

# TEST REPORT

Report no.:  
300-KLAB-17-019



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**Customer:** Contact person: Thomas Gross  
Company: Panasonic DE GmbH  
Address: Hagenauer Strasse 43  
City: 65203 Wiesbaden  
Tel.: +49 1724 141441

**Component:** Brand: Panasonic  
Type: Air to water heat pump  
Model: Indoor WH-SDC16H6E5 & outdoor WH-UD16HE5  
  
Series no.: Indoor 55190, outdoor 56201  
Production year: Indoor 2017, outdoor 2017

**Dates:** Component tested: July-August 2017

**Procedure:** Test procedure according to EHPA Air/Water Heat Pumps v. 2.3 and EN 14511:2013, part 1, 2 and 3.

**Remarks:** The unit was delivered by the customer. The installation and test settings were done according to the manufacturer's instructions.

**Terms:** The test has been performed according to the conditions laid down by DANAK (The Danish Accreditation), cf. [www.danak.dk](http://www.danak.dk), and the general terms and conditions of Danish Technological Institute. The results from DTI's work in this report, i.e. analyses, assessments and instructions may only be used or reported in their entirety. The customer may not mention or refer to DTI or DTI's employees for advertising or marketing purposes unless DTI has granted its written consent in each case.

**Division/Centre:** Danish Technological Institute  
Energy and Climate  
Heat Pump Laboratory, Aarhus

**Date:** 2017.10.24

**Signature:** Henning S. Grindorf  
B.TecMan & MarEng.



Test Reg. nr. 300



## Objective

The objective of this report is to document the following:

- Nominal performance test according to EN 14511 for the determination of the heating capacity and COP.
- The Seasonal Coefficient of Performance (SCOP) according to EN 14825:2016. In order to calculate the SCOP, tests were carried out at the part load conditions stated in the table below.
- The sound power level of the unit at test conditions given in the EHPA Test Regulation version 2.3 for an air to water heat pump as well as two additional measurements, i.e. one measurement with quiet mode level 3 and one measurement with an outlet water temperature of 35°C.

The measurement of the sound power level is performed according to EN 12102, using the Class A method. ISO 3743-1 is the basic method of carrying out sound power measurements. The method is briefly described in appendix 1. For a more detailed description, please view the accreditation papers DANAK-300 (in Danish only). The sound power level is not measured for the indoor unit as the compressor is not part of this.

- The operating range stated by the manufacturer. The test conditions are specified in the EHPA Test Regulation version 2.3 for an air to water heat pump.
- Four safety tests according to EHPA Test Regulation version 2.3.
- Extra test points (not included in the EHPA Test Regulation) according to EN 14511.





### Test conditions for standard performance test

Parameter	Unit	Value	Test speed		Test mode	
			Test speed	Test speed	Test mode	Test mode
Test speed	s	1000	1	1	1	1
Test speed	s	1000	1	1	1	1
Test speed	s	1000	1	1	1	1

- 1. The test speed is 1000 s, which is required to determine the test speed for the standard performance test of the standard performance test.
- 2. The test speed is 1000 s, which is required to determine the test speed for the standard performance test of the standard performance test.
- 3. The test speed is 1000 s, which is required to determine the test speed for the standard performance test of the standard performance test.

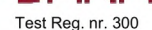
### Test conditions for testing test results

Parameter	Test speed	Test speed	Test speed	Test speed
Test speed	1	1	1	1
Test speed	1	1	1	1
Test speed	1	1	1	1
Test speed	1	1	1	1

The test speed is 1000 s, which is required to determine the test speed for the standard performance test of the standard performance test.

The test speed is 1000 s, which is required to determine the test speed for the standard performance test of the standard performance test.

Test conditions for low temperature application at reference testing  
ambient storage







## Test conditions for sound power measurements

N°	Test condition		Heat pump setting		
	Outdoor heat exchanger (dry/wet bulb) (°C)	Indoor heat exchanger (inlet/outlet) (°C)	Compressor speed (Hz)	Heating capacity (kW)	COP
1	7/6	30/35	65	16.3	4.2
2	7/6	47/55	68	15.5	2.8
3	7/6	47/55	47	9.6	2.8

## Test conditions for testing of the operating range

N°	Air inlet dry bulb temperature (°C)	Outlet water temperature (°C)	Water flow rate (l/h)
1	35	55	1260
2	-20	55	2800
3	-20	25	750

## Test conditions for safety tests

1	Shutting of the heat transfer medium flows (EN 14511-4 clause 4.4)
2	Complete power supply failure (EN 14511-4 clause 4.5)
3	Condensate draining and enclosure sweat test (EN 14511-4 clause 4.6)
4	Defrosting (EN 14511-4 clause 4.7)



## Main test results for low temperature application at reference heating season average

<b>Model (indoor + outdoor)</b>	Indoor: WH-SDC16H6E5 + Outdoor: WH-UD16HE5
<b>Air-to-water heat pump</b>	Y
<b>Low-temperature heat pump</b>	N
<b>Equipped with supplementary heater</b>	Y
<b>Heat pump combination heater</b>	N

<b>Rated heat output<sup>1)</sup></b>	Prated	12 [kW]
<b>Seasonal space heating energy efficiency</b>	$\eta_s$	190.3 [%]
	SCOP	4.86 [-]

<b>Measured capacity for heating for part load at outdoor temperature Tj</b>	Average Climate	Tj=-7 °C	Pdh	10.92 [kW]
	-	Tj=2 °C	Pdh	6.39 [kW]
	Low temperature application	Tj=7 °C	Pdh	5.30 [kW]
		Tj=12 °C	Pdh	6.16 [kW]
		Tj=bivalent temperature	Pdh	11.50 [kW]
		Tj=operation limit	Pdh	11.50 [kW]

<b>Measured coefficient of performance at outdoor temperature Tj</b>	Average Climate	Tj=-7 °C	COPd	2.82 [-]
	-	Tj=2 °C	COPd	4.30 [-]
	Low temperature application	Tj=7 °C	COPd	6.18 [-]
		Tj=12 °C	COPd	7.68 [-]
		Tj=bivalent temperature	COPd	2.50 [-]
		Tj=operation limit	COPd	2.50 [-]

<b>Bivalent temperature</b>	Tbivalent	-10 [°C]
<b>Operation limit temperatures</b>	TOL	-10 [°C]
	WTOL	- [°C]
<b>Degradation coefficient<sup>2)</sup></b>	Cdh	1.00 [-]

<b>Power consumption in modes other than active mode</b>	Off mode	P <sub>OFF</sub>	0.008 [kW]
	Thermostat-off mode	P <sub>TO</sub>	0.000 [kW]
	Standby mode	P <sub>SB</sub>	0.008 [kW]
	Crankcase heater mode	P <sub>CK</sub>	0.008 [kW]
<b>Supplementary heater<sup>1)</sup></b>	Rated heat output	P <sub>SUP</sub>	- [kW]
	Type of energy input		Electrical

<b>Other items</b>	Capacity control		Variable
	Water flow control		Variable
	Water flow rate		-
	Annual energy consumption	Q <sub>HE</sub>	5055 [kWh]

<sup>1)</sup>For heat pump space heaters and heat pump combination heaters, the rated heat output, Prated, is equal to the design load for heating, Pdesignh, and the rated heat output of a supplementary heater, Psup, is equal to the supplementary capacity for heating, sup(Tj).

<sup>2)</sup>Determined by measurements



## Main test results for medium temperature application at reference heating season average

<b>Model (indoor + outdoor)</b>	Indoor: WH-SDC16H6E5 + Outdoor: WH-UD16HE5
<b>Air-to-water heat pump</b>	Y
<b>Low-temperature heat pump</b>	N
<b>Equipped with supplementary heater</b>	Y
<b>Heat pump combination heater</b>	N

<b>Rated heat output<sup>1)</sup></b>	Prated	13.1 [kW]
<b>Seasonal space heating energy efficiency</b>	$\eta_s$	131.1 [%]
	SCOP	3.35 [-]

<b>Measured capacity for heating for part load at outdoor temperature Tj</b>	Average Climate	Tj=-7 °C	Pdh	9.22 [kW]
	-	Tj=2 °C	Pdh	6.91 [kW]
	Medium temperature application	Tj=7 °C	Pdh	4.98 [kW]
		Tj=12 °C	Pdh	5.93 [kW]
		Tj=bivalent temperature	Pdh	9.31 [kW]
		Tj=operation limit	Pdh	8.88 [kW]

<b>Measured coefficient of performance at outdoor temperature Tj</b>	Average Climate	Tj=-7 °C	COPd	2.19 [-]
	-	Tj=2 °C	COPd	3.41 [-]
	Medium temperature application	Tj=7 °C	COPd	4.71 [-]
		Tj=12 °C	COPd	6.10 [-]
		Tj=bivalent temperature	COPd	2.41 [-]
		Tj=operation limit	COPd	1.81 [-]

<b>Bivalent temperature</b>	Tbivalent	-3 [°C]
<b>Operation limit temperatures</b>	TOL	-10 [°C]
	WTOL	- [°C]
<b>Degradation coefficient<sup>2)</sup></b>	Cdh	0.99 [-]

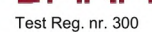
<b>Power consumption in modes other than active mode</b>	Off mode	P <sub>OFF</sub>	0.008 [kW]
	Thermostat-off mode	P <sub>TO</sub>	0.007 [kW]
	Standby mode	P <sub>SB</sub>	0.008 [kW]
	Crankcase heater mode	P <sub>CK</sub>	0.008 [kW]
<b>Supplementary heater<sup>1)</sup></b>	Rated heat output	P <sub>SUP</sub>	- [kW]
	Type of energy input		Electrical

<b>Other items</b>	Capacity control		Variable
	Water flow control		Variable
	Water flow rate		-
	Annual energy consumption	Q <sub>HE</sub>	7854 [kWh]

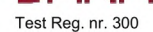
<sup>1)</sup>For heat pump space heaters and heat pump combination heaters, the rated heat output, Prated, is equal to the design load for heating, Pdesignh, and the rated heat output of a supplementary heater, Psup, is equal to the supplementary capacity for heating, sup(Tj).

<sup>2)</sup>Determined by measurements











Test Reg. nr. 300



## Test results of the sound power test

N°	Sound power level LW(A) [dB re 1pW]	Uncertainty (dB) (weighted value)
1	68	0.3
2	68	0.3
3	65	0.3

The uncertainty value is a weighted value using the level and frequency dependant influence for each 1/1-octave level on the final A-weighted sound power level.

The A-weighted total sound power level is determined for the measured frequency range from 100 Hz to 10 kHz.

## Test results of the operating range test

N°	Air inlet dry bulb temperature (°C)	Outlet water temperature (°C)	Result
1	35	55	Passed
2	-20	55	Passed
3	-20	25	Passed

## Test results of the safety tests

N°	Safety test	Result
1	Shutting of the heat transfer medium flows (EN 14511-4 clause 4.4)	Passed
2	Complete power supply failure (EN 14511-4 clause 4.5)	Passed
3	Condensate draining and enclosure sweat test (EN 14511-4 clause 4.6)	Passed
4	Defrosting (EN 14511-4 clause 4.7)	Passed





## Test results for nominal performance test

N°	Test condition	Heating capacity [kW]	COP
1	A7/W35	16.30	4.18
2	A2/W35	13.23	3.22
3	A7/W55	15.54	2.76

## Test results for extra test points

N°	Test condition	Heating capacity – [kW]	COP
1 (part load)	A2/W35	6.34	3.95
2	A7/W45	15.98	3.30
3	A2/W45	12.18	2.68
4	A-7/W35	11.35	2.68
5	A-25/W35	N/A	N/A



Testkammer 1000



Testkammer 1000 - Testkammer 1000





Indikator 100%



Indikator 100% - Indikator 100%





Table with 3 columns: Test results, Reference, and Remarks. The table contains multiple rows of data, including test results for various parameters and reference values.



TEST RESULT		TEST RESULT	
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40
41	42	43	44
45	46	47	48
49	50	51	52
53	54	55	56
57	58	59	60
61	62	63	64
65	66	67	68
69	70	71	72
73	74	75	76
77	78	79	80
81	82	83	84
85	86	87	88
89	90	91	92
93	94	95	96
97	98	99	100





TEST RESULT		TEST RESULT	
1	2	3	4
5	6	7	8
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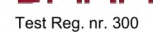
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TEST RESULTS	
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100	1000



Table with 3 columns: Test item, Test method, and Result. The table contains multiple rows of test data, including various mechanical and material properties.





TEST RESULT		TEST RESULT	
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
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TEST RESULT		TEST RESULT	
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97	98	99	100







Measured test results - second series test - test 2

