Product Service

Technical Report No.: 64.181.23.02590.01 Rev.00

Date: 2023-07-13

Client:	Report holder's name:	ThermoFLUX d.o.o
	Report holder's Address:	Bage 3, 70101 Jajce, Bosnia and Herzegovina
	Contact person of report holder:	Amel Kopić
Manufacturer:	Manufacturer's name:	ThermoFLUX d.o.o
	Manufacturer's address:	Bage 3, 70101 Jajce, Bosnia and Herzegovina
Test object:	Product:	EVI DC Inverter Air Source Heat Pumps
	Model:	MONOBLOCK TF20EVI R32 CT 400V
	Trade mark:	ThermoFLUX
Test specification:	☑	EN 14825:2022
	☑	EN 14511-3:2022
	☑	EN 14511-4:2022 Clause 4
	☑	EN 12102-1:2022
Purpose of examination:	Test according to the test specification	
	☑	(EU) No 813/2013
	☑	EU 2016/2282:2016-11-30
Test result:	The test results show that the presented product is in compliance with the above listed test specifications.	

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Product Service

1 Description of the test object

1.1 Function

Manufacturer's specification for intended use:
The appliance is air to water heat pump.
Manufacturer's specification for predictive use:
According to user manual

1.2 Consideration of the foreseeable use

☐ Not applicable
☑ Covered through the applied standard
☐ Covered by the following comment
☐ Covered by attached risk analysis

1.3 Technical Data

Model :	MONOBLOCK TF20EVI R32 CT 400V
Rated Voltage (V) :	380-420V, 3N~
Rated Frequency (Hz) :	50
Rated Power (W) :	6100
Rated Current (A) :	12.9
Protection Class :	Class I
Protection Against Moisture :	IP X4
Construction :	Stationary
Supply connection :	☐ Non detachable cord
	☑ Permanent connection to fixed wiring
Operation mode:	☑ Continuous operation;
	☐ Intermittent operation;
	☐ Short time operation;
Refrigerant/charge (kg) :	R32 / 2.80kg
Declared parameters :	☑ Average ☐ Warmer ☐ Colder
Sound power level dB(A) :	N/A
Series No :	KRZJ09A20500700177

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2 Order

2.1 Date of Purchase Order, Customer's Reference

Date of Purchase Order: 2021-09-02, 2023-04-18, 2023-07-11

Customer's Reference: ThermoFLUX d.o.o

2.2 Test Sample(s)

- Reception date(s): 2021-09-02, 2023-04-18
- Location(s) of reception:

For Energy test:

Guangzhou Customs District Technology Center

Address: No.3, Desheng East Road, Daliang, Shunde District, Foshan, Guangdong, China

For Noise tests:

CVC Testing Technology Co., Ltd.

Address: No.3, Tiantai Yilu, Kaitai Avenue, Science City, Guangzhou, Guangdong, China

- Condition of test sample(s): completed and can be normal operation

2.3 Date(s) of Testing

2021-09-02 to 2021-09-10, 2023-04-18 to 2023-05-24

2.4 Location(s) of Testing

Same as 2.2

2.5 Points of Non-compliance or Exceptions of the Test Procedure

N/A

3 Test Results

☒ Decision rule according to ILAC-G8:09/2019 clause 4.2.1 Binary statement for simple acceptance rule or IEC Guide 115:2021, clause 4.4.3, 4.5.1 Accuracy method was applied.

☐ Decision rule according to customer's requirements was applied. It is:

☐ Decision rule according to ILAC-G8:09/2019 clause 4.2.2 Binary statement with guard band - guard band length = 95 % extended measurement uncertainty, was applied.

☐ Decision rule (based on ILAC-G8:09/2019 clause 4.2.3 Non-binary statement with guard band, guard band length = 95 % extended measurement uncertainty) for an upper specification limit (A lower limit or specification with an up-per and a lower limit is treated similarly.):

- Compliance with the requirement: If a specification limit is not breached by a measurement result plus the expanded uncertainty with a 95% coverage probability, then compliance with the specification will be stated (e. g. Pass).
- Non-compliance with the requirement: If a specification limit is exceeded by the measurement result minus the expanded uncertainty with a 95% coverage probability, then non-compliance with the specification will be stated (e. g. Fail).
- Inconclusive result: If a measurement result plus/minus the expanded uncertainty with a 95 % coverage probability overlaps the limit it will be stated that it is not possible to state compliance or non-compliance.

3.1 Positive Test Results

See Appendix I

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4 Remarks

4.1 General

The user manual has been examined according to the minimum requirements described in the product standard. The manufacturer is responsible for the accuracy of further par-ticulars as well as of the composition and layout.

4.2 When the product is placed on the market, it must be accompanied with safety Instruc-tions written in official language of the country. The instructions shall give information re-garding safe operation, installation and maintenance.

5 Documentation

- Appendix I: Test results
- Appendix II: Marking plate
- Appendix III: photo documentation
- Appendix IV: Construction data form
- Appendix V: Test equipment list

6 Test History

1) The appliance is Air To Water Heat Pump Unit, including a whole compression type refrigerant circuit to heat water in another circuit. The appliance was for cooling and heating water function, this report only for heating capacity test.
2) The main power is supplied by a 5-pole supply cord connecting to fixed wiring.
3) Water enthalpy method was adopted in this report.
4) Standby mode power, off mode power and thermostat-off mode power were tested according to clause 12 of standard EN 14825:2022.
5) This test report 64.181.23.02590.01 Rev.00, dated 2023-07-13 bases on original test report 64.181.21.05050.02 Rev.00, dated 2023-06-27 to include the following changes and/or additions, which were considered technical modifications:

   a) Changing report holder name and address, manufacturer name and address, trademark and model name.

   b) After evaluating, no additional test was needed.

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Tested by: William Liang, Project Handler

printed name, function & signature

Approved by: Plum Li, Designated Reviewer

printed name, function & signature

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Appendix I Test results

Table 1.	Heating mode(Low temperature application):						P
Model	MONOBLOCK TF20EVI R32 CT 400V						
Product type	Air to Water	**Heating season**	☑	Average	☐	Warmer ☐	Colder

1. Test conditions:

Condition	Part Load Ratio in %				Outdoor heat exchanger	Indoor heat exchanger
	Formula	A	W	C	Inlet dry (wet) bulb temperature °C	Inlet/outlet water temperatures (°C)
A	(-7-16)/(Tdesignh-16)	88	N/A	N/A	-7(-8)	a / 34
B	(+2-16)/ (Tdesignh-16)	54	N/A	N/A	2(1)	a / 30
C	(+7-16)/(Tdesignh-16)	35	N/A	N/A	7(6)	a / 27
D	(+12-16)/(Tdesignh-16)	15	N/A	N/A	12(11)	a / 24
E	(TOL-16)/ (Tdesignh-16)				TOL	a / 35.3
F	(Tbivalent-16)/(Tdesignh-16)				Tbiv	a / 34
G	(-15-16)/(Tdesignh-16)	N/A	N/A	N/A	-15	N/A

Remark: a) With the water flow rate as determined at the standard rating conditions given in EN14511-2 at 30/35 conditions, the capacity is 10.845kW, the power is 2.114kW, the COP is 5.13kW/kW.

2.Tested data/correction data(Average):

General test conditions/ Part-Load	Unit	A(-7)/W34 (88%)	A2/W30 (54%)	A7/W27 (35%)	A12/W24 (15%)	A(-10)/W35.3 (100%)	A(-7)/W34 (88%)
	--	A	B	C	D	E	F
Data collection period	hh: min:sec	3:00:00	1:10:00	1:10:00	1:10:00	3:00:00	3:00:00
The heat pump defrosts	--	Yes	No	No	No	Yes	Yes
Complete Cycles	--	2	0	0	0	1	2
Barometric pressure	kPa	101.02	101.02	101.02	101.02	101.02	101.02
Voltage	V	399.4	399.4	400.5	399.0	401.0	399.4
Current input of the unit	A	8.24	3.48	3.38	3.07	8.40	8.24
Power input of the unit	kW	3.704	1.442	1.287	1.108	3.816	3.704
Test conditions **indoor** unit							
Inlet Water temperature, DB	°C	27.78	26.66	25.07	23.15	29.65	27.78
Outlet Water temperature, DB	°C	32.63*	29.89	28.80	27.34	34.26*	32.63*

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Appendix I Test results

Test conditions **outdoor** unit							
Air **inlet** temperature, DB	°C	-6.98	1.97	7.02	12.01	-9.89	-6.98
Air **inlet** temperature, WB	°C	-8.16	1.03	6.00	11.00	-10.84	-8.16
Summary of the results							
Total heating capacity	kW	10.684	6.824	8.217	9.224	10.154	10.684
Effective power input	kW	3.724	1.463	1.308	1.128	3.836	3.724
Coefficient of performance (COP)	--	2.87	4.67	6.28	8.17	2.65	2.87
Compressor frequency	Hz	70	30	30	30	70	70
Water flow	m³/h	1.90	1.90	1.90	1.90	1.90	1.90
Remark: * In part condition, outlet temperature data is recorded by a full average complete cycle's data.							

3.Calculation/conclusion for SCOP(Average):

Tdesignh(°C)	-10	Tbiv(°C)	-7
Pdesignh(kW)	12.077	TOL(°C)	-10

Test result A, B, C, D, E, F conditions:

Condition	Part load	Measured capacity	COP at measured capacity	Cdh	CR	COP at part load
E	12.077	10.154	2.65	0.90	1.00	2.65
F	10.684	10.684	2.87	0.90	1.00	2.87
A	10.684	10.684	2.87	0.90	1.00	2.87
B	6.503	6.824	4.67	0.90	0.95	4.67
C	4.181	8.217	6.28	0.90	0.51	5.73
D	1.858	9.224	8.17	0.90	0.20	5.85
CR: part load divided by capacity;						

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Appendix I Test results

Electric power consumptions	Unit	Value
Thermostat-off mode [P_{TO}]	kW	0.019
Standby mode [P_{SB}]	kW	0.016
Crankcase heater [P_{CK}]	kW	0.047
Off mode [P_{OFF}]	kW	0.016

Conclusions:	Unit	Value
SCOPon:	kWh/kWh	4.56
SCOP:	kWh/kWh	4.55
Q_H:	kWh/year	24951
Q_{HE}:	kWh/year	5482
$\eta_{s,h}$	%	179.1
Seasonal space heating energy efficiency classes: (According (EU) No 811/2013 Table 2)	--	A+++

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Appendix I Test results

Table 2.	Heating mode(Medium temperature application):							P
Model	MONOBLOCK TF20EVI R32 CT 400V							
Product type	Air to Water	**Heating season**	☑	Average	☐	Warmer	☐	Colder

1. Test conditions:

Condition	Part Load Ratio in %				Outdoor heat exchanger	Indoor heat exchanger
	Formula	A	W	C	Inlet dry (wet) bulb temperature °C	Inlet/outlet water temperatures (°C)
A	(-7-16)/(Tdesignh-16)	88	N/A	N/A	-7(-8)	a / 52
B	(+2-16)/ (Tdesignh-16)	54	N/A	N/A	2(1)	a / 42
C	(+7-16)/(Tdesignh-16)	35	N/A	N/A	7(6)	a / 36
D	(+12-16)/(Tdesignh-16)	15	N/A	N/A	12(11)	a / 30
E	(TOL-16)/ (Tdesignh-16)				TOL	a / 55.3
F	(Tbivalent-16)/(Tdesignh-16)				Tbiv	a / 52
G	(-15-16)/(Tdesignh-16)	N/A	N/A	N/A	-15	N/A

Remark: a) With the water flow rate as determined at the standard rating conditions given in EN14511-2 at 47/55 conditions, the capacity is 15.650kW, the power is 4.794kW, the COP is 3.26kW/kW.

2.Tested data/correction data(Average):

General test conditions/ Part-Load	Unit	A(-7)/W52 (88%)	A2/W42 (54%)	A7/W36 (35%)	A12/W30 (15%)	A(-10)/W55.3 (100%)	A(-7)/W52 (88%)
	--	A	B	C	D	E	F
Data collection period	hh: min:sec	3:00:00	1:10:00	1:10:00	1:10:00	3:00:00	3:00:00
The heat pump defrosts	--	Yes	No	No	No	Yes	Yes
Complete Cycles	--	2	0	0	0	2	2
Barometric pressure	kPa	101.02	101.02	101.02	101.02	101.02	101.02
Voltage	V	400.0	399.2	400.9	400.4	400.4	400.0
Current input of the unit	A	10.00	4.88	4.36	3.69	12.27	10.00
Power input of the unit	kW	4.691	1.863	1.645	1.408	5.355	4.691
Test conditions **indoor** unit							
Inlet Water temperature, DB	°C	44.91	38.52	33.79	29.07	47.92	44.91
Outlet Water temperature, DB	°C	50.49*	42.02	37.80	33.64	53.72*	50.49*

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Appendix I Test results

Test conditions **outdoor** unit							
Air **inlet** temperature, DB	°C	-6.94	2.01	7.02	12.01	-9.85	-6.94
Air **inlet** temperature, WB	°C	-8.01	1.00	6.01	11.00	-10.84	-8.01
Summary of the results							
Total heating capacity	kW	10.927	6.886	7.888	9.006	11.342	10.927
Effective power input	kW	4.731	1.903	1.685	1.447	5.395	4.731
Coefficient of performance (COP)	--	2.31	3.62	4.68	6.22	2.10	2.31
Compressor frequency	Hz	63	30	30	30	70	63
Water flow	m³/h	1.70	1.70	1.70	1.70	1.70	1.70
Remark: * In part condition, outlet temperature data is recorded by a full average complete cycle's data.							

3.Calculation/conclusion for SCOP(Average):

Tdesignh(°C)	-10	Tbiv(°C)	-7
Pdesignh(kW)	12.352	TOL(°C)	-10

Test result A, B, C, D, E, F conditions:

Condition	Part load	Measured capacity	COP at measured capacity	Cdh	CR	COP at part load
E	12.352	11.342	2.10	0.90	1.00	2.10
F	10.927	10.927	2.31	0.90	1.00	2.31
A	10.927	10.927	2.31	0.90	1.00	2.31
B	6.651	6.886	3.62	0.90	0.97	3.62
C	4.276	7.888	4.68	0.90	0.54	4.32
D	1.900	9.006	6.22	0.90	0.21	4.53
CR: part load divided by capacity;						

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Product Service

Appendix I Test results

Electric power consumptions	Unit	Value
Thermostat-off mode [P_{TO}]	kW	0.019
Standby mode [P_{SB}]	kW	0.016
Crankcase heater [P_{CK}]	kW	0.047
Off mode [P_{OFF}]	kW	0.016

Conclusions:	Unit	Value
SCOPon:	kWh/kWh	3.55
SCOP:	kWh/kWh	3.54
Q_H:	kWh/year	25519
Q_{HE}:	kWh/year	7200
$\eta_{s,h}$	%	138.8
Seasonal space heating energy efficiency classes: (According (EU) No 811/2013 Table 1)	--	A++

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Appendix I Test results

Table 3a.	Sound power level measurement(Low temperature application)		P
Model	MONOBLOCK TF20EVI R32 CT 400V		
	Product type :		Air to Water
	Outdoor heat exchanger, Air temperature DB/WB (°C):		7.0 / 6.0
	Indoor heat exchanger, Water inlet/outlet temperature (°C):		30.0 / 35.0
	Voltage (V):		400
	Frequency (Hz):		50
	Working condition class :		Class A
	Acoustical environment :		Hemi-anechoic room
	Windshield type :		Sponge
	Measured position amount :		14
	Water flow (m^3/h):		1.90
Measured quantity	**$L_{WA,indoors}$ (dB(A))**	**$L_{WA,outdoors}$ (dB(A))**	**Remark**
Sound pressure level `$L_{p(ST)}$****	--	48	--
Measurement distance d *	--	1.0m	--
Sound power level L_{wA}****	--	63	--

Setting of controls: according to user manual.
Duct connection:--
Rounding to: *) 1 decimal places; **) 2 decimal places; ***) 3 decimal places; ****) nearest integer
Fan speed: 460 r/min, compressor frequency: 41Hz.

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Appendix I Test results

Table 3b.	Sound power level measurement(Medium temperature application)		P
Model	MONOBLOCK TF20EVI R32 CT 400V		
	Product type :		Air to Water
	Outdoor heat exchanger, Air temperature DB/WB (°C):		7.0 / 6.0
	Indoor heat exchanger, Water inlet/outlet temperature (°C):		47.0 / 55.0
	Voltage (V):		400
	Frequency (Hz):		50
	Working condition class :		Class A
	Acoustical environment :		Hemi-anechoic room
	Windshield type :		Sponge
	Measured position amount :		14
	Water flow (m^3/h):		1.70
Measured quantity	**$L_{WA,indoors}$ (dB(A))**	**$L_{WA,outdoors}$ (dB(A))**	**Remark**
Sound pressure level `$L_{p(ST)}$****	--	51	--
Measurement distance d *	--	1.0m	--
Sound power level L_{wA}****	--	66	--

Setting of controls: according to user manual.
Duct connection:--
Rounding to: *) 1 decimal places; **) 2 decimal places; ***) 3 decimal places; ****) nearest integer
Fan speed: 480 r/min, compressor frequency: 55Hz.

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Appendix I Test results

Table 4.	Clause 4 of EN 14511-4:2022				P
Model	**MONOBLOCK TF20EVI R32 CT 400V**				
Customer Code	Execution Date [dd-mm-yyyy]	Testing item	Standard Reference	Comment	Test Response
TEST 1	06-05-2023	STARTING TEST	EN14511-4:2022, § 4.2.1.2 Table 3	The "lower" starting operating conditions declared by the manufacturer for the heating mode- i.e. Tair=-25.03°C, T out water 14.90°C, Flow rate 1.53m^3/h have been set and obtained. At those conditions, the machine was switched on. It started without any problem and worked for 30 minutes without showing any warning or allarm. During the test the machine operated in automode. No damage was recorded on the machine during and after the test.	Passed
TEST 2	06-05-2023	OPERATING TEST	EN14511-4:2022, § 4.2.1.2 Table 3	From the machine "lower" starting conditions - i.e. - the machine was brought to the lower operating conditions declared by the manufacturer for the heating mode- i.e. Tair=-25.01°C, T out water 56.35°C, Flow rate 1.53m^3/h. Once these conditions were obtained, the machine was let operate for over 1 hour in automode. During the test, no waring or alarm were showed. No damage was recorded on the machine during and after the test.	Passed
TEST 3	06-05-2023	SHUTTING OFF WATER FLOW	EN14511-4:2022, § 4.5	The water flow rate was shutted off through manual and automatic valves of the test rig. The machine switched off and only the flow switch Protection appeared on the user interface of indoor unit. Perform error reset operation , once the water flow rate was restored, the machine restarted automatically and worked for 30 minutes normally. No damage was recorded on the machine during and after the test.	Passed
TEST 4	06-05-2023	SHUTTING OFF AIR FLOW	EN14511-4:2022, § 4.5	The air flow rate was shutted off through a plastic sheet and a panel. The machine never turned off. It continued to operate with continuous frosting and defrosting cycles. After more than half an hour, the air flow rate was restored and the machine started to operate normally. During the test, no waring or alarm were showed. No damage was recorded on the machine during and after the test.	Passed
TEST 5	06-05-2023	COMPLETE POWER SUPPLY FAILURE	EN14511-4:2022, § 4.6	The power supply was cut off for about 10 seconds.The unit restarted automatically within about 3 minutes after the power supply was reactivated.	Passed

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Appendix II Marking plate

Nameplate

Model: MONOBLOCK TF20EVI R32 CT 400V

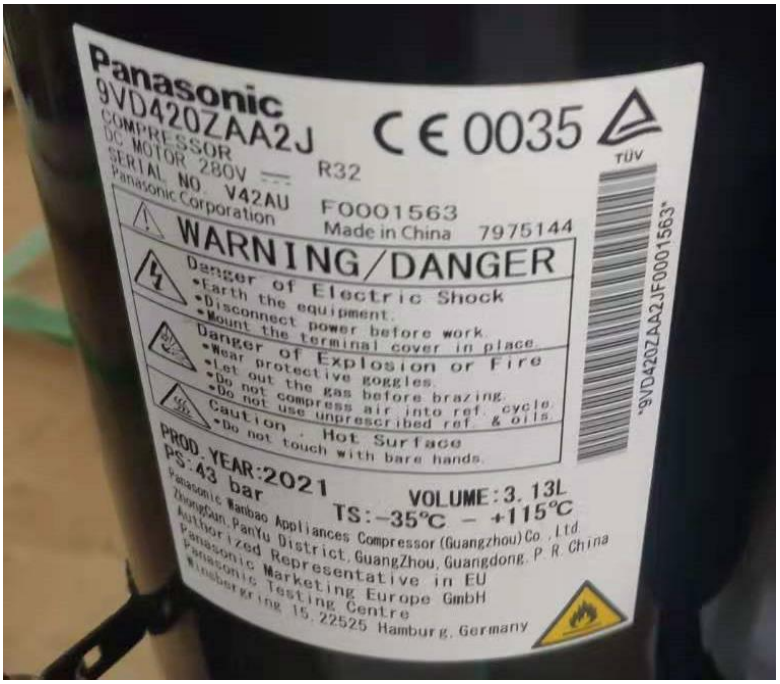
ThermoFLUX

EVI DC Inverter toplotna pumpa zrak - voda
EVI DC Inverter Air Source Heat Pumps

Model	MONOBLOCK TF20EVI R32 CT 400V
Napajanje Power Supply	380-420V 3N~/50Hz
Kapacitet grijanja Min./Max. Heating Capacity Min./Max.	9.2/20kW
Potrošnja el. energije - grijanje Heating Input Power Min./Max.	1.55/4.2kW
Kapacitet hlađenja Min./Max. Cooling Capacity Min./Max.	6.62/14.4kW
Potrošnja el. energije - hlađenje Cooling Input Power Min./Max.	1.69/5.36kW
Prosječna potrošnja/Jačina struje Rated. Input Power/Current	6.1kW/12.9A
Max. temperatura polaza vode Max. Water Outlet Temperature	55℃
Protok Water Flow	3.4m³/h
Rashladno sredstvo / težina Refrigerant/Weight	R32/2800g
Niski i Visoki radni pritisak freona Low/High side operation pressure	1.5/4.4MPa
Max. dozvoljeni pritisak freona Maximum allowable pressure	4.4MPa
Max. pritisak vode Max Water Pressure	1.0MPa
Klasa otpornosti na strujni udar Electric Shock Proof Grade	I
Klasa vodootpornosti WaterProof Level	IPX4
Pad pritiska na vodenoj strani Water Pressure Drop	23kPa
Hidraulički priključak Water Pipe Connection	1"
Netto težina Net Weight	124kg
Datum:/Serijski broj: Date: /NO.:	Pogledati bar code See bar code
Ekvivalentna težina punjenja sustava CO2: 1,89 tona System CO2 aquivalent charge weight: 1.89 ton	
ThermoFLUX d.o.o. Bage br. 3, 70101 Jajce Bosna i Hercegovina www.thermoflux.ba	

Appendix III photo documentaiton

Details of:	Overall view
View: ☐ General ☐ Front ☐ Rear ☐ Right ☐ Left ☐ Top ☐ Bottom	

Details of:	Compressor
View: ☐ General ☐ Front ☐ Rear ☐ Right ☐ Left ☐ Top ☐ Bottom	

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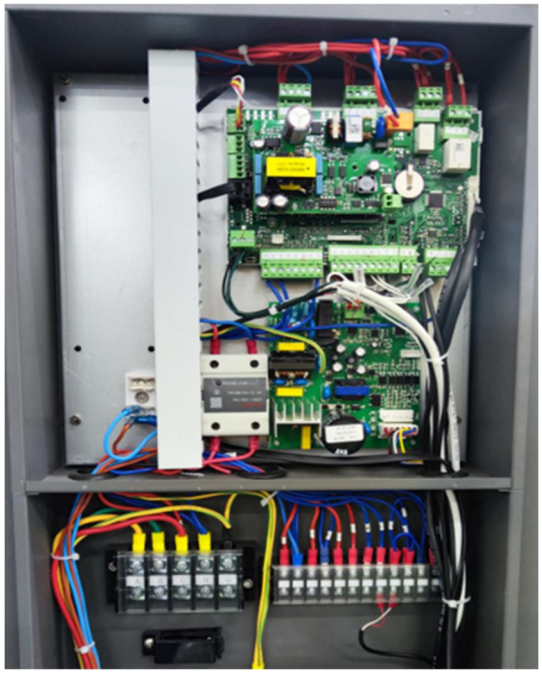
Appendix III photo documentaiton

Details of:	Fan Motor
View: ☐ General ☐ Front ☐ Rear ☐ Right ☐ Left ☐ Top ☐ Bottom	

Details of:	Main Control Board
View: ☐ General ☐ Front ☐ Rear ☐ Right ☐ Left ☐ Top ☐ Bottom	

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Product Service

Appendix IV Construction data form

Model: MONOBLOCK TF20EVI R32 CT 400V		
Part		**Technical data**
1. Compressor		
	Manufacture:	Panasonic Wanbao Appliances Compressor (Guangzhou) Co., Ltd
	Type:	9VD420ZAA2J
	Rated capacity:	4390W
	Serial-number:	F0001563
	Specification:	DC280V; R32
2. Condenser		
	Manufacture:	JIANGSU BAODE HEAT EXCHANGER EQUIPMENT CO.,LTD.
	Type:	61-D-40-2M-2L
	Heat exchanger:	Plate heat exchanger
	Dimension (mm):	542(L)mmX126(H)mmX108(D)mm
3. Evaporator		
	Manufacture:	Guangzhou Aotai Refrigeration Equipment Co.,Ltd.
	Type:	05KA-CP-01
	Heat exchanger:	Finned-coil heat exchanger
	Dimension (mm):	660(L)mmX1300(H)mmX345(D)mm
4. Fan motor		
	Manufacture:	Wolong Electric Group Co., Ltd
	Type:	ZWB278D04A
	Fan type:	3 blade
	Specification:	DC310V; 102W
5. Main control board		
	Manufacture:	CAREL
	Type:	UP3A02200T3S0
	Specification:	220-240V; 50Hz

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Appendix V Equipment List

No.	Type	Manufacture	Model	Equipment ID	Calibration Due Date
1	Heat pump energy efficiency testing system	PINXIN	10HP	2017J00001	2023-11-24
2	Electromagnetic flowmeter	KROHNE	OPTIFLUX4100 C	H17221264	2023-12-21
3	Anechoic rooms (hemi-anechoic rooms)	Guangzhou Kinte	-	NC-036-2	2023-10-07
4	AC source Supply	YANGHONG	YF-3600	VGDS-0637	2023-11-07
5	6 channel data logger	—	PXI-1033	VGDY-0257	2024-05-20
6	PULSE system	B & K	3660C	VGDY-0184	2024-04-12
7	Calibrator	B & K	4231	HJ-000095	2024-06-30
8	Long steel tape	—	5m	HJ-000150	2024-01-04
9	Temperature measurement system	—	—	NC-036-1	2024-06-07
10	Atmospheric pressure meter	—	—	HJ-000165	2023-11-22
11	Constant temperature water system	B & K	—	VGDS-0448	2024-04-18
12	Windscreen	B & K	WS002-5	—	—

-- End of Report --

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