

Report No.: HP182022E2

Energy Performance acc. EN 16147
Heat pumps with electrically driven compressors

Product:
Heat pump

Type:
WP4 LF-502

Trademark:
KRONOTERM

Company:
KRONOTERM d.o.o.



Deutsche
Akkreditierungsstelle
D-PL-11120-04-00

This accreditation is valid only for the listed standards as stated in the accreditation annex of D-PL-11120-04-00

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Publication of page 2 is permitted.

The test results presented in this report refer solely to the test object stated as described on page 2. The report does not represent a general statement about the serial production of the test object and gives not an authorization for use of a TÜV Rheinland test- / certification mark.

**Supplement Test Report Energy Performance acc.
EN 16147 from January: 2017 to report HP1820216B1
Heat pumps with electrically driven compressors**

Manufacturer: KRONOTERM d.o.o.
Trnava 5e
3303 Gomilsko
Slovenija

Trademark: KRONOTERM

Product Group: Water Heater

Product: Domestic Hot Water Heat Pump

Type designation: **WP4 LF-502**

Additional trademark: See page 3

Technical Specifications:

Technical Specifications:	Outdoor Average (+7°C)	Indoor Cold, Average, Warm (+20°C)
Max Electrical Power Consumption	1,5 (3,5*, 5,5**) kW	1,5 (3,5*, 5,5**) kW
Heat power	3,0 (5,0*, 7,0**)kW	3,8 (5,8*, 7,8**)kW
Water tank volume	450 l	
Max. water temperature	65°C	
Max. water pressure	10 bar	
Weight	240 kg	
Refrigerant	R134a (1,8 kg)	

* With the usage of one additional integrated electrical heater. **With the usage of two additional integrated electrical heaters.

Test basis: This examination has been carried out in a test laboratory equipped in accordance with DIN EN16147:2017.01 and has been performed in accordance with the EN16147:2017

Test cause: Additional trademark Dynamis Max and update to EN16147:2017

Test results: The requirements of the above mentioned standards are fulfilled with the following values:

	Outdoor	Indoor
Maximum / measured load profile	XXL	
Measured climate condition	Average (+7°C)	Cold, Average, Warm (+20°C)
Water heating energy efficiency	128%	144 %
Annual Consumption of elec. energy	1686 kWh/y	1496 kWh/y
Mixed water (V40)	588,5 l	578,1 l

Dated in Cologne, 22.02.2022
432 / pom

TÜV Rheinland Energy GmbH
Test Centre for Energy Appliances
Recognized Test Centre for HP Keymark under
the certification body DIN Certco

Assessor:

Report released after review:



Dipl.-Ing. A. Pomp

Dipl.-Ing. M. Reimbold

Overview additional trademarks

Basic KRONOTERM d.o.o. Trnava 5e 3303 Gomilsko Slovenija	Additional Trademark: AIC Europe B.V. Graafschap Hornelaan 163A 6001 AC Weert Netherlands
Trademark: KRONOTERM	Trademark: Dynamis Max
Type: WP4 LF-502	Type: DM 450

Declaration of identical see Annex A01

1. Task

History of test report HP182016B1:

The Test Centre for Energy Appliances was instructed to execute the energy performance testing on the Domestic Hot Water Heat Pump WP4 LF-502.

The test was conducted with a declared load profile of the size "XXL". The tests were carried out with the test institute TÜV Rheinland in November 2016 in the laboratory of Termo-Tehnika d.o.o. in Slovenia.

New supplement test report HP182022E2:

Update to new version of standard EN 16147:2017 and additional trademark Dynamis Max with type designation DM 450.

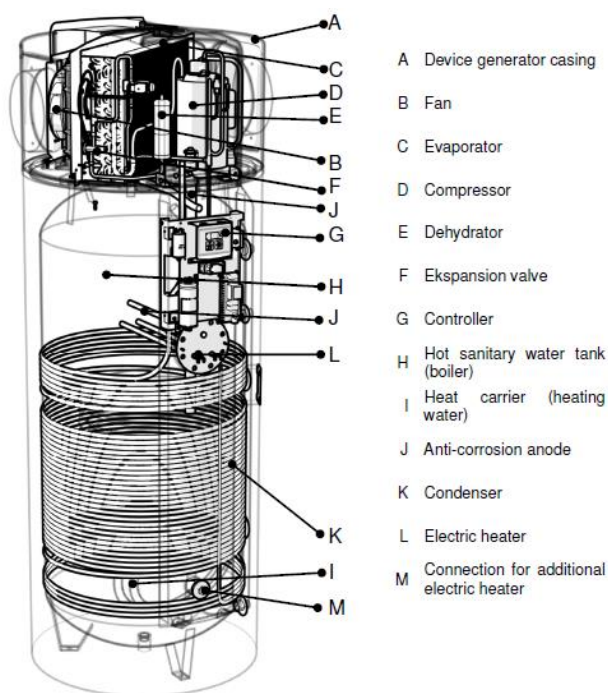
2. Description of the appliance

This is a household heat pump for sanitary hot water preparation.

The heat source is ambient air, exhaust air or outside air. With the heat pump different installations are possible. The heat pump can be operated directly in the installation room or be connected to air duct system. It is possible to use waste heat or outside air.

The hot water storage with enamel is insulated with closed cell PU.

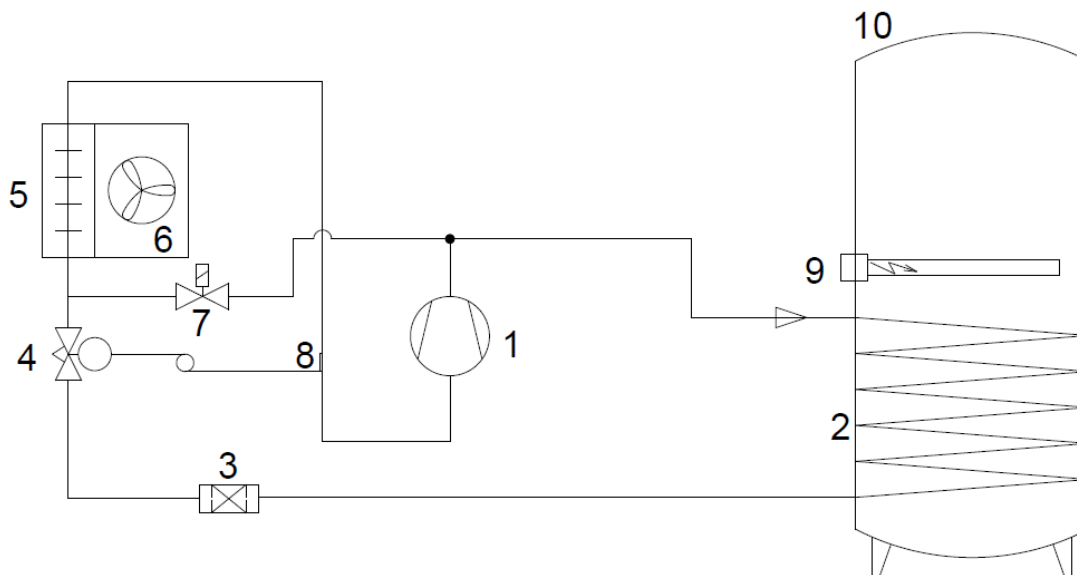
Additional heat exchanger are integrated in the hot water storage. There additional heat sources can be connected (solar, biomass boilers etc.).





Nameplate of WP4 LF-502

Operation principle



1. Compressor
2. Condenser
3. Dehydrator
4. Expansion valve
5. Evaporator

6. Fan
7. Magnetic valve
8. Temperature feeler of the expansion valve
9. Electric heater
10. Hot sanitary water tank (boiler)

3. Testing

The tests were carried out with the Test Centre for Energy Appliances, TÜV Rheinland in the laboratory of KRONOTERM d.o.o. in November 2016.

3.1. Measurement results for outdoor modus

Load Profile for Average (+7°C)

Tapping profile "XXL"

Time	Required values				Achieved values			
	Q _{rap} [kWh]	f [l/min]	T _m [°C]	T _p [°C]	Q _{H2O} [kWh]	f [l/min]	T _m [°C]	T _p [°C]
07:00	0,105	3	25		0,109	3	50	
07:05								
07:15	1,82	6	40		1,827	6	51	
07:26	0,105	3	25		0,109	3	53	
07:30								
07:45	6,24	16	10	40	6,261	16	51	54
08:01	0,105	3	25		0,109	3	52	
08:05								
08:15	0,105	3	25		0,109	3	51	
08:25								
08:30	0,105	3	25		0,109	3	52	
08:45	0,105	3	25		0,109	3	51	
09:00	0,105	3	25		0,109	3	51	
09:30	0,105	3	25		0,109	3	51	
10:00	0,105	3	25		0,109	3	50	
10:30	0,105	3	10	40	0,109	3	51	53
11:00	0,105	3	25		0,109	3	50	
11:30	0,105	3	25		0,109	3	50	
11:45	0,105	3	25		0,109	3	50	
12:00								
12:30								
12:45	0,735	4	10	55	0,740	4	49	53
14:30	0,105	3	25		0,109	3	48	
15:00	0,105	3	25		0,109	3	49	
15:30	0,105	3	25		0,109	3	49	
16:00	0,105	3	25		0,109	3	48	
16:30	0,105	3	25		0,109	3	49	
17:00	0,105	3	25		0,109	3	49	
18:00	0,105	3	25		0,109	3	47	
18:15	0,105	3	40		0,109	3	48	
18:30	0,105	3	40		0,109	3	49	
19:00	0,105	3	25		0,109	3	47	
19:30								
20:00								
20:30	0,735	4	10	55	0,740	4	46	50
20:45								
20:46	6,24	16	10	40	6,258	16	47	50
21:00								
21:15	0,105	3	25		0,109	3	46	
21:30	6,24	16	10	40	6,256	16	46	48
21:45								
Σ	24,53				24,696			

Electricity consumption Q_{elec} and water heating energy efficiency η_{wh}

Description	Parameter	Value	Unit
Tapping profile	/	XXL	
k-Value	k	0	
Smart control compliance	smart	0	
Smart control factor	SFC	0	
Conversion coefficient	CC	2,5	
Ambient correction term	Q_{cor}	0,000	kWh
Electrical consumption of last on-/off-cycle during stand-by time	W_{es}	1,926	kWh
Duration of last on-/off-cycle during stand-by time	t_{es}	52,22	h
Electrical energy consumption of last on-/off-cycle during stand-by time	P_{es}	0,037	kW
Electrical consumption during stand-by time	P_{stby}	0,092	kW
Duration of the test cycle	t_{TTC}	71,21	h
Measured electrical energy consumption of the heat pump	$W_{EL-M-TC}$	9,50	kWh
Electrical energy consumption of liquid pumps	$W_{EL-corr}$	0,15	kWh
Measured electrical energy consumption of the heat pump	$W_{EL-HP-TC}$	9,35	kWh
Daily electricity consumption	W_{EL-TC}	7,73	kWh
Reference energy	Q_{ref}	24,53	kWh
Useful energy content	Q_{TC}	24,696	kWh
In addition, the energy required to reach T_p (extrapolation) 12:45	$Q_{EL-Tap1}$	0,039	kWh
In addition, the energy required to reach T_p (extrapolation) 20:30	$Q_{EL-Tap2}$	0,083	kWh
In addition, the energy required to reach the T_p 's	Q_{EL-TC}	0,121	kWh
Correction ratio of reference and useful energy	Q_{ref}/Q_{TC}	0,99	
Daily electricity consumption (corrected)	Q_{elec}	7,68	kWh
Water heating energy efficiency	η_{wh}	128	%
Annual Electricity consumption	AEC	1686	kWh
Water heating energy efficiency class		A	/
Coefficient of performance	COP_{DHW}	3,20	

Mixed water at 40°C (V40)

Description	Parameter	Value	Unit
Water temperature without tapping	T_{set}	54,8	°C
Average water temperature of outlet warm water	θ'_p	52,9	°C
Average water temperature of inlet cold water	θ_c	10,5	°C
Normalised value of the average temperature	θ_p	52,9	°C
Volume that delivered water of at least 40°C	V_{40exp}	411,2	l
Calculated volume that delivered hot water of at least 40°C	V40	588,5	l

Sound measurement at A7 acc. EN 12102 (Class A); EN ISO 3743-1

	Value	Requirement
Sound power level L_{WA} [dB(A)] at A7 (Outdoor)	60	< 65 dB

3.2 Measurement Results for indoor modus

Load Profile for Cold, Average, Warm (+20°C)

Tapping profile "XXL"

Time	Required values				Achieved values			
	Q _{tap} [kWh]	f [l/min]	T _m [°C]	T _p [°C]	Q _{H2O} [kWh]	f [l/min]	T _m [°C]	T _p [°C]
07:00	0,105	3	25		0,109	3	49	
07:05								
07:15	1,82	6	40		1,827	6	49	54
07:26	0,105	3	25		0,109	3	52	
07:30								
07:45	6,24	16	10	40	6,261	16	51	54
08:01	0,105	3	25		0,109	3	51	
08:05								
08:15	0,105	3	25		0,110	3	49	
08:25								
08:30	0,105	3	25		0,109	3	50	
08:45	0,105	3	25		0,109	3	50	
09:00	0,105	3	25		0,109	3	50	
09:30	0,105	3	25		0,109	3	49	
10:00	0,105	3	25		0,109	3	48	
10:30	0,105	3	10	40	0,109	3	49	52
11:00	0,105	3	25		0,109	3	47	
11:30	0,105	3	25		0,109	3	48	
11:45	0,105	3	25		0,109	3	50	
12:00								
12:30								
12:45	0,735	4	10	55	0,740	4	49	52
14:30	0,105	3	25		0,109	3	47	
15:00	0,105	3	25		0,109	3	46	
15:30	0,105	3	25		0,109	3	47	
16:00	0,105	3	25		0,109	3	47	
16:30	0,105	3	25		0,109	3	46	
17:00	0,105	3	25		0,109	3	47	
18:00	0,105	3	25		0,109	3	46	
18:15	0,105	3	40		0,108	3	46	
18:30	0,105	3	40		0,109	3	46	
19:00	0,105	3	25		0,108	3	44	
19:30								
20:00								
20:30	0,735	4	10	55	0,740	4	47	52
20:45								
20:46	6,24	16	10	40	6,259	16	51	54
21:00								
21:15	0,105	3	25		0,109	3	49	
21:30	6,24	16	10	40	6,261	16	51	54
21:45								
Σ	24,53				24,703			

Electricity consumption Q_{elec} and water heating energy efficiency η_{wh}

Description	Parameter	Value	Unit
Tapping profile	/	XXL	
k-Value	k	0	
Smart control compliance	smart	0	
Smart control factor	SFC	0	
Conversion coefficient	CC	2,5	
Ambient correction term	Q_{cor}	0,000	kWh
Electrical consumption of last on-/off-cycle during stand-by time	W_{es}	1,654	kWh
Duration of last on-/off-cycle during stand-by time	t_{es}	46,91	h
Electrical energy consumption of last on-/off-cycle during stand-by time	P_{es}	0,035	kW
Electrical consumption during stand-by time	P_{stby}	0,088	kW
Duration of the test cycle	t_{TTC}	63,86	h
Measured electrical energy consumption of the heat pump	$W_{EL-M-TC}$	8,17	kWh
Electrical energy consumption of liquid pumps	$W_{EL-corr}$	0,00	kWh
Measured electrical energy consumption of the heat pump	$W_{EL-HP-TC}$	8,17	kWh
Daily electricity consumption	W_{EL-TC}	6,86	kWh
Reference energy	Q_{ref}	24,53	kWh
Useful energy content	Q_{TC}	24,703	kWh
In addition, the energy required to reach T_p (extrapolation) 12:45	$Q_{EL-Tap1}$	0,048	kWh
In addition, the energy required to reach T_p (extrapolation) 20:30	$Q_{EL-Tap2}$	0,053	kWh
In addition, the energy required to reach the T_p 's	Q_{EL-TC}	0,101	kWh
Correction ratio of reference and useful energy	Q_{ref}/Q_{TC}	0,99	
Daily electricity consumption (corrected)	Q_{elec}	6,81	kWh
Water heating energy efficiency	η_{wh}	144	%
Annual Electricity consumption	AEC	1496	kWh
Water heating energy efficiency class		A	/
Coefficient of performance	COP_{DHW}	3,60	

Mixed water at 40°C (V40)

Description	Parameter	Value	Unit
Water temperature without tapping	T_{set}	54,8	°C
Average water temperature of outlet warm water	θ'_p	52,7	°C
Average water temperature of inlet cold water	θ_c	10,0	°C
Normalised value of the average temperature	θ_p	52,7	°C
Volume that delivered water of at least 40°C	V_{40exp}	406,4	l
Calculated volume that delivered hot water of at least 40°C	V40	578,1	l

Sound measurement at A20 acc. EN 12102 (Class A); EN ISO 3743-1

	Value	Requirement
Sound power level L_{WA} [dB(A)] at A20 (Indoor)	63	< 65 dB

4. Statement of test results

The Domestic Hot Water heat pump

WP4 LF-502

of the company

KRONOTERM d.o.o.

was tested with the declared load profiles of the size

“XXL”.

The product fulfils and corresponds to the requirements of the EN 16147 for heat pump with electrically driven compressors and achieved a water heating energy efficiency of

$\eta_{\text{wth}} = 128\%$ (average +7°C)

$\eta_{\text{wth}} = 144\%$ (cold +20°C)

$\eta_{\text{wth}} = 144\%$ (average +20°C)

$\eta_{\text{wth}} = 144\%$ (warm +20°C)

This statement was given based on the documentation submitted by the manufacturer and the tested sample. The statement is valid only for products / appliances which are manufactured according to the tested specimen.

The report does not represent a general statement about the serial production of the test object and gives not an authorization for use of a TÜV Rheinland test- or certification mark.

5. Appendix

Appendix	Subject	Reference
A 01	Declaration of Identical	10.02.2022
A 02	Labels Dynamis Max 450	