

OŚWIADCZENIE

Producent **BERETTA/RUG RIELLO Unghereze** oświadcza, iż pompy ciepła
GRZEWCZE S.A.

1) HYDRO UNIT M 014
Oznaczenie typ identyfikator modelu

2) HYDRO UNIT M 016
Oznaczenie typ identyfikator modelu

3) HYDRO UNIT M 012T
Oznaczenie typ identyfikator modelu

4) HYDRO UNIT M 014T
Oznaczenie typ identyfikator modelu

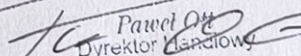
5) HYDRO UNIT M 016T
Oznaczenie typ identyfikator modelu

Należą do jednego podtypu w danym typoszeregu i spełniają łącznie następujące warunki:

- identyczna konstrukcja obiegu chłodniczego, ten sam czynnik chłodniczy/roboczy;
- ten sam producent, typ i liczba sprężarek;
- ten sam typ elementu rozprężnego;
- ten sam typ skraplacza;
- ten sam typ parownika;
- ten sam typ procesu odszraniania;
- ten sam sterownik i zasada sterowania wydajnością;
- ten sam producent, typ i liczba wentylatorów parownika (w przypadku powietrznych pomp ciepła) i zasada sterowania wydajnością (stała, zmienna lub stopniowana regulacja prędkości obrotowej);
- urządzenia z i bez zaworu czterodrogowego nie mogą być zaliczone do tego samego typoszeregu.

Toniń, 11-06-2024
Miejscowość, data

RUG
RIELLO URZĄDZENIA GRZEWCZE S.A.


Paweł Ott
Dyrektor Handlowy
Podpis osoby upoważnionej

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RAPORT Z BADANIA

Raport nr: 300-KLAB-23-039-6

Strona 1 z 44
Ref.: PRES/RTHI
Nr pliku: 226006
Załącznik: 2

Klient: Spółka: GD MIDEA HEATING & VENTILATING EQUIPMENT CO., LTD.
Adres: Penglai Industry Road, Beijiao
Miasto: Shunde, Foshan, Guangdong, 528311, Chiny
Tel.: +86 13902810522

Badane urządzenie: Marka: Midea
Typ: Pompa ciepła powietrze-woda (Monoblok)
Model: MHC-V16W/D2RN8-B
Nr serii: 541K814480238190100003
Rok prod.: Jednostka zewnętrzna: NIE DOTYCZY

Daty: Czasowy zakres badania: Grudzień 2023 - styczeń 2024

Nazwa handlowa: Marka: BERETTA
Typ: Pompa ciepła powietrze-woda (Monoblok)
Model: HYDRO UNIT M 016T

Procedury: Aby zapoznać się z listą norm, patrz Cel (strona 2)

Uwagi: Urządzenie zostało dostarczone przez klienta. Montaż i ustawienia badania zostały wykonane zgodnie z instrukcjami klienta. Pomiędzy poszczególnymi warunkami testowymi klient zmieniał różne parametry, takie jak prędkość sprężarki, zawór rozprężny, prędkość wentylatora, prędkość pompy, czas odszraniania, czas nagrzewania. Raport dla badanego urządzenia nosi nazwę 300-KLAB-23-039, wydany 2024.03.21. Patrz również załącznik 2.

Warunki: Niniejsze badanie zostało przeprowadzone w ramach akredytacji zgodnie z międzynarodowymi wymogami (ISO/IEC 17025:2017) oraz zgodnie z Ogólnymi Warunkami Duńskiego Instytutu Technologicznego. Wyniki badania odnoszą się wyłącznie do badanego przedmiotu. Niniejszy raport z badania może być publikowany we fragmentach wyłącznie za pisemną zgodą Duńskiego Instytutu Technologicznego.

Klient nie może wymieniać ani powoływać się na Danish Technological Institute lub pracowników Danish Technological Institute w celach reklamowych lub marketingowych, chyba że Danish Technological Institute wyraził w każdym przypadku pisemną zgodę.

Dział/Centrum: Duński Instytut Technologiczny
Energia i klimat
Laboratorium pomp ciepła, Aarhus

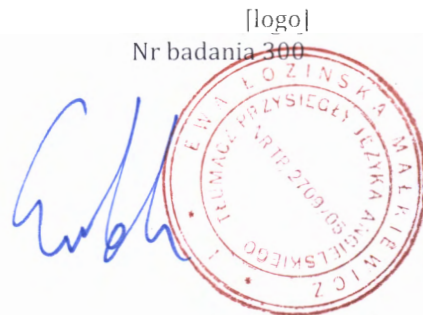
Data: 2024.04.19

Podpisał:
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B.TecMan & MarEng

[Dokument podpisany elektronicznie
22 kwietnia 2024
Duński Instytut Technologiczny]

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Nr badania 300



Cel

Celem niniejszego raportu jest udokumentowanie następujących kwestii:

Sezonowy współczynnik wydajności (SCOP) przy zastosowaniu w niskiej i średniej temperaturze dla klimatu umiarkowanego zgodnie z normą EN 14825:2022.

W celu obliczenia SCOP przeprowadzono badania w warunkach obciążenia częściowego podanych w tabelach na stronie 5 i 6.

Badanie obciążenia częściowego SCOP w warunkach SCOP_B i SCOP_C przy zastosowaniu w niskiej temperaturze dla cieplejszego klimatu zgodnie z EN 14825:2022.

Warunki badania obciążenia częściowego: SCOP_A i SCOP_{F/G} przy zastosowaniu w niskiej temperaturze dla chłodniejszego klimatu zgodnie z EN 14825:2022.

Standardowe warunki znamionowe badania COP A7/W35 i A7/W55 zgodnie z EN 14511:2022.

Wymagania eksploatacyjne zgodnie z normą EN 14511-4:2022

4.2.1 Badania rozruchowe i eksploatacyjne

4.5 Odcięcie przepływu nośnika ciepła

4.6 Całkowita awaria zasilania

Pomiary mocy akustycznej zgodnie z normą EN 12102-1:2022.

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Warunki badania**Warunki badania SCOP dla niskich temperatur - EN 14825**

Warunki częściowego obciążenia dla referencyjnego SCOP i referencyjnego SCOPon przy obliczaniu jednostek powietrze-woda dla zastosowań niskotemperaturowych dla referencyjnego sezonu grzewczego;

"A" = klimat umiarkowany, "W" = klimat cieplejszy i "C" = klimat chłodniejszy.

	Współczynnik obciążenia częściowego w %				Zewnętrzny wymiennik ciepła		Wewnętrzny wymiennik ciepła			
					Temperatura termometru suchego (mokrego) °C		Stały wylot °C	Zmienny wylot ^d °C		
	Wzór	umiarkowany	cieplejszy	chłodniejszy	Powietrze zewnętrzne	Wylot powietrza		Wszystkie klimaty	umiarkowany	cieplejszy
A	$(-7-16) / (T_{\text{designh}} - 16)$	88,46	Nie dotyczy	60,53	-7(-8)	20(12)	a / 35	a / 34	Nie dotyczy	a / 30
B	$(+2-16) / (T_{\text{designh}} - 16)$	53,85	100,00	36,84	2(1)	20(12)	a / 35	a / 30	a / 35	a / 27
C	$(+7-16) / (T_{\text{designh}} - 16)$	34,62	64,29	23,68	7(6)	20(12)	a / 35	a / 27	a / 31	a / 25
D	$(+12-16) / (T_{\text{designh}} - 16)$	15,38	28,57	10,53	12(11)	20(12)	a / 35	a / 24	a / 26	a / 24
E	$(TOL^e - 16) / (T_{\text{designh}} - 16)$				TOL ^e	20(12)	a / 35	a / b	a / b	a / b
F	$(T_{\text{biv}} - 16) / (T_{\text{designh}} - 16)$				T _{biv}	20(12)	a / 35	a / c	a / c	a / c
G	$(-15-16) / (T_{\text{designh}} - 16)$	Nie dotyczy	Nie dotyczy	81,58	-15	20(12)	a / 35	Nie dotyczy	Nie dotyczy	a / 32

Dodatkowe informacje

Klimat	T _{designh} [°C]	T _{bivalent} [°C]	TOL [°C]	Temperatura na wylocie	Natężenie przepływu
umiarkowany	-10	-7	-10	Zmienna	Zmienne
chłodniejszy	-22	-15	-22	Zmienna	Zmienne
cieplejszy	2	7	2	Zmienna	Zmienne

[logo]
Nr badania 300



Warunki badania SCOP dla średnich temperatur - EN 14825

Warunki częściowego obciążenia dla referencyjnego SCOP i referencyjnego SCOPon przy obliczaniu jednostek powietrze-woda dla zastosowań średnotemperaturowych dla referencyjnego sezonu grzewczego;

"A" = klimat umiarkowany, "W" = klimat cieplejszy i "C" = klimat chłodniejszy.

	Współczynnik obciążenia częściowego w %				Zewnętrzny wymiennik ciepła		Wewnętrzny wymiennik ciepła			
					Temperatura termometru suchego (mokrego) °C		Stały wylot °C	Zmienny wylot ^d °C		
	Wzór	umiarkowany	cieplejszy	chłodniejszy	Powietrze zewnętrzne	Wylot powietrza		Wszystkie klimaty	umiarkowany	cieplejszy
A	$(-7-16) / (T_{designh} - 16)$	88,46	Nie dotyczy	60,53	-7(-8)	20(12)	a / 55	a / 52	Nie dotyczy	a / 44
B	$(+2-16) / (T_{designh} - 16)$	53,85	100,00	36,84	2(1)	20(12)	a / 55	a / 42	a / 55	a / 37
C	$(+7-16) / (T_{designh} - 16)$	34,62	64,29	23,68	7(6)	20(12)	a / 55	a / 36	a / 46	a / 32
D	$(+12-16) / (T_{designh} - 16)$	15,38	28,57	10,53	12(11)	20(12)	a / 55	a / 30	a / 34	a / 28
E	$(TOL^c - 16) / (T_{designh} - 16)$				TOL ^c	20(12)	a / 55	a / b	a / b	a / b
F	$(T_{biv} - 16) / (T_{designh} - 16)$				T _{biv}	20(12)	a / 55	a / c	a / c	a / c
G	$(-15-16) / (T_{designh} - 16)$	Nie dotyczy	Nie dotyczy	81,58	-15	20(12)	a / 55	Nie dotyczy	Nie dotyczy	a / 49

Dodatkowe informacje

Klimat	T _{designh} [°C]	T _{bivalent} [°C]	TOL [°C]	Temperatura na wylocie	Natężenie przepływu
umiarkowany	-10	-7	-10	Zmienna	Zmienne

[logo]
 Nr badania 300



Warunki badania COP - niska temperatura - EN 14511

Nr	Źródło ciepła		Radiator	
	Temperatura termometru suchego na wlocie temperatury (°C)	Temperatura termometru mokrego na wlocie temperatury (°C)	Temperatura na wlocie (°C)	Temperatura na wylocie (°C)
1 ^s	7	6	30	35

S: Standardowy warunek oceny

Warunki badania COP - średnia temperatura - EN 14511

Nr	Źródło ciepła		Radiator	
	Temperatura termometru suchego na wlocie temperatury (°C)	Temperatura termometru mokrego na wlocie temperatury (°C)	Temperatura na wlocie (°C)	Temperatura na wylocie (°C)
1 ^s	7	6	47	55

S: Standardowy warunek oceny

Warunki badania dla wymagań eksploatacyjnych - EN 14511-4

Nr	Źródło ciepła		Radiator	Natężenie przepływu wody w wewnętrznym wymienniku ciepła	Badanie
	Temperatura termometru suchego na wlocie temperatury (°C)	Temperatura termometru mokrego na wlocie temperatury (°C)	Temperatura na wlocie (°C)		
1	-25	-	12	800 L/h	Rozruchowe
2	-25	-	38	710 L/h	Eksploatacyjne

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Nr badania 300

Warunki badania odciążenia nośnika ciepła - EN 14511-4

Nr	Źródło ciepła		Radiator		Wymiennik ciepła
	Temperatura termometru suchego na wlocie temperatury (°C)	Temperatura termometru mokrego na wlocie temperatury (°C)	Temperatura na wlocie (°C)	Temperatura na wylocie (°C)	
1	7	6	47	55	Wewnętrzny
2	7	6	47	55	Zewnętrzny

Warunki badania dla całkowitej awarii zasilania - EN 14511-4

Nr	Źródło ciepła		Radiator	
	Temperatura termometru suchego na wlocie temperatury (°C)	Temperatura termometru mokrego na wlocie temperatury (°C)	Temperatura na wlocie (°C)	Temperatura na wylocie (°C)
1	7	6	47	55

Warunki badania dla pomiarów mocy akustycznej - EN 12102-1

Nr	Warunki badania		Ustawienie pompy ciepła			
	Zewnętrzny wymiennik ciepła (Termometr suchy/termometr mokry) (°C)	Wewnętrzny wymiennik ciepła (wlot/wylot) (°C)	Prędkość sprężarki (Hz)	Prędkość wentylatora na zewnątrz (obr./min)	Moc grzewcza (kW)	Moc wejściowa (kW)
1 ^F	7/6	30/35	64	730	15,70	3,49
2 ^P	7/6	30/35	24	400	5,67	1,16
3 ^F	7/6	47/55	72	650	16,14	5,65
4 ^E	7/6	47/55	32	450	7,10	2,34

F) Pełne obciążenie, P) Częściowe obciążenie i E) Oznaczenie ErP

[logo]
 Nr badania 300



Wyniki badania

Wyniki badania SCOP w niskiej temperaturze - średnia sezonu grzewczego - EN 14825

Model (zewnątrzny)	MHC-V16W/D2RN8-B
Monoblokowa pompa ciepła powietrze-woda	Tak
Niskotemperaturowa pompa ciepła	Nie
Wyposażony w dodatkową grzałkę	Tak
Pompa ciepła z wielofunkcyjnym podgrzewaczem	Nie
Odwracalny	Tak

Znamionowa moc cieplna ¹⁾	P_{rated}	15,2 [kW]
Sezonowa efektywność energetyczna	ns	184,1 [%]
ogrzewania pomieszczeń	SCOP	4,68 [-]

Zmierzona wydajność ogrzewania dla częściowego obciążenia przy temperaturze zewnętrznej T_j	Klimat umiarkowany - Zastosowanie w niskich temperaturach	$T_j = -15\text{ °C}$	Pdh	- [kW]
		$T_j = -7\text{ °C}$	Pdh	13,27 [kW]
		$T_j = 2\text{ °C}$	Pdh	8,24 [kW]
		$T_j = 7\text{ °C}$	Pdh	6,26 [kW]
		$T_j = 12\text{ °C}$	Pdh	7,26 [kW]
		$T_j = \text{temperatura dwuwartościowa}$	Pdh	13,27 [kW]
		$T_j = \text{limit operacyjny}$	Pdh	12,62 [kW]

Zmierzony współczynnik wydajności w temperaturze zewnętrznej T_j	Klimat umiarkowany - Zastosowanie w niskich temperaturach	$T_j = -15\text{ °C}$	COPd	- [-]
		$T_j = -7\text{ °C}$	COPd	2,64 [-]
		$T_j = 2\text{ °C}$	COPd	4,59 [-]
		$T_j = 7\text{ °C}$	COPd	6,62 [-]
		$T_j = 12\text{ °C}$	COPd	8,13 [-]
		$T_j = \text{temperatura dwuwartościowa}$	COPd	2,64 [-]
		$T_j = \text{limit operacyjny}$	COPd	2,51 [-]

Temperatura dwuwartościowa	Tbivalent	-7 [°C]
Limit eksploatacji	TOL	-10 [°C]
Temperatury	WTOL	- [°C]
Współczynnik degradacji	Cdh	0,97 [-]

Zużycie energii w trybach innych niż tryb aktywny	Tryb off	P_{OFF}	0,021 [kW]
	Termostat - Tryb off	P_{TO}	0,026 [kW]
	Tryb gotowości	P_{SB}	0,021 [kW]
	Tryb grzałki skrzyni korbowej ²⁾	P_{CK}	0,021 [kW]
Grzałka dodatkowa ¹⁾	Znamionowa moc cieplna	P_{SUP}	2,58 [kW]
	Rodzaj pobieranej energii		Elektryczna

Inne przedmioty	Kontrola wydajności		Zmienna
	Kontrola przepływu wody		Zmienna
	Natężenie przepływu wody		-
	Roczne zużycie energii	Q_{HE}	6712 [kWh]

¹⁾ W przypadku ogrzewania pomieszczeń pompą ciepła oraz pomp ciepła z wielofunkcyjnymi podgrzewaczami, znamionowa moc cieplna P_{rated} , jest równa projektowemu obciążeniu grzewczemu $P_{designh}$, a wskaźnik mocy cieplnej dodatkowego podgrzewacza P_{sup} , jest równy dodatkowej wydajności grzewczej, $sup(T_j)$.

²⁾ Do obliczenia SCOP używana jest wartość PCK - PSB. Patrz strona 15



Wyniki badania SCOP w średniej temperaturze - średnia sezonu grzewczego - EN 14825

Model (zewnątrzny)	MHC-V16W/D2RN8-B
Monoblokowa pompa ciepła powietrze-woda	Tak
Niskotemperaturowa pompa ciepła	Nie
Wyposażony w dodatkową grzałkę	Tak
Pompa ciepła z wielofunkcyjnym podgrzewaczem	Nie
Odwracalny	Tak

Znamionowa moc cieplna ¹⁾	P_{rated}	13 [kW]
Sezonowa efektywność energetyczna ogrzewania pomieszczeń	ns	137,3 [%]
	SCOP	3,51 [-]

Zmierzona wydajność ogrzewania dla częściowego obciążenia przy temperaturze zewnętrznej T_j	Klimat umiarkowany - Zastosowanie w średniej temperaturze	$T_j = -15\text{ °C}$	P_{dh}	- [kW]
		$T_j = -7\text{ °C}$	P_{dh}	11,68 [kW]
		$T_j = 2\text{ °C}$	P_{dh}	7,29 [kW]
		$T_j = 7\text{ °C}$	P_{dh}	6,03 [kW]
		$T_j = 12\text{ °C}$	P_{dh}	6,89 [kW]
		$T_j = \text{temperatura dwuwartościowa}$	P_{dh}	11,68 [kW]
		$T_j = \text{limit operacyjny}$	P_{dh}	10,53 [kW]

Zmierzony współczynnik wydajności w temperaturze zewnętrznej T_j	Klimat umiarkowany - Zastosowanie w średniej temperaturze	$T_j = -15\text{ °C}$	COPd	- [-]
		$T_j = -7\text{ °C}$	COPd	2,02 [-]
		$T_j = 2\text{ °C}$	COPd	3,42 [-]
		$T_j = 7\text{ °C}$	COPd	4,93 [-]
		$T_j = 12\text{ °C}$	COPd	6,02 [-]
		$T_j = \text{temperatura dwuwartościowa}$	COPd	2,02 [-]
		$T_j = \text{limit operacyjny}$	COPd	1,82 [-]

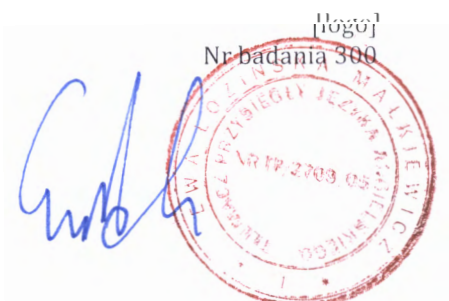
Temperatura dwuwartościowa	Tbivalent	-7 [°C]
Limit eksploatacji	TOL	-10 [°C]
Temperatury	WTOL	- [°C]
Współczynnik degradacji	Cdh	0,98 [-]

Zużycie energii w trybach innych niż tryb aktywny	Tryb off	P_{OFF}	0,021 [kW]
	Termostat - Tryb off	P_{TO}	0,026 [kW]
	Tryb gotowości	P_{SB}	0,021 [kW]
	Tryb grzałki skrzyni korbowej	P_{CK}	0,021 [kW]
Grzałka dodatkowa ¹⁾	Znamionowa moc cieplna	P_{SUP}	2,47 [kW]
	Rodzaj pobieranej energii		Elektryczna

Inne przedmioty	Kontrola wydajności		Zmienna
	Kontrola przepływu wody		Zmienna
	Nateżenie przepływu wody		-
	Roczne zużycie energii	Q_{HE}	7655 [kWh]

¹⁾ W przypadku ogrzewania pomieszczeń pompą ciepła oraz pomp ciepła z wielofunkcyjnymi podgrzewaczami, znamionowa moc cieplna P_{rated} , jest równa projektowemu obciążeniu grzewczemu $P_{design,h}$, a wskaźnik mocy cieplnej dodatkowego podgrzewacza P_{sup} , jest równy dodatkowej wydajności grzewczej, $sup(T_j)$.

²⁾ Do obliczenia SCOP używana jest wartość PCK - PSB. Patrz strona 17



Wyniki badań dla cieplejszego klimatu, niska temperatura zgodnie z EN14825

Nr	Warunki badania	Moc grzewcza [kW]	COP
1	B	13,106	3,508
2	T _{bivalent F&C}	8,750	5,514

Wyniki badań dla chłodniejszego klimatu, niska temperatura zgodnie z EN14825

Nr	Warunki badania	Moc grzewcza [kW]	COP
1	A	8,383	3,315
2	T _{bivalent F & G}	11,301	2,497

Wyniki badania COP - niska temperatura - EN 14511

Nr	Warunki badania	Moc grzewcza [kW]	COP
1	A7/W35	15,707	4,498

Wyniki badania COP - średnia temperatura - EN 14511

Nr	Warunki badania	Moc grzewcza [kW]	COP
1	A7/W55	16,139	2,854

[logo]
Nr badania 300



Wyniki badań rozruchu i działania - EN 14511-4

Nr	Warunki badania powietrze/woda na wlocie [°C]	Walidacja badania
Rozruchowe	A-25/W18	Zaliczone
Eksploatacyjne	A-25/W38	Zaliczone

Wyniki badań odcięcia nośnika ciepła - EN 14511-4

Nr	Wymiennik ciepła	Walidacja badania
1	Wewnętrzny	Zaliczone
2	Zewnętrzne	Zaliczone

Wyniki badań dla całkowitej awarii zasilania - EN 14511-4

Nr	Walidacja badania
1	zaliczone

[logo]
Nr badania 300



Wyniki pomiarów mocy akustycznej - EN 12102- 1

Nr	Warunki badania	Poziom mocy akustycznej LW(A) [dB re 1pW]	Niepewność σ_{tot} [dB]
1 ^F	A7/W35	66,5	1,6
2 ^P	A7/W35	51,5	1,6
3 ^F	A7/W55	65,2	1,6
4 ^E	A7/55	55,6	1,6

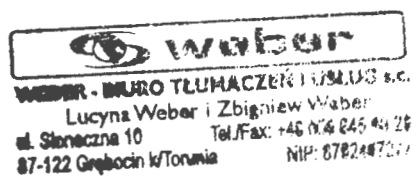
F) Pełne obciążenie, P) Częściowe obciążenie i E) Oznaczenie ErP

Całkowity poziom mocy akustycznej skorygowany charakterystyką A jest określany dla mierzonego zakresu częstotliwości od 100 Hz do 10 kHz. W celu obliczenia niepewności proszę zapoznać się z Załącznikiem 1.

Pomiary mocy akustycznej są przeprowadzane przez Kamalathasana Arumugama (KAMA) i sprawdzane przez Patricka Gliberta (PGL) z Duńskiego Instytutu Technologicznego.

Poświadczam, że tłumaczenie jest zgodne
z dokumentem mi przedstawionym

rep. **338/24** data **27.05.2024**



TEST REPORT

Report no.:
300-KLAB-23-039-6



**DANISH
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Page 1 of 44
Init: PRES/RTHI
File no.: 226006
Enclosures: 2

Customer: Company: GD MIDEA HEATING & VENTILATING EQUIPMENT CO., LTD.
Address: Penglai Industry Road, Beijiao
City: Shunde, Foshan, Guangdong, 528311, China
Tel.: +86 13902810522

Unit tested: Brand: Midea
Type: Air to water heat pump (mono block)
Model: MHC-V16W/D2RN8-B
Series no.: 541K814480238190100003
Prod. year: Outdoor unit: N/A
Dates: Test period: December 2023 – January 2024

Brand name: Brand: BERETTA
Type: Air to water heat pump (mono block)
Model: HYDRO UNIT M 016T

Procedures 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 customers instructions. Between each test condition the customer changed various parameters like compressor speed, expansion valve, fan speed, pump speed, defrost time, heating time. The report for the tested unit is named 300-KLAB-23-039 issued 2024.03.21 Also see appendix 2.

Terms: This test was conducted under accreditation in accordance with international requirements (ISO/IEC 17025:2017) and in accordance with the General Terms and Conditions of Danish Technological Institute. The test results solely apply to the tested item. This test report may be quoted in extract only if Danish Technological Institute has granted its written consent.

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

Date: 2024.04.19

Signature:
Preben Eskerod
B.TecMan & MarEng

Co-reader:
Rasmus Thisgaard
B.TecMan & MarEng



 **DANAK**
Test Reg. nr. 300



Objective

The objective of this report is to document the following:

The Seasonal Coefficient of Performance (SCOP) at low and medium temperature application for average climate according to EN 14825:2022.

In order to calculate the SCOP, tests were carried out at the part load conditions stated in the tables on page 5 and 6.

SCOP part load test in conditions $SCOP_B$ and $SCOP_C$ at low temperature application for warmer climate according to EN 14825:2022.

SCOP part load test conditions $SCOP_A$ and $SCOP_{F/G}$ at low temperature application for colder climate according to EN 14825:2022.

COP test standard rating conditions A7/W35 and A7/W55 according to EN 14511:2022.

Operating requirements according to EN 14511-4:2022

- 4.2.1 Starting and operating tests
- 4.5 Shutting of the heat transfer medium flows
- 4.6 Complete power supply failure

Sound power measurements according to EN 12102-1:2022.



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Test conditions

SCOP test conditions for low temperature – EN 14825

Part load conditions for reference SCOP and reference SCOPon calculation of air to water units for low temperature application for the reference heating season;

“A” = average, “W” = warmer, and “C” = colder.

	Part load ratio in %				Outdoor heat exchanger		Indoor heat exchanger			
					Dry (wet) bulb temperature °C		Fixed outlet °C	Variable outlet ^d °C		
	Formula	Average	Warmer	Colder	Outdoor air	Exhaust air	All climates	Average	Warmer	Colder
A	$(-7 - 16) / (T_{\text{designh}} - 16)$	88,46	n.a.	60,53	-7(-8)	20(12)	a / 35	a / 34	n.a.	a / 30
B	$(+2 - 16) / (T_{\text{designh}} - 16)$	53,85	100,00	36,84	2(1)	20(12)	a / 35	a / 30	a / 35	a / 27
C	$(+7 - 16) / (T_{\text{designh}} - 16)$	34,62	64,29	23,68	7(6)	20(12)	a / 35	a / 27	a / 31	a / 25
D	$(+12 - 16) / (T_{\text{designh}} - 16)$	15,38	28,57	10,53	12(11)	20(12)	a / 35	a / 24	a / 26	a / 24
E	$(TOL^e - 16) / (T_{\text{designh}} - 16)$				TOL^e	20(12)	a / 35	a / b	a / b	a / b
F	$(T_{\text{biv}} - 16) / (T_{\text{designh}} - 16)$				T_{biv}	20(12)	a / 35	a / c	a / c	a / c
G	$(-15 - 16) / (T_{\text{designh}} - 16)$	n.a.	n.a.	81,58	-15	20(12)	a / 35	n.a.	n.a.	a / 32

Additional information

Climate	T_{designh} [°C]	T_{bivalent} [°C]	TOL [°C]	Outlet temperature	Flow rate
Average	-10	-7	-10	Variable	Variable
Colder	-22	-15	-22	Variable	Variable
Warmer	2	7	2	Variable	Variable



SCOP test conditions for medium temperature – EN 14825

Part load conditions for reference SCOP and reference SCOPon calculation of air to water units for medium temperature application for the reference heating season;

“A” = average, “W” = warmer, and “C” = colder.

	Part load ratio in %				Outdoor heat exchanger		Indoor heat exchanger			
					Dry (wet) bulb temperature °C		Fixed outlet °C	Variable outlet ^d °C		
	Formula	Average	Warmer	Colder	Outdoor air	Exhaust air	All climates	Average	Warmer	Colder
A	$\frac{-7 - 16}{(T_{designh} - 16)}$	88,46	n.a.	60,53	-7(-8)	20(12)	^a / 55	^a / 52	n.a.	^a / 44
B	$\frac{+2 - 16}{(T_{designh} - 16)}$	53,85	100	36,84	2(1)	20(12)	^a / 55	^a / 42	^a / 55	^a / 37
C	$\frac{+7 - 16}{(T_{designh} - 16)}$	34,62	64,29	23,68	7(6)	20(12)	^a / 55	^a / 36	^a / 46	^a / 32
D	$\frac{+12 - 16}{(T_{designh} - 16)}$	15,38	28,57	10,53	12(11)	20(12)	^a / 55	^a / 30	^a / 34	^a / 28
E	$(TOL^e - 16) / (T_{designh} - 16)$				TOL^e	20(12)	^a / 55	^a / ^b	^a / ^b	^a / ^b
F	$(T_{biv} - 16) / (T_{designh} - 16)$				T_{biv}	20(12)	^a / 55	^a / ^c	^a / ^c	^a / ^c
G	$\frac{-15 - 16}{(T_{designh} - 16)}$	n.a.	n.a.	81,58	-15	20(12)	^a / 55	n.a.	n.a.	^a / 49

Additional information

Climate	T _{designh} [°C]	T _{bivalent} [°C]	TOL [°C]	Outlet temperature	Flow rate
Average	-10	-7	-10	Variable	Variable



COP test conditions - low temperature – EN 14511

N#	Heat source		Heat sink	
	Inlet dry bulb temperature (°C)	Inlet wet bulb temperature (°C)	Inlet temperature (°C)	Outlet temperature (°C)
1 ^S	7	6	30	35

S: Standard rating condition

COP test conditions - medium temperature – EN 14511

N#	Heat source		Heat sink	
	Inlet dry bulb temperature (°C)	Inlet wet bulb temperature (°C)	Inlet temperature (°C)	Outlet temperature (°C)
1 ^S	7	6	47	55

S: Standard rating condition

Test conditions for operating requirements – EN 14511-4

N#	Heat source		Heat sink	Water flow rate at indoor heat exchanger	Test
	Inlet dry bulb temperature (°C)	Inlet wet bulb temperature (°C)	Inlet temperature (°C)		
1	-25	-	12	800 L/h	Starting
2	-25	-	38	710 L/h	Operating



Test conditions for shutting off the heat transfer medium – EN 14511-4

N#	Heat source		Heat sink		Heat exchanger
	Inlet dry bulb temperature (°C)	Inlet wet bulb temperature (°C)	Inlet temperature (°C)	Outlet temperature (°C)	
1	7	6	47	55	Indoor
2	7	6	47	55	Outdoor

Test conditions for complete power supply failure – EN 14511-4

N#	Heat source		Heat sink	
	Inlet dry bulb temperature (°C)	Inlet wet bulb temperature (°C)	Inlet temperature (°C)	Outlet temperature (°C)
1	7	6	47	55

Test conditions for sound power measurements – EN 12102-1

N#	Test condition		Heat pump setting			
	Outdoor heat exchanger (dry bulb/wet bulb) (°C)	Indoor heat exchanger (inlet/outlet) (°C)	Compressor speed (Hz)	Fan speed outdoor (rpm)	Heating capacity (kW)	Power input (kW)
1 ^F	7/6	30/35	64	730	15.70	3.49
2 ^P	7/6	30/35	24	400	5.67	1.16
3 ^F	7/6	47/55	72	650	16.14	5.65
4 ^E	7/6	47/55	32	450	7.10	2.34

F) Full load, P) part load and E) ErP labelling





Test results

Test results of SCOP test at low temperature - heating season average - EN 14825

Model (Outdoor)	MHC-V16W/D2RN8-B
Air-to-water heat pump mono bloc	Y
Low-temperature heat pump	N
Equipped with supplementary heater	Y
Heat pump combination heater	N
Reversible	Y

Rated heat output¹⁾	P_{rated}	15.2 [kW]
Seasonal space heating energy efficiency	η_s	184.1 [%]
	SCOP	4.68 [-]

Measured capacity for heating for part load at outdoor temperature T_j	Average Climate	$T_j = -15\text{ °C}$	P_{dh}	- [kW]
	-	$T_j = -7\text{ °C}$	P_{dh}	13.27 [kW]
	Low temperature application	$T_j = 2\text{ °C}$	P_{dh}	8.24 [kW]
		$T_j = 7\text{ °C}$	P_{dh}	6.26 [kW]
		$T_j = 12\text{ °C}$	P_{dh}	7.26 [kW]
		$T_j = \text{bivalent temperature}$	P_{dh}	13.27 [kW]
		$T_j = \text{operation limit}$	P_{dh}	12.62 [kW]

Measured coefficient of performance at outdoor temperature T_j	Average Climate	$T_j = -15\text{ °C}$	COP _d	- [-]
	-	$T_j = -7\text{ °C}$	COP _d	2.64 [-]
	Low temperature application	$T_j = 2\text{ °C}$	COP _d	4.59 [-]
		$T_j = 7\text{ °C}$	COP _d	6.62 [-]
		$T_j = 12\text{ °C}$	COP _d	8.13 [-]
		$T_j = \text{bivalent temperature}$	COP _d	2.64 [-]
		$T_j = \text{operation limit}$	COP _d	2.51 [-]

Bivalent temperature	$T_{bivalent}$	-7 [°C]
Operation limit temperatures	TOL	-10 [°C]
Degradation coefficient	C_{dh}	0.97 [-]

Power consumption in modes other than active mode	Off mode	P_{OFF}	0.021 [kW]
	Thermostat-off mode	P_{TO}	0.026 [kW]
	Standby mode	P_{SB}	0.021 [kW]
	Crankcase heater mode ²⁾	P_{CK}	0.021 [kW]
Supplementary heater¹⁾	Rated heat output	P_{SUP}	2.58 [kW]
	Type of energy input		Electrical

Other items	Capacity control		Variable
	Water flow control		Variable
	Water flow rate		-
	Annual energy consumption	Q_{HE}	6712 [kWh]

¹⁾For heat pump space heaters and heat pump combination heaters, the rated heat output, P_{rated} , is equal to the design load for heating, $P_{design,h}$, and the rated heat output of a supplementary heater, P_{sup} , is equal to the supplementary capacity for heating, $sup(T_j)$.

²⁾For SCOP calculation the value $P_{CK} - P_{SB}$ is used. See page 15



Test results of SCOP test at medium temperature - heating season average – EN 14825

Model (Outdoor)	MHC-V16W/D2RN8-B
Air-to-water heat pump mono bloc	Y
Low-temperature heat pump	N
Equipped with supplementary heater	Y
Heat pump combination heater	N
Reversible	Y

Rated heat output¹⁾	P_{rated}	13 [kW]
Seasonal space heating energy efficiency	η_s	137.3 [%]
	SCOP	3.51 [-]

Measured capacity for heating for part load at outdoor temperature T_j	Average Climate - Medium temperature application	$T_j = -15\text{ °C}$	P_{dh}	- [kW]
		$T_j = -7\text{ °C}$	P_{dh}	11.68 [kW]
		$T_j = 2\text{ °C}$	P_{dh}	7.29 [kW]
		$T_j = 7\text{ °C}$	P_{dh}	6.03 [kW]
		$T_j = 12\text{ °C}$	P_{dh}	6.89 [kW]
		$T_j = \text{bivalent temperature}$	P_{dh}	11.68 [kW]
		$T_j = \text{operation limit}$	P_{dh}	10.53 [kW]

Measured coefficient of performance at outdoor temperature T_j	Average Climate - Medium temperature application	$T_j = -15\text{ °C}$	COPd	- [-]
		$T_j = -7\text{ °C}$	COPd	2.02 [-]
		$T_j = 2\text{ °C}$	COPd	3.42 [-]
		$T_j = 7\text{ °C}$	COPd	4.93 [-]
		$T_j = 12\text{ °C}$	COPd	6.02 [-]
		$T_j = \text{bivalent temperature}$	COPd	2.02 [-]
		$T_j = \text{operation limit}$	COPd	1.82 [-]

Bivalent temperature	$T_{bivalent}$	-7 [°C]
Operation limit temperatures	TOL	-10 [°C]
Degradation coefficient	C_{dh}	0.98 [-]

Power consumption in modes other than active mode	Off mode	P_{OFF}	0.021 [kW]
	Thermostat-off mode	P_{TO}	0.026 [kW]
	Standby mode	P_{SB}	0.021 [kW]
	Crankcase heater mode	P_{CK}	0.021 [kW]
Supplementary heater¹⁾	Rated heat output	P_{SUP}	2.47 [kW]
	Type of energy input		Electrical

Other items	Capacity control		Variable
	Water flow control		Variable
	Water flow rate		-
	Annual energy consumption	Q_{HE}	7655 [kWh]

¹⁾For heat pump space heaters and heat pump combination heaters, the rated heat output, P_{rated} , is equal to the design load for heating, $P_{design,h}$, and the rated heat output of a supplementary heater, P_{sup} , is equal to the supplementary capacity for heating, $sup(T_j)$.

²⁾For SCOP calculation the value $P_{CK} - P_{SB}$ is used. See page 17



Test results for warmer climate, low temperature according to EN14825

N°	Test condition	Heating capacity [kW]	COP
1	B	13.106	3.508
2	Tbivalent F and C	8.750	5.514

Test results for colder climate, low temperature according to EN14825

N°	Test condition	Heating capacity [kW]	COP
1	A	8.383	3.315
2	Tbivalent F and G	11.301	2.497

COP test results - low temperature – EN 14511

N#	Test conditions	Heating capacity [kW]	COP
1	A7/W35	15.707	4.498

COP test results - medium temperature – EN 14511

N#	Test conditions	Heating capacity [kW]	COP
1	A7/W55	16.139	2.854



Test results for starting and operating test - EN 14511-4

N#	Test conditions air/water inlet [°C]	Test validation
Starting	A-25/W18	Passed
Operating	A-25/W38	Passed

Test results for shutting off the heat transfer medium – EN 14511-4

N#	Heat exchanger	Test validation
1	Indoor	Passed
2	Outdoor	Passed

Test results for complete power supply failure – EN 14511-4

N#	Test validation
1	Passed



Test results of sound power measurements – EN 12102-1

N [#]	Test conditions	Sound power level LW(A) [dB re 1pW]	Uncertainty σ_{tot} [dB]
1 ^F	A7/W35	66.5	1.6
2 ^P	A7/W35	51.5	1.6
3 ^F	A7/W55	65.2	1.6
4 ^E	A7/55	55.6	1.6

F) Full load, P) part load and E) ErP labelling

The A-weighted total sound power level is determined for the measured frequency range from 100 Hz to 10 kHz. For the calculation of uncertainty, see appendix 1.

The sound power measurements are carried out by Kamalathan Arumugam (KAMA) and co-read by Patrick Glibert (PGL), Danish Technological Institute.



Photos

Rating plate

MONOBLOC HEAT PUMP	
MODEL	MHC-V16W/D2RN8-B
COOLING CAPACITY/EER @ A35W18	14.20kW / 3.61
HEATING CAPACITY/COP @ A7W35	15.90kW / 4.50
POWER SOURCE	380-415V 3N-50Hz
RATED INPUT	6200W
RATED WATER PRESSURE	0.1-0.3MPa
NET WEIGHT	144kg
REFRIGERANT	R32/1750g
GWP	675
EQUIVALENT CO ₂	1.18t
EXCESSIVE OPERATING PRESSURE	HIGH 4.3MPa LOW 2.0MPa
MAXIMUM ALLOWABLE PRESSURE	4.3MPa
OUTDOOR RESISTANCE CLASS	IP24
Hermetically sealed equipment contains fluorinated greenhouse gases	
GD Midea Heating & Ventilating Equipment Co., Ltd. (Penguin Industry Road, Daxin, Shaoxing, Zhejiang, Guangdong, P.R. China)	



Outdoor unit





SCOP - detailed calculation

Detailed SCOP calculation of low temperature and average climate conditions – EN 14825

Calculation of reference SCOP

$$SCOP = \frac{P_{designh} \times H_{he}}{\frac{P_{designh} \times H_{he}}{SCOP_{on}} + H_{TO} \times P_{TO} + H_{SB} \times P_{SB} + H_{CK} \times P_{CK} + H_{OFF} \times P_{OFF}}$$

Where

- P_{design} = Heating load of the building at design temperature, kW
 H_{he} = Number of equivalent heating hours, 2066 h
 $H_{TO}, H_{SB}, H_{CK}, H_{OFF}$ = Number of hours for which the unit is considered to work in thermostat off mode, standby mode, crankcase heater mode and off mode, h, respectively
 $P_{TO}, P_{SB}, P_{CK}, P_{OFF}$ = Electricity consumption during thermostat off mode, standby mode, crankcase heater mode and off mode, kW, respectively

Data for SCOP

	Outdoor temperature [°C]	Part load ratio [%]	Part load [kW]	Declared capacity [kW]	Declared COP [-]	cdh [-]	CR [-]	COPbin [-]
A	-7	88	13.45	13.27	2.64	0.99	1.00	2.64
B	2	54	8.18	8.24	4.59	0.99	1.00	4.59
C	7	35	5.26	6.26	6.62	0.97	0.84	6.58
D	12	15	2.34	7.26	8.13	0.97	0.32	7.66
E	-10	100	15.20	12.62	2.51	0.99	1.00	2.51
F - BIV	-7	88	13.45	13.27	2.64	0.99	1.00	2.64

Energy consumption for thermostat off, standby, off mode, crankcase heater mode

	Hours [h]	Power input [kW]	Applied to SCOP calculation [kW]	Energy consumption [kWh]
Off mode	0	0.02097	0.02097	0
Thermostat off	178	0.02612	0.02612	4.64936
Standby	0	0.02097	0.02097	0
Crankcase heater	178	0.02111	0.00014	0.02492



Calculation Bin for SCOPon

	Bin [-]	Outdoor temperature [°C]	Hours [h]	Heat load [kW]	Heat load covered by heat pump [kW]	Electrical back up heater [kW]	Annual backup heater energy input [kWh]	COPbin [-]	Annual heating demand [kWh]	Annual energy input [kWh]	Net annual heating capacity [kWh]	Net annual power input [kWh]
E	21	-10	1	15.20	12.62	2.58	2.58	2.51	15.20	7.61	12.62	5.03
	22	-9	25	14.62	12.84	1.78	44.46	2.55	365.38	170.15	320.93	125.69
	23	-8	23	14.03	13.05	0.98	22.47	2.60	322.71	138.05	300.24	115.58
A / F - BIV	24	-7	24	13.45	13.27	0.00	0.00	2.64	322.71	122.15	322.71	122.15
	25	-6	27	12.86	12.71	0.00	0.00	2.86	347.26	121.49	347.26	121.49
	26	-5	68	12.28	12.14	0.00	0.00	3.07	834.83	271.52	834.83	271.52
	27	-4	91	11.69	11.58	0.00	0.00	3.29	1064.00	323.31	1064.00	323.31
	28	-3	89	11.11	11.01	0.00	0.00	3.51	988.58	281.86	988.58	281.86
	29	-2	165	10.52	10.45	0.00	0.00	3.72	1736.31	466.29	1736.31	466.29
	30	-1	173	9.94	9.88	0.00	0.00	3.94	1719.35	436.38	1719.35	436.38
	31	0	240	9.35	9.31	0.00	0.00	4.16	2244.92	540.12	2244.92	540.12
	32	1	280	8.77	8.75	0.00	0.00	4.37	2455.38	561.53	2455.38	561.53
	B	33	2	320	8.18	8.18	0.00	0.00	4.59	2619.08	570.73	2619.08
34		3	357	7.60	7.60	0.00	0.00	4.99	2713.20	544.02	2713.20	544.02
35		4	356	7.02	7.02	0.00	0.00	5.39	2497.48	463.73	2497.48	463.73
36		5	303	6.43	6.43	0.00	0.00	5.78	1948.52	336.88	1948.52	336.88
37		6	330	5.85	5.85	0.00	0.00	6.18	1929.23	312.06	1929.23	312.06
C		38	7	326	5.26	5.26	0.00	0.00	6.58	1715.26	260.66	1715.26
	39	8	348	4.68	4.68	0.00	0.00	6.80	1627.57	239.46	1627.57	239.46
	40	9	335	4.09	4.09	0.00	0.00	7.01	1370.92	195.48	1370.92	195.48
	41	10	315	3.51	3.51	0.00	0.00	7.23	1104.92	152.84	1104.92	152.84
	42	11	215	2.92	2.92	0.00	0.00	7.45	628.46	84.41	628.46	84.41
	D	43	12	169	2.34	2.34	0.00	0.00	7.66	395.20	51.58	395.20
44		13	151	1.75	1.75	0.00	0.00	7.88	264.83	33.61	264.83	33.61
45		14	105	1.17	1.17	0.00	0.00	8.09	122.77	15.17	122.77	15.17
46		15	74	0.58	0.58	0.00	0.00	8.31	43.26	5.21	43.26	5.21

SUM	31397.35	6706.27	31327.85	6636.77
SCOPon		4.68	SCOPnet	4.72



Detailed SCOP calculation of medium temperature and average climate conditions – EN 14825

Calculation of reference SCOP

$$SCOP = \frac{P_{designh} \times H_{he}}{\frac{P_{designh} \times H_{he}}{SCOP_{on}} + H_{TO} \times P_{TO} + H_{SB} \times P_{SB} + H_{CK} \times P_{CK} + H_{OFF} \times P_{OFF}}$$

Where

P_{design} =	Heating load of the building at design temperature, kW
H_{he} =	Number of equivalent heating hours, 2066 h
$H_{TO}, H_{SB}, H_{CK}, H_{OFF}$ =	Number of hours for which the unit is considered to work in thermostat off mode, standby mode, crankcase heater mode and off mode, h, respectively
$P_{TO}, P_{SB}, P_{CK}, P_{OFF}$ =	Electricity consumption during thermostat off mode, standby mode, crankcase heater mode and off mode, kW, respectively

Data for SCOP

	Outdoor temperature [°C]	Part load ratio [%]	Part load [kW]	Declared capacity [kW]	Declared COP [-]	cdh [-]	CR [-]	COPbin [-]
A	-7	88	11.50	11.68	2.02	1.00	1.00	2.02
B	2	54	7.00	7.29	3.42	0.99	1.00	3.42
C	7	35	4.50	6.03	4.93	0.98	0.75	4.90
D	12	15	2.00	6.89	6.02	0.98	0.29	5.70
E	-10	100	13.00	10.53	1.82	1.00	1.00	1.82
F - BIV	-7	88	11.50	11.68	2.02	1.00	1.00	2.02

Energy consumption for thermostat off, standby, off mode, crankcase heater mode

	Hours [h]	Power input [kW]	Applied to SCOP calculation [kW]	Energy consumption [kWh]
Off mode	0	0.02097	0.02097	0
Thermostat off	178	0.02612	0.02612	4.64936
Standby	0	0.02097	0.02097	0
Crankcase heater	178	0.02111	0.00014	0.02492



Calculation Bin for SCOP_{on}

	Bin	Outdoor temperature [°C]	Hours [h]	Heat load [kW]	Heat load covered by heat pump [kW]	Electrical back up heater [kW]	backup heater energy input [kWh]	COP _{bin} [-]	Annual heating demand [kWh]	Annual energy input [kWh]	Net annual heating capacity [kWh]	Net annual power input [kWh]
E	21	-10	1	13.00	10.53	2.47	2.47	1.82	13.00	8.26	10.53	5.79
	22	-9	25	12.50	10.85	1.65	41.15	1.89	312.50	185.05	271.35	143.90
	23	-8	23	12.00	11.18	0.82	18.93	1.95	276.00	150.54	257.07	131.61
A / F - BIV	24	-7	24	11.50	11.50	0.00	0.00	2.02	276.00	136.57	276.00	136.57
	25	-6	27	11.00	11.00	0.00	0.00	2.18	297.00	136.46	297.00	136.46
	26	-5	68	10.50	10.50	0.00	0.00	2.33	714.00	306.19	714.00	306.19
	27	-4	91	10.00	10.00	0.00	0.00	2.49	910.00	365.85	910.00	365.85
	28	-3	89	9.50	9.50	0.00	0.00	2.64	845.50	319.93	845.50	319.93
	29	-2	165	9.00	9.00	0.00	0.00	2.80	1485.00	530.69	1485.00	530.69
	30	-1	173	8.50	8.50	0.00	0.00	2.95	1470.50	497.86	1470.50	497.86
	31	0	240	8.00	8.00	0.00	0.00	3.11	1920.00	617.54	1920.00	617.54
	32	1	280	7.50	7.50	0.00	0.00	3.26	2100.00	643.27	2100.00	643.27
	B	33	2	320	7.00	7.00	0.00	0.00	3.42	2240.00	654.97	2240.00
34		3	357	6.50	6.50	0.00	0.00	3.72	2320.50	624.49	2320.50	624.49
35		4	356	6.00	6.00	0.00	0.00	4.01	2136.00	532.45	2136.00	532.45
36		5	303	5.50	5.50	0.00	0.00	4.31	1666.50	386.89	1666.50	386.89
37		6	330	5.00	5.00	0.00	0.00	4.60	1650.00	358.44	1650.00	358.44
C	38	7	326	4.50	4.50	0.00	0.00	4.90	1467.00	299.45	1467.00	299.45
	39	8	348	4.00	4.00	0.00	0.00	5.06	1392.00	275.13	1392.00	275.13
	40	9	335	3.50	3.50	0.00	0.00	5.22	1172.50	224.62	1172.50	224.62
	41	10	315	3.00	3.00	0.00	0.00	5.38	945.00	175.64	945.00	175.64
	42	11	215	2.50	2.50	0.00	0.00	5.54	537.50	97.01	537.50	97.01
D	43	12	169	2.00	2.00	0.00	0.00	5.70	338.00	59.29	338.00	59.29
	44	13	151	1.50	1.50	0.00	0.00	5.86	226.50	38.64	226.50	38.64
	45	14	105	1.00	1.00	0.00	0.00	6.02	105.00	17.44	105.00	17.44
	46	15	74	0.50	0.50	0.00	0.00	6.18	37.00	5.98	37.00	5.98

SUM	26853.00	7648.65	26790.45	7586.11
SCOP_{on}		3.51	SCOP_{net}	3.53



Detailed test results

Detailed SCOP part load test results - low temperature application - average climate – EN 14825

Detailed result for 'EN14825:2022' Average Low (A and F) A -7 /W34		
Tested according to:	EN14511:2022 and EN14825:2022	
Climate zone:	Average	
Temperature application:	Low	
Condition name:	A and F	
Condition temperature:	°C	-7
Part load:	%	88%
Chosen Tbivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	15.20
Heating demand:	kW	13.45
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:	Transient	
Integrated circulation pump:	Yes	
Included corrections (Final result)		
Heating capacity	kW	13.271
COP	-	2.642
Power consumption	kW	5.023
Measured		
Heating capacity	kW	13.299
COP	-	2.630
Power consumption	kW	5.057
During heating		
Air temperature dry bulb	°C	-7.16
Air temperature wet bulb	°C	-8.12
Inlet temperature	°C	29.15
Outlet temperature	°C	34.06
Outlet temperature (Time averaged)	°C	34.06
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	9410
Calculated Hydraulic power	W	7
Calculated global efficiency	η	0.19
Calculated Capacity correction	W	27
Calculated Power correction	W	34
Water Flow	m ³ /s	0.000694



Detailed result for 'EN14825:2022' Average Low (B) A 2 /W30		
Tested according to:	EN14511:2022 and	EN14825:2022
Climate zone:		Average
Temperature application:		Low
Condition name:		B
Condition temperature:	°C	2
Part load:	%	54%
Chosen Tbivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	15.20
Heating demand:	kW	8.18
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Transient
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	8.235
COP	-	4.589
Power consumption	kW	1.795
Measured		
Heating capacity	kW	8.249
COP	-	4.556
Power consumption	kW	1.810
During heating		
Air temperature dry bulb	°C	1.95
Air temperature wet bulb	°C	0.92
Inlet temperature	°C	24.97
Outlet temperature	°C	30.08
Outlet temperature (Time averaged)	°C	30.08
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	5256
Calculated Hydraulic power	W	2
Calculated global efficiency	η	0.14
Calculated Capacity correction	W	13
Calculated Power correction	W	16
Water Flow	m ³ /s	0.000417



Detailed result for 'EN14825:2022' Average Low (C) A 7 /W27		
Tested according to:	EN14511:2022 and	EN14825:2022
Climate zone:		Average
Temperature application:		Low
Condition name:		C
Condition temperature:	°C	7
Part load:	%	35%
Chosen Tbivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	15.20
Heating demand:	kW	5.26
CR:	-	0.8
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	6.264
COP	-	6.615
Power consumption	kW	0.947
Measured		
Heating capacity	kW	6.266
COP	-	6.601
Power consumption	kW	0.949
During heating		
Air temperature dry bulb	°C	7.04
Air temperature wet bulb	°C	6.02
Inlet temperature	°C	22.80
Outlet temperature	°C	27.77
Outlet temperature (Time averaged)	°C	26.98
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	874
Calculated Hydraulic power	W	0
Calculated global efficiency	η	0.12
Calculated Capacity correction	W	2
Calculated Power correction	W	2
Water Flow	m ³ /s	0.000303



Detailed result for 'EN14825:2022' Average Low (D) A 12 /W24		
Tested according to:	EN14511:2022 and	EN14825:2022
Climate zone:		Average
Temperature application:		Low
Condition name:		D
Condition temperature:	°C	12
Part load:	%	15%
Chosen Tbivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	15.20
Heating demand:	kW	2.34
CR:	-	0.3
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	7.265
COP	-	8.134
Power consumption	kW	0.893
Measured		
Heating capacity	kW	7.271
COP	-	8.081
Power consumption	kW	0.900
During heating		
Air temperature dry bulb	°C	12.00
Air temperature wet bulb	°C	10.92
Inlet temperature	°C	22.38
Outlet temperature	°C	27.40
Outlet temperature (Time averaged)	°C	23.99
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	2308
Calculated Hydraulic power	W	1
Calculated global efficiency	η	0.12
Calculated Capacity correction	W	6
Calculated Power correction	W	7
Water Flow	m ³ /s	0.000348



Detailed result for 'EN14825:2022' Average Low (E) A -10 /W35		
Tested according to:	EN14511:2022 and EN14825:2022	
Climate zone:	Average	
Temperature application:	Low	
Condition name:	E	
Condition temperature:	°C	-10
Part load:	%	100%
Chosen Tbivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	15.20
Heating demand:	kW	15.20
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:	Transient	
Integrated circulation pump:	Yes	
Included corrections (Final result)		
Heating capacity	kW	12.620
COP	-	2.509
Power consumption	kW	5.030
Measured		
Heating capacity	kW	12.640
COP	-	2.501
Power consumption	kW	5.055
During heating		
Air temperature dry bulb	°C	-10.23
Air temperature wet bulb	°C	-11.37
Inlet temperature	°C	29.94
Outlet temperature	°C	35.02
Outlet temperature (Time averaged)	°C	35.02
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	6527
Calculated Hydraulic power	W	4
Calculated global efficiency	η	0.16
Calculated Capacity correction	W	21
Calculated Power correction	W	25
Water Flow	m ³ /s	0.000619



Detailed SCOP part load test results - medium temperature application - average climate – EN 14825

Detailed result for 'EN14825:2022' Average Medium (A and F) A -7 /W52		
Tested according to:	EN14511:2022 and EN14825:2022	
Climate zone:		Average
Temperature application:		Medium
Condition name:		A and F
Condition temperature:	°C	-7
Part load:	%	88%
Chosen Tbivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	13.00
Heating demand:	kW	11.50
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Transient
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	11.680
COP	-	2.012
Power consumption	kW	5.805
Measured		
Heating capacity	kW	11.694
COP	-	2.009
Power consumption	kW	5.821
During heating		
Air temperature dry bulb	°C	-7.05
Air temperature wet bulb	°C	-8.07
Inlet temperature	°C	44.07
Outlet temperature	°C	52.29
Outlet temperature (Time averaged)	°C	52.29
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	6527
Calculated Hydraulic power	W	2
Calculated global efficiency	η	0.14
Calculated Capacity correction	W	14
Calculated Power correction	W	17
Water Flow	m ³ /s	0.000361



Detailed result for 'EN14825:2022' Average Medium (B) A 2 /W42		
Tested according to:	EN14511:2022	EN14825:2022
Climate zone:		Average
Temperature application:		Medium
Condition name:		B
Condition temperature:	°C	2
Part load:	%	54%
Chosen Tbivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	13.00
Heating demand:	kW	7.00
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Transient
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	7.291
COP	-	3.420
Power consumption	kW	2.132
Measured		
Heating capacity	kW	7.296
COP	-	3.414
Power consumption	kW	2.137
During heating		
Air temperature dry bulb	°C	1.91
Air temperature wet bulb	°C	0.91
Inlet temperature	°C	34.04
Outlet temperature	°C	42.18
Outlet temperature (Time averaged)	°C	42.18
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	2485
Calculated Hydraulic power	W	1
Calculated global efficiency	η	0.12
Calculated Capacity correction	W	4
Calculated Power correction	W	5
Water Flow	m ³ /s	0.000231



Detailed result for 'EN14825:2022' Average Medium (C) A 7 /W36		
Tested according to:	EN14511:2022	EN14825:2022
Climate zone:		Average
Temperature application:		Medium
Condition name:		C
Condition temperature:	°C	7
Part load:	%	35%
Chosen Tivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	13.00
Heating demand:	kW	4.50
CR:	-	0.7
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	6.028
COP	-	4.935
Power consumption	kW	1.222
Measured		
Heating capacity	kW	6.041
COP	-	4.884
Power consumption	kW	1.237
During heating		
Air temperature dry bulb	°C	6.99
Air temperature wet bulb	°C	6.03
Inlet temperature	°C	29.90
Outlet temperature	°C	37.90
Outlet temperature (Time averaged)	°C	35.87
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	11703
Calculated Hydraulic power	W	2
Calculated global efficiency	η	0.14
Calculated Capacity correction	W	13
Calculated Power correction	W	15
Water Flow	m ³ /s	0.000182



Detailed result for 'EN14825:2022' Average Medium (D) A 12 /W30		
Tested according to:	EN14511:2022	EN14825:2022
Climate zone:		Average
Temperature application:		Medium
Condition name:		D
Condition temperature:	°C	12
Part load:	%	15%
Chosen Tivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	13.00
Heating demand:	kW	2.00
CR:	-	0.3
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	6.889
COP	-	6.019
Power consumption	kW	1.145
Measured		
Heating capacity	kW	6.893
COP	-	6.001
Power consumption	kW	1.149
During heating		
Air temperature dry bulb	°C	12.01
Air temperature wet bulb	°C	11.00
Inlet temperature	°C	27.71
Outlet temperature	°C	35.68
Outlet temperature (Time averaged)	°C	30.03
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	2265
Calculated Hydraulic power	W	0
Calculated global efficiency	η	0.12
Calculated Capacity correction	W	4
Calculated Power correction	W	4
Water Flow	m ³ /s	0.000208



Detailed result for 'EN14825:2022' Average Medium (E) A -10 /W55		
Tested according to:	EN14511:2022 and EN14825:2022	
Climate zone:	Average	
Temperature application:	Medium	
Condition name:	E	
Condition temperature:	°C	-10
Part load:	%	100%
Chosen Tivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	13.00
Heating demand:	kW	13.00
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:	Transient	
Integrated circulation pump:	Yes	
Included corrections (Final result)		
Heating capacity	kW	10.531
COP	-	1.818
Power consumption	kW	5.792
Measured		
Heating capacity	kW	10.545
COP	-	1.816
Power consumption	kW	5.807
During heating		
Air temperature dry bulb	°C	-10.00
Air temperature wet bulb	°C	-11.08
Inlet temperature	°C	47.07
Outlet temperature	°C	55.07
Outlet temperature (Time averaged)	°C	55.07
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	6527
Calculated Hydraulic power	W	2
Calculated global efficiency	η	0.14
Calculated Capacity correction	W	13
Calculated Power correction	W	15
Water Flow	m ³ /s	0.000329



Detailed SCOP part load test results - low temperature application - warmer climate – EN 14825

Detailed result for 'EN14825:2022' Warmer Low (B) A 2 /W35		
Tested according to:	EN14511:2022 and EN14825:2022	
Climate zone:		Warmer
Temperature application:		Low
Condition name:		B
Condition temperature:	°C	2
Part load:	%	100%
Chosen Tbivalent	°C	2
Tdesign	°C	2
Pdesign	kW	13.10
Heating demand:	kW	13.10
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Transient
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	13.106
COP	-	3.508
Power consumption	kW	3.736
Measured		
Heating capacity	kW	13.134
COP	-	3.482
Power consumption	kW	3.772
During heating		
Air temperature dry bulb	°C	2.08
Air temperature wet bulb	°C	0.83
Inlet temperature	°C	30.07
Outlet temperature	°C	35.08
Outlet temperature (Time averaged)	°C	35.08
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	10206
Calculated Hydraulic power	W	7
Calculated global efficiency	η	0.20
Calculated Capacity correction	W	29
Calculated Power correction	W	36
Water Flow	m ³ /s	0.000709



Detailed result for 'EN14825:2022' Warmer Low (C) A 7 /W31		
Tested according to:	EN14511:2022 and EN14825:2022	
Climate zone:	Warmer	
Temperature application:	Low	
Condition name:	C	
Condition temperature:	°C	7
Part load:	%	64%
Chosen Tbivalent	°C	2
Tdesign	°C	2
Pdesign	kW	13.10
Heating demand:	kW	8.42
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:	Steady State	
Integrated circulation pump:	No	
Included corrections (Final result)		
Heating capacity	kW	8.750
COP	-	5.514
Power consumption	kW	1.587
Measured		
Heating capacity	kW	8.737
COP	-	5.557
Power consumption	kW	1.572
During heating		
Air temperature dry bulb	°C	6.99
Air temperature wet bulb	°C	6.01
Inlet temperature	°C	26.03
Outlet temperature	°C	31.04
Outlet temperature (Time averaged)	°C	31.04
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	4732
Calculated Hydraulic power	W	2
Calculated global efficiency	η	0.14
Calculated Capacity correction	W	-12
Calculated Power correction	W	-14
Water Flow	m ³ /s	0.000419



Detailed SCOP part load test results - low temperature application - colder climate – EN 14825

Detailed result for 'EN14825:2022' Colder Low (A) A -7 /W30		
Tested according to:	EN14511:2022 and EN14825:2022	
Climate zone:		Colder
Temperature application:		Low
Condition name:		A
Condition temperature:	°C	-7
Part load:	%	61%
Chosen Tbivalent	°C	-15
Tdesign	°C	-22
Pdesign	kW	13.70
Heating demand:	kW	8.29
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Transient
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	8.383
COP	-	3.315
Power consumption	kW	2.529
Measured		
Heating capacity	kW	8.386
COP	-	3.312
Power consumption	kW	2.532
During heating		
Air temperature dry bulb	°C	-6.91
Air temperature wet bulb	°C	-8.13
Inlet temperature	°C	25.01
Outlet temperature	°C	30.13
Outlet temperature (Time averaged)	°C	30.13
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	694
Calculated Hydraulic power	W	0
Calculated global efficiency	η	0.12
Calculated Capacity correction	W	2
Calculated Power correction	W	2
Water Flow	m ³ /s	0.000411



Detailed result for 'EN14825:2018' Colder Low (F and G) A -15 /W32		
Tested according to:		EN14825:2018
Climate zone:		Colder
Temperature application:		Low
Condition name:		F and G
Condition temperature:	°C	-15
Part load:	%	82%
Chosen Tbivalent	°C	-15
Tdesign	°C	-22
Pdesign	kW	13.70
Heating demand:	kW	11.18
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	11.301
COP	-	2.497
Power consumption	kW	4.526
Measured		
Heating capacity	kW	11.328
COP	-	2.484
Power consumption	kW	4.560
During heating		
Air temperature dry bulb	°C	-15.10
Air temperature wet bulb	°C	-14.89
Inlet temperature	°C	27.01
Outlet temperature	°C	32.09
Outlet temperature (Time averaged)	°C	32.09
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	12070
Calculated Hydraulic power	W	6
Calculated global efficiency	η	0.19
Calculated Capacity correction	W	27
Calculated Power correction	W	34
Water Flow	m ³ /s	0.000536



Detailed COP test results - low temperature – EN 14511

Detailed result for 'EN14511:2022' A7/W35		
Tested according to:		EN14511:2022
Minimum flow reached:		No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	15.707
COP	-	4.498
Power consumption	kW	3.492
Measured		
Heating capacity	kW	15.749
COP	-	4.438
Power consumption	kW	3.549
During heating		
Air temperature dry bulb	°C	6.98
Air temperature wet bulb	°C	5.85
Inlet temperature	°C	29.99
Outlet temperature	°C	34.96
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	20390
Calculated Hydraulic power	W	16
Calculated global efficiency	η	0.27
Calculated Capacity correction	W	41
Calculated Power correction	W	57
Water Flow	m ³ /s	0.000763



Detailed COP test results - medium temperature – EN 14511

Detailed result for 'EN14511:2022' A7/W55		
Tested according to:		EN14511:2022
Minimum flow reached:		No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	16.139
COP	-	2.854
Power consumption	kW	5.654
Measured		
Heating capacity	kW	16.152
COP	-	2.849
Power consumption	kW	5.669
During heating		
Air temperature dry bulb	°C	6.92
Air temperature wet bulb	°C	5.91
Inlet temperature	°C	47.01
Outlet temperature	°C	54.85
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	4062
Calculated Hydraulic power	W	2
Calculated global efficiency	η	0.14
Calculated Capacity correction	W	13
Calculated Power correction	W	15
Water Flow	m ³ /s	0.000500



Detailed test results of sound power measurement – Test N#1

		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:	Midea		Date of test: 18-01-2024																																																																			
Object:	Type: Mono Air to water heat pump, Model: MHC-V16W/D2RN8-BER90																																																																					
Mounting conditions:	The outdoor unit is mounted on the supporting metal support frame using six vibration insulators and placed on four pieces of concrete tiles (20x20x2.5 cm). All of these are placed in a water drop tray on two pieces of heavy concrete tiles (90x90x10cm) laying on a vibration damping mat on the floor. The noise radiated by the outdoor unit has been measured in Test room 2.																																																																					
Operating conditions:	A7/W35, Compressor speed: 64[Hz], Fan speed: 730[rpm], Pump speed: 80 [%], EXV1(P): 138, Heating capacity: 15.7 [kW], Power_input: 3.49 [kW], Water flow rate: 2720 [l/h]																																																																					
Static pressure:	995 hPa	Reference box:																																																																				
Air temperature:	7.0 °C	L1:	1.4 m																																																																			
Relative air humidity:	84.0 %	L2:	0.4 m																																																																			
Test room volume:	102.8 m³	L3:	0.9 m																																																																			
Area, S, of test room:	138.9 m²	Room:	Room 2																																																																			
		Volume:	0.5 m³																																																																			
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Sound power level L_w(A): 66.5 dB [re 1pW], Uncertainty σ_{tot}: 1.6 dB																																																																						
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No. of test report:	300-KLAB-23-039																																																																					
Measurements are in full conformity with ISO 3743-1																																																																						



Detailed test results of sound power measurement – Test N#2

	<h2 style="margin: 0;">Sound power levels according to ISO 3743-1:2010</h2>																																																																		
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms																																																																			
Client: Midea Object: Type: Mono Air to water heat pump, Model: MHC-V16W/D2RN8-BER90 Mounting conditions: The outdoor unit is mounted on the supporting metal support frame using six vibration insulators and placed on four pieces of concrete tiles (20x20x2.5 cm). All of these are placed in a water drop tray on two pieces of heavy concrete tiles (90x90x10cm) laying on a vibration damping mat on the floor. The noise radiated by the outdoor unit has been measured in Test room 2. Operating conditions: A7/W35, Compressor speed: 24[Hz], Fan speed: 400[rpm], Pump speed: 50 [%], EXV1(P): 94, Heating capacity: 5.67 [kW], Power_input: 1.16 [kW], Water flow rate: 980 [l/h] Static pressure: 995 hPa Air temperature: 7.0 °C Relative air humidity: 84.0 % Test room volume: 102.8 m³ Area, S, of test room: 138.9 m²	Date of test: 18-01-2024 Reference box: L1: 1.4 m L2: 0.4 m L3: 0.9 m Volume: 0.5 m³ Room: Room 2																																																																		
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Sound power level L_w(A): 51.5 dB [re 1pW], Uncertainty σ_{tot}: 1.6 dB																																																																			
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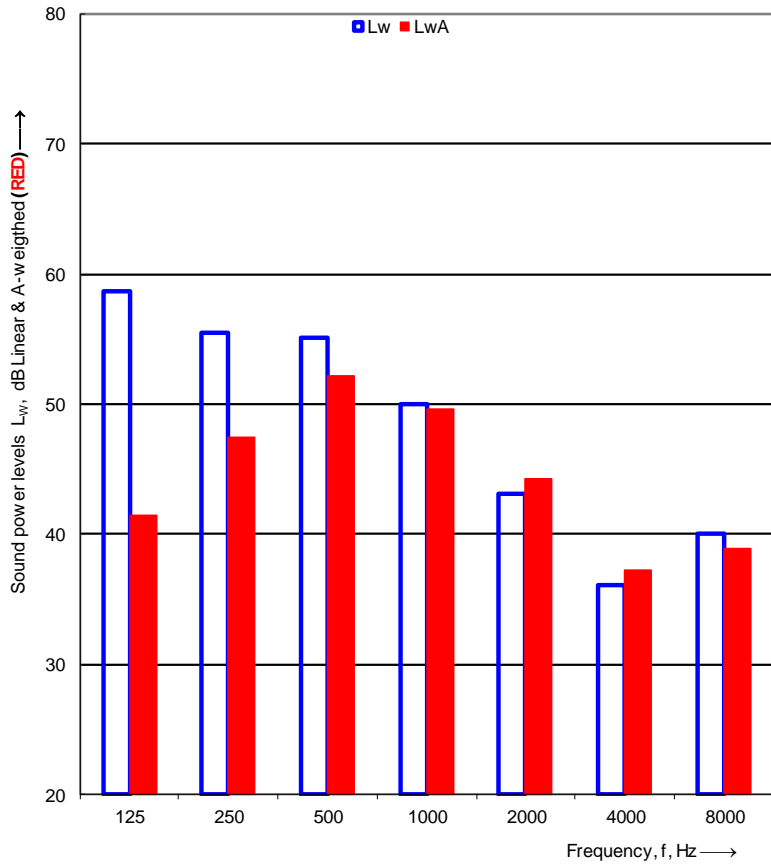


Detailed test results of sound power measurement – Test N#3

		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:	Midea	Date of test:	18-01-2024																																																																		
Object:	Type: Mono Air to water heat pump, Model: MHC-V16W/D2RN8-BER90																																																																				
Mounting conditions:	The outdoor unit is mounted on the supporting metal support frame using six vibration insulators and placed on four pieces of concrete tiles (20x20x2.5 cm). All of these are placed in a water drop tray on two pieces of heavy concrete tiles (90x90x10cm) laying on a vibration damping mat on the floor. The noise radiated by the outdoor unit has been measured in Test room 2.																																																																				
Operating conditions:	A7/W55, Compressor speed: 72[Hz], Fan speed: 650[rpm], Pump speed: 50 [%], EXV1(P): 128, Heating capacity: 16.14 [kW], Power_input: 5.65 [kW], Water flow rate: 1790 [l/h]																																																																				
Static pressure:	996 hPa	<u>Reference box:</u>																																																																			
Air temperature:	7.0 °C	L1:	1.4 m																																																																		
Relative air humidity:	84.0 %	L2:	0.4 m																																																																		
Test room volume:	102.8 m ³	L3:	0.9 m																																																																		
Area, S, of test room:	138.9 m ²	Room:	Room 2																																																																		
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Sound power level L_w(A): 65.2 dB [re 1pW], Uncertainty σ_{tot}: 1.6 dB																																																																					
Name of test institute:	DTI	Date:	18-01-2024																																																																		
No. of test report:	300-KLAB-23-039																																																																				
Measurements are in full conformity with ISO 3743-1																																																																					



Detailed test results of sound power measurement – Test N#4

	<h3>Sound power levels according to ISO 3743-1:2010</h3>																																																																		
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms																																																																			
<p>Client: Midea</p> <p>Object: Type: Mono Air to water heat pump, Model: MHC-V16W/D2RN8-BER90</p> <p>Mounting conditions: The outdoor unit is mounted on the supporting metal support frame using six vibration insulators and placed on four pieces of concrete tiles (20x20x2.5 cm). All of these are placed in a water drop tray on two pieces of heavy concrete tiles (90x90x10cm) laying on a vibration damping mat on the floor. The noise radiated by the outdoor unit has been measured in Test room 2.</p> <p>Operating conditions: A7/W55, Compressor speed: 32[Hz], Fan speed: 450[rpm], Pump speed: 30 [%], EXV1(P): 92, Heating capacity: 7.1 [kW], Power_input: 2.34 [kW], Water flow rate: 765 [l/h]</p> <p>Static pressure: 996 hPa</p> <p>Air temperature: 7.0 °C</p> <p>Relative air humidity: 84.0 %</p> <p>Test room volume: 102.8 m³</p> <p>Area, S, of test room: 138.9 m²</p>	<p>Date of test: 18-01-2024</p> <p><u>Reference box:</u></p> <p>L1: 1.4 m</p> <p>L2: 0.4 m</p> <p>L3: 0.9 m</p> <p>Volume: 0.5 m³</p> <p>Room: Room 2</p>																																																																		
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<p>Sound power level L_w(A): 55.6 dB [re 1pW], Uncertainty σ_{tot}: 1.6 dB</p>																																																																			
Name of test institute: DTI		Date: 18-01-2024																																																																	
No. of test report: 300-KLAB-23-039																																																																			
Measurements are in full conformity with ISO 3743-1																																																																			





Appendix 1

Unit specification

Type of unit: Mono air to water heat pump
Manufacturer: Midea
Size of the heat pump: 0.4 x 0.9 x 1.3m (W x L x H)
Year of production: n/a.

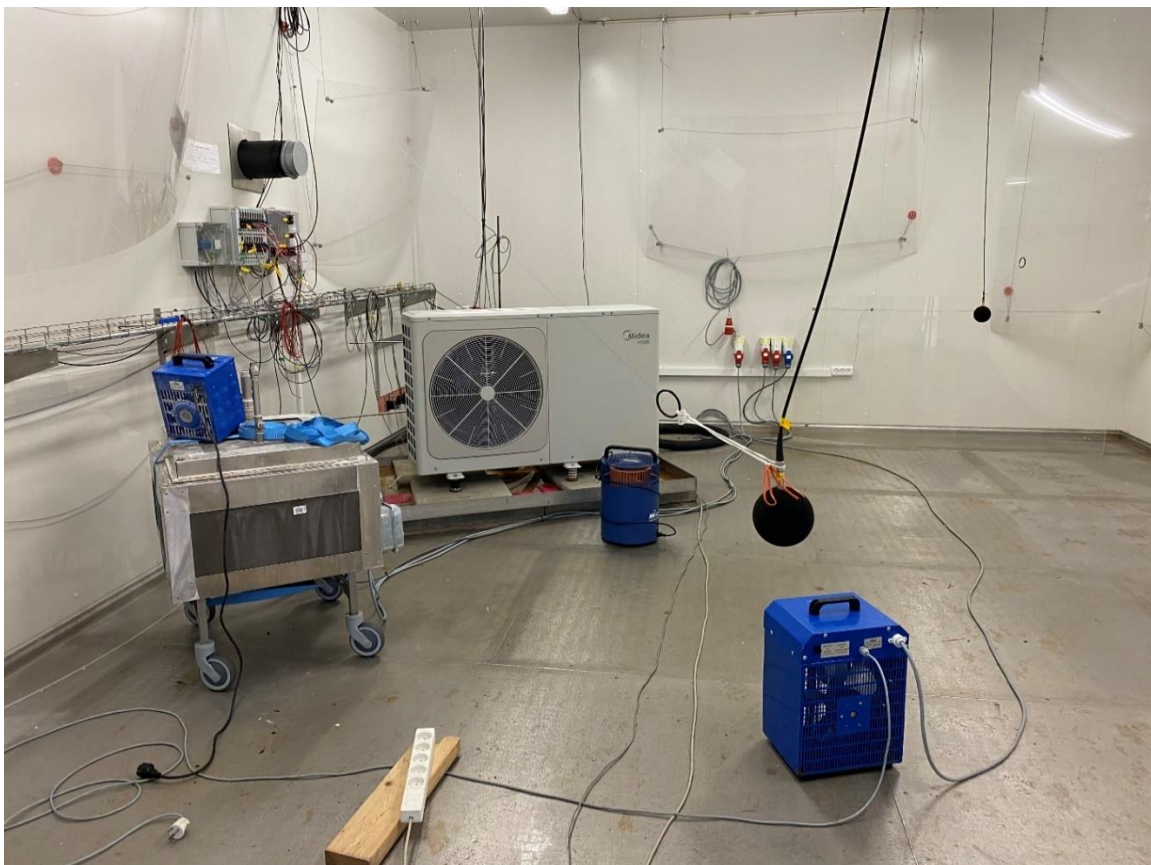
Operating conditions and environment

The operating conditions of the unit under test fulfill the requirements for Class A.

The acoustic test chamber is a hard wall reverberant room (103 m³ and equipped with relevant sound diffusing reflector panels. The acoustical test chamber fulfils the requirements of ISO3743-1 accuracy grade 2 (engineering grade).

The measurements of the average sound pressure levels in 1/3 octave frequency bands are carried out using three microphones in the test chamber. During the measurements, the microphones are traversed up and down for one meter in the arc of a quarter circle.

The picture below shows the installation of the unit during test, position of microphones, sound diffusing reflector panels, and the reference sound source.





Measurement instruments

Id nr.	Manufacturer	Description	Calibration company
100864	GRAS	Gras 40AE_26CA, 1/2" free field microphone, Room 1	Norsonic A/S, Norway
100865	GRAS	Gras 40AE_26CA, 1/2" free field microphone, Room 1	Norsonic A/S, Norway
100866	GRAS	Gras 40AE_26CA, 1/2" free field microphone, Room 1	Norsonic A/S, Norway
100867*	GRAS	Gras 40AE_26CA, 1/2" free field microphone, Room 2	Norsonic A/S, Norway
100868*	GRAS	Gras 40AE_26CA, 1/2" free field microphone, Room 2	Norsonic A/S, Norway
100869*	GRAS	Gras 40AE_26CA, 1/2" free field microphone, Room 2	Norsonic A/S, Norway
100870	GRAS	Gras 40AE_26CA, 1/2" free field microphone, Roof monitor	Norsonic A/S, Norway
100873*	Brüel & Kjær	Acoustical calibrator, Brüel & Kjær 4231	Element Metech, Denmark
100859	Norsonic	Reference sound source, Norsonic Nor278 Room 1	RISE, Sweden
100872*	Norsonic	Reference sound source, Norsonic Nor278 Room 2	RISE, Sweden
100620*	Norsonic	Multi-channel measurement system Nor850	Norsonic A/S, Norway

*Instruments are used for the actual measurements for the calculation of the test results.

The other instruments are used for control measurements.
All microphones are equipped with windshields.



Test Procedure

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

- DS/EN 14511:2022
- EN 12102-1:2022
- ISO/EN 3743-1:2010

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

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.

Measurement uncertainty

The uncertainty of sound power level in decibel is determined in accordance with ISO 3743-1, equation 22 $\sigma_{tot} = \sqrt{\sigma_{RO}^2 + \sigma_{omc}^2}$ where:

- σ_{RO} is the standard deviation of the reproducibility of the method
- σ_{omc} is the standard deviation describing the uncertainty associated with the instability of the operating and mounting conditions for the particular noise source during test.

σ_{RO} expresses the uncertainty in test results delivered by the different accredited test laboratories due to different instrumentation and implementation of measurement procedure as well different radiation characteristics of the noise source during test.

σ_{omc} expresses the uncertainty associated with the instability of the operating and mounting conditions for the particular noise source during test. The mounting and installation conditions in two DTI acoustical test chambers are well defined in the test procedure. Possible instability of the operating conditions is monitored and assessed prior to each noise test.





The test uncertainty σ_{omc} is calculated according to ISO3743-1 Annex C formula C.1 and is typically below 0.5dB. However, the uncertainty is rounded up to the nearest 0.5dB increment in the report. As pr. Table C.1 (accuracy grade 2), the uncertainty σ_{RO} is set to 1.5.

The expanded uncertainty U is calculated according to ISO 3743-1 equation 23:
 $U = k \sigma_{\text{tot}}$ where $k = 2$ for 95% confidence.

EXAMPLE: $\sigma_{\text{tot}}: \sqrt{1.5^2 + 0.5^2} = 1.6 \text{ dB}$ and $U(95\%) = 3.2 \text{ dB}$

Note: The expanded uncertainty does not include the standard deviation of production which is used in ISO4871 for the purpose of making noise declaration for batches of machines.



Appendix 2



EU Declaration of Consistency

Product: Air source heat pump

Brand: Beretta

Manufacturer' s Name: GD Midea HEATING&VENTILATING Equipment Co.,Ltd.

Manufacturer' s Address: Midea Industrial City, Shunde, Foshan, Guangdong, P.R. China

Importer' s Name: Riello S.p.A

Importer' s Address: VIA ING. PILADE RIELLO 7, 37045 LEGNAGO VR (ITALY), Italy

We, GD Midea Heating & Ventilating Equipment Co., Ltd, hereby declare that the following Heat Pump we produced for Riello S.p.A are identical to our following models, except for the model name, for the labels and for the manuals.

Midea model name	Model names (per brand) for Riello SpA
	BERETTA
MHC-V4W/D2N8-B	HYDRO UNIT M 004
MHC-V6W/D2N8-B	HYDRO UNIT M 006
MHC-V8W/D2N8-B	HYDRO UNIT M 008
MHC-V10W/D2N8-B	HYDRO UNIT M 010
MHC-V12W/D2N8-B	HYDRO UNIT M 012
MHC-V14W/D2N8-B	HYDRO UNIT M 014
MHC-V16W/D2N8-B	HYDRO UNIT M 016
MHC-V12W/D2RN8-B	HYDRO UNIT M 012T
MHC-V14W/D2RN8-B	HYDRO UNIT M 014T
MHC-V16W/D2RN8-B	HYDRO UNIT M 016T
MHC-V18W/D2RN8-B	HYDRO UNIT M 018T
MHC-V22W/D2RN8-B	HYDRO UNIT M 022T
MHC-V26W/D2RN8-B	HYDRO UNIT M 026T
MHC-V30W/D2RN8-B	HYDRO UNIT M 030T

广东美的暖通设备有限公司 GD Midea Heating & Ventilating Equipment Co., Ltd.

地址: 中国广东省佛山市顺德区北滘镇美的工业城 邮编: 528311

Address: Midea Industrial City, Beijiao, Shunde, Foshan, Guangdong, P.R. China Postcode: 528311

电话 Tel: +86-757-26338495 传真 Fax: +86-757-22390205 网址 Website: <http://www.midea.com> <http://cac.midea.com>



Test Reg. nr. 300



Note: This declaration becomes invalid if technical or operational modifications are introduced without the manufacturer' s consent.

Production year: From 2022

Year of affixing CE Marking: From 2022

Address: Midea Industrial City, Beijiao, Shunde, Foshan, Guangdong, P.R.C.

Date : 28/03/2024

Authorization:



广东美的暖通设备有限公司 GD Midea Heating & Ventilating Equipment Co. , Ltd.

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