

Summary technical overview



Product Service

Date: 2022-07-13

Test object: Product: EVI DC Inverter Heat Pump
 Model: EcoLogic M-140

Trade name:

GRUBMANN

Test specification: EN 14825:2018
 (EU) No 813/2013
 EN 12102-1:2017
 EN 14511-4:2018 Clause 4

Purpose of examination: Test according to the test specification
 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.

1 Description of the test object

1.1 Function

Manufacturer's specification for intended use:
These appliances are 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 :	EcoLogic M-140
Rated Voltage (V) :	EcoLogic M-140: 220-240V~;
Rated Frequency (Hz) :	50
Rated Power (W) :	EcoLogic M-140: 1720;
Rated Current (A) :	EcoLogic M-140: 8.23;
Protection Class :	Class I
Protection Against Moisture :	IP X4
Construction :	Stationary
Supply connection :	<input type="checkbox"/> Non detachable cord <input checked="" type="checkbox"/> Permanent connection to fixed wiring
Operation mode:	<input checked="" type="checkbox"/> Continuous operation; <input type="checkbox"/> Intermittent operation; <input type="checkbox"/> Short time operation;
Refrigerant/charge (g) :	R32 /EcoLogic M-140: 1300g;
Declared parameters :	<input checked="" type="checkbox"/> Average <input type="checkbox"/> Warmer <input type="checkbox"/> Colder

2 Order

2.1 Date of Purchase Order

2021-06-21, 2022-05-07

2.2 Test Sample(s)

- Reception date(s): 2021-06-22, 2022-05-07
- Condition of test sample(s): completed and can be normal operation

2.3 Date(s) of Testing

2021-12-01 to 2021-12-10, 2022-05-07 to 2022-05-17

2.4 Location(s) of Testing

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

N/A

3 Test Results

3.1 Positive Test Results

See Appendix I

4 Remark

N/A

- 4.1** 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 particulars as well as of the composition and layout.
- 4.2** When the product is placed on the market, it must be accompanied with safety Instructions written in of ficial language of the country. The instructions shall give information regarding 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 Summary

- 1) These appliances are EVI DC Inverter Heat Pump, each one including a whole compression type refrigerant circuit to heat water in another circuit. These appliances were for cooling and heating water function, this report only for heating capacity test.
- 2) EcoLogic M-140: the main power is supplied by a 3-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 14825:2018.
- 5) This test report include the following changes and/or additions:
 - a) Adding EN 12102-1:2017 test for models EcoLogic M-140.
 - b) Adding EN 14511-4:2018 Clause 4 test for models EcoLogic M-140

Appendix I Test results

Table 1.	Heating mode(Low temperature application):						P	
Model	EcoLogic M-140							
Product type	Air to Water	Heating season	<input checked="" type="checkbox"/>	Average	<input type="checkbox"/>	Warmer	<input type="checkbox"/>	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	$(-7-16)/(T_{designh-16})$	88	N/A	N/A	-7(-8)	a / 34		
B	$(+2-16)/(T_{designh-16})$	54	N/A	N/A	2(1)	a / 30		
C	$(+7-16)/(T_{designh-16})$	35	N/A	N/A	7(6)	a / 27		
D	$(+12-16)/(T_{designh-16})$	15	N/A	N/A	12(11)	a / 24		
E	$(TOL-16)/(T_{designh-16})$				TOL	a / 35.3		
F	$(T_{bivalent-16})/(T_{designh-16})$				T _{biv}	a / 34		
G	$(-15-16)/(T_{designh-16})$	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 7030.58W, the power is 1586.57W, the COP is 4.43.								
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	2:00:00	2:00:00	2:00:00	2:00:00	2:00:00	2:00:00	
The heat pump defrosts	--	No	No	No	No	No	No	
Complete Cycles	--	0	0	0	0	0	0	
Barometric pressure	kPa	101.02	101.02	101.02	101.02	101.02	101.02	
Voltage	V	228.6	229.0	229.2	228.9	228.6	228.6	
Current input of the unit	A	7.12	3.39	2.36	2.00	8.35	7.12	
Power input of the unit	kW	1.606	0.733	0.484	0.400	1.888	1.606	
Test conditions indoor unit								
Inlet Water temperature, DB	°C	30.01	27.56	24.92	21.77	31.15	30.01	
Outlet Water temperature, DB	°C	34.02	30.00	26.98	23.95	35.35	34.02	

Appendix I Test results

Test conditions outdoor unit							
Air inlet temperature, DB	°C	-7.00	2.05	7.06	11.99	-10.00	-7.00
Air inlet temperature, WB	°C	-8.00	1.01	6.00	10.98	-11.00	-8.00
Summary of the results							
Total heating capacity	kW	5.637	3.446	3.000	3.089	5.849	5.637
Effective power input	kW	1.657	0.784	0.535	0.451	1.939	1.657
Coefficient of performance (COP)	--	3.40	4.40	5.61	6.85	3.02	3.40
Compressor frequency	Hz	81	40	30	30	90	81
Water flow	m ³ / h	1.24	1.24	1.24	1.24	1.24	1.24
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)	6.373	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	6.373	5.849	3.02	0.00	1.00	3.02	
F	5.637	5.637	3.40	0.00	1.00	3.40	
A	5.637	5.637	3.40	0.00	1.00	3.40	
B	3.431	3.446	4.40	0.00	1.00	4.40	
C	2.206	3.000	5.61	0.99	0.74	5.59	
D	0.980	3.089	6.85	0.99	0.32	6.71	
CR: part load divided by capacity;							

Appendix I Test results

Electric power consumptions	Unit	Value
Thermostat-off mode [P_{TO}]	kW	0.005
Standby mode [P_{SB}]	kW	0.005
Crankcase heater [P_{CK}]	kW	0.030
Off mode [P_{OFF}]	kW	0.005

Conclusions:	Unit	Value
SCOP _{on} :	kWh/kWh	4.60
SCOP:	kWh/kWh	4.59
Q_H :	kWh/year	13166
Q_{HE} :	kWh/year	2867
$\eta_{s,h}$	%	180.7
Seasonal space heating energy efficiency classes: (According (EU) No 811/2013 Table 2)	--	A+++

Appendix I Test results

Table 2.	Heating mode(Medium temperature application):						P	
Model	EcoLogic M-140							
Product type	Air to Water	Heating season	<input checked="" type="checkbox"/>	Average	<input type="checkbox"/>	Warmer	<input type="checkbox"/>	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	$(-7-16)/(T_{designh-16})$	88	N/A	N/A	-7(-8)	a / 52
B	$(+2-16)/(T_{designh-16})$	54	N/A	N/A	2(1)	a / 42
C	$(+7-16)/(T_{designh-16})$	35	N/A	N/A	7(6)	a / 36
D	$(+12-16)/(T_{designh-16})$	15	N/A	N/A	12(11)	a / 30
E	$(TOL-16)/(T_{designh-16})$				TOL	a / 55.3
F	$(T_{bivalent-16})/(T_{designh-16})$				Tbiv	a / 52
G	$(-15-16)/(T_{designh-16})$	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 10386.17W, the power is 3004.24W, the COP is 3.46.

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	2:00:00	2:00:00	2:00:00	2:00:00	2:00:00	2:00:00
The heat pump defrosts	--	No	No	No	No	No	No
Complete Cycles	--	0	0	0	0	0	0
Barometric pressure	kPa	99.85	99.85	99.85	99.80	99.75	99.85
Voltage	V	229.0	229.1	229.2	229.1	228.7	229.0
Current input of the unit	A	11.38	4.44	3.11	2.48	11.93	11.38
Power input of the unit	kW	2.564	0.960	0.639	0.523	2.696	2.564

Test conditions **indoor** unit

Inlet Water temperature, DB	°C	47.37	39.27	33.79	27.39	50.44	47.37
Outlet Water temperature, DB	°C	51.97	42.01	35.98	30.01	54.98	51.97

Appendix I Test results

Test conditions outdoor unit							
Air inlet temperature, DB	°C	-6.95	2.01	7.06	11.99	-10.00	-6.95
Air inlet temperature, WB	°C	-7.95	0.99	6.00	10.98	-11.01	-7.95
Summary of the results							
Total heating capacity	kW	5.909	3.530	2.841	3.382	5.846	5.909
Effective power input	kW	2.609	1.005	0.683	0.568	2.740	2.609
Coefficient of performance (COP)	--	2.27	3.51	4.16	5.96	2.13	2.27
Compressor frequency	Hz	85	40	30	30	85	85
Water flow	m ³ / h	1.10	1.10	1.10	1.10	1.10	1.10
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)	6.680	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	6.680	5.846	2.13	0.00	1.00	2.13	
F	5.909	5.909	2.27	0.00	1.00	2.27	
A	5.909	5.909	2.27	0.00	1.00	2.27	
B	3.597	3.530	3.51	0.00	1.00	3.51	
C	2.312	2.841	4.16	0.99	0.81	4.15	
D	1.028	3.382	5.96	0.99	0.30	5.82	
CR: part load divided by capacity;							

Appendix I Test results

Electric power consumptions	Unit	Value
Thermostat-of f mode [P_{TO}]	kW	0.005
Standby mode [P_{SB}]	kW	0.005
Crankcase heater [P_{CK}]	kW	0.030
Of f mode [P_{OFF}]	kW	0.005

Conclusions:	Unit	Value
SCOPon:	kWh/kWh	3.47
SCOP:	kWh/kWh	3.47
Q_H :	kWh/year	13801
Q_{HE} :	kWh/year	3983
$\eta_{s,h}$	%	135.6
Seasonal space heating energy efficiency classes: (According (EU) No 811/2013 Table 1)	--	A++

Appendix I Test results

Table 5.		Clause 4 of EN 14511-4:2018			P
Model		EcoLogic M-140			
Customer Code	Execution Date [dd-mm-yyyy]	Testing item	Standard Reference	Comment	Test Response
TEST 1	15-05-2022	STARTING TEST	EN14511-4:2018, §4.2.1.2 Table 3	The "lower" starting operating conditions declared by the manufacturer for the heating mode- i.e. Tair=-24.95°C, T out water 9.11°C, Flow rate 1.00m 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 alarm. During the test the machine operated in automode. No damage was recorded on the machine during and after the test.	Passed
TEST 2	15-05-2022	OPERATING TEST	EN14511-4:2018, §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=-24.63°C, T out water 50.43°C, Flow rate 1.00m ³ /h. Once these conditions were obtained, the machine was let operate for over 1 hour in automode. During the test, no warning or alarm were showed. No damage was recorded on the machine during and after the test.	Passed
TEST 3	15-05-2022	SHUTTING OFF WATER FLOW	EN14511-4:2018, §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	15-05-2022	SHUTTING OFF AIR FLOW	EN14511-4:2018, §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 warning or alarm were showed. No damage was recorded on the machine during and after the test.	Passed
TEST 5	15-05-2022	COMPLETE POWER SUPPLY FAILURE	EN14511-4:2018, §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

Appendix I Test results

Table 7a.	Sound power level measurement (Low temperature application)		P
Model	EcoLogic M-140		
	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):	230	
	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):	1.24	
	Measured quantity	L_{WA,indoors} (dB(A))	L_{WA,outdoors} (dB(A))
	Sound pressure level $\bar{L}_{p(ST)}$ ****	--	48
	Spheres radius r *	--	1.0m
	Sound power level L _{WA} ****	--	62
Setting of controls: according to user manual. Duct connection:-- Rounding to: *) 1 decimal places; **) 2 decimal places; ***) 3 decimal places; ****) nearest integer Fan speed: 600 r/min, compressor speed: 60Hz.			

Appendix I Test results

Table 7b.	Sound power level measurement (Medium temperature application)		P
Model	EcoLogic M-140		
	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):	230	
	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):	1.10	
	Measured quantity	L_{WA,indoors} (dB(A))	L_{WA,outdoors} (dB(A))
	Sound pressure level $\bar{L}_{p(ST)}$ ****	--	50
	Spheres radius d *	--	1.0m
	Sound power level L _{WA} ****	--	64
Setting of controls: according to user manual. Duct connection:-- Rounding to: *) 1 decimal places; **) 2 decimal places; ***) 3 decimal places; ****) nearest integer Fan speed: 600 r/min, compressor speed: 63Hz.			

Appendix II Marking plate

Nameplate

Model: EcoLogic M-140



**EVI DC Inverter
Heat Pump**

Model	EcoLogic M-140
Power supply	230V/ 1Ph/ 50-60Hz
Heating capacity *	1,28 - 6,81kW
Input power *	0,31 - 2,13kW
Heating capacity **	1,57 - 8,40kW
Input power **	0,32 - 1,87kW
Cooling capacity	0,99 - 6,22kW
Cooling input power	0,29 - 2,18kW
Current	1,28 - 9,67A
Refrigerant	R32 / 1300g
GWP/CO2	675 / 878kg
Max. operating pressure	4,4MPa
Electric shock rating / IP Grade	I / IPX4
Water circulation	1,40 m ³ /h
Pipe size	DN25
Net weight	110kg
Noise	≤53dB (A)

Heating* testing condition: Inlet water temperature 15°C, Outlet water temperature 55°C, Dry bulb temperature 7°C, Wet bulb temperature 6°C.
 Heating** testing condition: Inlet water temperature 30°C, Outlet water temperature 35°C, Dry bulb temperature 7°C, Wet bulb temperature 6°C.
 Cooling testing condition: Inlet water temperature 12°C, Outlet water temperature 7°C, Dry bulb temperature 35°C, Wet bulb temperature 24°C.

The system is hermetically sealed.




Appendix III photo documentaiton

Details of:	Overall view for EcoLogic M-140
View:	
<input type="checkbox"/> General	
<input type="checkbox"/> Front	
<input type="checkbox"/> Rear	
<input type="checkbox"/> Right	
<input type="checkbox"/> Left	
<input type="checkbox"/> Top	
<input type="checkbox"/> Bottom	

Details of:	Compressor for EcoLogic M-140
View:	
<input type="checkbox"/> General	
<input type="checkbox"/> Front	
<input type="checkbox"/> Rear	
<input type="checkbox"/> Right	
<input type="checkbox"/> Left	
<input type="checkbox"/> Top	
<input type="checkbox"/> Bottom	

Appendix III photo documentaiton

Details of:	Fan Motor for EcoLogic M-140
View:	
<input type="checkbox"/> General	
<input type="checkbox"/> Front	
<input type="checkbox"/> Rear	
<input type="checkbox"/> Right	
<input type="checkbox"/> Left	
<input type="checkbox"/> Top	
<input type="checkbox"/> Bottom	

Details of:	Main Control Board for EcoLogic M-140
View:	
<input type="checkbox"/> General	
<input type="checkbox"/> Front	
<input type="checkbox"/> Rear	
<input type="checkbox"/> Right	
<input type="checkbox"/> Left	
<input type="checkbox"/> Top	
<input type="checkbox"/> Bottom	

Appendix IV Construction data form

Model: EcoLogic M-140		
Part		Technical data
1. Compressor		
	Manufacture:	Panasonic Wanbao Appliances Compressor (Guangzhou) Co., Ltd.
	Type:	9RD138ZBA2J
	Rated capacity:	1400W
	Serial-number:	F0000507
	Specification:	DC280V; R32
2. Condenser		
	Manufacture:	Foshan H,N,E Energy-saving Equipment Co.,Ltd
	Type:	ZE-KG01ZF091-01
	Heat exchanger:	Tube in Shell heat exchanger
	Dimension (mm):	238(L)mmX420(H)mmX162(D)mm
3. Evaporator		
	Manufacture:	Guangzhou AOTAI Refrigeration Equipment co., LTD
	Type:	ZC-030072602-00
	Heat exchanger:	Finned-coil heat exchanger
	Dimension (mm):	640(L)mmX750(H)mmX355(D)mm
4. Fan motor		
	Manufacture:	Jiangmen LT Motor Co., Ltd
	Type:	RD80HB
	Fan type:	3 blades
	Specification:	DC310V; 80W
5. Main control board		
	Manufacture:	Guangdong Chico Electronic Inc.
	Type:	PW58181
	Specification:	220-240V; 50Hz

Appendix V Equipment List

No.	Type	Manufacture	Model	Equipment ID	Calibration Due Date
1	R&A performance measuring system	GEI	20kW	—	2022-08-02
2	Temperature and humidity meter	VAISALA	HMD42	H5110021	2022-08-02
3	Platinum resistance	YINUO	Pt100	TS-0167C0447	2022-10-12
4	Platinum resistance	YINUO	Pt100	TS-0167C0436	2022-10-12
5	Flowmeter	YOKOGAWA	LDY-25S	2161283	2022-10-12
6	Water pressure difference transmitter	MICRO	MDM3051	291459	2022-08-02
7	AC source Supply	YANGHONG	YF-3600	VGDS-0637	2022-11-07
8	Anechoic rooms (hemi-anechoic rooms)	Guangzhou Kinte	5.2m×4.7m×4.6 m	NC-036-2	2023-10-07
9	6 channel data logger	—	PXI-1033	VG DY-0257	2023-05-20
10	PULSE system	B & K	3660C	VG DY-0184	2023-04-12
11	Calibrator	B & K	4231	HJ-000095	2023-06-30
12	Long steel tape	—	5m	HJ-000150	2023-01-01
13	Temperature measurement system	—	—	NC-036-1	2023-06-07
14	Atmospheric pressure meter	—	—	HJ-000165	2022.11.22
15	Constant temperature water system	B & K	—	VGDS-0448	2023.04.18
16	Windscreen	B & K	WS002-5	—	—

-- End of Report --