

TEST REPORT

Report no.:
300-KLAB-20-003



**DANISH
TECHNOLOGICAL
INSTITUTE**

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Page 1 of 12
Init: KAMA/BBJN
File no.: 906730
Enclosures: 1

Customer: 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: Outdoor: WH-UD03JE5 Indoor: WH-ADC0309J3E5
Series no.: Outdoor: 5621201008 Indoor: 5704001319
Production year: Outdoor: 2019.04 Indoor: 2019.05

Dates: Component tested: February 2020

Procedure: See objective (page 2) for list of standards

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, 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: 2020.03.17

Signature:
Kamalathasan Arumugam
B.Sc. Engineer

Co-reader:
Birger Bech Jensen
Senior specialist



 **DANAK**
Test Reg. nr. 300



Objective

The objective of this report is to document the acoustical performance of the outdoor unit with different heat pump settings and setups.

The tests were carried out in the following order (test 1-6):

Sound power measurement without any modification of the outdoor unit.

1. With free mode at A7/W55
2. With free mode and quiet mode 3 at A7/W55

Sound power measurement with a noise reduction box mounted around the outdoor unit.

3. With free mode at A7/W55
4. With free mode and quiet mode 3 at A7/W55

Sound power measurement with a soundproof kit mounted in the outdoor unit (in order to mount the soundproof kit, both the noise reduction box and the enclosure materials of the compressor from the factory must be removed).

5. With free mode at A7/W55
6. With free mode and quiet mode 3 at A7/W55

The sound power level of the outdoor unit according to EN 12102:2017 for average climate at the highest temperature application. The measurement of the sound power level is performed 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).





Test order and conditions of sound power test according to EN12102

N°	Test condition		Heat pump setting			
	Outdoor heat exchanger (dry/wet bulb) (°C)	Indoor heat exchanger (inlet/outlet) (°C)	Compressor speed (Hz)	Fan speed Outdoor (rpm)	Heating capacity (kW)	Power input (kW)
1	7/6	48.7/55	45 - 46	730 - 7400	3.20	1.1
2	7/6	51.6/55	28 - 29	290 - 310	1.65	0.72
3	7/6	48.8/55	45 - 46	730 - 7400	3.10	1.1
4	7/6	51.6/55	28 - 29	290 - 310	1.62	0.71
5	7/6	48.7/55	45 - 46	730 - 7400	3.15	1.1
6	7/6	51.6/55	28 - 29	290 - 310	1.65	0.71

All measurements were done with a water flow rate of 450 (l/h), which is the minimum flow rate of the unit.

Test results of sound power test according to EN12102

N°	Sound power level LW(A) [dB re 1pW]	Uncertainty (dB) (weighted value)
1	55.8	0.5
2	49.1	1.0
3	48.4	0.5
4	43.2	1.5
5	54.8	0.5
6	49.8	1.0

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.

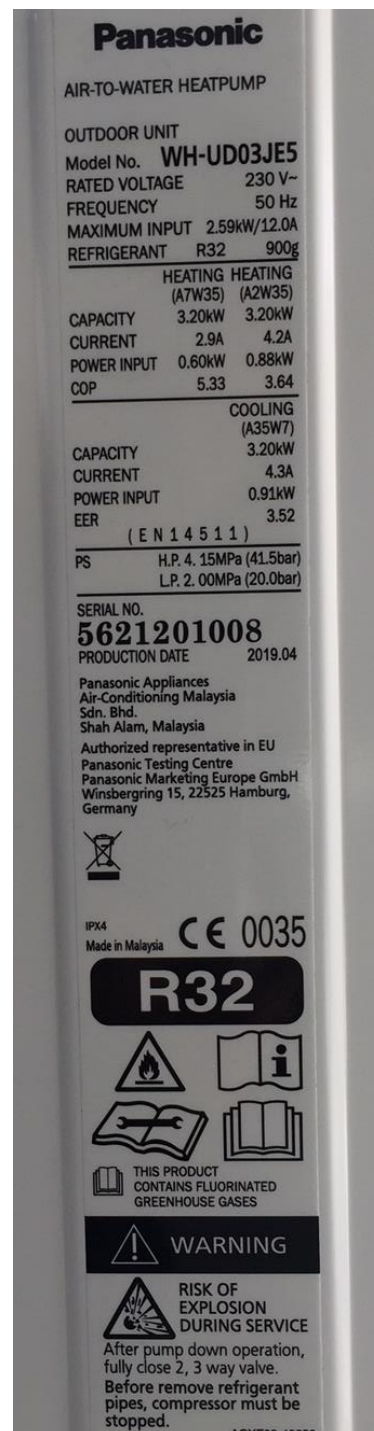




Outdoor unit



Outdoor unit rating plate





Indoor unit



Indoor unit rating plate

Panasonic

AIR-TO-WATER HYDROMODULE + TANK

Model No.	WH-ADC0309J3E5	POWER SUPPLY 1 (HEAT PUMP)	
OUTDOOR UNIT	WH-UD03JE5	RATED VOLTAGE	230V~
	WH-UD05JE5	RATED FREQUENCY	50Hz
	WH-UD07JE5	POWER SUPPLY 2 (BACKUP HEATER)	
	WH-UD09JE5	RATED VOLTAGE	230V~
		RATED FREQUENCY	50Hz
		MAXIMUM POWER	3.00kW
		MAXIMUM CURRENT	13.00A
		MAX. WORKING PRESSURE	MPa (Bar)
		- SPACE HEAT/COOL	0.3 (3.0)
		- TANK CIRCUIT	0.8 (8.0)
		TANK UNIT CAPACITY (NETT)	185L

Panasonic AVC Networks Czech, s.r.o.
U Panasoniku 1, 320 84 Plzeň, Czech Republic
Assembled in the Czech Republic
Authorized representative in EU
Panasonic Testing Centre
Panasonic Marketing Europe GmbH
Winsberggring 15, 22525 Hamburg, Germany

SERIAL NO. **5704001319**

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IP21

ACXF09-04700




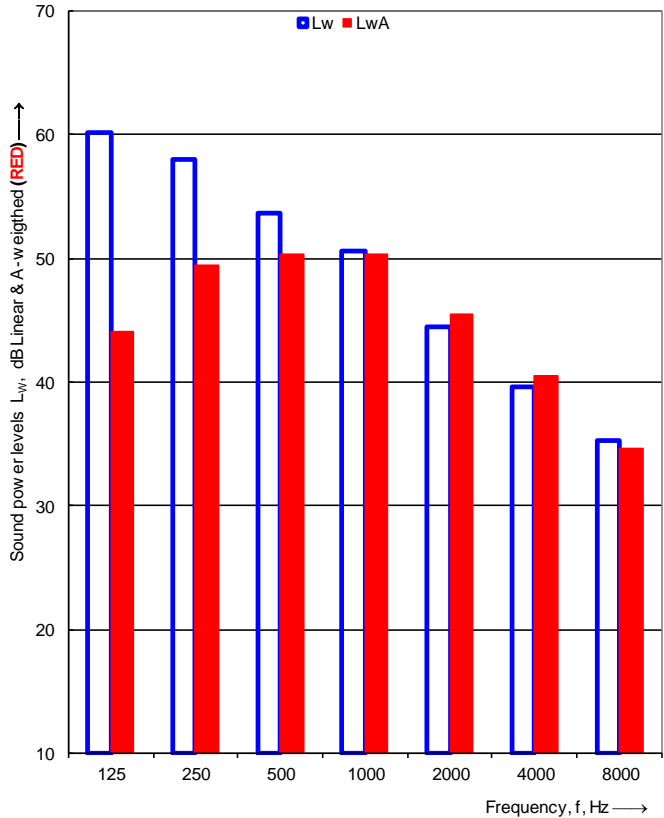
R32

PRODUCTION DATE 2019.05








Detailed test results of sound power measurement N° 1

 		Sound power levels according to ISO 3743-1:2010		 TEKNOLOGISK INSTITUT																																																																			
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms																																																																							
Client:	Panasonic Europe GmbH			Date of test: 05-02-2020																																																																			
Object:	Type: Split Air to water heat pump Model: WH-UD03JE5 (OD) + WH-ADC0309J3E5 (ID)																																																																						
Mounting conditions:	The outdoor unit is standing free on four 5.5 cm thick heavy concrete tiles placed on a vibration damping mat, which is placed on a water drop tray. The water drop tray is located on a 2.5 cm thick wooden board laying on the floor. The outdoor unit is mounted on the supporting metal support frame using 4 vibration isolators. The sound power measurement on outdoor unit only without any modification.																																																																						
Operating conditions:	A7/W48.7-55, Compressor speed: 45 - 46[Hz], Heating capacity: 3.2 [kW], Power input: 1.1 [kW], Water flow rate: 450 [l/h], Fan speed : 730 - 740 [rpm], dp_water : 111 [mbar]																																																																						
Static pressure:	1028 kPa			<u>Reference box:</u>																																																																			
Air temperature:	7.0 °C			L1:	0.8 m																																																																		
Relative air humidity:	85.0 %			L2:	0.3 m																																																																		
Test room volume:	102.8 m³	Room:	Room 1	L3:	0.6 m																																																																		
Area, S, of test room:	138.9 m²			Volume:	0.1 m³																																																																		
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Sound power level L_w(A): 55.8 dB [re 1pW]																																																																							
Name of test institute:	DTI																																																																						
No. of test report:	300-KLAB-20-003																																																																						
Date:	05-02-2020																																																																						



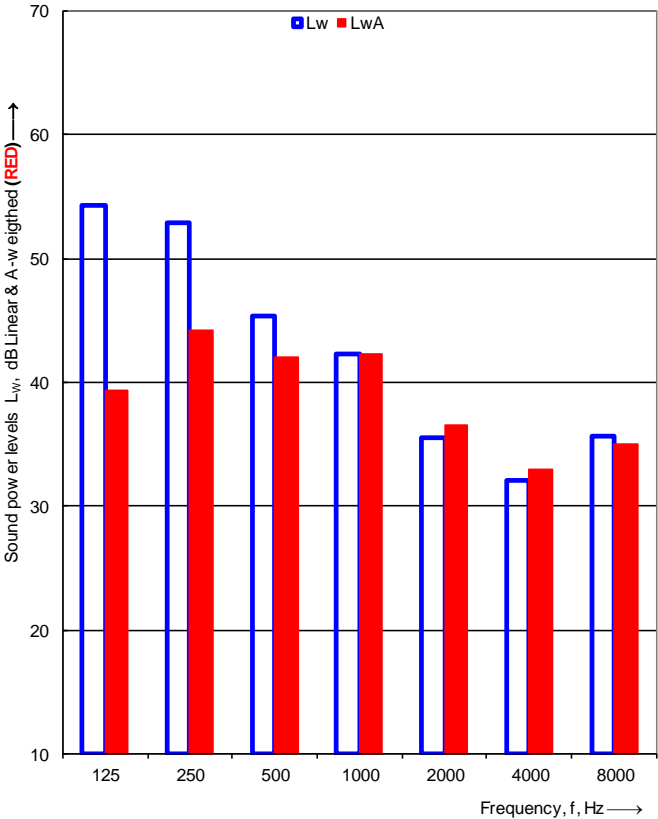


Detailed test results of sound power measurement N° 2

 		Sound power levels according to ISO 3743-1:2010		 TEKNOLOGISK INSTITUT	
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms					
Client:		Panasonic Europe GmbH		Date of test: 05-02-2020	
Object:		Type: Split Air to water heat pump Model: WH-UD03JE5 (OD) + WH-ADC0309J3E5 (ID)			
Mounting conditions:		The out door unit is standing free on four 5.5 cm thick heavy concrete tiles placed on a vibration damping mat, which is placed on a water drop tray. The water drop tray is located on a 2.5 cm thick wooden board laying on the floor. The outdoor unit is mounted on the supporting metal support frame using 4 vibration isolators. The sound power measurement on outdoor unit only without any modification.			
Operating conditions:		A7/W51.6-55, Quiet mode 3, Compressor speed: 28 - 29[Hz], Heating capacity: 1.65 [kW], Power_input: 0.72 [kW], Water flow rate: 450 [l/h], Fan_speed : 290 - 310 [rpm], dp_water : 111			
Static pressure:		1028 kPa		<u>Reference box:</u>	
Air temperature:		7.0 °C		L1: 0.8 m	
Relative air humidity:		85.0 %		L2: 0.3 m	
Test room volume:		102.8 m³		L3: 0.6 m	
Area, S, of test room:		138.9 m²		Volume: 0.1 m³	
Room:		Room 1			

Frequency f [Hz]	L _w 1/3 octave [dB]	1/1 oct [dB]
100	44.7	
125	51.2	54.3
160	50.4	
200	47.3	
250	50.1	52.9
315	45.7	
400	40.6	
500	42.4	45.4
630	37.6	
800	36.8	
1000	36.2	42.2
1250	38.9	
1600	33.7	
2000	28.2	35.5
2500	27.3	
3150	27.0	
4000	27.3	32.0
5000	27.4	
6300	32.7	
8000	31.9	35.6
10000	23.3	

¹ Too high






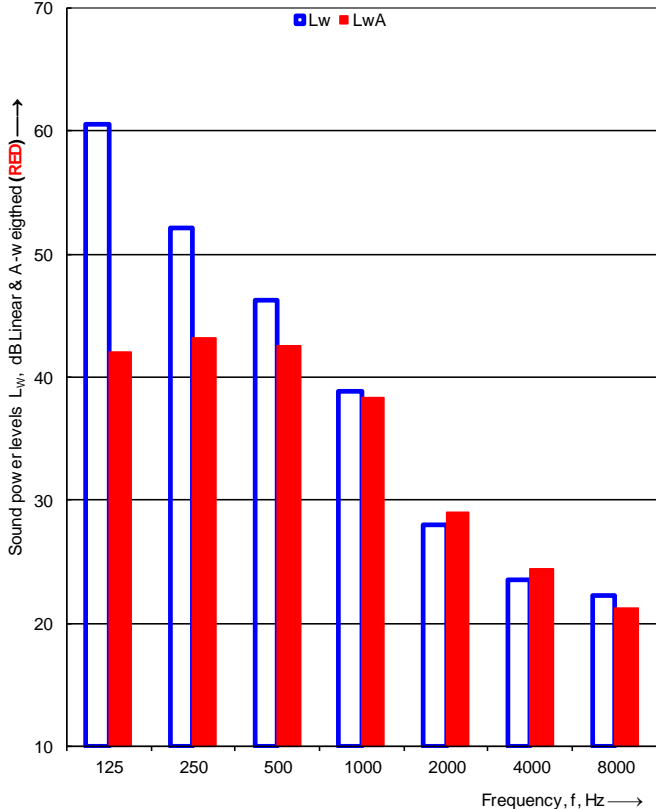
Sound power level L_w(A): 49.1 dB [re 1pW]

Name of test institute:	DTI
No. of test report:	300-KLAB-20-003
Date:	05-02-2020








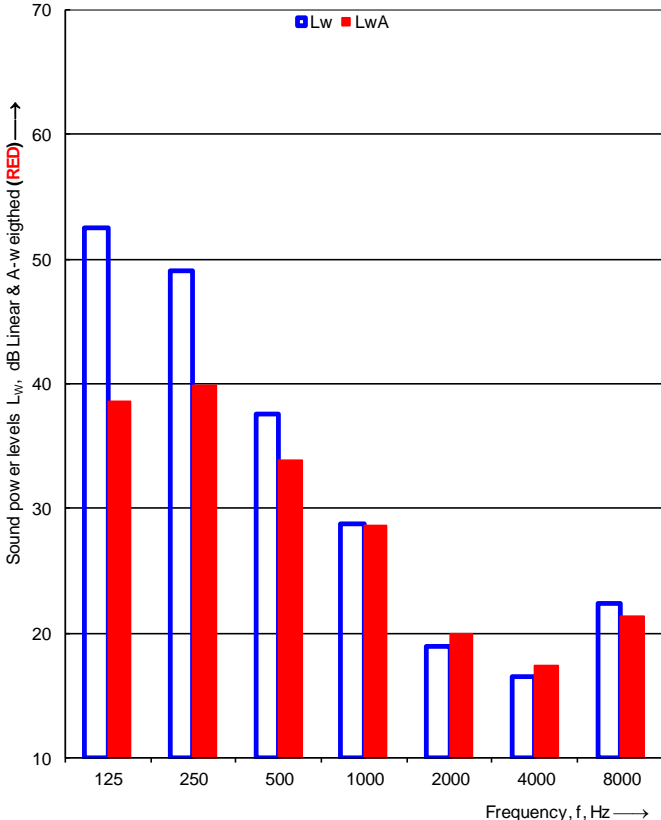
Detailed test results of sound power measurement N° 3

 		Sound power levels according to ISO 3743-1:2010		 TEKNOLOGISK INSTITUT																																																																			
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms																																																																							
Client:		Panasonic Europe GmbH		Date of test: 10-03-2020																																																																			
Object:		Type: Split Air to water heat pump Model: WH-UD03JE5 (OD) + WH-ADC0309J3E5 (ID)																																																																					
Mounting conditions:		The out door unit is standing free on two pieces of heavy concrete tiles (90x90x10cm) placed on the floor. The sound power measurement on outdoor unit only without any modification. Test with a noise reduction box mounted around the outdoor unit																																																																					
Operating conditions:		A7/W48.9-55, Compressor speed: 45 - 46[Hz], Heating capacity: 3.1 [kW], Power_input: 1.1 [kW], Water flow rate: 450 [l/h], Fan_speed : 730 - 740 [rpm], dp_water : 168 [mbar]																																																																					
Static pressure:		1000 kPa		<u>Reference box:</u>																																																																			
Air temperature:		7.0 °C		L1: 0.8 m																																																																			
Relative air humidity:		85.0 %		L2: 0.3 m																																																																			
Test room volume:		102.8 m³		Room: Room 1																																																																			
Area, S, of test room:		138.9 m²		L3: 0.6 m																																																																			
				Volume: 0.1 m³																																																																			
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Sound power level L_w(A): 48.4 dB [re 1pW]																																																																							
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Date:		10-03-2020																																																																					








Detailed test results of sound power measurement N° 4

 		Sound power levels according to ISO 3743-1:2010		 TEKNOLOGISK INSTITUT																																																																			
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms																																																																							
Client:		Panasonic Europe GmbH		Date of test: 10-02-2020																																																																			
Object:		Type: Split Air to water heat pump Model: WH-UD03JE5 (OD) + WH-ADC0309J3E5 (ID)																																																																					
Mounting conditions:		The out door unit is standing free on four 5.5 cm thick heavy concrete tiles placed on a vibration damping mat, which is placed on a water drop tray. The water drop tray is located on a 2.5 cm thick wooden board laying on the floor. The sound power measurement on outdoor unit only. Test with a noise reduction box mounted around the out unit.																																																																					
Operating conditions:		A7/W51.6-55, Quiet mode 3, Compressor speed: 28 - 29[Hz], Heating capacity: 1.62 [kW], Power_input: 0.71 [kW], Water flow rate: 450 [l/h], Fan_speed : 290 - 310 [rpm], dp_water : 115																																																																					
Static pressure:		973 kPa		<u>Reference box:</u>																																																																			
Air temperature:		7.0 °C		L1: 0.8 m																																																																			
Relative air humidity:		85.0 %		L2: 0.3 m																																																																			
Test room volume:		102.8 m³		Room: Room 1																																																																			
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No. of test report:		300-KLAB-20-003																																																																					
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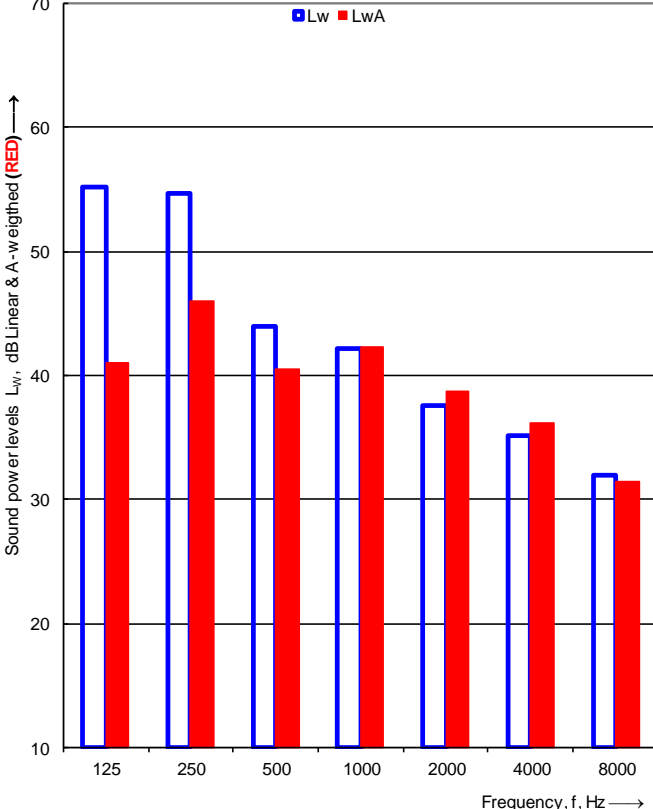
Detailed test results of sound power measurement N ° 5

 		Sound power levels according to ISO 3743-1:2010		 TEKNOLOGISK INSTITUT	
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms					
Client:		Panasonic Europe GmbH		Date of test: 12-02-2020	
Object:		Type: Split Air to water heat pump Model: WH-UD03JE5 (OD) + WH-ADC0309J3E5 (ID)			
Mounting conditions:		The out door unit is standing free on four 5.5 cm thick heavy concrete tiles placed on a vibration damping mat, which is placed on a water drop tray. The water drop tray is located on a 2.5 cm thick wooden board laying on the floor. The outdoor unit is mounted on the supporting metal support frame using 4 vibration isolators. The sound power measurement on outdoor unit only. Test with a sound proof kit.			
Operating conditions:		A7/W48.7-55, Compressor speed: 45 - 46[Hz], Heating capacity: 3.15 [kW], Power input: 1.1 [kW], Water flow rate: 450 [l/h], Fan_speed : 730 - 740 [rpm], dp_water : 111 [mbar]			
Static pressure:		1028 kPa		<u>Reference box:</u>	
Air temperature:		7.0 °C		L1: 0.8 m	
Relative air humidity:		85.0 %		L2: 0.3 m	
Test room volume:		102.8 m³		L3: 0.6 m	
Area, S, of test room:		138.9 m²		Volume: 0.1 m³	
Room:		Room 1			
Frequency		L _w		L _w & A-weighted (RED)	
f [Hz]		1/3 octave [dB]		1/1 oct [dB]	
100		55.7			
125		50.5		58.0	
160		51.5			
200		54.4			
250		54.8		58.3	
315		50.2			
400		47.4			
500		45.8		51.8	
630		47.7			
800		46.6			
1000		43.8		49.5	
1250		42.8			
1600		39.9			
2000		37.1		42.6	
2500		35.0			
3150		33.9			
4000		34.6		39.4	
5000		35.3			
6300		31.8			
8000		29.9		34.4	
10000		24.7			
¹ Too high					
Sound power level L_w(A): 54.8 dB [re 1pW]					
Name of test institute: DTI					
No. of test report: 300-KLAB-20-003					
Date: 12-02-2020					





Detailed test results of sound power measurement N° 6

 		Sound power levels according to ISO 3743-1:2010																																																																					
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms																																																																							
Client:		Panasonic Europe GmbH		Date of test: 12-02-2020																																																																			
Object:		Type: Split Air to water heat pump Model: WH-UD03JE5 (OD) + WH-ADC0309J3E5 (ID)																																																																					
Mounting conditions:		The outdoor unit is standing free on four 5.5 cm thick heavy concrete tiles placed on a vibration damping mat, which is placed on a water drop tray. The water drop tray is located on a 2.5 cm thick wooden board laying on the floor. The outdoor unit is mounted on the supporting metal support frame using 4 vibration isolators. The sound power measurement on outdoor unit only. Test with a sound proff kit.																																																																					
Operating conditions:		A7/W51.6-55, Quiet mode 3, Compressor speed: 28 - 29[Hz], Heating capacity: 1.64 [kW], Power input: 0.71 [kW], Water flow rate: 450 [l/h], Fan speed: 290 - 310 [rpm], dp water: 111																																																																					
Static pressure:		1028 kPa		<u>Reference box:</u>																																																																			
Air temperature:		7.0 °C		L1: 0.8 m																																																																			
Relative air humidity:		85.0 %		L2: 0.3 m																																																																			
Test room volume:		102.8 m³		L3: 0.6 m																																																																			
Area, S, of test room:		138.9 m²		Volume: 0.1 m³																																																																			
Room:		Room 1																																																																					
<table border="1"><thead><tr><th>Frequency f [Hz]</th><th>L_w 1/3 octave [dB]</th><th>1/1 oct [dB]</th></tr></thead><tbody><tr><td>100</td><td>43.8</td><td></td></tr><tr><td>125</td><td>49.8</td><td>55.2</td></tr><tr><td>160</td><td>53.3</td><td></td></tr><tr><td>200</td><td>49.2</td><td></td></tr><tr><td>250</td><td>52.2</td><td>54.7</td></tr><tr><td>315</td><td>46.5</td><td></td></tr><tr><td>400</td><td>39.4</td><td></td></tr><tr><td>500</td><td>40.3</td><td>43.9</td></tr><tr><td>630</td><td>37.1</td><td></td></tr><tr><td>800</td><td>34.8</td><td></td></tr><tr><td>1000</td><td>37.9</td><td>42.1</td></tr><tr><td>1250</td><td>38.5</td><td></td></tr><tr><td>1600</td><td>35.0</td><td></td></tr><tr><td>2000</td><td>30.5</td><td>37.6</td></tr><tr><td>2500</td><td>31.6</td><td></td></tr><tr><td>3150</td><td>32.6</td><td></td></tr><tr><td>4000</td><td>29.8</td><td>35.1</td></tr><tr><td>5000</td><td>26.8</td><td></td></tr><tr><td>6300</td><td>29.3</td><td></td></tr><tr><td>8000</td><td>28.0</td><td>32.0</td></tr><tr><td>10000</td><td>19.6¹</td><td></td></tr></tbody></table>		Frequency f [Hz]	L _w 1/3 octave [dB]	1/1 oct [dB]	100	43.8		125	49.8	55.2	160	53.3		200	49.2		250	52.2	54.7	315	46.5		400	39.4		500	40.3	43.9	630	37.1		800	34.8		1000	37.9	42.1	1250	38.5		1600	35.0		2000	30.5	37.6	2500	31.6		3150	32.6		4000	29.8	35.1	5000	26.8		6300	29.3		8000	28.0	32.0	10000	19.6 ¹					
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Appendix 1: Test Procedure

The measurements of the emitted sound power level from the heat pump are carried out according to the following:

- DS/EN 14511:2013
- EN 12102:2017
- DS/EN 3743/1

The basic acoustic measurement standard DS/EN 3743-1 is a comparison method using a calibrated reference sound source. Two series of sound pressure measurements are made under exactly the same acoustic conditions, e.g. the same microphone positions, temperature and air humidity. The calibrated sound power levels are known for the reference sound source at each frequency band, and they are used in the estimation of the acoustical correction factor for the calculation of the sound power emitted from the tested heat pump. The background noise levels are measured and used for relevant corrections.

The final total A-weighted sound power level is based on measurements and calculations in 1/3-octave levels, which then are summed into 1/1-octave levels. The uncertainty is estimated on the weighted standard deviations in 1/1-octave levels.

The actual microphone positions and correction values are saved in data files linked to the complete project documentation according to the DANAK-accreditation.

The complete measurement system is documented and regularly calibrated according to DANAK.

The detailed description of the measurement method is given in Danish in the quality database system "QA Web" at Danish Technological Institute, which is accessible by DANAK.

