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MEP DESIGN

Document Reference

22_010-X-MEP-G525-RP-XX-001

Revision

P02

Title

17 QUAY STREET, MANCHESTER
VENTILATION, EXTRACTION & ODOUR STRATEGY

Mechanical Electrical Public Health Limited

MEP Design
1st Floor
The Hillock ,Harwood
Bolton BL2 3HP

DOCUMENT HISTORY

Revision	Date	Purpose	Author	Approved
P01	30/08/2022	Preliminary Issue for Planning	B.W.J. / J.K.	B.W.J.
P02	12/09/2022	Updated to Incorporate Comments	B.W.J.	B.W.J.

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1 INTRODUCTION

1.1 BACKGROUND

This Ventilation Statement has been prepared by MEP Design to support the Planning application for the refurbishment of existing offices at 17 Quay Street, Manchester M3 3HN.

Located in the Deansgate area of Manchester. The site is bounded by:

- Quay Street to the north
- Byrom Street to the west
- Artillery Street to the south
- Deansgate to the east

1.2 DEVELOPMENT DETAIL

17 Quay Street is an office block that also contains:

- Basement Car Park
- 5 storey office block
- Retail units
- Staff shower block in basement
- Welfare facilities on each office floor

2 VENTILATION

2.1 OFFICES

All offices will be ventilated in accordance with Part F of Building Regulations (2021 version).

The windows within the office space do not open.

There are two central Air Handling Units (AHUs) to be mounted on the roof. Each AHU connects to a riser on opposite sides of the building. The AHUs will provide tempered fresh air matching or improving on the ventilation rates detailed in Approved Document F.

The ventilation system will have demand controlled via integrated CO_2 sensors.

All ductwork will be rigid steel galvanised ductwork. There will be no use of flexible ductwork. Intake and exhaust ductwork will be insulated to prevent condensation.

Attenuators will be installed to reduce external noise intrusion. The attenuators will be designed in accordance with CIBSE Guidance, or to the design criteria of an acoustic specialist if one is appointed.

Upon a fire signal the AHUs will automatically shut off and will require a manual restart.

A fire damper will be installed between each floor and through any penetration through the lift lobby/stair core area, to maintain the existing fire compartmentation of the building.

Carbon filtration will be installed if required, subject to an external air quality assessment identifying poor air quality present.

2.2 BASEMENT CAR PARK

Single-level Basement car park with entry/exit via a single ramp.

A fully mechanical ventilation system compliant with Approved Documents B & F of the current Building Regulations and designed in accordance with British Standard BS7346: Part 7: 2013 is to be installed.

Make up air to the car park with be via the ramp. The ramp door will be selected to ensure if provides adequate free area to provide make up air even when the doors are closed.

The system will exhaust via an existing louvre located at Ground Floor on Artillery Street.

The system is to be designed to provide smoke dispersal in accordance with BS7346: Part 7: 2013 Clause 9 in the event of fire.

Fresh air will be drawn into the car park as described above. Contaminated air will be extracted via two main extract fans mounted in parallel. The fans will be located in the plant room.

CO monitoring will be adopted to reduce energy consumption and to reduce the running costs for day to day ventilation by varying the rate of ventilation according to the level of traffic movement.

2.2.1 DAILY VENTILATION

Under “normal” ventilation conditions, air will be drawn through all parts of the car park at a rate equivalent to approximately 3 air changes per hour and the induction fans will operate at low speed.

CO pollution levels will be continually monitored. On detection of CO levels rising beyond 20ppm (part per million), the induction fans will operate at low speed to mix and dilute the CO gases for extract via the main fans. Should the CO level continue to rise to 30ppm, the air change rate will increase to 6 per hour.

The main extract fans will vary in speed according to the exhaust pollution levels within the car park, thereby providing the 3 to 6 air changes per hour.

2.2.2 FIRE CONDITION

A fire signal will be received via the smoke detection system.

On detection of fire, the main fans will operate at full speed and the extract damper serving the non-fire floors will close, increasing the airflow to at 10 air changes per hour to the fire floor. The induction fans on the fire floor will activate at high speed, with those on the non-fire floors being switched off.

A fireman’s override switch will be installed to enable the attending fire service personnel to switch the system off if required. The fireman’s switch will be wired back to the main control panel.

In order to achieve good distribution of air flow, the mechanical extract ventilation will be supported with 9No. induction fans located around the car park.

2.3 COMMERCIAL / RETAIL UNITS

The commercial units are being designed as shell and core for fit out by the respective tenant.

Plant space will be retained for the use for each retail unit on the roof. Associated riser provision will also be provided.

Final ventilation installations, including odour and acoustic control measures shall be designed and provided by the incoming tenant and their fit-out contractor to suit the use of the space.

An EMQA+ risk assessment for odour control will be produced for each unit.

2.4 PLANT AREAS

Plant areas shall be provided at roof level as shown on the drawing included within Section 3 of this report.

2.5 SMOKE EXTRACT SYSTEM

A smoke clearance system shall be installed that shall operate automatically in the event of a fire within the office area of the development.

There shall be a head of stair Automatic Opening Vent (AOV) within the secondary escape stair. This shall open automatically at the dictates of the fire control panel to provide make up air for the smoke clearance system.

There shall be an AOV connected to a fresh air shaft on each office level. On receipt of a fire signal, the AOV on the fire signal floor shall open, providing make up air to the AOV.

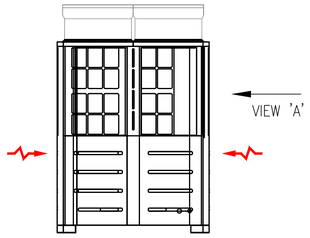
An AOV located at high level within the protected lobby of the secondary escape stair well shall open automatically at the dictates of the fire control panel to allow the passage of smoke from the affected corridor, into the smoke shaft formed within the core area.

A dedicated corridor smoke detector located at each level shall be used to actuate the fire damper at the affected floor.

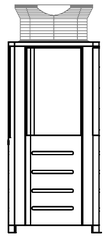
Fans at roof level, controlled automatically by the fire control panel, once energised shall extract smoke from the building through the automatic opening vents. The fans shall be run in duty / standby mode to ensure operation in the event of a fan failure.

A repeater panel will be installed in a location accessible to the fire brigade to allow them to monitor and control this system in fire conditions.

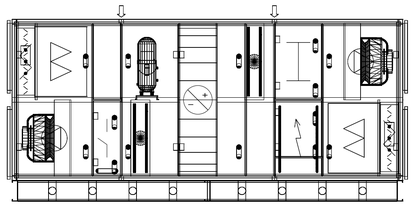
3 PROPOSED ROOF PLANT LAYOUT



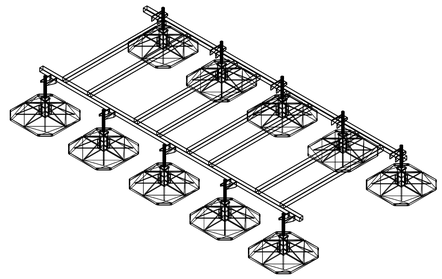
TYPICAL CONDENSER BLOCK
DIMS: 1800Wx740Lx2153Hmm
SCALE 1 : 25



VIEW A
SCALE 1 : 25



TYPICAL AHU SECTION ARRANGEMENT
3982mm x 1902mm high.
UNIT WIDTH: 1682 mm
WEIGHT: 1763 kg
NOT TO SCALE



INDICATIVE BIG FOOT FRAME ARRANGEMENT

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This drawing is for information only and shall not be used for construction purposes.

Any drawing issued as "Contract or Construction Issue" is done so to confirm the basis on which the contractor shall provide their own working drawings.

All dimensions are in mm unless stated otherwise.

The information on this drawing shall be read in conjunction with any relevant associated documents.

GENERAL NOTES

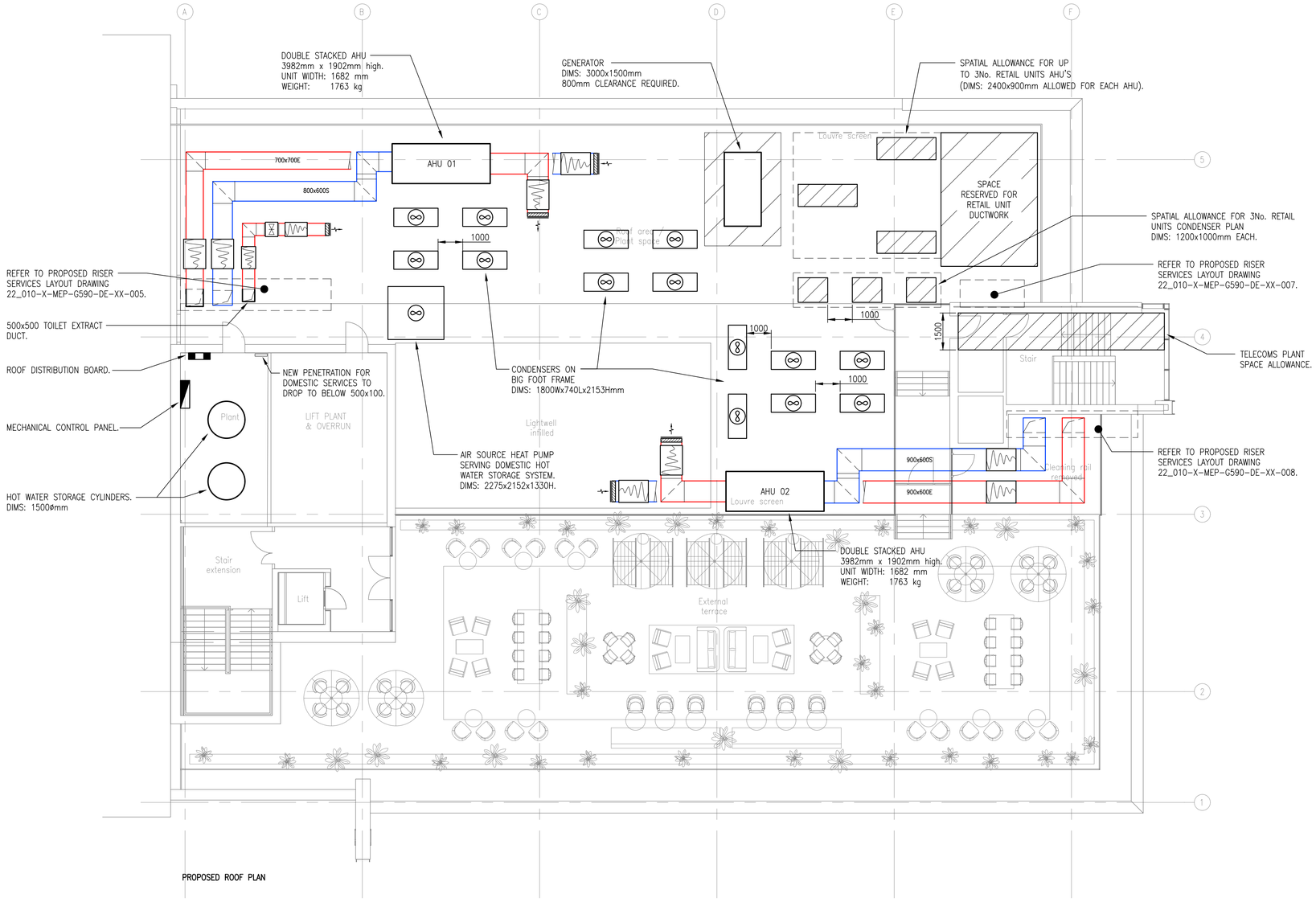
1.0 THE DRAWING SHALL BE READ IN CONJUNCTION WITH THE SPECIFICATION & ALL OTHER RELEVANT DOCUMENTS & DRAWINGS PROVIDED BY MEP DESIGN.

2.0 THE DRAWING INDICATES THE DESIGN INTENT FOR THE WORKS.

3.0 ALL SERVICES SHOWN ARE NEW UNLESS OTHERWISE INDICATED.

GENERAL LEGEND

L/L	ITEM MOUNTED AT LOW LEVEL.
H/L	ITEM MOUNTED AT HIGH LEVEL.
C/V	ITEM MOUNTED IN CEILING VOID.
R/V	ITEM MOUNTED IN ROOF VOID.
F/V	ITEM MOUNTED IN FLOOR VOID.
W/T	ITEM MOUNTED AT WORKTOP LEVEL.
WP	DENOTES WEATHERPROOF IP65 TYPE SUITABLE FOR EXTERNAL USE.
EX	DENOTES EXISTING TO BE RETAINED.
R	DENOTES EXISTING TO BE RELOCATED.
R.T.A.	RISE TO ABOVE.
R.F.B.	RISE FROM BELOW.
D.F.A.	DROP FROM ABOVE.
D.T.B.	DROP TO BELOW.



PROPOSED ROOF PLAN

Revison	Description	Date
P03	REVISED COMMENT ISSUE	SEPT 22
P02	REVISED COMMENT ISSUE	AUG 22
P01	ISSUED FOR COMMENT	JULY 22

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Client
URBANA PARTNERS

Project
17 QUAY STREET, MANCHESTER

Title
COORDINATED SERVICES
PROPOSED ROOF LAYOUT
PLANT SPATIAL ALLOWANCE DRAWING

Scale 1 : 100 @A1 Drawn W.H.

Project No.	Zone	Originator	Uniclass	Type	Level	Code	Rev
22_010 -	X -	MEP -	G590 -	PL -	RF -	001 -	P03

4 DETAILS OF PLANT

Air Conditioning | Product Information

MITSUBISHI ELECTRIC

PUZ-ZM200/250YKA R32

High Capacity Outdoor Units

Power Inverter Heat Pump (Three Phase)

Mr.SLIM™

Our high capacity Power Inverter outdoor units provide excellent system flexibility by connecting to 2, 3 or 4 Mr Slim indoor units.

Power Inverter technology allows high seasonal efficiency performance as well as extra-long pipe runs. These units provide efficient cooling or heating to large open areas such as retail units, gyms and halls.

R32 POWER INVERTER

Key Features & Benefits:

- Connectable to up to 4 cassette, wall mount, ducted or ceiling suspended units
- Exceptional application coverage with up to 100m pipe runs
- Maximum design flexibility due to 30m height difference between outdoor unit & indoor units
- Utilises lower GWP R32 refrigerant

Air Conditioning | **Product Information**

PUZ-ZM200/250YKA R32

High Capacity Outdoor Units
Power Inverter Heat Pump (Three Phase)

R32

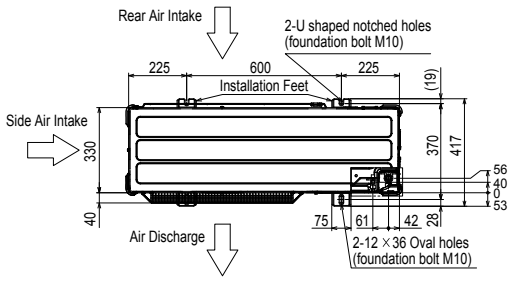
POWER INVERTER

PUZ-ZM200/250YKA OUTDOOR UNITS		PUZ-ZM200YKA	PUZ-ZM250YKA
Capacity (kW)	Heating (nominal)	22.4	27.0
	Cooling (nominal)	19.0	22.0
SCOP (nsh) / SEER (nsc) (BS EN14825)*1		4.50 (177.1%) / 7.49 (296.4%)	4.47 (175.7%) / 7.43 (294.3%)
SOUND PRESSURE LEVEL (dBA)	Heating/Cooling	62 / 59	62 / 59
WEIGHT (kg)		137	138
DIMENSIONS (mm)	Width x Depth x Height	1050 x 330+40 x 1338	1050 x 330+40 x 1338
PIPE SIZE mm (in)	Gas	28.58 (1 1/8")	28.58 (1 1/8")
	Liquid	9.52 (3/8")	12.7 (1/2")
ELECTRICAL SUPPLY		380-415v, 50Hz	380-415v, 50Hz
PHASE		Three	Three
SYSTEM POWER INPUT (kW)	Heating/Cooling (nominal)	5.63 / 4.95	7.81 / 6.86
	Heating/Cooling (UK)	5.07 / 4.11	7.03 / 5.69
STARTING CURRENT (A)		5	5
SYSTEM RUNNING CURRENT (A)	Heating/Cooling [MAX]	9.57 / 8.58 [22.5]	13.3 / 11.6 [22.5]
FUSE RATING (BS88) - HRC (A)		25	25
MAINS CABLE No. CORES		5	5
MAX PIPE LENGTH (m)		100	100
MAX HEIGHT DIFFERENCE (m)		30	30
CHARGE REFRIGERANT (kg) / CO_2 EQUIVALENT (t)	R32 (GWP 675) - 30m	6.3 / 4.25	6.8 / 4.59
MAX ADDITIONAL REFRIGERANT (kg) / CO_2 EQUIVALENT (t)	R32 (GWP 675)	2.9 / 1.96	2.4 / 1.62

*1 PUZ-ZM200YKA connected to 2 x PLA-ZM100EA, PUZ-ZM250YKA connected to 2 x PLA-ZM125EA

PUZ-ZM200/250YKA DIMENSIONS

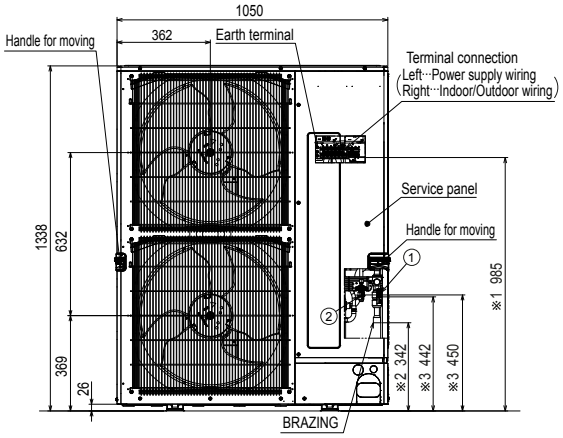
UPPER VIEW



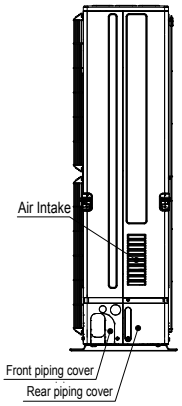
Model	① Refrigerant GAS pipe connection	② Refrigerant LIQUID pipe connection
PUZ-ZM200YKA	ø19.05 (3/4F)	ø9.52 (3/8F)
PUZ-ZM250YKA	ø19.05 (3/4F)	ø12.7 (1/2F)
PUHZ-ZRP200YKA.UK	ø19.05 (3/4F)	ø9.52 (3/8F)
PUHZ-ZRP250YKA.UK	ø19.05 (3/4F)	ø12.7 (1/2F)

※1···Indication of Terminal connection location.
※2···Refrigerant GAS pipe connection (BRAZING) O.Dø25.4.
※3···Indication of STOP VALVE connection location.

FRONT VIEW



SIDE VIEW



MITSUBISHI ELECTRIC
Changes for the Better

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IRELAND Mitsubishi Electric Europe, Westgate Business Park, Ballymount, Dublin 24, Ireland. Telephone: (01) 419 8800 Fax: (01) 419 8890 International code: (003531)

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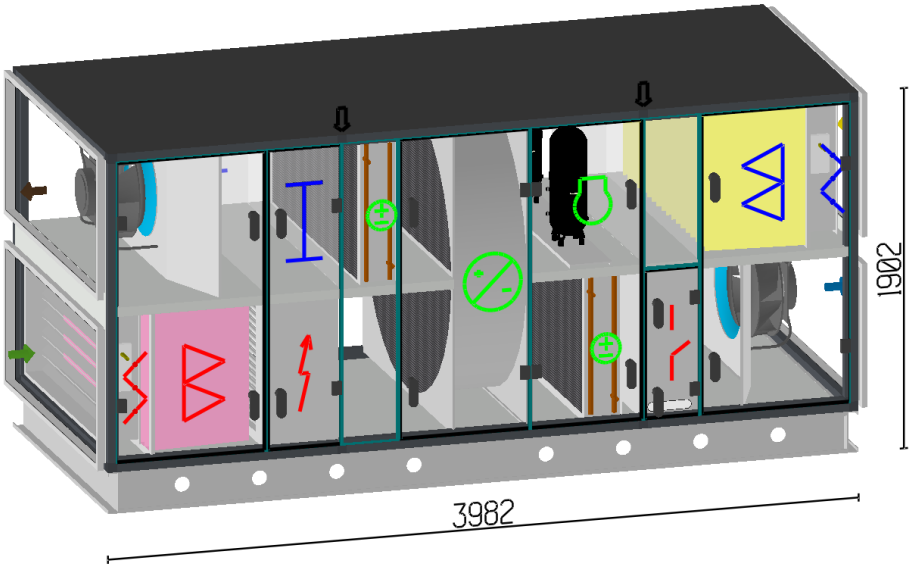
Note: The fuse rating is for guidance only. Please refer to the relevant databook for detailed specification. It is the responsibility of a qualified electrician/electrical engineer to select the correct cable size and fuse rating based on current regulation and site specific conditions. Mitsubishi Electric's air conditioning equipment and heat pump systems contain a fluorinated greenhouse gas, R410A (GWP:2088), R32 (GWP:675), R407C (GWP:1774), R134a (GWP:1430), R513A (GWP:631), R454B (GWP:466), R1234ze (GWP:7) or R1234yf (GWP:4). *These GWP values are based on Regulation (EU) No 517/2014 from IPCC 4th edition. In case of Regulation (EU) No.626/2011 from IPCC 3rd edition, these are as follows. R410A (GWP:1975), R32 (GWP:550), R407C (GWP:1650) or R134a (GWP:1300).

Effective as of May 2020

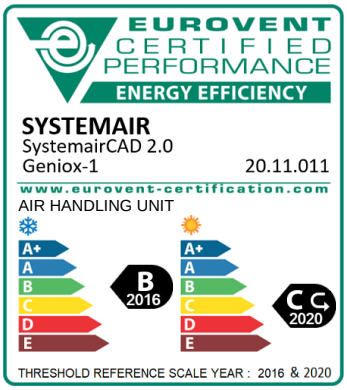
Green Gateway greengateway.mitsubishielectric.co.uk

Unit no.: 20
Geniox 16 - Roof
Weight: 1763 kg
Unit width: 1682 mm



Air/fan data	Supply air	Extract air	Units
Airflow (1.205 kg/m³)	2.90	2.75	m³/s
Face velocity (unit)	2.49	2.37	m/s
External pressure	300	250	Pa
Fan speed	1985	1871	RPM
Motor; Voltage; Rated current	4.60; 3x400; 7.40	4.60; 3x400; 7.40	kW/V/A
Sound break out	65 dB(A)		
Power supply	L1 + L2 + L3 + N + PE (3x400V) 50 Hz		
Consumed current	47.8 A		
Filter Supply / Extract	F7 - ePM1 60% / M5 - ePM10 60%		
Heating, electric	52.4 kW ; -5.0/10.0°C ; 3x400V		
Reversible heat pump Winter / Summer	2.5 (16) kW ; COP 6 / 9.5 (40) kW ; EER 4.2		

Energy	Dimensioning	Average	Fans [kWh/year 8760 hours]
Heat Recovery (Wet / Dry)	75.5 % / 77.2 %	75.5 % / 77.2 %	
SFPv, clean filters including speed control	2.22 kW/(m³/s)	2.22 kW/(m³/s)	56473 kWh



Systemair Ltd.

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Graham.Priestley@systemair.co.uk

Winter

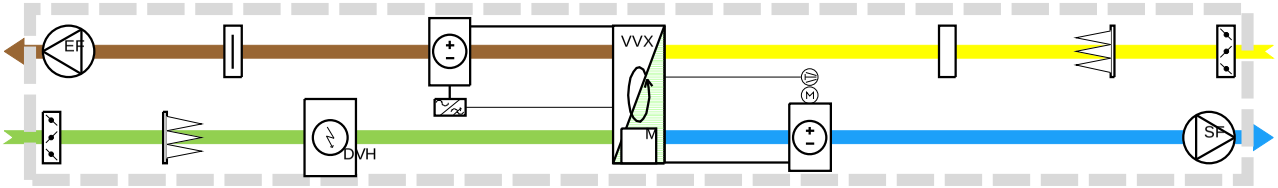
Temperature after [°C]	8.0	8.0	8.0	8.0	12.0	20.0	20.0	20.0	20.0
Humidity after [%]	87	87	87	87	67	40	40	40	40
Pressure drop [pa]	0	39	4	121	197	4	107	4	250
Pressure after function [pa]	-	0	0	-729	-562	0	-361	-254	-250
		Efficiency 71.1% (Total Pressure)					M5 - ePM10 60% Filter		

Summer

Temperature after [°C]	41.1	41.1	41.1	41.1	26.4	20.0	20.0	20.0	20.0
Humidity after [%]	12	12	12	12	27	40	40	40	40

Exhaust Air 85 dB(A)

Outdoor Air 73 dB(A)



74 dB(A) Extract Air

87 dB(A) Supply Air

Winter

Temperature after [°C]	-5.0	-5.0	-5.0	10.0	17.6	22.0	22.0	22.0
Humidity after [%]	90	90	90	31	19	14	14	14
Pressure drop [pa]	0	4	146	30	208	94	43	300
Pressure after function [pa]	-0	-4	-150	-181	-389	-365	300	-
			F7 - ePM1 60% Filter	52.38 kW	75.5/77.2% Wet/dry		Efficiency 71.8% (Total Pressure)	

Summer

Temperature after [°C]	28.0	28.0	28.0	28.0	22.0	16.9	16.9	16.9
Humidity after [%]	60	60	60	60	86	98	98	98
					75.5% wet			

Commissioning Data

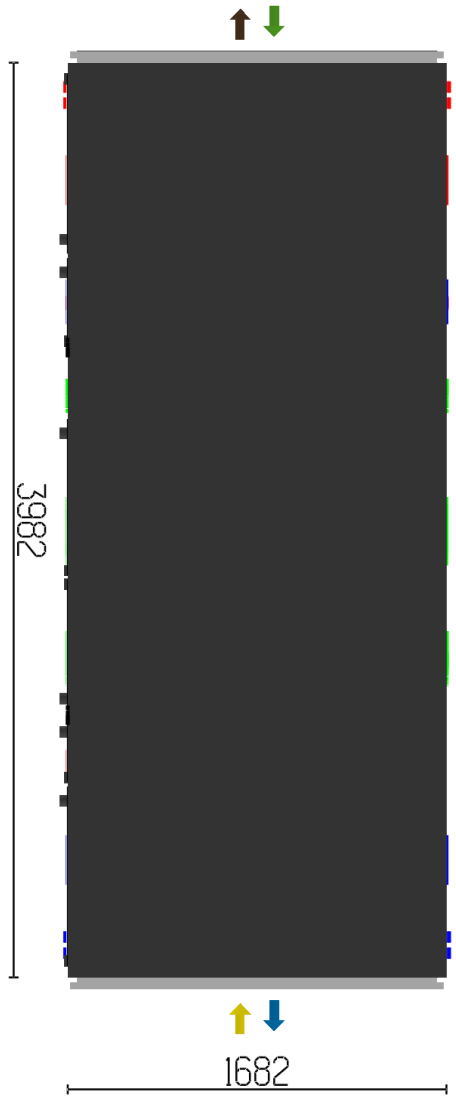
	Supply	Extract	Unit
Pressure drop clean filters	96	61	Pa
Fans absorbed power clean filters	-	-	kW

Alternative working points

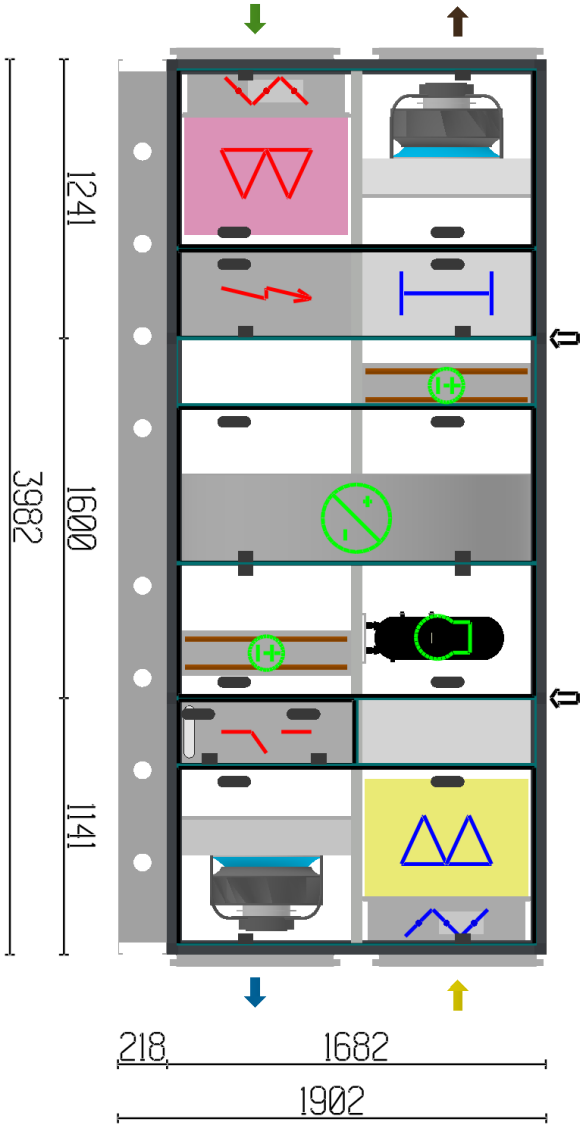
	Dim.										Average
Airflow, Supply, m³/s	2.90										2.90
Airflow, Extract, m³/s	2.75										2.75
External pressure drop, Supply	300										
External pressure, Extract	250										
SFPv, kW/(m³/s)	2.22										2.22
SFPe, kW/(m³/s)	2.35										2.35
Efficiency, Heat exchanger (wet), %	75.5										75.5
Efficiency, Heat exchanger (dry), %	77.2										77.2
Electric heating , Capacity, kW	52.4										52.4
Reversible heat pump, Absorbed power, Winter, kW	2.5										2.5
Reversible heat pump, Absorbed power, Summer, kW	9.5										9.5
Sound data dB(A)											
Supply air	87										
Outdoor air	73										
Exhaust air	85										
Extract air	74										
Sound break out	65										
Operation hours	8760										

Operational hours yearly	**8760**

Plan view



Access side



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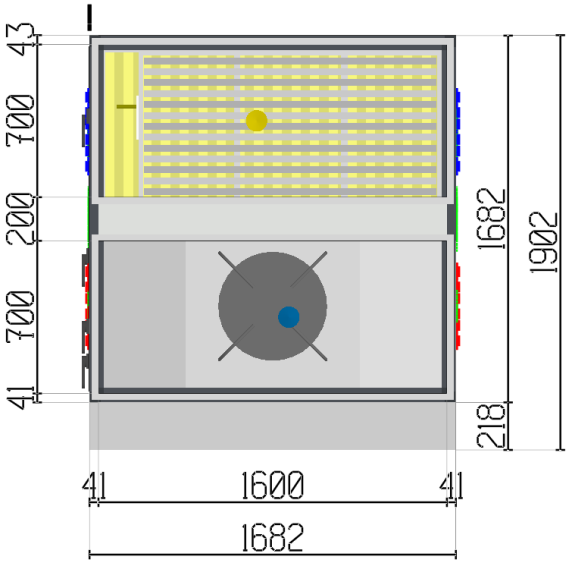
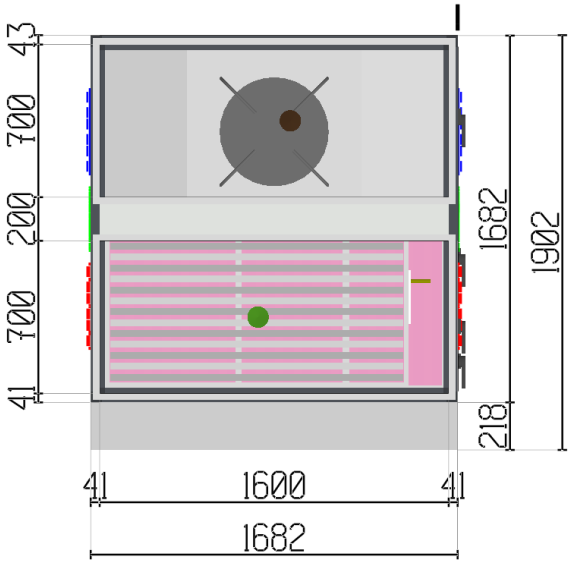
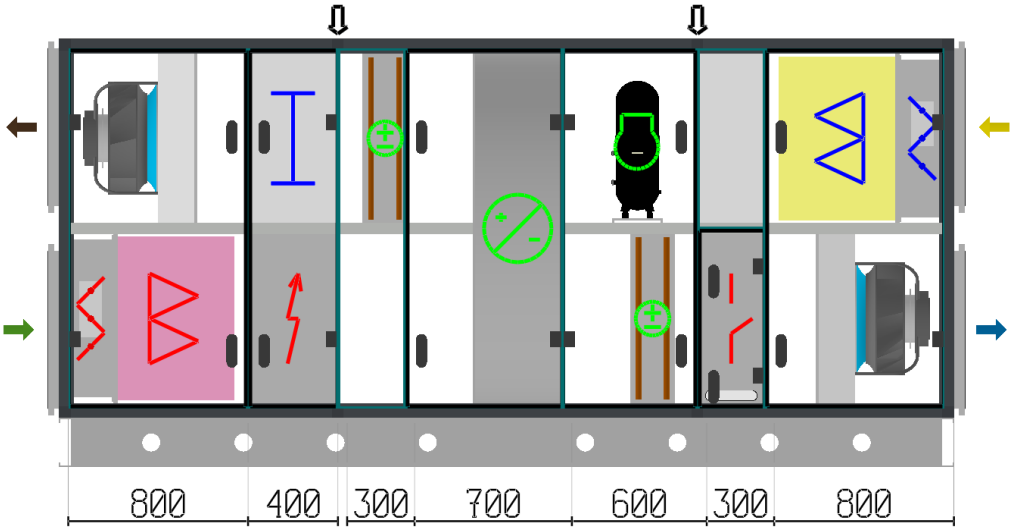
Right end

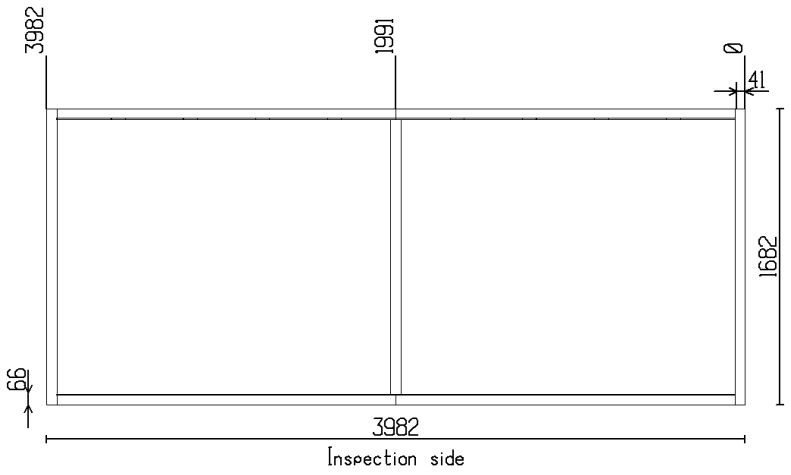


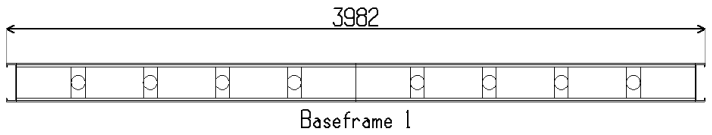
Left end



Doors and panels dimensions




3982
1991
0
41
1682
99
3982
Inspection side


3982
Baseframe 1

Technical specification

Unit

Frequency band [Hz] Sound power level	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1K [dB]	2K [dB]	4K [dB]	8K [dB]	Total [dB(A)]
Supply air	82	87	84	85	81	79	75	73	87
Outdoor air	76	79	76	73	63	56	49	47	73
Exhaust air	80	89	82	83	80	77	74	72	85
Extract air	75	80	77	72	67	62	59	55	74
Sound break out	74	77	61	60	58	53	48	35	65

Casing		
Panels	Steel sheets coated with ZM310, corrosion class C5	
Frame profiles	Steel profiles coated wiht z225 painted, corrosion class C4	
Mullion profiles	Steel profiles coated with ZM310, corrosion class C5	
Corners	PA6 fiber rienforced	
Insulation	60 mm mineral wool / Density 60 kg/m3	
Corrosion protection	Class C4 according to EN ISO 12944-2:2018	
Operating pressure	0 - 2000 Pa (Geniox10 - Geniox31)	
Operating temperatures	-40/+40 °C (Standard)	
	-40/+60 °C (Special design)	
Classifications	EN 1886, 2. edition 2008	
Mechanical Strength	Class D1(M)	
Casing air leakage	-400 Pa: Class L1(M)	
	+700 Pa: Class L1(M)	
Filter by-pass leakage	-400 Pa: Class G1-F9	
	+400 Pa: Class G1-F9	
Thermal transmittance	Class T2(M)	
Thermal bridging factor	Class TB2(M)	
Acoustic insulation of casing	Octave band Hz	Insulation dB
	63	10
	125	17
	250	24
	500	27
	1000	28
	2000	28
	4000	32
	8000	40
Roof	Polyvinyl chloride roof	

Control system

Language in controller menu	English	
NaviPad navigation tablet delivered	Yes	
External communication	MODBUS RTU, RS485	
Temperature control	Supply air temperature control	
Fan control	Air flow control m³/h	
Damper motor supply air	Motor ON/OFF	
Damper motor extract air	Motor ON/OFF	
Free cooling	Yes	

For selection of sensors - study flow chart in control system printout

Mains power supply for control system

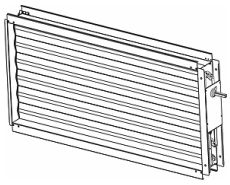
Supply cable	L1 + L2 + L3 + N + PE	
Voltage	3x400	VAC
Hz	50	Hz
Cable entry position	Cable entry in bottom	
Cable gland for main supply cable	M40	
Fuse for supply air fan (in main cabinet)	10	A
Fuse for extract air fan (in main cabint)	10	A
Fuse for heat pump (in cabinet for heat pump)	40	A
Rated fuse PSCC max (in main cabinet)	10	kA
Max. consumed current	47.8	A
Max. consumed current in neutral wire	5.0	A
Minimum fuses for unit (L1-L2-L3)	50	A
Minimum fuses for unit (L1-L2-L3-N)	50	A

The installer must ensure that protection of the mains power supply relating to frequency converters is according to local statutory requirements. By one or more 400 VAC motors, Residual Current Circuit Breaker type B must be installed. By one or more 400 VAC motors, HPFI type B must be installed.

The electrical installation (wiring, mounting of components, connection plugs, etc.) for the unit is done as an machine installation according to 60204-1

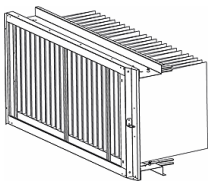
The supply unit consist of

Damper



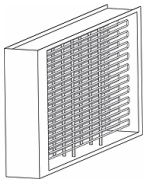
Pressure drop	4	Pa
Damper blades	Standard	
Number of dampers	1	pcs

Filter



Dimensioning pressure drop	146	Pa
Initial pressure drop/Final pressure drop	96/196	Pa
Velocity, face area	3.33	m/s
Velocity, filter area	0.19	m/s
Filter class	F7 - ePM1 60%	
Filter size	3x[490x592x25]	
Filter length	520	mm
Filter description	Camfil Hi-Flo II XLT	

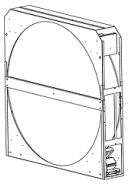
Pre-heater



Air flow	2.90	m³/s
Pressure drop	30	Pa
Face velocity for the coil	3.31	m/s
Air temperature before/after	-5.0/10.0	°C
Air relative humidity before/after	90/31	%
Capacity	52.38	kW
Number of steps	Modulating	
Voltage	3x400	V
Current, Amp.	77.9	A
Connection side	Service side	

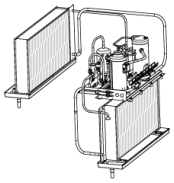
Electrical coils must have separate power supply

Rotary heat exchanger



	Supply	Extract	
Air flow	2.90	2.75	m³/s
Pressure drop	208	197	Pa
WINTER			
Air temperature before/after	10.0/17.6	20.0/12.0	°C
Air relative humidity before/after	31/19	40/67	%
Capacity	26.73		kW
Temperature efficiency	75.5		%
Dry efficiency according to EN 308 at 2.90 m³/s	77.2		%
Humidity efficiency	0.0		%
Energy class for heatrecovery (EN13053)		H1	
SUMMER			
Air temperature before/after	28.0/22.0	20.0/26.4	°C
Air relative humidity before/after	60/86	40/27	%
Capacity	21.85		kW
Temperature efficiency		75.5	%
Humidity efficiency		0.0	%
Heat exchanger type		P - Condensation (Temperature)	
Efficiency (Wave height)		B - High	
Wheel Diameter		Ø1480	
Description		P140_380_2-1480*	
Rotor drive		Variable speed	
Electrical data		1x230V, 85W, 0.4Amp	
Purging sector		1	pcs

Reversible heat pump



	Supply	Extract	
Air flow	2.90	2.75	m³/s
Pressure drop	94	121	Pa
Droplet eliminator	52	47	Pa
Face velocity for the coil	3.2	3.0	m/s
WINTER			
Air temperature before/after *	17.6/22.0	12.0/8.0	°C
Air relative humidity before/after	18.8/14.3	66.6/87.1	%
Capacity *	15.7	13.4	kW
Refrigerant temperature	28.6	5.4	°C
Condensate		0.0	l/min
Used capacity at working conditions	34.7		%
Absorbed power, at operating point	2.5		kW
COP, compressor system *	6.3		
COP total, compressor system + rotary heat exchanger *	16.8		
* Energy for the defrosting is not considered in the winter calculation. The heat pumps cannot run continuously with refrigerant temperatures below -2°C without defrosting. The defrosting will cause temperature drop in the supply air for a short period.			
SUMMER			
Air temperature before/after	22.0/16.9	26.4/41.1	°C
Air relative humidity before/after	86.1/97.7	27.2/11.9	%
Capacity	40.0	49.5	kW
Refrigerant temperature	11.2	47.6	°C
Sensible cooling in % of total cooling	44		%
Condensate	0.5		l/min
Used capacity at working conditions	93.9		%
Absorbed power, at operating point	9.5		kW
EER, compressor system	4.2		
EER total, compressor system + rotary heat exchanger	6.5		
Tube material	Cu	Cu	
Fin material	Al	Al	
Fin spacing	2.5	2.5	mm
Code for supply air coil	TDZ-16-CD-Z-5-11-675-1358-2.5-Cu-Al-H-1 1/8		
Code for extract air coil	TCZ-16-CD-Z-6-8-675-1358-2.5-Cu-Al-V-1 1/8		
Drip tray material	Stainless steel	Stainless steel	
Diameter of pipe from drip tray	40	40	mm
Refrigerant / Amount	R410A	9.7	kg
Compressor	ZPD72+ZP72		
External connections			
Current (is included in the main cabinet)	3*400V+N+PE, 50Hz	30.0	A
Start signal (Heating) / Cooling demand		Potential free contact set	
Control signal		0 - 10	V,DC
Potential-free alarm signal		1	pcs

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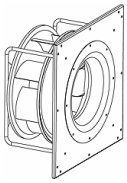
Fan, Plug



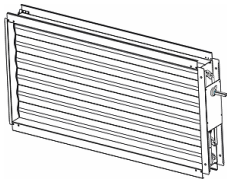
Air flow	2.90	m³/s
External pressure	300	Pa
Pressure drop	43	Pa
Static pressure (Designed at wet conditions)	882	Pa
Total pressure	919	Pa
Fan speed	1985	RPM
Maximum fan speed	2150	RPM
Total efficiency by static pressure, incl. motor and speed control	68.9	%
Total efficiency by total pressure, incl. motor and speed control	71.8	%
K-factor (p=1.2 kg/m³)	280	
Fan type - Large	GR50I-ZID.GL.CR	
ErP efficiency n(stat,A)	75.1	%
ErP efficiency class N(actual)/ N(target)	78.6 / 62	
ErP-conformity	Yes	
Direct drive		

Motor

Motor type	EC motor	
Motor types-size	ZID.GL.CR	
Motor protection	Thermistor	
Rated power	4.60	kW
Speed (nominal)	2150	RPM
Current, Amp.	7.40	A
Voltage	3x400	V
Consumed power from mains power supply, including speed control	3.73	kW
SFPv, clean filters including speed control	1.21	kW/(m³/s)

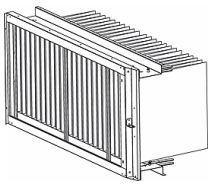
The extract unit consist of

Damper



Pressure drop	4	Pa
Damper blades	Standard	
Number of dampers	1	pcs

Filter



Dimensioning pressure drop	107	Pa
Initial pressure drop/Final pressure drop	61/153	Pa
Velocity, face area	3.16	m/s
Velocity, filter area	0.18	m/s
Filter class	M5 - ePM10 60%	
Filter size	3x[490x592x25]	
Filter length	520	mm
Filter description	Camfil Hi-Flo II XLT	

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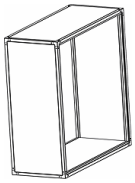
Empty section



Pressure drop	4	Pa
Length	300	mm

Reversible heat pump

Data are stated on supply.

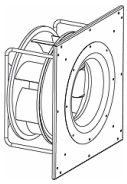
Rotary heat exchanger

Data are stated on supply.

Inspection section

Pressure drop	4	Pa
Length	400	mm

Fan, Plug



Air flow	2.75	m³/s
External pressure	250	Pa
Pressure drop	39	Pa
Static pressure (Designed at wet conditions)	772	Pa
Total pressure	805	Pa
Fan speed	1871	RPM
Maximum fan speed	2150	RPM
Total efficiency by static pressure, incl. motor and speed control	68.2	%
Total efficiency by total pressure, incl. motor and speed control	71.1	%
K-factor (p=1.2 kg/m³)	280	
Fan type - Large	GR50I-ZID.GL.CR	
ErP efficiency n(stat,A)	75.1	%
ErP efficiency class N(actual)/ N(target)	78.6 / 62	
ErP-conformity	Yes	
Direct drive		

Motor

Motor type	EC motor	
Motor types-size	ZID.GL.CR	
Motor protection	Thermistor	
Rated power	4.60	kW
Speed (nominal)	2150	RPM
Current, Amp.	7.40	A

Voltage	3x400	V
Consumed power from mains power supply, including speed control	3.11	kW
SFPv, clean filters including speed control	1.07	kW/(m³/s)

Other parts

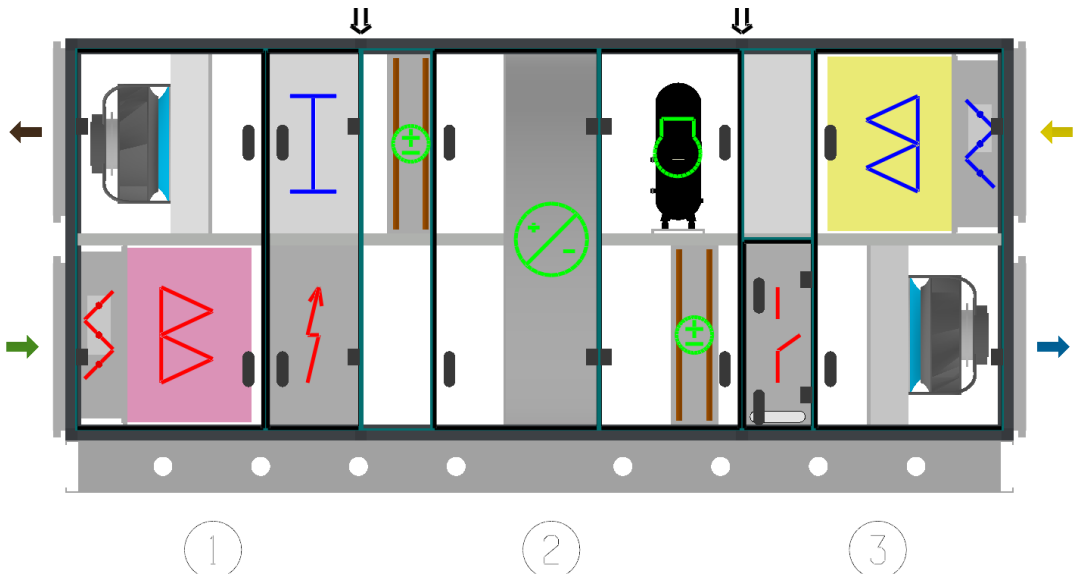
Feet or baseframe		
Feet or baseframe	Baseframe	
Baseframe height	218	mm
Corrosion protection	Galvanized ZM310	

Rigid duct connection, 30 mm EP profile		
Product	Dimensions (width x height)	
Outdoor	1600x700 mm	
Supply	1600x700 mm	
Extract	1600x700 mm	
Exhaust	1600x700 mm	

Section about shipping

Product	Dimensions (width x height x length), incl. packaging	Weight, Inc. Packaging	Weight of unit
AHU1-4182	1782 x 2020 x 4182 mm	1766 kg	1763 kg
	The unit sections are delivered mounted on base frame.		

Weights



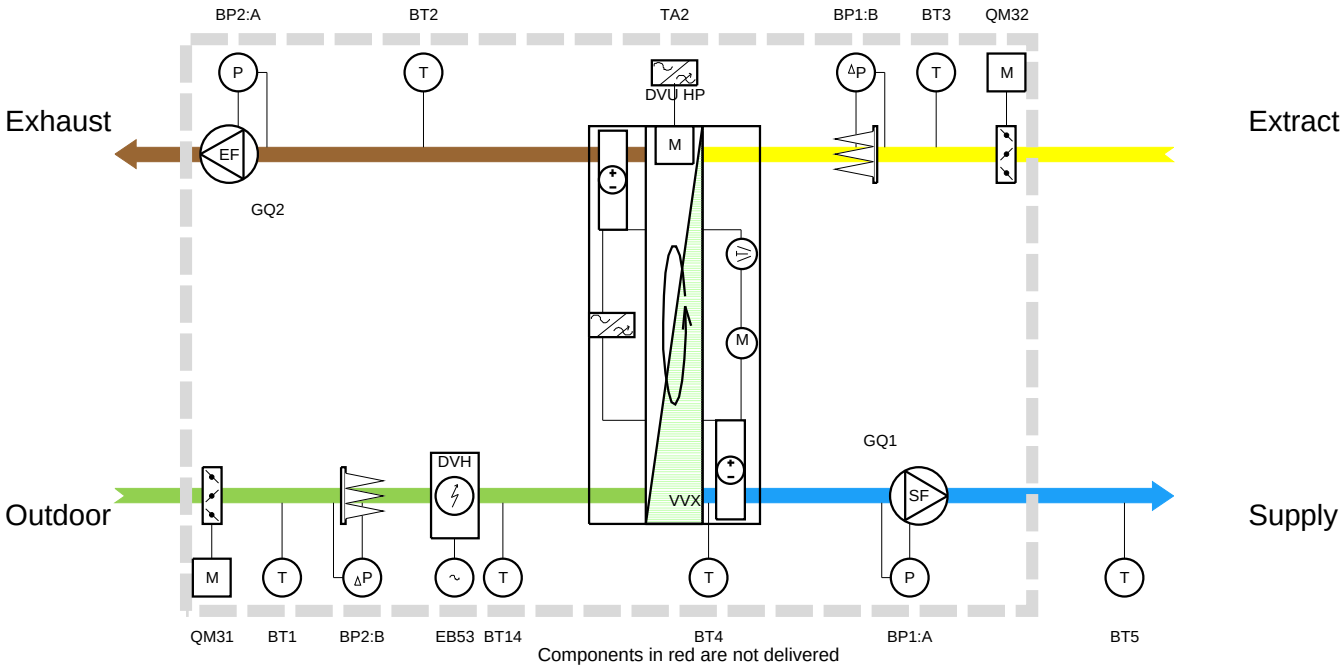
Section No	Section Code	Function Code	Weight of function kg	Weight of section kg
1	Casing Length 1241 mm			385
		Casing	226	
		Damper	22	
		Filter	21	
		Pre-heater	49	
		Inspection section	0.1	
		Fan	67	
2	Casing Length 1600 mm			844
		Casing	21	
		Rotary heat exchanger	145	
		Integrated cooling	678	
3	Casing Length 1141 mm			336
		Casing	209	
		Control system	19	
		Fan	67	
		Damper	22	
		Filter	19	
		Empty section	0.1	
4	Baseframe Length 3982 mm			142
	Other components			58
	Weight of unit			1763

Integrated Systemair Access control system

The air handling unit is built with a complete and fully integrated control system - based on the Access control unit mounted in the control cabinet and the NaviPad control panel with a graphical user interface. The air handling unit can either run stand alone or handled from a building management system.

Before shipment the unit has been assembled and has passed a final functional test and inspection. Order-specific parameters are stored in the control unit during this process. The test report is delivered with the air handling unit.

Flow chart



Detailed technical specification

External components	Symbol Name	Cable number	Page/ Column	Terminals	HW I/O
Power supply, pre-heater coil, electrical	EB53		17 : 8		3*400V+PE
Supply air temperature	BT5	W355	14 : 5	T81	UI1
Normal speed	Ext. Sig.	W581	10 : 2	T31	DI2
Reduced speed		W580	10 : 1	T32	DI1
Unit stop		W583	10 : 3	T30	DI3
Internal components					
Rotor drive	TA2	W232	37 : 6	F3: L1-N	
		W642	37 : 6	Link 2	BUS Adr. 7
Temperature efficiency	BT4	W343	29 : 1	BP1	DPT BP1: In2
Damper motor, supply	QM31	W631	33 (35) : 1 (1)	Link 1	BUS Adr. 21 (31)
Pressure over filter, supply	BP2:B	W662	30 : 2		DPT BP2: B

Outdoor air temperature	BT1	W341	30 : 1	BP2	DPT BP2: In1
Pressure transmitter - supply fan	BP1:A	W661	29 : 1	Link 1	BUS Adr. 5
EC fan, supply 1	GQ1	W601	29 : 3	Link 1	BUS Adr. 1
		W101	23 : 2	F1: L1-L2-L3	
Pre-heating electrical	EB53	W353	11 : 8	T24	DI9
			17 : 6	T73	AO3
			15 : 5	T63	DO3
Pre-heat temperature - electrical coil	BT14	W369	14 : 3	T19	AI1
Heat pump	DVU HP	W529	19 : 8		
		W528	10 : 5	T29	DI4
			15 : 4	T62	DO2
			10 : 8	T28	DI5
			16 : 4	T66	DO6
			17 : 5	T72	AO2
Temperature efficiency	BT4	W343	29 : 1	BP1	DPT BP1: In2
Damper motor, extract	QM32	W632	34 (35) : 2 (5)	Link 2	BUS Adr. 22 (32)
Pressure over filter, extract	BP1:B	W661	29 : 2		DPT BP1: B
Extract temperature	BT3	W444	29 : 1	BP1	DPT BP1: In1
Exhaust/De-ice temperature	BT2	W442	30 : 1	BP2	DPT BP2: In2
Pressure transmitter - extract fan	BP2:A	W662	30 : 1	Link 2	BUS Adr. 6
EC fan, extract 1	GQ2	W602	30 : 3	Link 2	BUS Adr. 2
		W102	24 : 2	F2: L1-L2-L3	

Control cabinet and mains supply

The control cabinet is placed as indicated in order confirmation material. The control cabinet holds necessary components including terminal blocks, fuses, 24V DC power supply and the Access control unit. The controller is configured according to the customer's order and confirmed in the order confirmation. Specification is also delivered with the unit. On site mains power supply must be connected to the cabinet. The installer on site has full responsibility to ensure that any unit/installation which requires additional protection of the mains power supply relating to frequency converters or any other such device is all carried out according to local statutory requirements.

The supply disconnecting device for the unit is not included.

External electrical components

Temperature sensor for the supply air is delivered with 10 metres of cable, and must be connected to the terminals in the control cabinet by the installer on site.

The Access control unit is prepared for connection of delivered components and extra sensors that could be needed.

Control panel with 3 m cable is not connected to controller.

Depending on the customer's choice, external components are delivered, such as:

- pressure transmitters in ducts for pressure control
- valve for heating with heating coil
-

temperature sensor for frost protection of the hot water heating coil

- electrical heating coil
- valve for cooling with chilled water.

NaviPad control panel with 3 m cable is not connected to the Access control unit from the factory.

Access control unit and NaviPad control panel.

The Navipad control panel with 7” capacitive touch panel and 3 m cable must be connected to the Access control unit in the control cabinet. All normal handling and configuration is carried out from the graphical user interface on the NaviPad control panel. The protection class of the NaviPad control panel is IP 54 and 0-50 C° permitted temperature. The NaviPad enclosure is not UV resistant and the NaviPad is not for outdoor mounting. Communication between the panel and the controller in the cabinet is possible with up to 100 meters of cable. The installer must use Standard PDS LAN network cable AWG23 (path cable) for extension.

If several units are connected to a local network (on the same subnet), the NaviPad will be able to connect and monitor up to nine units. Please see separate instruction for details

If more units are connected to a local network (same subnet), the panel will be able to connect and handle up to nine units. Please see separate instruction for details

Schedules

The controller has individual schedules for start, stop and normal/reduced/high airflow rate for each weekday as well as schedules for holidays.

The controller has automatic summer-winter-time change over.

Outside normal operating hours, free cooling is available according to settings.

Cooling recovery

If the extract air temperature is lower than the outdoor air temperature, and there is a cooling demand in the rooms, the cooling recovery will be activated. The heat exchanger signal is reversed to give increasing cooling recovery on increasing demand.

Access rights - passwords

There are 3 different user levels

- End-user - (no password) - access to read values on the start page, see the flow diagram, possibility to start/stop the unit, adjust the temperature setpoint and activate extended running.
- Operator level (password) - access to read values, change user relevant settings concerning schedules, temperature, air flow and also to acknowledge alarms and to restart the system after having removed the reason that triggered the alarm.
- Service (special password) - access to make changes in configuration menus, access to store new settings, access to restart the unit according to user’s own settings or original factory settings.

Alarms and safety functions

If an alarm condition occurs, a circular light appear at the bottom of the control panel.

• Fixed green — Status ok (no active alarms).

• Flashing red — Active/returned alarms in one or more controllers.

• Fixed red — Acknowledged/blocked alarms in one or more controllers, alarms not reset

Alarms are logged in an alarm list. The list shows the type of alarm, date and time for the alarm and alarm class:

- Class A alarm - Needs to be acknowledged
- Class B alarm - Needs to be acknowledged
- Class C alarm - Returns when the cause of the alarm disappear

Flexible System

A qualified service technician - on the site and at the request of the user - will be able to adapt the regulation further to the requirements of the users;

- The air flow regulation can be changed between several methods that are constant air volume through the fans, constant pressure in the ducts, CO2 dependant control or humidity dependant control. Temperature controlled airflow, which either decrease or increase airflow to achieve heating or cooling demand.
- The temperature control mode can be changed between room temperature control, supply air temperature control, extract temperature control and outdoor compensation of the selected temperature. Summer/winter dependent switching between extract air/room temperature control and supply air temperature control.
- In addition to the fixed schedule, an external start signal for extended operation is available, 3 levels
- In addition or as an alternative to the fixed schedule, an external stop input signal is available.
- A large number of other alternative functions are also optional.

Recovery with rotary heat exchanger

The capacity of the rotary heat exchanger is steplessly controlled via the modulated control of rotor speed.

Free cooling

If the outdoor/intake temperature exceeded a settable limit (22 degrees) during the previous day, the fans will start to cool down the building during the night (settable time period with default values 00.00 …. 07.00) as long time as the outdoor temperature is within af settable interval (default 18 degrees ….. 10 degrees). The function is only active before and after time scheduled operation. All parameters can be set individually. Default stop conditions is when extract/room temperature goes below 18 degrees (settable value) or if outdoor temperature goes outside the allowed interval. After 1 hour the system will start up again if all start conditions are met. Optional room- and outdoor temperature sensors will

improve performance of this function.

Extended running - normal, reduced speed, high speed and stop

Extended running can be activated in 3 ways:

- Digital input for normal, reduced, high, stop.
- From the start page of the NaviPad at normal speed.
- Signal from BMS system for normal, reduced, high, stop.

Communication to BMS systems via MODBUS RTU, RS485

The controller has been prepared for communication via RS485 with MODBUS RTU based BMS system (Building Management System).

The controller can work as a stand-alone system without any support from other controllers or BMS systems.

Supply air temperature control

- The control of the supply air temperature is based on the value from the sensor mounted in the supply air duct.

The supply air temperature is controlled by a PID-controller (PID control loop). The set-point for the supply temperature can be adjusted from the control panel.

Air flow control - m3/h, l/s, m3/s, CFM

The air flow rates of supply and extract air are controlled separately. The supply and extract air at low, normal, high airflow are set separately on the control panel.

On each fan a pressure transmitter measures the difference between the pressure before the fan and the pressure at the measuring probe in the inlet cone. Through a formula with a factor for each fan size, the output signal from the pressure transmitter is used to calculate the actual airflow.

A PID-controller maintains the set point value by controlling the speed of the fans.

Supply fan with EC motor

The supply air fan is driven by an EC motor with the impeller mounted directly on the motort. All parameters in the motor speed control have been configured and tested from factory.

Extract fan with EC motor

The extract air fan is driven by an EC motor with the impeller mounted directly on the motor. All parameters in the motor speed control have been configured and tested from factory.

Preheater - electrical

The unit is delivered with an electrical preheater in the airflow before the heat recovery. The main controller in the cabinet delivers a 0-10V DC signal for control of the heater capacity. The separate controller beside the heater, in the same section as the heater, converts the 0-10V DC signal to the heating capacity required. The electric heater must have an external power supply (3 x 400V).

Geniox HP compressor system with cooling recovery, cooling and heating function

The complete compressor system is in a separate section with rotary heat exchanger, coils and the system for the control of safety functions as well as the capacity. The system is able to provide cooling or heating of the supply air.

The main controller in the cabinet for the air handling unit delivers a start/stop signal and 0-10V DC signal for control of the capacity between 5 % and 100 %. The separate controller in this section converts the signal to the capacity required.

To promote maximum reliability, the system has an automatic capacity reduction system for reduction of the risk of cut off due to overheating. The system is provided with refrigerant and tested for easy start up on the site.

The power supply for the compressor system is delivered from the main cabinet for the air handling unit.

The main controller in the cabinet for the air handling unit is able to control the cooling recovery by the rotary heat exchanger with the advantage that the outdoor air is precooled by the rotary heat exchanger, when the extract air temperature is lower than the outdoor air temperature. Due to the reduced outdoor air temperature before the cooling coil, the electricity consumption of the compressor system is reduced. The condenser is in the extract airflow after the rotary heat exchanger.

Damper motors

Supplied and installed as in flow chart specification. Spring return models (S) will have running time of about 150/16 seconds. Non spring about 150 seconds. Modulated models indicated by round symbol.

Filter guards

Filter guards over bag filters are modulated. Pressure limit is depending on the flow. Low flow = low pressure limit, high flow = high limit. Transmitters are connected to the controller. From the display you can see actual pressure and set limits for alarm. Transmitters placed as indicated in flow chart.

Panel filter will have a pressure switch to give signal to the controller when set limit is exceeded.

Summary of notes for printout to customers

Note

The supply unit consist of

Damper

Filter

Pre-heater

Reversible heat pump

Rotary heat exchanger

Reversible heat pump

Control system

Fan, Plug

The extract unit consist of

Damper

Filter

Empty section

Reversible heat pump

Rotary heat exchanger

Reversible heat pump

Inspection section

Fan, Plug

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