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ČSN EN ISO/IEC 17025:2018

Strojírenský zkušební ústav, s.p. Zkušební laboratoř
(Engineering Test Institute, Public Enterprise, Testing Laboratory)
Hudcova 424/56b, Medlánky, 621 00 Brno

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TEST REPORT

39-17512/H

Product: Outdoor Air/Water Heat pump - monobloc

Type designation: HPMO2-8

Customer: Kospel spółka z o.o.
ul. Olchowa 1
75-136 Koszalin
POLAND

Manufacturer: Kospel spółka z o.o.
ul. Olchowa 1
75-136 Koszalin
POLAND

Report issue date: 2024-03-28

Distribution list: 1 copy to the Customer
1 copy to the Engineering Test Institute

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SP-2021-000012_1_12

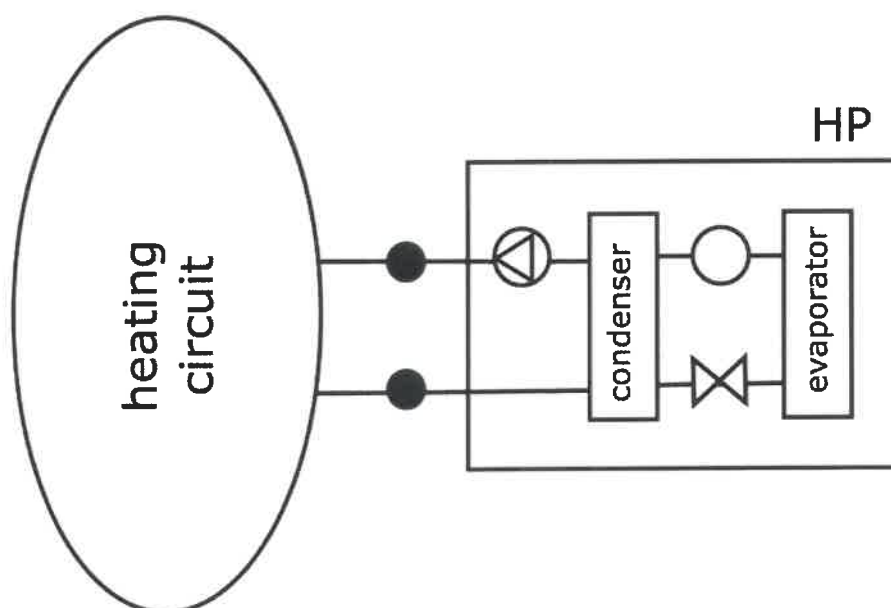
I. Description of product tested

The Heat pump **HPMO2-8** supplied by the company **Kospel spółka z o.o.** is structurally adapted to operate in air/water system. Device is designed as monobloc placed outdoor. Outdoor unit is connected by water pipes. Refrigerant R32 is used with charge 1.1 kg. Power supply is a one-phase. Heat pump is able to work in heating and cooling mode. Heat pump is working with variable flow rate.

Main components of the outdoor unit **HPMO2-8**:

- Serial number HNG08EU01Z00148
- Cuboid shape with dimensions 1170 × 400 × 770 mm (W × D × H)
- Frame and casing made of varnished steel sheets and plastics
- L-shaped evaporator, 2 rows, dimensions 960 × 40 × 730 mm (W × D × H), spacing 1.5 mm
- Plate condenser, dimensions 90 × 40 × 140 mm (W × D × H) including insulation
- Plate condenser, dimensions 130 × 60 × 530 mm (W × D × H) including insulation
- Compressor Panasonic 9RD138ZBA2J N0R14ED F0002288
- Refrigerant R32 (1.1 kg)
- Electric expansion valve
- 4-way reversing valve Sanhua SHF-7H-34U-P
- Refrigerant accumulator
- Axial fan Ø570 mm
- DC brushless motor ZWS150-F2 DC310V KBFN02522062121545
- Pressure sensors
- Temperature sensors
- Refrigerant pipes

Scheme:



Photodocumentation:



Heat pump **HPMO2-8** – outdoor unit
– Front view –



Heat pump **HPMO2-8** – outdoor unit
– Back view –



not fully recognized



Heat pump **HPMO2-8** – outdoor unit
– Compressor label –

Heat pump **HPMO2-8** – outdoor unit
– Label –



Heat pump **HPMO2-8** – outdoor unit
– Without cover –

II. Sample tested

SZU reg. no.	Product name	Date of submission
1212.24.39620.001	HPMO2-8	2024-03-01

The visual inspection, tests and verification were carried out by Ing. Antonín Kolbábek, Ph.D. at the test station of SZU.

The tests were performed using measuring and testing equipment with valid calibration.

III. Measuring and test equipment:

No.	Description	Inventory number
1.	Electrical energy meter	022370/1
2.	Flow meter Krohne Optiflux	022370/5
3.	Flow meter Krohne Optiflux	022370/4
4.	Barometer	022370/7
5.	Differential pressure gauge	MaR01_Tl
6.	Temperature-humidity meter HC2-IC305	022370/10
7.	Temperature-humidity meter HC2-IC305	022370/11
8.	Thermometers	022370/13
9.	Tape measure	ME 475
10.	Multi-analyser SINUS SoundBook MK2	000-000-000-875/1
11.	Microphone pair G.R.A.S. 40 AK, wind deflector	000-000-000-875/2
12.	Calibrator G.R.A.S. 42AG	000-000-000-875/3

No.	Test objective	Requirement	Method of test	Documentation	Test evaluation/ verification *
1.	Calculation of sound power level	Art. 9	ČSN ISO 9614-2:1997	Page No. 6-11	+
2.	Acoustic measurements – Sound power level	Art. 8	ČSN EN 12102-1:2023	Page No. 5-11	+

*) **Evaluation / statement of conformity:**

+ Requirement fulfilled
0 Not applicable

- Requirement not fulfilled
x Not evaluated

The stated extended measurement uncertainties are calculated as a factor of the measurement uncertainty and the extension coefficient $k=2$, corresponding to the coverage certainty of 95% as regards standard classification.

Test objective:	Heating and cooling equipment
Exact name of the test procedure:	2.136* - Measurement of noise characteristics
Test method:	ČSN EN 12102-1:2023; ČSN ISO 9614-2:1997
Sample tested:	Air/Water Heat pump HPMO2-8
Measuring equipment used:	see Chapter III
Place of test:	Engineering Test Institute, Hudcova 424/56b, 621 00 Brno, CZ

Measurement uncertainty:

Measured quantity	Unit	Uncertainty of measurement	Evaluation
Liquid			
- temperature difference (dT)	[K]	± 0.15 K	fulfilled
- temperature inlet/outlet	[°C]	± 0.15 K	fulfilled
- volume flow	[m ³ /s]	± 1 %	fulfilled
- static pressure difference	[kPa]	± 1 kPa ($\Delta p \leq 20$ kPa) or ± 5 % ($\Delta p > 20$ kPa)	fulfilled
Air			
- dry bulb temperature	[°C]	± 0.2 K	fulfilled
- wet bulb temperature	[°C]	± 0.4 K	fulfilled
- volume flow	[m ³ /s]	± 5 %	not applied
- static pressure difference	[Pa]	± 5 Pa ($\Delta p \leq 100$ Pa) or ± 5 % ($\Delta p > 100$ Pa)	not applied
Refrigerant			
- pressure at compressor outlet	[kPa]	± 1 %	not applied
- temperature	[°C]	± 0.5 K	not applied
Concentration (in volume)			
- heat transfer medium	[%]	± 2	not applied
Electrical quantities			
- electric power	[W]	± 1 %	fulfilled
- voltage	[V]	± 0.5 %	fulfilled
- current	[A]	± 0.5 %	fulfilled
- electric energy	[kWh]	± 1 %	not applied
Compressor rotational speed	[min ⁻¹]	± 0.5 %	not applied
The heating or cooling capacities measured on the liquid side shall be determined within a maximum uncertainty of 5 % independent of the individual uncertainties of measurement including the uncertainties on the properties of fluids.			fulfilled

Note:

Comment to abbreviated marking: e.g. A7/W55

A (air) 7 (input source air temperature in °C) / W (water), 55 (output heating water temperature in °C)

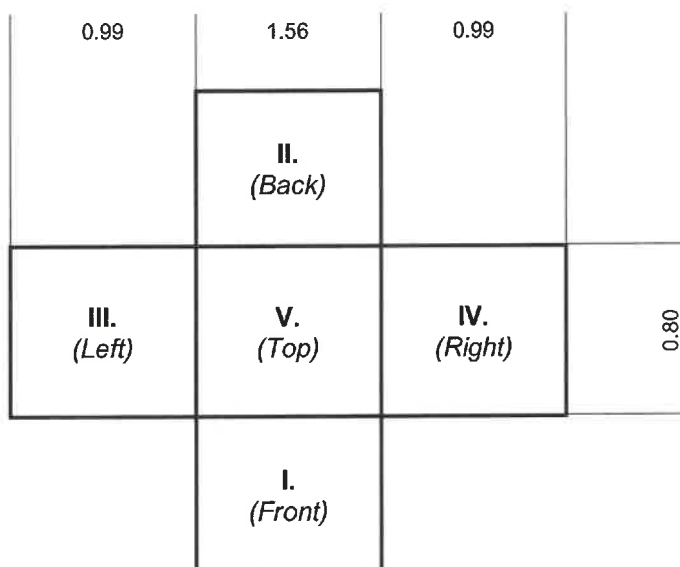
a) Measurement surface

Tested samples were surrounded by a cuboid-shape measuring surface set at the distance d [m].

Test Sample: Air/Water Heat pump HPMO2-8			
Distance from the test sample	d	[m]	0.20
Height of measurement surface	h	[m]	0.99
Width of measurement surface	w	[m]	1.56
Depth of measurement surface	l	[m]	0.80
Total measurement surface area*	S	[m ²]	5.92
Minimal measuring time per surface	t_M	[s]	90.00

Sketch of measurement surface (not to scale):

Air/Water Heat pump **HPMO2-8**
– Outdoor unit –



b) Acoustic environment

The testing sample was placed inside a climate chamber (with dimensions shown below); sound absorbing panels were mounted on the walls and the ceiling of the chamber. The outdoor unit was placed in the middle of the chamber, at a sufficient distance from the surrounding walls, and was rotated by about $5 \pm 10^\circ$.

Climate-acoustic chamber <i>(corresponds to free field over a reflecting plane)</i>			
Width of testing room	l_1	[m]	6.00
Length of testing room	l_2	[m]	4.00
Height of testing room	l_3	[m]	2.30

c) Measured and calculated data – General overview:

Test sample			Air/Water Heat pump HPMO2-8
The measured values are in accordance with ČSN EN 12102-1:2023			YES
The measured values are in accordance with ČSN EN ISO 9614-2:1997			YES
Operation mode			Heating
Specification of the assessment condition			A7/W55*
Type of HP capacity regulation			Inverter
Control settings of heat pump / compressor			34 Hz
Fan speed settings			AUTO
Date of testing (YYYY-MM-DD)			2024-03-19
Reference air temperature	t_{amb}	[°C]	7.2
Relative humidity of air	RH	[%]	83.1
Ambient pressure	p_{amb}	[hPa]	990.0
Overall sound power level (linear)	L_W	[dB]	55.4 ± 1.5
Overall A-weighted sound power level	L_{WA}	[dB(A)]	49.4 ± 1.5
Accuracy class			Engineering (grade 2)

*) Comment to abbreviated marking: i.e. A7/W55
A (water), 7 (input source liquid temperature in °C) / W (water), 55 (outlet heating water temperature in °C)

1B) Measurement results – one-third octave bands

Air/Water Heat pump HPMO2-8 ; Outdoor unit at A7/W55 / Compressor @ 34 Hz, Fan @ AUTO /	Engineering (Grade 2)
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f_m [Hz]	Criterion 1			Criterion 2		Criterion 3	All criteria passed?	L_w [dB]	L_{WA} [dB(A)]	U [dB]	Evaluation
	L_d	F_{pl}	$L_d > F_{pl}$	$F_{+/-}$	$F_{+/-} \leq 3$	$L_{W(1)} - L_{W(2)} \leq 5$					
100	21.3	3.6	YES	0.0	YES	YES	YES	44.4	25.3	± 3.0	c
125	20.5	2.7	YES	0.0	YES	YES	YES	48.8	32.7	± 3.0	c
160	20.6	2.9	YES	0.0	YES	YES	YES	42.5	29.1	± 3.0	c
200	20.8	3.9	YES	0.0	YES	YES	YES	41.4	30.5	± 2.0	c
250	20.8	6.3	YES	0.0	YES	YES	YES	43.5	34.9	± 2.0	passed
315	21.1	3.9	YES	0.0	YES	YES	YES	42.9	36.3	± 2.0	passed
400	21.3	3.0	YES	0.0	YES	YES	YES	39.6	34.8	± 1.5	passed
500	21.4	2.8	YES	0.0	YES	YES	YES	44.3	41.1	± 1.5	passed
630	21.3	2.9	YES	0.0	YES	YES	YES	41.1	39.2	± 1.5	passed
800	21.3	4.3	YES	0.0	YES	YES	YES	37.0	36.2	± 1.5	passed
1000	20.6	4.0	YES	0.0	YES	YES	YES	41.9	41.9	± 1.5	passed
1250	21.6	3.3	YES	0.0	YES	YES	YES	43.7	44.3	± 1.5	passed
1600	20.6	3.2	YES	0.0	YES	YES	YES	35.0	36.0	± 1.5	passed
2000	20.0	3.5	YES	0.0	YES	YES	YES	28.7	29.9	± 1.5	c
2500	20.1	3.0	YES	0.0	YES	YES	YES	24.7	26.0	± 1.5	c
3150	20.1	5.4	YES	0.6	YES	YES	YES	21.6	22.8	± 1.5	c
4000	19.9	6.6	YES	0.9	YES	YES	YES	18.7	19.7	± 1.5	c
5000	19.5	9.3	YES	0.0	YES	YES	YES	13.7	14.2	± 1.5	c
6300	19.5	13.9	YES	2.1	YES	YES	YES	11.6	11.5	± 2.5	c
Total								55.4	49.4	± 1.5	

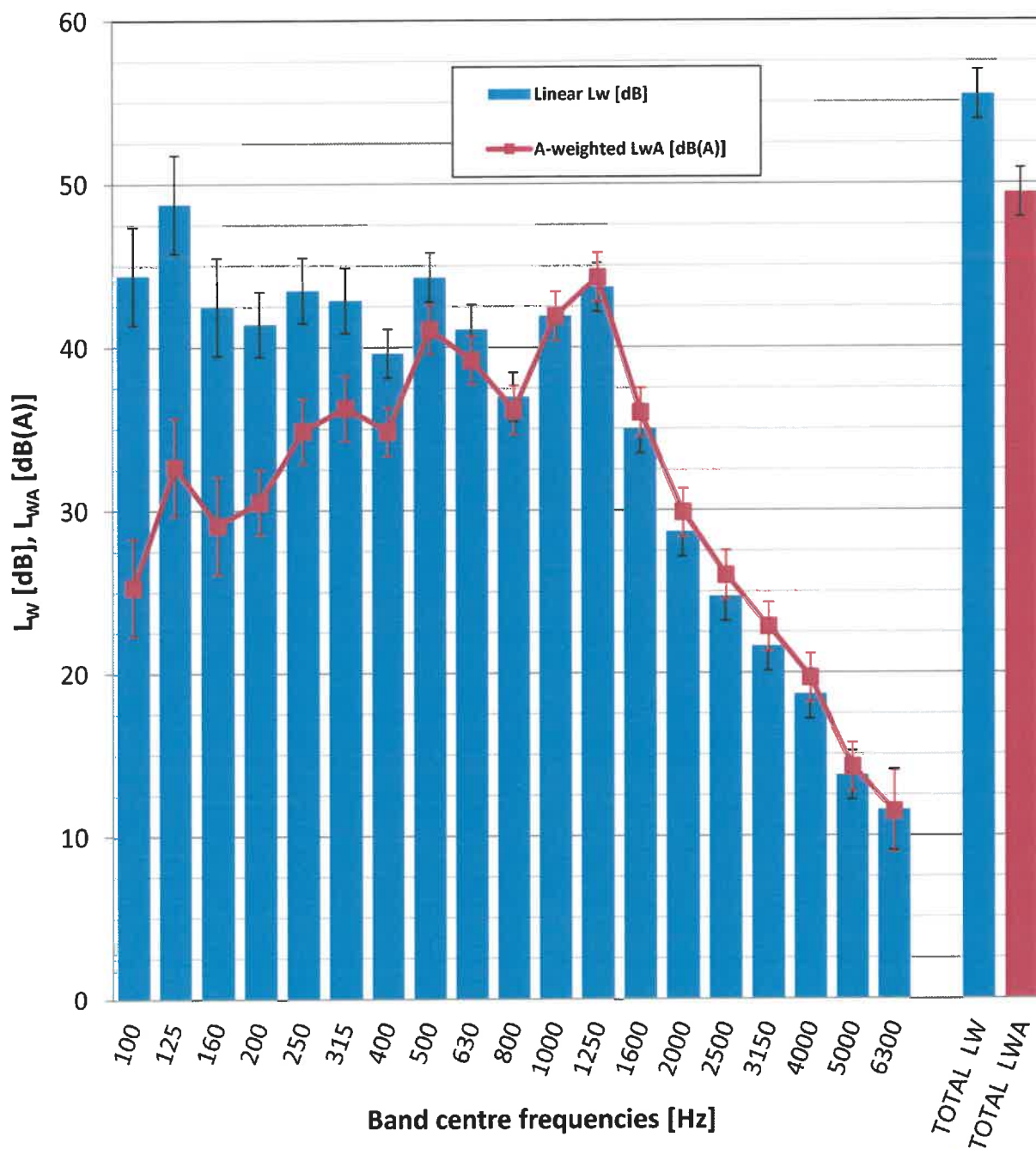
Legend:

- passed* Third frequency bands with this description are significant for calculation of A-weighted total sound power level L_{WA} . Required accuracy class is fulfilled in this band.
- not passed* Third frequency bands with this description are significant for calculation of A-weighted total sound power level L_{WA} . Required accuracy class is not fulfilled in this band.
- c* Third frequency bands with this description are not significant for calculating of A-weighted total sound power level L_{WA} . These bands are evaluated in calculating of L_{WA} .
- nc* Third frequency bands with this description are not significant for calculating of A-weighted total sound power level L_{WA} . These bands are not evaluated in calculating of L_{WA} .

Spectrum of Sound power level L_w – one-third octave bands

Air/Water Heat pump **HPMO2-8**; Outdoor unit at A7/W55
/ Compressor @ 34 Hz, Fan @ AUTO /

**Engineering
(Grade 2)**



Tested by: Ing. Antonín Kolbábek, Ph.D.

Date: 2024-03-19

Signed: 

Reviewed and approved by: Ing. Petr Lindovský

Date: 2024-03-20

Signed: 

V. A list of referenced documents

- Order of 2024-01-15 (Order reg. no. B-81200, received on 2024-01-15)
- Contract B-81200/39
- ČSN EN 12102-1:2023 - Air conditioners, liquid chilling packages, heat pumps, process chillers and dehumidifiers with electrically driven compressors - Determination of the sound power level - Part 1: Air conditioners, liquid chilling packages, heat pumps for space heating and cooling, dehumidifiers and process chillers
- ČSN ISO 9614-2:1997 - Acoustics - Determination of sound power levels of noise sources using sound intensity - Part 2: Measurement by scanning
- ČSN EN 14511-2:2023 - Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors - Part 2: Test conditions
- ČSN EN 14511-3:2023 - Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors - Part 3: Test methods
- ČSN EN 14511-4:2023 - Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors - Part 4: Requirements
- ČSN EN 14825:2023 - Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling, commercial and process cooling - Testing and rating at part load conditions and calculation of seasonal performance
- ČSN EN 16147+A1:2023 - Heat pumps with electrically driven compressors - Testing, performance rating and requirements for marking of domestic hot water units
- Background of the SZU task no. 39-17512
- Record measurement file 39-17512-H.zip

Test Report compiled by: Ing. Ondřej Bilkovič



Test Report approved by: Ing. Antonín Kolbábek, Ph.D.
Hydraulic and Pressure Equipment Manager



– End of Test Report –