST.SWCH     | 2   |
| Differential Pressure Transducer CAV | PRSS.TRDC_CAV | 1   |
| CO2 Transducer                       | CO2.TRDC      | 1   |

## AHU Connection Box

## AHU Connection Box

|                  |                    |                |                       |
|------------------|--------------------|----------------|-----------------------|
| Rated Power      | 0.36 kW            | Full Load Amps | 1.2 A                 |
| Power Connection | 1x230V AC<br>+N+PE | Power Cord     | 3 x 0 mm <sup>2</sup> |

## DECLARATION OF PERFORMANCE - Product information - (EU) 1253/2014 annex V as referred to in art. 4(2)

| No. | Parameter                                                               | Unit                | Value                     |
|-----|-------------------------------------------------------------------------|---------------------|---------------------------|
| 1   | Manufacturer's name                                                     |                     | VTS sp. z o.o.            |
| 2   | Manufacturer's product code                                             |                     | VVS005s-H-F-P-V-H         |
| 3   | Declared type                                                           |                     | NRVU, BVU                 |
| 4   | Type of drive installed                                                 |                     | VFD(AC) or Controller(EC) |
| 5   | Type of energy recovery                                                 |                     | Other                     |
| 6   | Thermal efficiency of heat recovery                                     | %                   | 82.00                     |
| 7   | Nominal NRVU flow rate                                                  |                     | 0.07 / 0.07               |
| 8   | Effective electric power input                                          | kW                  | 0.06 / 0.05               |
| 9   | Internal Specific Fan Power (SFPint)                                    | w/m <sup>3</sup> /s | 34.84 / 35.94             |
| 10  | Face velocity                                                           | m/s                 | 0.66                      |
| 11  | Nominal external pressure                                               | Pa                  | 150.00 / 150.00           |
| 12  | Internal Pressure Drop of ventilation components $\Delta p_{s,int}$     | Pa                  | 11.12 / 11.60             |
| 13  | Internal pressure drop of non-ventilation components $\Delta p_{s,add}$ | Pa                  | 108.82 / 96.64            |
| 14  | Maximum Leakage Rate                                                    | %                   | 0.01 / 0.01               |



Technical data for item 3

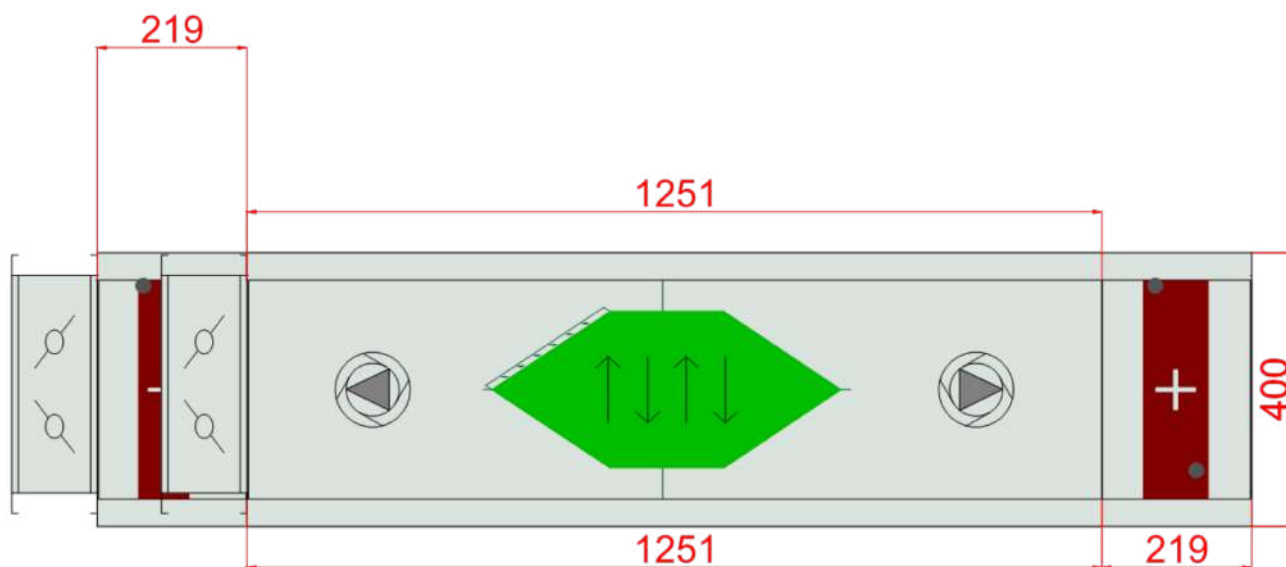
Offer number 166/LIVE.EUR/GB/2021

|    |                                                                                                     |    |                                                               |
|----|-----------------------------------------------------------------------------------------------------|----|---------------------------------------------------------------|
| 15 | Energy performance of filters (declared information about the calculated annual energy consumption) |    | EU7MPleat / F7 / - / EU5MPleat / M5 / -                       |
| 16 | Description of visual filter warning for NRVUs                                                      |    | Supported by control application                              |
| 17 | Casing sound power level LWA                                                                        | dB | 48                                                            |
| 18 | Internet address for disassembly instructions                                                       |    | <a href="http://www.vtsgroup.com">http://www.vtsgroup.com</a> |
| 19 | Ecodesign Compliance                                                                                |    | Yes (2018 +)                                                  |

## Section splits

| Transport Sections | Mass [Kg] | LENGTH [mm] | WIDTH [mm] | HEIGHT [mm] |
|--------------------|-----------|-------------|------------|-------------|
| 1                  | 14        | 219         | 415        | 400         |
| 2                  | 126       | 1251        | 830        | 400         |
| 3                  | 15        | 219         | 415        | 400         |

Transport Sections Dims



## Technical data for item 5

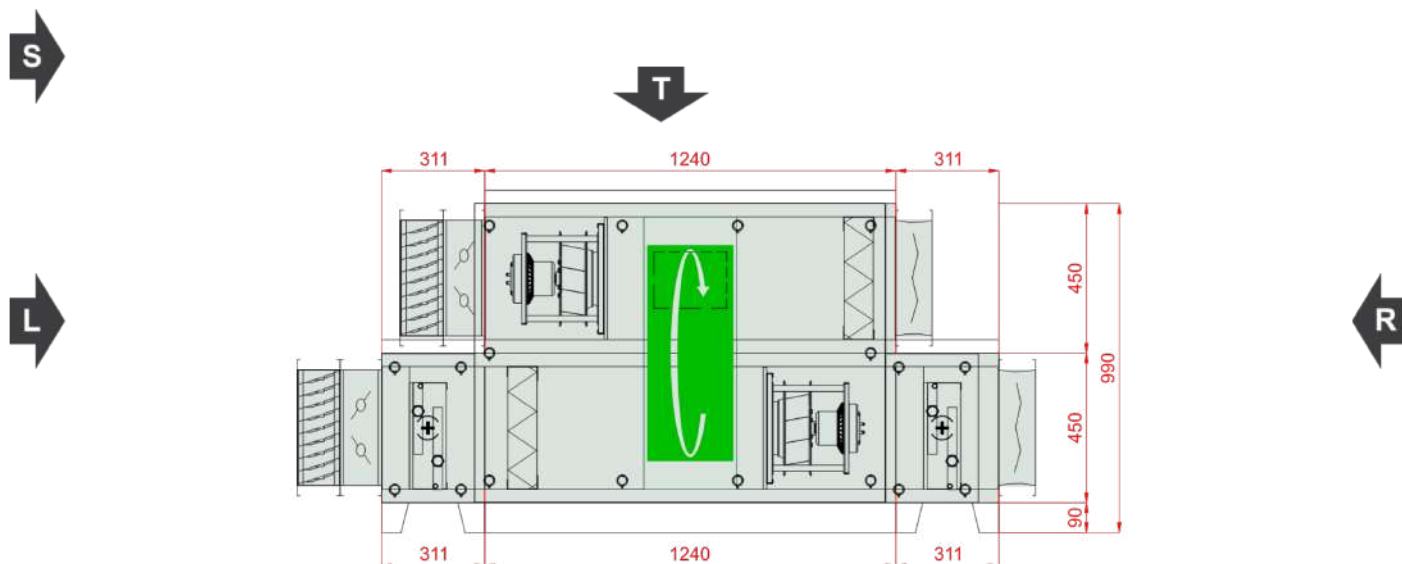
Offer number 166/LIVE.EUR/GB/2021

Project name Highgate Newton Community  
Centre /1DP.CER.004.001/

|                                  |                                  |
|----------------------------------|----------------------------------|
| Type                             | RecoveryRotaryVerticalCompact    |
| Application                      | Outdoor                          |
| Project Tag                      | 03-HRU-02                        |
| Size                             | VVS021c                          |
| Set                              | VVS021c-R-HFRVH/VVS021c-L-FRV_cd |
| Insulation thickness             | 40 mm                            |
| Insulation                       | Mineral Wool                     |
| Weight of the set (+/- 10%)*     | 298 Kg                           |
| Supply airflow 2                 | 275.00 L/s                       |
| External pressure                | 200 Pa                           |
| Exhaust airflow 2                | 275.00 L/s                       |
| External pressure                | 200 Pa                           |
| SFP Winter                       | 0.99 kW/m³/s                     |
| SFP Summer                       | 0.99 kW/m³/s                     |
| Ecodesign                        | Yes (2018 +)                     |
| Eurovent Energy efficiency class | A+ 2016                          |

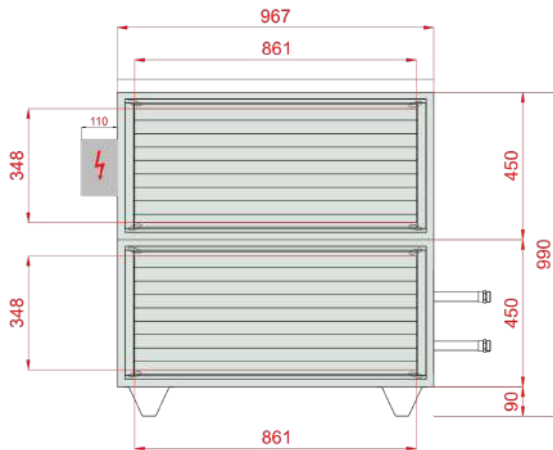


## Inspection Panels

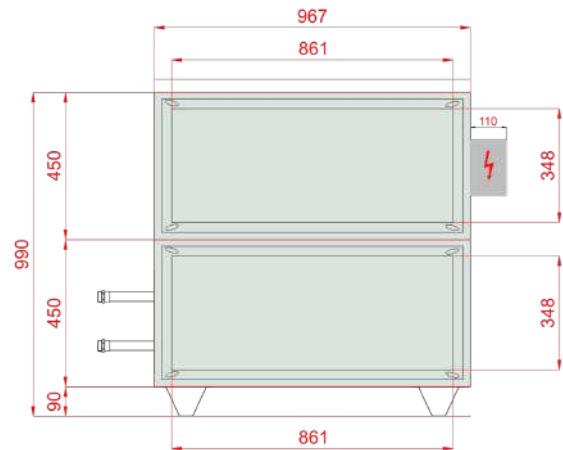


Comment 1:

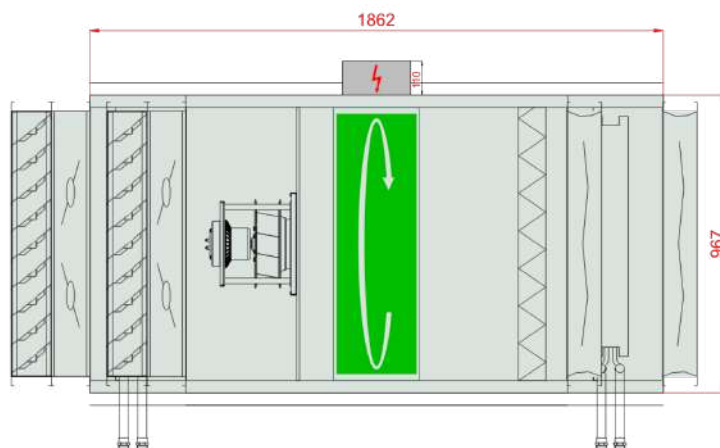
Front View (left)



Front View (right)



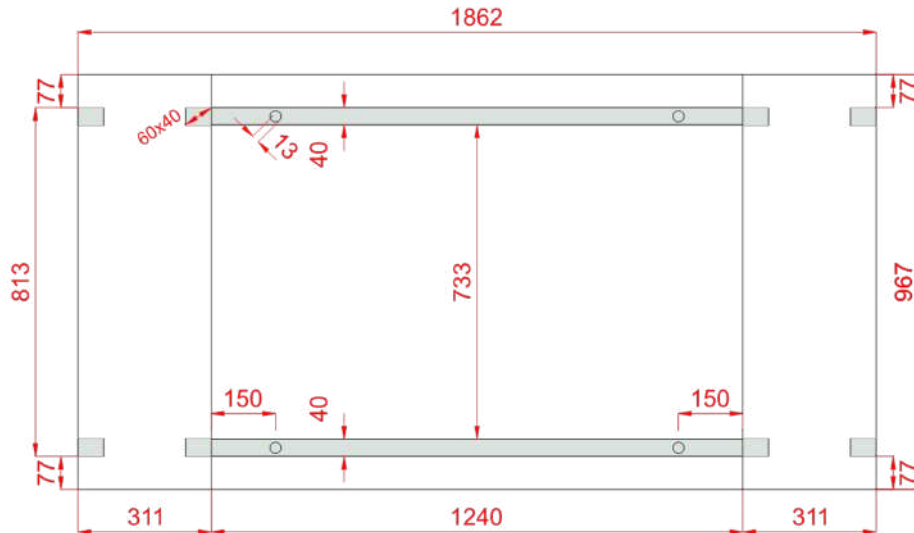
Top View



Technical data for item 5

Offer number 166/LIVE.EUR/GB/2021

## Frame Top View, within the AHU outline contour



## Sizes [mm]

|                       |         |          |        |        |
|-----------------------|---------|----------|--------|--------|
| Air intake Supply FF  | 861x348 | Lt 1862  | Hi 370 | Wi 887 |
| Air outlet Supply FF  | 861x348 | LtA 2227 | H 540  | W 967  |
|                       |         | L1 1862  | H2 990 |        |
| Air inlet Exhaust FF  | 861x348 | L2 1240  | Hf 90  |        |
| Air outlet Exhaust FF | 861x348 | L21 311  |        |        |
|                       |         | L22 311  |        |        |

## Unit design

40mm insulated walls , double skin made of steel

Unit Power Supply 400V/3ph/50Hz

Casing anti-corrosion protection: Aluzinc AZ 150. Corrosion resistance (salt spary test): over 2400 hours

In case of delivery with controls a base unit fully wired, with pre-configured controller and EC motors drives

Energy recovery efficiency exceeding 86% (for EC 1253/2014 conditions)

## Temperature Conditions

Reference atmospheric pressure 101325 Pa

Winter outdoor reference temperature -4.0 °C

|        | External air |      |              | Return air |      |              |
|--------|--------------|------|--------------|------------|------|--------------|
|        | DBT          | RH   | DA           | DBT        | RH   | DA           |
| Summer | 27.2 °C      | 56 % | 1.2000 kg/m³ | 20.0 °C    | 76 % | 1.2000 kg/m³ |
| Winter | -4.0 °C      | 80 % | 1.2000 kg/m³ | 22.0 °C    | 37 % | 1.2000 kg/m³ |



Technical data for item 5

Offer number 166/LIVE.EUR/GB/2021

## Supply

## Hot Water Coil

| Type WCL VVS021c 1R DT SH.St.St.Std |                          | Number of rows 1            | Connection Supply/Return: 1"/1" |
|-------------------------------------|--------------------------|-----------------------------|---------------------------------|
| Standard Circuits                   |                          | 1,29 [dm <sup>3</sup> ]     |                                 |
| Medium                              | Ethylene                 | Maximum working pressure    | 16 bar                          |
| Glycole concentration               | 10.00 %                  | Maximum medium temperature  | 160.0 °C                        |
| <b>Winter operation</b>             |                          | <b>Summer operation</b>     |                                 |
| Intake air DBT / RH                 | -4.0 °C / 80 %           | Intake air DBT / RH         | 27.2 °C / 56 %                  |
| Discharge air DBT / RH              | 5.0 °C / 40 %            | Discharge air DBT / RH      | 27.2 °C / 56 %                  |
| Air velocity                        | 1.06 m/s                 | Air velocity                | 1.06 m/s                        |
| Pressure drop Wet / Dry Wet         | 6 Pa                     | Pressure drop Wet / Dry Wet | 6 Pa                            |
| Air Pressure                        | 101325 Pa                | Air Pressure                | 101325 Pa                       |
| Air Density                         | 1.2000 kg/m <sup>3</sup> | Air Density                 | 1.2000 kg/m <sup>3</sup>        |
| Air Volume Flow                     | 275.00 L/s               | Air Volume Flow             | 275.00 L/s                      |
| Total heating capacity              | 3.0 kW                   | Total heating capacity      | 0.0 kW                          |
| Medium temperature                  | 70.0 °C/40.0 °C          | Medium temperature          | 70.0 °C/40.0 °C                 |
| Medium flow rate                    | 0.09 m <sup>3</sup> /h   | Medium flow rate            | 0.00 m <sup>3</sup> /h          |
| Medium pressure drop                | 0.28 kPa                 | Medium pressure drop        | 0.00 kPa                        |

## Panel Filter

Type F7/50.EU7MPleat.Int.Sld  
 ePM2,5 65% (ISO16890) - EFF CLASS Flat Mini-Pleat Filter[27.0]  
 E

|                                 |          |                              |          |
|---------------------------------|----------|------------------------------|----------|
| Filter Energy Performance Class | E        |                              |          |
| <b>Winter operation</b>         |          | <b>Summer operation</b>      |          |
| 50% Dirty Air Pressure Drop     | 108 Pa   | 50% Dirty Air Pressure Drop  | 108 Pa   |
| Initial Air Pressure Drop       | 15 Pa    | Initial Air Pressure Drop    | 15 Pa    |
| 100% Dirty Air Pressure Drop    | 200 Pa   | 100% Dirty Air Pressure Drop | 200 Pa   |
| Air velocity                    | 0.86 m/s | Air velocity                 | 0.86 m/s |
| <b>Filter Sizes</b>             |          |                              |          |
| P.FLT (1-2-0301-0213)           | 2 x Pcs  |                              |          |



Technical data for item 5

Offer number 166/LIVE.EUR/GB/2021

**Rotary Wheel****Type** RRG VVS021c NHG

R2\_SR\_NHG

Rated voltage 230 V/1 ph/50 Hz

**Winter operation****Supply**

Intake air DBT / RH 5.0 °C / 40 %

Discharge air DBT / RH 19.5 °C / 15 %

Air velocity 1.45 m/s

Pressure drop Wet / Dry Wet / Dry 82 Pa / 88 Pa

Air Pressure 101325 Pa

Air Density 1.2000 kg/m³

Air Volume Flow 275.00 L/s

Recovery capacity Sensible / Total  
Sensible / Total 4.8 kW / 4.8 kWActual efficiency / at balanced flow Real /  
BalancedFlow 86 % / 86 %

Dry efficiency in winter 85 %

**Winter operation****Exhaust**

Intake air DBT / RH 22.0 °C / 37 %

Discharge air DBT / RH 9.0 °C / 85 %

Air velocity 1.45 m/s

Pressure drop Wet / Dry Wet / Dry 88 Pa / 88 Pa

Air Pressure 101325 Pa

Air Density 1.2000 kg/m³

Air Volume Flow 275.00 L/s

Recovery Bypass No

Rotary Regenerator

Max Internal Leakage 3%

**Summer operation****Supply**

Intake air DBT / RH 27.2 °C / 56 %

Discharge air DBT / RH 27.2 °C / 56 %

Air velocity 1.45 m/s

Pressure drop Wet / Dry Wet 82 Pa

Air Pressure 101325 Pa

Air Density 1.2000 kg/m³

Air Volume Flow 275.00 L/s

**Summer operation****Exhaust**

Intake air DBT / RH 20.0 °C / 76 %

Discharge air DBT / RH 20.0 °C / 76 %

Air velocity 1.45 m/s

Pressure drop Wet / Dry Wet 88 Pa

Air Pressure 101325 Pa

Air Density 1.2000 kg/m³

Air Volume Flow 275.00 L/s

Eco Design Class

Eco Design

**Plug-Fan Set****Fan Section** PLUG\_DD\_250\_0,70\_1.58

EC\_IE4\_F\_IMB14\_71\_1.58p\_T 771.3.570

250|0.7kW|1.58x1

Fan System Main Fan Qty in section x 1

Fan Set Assembly Type FLX1 (Gasket)

Fan Set Designed for wet operating conditions

The Fan System Effects Taken Into Account In The Fan Performances

**Fan** PLUG\_VS\_250\_AF\_Px 1

**Technical data for item 5****Offer number 166/LIVE.EUR/GB/2021**

|                         |            |
|-------------------------|------------|
| Total Static Pressure   | 403 Pa     |
| Dynamic pressure        | 14 Pa      |
| External pressure       | 200 Pa     |
| Total Pressure          | 417 Pa     |
| <b>Winter operation</b> |            |
| Air Volume Flow         | 275.00 L/s |

|                                     |               |
|-------------------------------------|---------------|
| Impeller efficiency: Static / Total | 71 %/73 %     |
| Shaft power                         | 0.16 kW x 1   |
| Working revolutions                 | 2275 1/min    |
| Fans Connection Standard            | FLX1 (Gasket) |
| <b>Summer operation</b>             |               |
| Air Volume Flow                     | 275.00 L/s    |

**Motor EC\_IE4\_F\_71\_IMB14\_1.58p\_0.7\_50x 1**  
 EC\_IE4\_F\_IMB14\_71\_1.58p\_T

|                         |                  |
|-------------------------|------------------|
| Motor enclosure         | IMB14            |
| IEC Size                | 71               |
| Operational Voltage     | 230 V/1 ph       |
| Fan Motor Rated Voltage | 230 V/1 ph/50 Hz |

|                   |             |
|-------------------|-------------|
| Rated Current     | 3.8 A x 1   |
| Rated revolutions | 4000 1/min  |
| Rated Power       | 0.70 kW x 1 |
| Motor Version     | Standard    |

**EC Motor Controller**

|                                 |          |
|---------------------------------|----------|
| EC Controller                   | Yes      |
| EC Controller Qty in section    | 1        |
| EC Controller Settings          | 28 Hz    |
| EC Controller in selection      | Included |
| EC Controller Optional Nema KIT | No       |

|                              |                  |
|------------------------------|------------------|
| Connecting Point             | CP Excluded      |
| EC Controller Voltage Supply | 230/1/50 V/ph/Hz |
| EC Controller Rated Power    | 0.75 kW x 1      |

**Winter operation**

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.18 kW      |
| EPC for clean filters             | 0.14 kW      |
| SFP for clean filters             | 0.50 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

**Summer operation**

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.18 kW      |
| EPC for clean filters             | 0.14 kW      |
| SFP for clean filters             | 0.50 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

**Hot Water Coil**

|                                            |                         |                                        |
|--------------------------------------------|-------------------------|----------------------------------------|
| <b>Type</b> WCL VVS021c 1R DT SH.St.St.Std | <b>Number of rows</b> 1 | <b>Connection Supply/Return:</b> 1"/1" |
| Standard Circuits                          | 1,29 [dm³]              |                                        |

|                             |                 |
|-----------------------------|-----------------|
| Medium                      | Water           |
| Glycole concentration       | 0.00 %          |
| <b>Winter operation</b>     |                 |
| Intake air DBT / RH         | 15.0 °C / 80 %  |
| Discharge air DBT / RH      | 21.0 °C / 55 %  |
| Air velocity                | 1.12 m/s        |
| Pressure drop Wet / Dry Wet | 7 Pa            |
| Air Pressure                | 101325 Pa       |
| Air Density                 | 1.2000 kg/m³    |
| Air Volume Flow             | 275.00 L/s      |
| Total heating capacity      | 2.0 kW          |
| Medium temperature          | 70.0 °C/40.0 °C |
| Medium flow rate            | 0.06 m³/h       |
| Medium pressure drop        | 0.24 kPa        |

|                             |                 |
|-----------------------------|-----------------|
| Maximum working pressure    | 16 bar          |
| Maximum medium temperature  | 160.0 °C        |
| <b>Summer operation</b>     |                 |
| Intake air DBT / RH         | 27.2 °C / 56 %  |
| Discharge air DBT / RH      | 27.2 °C / 56 %  |
| Air velocity                | 1.12 m/s        |
| Pressure drop Wet / Dry Wet | 7 Pa            |
| Air Pressure                | 101325 Pa       |
| Air Density                 | 1.2000 kg/m³    |
| Air Volume Flow             | 275.00 L/s      |
| Total heating capacity      | 0.0 kW          |
| Medium temperature          | 70.0 °C/40.0 °C |
| Medium flow rate            | 0.00 m³/h       |
| Medium pressure drop        | 0.00 kPa        |

Technical data for item 5

Offer number 166/LIVE.EUR/GB/2021

## Acoustic data

| Acoustic power level [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lw [dB(A)] |
|------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
| Inlet                        | [dB(A)]   | 41.3     | 47.5     | 31.8     | 35.7      | 27.7      | 24.1      | 18.5      | 48.8       |
| Outlet                       | [dB(A)]   | 45.8     | 52.9     | 38.1     | 42.9      | 36.7      | 34.9      | 30.2      | 54.3       |
| Environment                  | [dB(A)]   | 29.9     | 41.3     | 39.2     | 33.5      | 25.8      | 18.3      | 4.7       | 44.0       |

| Acoustic pressure level at 1 meter distance [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lp [dB(A)] |
|-----------------------------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
|                                                     | [dB(A)]   | 18.9     | 30.3     | 28.2     | 22.5      | 14.8      | 7.3       | 2.0       | 33.0       |

## Exhaust airflow 3

 Panel Filter

Type M5/50.EU5MPleat.Int.Sld

ePM10 40% - ISO 16890 - EFF CLASS Flat Mini-Pleat Filter[26.0]  
E

Filter Energy Performance Class E

## Winter operation

50% Dirty Air Pressure Drop 106 Pa  
 Initial Air Pressure Drop 11 Pa  
 100% Dirty Air Pressure Drop 200 Pa  
 Air velocity 0.86 m/s

## Filter Sizes

P.FLT (1-2-0301-0201) 2 x Pcs

## Summer operation

50% Dirty Air Pressure Drop 106 Pa  
 Initial Air Pressure Drop 11 Pa  
 100% Dirty Air Pressure Drop 200 Pa  
 Air velocity 0.86 m/s

 Plug-Fan Set

Fan Section PLUG\_DD\_250\_0,70\_1.58

EC\_IE4\_F\_IMB14\_71\_1.58p\_T 771.3.570 250|0.7kW|1.58x1

Fan System Main Fan Qty in section x 1

Fan Set Assembly Type FLX1 (Gasket)

Fan Set Designed for wet operating conditions

The Fan System Effects Taken Into Account In The Fan Performances

Fan PLUG\_VS\_250\_AF\_Px 1

|                       |        |                                     |               |
|-----------------------|--------|-------------------------------------|---------------|
| Total Static Pressure | 394 Pa | Impeller efficiency: Static / Total | 71 %/73 %     |
| Dynamic pressure      | 14 Pa  | Shaft power                         | 0.15 kW x 1   |
| External pressure     | 200 Pa | Working revolutions                 | 2253 1/min    |
| Total Pressure        | 408 Pa | Fans Connection Standard            | FLX1 (Gasket) |

|                         |            |                         |            |
|-------------------------|------------|-------------------------|------------|
| <b>Winter operation</b> |            | <b>Summer operation</b> |            |
| Air Volume Flow         | 275.00 L/s | Air Volume Flow         | 275.00 L/s |

Motor EC\_IE4\_F\_71\_IMB14\_1.58p\_0.7\_50x 1



## Technical data for item 5

Offer number 166/LIVE.EUR/GB/2021

EC\_IE4\_F\_IMB14\_71\_1.58p\_T

|                         |                  |                   |             |
|-------------------------|------------------|-------------------|-------------|
| Motor enclosure         | IMB14            | Rated Current     | 3.8 A x 1   |
| IEC Size                | 71               | Rated revolutions | 4000 1/min  |
| Operational Voltage     | 230 V/1 ph       | Rated Power       | 0.70 kW x 1 |
| Fan Motor Rated Voltage | 230 V/1 ph/50 Hz | Motor Version     | Standard    |

## EC Motor Controller

|                                 |          |                              |                  |
|---------------------------------|----------|------------------------------|------------------|
| EC Controller                   | Yes      | Connecting Point             | CP Excluded      |
| EC Controller Qty in section    | 1        | EC Controller Voltage Supply | 230/1/50 V/ph/Hz |
| EC Controller Settings          | 28 Hz    | EC Controller Rated Power    | 0.75 kW x 1      |
| EC Controller in selection      | Included |                              |                  |
| EC Controller Optional Nema KIT | No       |                              |                  |

## Winter operation

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.18 kW      |
| EPC for clean filters             | 0.13 kW      |
| SFP for clean filters             | 0.48 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

## Summer operation

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.18 kW      |
| EPC for clean filters             | 0.13 kW      |
| SFP for clean filters             | 0.48 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

## Acoustic data

| Acoustic power level [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lw [dB(A)] |
|------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
| Inlet                        | [dB(A)]   | 42.0     | 55.3     | 61.3     | 61.6      | 59.9      | 54.5      | 48.9      | 66.5       |
| Outlet                       | [dB(A)]   | 44.7     | 58.0     | 64.0     | 64.3      | 62.6      | 58.1      | 52.5      | 69.3       |
| Environment                  | [dB(A)]   | 29.7     | 41.0     | 39.0     | 33.3      | 25.6      | 18.1      | 4.5       | 43.8       |

| Acoustic pressure level at 1 meter distance [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lp [dB(A)] |
|-----------------------------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
|                                                     | [dB(A)]   | 18.7     | 30.0     | 28.0     | 22.3      | 14.6      | 7.1       | 2.0       | 32.8       |

## Air Inlet Outlet ACCESSORIES

## Supply

## Exhaust

## Controls Selection Mode: Functional set

| Inlet Outlet Holes         | Supply        | Exhaust       |
|----------------------------|---------------|---------------|
| Air Inlet                  | Front 861x348 | Front 861x348 |
| Air Outlet                 | Front 861x348 | Front 861x348 |
| AirDamper                  | Supply        | Exhaust       |
| Air Inlet                  | Yes           | No            |
| Air Outlet                 | No            | Yes           |
| Flexible Connection        | Supply        | Exhaust       |
| Air Inlet                  | No            | Yes           |
| Air Outlet                 | Yes           | No            |
| AirIntake/Exhaust terminal | Supply        | Exhaust       |
| Air Inlet                  | Yes           | No            |
| Air Outlet                 | No            | Yes           |





Technical data for item 5

Offer number 166/LIVE.EUR/GB/2021

## Other Accessories

Roof

ROOF\_1

1 Accessories  
Quantity

## Control application

Functional Code AR|1|0|0|1|0|0|0|6|1|0|0|0|0|0|1

APP Code uPC3 (AR-257)

Main Temp. Sensor Duct Exhaust

## Human Machine Interface

## Options

|     |     |                                  |     |
|-----|-----|----------------------------------|-----|
| BMS | Yes | Differential Pressure Transducer | CAV |
|     |     | CO2 Control                      | Yes |

HMI Basic (User) Yes

Control Box Yes

## Air damper actuators

| Name                              | Code                       | Set |
|-----------------------------------|----------------------------|-----|
| Air Damper Actuator ON-OFF S 10Nm | ADMP.ACT.SET ON-OFF S 10Nm | 1   |
| Air Damper Actuator ON-OFF 10Nm   | ADMP.ACT.SET ON-OFF 10Nm   | 1   |

## Temperature sensor

| Name                                                    | Code                           | Set |
|---------------------------------------------------------|--------------------------------|-----|
| Resp_Controls_TempSensors_Temp. Sensor NTC10k (Outdoor) | Temp. Sensor NTC10k (Outdoor)  | 3   |
| Duct temperature sensor NTC 10k                         | Temp. Sensor NTC10k (Duct)     | 2   |
| Strap-on temperature sensor NTC 10k                     | Temp. Sensor NTC10k (Strap-on) | 2   |

## Hydronic Coils Controls

| Name        | Code           | Set |
|-------------|----------------|-----|
| 3-way Valve | VLV.SET-3W-2,5 | 2   |

## Transducers and Switches

| Name                                 | Code          | Set |
|--------------------------------------|---------------|-----|
| Frost Switch                         | FRST.SWCH     | 2   |
| Differential Pressure Transducer CAV | PRSS.TRDC_CAV | 1   |
| CO2 Transducer                       | CO2.TRDC      | 1   |

## AHU Connection Box

## AHU Connection Box

|                  |                    |                |                         |
|------------------|--------------------|----------------|-------------------------|
| Rated Power      | 1.40 kW            | Full Load Amps | 3.4 A                   |
| Power Connection | 3x400V AC<br>+N+PE | Power Cord     | 5 x 2,5 mm <sup>2</sup> |

## DECLARATION OF PERFORMANCE - Product information - (EU) 1253/2014 annex V as referred to in art. 4(2)

| No. | Parameter                           | Unit | Value                     |
|-----|-------------------------------------|------|---------------------------|
| 1   | Manufacturer's name                 |      | VTS sp. z o.o.            |
| 2   | Manufacturer's product code         |      | VVS021c-H-F-R-V-H         |
| 3   | Declared type                       |      | NRVU, BVU                 |
| 4   | Type of drive installed             |      | VFD(AC) or Controller(EC) |
| 5   | Type of energy recovery             |      | Other                     |
| 6   | Thermal efficiency of heat recovery | %    | 86.00                     |



## Technical data for item 5

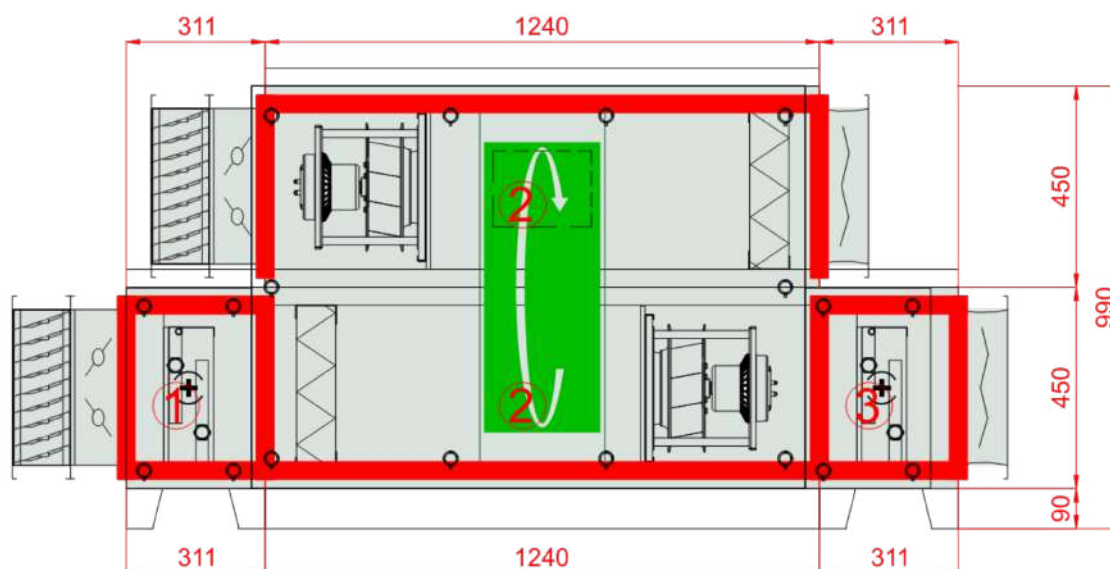
Offer number 166/LIVE.EUR/GB/2021

|    |                                                                                                     |        |                                                               |
|----|-----------------------------------------------------------------------------------------------------|--------|---------------------------------------------------------------|
| 7  | Nominal NRVU flow rate                                                                              |        | 0.28 / 0.28                                                   |
| 8  | Effective electric power input                                                                      | kW     | 0.18 / 0.18                                                   |
| 9  | Internal Specific Fan Power (SFPint)                                                                | w/m³/s | 160.03 / 162.54                                               |
| 10 | Face velocity                                                                                       | m/s    | 0.86                                                          |
| 11 | Nominal external pressure                                                                           | Pa     | 200.00 / 200.00                                               |
| 12 | Internal Pressure Drop of ventilation components $\Delta p_{s,int}$                                 | Pa     | 97.64 / 99.28                                                 |
| 13 | Internal pressure drop of non-ventilation components $\Delta p_{s,add}$                             | Pa     | 105.49 / 94.31                                                |
| 14 | Maximum Leakage Rate                                                                                | %      | 0.01 / 0.01                                                   |
| 15 | Energy performance of filters (declared information about the calculated annual energy consumption) |        | EU7MPleat / F7 / - / EU5MPleat / M5 / -                       |
| 16 | Description of visual filter warning for NRVUs                                                      |        | Supported by control application                              |
| 17 | Casing sound power level LWA                                                                        | dB     | 52                                                            |
| 18 | Internet address for disassembly instructions                                                       |        | <a href="http://www.vtsgroup.com">http://www.vtsgroup.com</a> |
| 19 | Ecodesign Compliance                                                                                |        | Yes (2018 +)                                                  |

## Section splits

| Transport Sections | Mass [Kg] | LENGTH [mm] | WIDTH [mm] | HEIGHT [mm] |
|--------------------|-----------|-------------|------------|-------------|
| 1                  | 37        | 311         | 967        | 540         |
| 2                  | 184       | 1240        | 967        | 990         |
| 3                  | 31        | 311         | 967        | 540         |

Transport Sections Dims



## Technical data for item 6

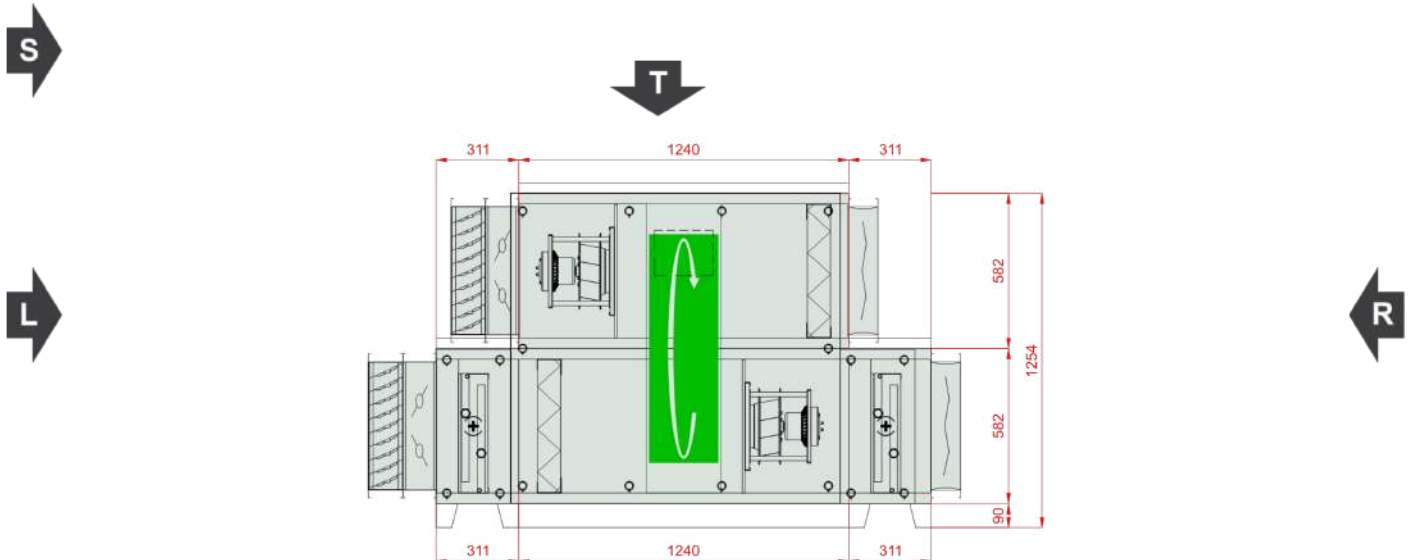
Offer number 166/LIVE.EUR/GB/2021

Project name Highgate Newton Community  
Centre /1DP.CER.004.001/

|                                  |                                  |
|----------------------------------|----------------------------------|
| Type                             | RecoveryRotaryVerticalCompact    |
| Application                      | Outdoor                          |
| Project Tag                      | RF-AHU-01                        |
| Size                             | VVS040c                          |
| Set                              | VVS040c-R-HFRVH/VVS040c-L-FRV_cd |
| Insulation thickness             | 40 mm                            |
| Insulation                       | Mineral Wool                     |
| Weight of the set (+/- 10%)*     | 407 Kg                           |
| Supply airflow 2                 | 935.00 L/s                       |
| External pressure                | 250 Pa                           |
| Exhaust airflow 2                | 935.00 L/s                       |
| External pressure                | 250 Pa                           |
| SFP Winter                       | 1.58 kW/m³/s                     |
| SFP Summer                       | 1.58 kW/m³/s                     |
| Ecodesign                        | Yes (2018 +)                     |
| Eurovent Energy efficiency class | A+ 2016                          |

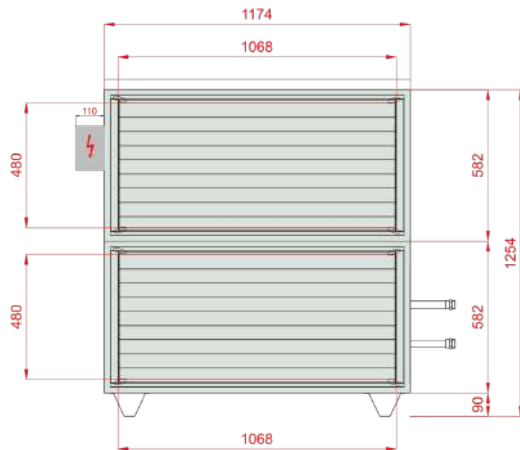


## Inspection Panels

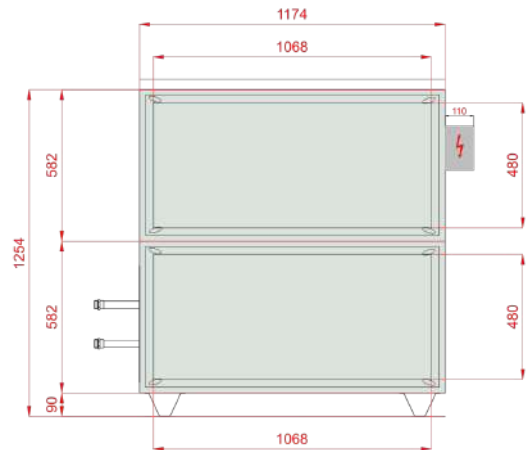


Comment 1:

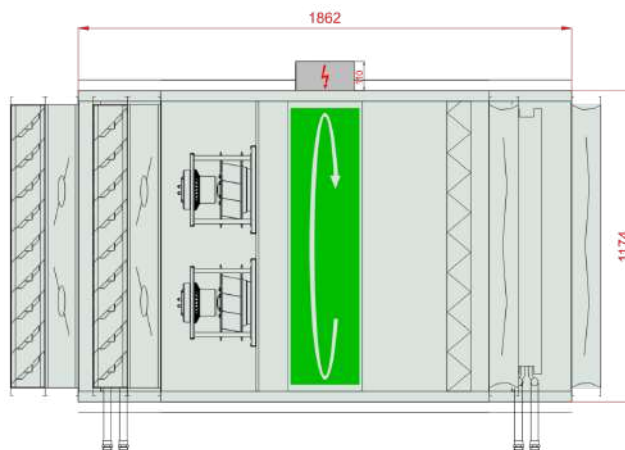
Front View (left)



Front View (right)



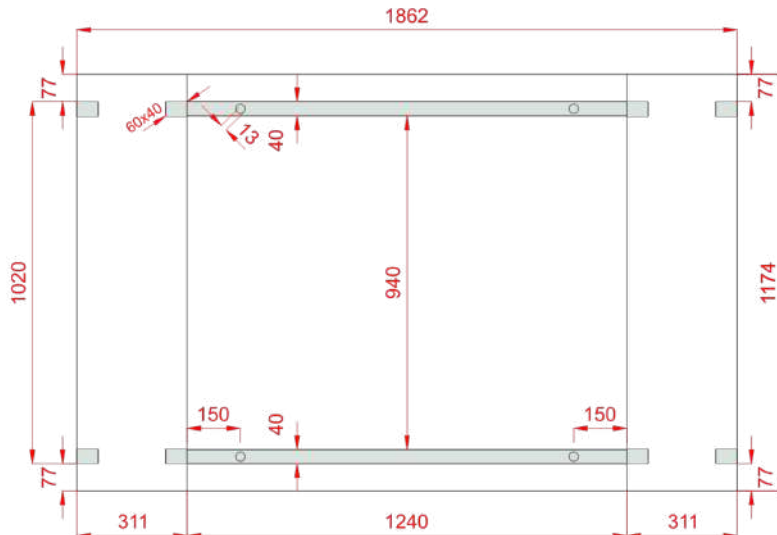
Top View



Technical data for item 6

Offer number 166/LIVE.EUR/GB/2021

## Frame Top View, within the AHU outline contour



## Sizes [mm]

|                       |          |          |         |         |
|-----------------------|----------|----------|---------|---------|
| Air intake Supply FF  | 1068x480 | Lt 1862  | Hi 502  | Wi 1094 |
| Air outlet Supply FF  | 1068x480 | LtA 2227 | H 672   | W 1174  |
|                       |          | L1 1862  | H2 1254 |         |
| Air inlet Exhaust FF  | 1068x480 | L2 1240  | Hf 90   |         |
| Air outlet Exhaust FF | 1068x480 | L21 311  |         |         |
|                       |          | L22 311  |         |         |

## Unit design

40mm insulated walls , double skin made of steel

Unit Power Supply 400V/3ph/50Hz

Casing anti-corrosion protection: Aluzinc AZ 150. Corrosion resistance (salt spary test): over 2400 hours

In case of delivery with controls a base unit fully wired, with pre-configured controller and EC motors drives

Energy recovery efficiency exceeding 86% (for EC 1253/2014 conditions)

## Temperature Conditions

Reference atmospheric pressure 101325 Pa

Winter outdoor reference temperature -4.0 °C

|        | External air |      |              | Return air |      |              |
|--------|--------------|------|--------------|------------|------|--------------|
|        | DBT          | RH   | DA           | DBT        | RH   | DA           |
| Summer | 27.2 °C      | 56 % | 1.2000 kg/m³ | 20.0 °C    | 76 % | 1.2000 kg/m³ |
| Winter | -4.0 °C      | 80 % | 1.2000 kg/m³ | 22.0 °C    | 37 % | 1.2000 kg/m³ |



Technical data for item 6

Offer number 166/LIVE.EUR/GB/2021

## Supply

## Hot Water Coil

| Type WCL VVS040c 1R DT SH.St.St.Std |                          | Number of rows 1            | Connection Supply/Return: 1"/1" |
|-------------------------------------|--------------------------|-----------------------------|---------------------------------|
| Standard Circuits                   |                          | 2,18 [dm <sup>3</sup> ]     |                                 |
| Medium                              | Ethylene                 | Maximum working pressure    | 16 bar                          |
| Glycole concentration               | 10.00 %                  | Maximum medium temperature  | 160.0 °C                        |
| <b>Winter operation</b>             |                          | <b>Summer operation</b>     |                                 |
| Intake air DBT / RH                 | -4.0 °C / 80 %           | Intake air DBT / RH         | 27.2 °C / 56 %                  |
| Discharge air DBT / RH              | 5.0 °C / 40 %            | Discharge air DBT / RH      | 27.2 °C / 56 %                  |
| Air velocity                        | 1.93 m/s                 | Air velocity                | 1.93 m/s                        |
| Pressure drop Wet / Dry Wet         | 18 Pa                    | Pressure drop Wet / Dry Wet | 18 Pa                           |
| Air Pressure                        | 101325 Pa                | Air Pressure                | 101325 Pa                       |
| Air Density                         | 1.2000 kg/m <sup>3</sup> | Air Density                 | 1.2000 kg/m <sup>3</sup>        |
| Air Volume Flow                     | 935.00 L/s               | Air Volume Flow             | 935.00 L/s                      |
| Total heating capacity              | 10.2 kW                  | Total heating capacity      | 0.0 kW                          |
| Medium temperature                  | 70.0 °C/40.0 °C          | Medium temperature          | 70.0 °C/40.0 °C                 |
| Medium flow rate                    | 0.30 m <sup>3</sup> /h   | Medium flow rate            | 0.00 m <sup>3</sup> /h          |
| Medium pressure drop                | 3.15 kPa                 | Medium pressure drop        | 0.00 kPa                        |

## Panel Filter

Type F7/50.EU7MPleat.Int.Sld  
 ePM2,5 65% (ISO16890) - EFF CLASS Flat Mini-Pleat Filter[27.0]  
 E

|                                 |          |                              |          |
|---------------------------------|----------|------------------------------|----------|
| Filter Energy Performance Class | E        |                              |          |
| <b>Winter operation</b>         |          | <b>Summer operation</b>      |          |
| 50% Dirty Air Pressure Drop     | 131 Pa   | 50% Dirty Air Pressure Drop  | 131 Pa   |
| Initial Air Pressure Drop       | 62 Pa    | Initial Air Pressure Drop    | 62 Pa    |
| 100% Dirty Air Pressure Drop    | 200 Pa   | 100% Dirty Air Pressure Drop | 200 Pa   |
| Air velocity                    | 1.73 m/s | Air velocity                 | 1.73 m/s |
| <b>Filter Sizes</b>             |          |                              |          |
| P.FLT (1-2-0301-0215)           | 2 x Pcs  |                              |          |



Technical data for item 6

Offer number 166/LIVE.EUR/GB/2021

**Rotary Wheel****Type** RRG VVS040c NHG

R2\_SR\_NHG

Rated voltage 230 V/1 ph/50 Hz

**Winter operation****Supply**

Intake air DBT / RH 5.0 °C / 40 %  
 Discharge air DBT / RH 18.7 °C / 16 %  
 Air velocity 2.59 m/s  
 Pressure drop Wet / Dry Wet / Dry 152 Pa / 161 Pa  
 Air Pressure 101325 Pa  
 Air Density 1.2000 kg/m³  
 Air Volume Flow 935.00 L/s  
 Recovery capacity Sensible / Total 15.5 kW / 15.5 kW  
 Sensible / Total  
 Actual efficiency / at balanced flow Real / 80 % / 80 %  
 BalancedFlow  
 Dry efficiency in winter 80 %

**Winter operation****Exhaust**

Intake air DBT / RH 22.0 °C / 37 %  
 Discharge air DBT / RH 9.6 °C / 82 %  
 Air velocity 2.59 m/s  
 Pressure drop Wet / Dry Wet / Dry 161 Pa / 161 Pa  
 Air Pressure 101325 Pa  
 Air Density 1.2000 kg/m³  
 Air Volume Flow 935.00 L/s  
 Recovery Bypass No  
 Rotary Regenerator  
 Max Internal Leakage 3%

**Summer operation****Supply**

Intake air DBT / RH 27.2 °C / 56 %  
 Discharge air DBT / RH 27.2 °C / 56 %  
 Air velocity 2.59 m/s  
 Pressure drop Wet / Dry Wet 152 Pa  
 Air Pressure 101325 Pa  
 Air Density 1.2000 kg/m³  
 Air Volume Flow 935.00 L/s

**Summer operation****Exhaust**

Intake air DBT / RH 20.0 °C / 76 %  
 Discharge air DBT / RH 20.0 °C / 76 %  
 Air velocity 2.59 m/s  
 Pressure drop Wet / Dry Wet 161 Pa  
 Air Pressure 101325 Pa  
 Air Density 1.2000 kg/m³  
 Air Volume Flow 935.00 L/s  
 Eco Design Class Eco Design

**Plug-Fan Set****Fan Section** PLUG\_DD\_250\_0,70\_1.58

EC\_IE4\_F\_IMB14\_71\_1.58p\_T 771.3.570 250|0.7kW|1.58x2

Fan System Main Fan Qty in section x 2

Fan Set Assembly Type FLX1 (Gasket)

Fan Set Designed for wet operating conditions

The Fan System Effects Is Taken Into Account In The Fan Performances

**Fan** PLUG\_VS\_250\_AF\_Px 2

**Technical data for item 6****Offer number 166/LIVE.EUR/GB/2021**

|                         |            |
|-------------------------|------------|
| Total Static Pressure   | 569 Pa     |
| Dynamic pressure        | 41 Pa      |
| External pressure       | 250 Pa     |
| Total Pressure          | 610 Pa     |
| <b>Winter operation</b> |            |
| Air Volume Flow         | 935.00 L/s |

|                                     |               |
|-------------------------------------|---------------|
| Impeller efficiency: Static / Total | 71 %/76 %     |
| Shaft power                         | 0.37 kW x 2   |
| Working revolutions                 | 3027 1/min    |
| Fans Connection Standard            | FLX1 (Gasket) |
| <b>Summer operation</b>             |               |
| Air Volume Flow                     | 935.00 L/s    |

**Motor EC\_IE4\_F\_71\_IMB14\_1.58p\_0.7\_50x 2**  
**EC\_IE4\_F\_IMB14\_71\_1.58p\_T**

|                         |                  |
|-------------------------|------------------|
| Motor enclosure         | IMB14            |
| IEC Size                | 71               |
| Operational Voltage     | 230 V/1 ph       |
| Fan Motor Rated Voltage | 230 V/1 ph/50 Hz |

|                   |             |
|-------------------|-------------|
| Rated Current     | 3.8 A x 2   |
| Rated revolutions | 4000 1/min  |
| Rated Power       | 0.70 kW x 2 |
| Motor Version     | Standard    |

**EC Motor Controller**

|                                 |          |
|---------------------------------|----------|
| EC Controller                   | Yes      |
| EC Controller Qty in section    | 2        |
| EC Controller Settings          | 38 Hz    |
| EC Controller in selection      | Included |
| EC Controller Optional Nema KIT | No       |

|                              |                  |
|------------------------------|------------------|
| Connecting Point             | CP Excluded      |
| EC Controller Voltage Supply | 230/1/50 V/ph/Hz |
| EC Controller Rated Power    | 0.75 kW x 2      |

**Winter operation**

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.87 kW      |
| EPC for clean filters             | 0.77 kW      |
| SFP for clean filters             | 0.82 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

**Summer operation**

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.87 kW      |
| EPC for clean filters             | 0.77 kW      |
| SFP for clean filters             | 0.82 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

**Hot Water Coil**

|                                            |                         |                                        |
|--------------------------------------------|-------------------------|----------------------------------------|
| <b>Type</b> WCL VVS040c 1R DT SH.St.St.Std | <b>Number of rows</b> 1 | <b>Connection Supply/Return:</b> 1"/1" |
| Standard Circuits                          | 2,18 [dm³]              |                                        |

|                             |                 |
|-----------------------------|-----------------|
| Medium                      | Water           |
| Glycole concentration       | 0.00 %          |
| <b>Winter operation</b>     |                 |
| Intake air DBT / RH         | 15.0 °C / 80 %  |
| Discharge air DBT / RH      | 21.0 °C / 55 %  |
| Air velocity                | 2.07 m/s        |
| Pressure drop Wet / Dry Wet | 18 Pa           |
| Air Pressure                | 101325 Pa       |
| Air Density                 | 1.2000 kg/m³    |
| Air Volume Flow             | 935.00 L/s      |
| Total heating capacity      | 6.9 kW          |
| Medium temperature          | 70.0 °C/40.0 °C |
| Medium flow rate            | 0.20 m³/h       |
| Medium pressure drop        | 1.69 kPa        |

|                             |                 |
|-----------------------------|-----------------|
| Maximum working pressure    | 16 bar          |
| Maximum medium temperature  | 160.0 °C        |
| <b>Summer operation</b>     |                 |
| Intake air DBT / RH         | 27.2 °C / 56 %  |
| Discharge air DBT / RH      | 27.2 °C / 56 %  |
| Air velocity                | 2.07 m/s        |
| Pressure drop Wet / Dry Wet | 18 Pa           |
| Air Pressure                | 101325 Pa       |
| Air Density                 | 1.2000 kg/m³    |
| Air Volume Flow             | 935.00 L/s      |
| Total heating capacity      | 0.0 kW          |
| Medium temperature          | 70.0 °C/40.0 °C |
| Medium flow rate            | 0.00 m³/h       |
| Medium pressure drop        | 0.00 kPa        |





Technical data for item 6

Offer number 166/LIVE.EUR/GB/2021

## Acoustic data

| Acoustic power level [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lw [dB(A)] |
|------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
| Inlet                        | [dB(A)]   | 46.3     | 52.5     | 36.8     | 40.7      | 32.7      | 29.1      | 23.5      | 53.8       |
| Outlet                       | [dB(A)]   | 50.8     | 57.9     | 43.1     | 47.9      | 41.7      | 39.9      | 35.2      | 59.3       |
| Environment                  | [dB(A)]   | 34.9     | 46.3     | 44.2     | 38.5      | 30.8      | 23.3      | 9.7       | 49.0       |

| Acoustic pressure level at 1 meter distance [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lp [dB(A)] |
|-----------------------------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
|                                                     | [dB(A)]   | 23.9     | 35.3     | 33.2     | 27.5      | 19.8      | 12.3      | 2.0       | 38.0       |

## Exhaust airflow 3

## Panel Filter

Type M5/50.EU5MPleat.Int.Sld

ePM10 40% - ISO 16890 - EFF CLASS Flat Mini-Pleat Filter[26.0]  
E

Filter Energy Performance Class E

## Winter operation

50% Dirty Air Pressure Drop 123 Pa  
 Initial Air Pressure Drop 46 Pa  
 100% Dirty Air Pressure Drop 200 Pa  
 Air velocity 1.73 m/s

## Filter Sizes

P.FLT (1-2-0301-0203) 2 x Pcs

## Summer operation

50% Dirty Air Pressure Drop 123 Pa  
 Initial Air Pressure Drop 46 Pa  
 100% Dirty Air Pressure Drop 200 Pa  
 Air velocity 1.73 m/s

## Plug-Fan Set

Fan Section PLUG\_DD\_250\_0,70\_1.58

EC\_IE4\_F\_IMB14\_71\_1.58p\_T 771.3.570 250|0.7kW|1.58x2

Fan System Main Fan Qty in section x 2

Fan Set Assembly Type FLX1 (Gasket)

Fan Set Designed for wet operating conditions

The Fan System Effects Taken Into Account In The Fan Performances

Fan PLUG\_VS\_250\_AF\_Px 2

|                         |            |                                     |               |
|-------------------------|------------|-------------------------------------|---------------|
| Total Static Pressure   | 535 Pa     | Impeller efficiency: Static / Total | 71 %/76 %     |
| Dynamic pressure        | 41 Pa      | Shaft power                         | 0.35 kW x 2   |
| External pressure       | 250 Pa     | Working revolutions                 | 2977 1/min    |
| Total Pressure          | 576 Pa     | Fans Connection Standard            | FLX1 (Gasket) |
| <b>Winter operation</b> |            | <b>Summer operation</b>             |               |
| Air Volume Flow         | 935.00 L/s | Air Volume Flow                     | 935.00 L/s    |

Motor EC\_IE4\_F\_71\_IMB14\_1.58p\_0.7\_50x 2





## Technical data for item 6

Offer number 166/LIVE.EUR/GB/2021

EC\_IE4\_F\_IMB14\_71\_1.58p\_T

|                         |                  |                   |             |
|-------------------------|------------------|-------------------|-------------|
| Motor enclosure         | IMB14            | Rated Current     | 3.8 A x 2   |
| IEC Size                | 71               | Rated revolutions | 4000 1/min  |
| Operational Voltage     | 230 V/1 ph       | Rated Power       | 0.70 kW x 2 |
| Fan Motor Rated Voltage | 230 V/1 ph/50 Hz | Motor Version     | Standard    |

## EC Motor Controller

|                                 |          |                              |                  |
|---------------------------------|----------|------------------------------|------------------|
| EC Controller                   | Yes      | Connecting Point             | CP Excluded      |
| EC Controller Qty in section    | 2        | EC Controller Voltage Supply | 230/1/50 V/ph/Hz |
| EC Controller Settings          | 37 Hz    | EC Controller Rated Power    | 0.75 kW x 2      |
| EC Controller in selection      | Included |                              |                  |
| EC Controller Optional Nema KIT | No       |                              |                  |

## Winter operation

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.82 kW      |
| EPC for clean filters             | 0.71 kW      |
| SFP for clean filters             | 0.76 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

## Summer operation

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.82 kW      |
| EPC for clean filters             | 0.71 kW      |
| SFP for clean filters             | 0.76 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

## Acoustic data

| Acoustic power level [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lw [dB(A)] |
|------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
| Inlet                        | [dB(A)]   | 46.8     | 60.2     | 66.1     | 66.5      | 64.8      | 59.4      | 53.7      | 71.4       |
| Outlet                       | [dB(A)]   | 49.5     | 62.9     | 68.8     | 69.2      | 67.5      | 63.0      | 57.3      | 74.2       |
| Environment                  | [dB(A)]   | 34.5     | 45.9     | 43.8     | 38.2      | 30.5      | 23.0      | 9.3       | 48.7       |

| Acoustic pressure level at 1 meter distance [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lp [dB(A)] |
|-----------------------------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
|                                                     | [dB(A)]   | 23.5     | 34.9     | 32.8     | 27.2      | 19.5      | 12.0      | 2.0       | 37.7       |

## Air Inlet Outlet ACCESSORIES

## Supply

## Exhaust

## Controls Selection Mode: Functional set

| Inlet Outlet Holes         | Supply         | Exhaust        |
|----------------------------|----------------|----------------|
| Air Inlet                  | Front 1068x480 | Front 1068x480 |
| Air Outlet                 | Front 1068x480 | Front 1068x480 |
| AirDamper                  | Supply         | Exhaust        |
| Air Inlet                  | Yes            | No             |
| Air Outlet                 | No             | Yes            |
| Flexible Connection        | Supply         | Exhaust        |
| Air Inlet                  | No             | Yes            |
| Air Outlet                 | Yes            | No             |
| AirIntake/Exhaust terminal | Supply         | Exhaust        |
| Air Inlet                  | Yes            | No             |
| Air Outlet                 | No             | Yes            |



Technical data for item 6

Offer number 166/LIVE.EUR/GB/2021

## Other Accessories

Roof

ROOF\_1

1 Accessories  
Quantity

## Control application

Functional Code AR|1|0|0|1|0|0|0|6|1|0|0|0|0|0|1

APP Code uPC3 (AR-257)

Main Temp. Sensor Duct Exhaust

## Human Machine Interface

## Options

|                         |     |                                  |     |
|-------------------------|-----|----------------------------------|-----|
| BMS                     | Yes | Differential Pressure Transducer | CAV |
| HMI Advanced (Settings) | Yes | CO2 Control                      | Yes |
| HMI Basic (User)        | Yes |                                  |     |
| Control Box             | Yes |                                  |     |

## Air damper actuators

| Name                              | Code                       | Set |
|-----------------------------------|----------------------------|-----|
| Air Damper Actuator ON-OFF S 10Nm | ADMP.ACT.SET ON-OFF S 10Nm | 1   |
| Air Damper Actuator ON-OFF 10Nm   | ADMP.ACT.SET ON-OFF 10Nm   | 1   |

## Temperature sensor

| Name                                                    | Code                           | Set |
|---------------------------------------------------------|--------------------------------|-----|
| Resp_Controls_TempSensors_Temp. Sensor NTC10k (Outdoor) | Temp. Sensor NTC10k (Outdoor)  | 3   |
| Duct temperature sensor NTC 10k                         | Temp. Sensor NTC10k (Duct)     | 2   |
| Strap-on temperature sensor NTC 10k                     | Temp. Sensor NTC10k (Strap-on) | 2   |

## Hydronic Coils Controls

| Name        | Code           | Set |
|-------------|----------------|-----|
| 3-way Valve | VLV.SET-3W-2,5 | 2   |

## Transducers and Switches

| Name                                 | Code          | Set |
|--------------------------------------|---------------|-----|
| Frost Switch                         | FRST.SWCH     | 2   |
| Differential Pressure Transducer CAV | PRSS.TRDC_CAV | 1   |
| CO2 Transducer                       | CO2.TRDC      | 1   |

## AHU Connection Box

## AHU Connection Box

|                  |                    |                |                         |
|------------------|--------------------|----------------|-------------------------|
| Rated Power      | 2.80 kW            | Full Load Amps | 4.7 A                   |
| Power Connection | 3x400V AC<br>+N+PE | Power Cord     | 5 x 2,5 mm <sup>2</sup> |

## DECLARATION OF PERFORMANCE - Product information - (EU) 1253/2014 annex V as referred to in art. 4(2)

| No. | Parameter                           | Unit | Value                     |
|-----|-------------------------------------|------|---------------------------|
| 1   | Manufacturer's name                 |      | VTS sp. z o.o.            |
| 2   | Manufacturer's product code         |      | VVS040c-H-F-R-V-H         |
| 3   | Declared type                       |      | NRVU, BVU                 |
| 4   | Type of drive installed             |      | VFD(AC) or Controller(EC) |
| 5   | Type of energy recovery             |      | Other                     |
| 6   | Thermal efficiency of heat recovery | %    | 81.00                     |



## Technical data for item 6

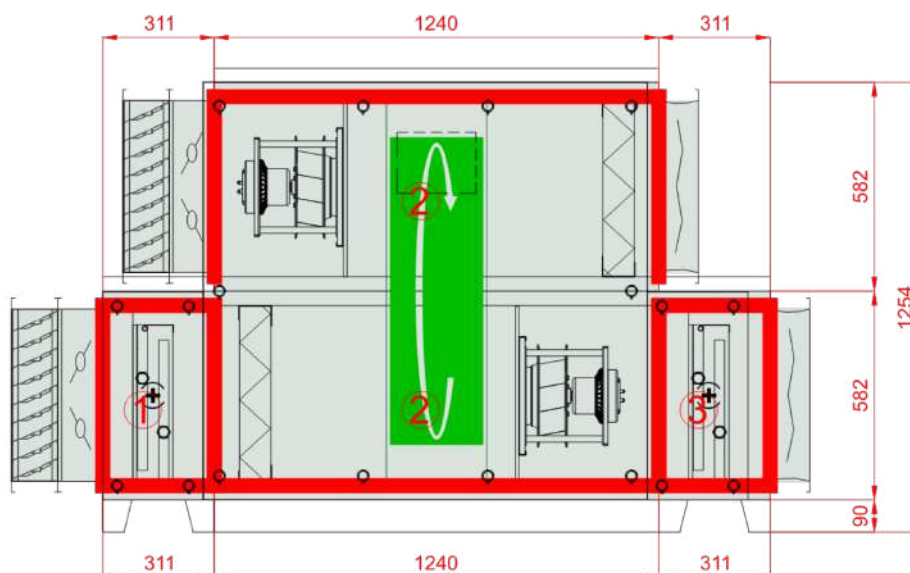
Offer number 166/LIVE.EUR/GB/2021

|    |                                                                                                     |        |                                                               |
|----|-----------------------------------------------------------------------------------------------------|--------|---------------------------------------------------------------|
| 7  | Nominal NRVU flow rate                                                                              |        | 0.94 / 0.94                                                   |
| 8  | Effective electric power input                                                                      | kW     | 0.87 / 0.82                                                   |
| 9  | Internal Specific Fan Power (SFPint)                                                                | w/m³/s | 347.32 / 339.28                                               |
| 10 | Face velocity                                                                                       | m/s    | 1.73                                                          |
| 11 | Nominal external pressure                                                                           | Pa     | 250.00 / 250.00                                               |
| 12 | Internal Pressure Drop of ventilation components $\Delta p_{s,int}$                                 | Pa     | 213.29 / 207.65                                               |
| 13 | Internal pressure drop of non-ventilation components $\Delta p_{s,add}$                             | Pa     | 105.31 / 76.89                                                |
| 14 | Maximum Leakage Rate                                                                                | %      | 0.01 / 0.01                                                   |
| 15 | Energy performance of filters (declared information about the calculated annual energy consumption) |        | EU7MPleat / F7 / - / EU5MPleat / M5 / -                       |
| 16 | Description of visual filter warning for NRVUs                                                      |        | Supported by control application                              |
| 17 | Casing sound power level LWA                                                                        | dB     | 57                                                            |
| 18 | Internet address for disassembly instructions                                                       |        | <a href="http://www.vtsgroup.com">http://www.vtsgroup.com</a> |
| 19 | Ecodesign Compliance                                                                                |        | Yes (2018 +)                                                  |

## Section splits

| Transport Sections | Mass [Kg] | LENGTH [mm] | WIDTH [mm] | HEIGHT [mm] |
|--------------------|-----------|-------------|------------|-------------|
| 1                  | 49        | 311         | 1174       | 672         |
| 2                  | 267       | 1240        | 1174       | 1254        |
| 3                  | 39        | 311         | 1174       | 672         |

Transport Sections Dims



## Technical data for item 4

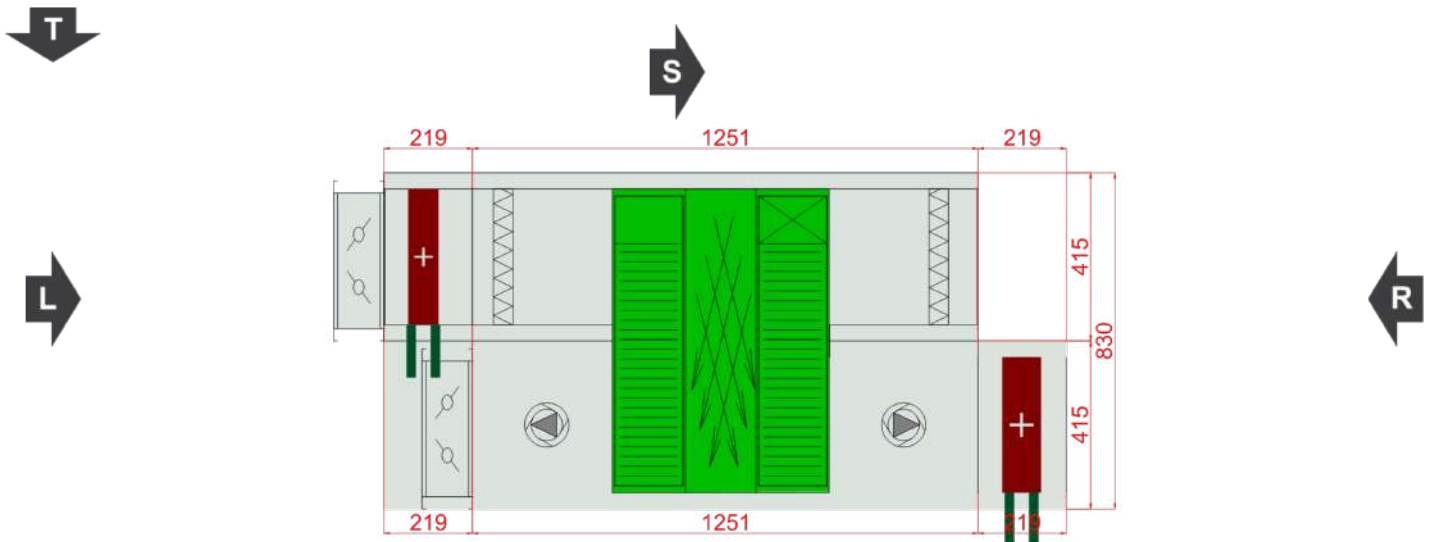
Offer number 166/LIVE.EUR/GB/2021

Project name Highgate Newton Community  
Centre /1DP.CER.004.001/

|                                  |                                  |
|----------------------------------|----------------------------------|
| Type                             | RecoveryHexHorizontal            |
| Application                      | Indoor                           |
| Project Tag                      | D00-HRU-01                       |
| Size                             | VVS005s                          |
| Set                              | VVS005s-R-HFPVH/VVS005s-L-FPV_cd |
| Insulation thickness             | 40 mm                            |
| Insulation                       | Mineral Wool                     |
| Weight of the set (+/- 10%)*     | 164 Kg                           |
| Supply airflow 2                 | 87.00 L/s                        |
| External pressure                | 150 Pa                           |
| Exhaust airflow 2                | 87.00 L/s                        |
| External pressure                | 150 Pa                           |
| SFP Winter                       | 1.05 kW/m³/s                     |
| SFP Summer                       | 1.05 kW/m³/s                     |
| Ecodesign                        | Yes (2018 +)                     |
| Eurovent Energy efficiency class | A+ 2016                          |

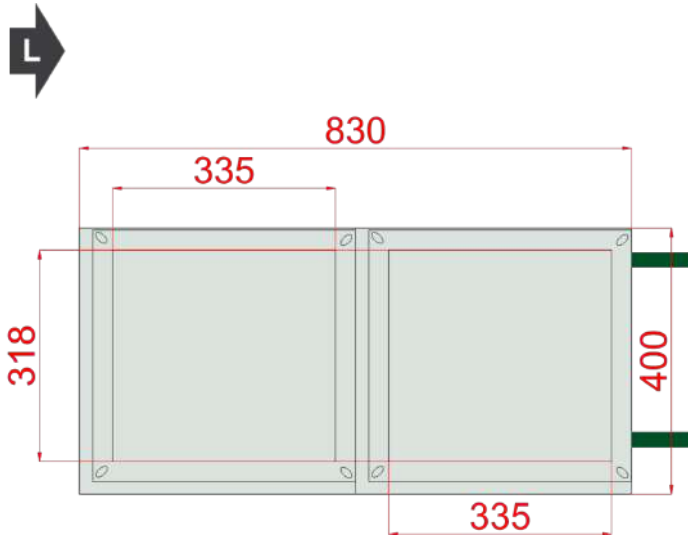


## Top View

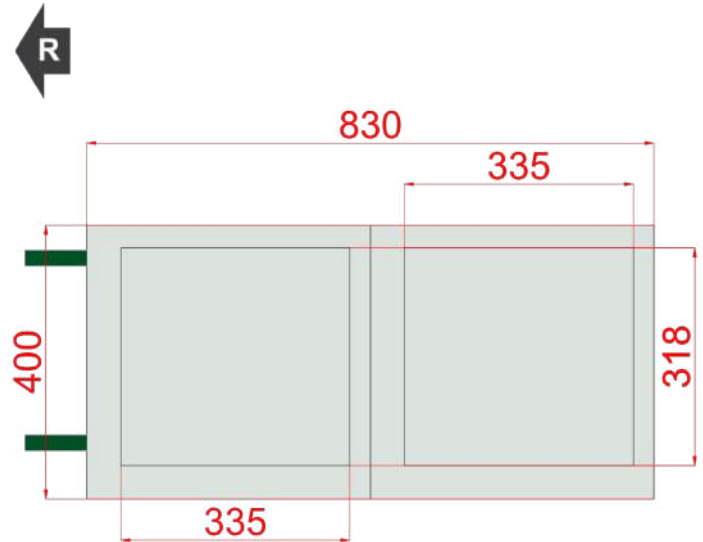


Comment 1:

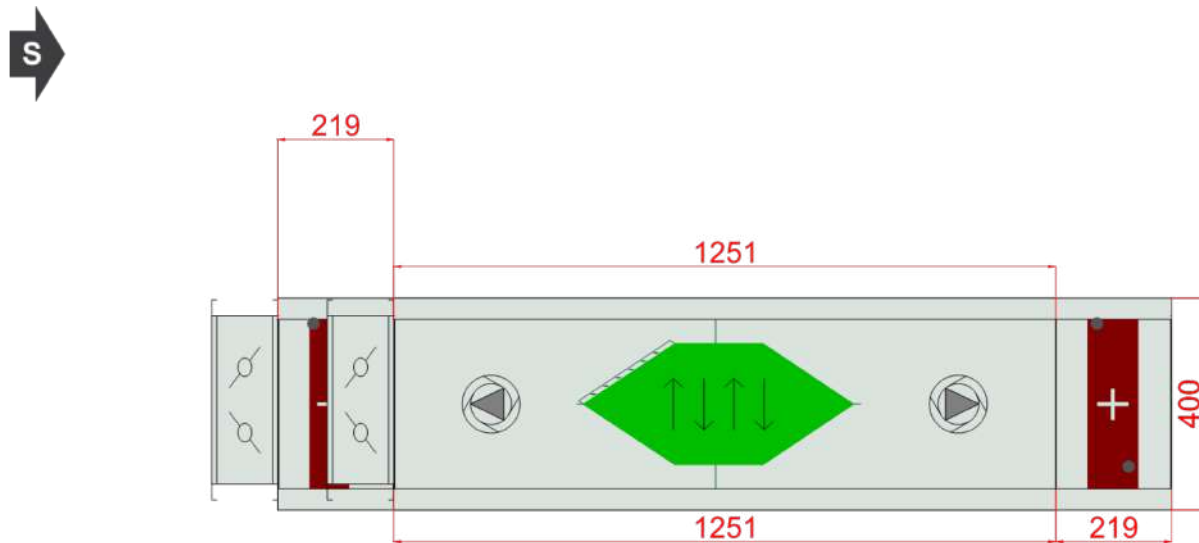
Front View (left)



Front View (right)



Inspection Panels



Sizes [mm]

|                    |    |         |          |        |        |
|--------------------|----|---------|----------|--------|--------|
| Air intake Supply  | FF | 335x318 | Lt 1689  | Hi 320 | Wi 335 |
| Air outlet Supply  | FF | 335x318 | LtA 1814 | H 400  | W 415  |
|                    |    |         | L1 1470  |        | W2 830 |
| Air inlet Exhaust  | FF | 335x318 | L2 1470  |        |        |
| Air outlet Exhaust | FF | 335x318 | L11 219  |        |        |
|                    |    |         | L22 219  |        |        |

Unit design

Walls filled with MW 30mm, double skin made of steel, excluding silencer and electric heater sections

**Technical data for item 4****Offer number 166/LIVE.EUR/GB/2021**

Down base unit inspection  
 Casing anti-corrosion protection: Aluzinc AZ 150.  
 Base unit with pre-configured EC motors drives  
 Energy recovery efficiency meet EC 1253/2014 requirements

**Temperature Conditions****Reference atmospheric pressure 101325 Pa****Winter outdoor reference temperature -4.0 °C**

|        | External air |      |              | Return air |      |              |
|--------|--------------|------|--------------|------------|------|--------------|
|        | DBT          | RH   | DA           | DBT        | RH   | DA           |
| Summer | 27.2 °C      | 56 % | 1.2000 kg/m³ | 20.0 °C    | 76 % | 1.2000 kg/m³ |
| Winter | -4.0 °C      | 80 % | 1.2000 kg/m³ | 22.0 °C    | 37 % | 1.2000 kg/m³ |

**Supply****+ Hot Water Coil**

| Type WCL VVS005s 1R DT SH.St.St.Std |                 | Number of rows 1            | Connection Supply/Return: 3/4"/22 |
|-------------------------------------|-----------------|-----------------------------|-----------------------------------|
| Standard Circuits                   |                 | 0,39 [dm³]                  |                                   |
| Medium                              | Ethylene        | Maximum working pressure    | 16 bar                            |
| Glycole concentration               | 10.00 %         | Maximum medium temperature  | 160.0 °C                          |
| <b>Winter operation</b>             |                 | <b>Summer operation</b>     |                                   |
| Intake air DBT / RH                 | -7.0 °C / 80 %  | Intake air DBT / RH         | 27.2 °C / 56 %                    |
| Discharge air DBT / RH              | 5.0 °C / 31 %   | Discharge air DBT / RH      | 27.2 °C / 56 %                    |
| Air velocity                        | 1.30 m/s        | Air velocity                | 1.30 m/s                          |
| Pressure drop Wet / Dry Wet         | 7 Pa            | Pressure drop Wet / Dry Wet | 7 Pa                              |
| Air Pressure                        | 101325 Pa       | Air Pressure                | 101325 Pa                         |
| Air Density                         | 1.2000 kg/m³    | Air Density                 | 1.2000 kg/m³                      |
| Air Volume Flow                     | 87.00 L/s       | Air Volume Flow             | 87.00 L/s                         |
| Total heating capacity              | 1.3 kW          | Total heating capacity      | 0.0 kW                            |
| Medium temperature                  | 70.0 °C/40.0 °C | Medium temperature          | 70.0 °C/40.0 °C                   |
| Medium flow rate                    | 0.04 m³/h       | Medium flow rate            | 0.00 m³/h                         |
| Medium pressure drop                | 0.36 kPa        | Medium pressure drop        | 0.00 kPa                          |

**Panel Filter**

**Type** F7/50.EU7MPleat.Int.Sld  
 ePM2,5 65% (ISO16890) - EFF CLASS E Flat Mini-Pleat Filter[27.0]

Filter Energy Performance Class E

**Winter operation**

|                              |          |
|------------------------------|----------|
| 50% Dirty Air Pressure Drop  | 108 Pa   |
| Initial Air Pressure Drop    | 16 Pa    |
| 100% Dirty Air Pressure Drop | 200 Pa   |
| Air velocity                 | 0.79 m/s |

**Filter Sizes**

P,FLT F7 332x320x48 (1-2-0301-0274) 1 x Pcs

**Summer operation**

|                              |          |
|------------------------------|----------|
| 50% Dirty Air Pressure Drop  | 108 Pa   |
| Initial Air Pressure Drop    | 16 Pa    |
| 100% Dirty Air Pressure Drop | 200 Pa   |
| Air velocity                 | 0.79 m/s |





Technical data for item 4

Offer number 166/LIVE.EUR/GB/2021

## Counter-Flow Recuperator (Hexagonal)

## Type PCR VVS005s Hex

HIPS or AL 3.0 (SR)

Rated voltage //

## Winter operation

## Supply

|                                                          |                |
|----------------------------------------------------------|----------------|
| Intake air DBT / RH                                      | 5.0 °C / 31 %  |
| Discharge air DBT / RH                                   | 18.4 °C / 13 % |
| Air velocity                                             | 1.19 m/s       |
| Pressure drop Wet / Dry Wet                              | 17 Pa          |
| Air Pressure                                             | 101325 Pa      |
| Air Density                                              | 1.2000 kg/m³   |
| Air Volume Flow                                          | 87.00 L/s      |
| Recovery capacity Sensible / Total Total                 | 1.4 kW         |
| Actual efficiency / at balanced flow Real / BalancedFlow | 79 % / 79 %    |
| Dry efficiency in winter                                 | 79 %           |

## Winter operation

## Exhaust

|                             |                |
|-----------------------------|----------------|
| Intake air DBT / RH         | 22.0 °C / 37 % |
| Discharge air DBT / RH      | 9.9 °C / 80 %  |
| Air velocity                | 1.19 m/s       |
| Pressure drop Wet / Dry Wet | 21 Pa          |
| Air Pressure                | 101325 Pa      |
| Air Density                 | 1.2000 kg/m³   |
| Air Volume Flow             | 87.00 L/s      |
| Recovery Bypass             | Yes            |
| Air Damper                  | No             |

Counter-Flow (Hex)

Max Internal Leakage 0.25%

## Summer operation

## Supply

|                             |                |
|-----------------------------|----------------|
| Intake air DBT / RH         | 27.2 °C / 56 % |
| Discharge air DBT / RH      | 27.2 °C / 56 % |
| Air velocity                | 1.19 m/s       |
| Pressure drop Wet / Dry Wet | 17 Pa          |
| Air Pressure                | 101325 Pa      |
| Air Density                 | 1.2000 kg/m³   |
| Air Volume Flow             | 87.00 L/s      |

## Summer operation

## Exhaust

|                             |                |
|-----------------------------|----------------|
| Intake air DBT / RH         | 20.0 °C / 76 % |
| Discharge air DBT / RH      | 20.0 °C / 76 % |
| Air velocity                | 1.19 m/s       |
| Pressure drop Wet / Dry Wet | 21 Pa          |
| Air Pressure                | 101325 Pa      |
| Air Density                 | 1.2000 kg/m³   |
| Air Volume Flow             | 87.00 L/s      |
| Eco Design Class            | Eco Design     |



## Plug-Fan Set

## Fan Section PLUG\_DD\_190\_0,18\_4.00

EC\_IE4\_F\_IMB14\_71\_4.00p\_T EC072-B190 190|0.18kW|4.00x1

Fan System Main Fan Qty in section x 1

Fan Set Assembly Type FLX1 (Gasket)

Fan Set Designed for wet operating conditions

The Fan System Effects Is Taken Into Account In The Fan Performances

## Fan PLUG\_VS\_190\_AF\_Px 1

**Technical data for item 4****Offer number 166/LIVE.EUR/GB/2021**

|                         |           |
|-------------------------|-----------|
| Total Static Pressure   | 296 Pa    |
| Dynamic pressure        | 4 Pa      |
| External pressure       | 150 Pa    |
| Total Pressure          | 301 Pa    |
| <b>Winter operation</b> |           |
| Air Volume Flow         | 87.00 L/s |

|                                     |               |
|-------------------------------------|---------------|
| Impeller efficiency: Static / Total | 41 %/41 %     |
| Shaft power                         | 0.06 kW x 1   |
| Working revolutions                 | 2957 1/min    |
| Fans Connection Standard            | FLX1 (Gasket) |
| <b>Summer operation</b>             |               |
| Air Volume Flow                     | 87.00 L/s     |

**Motor EC\_IE4\_F\_71\_IMB14\_4.00p\_0.18\_50x 1**  
**EC\_IE4**

|                         |                  |
|-------------------------|------------------|
| Motor enclosure         | IMB14            |
| IEC Size                | 71               |
| Operational Voltage     | 230 V/1 ph       |
| Fan Motor Rated Voltage | 230 V/1 ph/50 Hz |

|                   |             |
|-------------------|-------------|
| Rated Current     | 0.7 A x 1   |
| Rated revolutions | 4490 1/min  |
| Rated Power       | 0.18 kW x 1 |
| Motor Version     | Standard    |

**EC Motor Controller**

|                                 |          |
|---------------------------------|----------|
| EC Controller                   | Yes      |
| EC Controller Qty in section    | 1        |
| EC Controller Settings          | 33 Hz    |
| EC Controller in selection      | Included |
| EC Controller Optional Nema KIT | No       |

|                              |                  |
|------------------------------|------------------|
| Connecting Point             | CP Excluded      |
| EC Controller Voltage Supply | 230/1/50 V/ph/Hz |
| EC Controller Rated Power    | 0.18 kW x 1      |

**Winter operation**

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.07 kW      |
| EPC for clean filters             | 0.05 kW      |
| SFP for clean filters             | 0.55 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

**Summer operation**

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.07 kW      |
| EPC for clean filters             | 0.05 kW      |
| SFP for clean filters             | 0.55 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

**Hot Water Coil**

|                                            |                         |                                          |
|--------------------------------------------|-------------------------|------------------------------------------|
| <b>Type</b> WCL VVS005s 2R DT SH.St.St.Std | <b>Number of rows</b> 2 | <b>Connection Supply/Return:</b> 3/4"/22 |
| Standard Circuits                          | 0,59 [dm³]              |                                          |

|                             |                 |
|-----------------------------|-----------------|
| Medium                      | Water           |
| Glycole concentration       | 0.00 %          |
| <b>Winter operation</b>     |                 |
| Intake air DBT / RH         | 15.0 °C / 80 %  |
| Discharge air DBT / RH      | 30.0 °C / 32 %  |
| Air velocity                | 1.43 m/s        |
| Pressure drop Wet / Dry Wet | 15 Pa           |
| Air Pressure                | 101325 Pa       |
| Air Density                 | 1.2000 kg/m³    |
| Air Volume Flow             | 87.00 L/s       |
| Total heating capacity      | 1.6 kW          |
| Medium temperature          | 70.0 °C/40.0 °C |
| Medium flow rate            | 0.05 m³/h       |
| Medium pressure drop        | 0.70 kPa        |

|                             |                 |
|-----------------------------|-----------------|
| Maximum working pressure    | 16 bar          |
| Maximum medium temperature  | 160.0 °C        |
| <b>Summer operation</b>     |                 |
| Intake air DBT / RH         | 27.2 °C / 56 %  |
| Discharge air DBT / RH      | 27.2 °C / 56 %  |
| Air velocity                | 1.43 m/s        |
| Pressure drop Wet / Dry Wet | 15 Pa           |
| Air Pressure                | 101325 Pa       |
| Air Density                 | 1.2000 kg/m³    |
| Air Volume Flow             | 87.00 L/s       |
| Total heating capacity      | 0.0 kW          |
| Medium temperature          | 70.0 °C/40.0 °C |
| Medium flow rate            | 0.00 m³/h       |
| Medium pressure drop        | 0.00 kPa        |





Technical data for item 4

Offer number 166/LIVE.EUR/GB/2021

## Acoustic data

| Acoustic power level [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lw [dB(A)] |
|------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
| Inlet                        | [dB(A)]   | 43.4     | 43.2     | 20.3     | 19.8      | 11.8      | 18.1      | 16.1      | 46.3       |
| Outlet                       | [dB(A)]   | 41.6     | 48.6     | 33.8     | 38.7      | 32.5      | 30.7      | 26.0      | 50.0       |
| Environment                  | [dB(A)]   | 25.7     | 37.0     | 34.9     | 29.3      | 21.6      | 14.1      | 2.0       | 39.8       |

| Acoustic pressure level at 1 meter distance [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lp [dB(A)] |
|-----------------------------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
|                                                     | [dB(A)]   | 18.7     | 30.0     | 27.9     | 22.3      | 14.6      | 7.1       | 2.0       | 32.8       |

## Exhaust airflow 3

## Panel Filter

Type M5/50.EU5MPleat.Int.Sld

ePM10 40% - ISO 16890 - EFF CLASS Flat Mini-Pleat Filter[26.0]  
E

Filter Energy Performance Class E

## Winter operation

50% Dirty Air Pressure Drop 106 Pa  
 Initial Air Pressure Drop 12 Pa  
 100% Dirty Air Pressure Drop 200 Pa  
 Air velocity 0.79 m/s

## Filter Sizes

P,FLT M5 332x320x48 (1-2-0301-0272) 1 x Pcs

## Summer operation

50% Dirty Air Pressure Drop 106 Pa  
 Initial Air Pressure Drop 12 Pa  
 100% Dirty Air Pressure Drop 200 Pa  
 Air velocity 0.79 m/s

## Plug-Fan Set

Fan Section PLUG\_DD\_190\_0,18\_4.00

EC\_IE4\_F\_IMB14\_71\_4.00p\_T EC072-B190 190|0.18kW|4.00x1

Fan System Main Fan Qty in section x 1

Fan Set Assembly Type FLX1 (Gasket)

Fan Set Designed for wet operating conditions

The Fan System Effects Taken Into Account In The Fan Performances

Fan PLUG\_VS\_190\_AF\_Px 1

|                         |           |                                     |               |
|-------------------------|-----------|-------------------------------------|---------------|
| Total Static Pressure   | 276 Pa    | Impeller efficiency: Static / Total | 41 %/42 %     |
| Dynamic pressure        | 4 Pa      | Shaft power                         | 0.06 kW x 1   |
| External pressure       | 150 Pa    | Working revolutions                 | 2865 1/min    |
| Total Pressure          | 281 Pa    | Fans Connection Standard            | FLX1 (Gasket) |
| <b>Winter operation</b> |           | <b>Summer operation</b>             |               |
| Air Volume Flow         | 87.00 L/s | Air Volume Flow                     | 87.00 L/s     |

Motor EC\_IE4\_F\_71\_IMB14\_4.00p\_0.18\_50x 1





Technical data for item 4

Offer number 166/LIVE.EUR/GB/2021

EC\_IE4

|                         |                  |                   |             |
|-------------------------|------------------|-------------------|-------------|
| Motor enclosure         | IMB14            | Rated Current     | 0.7 A x 1   |
| IEC Size                | 71               | Rated revolutions | 4490 1/min  |
| Operational Voltage     | 230 V/1 ph       | Rated Power       | 0.18 kW x 1 |
| Fan Motor Rated Voltage | 230 V/1 ph/50 Hz | Motor Version     | Standard    |

**EC Motor Controller**

|                                 |          |                              |                  |
|---------------------------------|----------|------------------------------|------------------|
| EC Controller                   | Yes      | Connecting Point             | CP Excluded      |
| EC Controller Qty in section    | 1        | EC Controller Voltage Supply | 230/1/50 V/ph/Hz |
| EC Controller Settings          | 32 Hz    | EC Controller Rated Power    | 0.18 kW x 1      |
| EC Controller in selection      | Included |                              |                  |
| EC Controller Optional Nema KIT | No       |                              |                  |

**Winter operation**

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.07 kW      |
| EPC for clean filters             | 0.04 kW      |
| SFP for clean filters             | 0.49 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

**Summer operation**

|                                   |              |
|-----------------------------------|--------------|
| EPC for mean contaminated filters | 0.07 kW      |
| EPC for clean filters             | 0.04 kW      |
| SFP for clean filters             | 0.49 kW/m³/s |
| Air Pressure                      | 101325 Pa    |
| Air Density                       | 1.2000 kg/m³ |

**Acoustic data**

| Acoustic power level [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lw [dB(A)] |
|------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
| Inlet                        | [dB(A)]   | 37.1     | 50.4     | 56.3     | 56.7      | 55.0      | 49.6      | 44.0      | 61.6       |
| Outlet                       | [dB(A)]   | 39.8     | 53.1     | 59.0     | 59.4      | 57.7      | 53.2      | 47.6      | 64.4       |
| Environment                  | [dB(A)]   | 24.8     | 36.1     | 34.0     | 28.4      | 20.7      | 13.2      | 2.0       | 38.9       |

| Acoustic pressure level at 1 meter distance [dB(A)] | Frequency | 125 [Hz] | 250 [Hz] | 500 [Hz] | 1000 [Hz] | 2000 [Hz] | 4000 [Hz] | 8000 [Hz] | Lp [dB(A)] |
|-----------------------------------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|
|                                                     | [dB(A)]   | 17.8     | 29.1     | 27.0     | 21.4      | 13.7      | 6.2       | 2.0       | 31.9       |

**Air Inlet Outlet ACCESSORIES****Supply****Exhaust****Controls Selection Mode: Functional set**

| Inlet Outlet Holes | Supply        | Exhaust       |
|--------------------|---------------|---------------|
| Air Inlet          | Front 335x318 | Front 335x318 |
| Air Outlet         | Front 335x318 | Front 335x318 |
| AirDamper          | Supply        | Exhaust       |
| Air Inlet          | Yes 305x288   | No            |
| Air Outlet         | No            | Yes 305x288   |

**Control application**

|                         |                                  |
|-------------------------|----------------------------------|
| Functional Code         | AP 1 0 0 1 0 0 0 6 1 0 0 0 0 0 1 |
| APP Code                | uPC3 (AP-289)                    |
| Main Temp. Sensor       | Duct Supply                      |
| Human Machine Interface | Options                          |





## Technical data for item 4

Offer number 166/LIVE.EUR/GB/2021

|                  |     |                                  |     |
|------------------|-----|----------------------------------|-----|
| BMS              | Yes | Differential Pressure Transducer | CAV |
| HMI Basic (User) | Yes | CO2 Control                      | Yes |
| Control Box      | Yes |                                  |     |

## Air damper actuators

| Name                              | Code                       | Set |
|-----------------------------------|----------------------------|-----|
| Air Damper Actuator ON-OFF S 10Nm | ADMP.ACT.SET ON-OFF S 10Nm | 1   |
| Air Damper Actuator ON-OFF 10Nm   | ADMP.ACT.SET ON-OFF 10Nm   | 1   |
| Air Damper Actuator 0-10 2Nm      | ADMP.ACT.SET 0-10 2Nm      | 1   |

## Temperature sensor

| Name                                                    | Code                           | Set |
|---------------------------------------------------------|--------------------------------|-----|
| Duct temperature sensor NTC 10k                         | Temp. Sensor NTC10k (Duct)     | 2   |
| Resp_Controls_TempSensors_Temp. Sensor NTC10k (Outdoor) | Temp. Sensor NTC10k (Outdoor)  | 3   |
| Strap-on temperature sensor NTC 10k                     | Temp. Sensor NTC10k (Strap-on) | 2   |

## Hydronic Coils Controls

| Name        | Code           | Set |
|-------------|----------------|-----|
| 3-way Valve | VLV.SET-3W-2,5 | 2   |

## Transducers and Switches

| Name                                 | Code          | Set |
|--------------------------------------|---------------|-----|
| Frost Switch                         | FRST.SWCH     | 2   |
| Differential Pressure Transducer CAV | PRSS.TRDC_CAV | 1   |
| CO2 Transducer                       | CO2.TRDC      | 1   |

## AHU Connection Box

## AHU Connection Box

|                  |                    |                |                       |
|------------------|--------------------|----------------|-----------------------|
| Rated Power      | 0.36 kW            | Full Load Amps | 1.2 A                 |
| Power Connection | 1x230V AC<br>+N+PE | Power Cord     | 3 x 0 mm <sup>2</sup> |

## DECLARATION OF PERFORMANCE - Product information - (EU) 1253/2014 annex V as referred to in art. 4(2)

| No. | Parameter                                                               | Unit                | Value                     |
|-----|-------------------------------------------------------------------------|---------------------|---------------------------|
| 1   | Manufacturer's name                                                     |                     | VTS sp. z o.o.            |
| 2   | Manufacturer's product code                                             |                     | VVS005s-H-F-P-V-H         |
| 3   | Declared type                                                           |                     | NRVU, BVU                 |
| 4   | Type of drive installed                                                 |                     | VFD(AC) or Controller(EC) |
| 5   | Type of energy recovery                                                 |                     | Other                     |
| 6   | Thermal efficiency of heat recovery                                     | %                   | 79.00                     |
| 7   | Nominal NRVU flow rate                                                  |                     | 0.09 / 0.09               |
| 8   | Effective electric power input                                          | kW                  | 0.07 / 0.07               |
| 9   | Internal Specific Fan Power (SFPint)                                    | w/m <sup>3</sup> /s | 91.25 / 90.20             |
| 10  | Face velocity                                                           | m/s                 | 0.87                      |
| 11  | Nominal external pressure                                               | Pa                  | 150.00 / 150.00           |
| 12  | Internal Pressure Drop of ventilation components $\Delta p_{s,int}$     | Pa                  | 32.23 / 32.23             |
| 13  | Internal pressure drop of non-ventilation components $\Delta p_{s,add}$ | Pa                  | 114.15 / 94.16            |
| 14  | Maximum Leakage Rate                                                    | %                   | 0.01 / 0.01               |



Technical data for item 4

Offer number 166/LIVE.EUR/GB/2021

|    |                                                                                                     |    |                                                               |
|----|-----------------------------------------------------------------------------------------------------|----|---------------------------------------------------------------|
| 15 | Energy performance of filters (declared information about the calculated annual anergy consumption) |    | EU7MPleat / F7 / - / EU5MPleat / M5 / -                       |
| 16 | Description of visual filter warning for NRVUs                                                      |    | Supported by control application                              |
| 17 | Casing sound power level LWA                                                                        | dB | 48                                                            |
| 18 | Internet address for disassembly instructions                                                       |    | <a href="http://www.vtsgroup.com">http://www.vtsgroup.com</a> |
| 19 | Ecodesign Compliance                                                                                |    | Yes (2018 +)                                                  |

## Section splits

| Transport Sections | Mass [Kg] | LENGTH [mm] | WIDTH [mm] | HEIGHT [mm] |
|--------------------|-----------|-------------|------------|-------------|
| 1                  | 14        | 219         | 415        | 400         |
| 2                  | 126       | 1251        | 830        | 400         |
| 3                  | 15        | 219         | 415        | 400         |

Transport Sections Dims

