EQUINIX

ARUP

Equipment Data Sheet
Air Handling Unit
FR121-ARP-DC-XX-SP-M-HVAC-8004

Job Title: **Equinix FR12.1 Frankfurt** Date: 03 February 2023

Job Number: 285668-00 Purpose of Issue: D2 Revision: P02

Made by: BP Checked by: DD

Legend

Unit Reference	Phase 1
~~Unit Reference~~	Future Phases

General Data

Specification Type Reference	1-AHU-M3R1-1	1-AHU-M4R1-1	~~1-AHU-M5R2-1~~	~~1-AHU-M5R2-2~~
Phase	Phase 1	Phase 1	Future phases	Future phases
Type	Supply AHU + Condensing DX Outdoor Unit	Supply AHU + Condensing DX Outdoor Unit	Supply AHU + Condensing DX Outdoor Unit	Supply AHU + Condensing DX Outdoor Unit
Model	D-AHU Professional 1100x1000	D-AHU Professional 1100x1000	D-AHU Professional 1100x1000	D-AHU Professional 1100x1000
Area Served	Data Halls	Data Halls	Data Halls	Data Halls

Ambient Temperature

Summer	38.3°C	38.3°C	38.3°C	38.3°C
Winter	-17.4°C	-17.4°C	-17.4°C	-17.4°C

FAN

Performance Data

		Required	Offered	Required	Offered	Required	Offered	Required	Offered
Fan Type		Plug		Plug		Plug		Plug	
Fan Scroll Material									
Fan Scroll Joint Construction									
Air Leakage Class (DW 144)									
Impeller Material									
Impeller Finish									
Mounting Method									
Balance Grade	ISO 1940								
Bearing Design Life L_{10}	Hours	40000		40000		40000		40000	
Fan Test Arrangement (ISO 5801)									
Fan Diameter (Ø)	mm								
Speed Control		VSD		VSD		VSD		VSD	
Drive Type		Belt-driven		Belt-driven		Belt-driven		Belt-driven	
Flow Rate Complete Design	m³/h	5250		5250		5250		5250	
Airside Pressure Drop (External to AHU)	Pa	350		350		350		350	
Fan Total Efficiency	%								
Specific Fan Power	W/(m³/s)	<1500		<1500		<1500		<1500	
Maximum SFP class to DIN EN 13779/EnEV		SFP 3		SFP 3		SFP 3		SFP 3	
Fan Speed	rpm								
Electrical Supply	V/Ø/Hz	400/3/50		400/3/50		400/3/50		400/3/50	
Drive Efficiency	%								
Motor Efficiency	%								
Absorbed Power	kW	1.98		1.98		1.98		1.98	
Motor Rating	kW	2.5		2.5		2.5		2.5	
Motor Type		EC		EC		EC		EC	
Motor Efficiency Class (CEMEP)	EFF	IE5		IE5		IE5		IE5	
Motor Speed	rpm								
Starting Method									
Starting Current	A	3.1		3.1		3.1		3.1	
Full Load Running Current	A	3.1		3.1		3.1		3.1	
Power Source		From AHU board		From AHU board		From AHU board		From AHU board	
Fan Diameter (Ø)	mm								

EQUINIX

ARUP

Equipment Data Sheet
Air Handling Unit
FR121-ARP-DC-XX-SP-M-HVAC-8004

Job Title: **Equinix FR12.1 Frankfurt** Date: 03 February 2023
Job Number: 285668-00 Purpose of Issue: D2 Revision: P02
Made by: BP Checked by: DD

Legend

Unit Reference	Phase 1
~~Unit Reference~~	Future Phases

Anti-Vibration Mountings									
Fan Anti Vibration Mount (AVM)		YES		YES		YES		YES	
Fan AVM Static Deflection	mm								
Unit Anti Vibration Mount (AVM)		YES		YES		YES		YES	
Unit AVM Static Deflection	mm								
HEAT EXCHANGER - COUNTERFLOW									
Summer efficiency									
Supply air leaving condition summer	°C db/wb								
Summer total capacity	kW	No heat exchanger required		No heat exchanger required		No heat exchanger required		No heat exchanger required	
Winter efficiency									
Supply air leaving condition winter	°C db/wb								
Winter total capacity	kW								
HEATING									
Performance Data									
Frost coil									
Frost Coil Type		Electric		Electric		Electric		Electric	
Frost Coil Capacity	kW	53		53		53		53	
Coil Face Velocity	m/s								
Frost Coil Temp Air Entering	°C	-17.4		-17.4		-17.4		-17.4	
Frost Coil Temp Leaving	°C	12.1		12.1		12.1		12.1	
Protection Class		IP54		IP54		IP54		IP54	
Control Type		Thyristor		Thyristor		Thyristor		Thyristor	
Re-heat coil									
Re-Heat Coil Type		Electric		Electric		Electric		Electric	
Coil Heating Capacity	kW	27		27		27		27	
Coil Face Velocity	m/s								
Entering Air Temperature	°C	10.5		10.5		10.5		10.5	
Leaving Air Temperature	°C/%RH	25/40%		25/40%		25/40%		25/40%	
Protection Class		IP54		IP54		IP54		IP54	
Control Type		Thyristor		Thyristor		Thyristor		Thyristor	
DX COIL (for heating and cooling)									
Performance Data									
Cooling Type		DX		DX		DX		DX	
Total Coil Cooling Capacity	kW	77		77		77		77	
Coil Max Face Velocity	m/s								
No of refrigerant circuits		4		4		4		4	
Entering Air Condition Cooling	°C db/wb	38.3/24.1		38.3/24.1		38.3/24.1		38.3/24.1	
Leaving Air Condition Cooling	°C db/wb	9.7/9.7		9.7/9.7		9.7/9.7		9.7/9.7	
Moisture content air Cooling	g/kg								
Coil Heating Capacity (max)	kW	10.5		10.5		10.5		10.5	
Entering Air Condition Heating	°C db	10		10		10		10	
Leaving Air Condition Heating	°C db	18		18		18		18	
Refrigerant Type		R410A		R410A		R410A		R410A	
Coil Connection Size / Type	mm								
Drain Connection Size / Type	mm								
DX COIL (for heating and cooling)									
Condensate Tray Material									
Withdrawal Space Required	mm								

EQUINIX

ARUP

Equipment Data Sheet
Air Handling Unit
FR121-ARP-DC-XX-SP-M-HVAC-8004

Job Title: **Equinix FR12.1 Frankfurt** Date: 03 February 2023
Job Number: 285668-00 Purpose of Issue: D2 Revision: P02
Made by: BP Checked by: DD

Legend

Unit Reference	Phase 1
~~Unit Reference~~	Future Phases

STEAM HUMIDIFIER

Performance Data

Max Steam Injection Rate/Unit	kg/hr	34		38		38		38	
Face Velocity	m/s								
Entering Air Condition	°Cdb/%RH	18 / 4%		18 / 4%		18 / 4%		18 / 4%	
Leaving Air Condition	°Cdb/°Cdp	18 / 45%		18 / 45%		18 / 45%		18 / 45%	
Moisture content leaving air	g/kg								
Type		Suitable for softened water feed External humidifier module to be provided with housing and trace heating for weather protection		Suitable for softened water feed External humidifier module to be provided with housing and trace heating for weather protection		Suitable for softened water feed External humidifier module to be provided with housing and trace heating for weather protection		Suitable for softened water feed External humidifier module to be provided with housing and trace heating for weather protection	

Electrical Data (Humidifier)

Electrical Supply	V/Ø/HZ	400/3/50		400/3/50		400/3/50		400/3/50	
Power Rating	kW	26		26		26		26	
Maximum Current	A	38		38		38		38	
IP Rating		54		54		54		54	
Power Source		From AHU board		From AHU board		From AHU board		From AHU board	

DAMPERS

Performance Data

		Required	Offered	Required	Offered	Required	Offered	Required	Offered
Type		Control/ Shut-off		Control/ Shut-off		Control/ Shut-off		Control/ Shut-off	
Pressure Drop @ Open	Pa								
Max Differential Pressure (Closed)	Pa								
Air Leakage @ 500 Pa	(l/s)/m2	Low Leakage Criteria Required							
Blade Material									
Blade Profile									
Blade Length	mm								
Blade/Shaft Fixing									
Blade Seal Material									
Edge Seal Material									
Shaft Material									
Shaft Diameter	mm								
Shaft Seal Type									
Linkage Type									
Actuator Type		Motorized		Motorized		Motorized		Motorized	
Operating Torque @	Nm								

EQUINIX

ARUP

Equipment Data Sheet
Air Handling Unit
FR121-ARP-DC-XX-SP-M-HVAC-8004

Job Title: **Equinix FR12.1 Frankfurt** Date: 03 February 2023
Job Number: 285668-00 Purpose of Issue: D2 Revision: P02
Made by: BP Checked by: DD

Legend

Unit Reference	Phase 1
~~Unit Reference~~	Future Phases

Panel Filter									
Clean Filter Pressure Drop	Pa	77		77		77		77	
Dirty Filter Pressure Drop	Pa	102		102		102		102	
Design Filter Pressure Drop	Pa	127		127		127		127	
Dust Holding Capacity	g								
Filter Group & Class		G4		G4		G4		G4	
Filter Media									
Filter Module Fixing Method									
Seal Type									
Access Arrangement		Side		Side		Side		Side	
Bag Filter									
Clean Filter Pressure Drop	Pa	63		63		63		63	
Dirty Filter Pressure Drop	Pa	113		113		113		113	
Design Filter Pressure Drop	Pa	163		163		163		163	
Dust Holding Capacity	g								
Filter Group & Class		F7		F7		F7		F7	
Filter Media									
Filter Module Fixing Method									
Seal Type									
Access Arrangement		Side		Side		Side		Side	
OVERALL BODY / BUILD									
Construction Data		**Required**	**Offered**	**Required**	**Offered**	**Required**	**Offered**	**Required**	**Offered**
Panel Type		Insulated, Mineral Wool		Insulated, Mineral Wool		Insulated, Mineral Wool		Insulated, Mineral Wool	
Panel Thickness	mm	42		42		42		42	
Panel Construction		Double Skin		Double Skin		Double Skin		Double Skin	
Overall Weight	kg	1557		1557		1557		1557	
DIN EN 1886 Classes									
Casing Strength Class		D1		D1		D1		D1	
Casing Thermal Transmittance Class		T2		T2		T2		T2	
Casing Thermal Bridging Class		TB2		TB2		TB2		TB2	
Negative Test Pressure	Pa	400		400		400		400	
Negative Test Pressure Air Leakage Class		A		A		A		A	
Negative Test Pressure Air Leakage	l/s/m^2								
Positive Test Pressure	Pa	700		700		700		700	
Positive Test Pressure Air Leakage Class		A		A		A		A	
Positive Test Pressure Air Leakage	l/s/m^2								
Filter Bypass Air Leakage at 400Pa									

EQUINIX

ARUP

Equipment Data Sheet
Air Handling Unit
FR121-ARP-DC-XX-SP-M-HVAC-8004

Job Title: **Equinix FR12.1 Frankfurt** Date: 03 February 2023
Job Number: 285668-00 Purpose of Issue: D2 Revision: P02
Made by: BP Checked by: DD

Legend

Unit Reference	Phase 1
~~Unit Reference~~	Future Phases

DIN EN 13053 Classes

Air Velocity Class									
Panel Insulation Material		Non-flam.		Non-flam.		Non-flam.		Non-flam.	
Panel Insulation Thickness	mm	30		30		30		30	
Insulation Density	Kg/m³								
Insulation Thermal Conductivity	W/mK	0.035		0.035		0.035		0.035	
Inner Skin Material									
Inner Skin Thickness	mm								
Inner Skin Finish									
Outer Skin Material									
Outer Skin Thickness	mm								
Outer Skin Finish		Standard		Standard		Standard		Standard	

Section AHU Elements	**Required**	**Offered**	**Required**	**Offered**	**Required**	**Offered**	**Required**	**Offered**
Inlet Louvre	YES		YES		YES		YES	
Inlet Damper	YES		YES		YES		YES	
Access Section	YES		YES		YES		YES	
Panel Filter	YES		YES		YES		YES	
Bag Filter	YES		YES		YES		YES	
Access Section	YES		YES		YES		YES	
Frost Coil (Electric)	YES		YES		YES		YES	
Access Section	YES		YES		YES		YES	
Inlet Attenuator	YES		YES		YES		YES	
Access Section	YES		YES		YES		YES	
DX Coil Heating and Cooling	YES		YES		YES		YES	
Drop Separator	YES		YES		YES		YES	
Access Section	YES		YES		YES		YES	
Re-Heat Coil (Electric)	YES		YES		YES		YES	
Access Section	YES		YES		YES		YES	
Fan Section	YES		YES		YES		YES	
Control Panel	YES		YES		YES		YES	
Discharge Attenuator	YES		YES		YES		YES	
Access Section	YES		YES		YES		YES	
Steam Humidifier	YES		YES		YES		YES	
Drop Separator	YES		YES		YES		YES	
Air tight shut off Damper	YES		YES		YES		YES	
External Heat Pump Unit	YES		YES		YES		YES	

Component Data - Access Sections to be provided as required to meet VDI 6022

Overall Dimensions

Max Overall Length	mm	9940		11000		11000		11000	
Max Overall Width	mm	1000		1150		1150		1150	
Overall Height	mm	1100		1400		1400		1400	
Side Access Clearance	mm								
Overall Unit Pressure Drop	Pa								

EQUINIX

ARUP

Equipment Data Sheet
Air Handling Unit
FR121-ARP-DC-XX-SP-M-HVAC-8004

Job Title: **Equinix FR12.1 Frankfurt** Date: 03 February 2023
Job Number: 285668-00 Purpose of Issue: D2 Revision: P02
Made by: BP Checked by: DD

Legend

Unit Reference	Phase 1
~~Unit Reference~~	Future Phases

Acoustic Data		**Required**	**Offered**	**Required**	**Offered**	**Required**	**Offered**	**Required**	**Offered**
Casing Radiated	63 Hz	61		61		61		61	
	125 Hz	68		68		68		68	
	250 Hz	65		65		65		65	
Sound Power Level @	500 Hz	61		61		61		61	
Lw dB	1 kHz	59		59		59		59	
	2 kHz	53		53		53		53	
	4 kHz	38		38		38		38	
	8 kHz	30		30		30		30	
Inlet Air	63 Hz	63		63		63		63	
	125 Hz	64		64		64		64	
In Duct	250 Hz	60		60		60		60	
Sound Power Level @	500 Hz	56		56		56		56	
Lw dB	1 kHz	50		50		50		50	
	2 kHz	47		47		47		47	
	4 kHz	47		47		47		47	
	8 kHz	48		48		48		48	
Discharge Air									
	63 Hz	70		70		70		70	
	125 Hz	75		75		75		75	
In Duct	250 Hz	75		75		75		75	
Sound Power Level @	500 Hz	70		70		70		70	
Lw dB	1 kHz	65		65		65		65	
	2 kHz	63		63		63		63	
	4 kHz	62		62		62		62	
	8 kHz	61		61		61		61	
Max. Noise Level (Lw) (Night)	dB(A)								

EQUINIX

ARUP

Equipment Data Sheet
Air Handling Unit
FR121-ARP-DC-XX-SP-M-HVAC-8004

Job Title: **Equinix FR12.1 Frankfurt** Date: 03 February 2023

Job Number: 285668-00 Purpose of Issue: D2 Revision: P02

Made by: BP Checked by: DD

Legend

Unit Reference	Phase 1
~~Unit Reference~~	Future Phases

CORRESPONDING OUTDOOR UNIT

Unit Reference	1DX_M3R1_1 1DX_M3R1_2 1DX_M3R1_3 1DX_M3R1_4	1DX_M4R1_1 1DX_M4R1_2 1DX_M4R1_3 1DX_M4R1_4	~~1DX_M5R2_5~~ ~~1DX_M5R2_6~~ ~~1DX_M5R2_7~~ ~~1DX_M5R2_8~~	~~1DX_M5R2_1~~ ~~1DX_M5R2_2~~ ~~1DX_M5R2_3~~ ~~1DX_M5R2_4~~
Phase	Phase 1	Phase 1	Future phases	Future phases
Model (based on Daikin)	ERQ200AW1	ERQ200AW1	ERQ200AW1	ERQ200AW1
Type	Heat Pump	Heat Pump	Heat Pump	Heat Pump
Location	Level 4	Level 4	Level 4	Level 4

Performance Data

Total Heat Rejection Capacity all units	kW	77		77		77		77	
Total Heat Rejection Capacity per unit	kW	19.3		19.3		19.3		19.3	
Design Ambient Temperature Summer	°C	38.3		38.3		38.3		38.3	
Min Operating Temperature	°C	-17.4		-17.4		-17.4		-17.4	
Max. Operating Temperature	°C	40		40		40		40	
No of Outdoor Units	final	4		4		4		4	
No of Condenser Fans / Unit		1		1		1		1	
Condenser Fan Type		Axial		Axial		Axial		Axial	
Condenser Fan Speed	rpm								
Condenser Fan Size (Ø)	mm								
Refrigerant Type		R410A		R410A		R410A		R410A	
Total Refrigerant Charge per unit	kg	7.7		7.7		7.7		7.7	
Coefficient of Performance @									
Compressor Type		Scroll		Scroll		Scroll		Scroll	
Suction Pipe Equivalent Length	m								
Liquid Pipe Equivalent Length	m								
Suction Pipe Maximum Height	m								
Liquid Pipe Maximum Height	m								
Capacity Steps	%								
Noise Level (Lw) (Day / Night)	dB(A)	STA		STA		STA		STA	

Construction Data

Casing Material									
Casing Finish/Colour	mm								
Coil Tube/Fin Material Material									
Refrigerant Liquid Line Size									
Refrigerant Suction Line Size									
Unit Operating Weight	kg	187		187		187		187	

CONDENSING UNIT

Electrical Data

		Required	Offered	Required	Offered	Required	Offered	Required	Offered
Unit Max Absorbed Power	kW	18.5		18.5		18.5		18.5	
Unit Max Running Current	A	25		25		25		25	
Unit Max Starting Current	A								
Compressor Motor Rating	kW								
Fan Motor Rating	kW								
Power Source									
Electrical Supply	V/Ø/Hz	400/ 3/ 50		400/ 3/ 50		400/ 3/ 50		400/ 3/ 50	

EQUINIX

ARUP

Equipment Data Sheet
Air Handling Unit
FR121-ARP-DC-XX-SP-M-HVAC-8004

Job Title: **Equinix FR12.1 Frankfurt** Date: 03 February 2023

Job Number: 285668-00 Purpose of Issue: D2 Revision: P02

Made by: BP Checked by: DD

Legend

Unit Reference	Phase 1
~~Unit Reference~~	Future Phases

Dimensional Data

Overall Length	mm	765		765		765		765	
Overall Width	mm	930		930		930		930	
Overall Height	mm	1680		1680		1680		1680	
Front Clearance	mm								
End Clearance	mm								

Accessories

	Required	Offered		Required	Offered
Weatherproof Construction	✓		Access Door Security Locks	✓	
Pitched Water Shedding Roof	✓		Inlet Hood		
Glazed Viewing Ports in Access Doors	✓		Discharge Hood		
Bulkhead Luminaires in Access Sections	✓		Special Finish		
Magnahelic Pressure Gauges on Filters	✓		Spare Set of Filters	✓	
Manometers on Filters	✓		Flow Measuring Station	✓	
High Efficiency Motors	✓		Cooling Coil Eliminator Plates	✓	
Motors Wired to External Isolators	✓		Frost protection	✓	
Fan Motor Located Out of Airstream			Control Panel incl. Full control system	✓	
BMS Interface	✓		Thyristor control for electric heaters	✓	
Electrical Supply Panel			Protection Screens for external units	✓	
Automatic restart after power outage	✓		Safety temperature limiter (110°C)	✓	
Drip trays for all necessary components	✓		Big Foot Mounting System for outdoor units	✓	
High Efficiency Motors	✓		(or equal and approved)		

Testing

	Required	Offered
Factory Acceptance Test (FAT)		
Site Acceptance Test (SAT)	✓	

Samples

	Required	Offered
Type Samples		

Works Performance Tests

	Required	Offered
Noise Performance Tests		
Pressure & Leakage Performance Tests		

Manufacturer

	Preferred	Alternative
Manufacturer	Daikin	AL-KO
Contact Name	Aleksandar Knodt	Markus Wollenweber
Telephone Number	+49(0) 6021 7711 115	+49 (0)6182 990880
Fax Number		
E-mail Address	danojlic.a@daikin.de	wollenweber@wollenweber-gmbh.com
Internet Address	daikin.de	http://www.al-ko.com/en

EQUINIX

ARUP

Equipment Data Sheet
Air Handling Unit
FR121-ARP-DC-XX-SP-M-HVAC-8004

Job Title: **Equinix FR12.1 Frankfurt** Date: 03 February 2023

Job Number: 285668-00 Purpose of Issue: D2 Revision: P02

Made by: BP Checked by: DD

Legend

Unit Reference	Phase 1
~~Unit Reference~~	Future Phases

Additional Information

1 *This equipment data sheet must be read in conjunction with all other parts of the Specification, including: the Scheme report, the Materials and Workmanship Specification, the Scheme drawings.*

2 *All alarm volt free contacts shall be fail safe 3A inductive at 230V AC. Required BMS contacts/alarms outlined in BMS specification.*

3 *Type test data shall be provided to demonstrate that the equipment performs to the required standards.*

4 *Fan Test Arrangement ISO 5801*
Type B - Free Inlet & Ducted Outlet
Type C - Ducted Inlet & Free Outlet
Type D - Ducted Inlet & Ducted Outlet (AHU02)

5 *Air leakage and mechanical performance to DIN EN 1886*

6 *Rating and performance to DIN EN 13053, EU1253/2014*

7 *Flow measuring station, comprising air flow sensing device and sensor with (0-10VDC/4-20mA) output, to be calibrated at AHU manufacturer's works and on site. Power supply (24Vac) to be provided by BMS/Controls Specialist.*

8 *Rating standards to be in line with DIN EN 13053 and DIN EN 779*

9 *Allow for a pulley change on each belt driven fan.*

10 *Provide thermistors in motor windings wired out to terminals for connection to variable speed drives*

11 *Isolators and electrically shielded power cables between isolators, motors and variable speed drive shall be selected in accordance with the variable speed drive manufacturer's recommendations to ensure that the complete power installation satisfies all electromagnetic noise requirements.*

12 *The AHU manufacturer to fit variable frequency drive and BMS controls enclosure to the AHUs.*

13 *All lighting circuits wired to single terminal box for connection of power supply from local distribution board.*

14 *See the drawings for arrangement to access unit and hence determine the side for access panels and services connections.*

15 *Units to be constructed and certified to VDI 6022.*

16 *All control points are to be confirmed by the controls / BMS contractor*

17 *AHU to shut down on humidifier failure or fault*

18 *Flow measuring station, comprising air flow sensing device and sensor with (0-10VDC/4-20mA) output, to be calibrated at AHU manufacturer's works.*

19 *Condensate connections to be supplied with Siphon with trace heating*

20 *VSD specifications to comply with electrical requirements, see relevant electrical data sheets for details*

21 *All units and components to be suitable for external location.*

22 *Connection of cables and pipework to unit to be installed and completed by equipment manufacturer*

23 *Testing and Commissioning is to be carried out and whitnessed with General Contractor, AHU and Heat Pump Supplier and BMS Contractor present*

24 *AHU to be fitted out with smoke detectors at fresh air inlet, supply air outlet and extract air inlet.*

FR12.1 – Equinix
Data Centre Air Handling Units

Document Reference:	FR121-ARP-DC-XX-SP-M-HVAC-8004
Revision:	P02
Date:	2023-02-03
Purpose of Issue:	D2 – Tender Pack
Job number:	285668-00

Arup Deutschland GmbH
Mayfarthstraße 15
60314 Frankfurt
www.arup.com

REV	DATE	Description	DWN / CHK / APP
P02	03.02.2023	Tender Pack	BP / DD / DW
P01	16.12.2022	RIBA 4 design	KW / DD / DW