L 1045.1

TEST REPORT
31-10708/2/T

Product:	Outdoor Air/Water Heat Pump – split
Type designation:	**AWM1501.090.XB17.H00.C13**
Customer:	W&H ELECTRIC POLSKA Sp. z.o.o. (Trade Mark: BeGreen) ul. Biecka 21A 38-300 Gorlice POLAND
Manufacturer:	W&H ELECTRIC POLSKA Sp. z.o.o. (Trade Mark: BeGreen) ul. Biecka 21A 38-300 Gorlice POLAND
Responsible employee:	Ing. Mario Jankola
Report issue date:	2022-04-08
Distribution list:	1 copy to the Customer 1 copy to the Engineering Test Institute

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I. Description of product tested

The Heat pump **AWM1501.090.XB17.H00.C13** supplied by the company **W&H Electric LLC (trade mark BeGreen)** is structurally adapted to operate in air/water system. Device is divided to the outdoor unit **OU.H.160.C13**, placed outside on a pedestal, indoor unit **IU.AWM1501.090.XB17.H00**. Outdoor and indoor units are connected by copper piping and electrical wires. Refrigerant R410A is used with charge 2.5 kg. Power supply is a three-phase. Heat pump is able to work in heating mode.

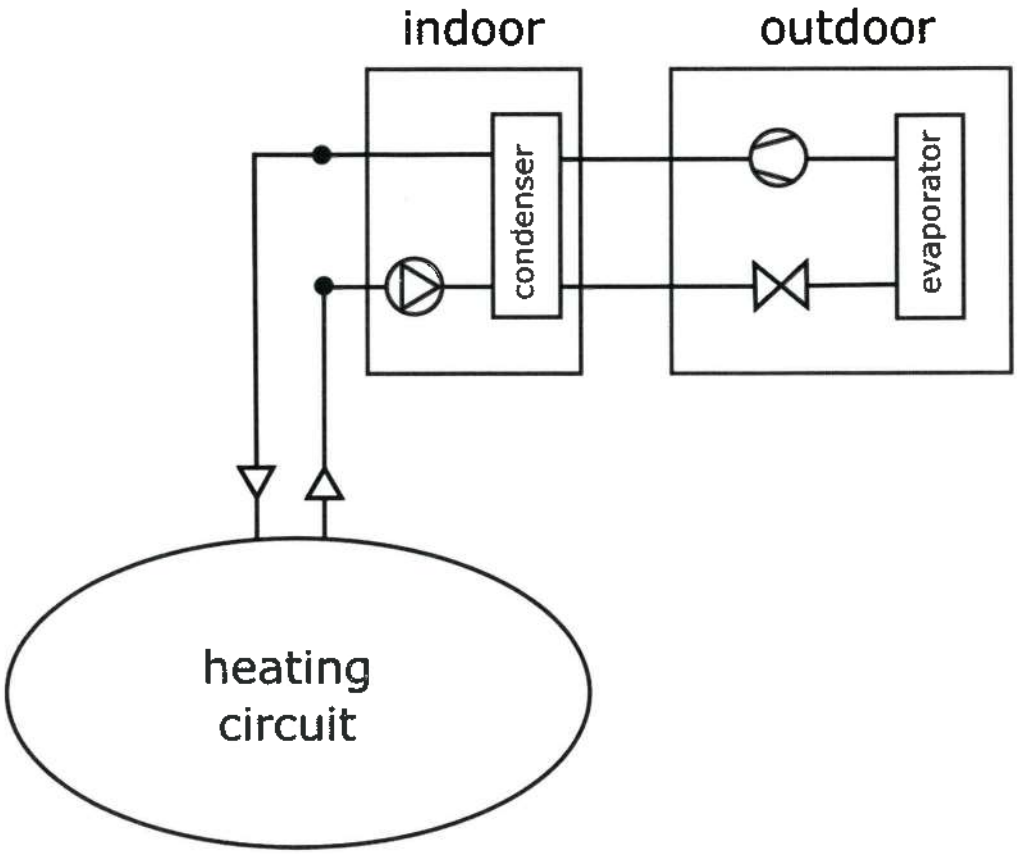
Main components of the outdoor unit **OU.H.160.C13**:

- Serial number AA9Z7 0E1F0 0AUM9 G0021
- Dimensions 945 × 380 × 1325 mm (W × D × H)
- Frame and casing made of varnished steel sheets
- L-shaped evaporator, 2 rows, dimensions, 1010 x 41 x 1290 mm (W × D × H), spacing 2 mm
- Compressor Mitsubishi Electric MNB42FFDMC-L
- Refrigerant R410A (2.5 kg)
- Electric expansion valve
- 4-way reversing valve Sanhua SHF-20D-46-04 with coil Sanhua V13996
- Axial fan ø 500 mm with motor ZhongShan
- Temperature sensors
- Pressure sensors
- Refrigerant accumulator

Main components of the indoor unit type **IU.AWM1501.090.XB17.H00**:

- Serial number Prototype
- Dimensions 432 × 337 × 631 mm (W × D × H)
- Frame and casing made of varnished steel
- Electric backup heater
- Plate condenser with dimensions 130 x 115 x 560 mm (W × D × H), including insulation
- Circulation pump WILO
- Temperature sensors
- Flowmeter
- Expansion vessel Winkelmann CRF 10
- Pressure relief valve
- Air vent
- Regulation Siemens + display

Scheme:



Photodocumentation:

Heat pump **AWM1501.090.XB17.H00.C13** - outdoor unit
– Front view –

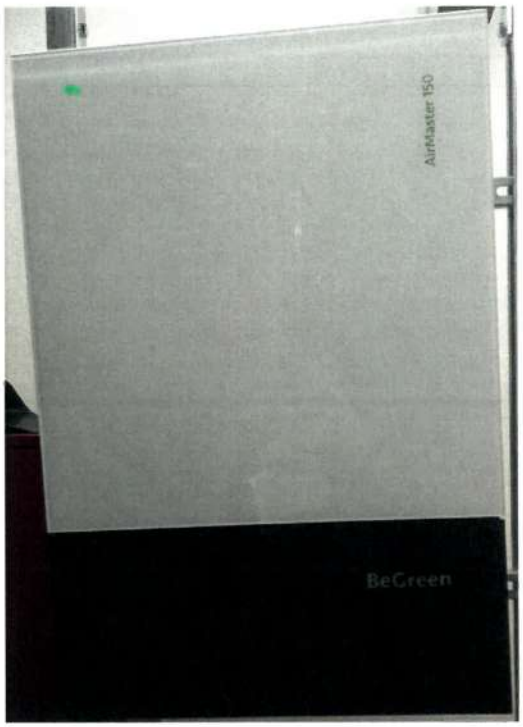
Heat pump **AWM1501.090.XB17.H00.C13** - outdoor unit
– Back view –

Heat pump **AWM1501.090.XB17.H00.C13** - outdoor unit
– Compressor label –

Heat pump **AWM1501.090.XB17.H00.C13** - outdoor unit
– Outdoor unit label –

Heat pump **AWM1501.090.XB17.H00.C13** - outdoor unit
– Without cover –

Heat pump **AWM1501.090.XB17.H00.C13** - indoor unit
– Label –



Heat pump **AWM1501.090.XB17.H00.C13** - indoor unit
– With cover –

Heat pump **AWM1501.090.XB17.H00.C13** - indoor unit
– Without cover –

II. Sample tested

SZU reg. no.	Product name	Date of submission
0213.22.36032.001-002	Outdoor Air/Water Heat Pump – split	2022-01-11

The visual inspection, tests and verification were carried out by Ing. Dominik Šedivý at the test station of SZU
The tests were performed using measuring and testing equipment with valid calibration.

III. Measuring and test equipment:

No.	Name:	Inventory number:	Calibration is valid to:	Accuracy see Calibration Sheet number:
1.	Electrical energy meter	E3.1	05/2031	0004/21
2.	Digital watt meter	1.2.3 ENERGIE ANALYZATOR_3	05/2023	K21050741
3.	Flow meter Krohne Optiflux	8.1.5 TECH_K3_V_DN15_SEK	04/2025	6015-KL-P0355-21
4.	Barometer	2.4 MAR18_1_PB	06/2023	4952/2021
5.	Differential pressure gauge	14.2.2 MAR18_3_dP_2	06/2023	KL-P-0063-21
6.	Temperature-humidity meter HF532	14.1.1 K3_VLHKOST_1	04/2026	6036-KL-V0118-21
7.	Temperature-humidity meter HF532	14.1.3 K3_VLHKOST_2	04/2026	6036-KL-V0119-21
8.	Thermometers	14.4 MAR18_T	05/2024	KL-T-0086-21
9.	Thermometers	14.4 MAR18_T	05/2024	KL-T-0086-21

IV. Methods, results of tests and verifications

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	[m3/s]	± 1 %	fulfilled
- static pressure difference	[kPa]	± 1 kPa (Δp ≤ 20 kPa) nebo ± 5 % (Δp > 20 kPa)	fulfilled
Air			
- dry bulb temperature	[°C]	± 0.2 K	fulfilled
- wet bulb temperature	[°C]	± 0.4 K	fulfilled
- volume flow	[m3/s]	± 5 %	not applied
- static pressure difference	[Pa]	± 5 Pa (Δp ≤ 100 Pa) nebo ± 5 % (Δp > 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 related
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

The following expanded measurement uncertainties have been calculated as the coefficient of measurement uncertainty and the expanded coefficient k = 2, which corresponds to a coverage probability of 95% for normal distribution. The uncertainties do not take into account the effects of sampling and the inhomogeneity of the sample. The standard uncertainty has been determined in accordance with EA 4/02.
If a statement of conformity is given, the binary statement for the simple acceptance rule pursuant to ILAC-G8: 09/2019 shall be used.

Test objective:	Heat pumps
Exact name of the test procedure:	T 037 – Tests of leakage, pressure resistance, thermal and technical parameters, combustion efficiency, safety functions
Test method:	ČSN EN 14511-2:2019, ČSN EN 14511-3:2019, ČSN EN 14511-4:2019, ČSN EN 14825:2020, EHPA Testing regulation – Testing of Air/Water Heat Pumps – Version 2.4a, ČSN EN 12102-1:2018
Sample tested:	Heat pump **AWM1501.090.XB17.H00.C13**
Measuring equipment used:	see Chapter III
Place of test:	at the Engineering Test Institute

a) Rating conditions:

Measurement results: Heat pump **AWM1501.090.XB17.H00.C13**

Test number		1	2
Assessment condition		**Rating conditions**	
Specification of the assessment condition*		**A7/W35**	**A7/W55**
Date of testing		**2022-01-12**	**2022-01-21**
Transient test procedure	YES / NO	NO	NO
Average defrost time of 1 cycle	[min]	–	–
Average time of 1 cycle	[min]	–	–
Calculation time	[min]	70.0	70.0
Output heating water – temperature calculation	[°C]	34.97	54.98
Input heating water – temperature calculation	[°C]	30.01	46.98
Output heating water temperature	[°C]	34.97	54.98
Input heating water temperature	[°C]	30.01	46.98
Air temperature – dry bulb temperature	[°C]	6.98	7.00
Air temperature – wet bulb temperature	[°C]	6.01	6.02
Relative humidity	[%]	87.12	87.04
Barometric pressure	[kPa]	100.510	99.088
Ambient temperature	[°C]	16.88	17.32
Secondary circuit pressure difference	[kPa]	15.381	12.962
Efficiency of the secondary liquid pump	[–]	0.229	0.164
Volume flow rate of heating water	$[m^3 \cdot h^{-1}]$	2.3118	1.1126
Density of heating water	$[kg \cdot m^{-3}]$	994.0	986.1
Specific heat capacity of heating water	$[kJ \cdot kg^{-1} \cdot K^{-1}]$	4.175	4.179
Voltage	[V]	402.33	402.21
Total current	[A]	16.67	23.36
Overall power input	[kW]	3.322	5.017
Capacity correction of sec. liquid pump	[W]	33.221	20.479
Power input correction of sec. liquid pump	[W]	43.10	24.48
Heating capacity – heating water	[kW]	13.226	10.185
Corrected heating capacity – heating water	**[kW]**	**13.193**	**10.165**
Uncertainty of corrected heating capacity	[kW]	± 0.230	± 0.113
Effective electric power input	**[kW]**	**3.279**	**4.992**
COP	**[–]**	**4.023**	**2.036**
Uncertainty of COP	[–]	± 0.070	± 0.023
Control settings	**[rps]**	**55**	**65**
Circulation pump settings – heating water	[%]	70	45

*Comment to abbreviated marking: e.g. A7/W35
A (air) 7 (input air, dry-bulb temperature in °C) / W (water), 35 (output heating water temperature in °C)

b) Seasonal performance tests and SCOP calculation – Low temperature application for reference heating seasons:

„A" = average (reference water temperature 35 °C, reference design conditions for heating $T_{designh}$ = -10 °C)
„W" = warmer (reference water temperature 35 °C, reference design conditions for heating $T_{designh}$ = +2 °C)
„C" = colder (reference water temperature 35 °C, reference design conditions for heating $T_{designh}$ = -22 °C)

Model				Heat pump **AWM1501.090.XB17.H00.C13**				
Design				Outdoor Air / water – split				
Conditions specification according to ČSN EN 14825:2020	Temperature application			**Low** (reference water temperature 35 °C)				
	Reference heating season			**A, W, C**				
	Outlet water temperature - indoor heat exchanger			Variable				
	Compressor speed control			Variable				
	Water flow rate – primary circuit			–				
	Water flow rate – secondary circuit			Variable				
Seasonal space heating energy efficiency	Heating	Average	η_s / **A**		156.8		%	
		Warmer	η_s / W		203.3	(Not tested)	%	
		Colder	η_s / C		141.2	(Not tested)	%	
Seasonal efficiency according to ČSN EN 14825:2020	Heating	Average	**SCOP / A**		3.99		–	
		Warmer	SCOP / W		5.16	(Not tested)	–	
		Colder	SCOP / C		3.60	(Not tested)	–	
Function	Cooling				Yes			
	Heating	Yes	Reference heating season	Average	Yes			
				Warmer	Yes			
				Colder	Yes			
Full heating load	Cooling		$P_{designc}$		–		kW	
	Heating	Average	$P_{designh}$		11.73		kW	
		Warmer	$P_{designh}$		11.49		kW	
		Colder	$P_{designh}$		14.02		kW	
Bivalent temperatures	Heating	Average	$T_{bivalent}$		-7		°C	
		Warmer	$T_{bivalent}$		2		°C	
		Colder	$T_{bivalent}$		-11		°C	
Operation limit temperatures	Heating	Average	TOL		-10		°C	
		Warmer	TOL		2		°C	
		Colder	TOL		-20		°C	
Seasonal power consumption according to ČSN EN 14825:2020	Cooling		Q_{CE}		–		kWh	
	Heating	Average	Q_{HE}/A		6067		kWh	
		Warmer	Q_{HE}/W		2977	(Not tested)	kWh	
		Colder	Q_{HE}/C		9590	(Not tested)	kWh	
Modes other than „active mode"	Off mode			P_{OFF}	18.3		W	
	Thermostat off mode			P_{TO}	18.3		W	
	Standby mode			P_{SB}	18.3		W	
	Crankcase heater mode			P_{CK}	0.0		W	

(Not tested): The technical data were declared by the Manufacturer and were not tested by the Testing Laboratory.

Calculation of SCOP according to ČSN EN 14825:2020:

Number of hours used for calculation of reference SCOP (Annex B – Table B. 2, B. 3)
- For reversible heat pumps and reference heating season „A" = average

H_{HE}	2066	[h]
H_{TO}	178	[h]
H_{SB}	0	[h]
H_{CK}	178	[h]
H_{OFF}	0	[h]

Measured data:

P_{TO}	0.0183	[kW]
P_{SB}	0.0183	[kW]
P_{CK}	0.0000	[kW]
P_{OFF}	0.0183	[kW]
$P_{designh}$	11.73	[kW]
$SCOP_{ON}$	4.00	[–]

Coefficient and correction:

F(1)	3	[%]
F(2)	0	[%]
CC	2.5	[–]

Calculation of SCOP:

7.3 Calculation of the reference annual heating demand (Q_H)

$Q_H = P_{designh} \cdot H_{HE}$ [kWh]

$Q_H = 11.73 \cdot 2066 = 24234$ [kWh]

7.4 Calculation of the annual electricity consumption (Q_{HE})

$Q_{HE} = Q_H / SCOP_{on} + H_{TO} \cdot P_{TO} + H_{SB} \cdot P_{SB} + H_{CK} \cdot P_{CK} + H_{OFF} \cdot P_{OFF}$ [kWh]

$Q_{HE} = 24234 / 4 + 178 \cdot 0.0183 + 0 \cdot 0.0183 + 178 \cdot 0 + 0 \cdot 0.0183 = 6067$ [kWh]

7.2 General formula for calculation of reference SCOP

$SCOP = Q_H / Q_{HE}$ [–]

$SCOP = 24234 / 6067 = 3.99$ [–]

7.1 Calculation of the seasonal space heating efficiency η_s

$\Sigma F(i) = F(1) + F(2)$ [–]

$\Sigma F = 0.03 + 0 = 0.03$ [–]

$\eta_s = 1 / CC \cdot SCOP - \Sigma F(i)$ [–]

$\eta_s (A) = (1 / 2.5) \cdot 3.99 - 0.03 =$ **1.568** [–]

Test results for single part load conditions

Measurement results: Heat pump **AWM1501.090.XB17.H00.C13**

Test number		3	4	5
Temperature level		Low (reference water temperature 35 °C)		
Reference heating season		„A" = average ($T_{designh}$ = -10 °C)		
Assessment condition		**A, Tbiv (F)**	**B**	**C**
Specification of the assessment condition*		**A-7/W34**	**A2/W30**	**A7/W29.21**
Date of testing		**2022-01-13**	**2022-01-21**	**2022-01-19**
Transient test procedure	YES / NO	YES	NO	NO
Average defrost time of 1 cycle	[min]	5.5	–	–
Average time of 1 cycle	[min]	55.9	–	–
Calculation time	[min]	167.8	70.0	70.0
Output heating water – temperature calculation	[°C]	33.23	29.95	29.24
Input heating water – temperature calculation	[°C]	29.01	24.95	24.24
Output heating water temperature	[°C]	34.03	29.95	29.24
Input heating water temperature	[°C]	29.03	24.95	24.24
Air temperature – dry bulb temperature	[°C]	-7.03	2.01	7.03
Air temperature – wet bulb temperature	[°C]	-8.00	1.02	6.03
Relative humidity	[%]	75.25	83.84	86.86
Barometric pressure	[kPa]	100.459	99.226	99.294
Ambient temperature	[°C]	17.06	15.61	17.68
Secondary circuit pressure difference	[kPa]	12.819	12.168	6.933
Efficiency of the secondary liquid pump	[–]	0.206	0.162	0.144
Volume flow rate of heating water	[$m^3 \cdot h^{-1}$]	2.1301	1.1551	1.2617
Density of heating water	[$kg \cdot m^{-3}$]	994.5	995.6	995.8
Specific heat capacity of heating water	[$kJ \cdot kg^{-1} \cdot K^{-1}$]	4.175	4.176	4.176
Voltage	[V]	401.96	402.18	402.65
Total current	[A]	19.61	9.43	8.36
Overall power input	[kW]	4.060	1.752	1.451
Capacity correction of sec. liquid pump	[W]	28.508	20.148	14.500
Power input correction of sec. liquid pump	[W]	36.01	24.05	16.93
Heating capacity – heating water	[kW]	10.405	6.670	7.288
Corrected heating capacity – heating water	**[kW]**	**10.376**	**6.650**	**7.273**
Uncertainty of corrected heating capacity	[kW]	± 0.211	± 0.115	± 0.126
Effective electric power input	**[kW]**	**4.024**	**1.728**	**1.434**
COP	**[–]**	**2.579**	**3.849**	**5.071**
Uncertainty of COP	[–]	± 0.053	± 0.067	± 0.088
Control settings	**[rps]**	**82**	**35**	**30**
Circulation pump settings – heating water	[%]	**65**	**45**	**42**

* Comment to abbreviated marking: e.g. A7/W35
A (air) 7 (input air, dry-bulb temperature in °C) / W (water), 35 (output heating water temperature in °C)

Test results for single part load conditions

Measurement results: Heat pump **AWM1501.090.XB17.H00.C13**

Číslo testu		6	7
Test number		Low (reference water temperature 35 °C)	
Temperature level		„A" = average ($T_{designh}$ = -10 °C)	
Reference heating season		**D**	**TOL (E)**
Assessment condition		**A12/W27.95**	**A-10/W35**
Specification of the assessment condition*		**2022-01-18**	**2022-01-13**
Transient test procedure	ANO / NE	NO	NO
Average defrost time of 1 cycle	[min]	–	–
Average time of 1 cycle	[min]	–	–
Calculation time	[min]	70.0	70.0
Output heating water – temperature calculation	[°C]	27.92	35.00
Input heating water – temperature calculation	[°C]	22.92	30.01
Output heating water temperature	[°C]	27.92	35.00
Input heating water temperature	[°C]	22.92	30.01
Air temperature – dry bulb temperature	[°C]	12.00	-10.01
Air temperature – wet bulb temperature	[°C]	10.95	-10.90
Relative humidity	[%]	88.30	72.64
Barometric pressure	[kPa]	100.267	100.254
Ambient temperature	[°C]	17.48	16.56
Secondary circuit pressure difference	[kPa]	1.920	19.646
Efficiency of the secondary liquid pump	[–]	0.122	0.235
Volume flow rate of heating water	[$m^3 \cdot h^{-1}$]	1.4924	1.9252
Density of heating water	[$kg \cdot m^{-3}$]	996.1	994.0
Specific heat capacity of heating water	[$kJ \cdot kg^{-1} \cdot K^{-1}$]	4.177	4.175
Voltage	[V]	401.77	401.78
Total current	[A]	6.87	21.35
Overall power input	[kW]	1.200	4.410
Capacity correction of sec. liquid pump	[W]	5.697	34.190
Power input correction of sec. liquid pump	[W]	6.49	44.70
Heating capacity – heating water	[kW]	8.627	11.094
Corrected heating capacity – heating water	**[kW]**	**8.621**	**11.059**
Uncertainty of corrected heating capacity	[kW]	± 0.149	± 0.191
Effective electric power input	**[kW]**	**1.193**	**4.366**
COP	**[–]**	**7.224**	**2.533**
Uncertainty of COP	[–]	± 0.125	± 0.044
Control settings	**[rps]**	**30**	**82**
Circulation pump settings – heating water	[%]	**42**	**65**

* Comment to abbreviated marking: e.g. A7/W35
A (air) 7 (input air, dry-bulb temperature in °C) / W (water), 35 (output heating water temperature in °C)

Test results for single part load conditions

Measurement results: Heat pump **AWM1501.090.XB17.H00.C13**

Test number		8	9	10
Temperature level		Low (reference water temperature 35 °C)		
Reference heating season		„W" = warmer (Tdesignh = 2 °C)	„C" = colder (Tdesignh = -22 °C)	
Assessment condition		**B, TOL (E), Tbiv (F)**	**C**	**Tbiv (F)**
Specification of the assessment condition*		**A2/W35**	**A7/W27.76**	**A-11/W31**
Date of testing		**2022-01-12**	**2022-01-24**	**2022-01-20**
Transient test procedure	YES / NO	YES	NO	NO
Average defrost time of 1 cycle	[min]	5.0	–	–
Average time of 1 cycle	[min]	87.1	–	–
Calculation time	[min]	174.1	70.0	70.0
Output heating water – temperature calculation	[°C]	34.46	27.75	30.97
Input heating water – temperature calculation	[°C]	30.00	22.75	25.97
Output heating water temperature	[°C]	34.93	27.75	30.97
Input heating water temperature	[°C]	30.01	22.75	25.97
Air temperature – dry bulb temperature	[°C]	1.96	6.98	-11.00
Air temperature – wet bulb temperature	[°C]	0.99	6.01	-11.92
Relative humidity	[%]	84.17	87.11	70.34
Barometric pressure	[kPa]	100.480	100.260	98.374
Ambient temperature	[°C]	15.54	15.99	16.79
Secondary circuit pressure difference	[kPa]	9.946	4.618	17.370
Efficiency of the secondary liquid pump	[–]	0.190	0.133	0.214
Volume flow rate of heating water	$[m^3 \cdot h^{-1}]$	2.2281	1.2844	1.7318
Density of heating water	$[kg \cdot m^{-3}]$	994.2	996.2	995.3
Specific heat capacity of heating water	$[kJ \cdot kg^{-1} \cdot K^{-1}]$	4.175	4.177	4.176
Voltage	[V]	401.41	401.68	401.47
Total current	[A]	17.65	7.82	17.85
Overall power input	[kW]	3.630	1.399	3.699
Capacity correction of sec. liquid pump	[W]	25.803	10.698	30.692
Power input correction of sec. liquid pump	[W]	31.89	12.35	39.05
Heating capacity – heating water	[kW]	11.520	7.422	9.995
Corrected heating capacity – heating water	**[kW]**	**11.494**	**7.411**	**9.965**
Uncertainty of corrected heating capacity	[kW]	± 0.221	± 0.128	± 0.172
Effective electric power input	**[kW]**	**3.599**	**1.386**	**3.660**
COP	**[–]**	**3.194**	**5.345**	**2.722**
Uncertainty of COP	[–]	± 0.061	± 0.093	± 0.047
Control settings	**[rps]**	**65**	**30**	**82**
Circulation pump settings – heating water	[%]	**65**	**40**	**60**

* Comment to abbreviated marking: e.g. A7/W35
A (air) 7 (input air, dry-bulb temperature in °C) / W (water), 35 (output heating water temperature in °C)

Data for SCOP calculation (Heat pump **AWM1501.090.XB17.H00.C13**)

- Low temperature application (reference water temperature 35 °C)
- Reference heating season „A" – average

	Outdoor heat exchanger Outdoor air inlet	Indoor heat exchanger Outlet water temperature	Part load ratio	Part load	DC Declared capacity	COPd at declared capacity	Cdh degradation coefficient	CR	COPbin (Tj)	Eff. power input of compressor off state
	[°C]	[°C]	[%]	[kW]	[kW]	[–]	[–]	[–]	[–]	[kW]
A	-7	34.00	88.46	10.38	10.376	2.579	0.900	1.00	2.579	–
B	2	30.00	53.85	6.32	6.650	3.849	0.900	1.00	3.849	–
C	7	29.21	34.62	4.06	7.273	5.071	0.987	0.56	5.020	0.0183
D	12	27.95	15.38	1.80	8.621	7.224	0.985	0.21	6.829	0.0183
TOL (E)	-10	35.00	100.00	11.73	11.059	2.533	0.900	1.00	2.533	–
Tbiv (F)	-7	34.00	88.46	10.38	10.376	2.579	0.900	1.00	2.579	–

Adaption of water temperature – according to ČSN EN 14825:2020, Annex F

- Low temperature application (reference water temperature 35 °C)
- Reference season „A"– average
- Condition D
- Variable water flow rate – secondary circuit

General formulas and derivation:

$t_{outlet,\ average} = t_{inlet,\ capacity\ test} + (t_{outlet,\ capacity\ test} - t_{inlet,\ capacity\ test}) \cdot CR$ [°C]

$t_{outlet,\ average} = t_{inlet,\ capacity\ test} + (\Delta t) \cdot CR$ [°C]

$t_{outlet,\ average} = t_{outlet,\ capacity\ test} - \Delta t + \Delta t \cdot CR$ [°C]

$t_{outlet,\ capacity\ test} = t_{outlet,\ average} + \Delta t - \Delta t \cdot CR$ [°C]

For variable flow:

$\Delta t = 5$

$CR \cdot \Delta t$ = Part load / Declared capacity · 5

$t_{outlet,\ capacity\ test,\ variable\ flow} = t_{outlet,\ average} + 5$ - Part load / Declared capacity · 5

Measured data:

$t_{outlet,\ average}$	24,00	[°C]
Declared capacity	8.621	[kW]
Declared capacity $_{standard\ rating\ condition\ A7/W35}$	–	[kW]
Part load	1.80	[kW]

Calculation of water temperature

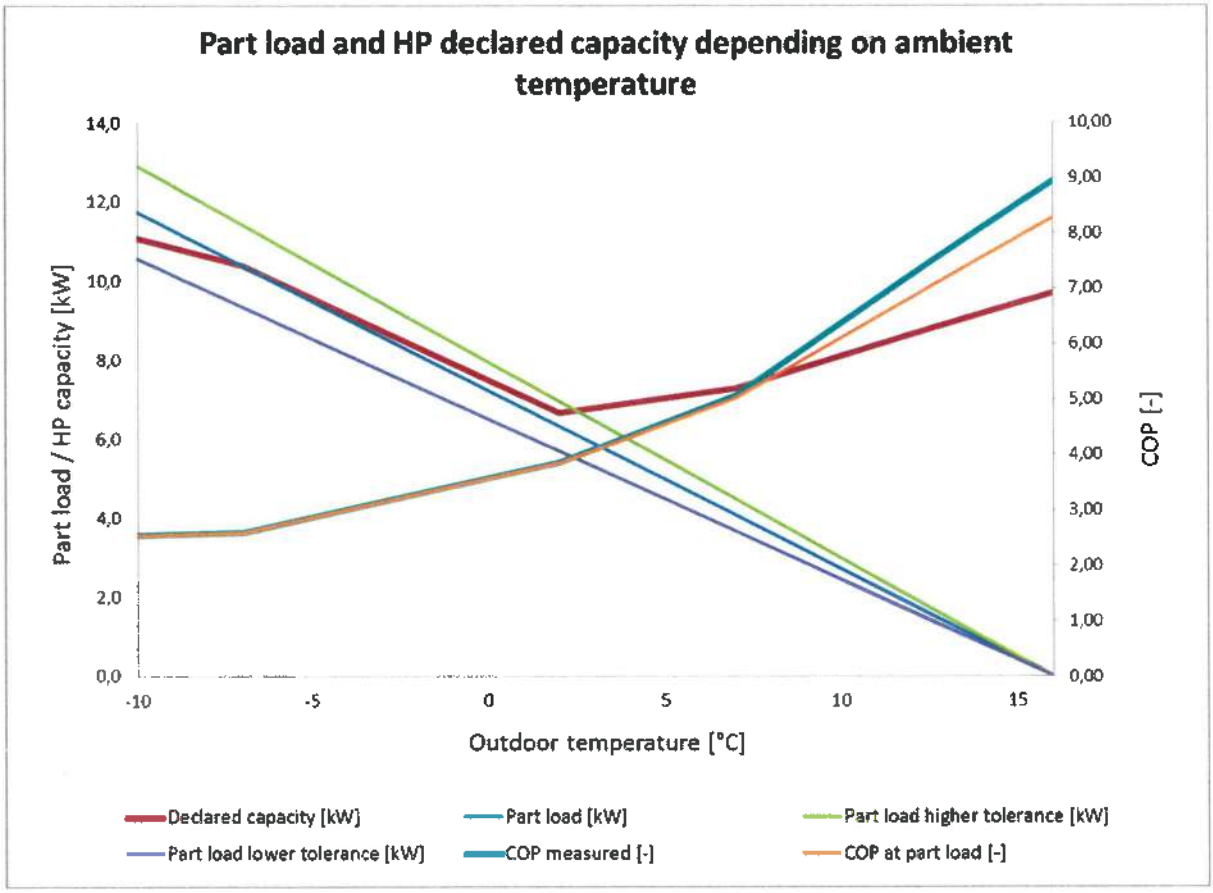
$t_{outlet,\ capacity\ test,\ variable\ flow} = 24 + 5 - 1.8 / 8.621 \cdot 5 =$ **27,95** [°C]

Calculation SCOP, $SCOP_{on}$, $SCOP_{net}$ (Heat pump **AWM1501.090.XB17.H00.C13**)
- Low temperature application (reference water temperature 35 °C)
- Reference heating season „A" – average

	Bin j [–]	Outdoor temp. (dry bulb) Tj [°C]	Hours hj [h]	Part load ratio [%]	Heat load Ph(Tj) [kW]	Capacity of HP [kW]	Heat load covered by heat pump [kW]	Resistive heat elbu (Tj) elbu(Tj) [kW]	Annual resistive heat hj x elbu(Tj) [kWh]	COPbin (Tj) COPbin (Tj) [–]	Annual heating demand hj x Ph(Tj) [kWh]	Annual power input including electric back up heating [kWh]	Net annual heating capacity hj x (Ph(Tj) - elbu(Tj)) [kWh]	Net annual power input without electric back up heating [kWh]
TOL (E)	**21**	**-10**	**1**	**100.00**	**11.73**	**11.06**	**11.06**	**0.67**	**0.67**	**2.53**	**12**	**5**	**11**	**4**
	22	-9	25	96.15	11.28	10.83	10.83	0.45	11.17	2.55	282	117	271	106
	23	-8	23	92.31	10.83	10.60	10.60	0.22	5.14	2.56	249	100	244	95
A, Tbiv (F)	**24**	**-7**	**24**	**88.46**	**10.38**	**10.38**	**10.38**	**0.00**	**0.00**	**2.58**	**249**	**97**	**249**	**97**
	25	-6	27	84.62	9.93	9.96	9.93	0.00	0.00	2.72	268	99	268	99
	26	-5	68	80.77	9.47	9.55	9.47	0.00	0.00	2.86	644	225	644	225
	27	-4	91	76.92	9.02	9.13	9.02	0.00	0.00	3.00	821	273	821	273
	28	-3	89	73.08	8.57	8.72	8.57	0.00	0.00	3.14	763	243	763	243
	29	-2	165	69.23	8.12	8.31	8.12	0.00	0.00	3.28	1340	408	1340	408
	30	-1	173	65.38	7.67	7.89	7.67	0.00	0.00	3.43	1327	387	1327	387
	31	0	240	61.54	7.22	7.48	7.22	0.00	0.00	3.57	1732	486	1732	486
	32	1	280	57.69	6.77	7.06	6.77	0.00	0.00	3.71	1895	511	1895	511
B	**33**	**2**	**320**	**53.85**	**6.32**	**6.65**	**6.32**	**0.00**	**0.00**	**3.85**	**2021**	**525**	**2021**	**525**
	34	3	357	50.00	5.86	6.77	5.86	0.00	0.00	4.08	2094	513	2094	513
	35	4	356	46.15	5.41	6.90	5.41	0.00	0.00	4.32	1927	446	1927	446
	36	5	303	42.31	4.96	7.02	4.96	0.00	0.00	4.55	1504	330	1504	330
	37	6	330	38.46	4.51	7.15	4.51	0.00	0.00	4.79	1489	311	1489	311
C	**38**	**7**	**326**	**34.62**	**4.06**	**7.27**	**4.06**	**0.00**	**0.00**	**5.02**	**1324**	**264**	**1324**	**264**
	39	8	348	30.77	3.61	7.54	3.61	0.00	0.00	5.38	1256	233	1256	233
	40	9	335	26.92	3.16	7.81	3.16	0.00	0.00	5.74	1058	184	1058	184
	41	10	315	23.08	2.71	8.08	2.71	0.00	0.00	6.11	853	140	853	140
	42	11	215	19.23	2.26	8.35	2.26	0.00	0.00	6.47	485	75	485	75
D	**43**	**12**	**169**	**15.38**	**1.80**	**8.62**	**1.80**	**0.00**	**0.00**	**6.83**	**305**	**45**	**305**	**45**
	44	13	151	11.54	1.35	8.89	1.35	0.00	0.00	7.19	204	28	204	28
	45	14	105	7.69	0.90	9.16	0.90	0.00	0.00	7.55	95	13	95	13
	46	15	74	3.85	0.45	9.43	0.45	0.00	0.00	7.91	33	4	33	4
		Σ	4910							Σ	24230	6063	24213	6046

SCOPon	4.00	SCOPnet	4.00
		SCOP	**3.99**

Power diagram (Heat pump **AWM1501.090.XB17.H00.C13**)
- Low temperature application (reference water temperature 35 °C)
- Reference heating season „A" – average



c) Seasonal performance tests and SCOP calculation – Low temperature application for reference heating seasons:

„A" = average (reference water temperature 35 °C, reference design conditions for heating $T_{designh}$ = -10 °C)
„W" = warmer (reference water temperature 35 °C, reference design conditions for heating $T_{designh}$ = +2 °C)
„C" = colder (reference water temperature 35 °C, reference design conditions for heating $T_{designh}$ = -22 °C)

Model			Heat pump **AWM1501.090.XB17.H00.C13**				
Design			Outdoor Air / water – split				
Conditions specification according to ČSN EN 14825:2020	Temperature application				**Medium** (reference water temperature 55 °C)		
	Reference heating season				**A, W, C**		
	Outlet water temperature - indoor heat exchanger				Variable		
	Compressor speed control				Variable		
	Water flow rate – primary circuit				–		
	Water flow rate – secondary circuit				Variable		
Seasonal space heating energy efficiency	Heating	Average	η_s / **A**		117.4		%
		Warmer	η_s / W		138.2	(Not tested)	%
		Colder	η_s / C		104.9	(Not tested)	%
Seasonal efficiency according to ČSN EN 14825:2020	Heating	Average	**SCOP / A**		3.01		–
		Warmer	SCOP / W		3.53	(Not tested)	–
		Colder	SCOP / C		2.70	(Not tested)	–
Function	Cooling				Yes		
	Heating	Yes	Reference heating season	Average	Yes		
				Warmer	Yes		
				Colder	Yes		
Full heating load	Cooling		$P_{designc}$		–		kW
	Heating	Average	$P_{designh}$		12.35		kW
		Warmer	$P_{designh}$		12.83		kW
		Colder	$P_{designh}$		14.01		kW
Bivalent temperatures	Heating	Average	$T_{bivalent}$		-7		°C
		Warmer	$T_{bivalent}$		2		°C
		Colder	$T_{bivalent}$		-10		°C
Operation limit temperatures	Heating	Average	TOL		-10		°C
		Warmer	TOL		2		°C
		Colder	TOL		-18		°C
Seasonal power consumption according to ČSN EN 14825:2020	Cooling		Q_{CE}		–		kWh
	Heating	Average	Q_{HE}/A		8478		kWh
		Warmer	Q_{HE}/W		4856	(Not tested)	kWh
		Colder	Q_{HE}/C		12797	(Not tested)	kWh
Modes other than „active mode"	Off mode			P_{OFF}	18.3		W
	Thermostat off mode			P_{TO}	18.3		W
	Standby mode			P_{SB}	18.3		W
	Crankcase heater mode			P_{CK}	0.0		W

(Not tested): The technical data were declared by the Manufacturer and were not tested by the Testing Laboratory.

Calculation of SCOP according to ČSN EN 14825:2020:

Number of hours used for calculation of reference SCOP (Annex B – Table B.2, B.3)

- For reversible heat pumps and reference heating season „A" = average

H_{HE}	2066	[h]
H_{TO}	178	[h]
H_{SB}	0	[h]
H_{CK}	178	[h]
H_{OFF}	0	[h]

Measured data:

P_{TO}	0.0183	[kW]
P_{SB}	0.0183	[kW]
P_{CK}	0.0000	[kW]
P_{OFF}	0.0183	[kW]
$P_{designh}$	12.35	[kW]
$SCOP_{ON}$	3.01	[–]

Coefficient and correction:

F(1)	3	[%]
F(2)	0	[%]
CC	2.5	[–]

Calculation of SCOP:

7.3 Calculation of the reference annual heating demand (Q_H)

$Q_H = P_{designh} \cdot H_{HE}$ [kWh]

$Q_H = 12.35 \cdot 2066 = 25520$ [kWh]

7.4 Calculation of the annual electricity consumption (Q_{HE})

$Q_{HE} = Q_H / SCOP_{on} + H_{TO} \cdot P_{TO} + H_{SB} \cdot P_{SB} + H_{CK} \cdot P_{CK} + H_{OFF} \cdot P_{OFF}$ [kWh]

$Q_{HE} = 25520 / 3.01 + 178 \cdot 0.0183 + 0 \cdot 0.0183 + 178 \cdot 0 + 0 \cdot 0.0183 = 8478$ [kWh]

7.2 General formula for calculation of reference SCOP

$SCOP = Q_H / Q_{HE}$ [–]

$SCOP = 25520 / 8478 = 3.01$ [–]

7.1 Calculation of the seasonal space heating efficiency η_s

$\Sigma F(i) = F(1) + F(2)$ [–]

$\Sigma F = 0.03 + 0 = 0.03$ [–]

$\eta_s = 1 / CC \cdot SCOP - \Sigma F(i)$ [–]

$\eta_s (A) = (1 / 2.5) \cdot 3.01 - 0.03 =$ **1.174** [–]

Test results for single part load conditions

Measurement results: Heat pump **AWM1501.090.XB17.H00.C13**

Test number		11	12	13
Temperature level		Medium (reference water temperature 55 °C)		
Reference heating season		„A" = average ($T_{designh}$ = -10 °C)		
Assessment condition		**A, Tbiv (F)**	**B**	**C**
Specification of the assessment condition*		**A-7/W52**	**A2/W42**	**A7/W38.58**
Date of testing		**2022-01-14**	**2022-01-22**	**2022-01-19**
Transient test procedure	YES / NO	NO	NO	NO
Average defrost time of 1 cycle	[min]	–	–	–
Average time of 1 cycle	[min]	–	–	–
Calculation time	[min]	70.0	70.0	70.0
Output heating water – temperature calculation	[°C]	52.00	42.00	38.57
Input heating water – temperature calculation	[°C]	44.00	34.96	32.51
Output heating water temperature	[°C]	52.00	42.00	38.57
Input heating water temperature	[°C]	44.00	34.96	32.51
Air temperature – dry bulb temperature	[°C]	-7.01	1.99	6.94
Air temperature – wet bulb temperature	[°C]	-8.00	1.01	5.98
Relative humidity	[%]	74.97	84.03	87.31
Barometric pressure	[kPa]	99.682	99.176	98.876
Ambient temperature	[°C]	17.05	14.72	15.98
Secondary circuit pressure difference	[kPa]	17.136	11.443	12.938
Efficiency of the secondary liquid pump	[–]	0.184	0.149	0.154
Volume flow rate of heating water	$[m^3 \cdot h^{-1}]$	1.1948	0.8953	0.9081
Density of heating water	$[kg \cdot m^{-3}]$	987.5	991.6	992.9
Specific heat capacity of heating water	$[kJ \cdot kg^{-1} \cdot K^{-1}]$	4.178	4.175	4.175
Voltage	[V]	401.88	402.98	401.93
Total current	[A]	25.86	12.67	9.74
Overall power input	[kW]	5.595	2.434	1.767
Capacity correction of sec. liquid pump	[W]	25.193	16.272	17.900
Power input correction of sec. liquid pump	[W]	30.88	19.12	21.16
Heating capacity – heating water	[kW]	10.952	7.252	6.331
Corrected heating capacity – heating water	**[kW]**	**10.927**	**7.236**	**6.314**
Uncertainty of corrected heating capacity	[kW]	± 0.121	± 0.090	± 0.091
Effective electric power input	**[kW]**	**5.565**	**2.415**	**1.746**
COP	**[–]**	**1.964**	**2.997**	**3.616**
Uncertainty of COP	[–]	± 0.022	± 0.037	± 0.052
Control settings	**[rps]**	**82**	**40**	**30**
Circulation pump settings – heating water	[%]	50	40	42

* Comment to abbreviated marking: e.g. A7/W35
A (air) 7 (input air, dry-bulb temperature in °C) / W (water), 35 (output heating water temperature in °C)

Test results for single part load conditions

Measurement results:

Heat pump **AWM1501.090.XB17.H00.C13**

Test number		**14**	**15**
Temperature level		Medium (reference water temperature 55 °C)	
Reference heating season		„A" = average ($T_{designh}$ = -10 °C)	
Assessment condition		**D**	**TOL (E)**
Specification of the assessment condition*		**A12/W36.09**	**A-10/W55**
Date of testing		**2022-01-18**	**2022-01-14**
Transient test procedure	YES / NO	NO	NO
Average defrost time of 1 cycle	[min]	–	–
Average time of 1 cycle	[min]	–	–
Calculation time	[min]	70.0	70.0
Output heating water – temperature calculation	[°C]	36.13	54.92
Input heating water – temperature calculation	[°C]	28.44	46.92
Output heating water temperature	[°C]	36.13	54.92
Input heating water temperature	[°C]	28.44	46.92
Air temperature – dry bulb temperature	[°C]	12.00	-9.99
Air temperature – wet bulb temperature	[°C]	10.91	-10.80
Relative humidity	[%]	87.94	75.33
Barometric pressure	[kPa]	100.216	99.545
Ambient temperature	[°C]	15.57	17.39
Secondary circuit pressure difference	[kPa]	11.342	21.385
Efficiency of the secondary liquid pump	[–]	0.149	0.181
Volume flow rate of heating water	[$m^3 \cdot h^{-1}$]	0.8976	0.9102
Density of heating water	[$kg \cdot m^{-3}$]	993.7	986.3
Specific heat capacity of heating water	[$kJ \cdot kg^{-1} \cdot K^{-1}$]	4.175	4.179
Voltage	[V]	401.19	401.14
Total current	[A]	8.07	26.05
Overall power input	[kW]	1.484	5.615
Capacity correction of sec. liquid pump	[W]	16.198	24.495
Power input correction of sec. liquid pump	[W]	19.03	29.90
Heating capacity – heating water	[kW]	7.962	8.331
Corrected heating capacity – heating water	**[kW]**	**7.946**	**8.306**
Uncertainty of corrected heating capacity	[kW]	± 0.091	± 0.092
Effective electric power input	**[kW]**	**1.465**	**5.585**
COP	**[–]**	**5.425**	**1.487**
Uncertainty of COP	[–]	± 0.063	± 0.017
Control settings	**[rps]**	**30**	**82**
Circulation pump settings – heating water	[%]	40	50

* Comment to abbreviated marking: e.g. A7/W35
A (air) 7 (input air, dry-bulb temperature in °C) / W (water), 35 (output heating water temperature in °C)

Test results for single part load conditions

Measurement results: Heat pump **AWM1501.090.XB17.H00.C13**

Test number		16	17	18
Temperature level		Medium (reference water temperature 55 °C)		
Reference heating season		„W" = warmer (Tdesignh = 2 °C)	„C" = colder (Tdesignh = -22 °C)	
Assessment condition		**B, TOL (E), Tbiv (F)**	**D**	**Tbiv (F)**
Specification of the assessment condition*		**A2/W55**	**A12/W34.54**	**A-10/W45.88**
Date of testing		**2022-01-17**	**2022-01-19**	**2022-01-14**
Transient test procedure	YES / NO	YES	NO	NO
Average defrost time of 1 cycle	[min]	5.2	–	–
Average time of 1 cycle	[min]	107.5	–	–
Calculation time	[min]	107.5	70.0	70.0
Output heating water – temperature calculation	[°C]	54.26	34.50	45.82
Input heating water – temperature calculation	[°C]	46.89	26.77	37.82
Output heating water temperature	[°C]	54.87	34.50	45.82
Input heating water temperature	[°C]	46.89	26.77	37.82
Air temperature – dry bulb temperature	[°C]	1.99	12.00	-10.00
Air temperature – wet bulb temperature	[°C]	1.00	11.01	-10.86
Relative humidity	[%]	84.05	89.00	73.89
Barometric pressure	[kPa]	98.579	99.974	99.482
Ambient temperature	[°C]	16.31	16.08	16.63
Secondary circuit pressure difference	[kPa]	10.405	12.864	19.489
Efficiency of the secondary liquid pump	[–]	0.168	0.154	0.184
Volume flow rate of heating water	[$m^3 \cdot h^{-1}$]	1.5202	0.9083	1.0459
Density of heating water	[$kg \cdot m^{-3}$]	986.3	994.2	990.2
Specific heat capacity of heating water	[$kJ \cdot kg^{-1} \cdot K^{-1}$]	4.179	4.175	4.176
Voltage	[V]	401.64	400.68	402.83
Total current	[A]	28.19	7.76	23.25
Overall power input	[kW]	6.058	1.422	4.993
Capacity correction of sec. liquid pump	[W]	21.204	17.872	25.132
Power input correction of sec. liquid pump	[W]	25.50	21.13	30.79
Heating capacity – heating water	[kW]	12.849	8.120	9.611
Corrected heating capacity – heating water	**[kW]**	**12.828**	**8.102**	**9.586**
Uncertainty of corrected heating capacity	[kW]	± 0.153	± 0.092	± 0.106
Effective electric power input	**[kW]**	**6.033**	**1.400**	**4.962**
COP	**[–]**	**2.126**	**5.786**	**1.932**
Uncertainty of COP	[–]	± 0.025	± 0.066	± 0.021
Control settings	**[rps]**	**82**	**30**	**82**
Circulation pump settings – heating water	[%]	50	42	50

* Comment to abbreviated marking: e.g. A7/W35
A (air) 7 (input air, dry-bulb temperature in °C) / W (water), 35 (output heating water temperature in °C)

Data for SCOP calculation (Heat pump **AWM1501.090.XB17.H00.C13**)

- Medium temperature application (reference water temperature 55 °C)
- Reference heating season „A" – average

	Outdoor heat exchanger Outdoor air inlet	Indoor heat exchanger Outlet water temperature	Part load ratio	Part load	DC Declared capacity	COPd at declared capacity	Cdh degradation coefficient	CR	COPb in (Tj)	Eff. power input of compressor off state
	[°C]	[°C]	[%]	[kW]	[kW]	[–]	[–]	[–]	[–]	[kW]
A	-7	52.00	88.46	10.93	10.927	1.964	0.900	1.00	1.964	–
B	2	42.00	53.85	6.65	7.236	2.997	0.900	1.00	2.997	–
C	7	38.58	34.62	4.28	6.314	3.616	0.990	0.68	3.598	0.0183
D	12	36.09	15.38	1.90	7.946	5.425	0.988	0.24	5.218	0.0183
TOL (E)	-10	55.00	100.00	12.35	8.306	1.487	0.900	1.00	1.487	–
Tbiv (F)	-7	52.00	88.46	10.93	10.927	1.964	0.900	1.00	1.964	–

Adaption of water temperature – according to ČSN EN 14825:2020, Annex F

- Medium temperature application (reference water temperature 55 °C)
- Reference season „A"– average
- Condition D
- Variable water flow rate – secondary circuit

General formulas and derivation:

$t_{outlet,\ average} = t_{inlet,\ capacity\ test} + (t_{outlet,\ capacity\ test} - t_{inlet,\ capacity\ test}) \cdot CR$ [°C]

$t_{outlet,\ average} = t_{inlet,\ capacity\ test} + (\Delta t) \cdot CR$ [°C]

$t_{outlet,\ average} = t_{outlet,\ capacity\ test} - \Delta t + \Delta t \cdot CR$ [°C]

$t_{outlet,\ capacity\ test} = t_{outlet,\ average} + \Delta t - \Delta t \cdot CR$ [°C]

For variable flow:

$\Delta t = 8$

$CR \cdot \Delta t$ = Part load / Declared capacity · 8

$t_{outlet,\ capacity\ test,\ variable\ flow} = t_{outlet,\ average} + 8$ - Part load / Declared capacity · 8

Measured data:

$t_{outlet,\ average}$	30.00	[°C]
Declared capacity	7.946	[kW]
Declared capacity $_{standard\ rating\ condition\ A7/W35}$	-	[kW]
Part load	1.90	[kW]

Calculation of water temperature

$t_{outlet,\ capacity\ test,\ variable\ flow} = 30 + 8 - 1.9 / 7.946 \cdot 8 =$ **36.09** [°C]

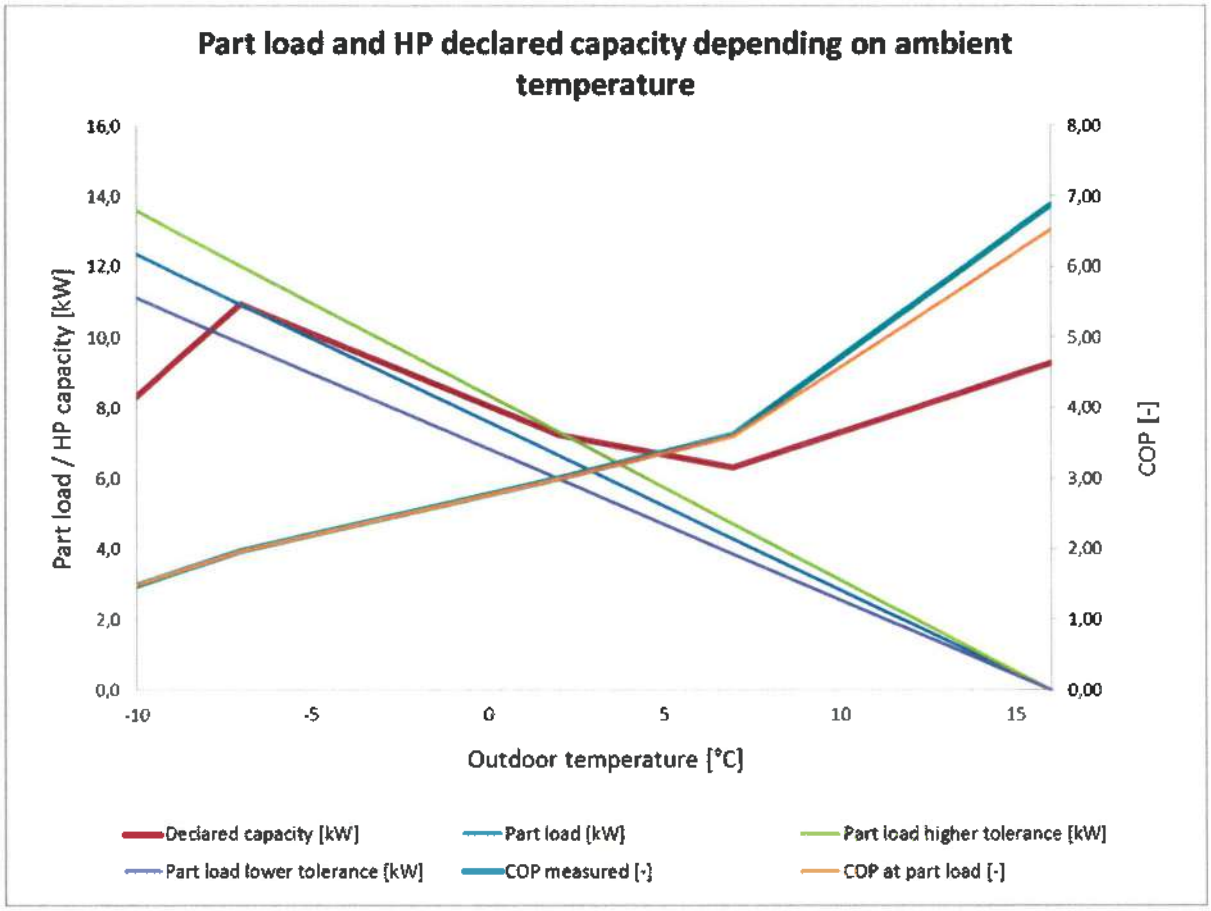
Calculation SCOP, $SCOP_{on}$, $SCOP_{net}$ (Heat pump **AWM1501.090.XB17.H00.C13**)

- Medium temperature application (reference water temperature 55 °C)
- Reference heating season „A" – average

	Bin	Outdoor temp. (dry bulb)	Hours	Part load ratio	Heat load	Capacity of HP	Heat load covered by heat pump	Resistive heat elbu (Tj)	Annual resistive heat	COPbin (Tj)	Annual heating demand	Annual power input including electric back up heating	Net annual heating capacity	Net annual power input without electric back up heating
	j	Tj	hj		Ph(Tj)			elbu(Tj)	hj x elbu(Tj)	COPbin (Tj)	hj x Ph(Tj)		hj x (Ph(Tj) - elbu(Tj))	
	[–]	[°C]	[h]	[%]	[kW]	[kW]	[kW]	[kW]	[kWh]	[–]	[kWh]	[kWh]	[kWh]	[kWh]
TOL (E)	21	-10	1	100.00	12.35	8.31	8.31	4.05	4.05	1.49	12	10	8	6
	22	-9	25	96.15	11.88	9.18	9.18	2.70	67.44	1.65	297	207	229	139
	23	-8	23	92.31	11.40	10.05	10.05	1.35	31.02	1.80	262	159	231	128
A, Tbiv (F)	24	-7	24	88.46	10.93	10.93	10.93	0.00	0.00	1.96	262	134	262	134
	25	-6	27	84.62	10.45	10.52	10.45	0.00	0.00	2.08	282	136	282	136
	26	-5	68	80.77	9.98	10.11	9.98	0.00	0.00	2.19	678	309	678	309
	27	-4	91	76.92	9.50	9.70	9.50	0.00	0.00	2.31	865	375	865	375
	28	-3	89	73.08	9.03	9.29	9.03	0.00	0.00	2.42	803	332	803	332
	29	-2	165	69.23	8.55	8.88	8.55	0.00	0.00	2.54	1411	556	1411	556
	30	-1	173	65.38	8.08	8.47	8.08	0.00	0.00	2.65	1397	527	1397	527
	31	0	240	61.54	7.60	8.06	7.60	0.00	0.00	2.77	1824	659	1824	659
	32	1	280	57.69	7.13	7.65	7.13	0.00	0.00	2.88	1995	692	1995	692
B	33	2	320	53.85	6.65	7.24	6.65	0.00	0.00	3.00	2128	710	2128	710
	34	3	357	50.00	6.18	7.05	6.18	0.00	0.00	3.12	2205	707	2205	707
	35	4	356	46.15	5.70	6.87	5.70	0.00	0.00	3.24	2030	627	2030	627
	36	5	303	42.31	5.23	6.68	5.23	0.00	0.00	3.36	1583	472	1583	472
	37	6	330	38.46	4.75	6.50	4.75	0.00	0.00	3.48	1568	451	1568	451
C	38	7	326	34.62	4.28	6.31	4.28	0.00	0.00	3.60	1394	387	1394	387
	39	8	348	30.77	3.80	6.64	3.80	0.00	0.00	3.92	1323	337	1323	337
	40	9	335	26.92	3.33	6.97	3.33	0.00	0.00	4.25	1114	262	1114	262
	41	10	315	23.08	2.85	7.29	2.85	0.00	0.00	4.57	898	196	898	196
	42	11	215	19.23	2.38	7.62	2.38	0.00	0.00	4.89	511	104	511	104
D	43	12	169	15.38	1.90	7.95	1.90	0.00	0.00	5.22	321	62	321	62
	44	13	151	11.54	1.43	8.27	1.43	0.00	0.00	5.54	215	39	215	39
	45	14	105	7.69	0.95	8.60	0.95	0.00	0.00	5.87	100	17	100	17
	46	15	74	3.85	0.48	8.92	0.48	0.00	0.00	6.19	35	6	35	6
		Σ	4910							Σ	25515	8473	25413	8371

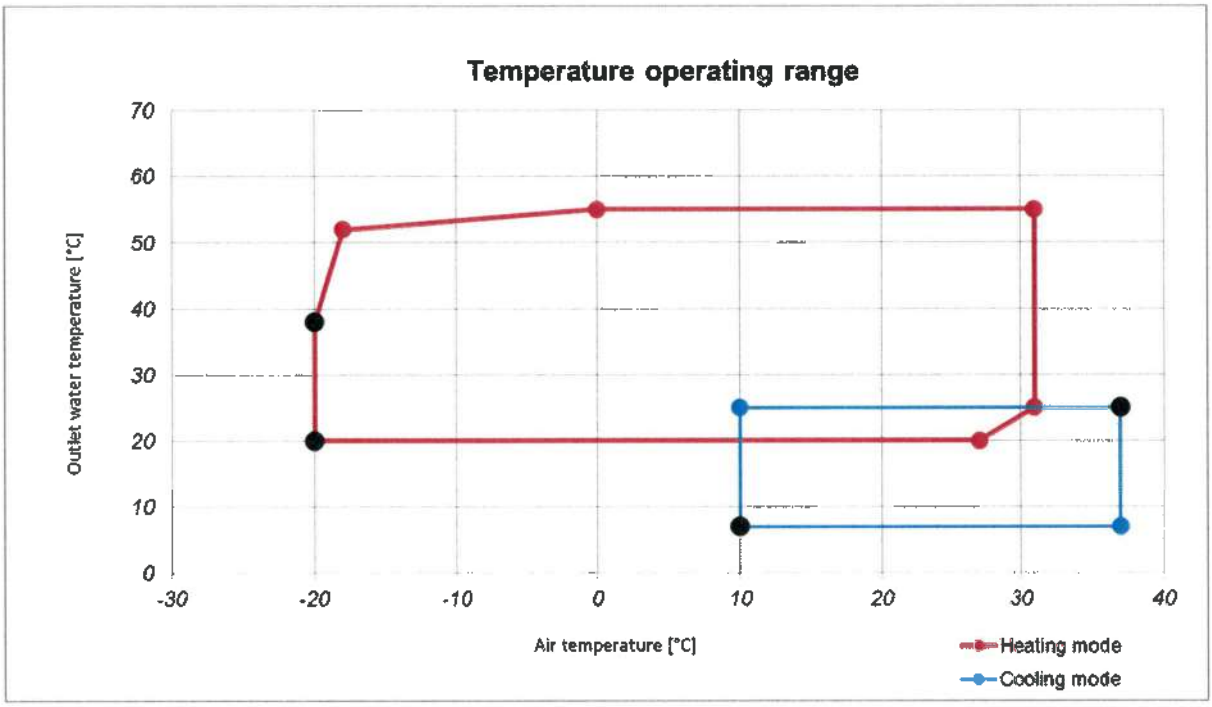
SCOPon	3.01	SCOPnet	3.04
		SCOP	**3.01**

Power diagram (Heat pump **AWM1501.090.XB17.H00.C13**)
- Medium temperature application (reference water temperature 55 °C)
- Reference heating season „A" – average



Test objective:	Heat pumps
Exact name of the test procedure:	T 037* - Tests of leakage, pressure resistance, thermal and technical parameters, combustion efficiency, safety functions
Test method:	ČSN EN 14511-4:2019
Sample tested:	Heat pump **AWM1501.090.XB17.H00.C13**
Measuring equipment used:	see Chapter III
Place of test:	at the Engineering Test Institute

1) Temperature operating range



Test point	Inlet air dry bulb temperature [°C]		Outlet heating water temperature [°C]		Water flow rate in condenser [m³/h]	Note
Heating mode						
1.	A	-20	W	20	Minimum	Minimum water flow rate: **0.900 m³·h⁻¹** Maximum water flow rate: **2.400 m³·h⁻¹**
2.	A	-20	W	38	Minimum	
Cooling mode						
1.	A	10	W	7	Minimum	Minimum starting water flow rate: **0.900 m³·h⁻¹** Maximum water flow rate: **2.400 m³·h⁻¹**
2.	A	37	W	25	Maximum	

Heat pump **AWM1501.090.XB17.H00.C13** is fully operational in the temperature operating range.

Starting and operating tests (heating mode)
Test according to Article 4.2.1.2 of ČSN EN 14511-4:2019

Operational requirements conditions for air-to-water units					
Test point	**Inlet temperature at outdoor heat exchanger (°C)**	**Inlet temperature at indoor heat exchanger (°C)**	**Water flow rate at indoor heat exchanger**	**Voltage (V)**	**Test result**
1 (starting)	Lower limit of use	Lower limit of use	minimum	Rated voltage	+
2 (operating)	Lower limit of use	Upper limit of use	minimum	Rated voltage	+

Evaluation:
+... For a starting test, the unit shall start and operate during 15 min, for an operating test, the unit shall be able to operate during 1 h, without tripping of the motor overload protective devices.
–... The unit did not fulfill test requirements.
0... The requirement does not apply to the product concerned.
x... Test was not required.

Starting and operating tests (cooling mode)
Test according to Article 4.2.1.3 of ČSN EN 14511-4:2019

Operational requirements conditions for air-to-water units					
Test point	**Inlet temperature at outdoor heat exchanger (°C)**	**Inlet temperature at indoor heat exchanger (°C)**	**Water flow rate at indoor heat exchanger**	**Voltage (V)**	**Test result**
1 (starting)	Lower limit of use	Lower limit of use	minimum	Rated voltage	+
2 (starting)	Upper limit of use	Upper limit of use	maximum	Rated voltage	+

Evaluation:
+... For a starting test, the unit shall start and operate during 15 min, without tripping of the motor overload protective devices.
–... The unit did not fulfill test requirements.
0... The requirement does not apply to the product concerned.
x... Test was not required.

2) Outside the operating range

Requirements for outside the operating range	Requirement specification	Test result	Note
If operating outside the temperature range can cause damage to the unit, it shall be provided with safety devices which ensure that the unit suffers no damage when the operating limits of use indicated by the manufacturer are exceeded and remains capable of operating when coming back within these limits. A safety device that does not automatically reset may trip provided that a warning device is fitted. The manufacturer shall indicate any safety devices provided and their operating conditions according to 7.2.3.	ČSN EN 14511-4:2019 Art. 4.3	x	–

Evaluation:
+... The unit fulfills test requirements.
–... The unit did not fulfill test requirements.
0... The requirement does not apply to the product concerned.
x... Test was not required.

3) Freeze-up test in cooling mode

Air-to-air and water(brine)-to-air units

Required operating conditions	Test result	Note
Test according to Article 4.4 of ČSN EN 14511-4:2019	0	–

Evaluation:
+... After the unit has operated for 6 hours or after the last freeze up cycle has been completed after these 6 h, the following requirements shall be fulfilled:
- no ice shall have accumulated on the evaporator;
- no ice shall drip from the unit;
- no water shall drip or be blown off the unit into the room.

–... The unit did not fulfill test requirements.
0... The requirement does not apply to the product concerned.
x... Test was not required.

4) Shutting off the heat transfer medium flows

Required operating conditions	Test result	Note
Test for section a) Art. 4.5 ČSN EN 14511-4:2019 – heating	+	Reduced capacity
Test for section a) Art. 4.5 ČSN EN 14511-4:2019 – cooling	x	–
Test for section b) Art. 4.5 ČSN EN 14511-4:2019 – heating	+	Flow switch
Test for section b) Art. 4.5 ČSN EN 14511-4:2019 – cooling	+	Flow switch
Test for section c) Art. 4.5 ČSN EN 14511-4:2019	0	–

Evaluation:
+... The unit shall remain capable of operating after restoration of the flow rates for 30 min once the compressor has restarted.
–... The unit did not fulfill test requirements.
0... The requirement does not apply to the product concerned.
x... Test was not required.

5) Complete power supply failure

Required operating conditions	Test result	Note
Test according to Article 4.6 of ČSN EN 14511-4:2019	+	–

Evaluation:
+... The unit has to restart automatically within 30 min. When manufacturer states that the unit does not automatically restart, fault detection is necessary. The unit is checked for any damage sustained during the test and if any safety devices have operated during the test.
–... The unit did not fulfill test requirements.
0... The requirement does not apply to the product concerned.
x... Test was not required.

6) Condensate draining and enclosure sweat test

Air-to-air and water(brine)-to-air units

Required operating conditions	Test result	Note
Test according to Article 4.7 of ČSN EN 14511-4:2019	0	–

Evaluation:
+... During the test of 4 hours no condensed water shall drip, run or blow off the unit except through the drain. For indoor units, drain holes shall be provided with suitable pipe connection, the minimum diameter of which shall be 12 mm.
–... The unit did not fulfill test requirements.
0... The requirement does not apply to the product concerned.
x... Test was not required.

V. Test results – Out of accredited tests

SCOP calculations – *based on values provided by the customer*

Testing method:	ČSN EN 14511-2:2019, ČSN EN 14511-3:2019, ČSN EN 14825:2020 EHPA Testing regulation – Testing of Air/Water Heat Pumps – Version 2.4a
Sample tested:	Heat pump **AWM1501.090.XB17.H00.C13**

Data for SCOP calculation (Heat pump **AWM1501.090.XB17.H00.C13**)
- Low temperature application (reference water temperature 35 °C)
- Reference heating season „W" – warmer

	Outdoor heat exchanger Outdoor air inlet	Indoor heat exchanger Outlet water temperature	Part load ratio	Part load	DC Declared capacity	COPd at declared capacity	Cdh degradation coefficient	CR	COPbin (Tj)	Eff. power input of compressor off state
	[°C]	[°C]	[%]	[kW]	[kW]	[–]	[–]	[–]	[–]	[kW]
A	–	–	–	–	–	–	–	–	–	–
B	2	35.00	100.00	11.49	11.494	3.194	0.900	1.00	3.194	–
C	7	31.00	64.29	7.39	7.273	4.510	0.900	1.00	4.510	–
D	12	29.05	28.57	3.28	8.410	6.430	0.986	0.39	6.293	0.0183
TOL (E)	2	35.00	100.00	11.49	11.494	3.194	0.900	1.00	3.194	–
Tbiv (F)	2	35.00	100.00	11.49	11.494	3.194	0.900	1.00	3.194	–

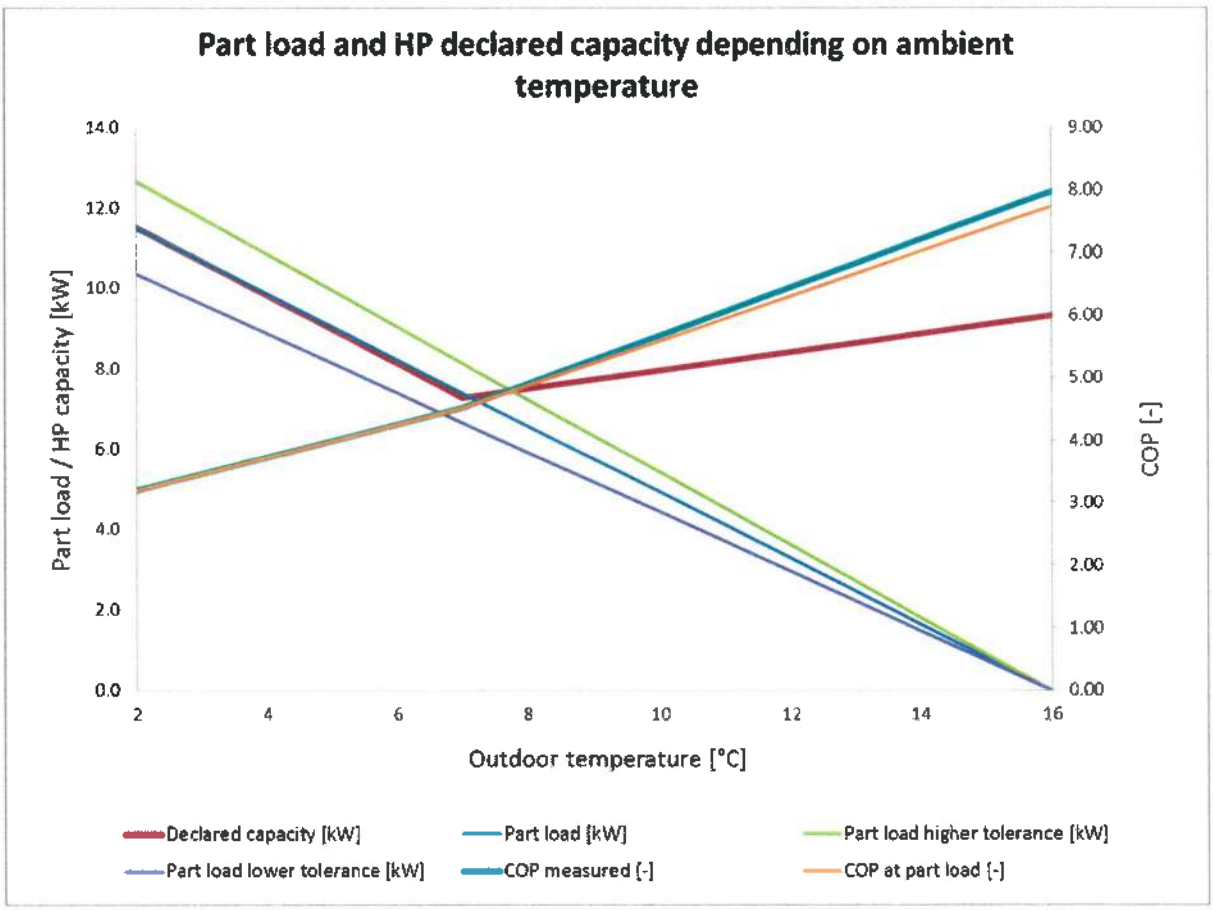
Calculation SCOP, $SCOP_{on}$, $SCOP_{net}$ (Heat pump **AWM1501.090.XB17.H00.C13**)
- Low temperature application (reference water temperature 35 °C)
- Reference heating season „W" – warmer

	Bin j	Outdoor temp. (dry bulb) T_j	Hours h_j	Part load ratio	Heat load $P_{h(Tj)}$	Capacity of HP	Heat load covered by heat pump	Resistive heat elbu (Tj) $elbu_{(Tj)}$	Annual resistive heat $h_j \times elbu_{(Tj)}$	COPbin (Tj) COPbin (Tj)	Annual heating demand $h_j \times P_{h(Tj)}$	Annual power input including electric back up heating	Net annual heating capacity $h_j \times (P_{h(Tj)} - elbu_{(Tj)})$	Net annual power input without electric back up heating
	[–]	[°C]	[h]	[%]	[kW]	[kW]	[kW]	[kW]	[kWh]	[–]	[kWh]	[kWh]	[kWh]	[kWh]
B, TOL (E), Tbiv (F)	**33**	**2**	**3**	**100.00**	**11.49**	**11.49**	**11.49**	**0.00**	**0.00**	**3.19**	**34**	**11**	**34**	**11**
	34	3	22	92.86	10.67	10.65	10.65	0.00	0.00	3.46	235	68	235	68

	35	4	63	85.71	9.85	9.81	9.81	0.00	0.00	3.72	621	167	621	167
	36	5	63	78.57	9.03	8.96	8.96	0.00	0.00	3.98	569	143	569	143
	37	6	175	71.43	8.21	8.12	8.12	0.00	0.00	4.25	1437	338	1437	338
C	**38**	**7**	**162**	**64.29**	**7.39**	**7.27**	**7.27**	**0.00**	**0.00**	**4.51**	**1197**	**265**	**1197**	**265**
	39	8	259	57.14	6.57	7.50	6.57	0.00	0.00	4.87	1701	350	1701	350
	40	9	360	50.00	5.75	7.73	5.75	0.00	0.00	5.22	2069	396	2069	396
	41	10	428	42.86	4.93	7.96	4.93	0.00	0.00	5.58	2108	378	2108	378
	42	11	430	35.71	4.11	8.18	4.11	0.00	0.00	5.94	1765	297	1765	297
D	**43**	**12**	**503**	**28.57**	**3.28**	**8.41**	**3.28**	**0.00**	**0.00**	**6.29**	**1652**	**263**	**1652**	**263**
	44	13	444	21.43	2.46	8.64	2.46	0.00	0.00	6.65	1094	164	1094	164
	45	14	384	14.29	1.64	8.86	1.64	0.00	0.00	7.01	631	90	631	90
	46	15	294	7.14	0.82	9.09	0.82	0.00	0.00	7.36	241	33	241	33
		Σ	3590							Σ	15354	2963	15354	2963

SCOPon	5.18	SCOPnet	5.18
		SCOP	**5.16**

Power diagram (Heat pump **AWM1501.090.XB17.H00.C13**)
- Low temperature application (reference water temperature 35 °C)
- Reference heating season „W" – warmer



Data for SCOP calculation (Heat pump **AWM1501.090.XB17.H00.C13**)
- Low temperature application (reference water temperature 35 °C)
- Reference heating season „C" – colder

	Outdoor heat exchanger	Indoor heat exchanger	Part load ratio	Part load	DC Declared capacity	COPd at declared capacity	Cdh degradation coefficient	CR	COPbin (Tj)	Eff. power input of compressor off state
	Outdoor air inlet	Outlet water temperature								
	[°C]	[°C]	[%]	[kW]	[kW]	[–]	[–]	[–]	[–]	[kW]
A	-7	30.00	60.53	8.49	8.230	3.240	0.900	1.00	3.240	–
B	2	27.00	36.84	5.17	4.900	4.350	0.900	1.00	4.350	–
C	7	27.76	23.68	3.32	7.411	5.345	0.987	0.45	5.260	0.0183
D	12	28.14	10.53	1.48	8.621	7.224	0.985	0.17	6.725	0.0183
TOL (E)	-20	34.14	94.74	13.29	7.260	2.315	0.900	1.00	2.315	–
Tbiv (F)	-11	31.00	71.05	9.96	9.965	2.722	0.900	1.00	2.722	–
G	-15	32.00	81.58	11.44	8.763	2.541	0.900	1.00	2.541	–

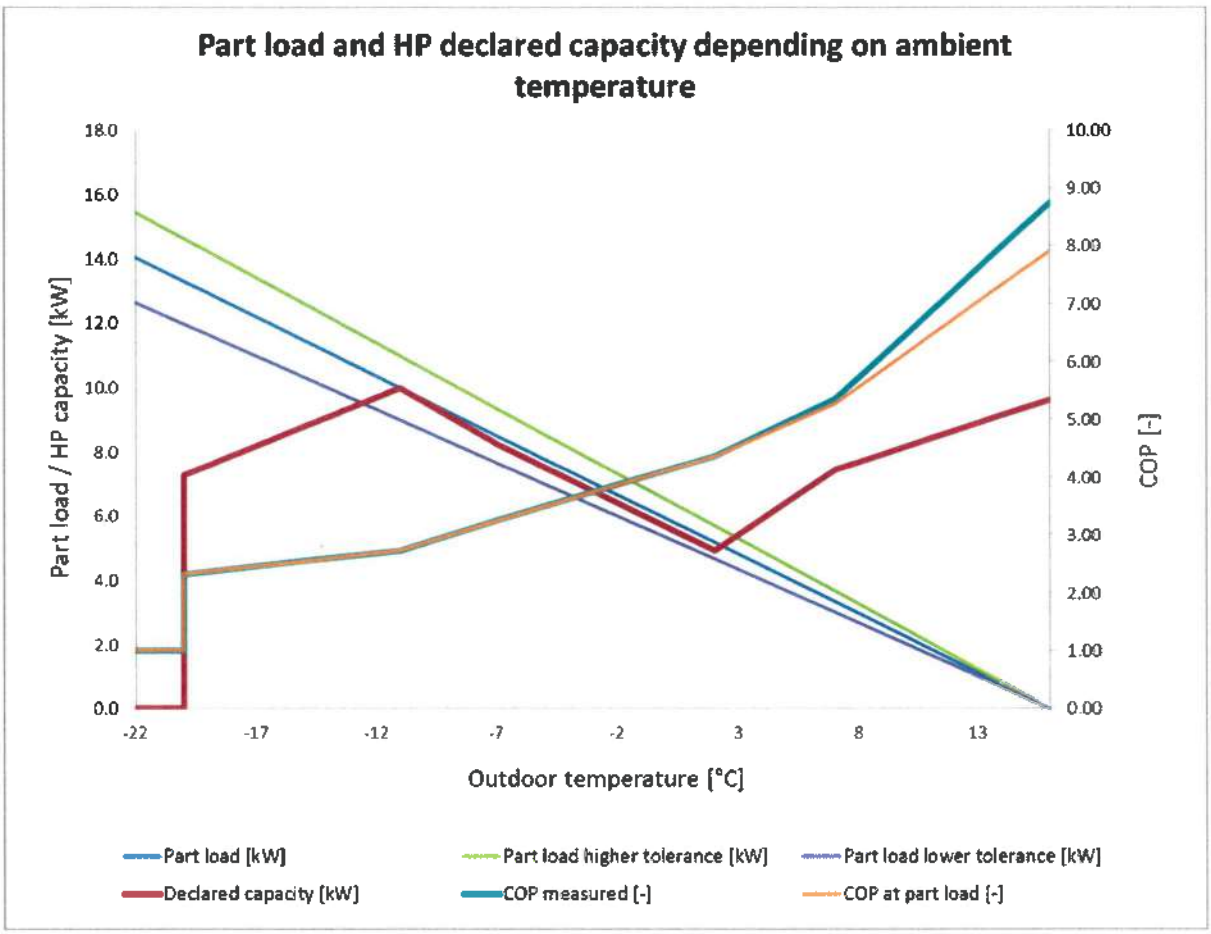
Calculation SCOP, $SCOP_{on}$, $SCOP_{net}$ (Heat pump **AWM1501.090.XB17.H00.C13**)
- Low temperature application (reference water temperature 35 °C)
- Reference heating season „C" – colder

	Bin	Outdoor temp. (dry bulb)	Hours	Part load ratio	Heat load	Capacity of HP	Heat load covered by heat pump	Resistive heat elbu (Tj)	Annual resistive heat	COPbin (Tj)	Annual heating demand	Annual power input including electric back up heating	Net annual heating capacity	Net annual power input without electric back up heating
	j	T_j	h_j		$P_{h(Tj)}$			$elbu_{(Tj)}$	$h_j \times elbu_{(Tj)}$	COP bin (Tj)	$h_j \times P_{h(Tj)}$		$h_j \times (P_{h(Tj)} - elbu_{(Tj)})$	
	[–]	[°C]	[h]	[%]	[kW]	[kW]	[kW]	[kW]	[kWh]	[–]	[kWh]	[kWh]	[kWh]	[kWh]
	9	-22	1	100.00	14.02	0.00	0.00	14.02	14.02	1.00	14	14	0	0
	10	-21	6	97.37	13.66	0.00	0.00	13.66	81.93	1.00	82	82	0	0
TOL (E)	**11**	**-20**	**13**	**94.74**	**13.29**	**7.26**	**7.26**	**6.03**	**78.34**	**2.31**	**173**	**119**	**94**	**41**
	12	-19	17	92.11	12.92	7.56	7.56	5.36	91.06	2.36	220	146	129	54
	13	-18	19	89.47	12.55	7.86	7.86	4.69	89.05	2.41	238	151	149	62
	14	-17	26	86.84	12.18	8.16	8.16	4.02	104.45	2.45	317	191	212	87
	15	-16	39	84.21	11.81	8.46	8.46	3.35	130.57	2.50	461	263	330	132
G	**16**	**-15**	**41**	**81.58**	**11.44**	**8.76**	**8.76**	**2.68**	**109.81**	**2.54**	**469**	**251**	**359**	**141**
	17	-14	35	78.95	11.07	9.06	9.06	2.01	70.30	2.59	388	193	317	123
	18	-13	52	76.32	10.70	9.36	9.36	1.34	69.63	2.63	557	255	487	185
	19	-12	37	73.68	10.33	9.66	9.66	0.67	24.77	2.68	382	158	358	134
Tbiv(F)	**20**	**-11**	**41**	**71.05**	**9.96**	**9.96**	**9.96**	**0.00**	**0.00**	**2.72**	**409**	**150**	**409**	**150**
	21	-10	43	68.42	9.60	9.53	9.53	0.00	0.00	2.85	413	145	413	145

	22	-9	54	65.79	9.23	9.10	9.10	0.00	0.00	2.98	498	167	498	167
	23	-8	90	63.16	8.86	8.66	8.66	0.00	0.00	3.11	797	256	797	256
A	**24**	**-7**	**125**	**60.53**	**8.49**	**8.23**	**8.23**	**0.00**	**0.00**	**3.24**	**1061**	**327**	**1061**	**327**
	25	-6	169	57.89	8.12	7.86	7.86	0.00	0.00	3.36	1372	408	1372	408
	26	-5	195	55.26	7.75	7.49	7.49	0.00	0.00	3.49	1511	433	1511	433
	27	-4	278	52.63	7.38	7.12	7.12	0.00	0.00	3.61	2052	568	2052	568
	28	-3	306	50.00	7.01	6.75	6.75	0.00	0.00	3.73	2146	575	2146	575
	29	-2	454	47.37	6.64	6.38	6.38	0.00	0.00	3.86	3016	782	3016	782
	30	-1	385	44.74	6.27	6.01	6.01	0.00	0.00	3.98	2415	607	2415	607
	31	0	490	42.11	5.90	5.64	5.64	0.00	0.00	4.10	2893	705	2893	705
	32	1	533	39.47	5.54	5.27	5.27	0.00	0.00	4.23	2951	698	2951	698
B	**33**	**2**	**380**	**36.84**	**5.17**	**4.90**	**4.90**	**0.00**	**0.00**	**4.35**	**1963**	**451**	**1963**	**451**
	34	3	228	34.21	4.80	5.40	4.80	0.00	0.00	4.53	1094	241	1094	241
	35	4	261	31.58	4.43	5.90	4.43	0.00	0.00	4.71	1156	245	1156	245
	36	5	279	28.95	4.06	6.41	4.06	0.00	0.00	4.90	1133	231	1133	231
	37	6	229	26.32	3.69	6.91	3.69	0.00	0.00	5.08	845	166	845	166
C	**38**	**7**	**269**	**23.68**	**3.32**	**7.41**	**3.32**	**0.00**	**0.00**	**5.26**	**893**	**170**	**893**	**170**
	39	8	233	21.05	2.95	7.65	2.95	0.00	0.00	5.55	688	124	688	124
	40	9	230	18.42	2.58	7.90	2.58	0.00	0.00	5.85	594	102	594	102
	41	10	243	15.79	2.21	8.14	2.21	0.00	0.00	6.14	538	88	538	88
	42	11	191	13.16	1.85	8.38	1.85	0.00	0.00	6.43	352	55	352	55
D	**43**	**12**	**146**	**10.53**	**1.48**	**8.62**	**1.48**	**0.00**	**0.00**	**6.73**	**216**	**32**	**216**	**32**
	44	13	150	7.89	1.11	8.86	1.11	0.00	0.00	7.02	166	24	166	24
	45	14	97	5.26	0.74	9.11	0.74	0.00	0.00	7.31	72	10	72	10
	46	15	61	2.63	0.37	9.35	0.37	0.00	0.00	7.60	23	3	23	3
		Σ	6446							Σ	34566	9587	33702	8723

SCOPon	3.61	SCOPnet	3.86
		SCOP	**3.60**

Power diagram (Heat pump **AWM1501.090.XB17.H00.C13**)
- Low temperature application (reference water temperature 35 °C)
- Reference heating season „C" – colder



Data for SCOP calculation (Heat pump **AWM1501.090.XB17.H00.C13**)
- Medium temperature application (reference water temperature 55 °C)
- Reference heating season „W" – warmer

	Outdoor heat exchanger Outdoor air inlet	Indoor heat exchanger Outlet water temperature	Part load ratio	Part load	DC Declared capacity	COPd at declared capacity	Cdh degradation coefficient	CR	COPbin (Tj)	Eff. power input of compressor off state
	[°C]	[°C]	[%]	[kW]	[kW]	[–]	[–]	[–]	[–]	[kW]
A	–	–	–	–	–	–	–	–	–	–
B	2	55.00	100.00	12.83	12.828	2.126	0.900	1.00	2.126	–
C	7	46.00	64.29	8.25	8.200	2.900	0.900	1.00	2.900	–
D	12	38.05	28.57	3.67	7.420	4.630	0.989	0.49	4.576	0.0183
TOL (E)	2	55.00	100.00	12.83	12.828	2.126	0.900	1.00	2.126	–
Tbiv (F)	2	55.00	100.00	12.83	12.828	2.126	0.900	1.00	2.126	–

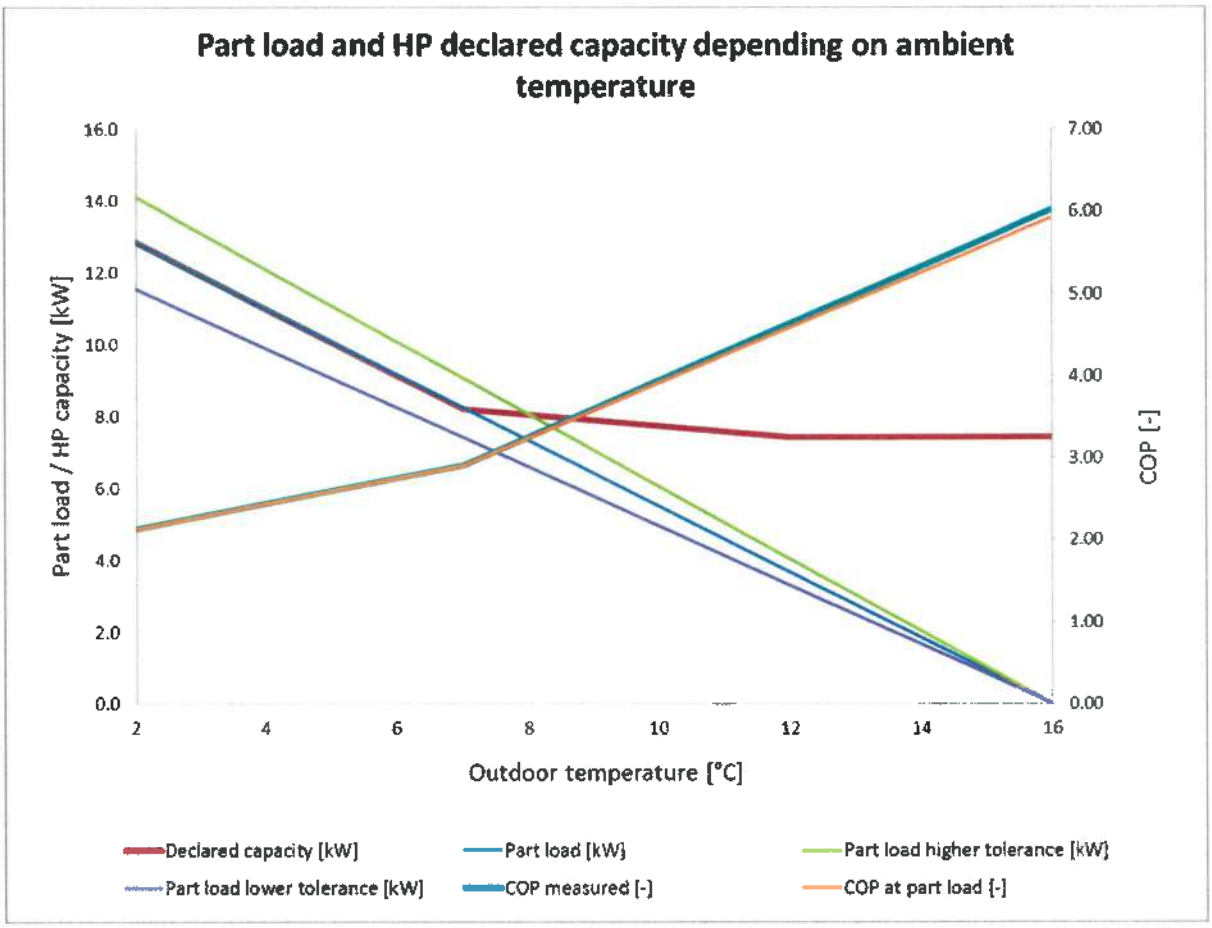
Calculation SCOP, $SCOP_{on}$, $SCOP_{net}$ (Heat pump **AWM1501.090.XB17.H00.C13**)
- Medium temperature application (reference water temperature 55 °C)
- Reference heating season „W" – warmer

	Bin j	Outdoor temp. (dry bulb) T_j	Hours h_j	Part load ratio	Heat load $P_{h(Tj)}$	Capacity of HP	Heat load covered by heat pump	Resistive heat elbu (Tj) $elbu_{(Tj)}$	Annual resistive heat $h_j \times elbu_{(Tj)}$	COPbin (Tj) COPbin (Tj)	Annual heating demand $h_j \times P_{h(Tj)}$	Annual power input including electric back up heating	Net annual heating capacity $h_j \times (P_{h(Tj)} - elbu_{(Tj)})$	Net annual power input without electric back up heating
	[–]	[°C]	[h]	[%]	[kW]	[kW]	[kW]	[kW]	[kWh]	[–]	[kWh]	[kWh]	[kWh]	[kWh]
B, TOL (E), Tbiv (F)	**33**	**2**	**3**	**100.00**	**12.83**	**12.83**	**12.83**	**0.00**	**0.00**	**2.13**	**38**	**18**	**38**	**18**
	34	3	22	92.86	11.91	11.90	11.90	0.00	0.00	2.28	262	115	262	115
	35	4	63	85.71	11.00	10.98	10.98	0.00	0.00	2.44	693	284	693	284
	36	5	63	78.57	10.08	10.05	10.05	0.00	0.00	2.59	635	245	635	245
	37	6	175	71.43	9.16	9.13	9.13	0.00	0.00	2.75	1603	584	1603	584
C	**38**	**7**	**162**	**64.29**	**8.25**	**8.20**	**8.20**	**0.00**	**0.00**	**2.90**	**1336**	**461**	**1336**	**461**
	39	8	259	57.14	7.33	8.04	7.33	0.00	0.00	3.24	1898	587	1898	587
	40	9	360	50.00	6.41	7.89	6.41	0.00	0.00	3.57	2309	647	2309	647
	41	10	428	42.86	5.50	7.73	5.50	0.00	0.00	3.91	2353	602	2353	602
	42	11	430	35.71	4.58	7.58	4.58	0.00	0.00	4.24	1970	464	1970	464
D	**43**	**12**	**503**	**28.57**	**3.67**	**7.42**	**3.67**	**0.00**	**0.00**	**4.58**	**1844**	**403**	**1844**	**403**
	44	13	444	21.43	2.75	7.26	2.75	0.00	0.00	4.91	1220	248	1220	248
	45	14	384	14.29	1.83	7.11	1.83	0.00	0.00	5.25	704	134	704	134

	46	15	294	7.14	0.92	6.95	0.92	0.00	0.00	5.58	269	48	269	48
		Σ	3590							Σ	17135	4841	17135	4841

SCOPon	3.54	SCOPnet	3.54
		SCOP	**3.53**

Power diagram (Heat pump **AWM1501.090.XB17.H00.C13**)
- Medium temperature application (reference water temperature 55 °C)
- Reference heating season „W" – warmer



Data for SCOP calculation (Heat pump **AWM1501.090.XB17.H00.C13**)
- Medium temperature application (reference water temperature 55 °C)
- Reference heating season „C" – colder

	Outdoor heat exchanger: Outdoor air inlet	Indoor heat exchanger: Outlet water temperature	Part load ratio	Part load	DC Declared capacity	COPd at declared capacity	Cdh degradation coefficient	CR	COPbin (Tj)	Eff. power input of compressor off state
	[°C]	[°C]	[%]	[kW]	[kW]	[–]	[–]	[–]	[–]	[kW]
A	-7	44.00	60.53	8.48	8.520	2.340	0.900	1.00	2.340	–
B	2	37.00	36.84	5.16	5.250	3.330	0.900	1.00	3.330	–
C	7	36.20	23.68	3.32	6.980	4.480	0.988	0.48	4.423	0.0183
D	12	34.54	10.53	1.47	8.102	5.786	0.987	0.18	5.465	0.0183
TOL (E)	-18	51.57	89.47	12.54	7.110	1.440	0.900	1.00	1.440	–
Tbiv (F)	-10	45.88	68.42	9.59	9.586	1.932	0.900	1.00	1.932	–
G	-15	49.00	81.58	11.43	8.038	1.624	0.900	1.00	1.624	–

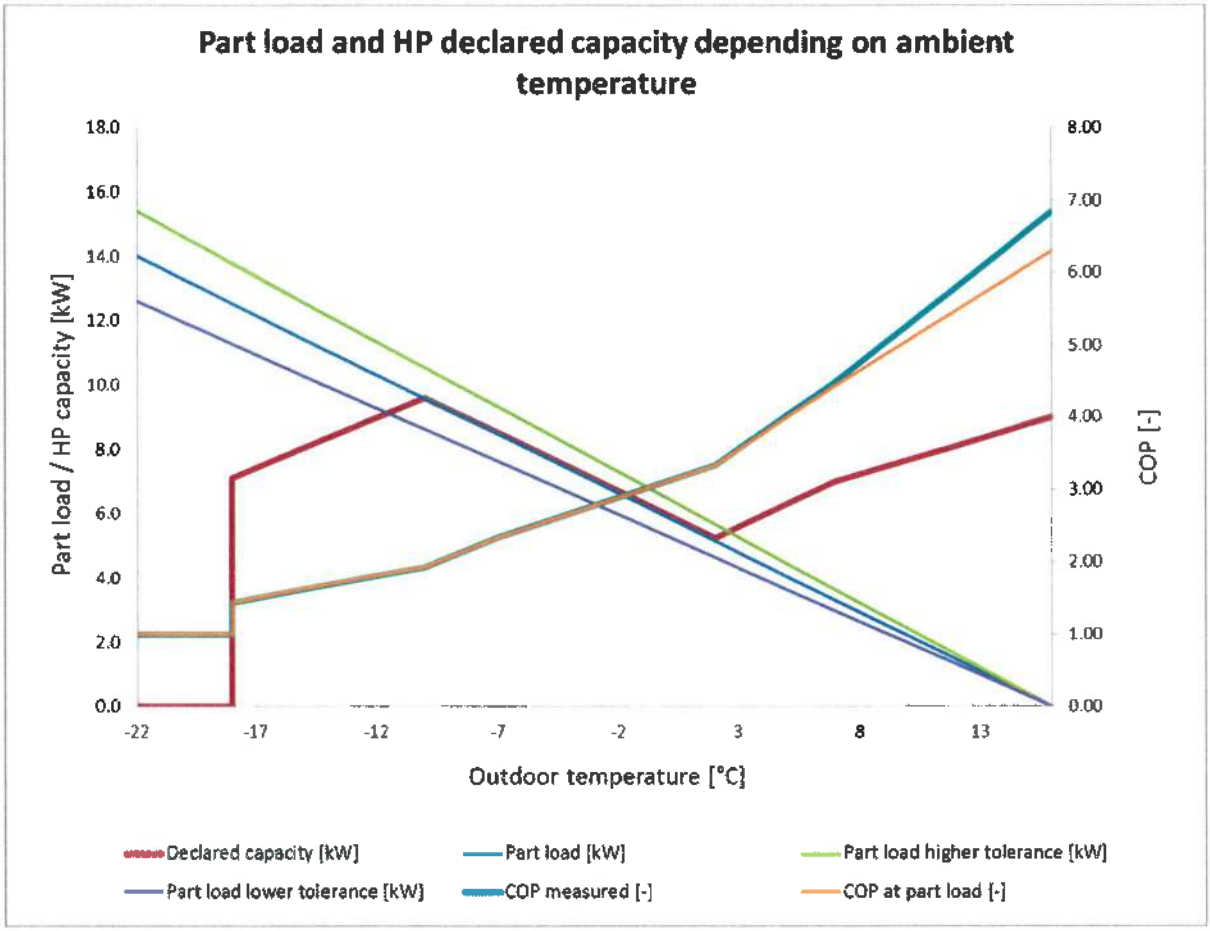
Calculation SCOP, $SCOP_{on}$, $SCOP_{net}$ (Heat pump **AWM1501.090.XB17.H00.C13**)
- Medium temperature application (reference water temperature 55 °C)
- Reference heating season „C" – colder

	Bin	Outdoor temp. (dry bulb)	Hours	Part load ratio	Heat load	Capacity of HP	Heat load covered by heat pump	Resistive heat elbu (Tj)	Annual resistive heat	COPbin (Tj)	Annual heating demand	Annual power input including electric back up heating	Net annual heating capacity	Net annual power input without electric back up heating
	j	T_j	h_j		$P_{h(Tj)}$			$elbu_{(Tj)}$	h_j x $elbu_{(Tj)}$	COP bin (Tj)	h_j x $P_{h(Tj)}$		h_j x ($P_{h(Tj)}$ – $elbu_{(Tj)}$)	
	[–]	[°C]	[h]	[%]	[kW]	[kW]	[kW]	[kW]	[kWh]	[–]	[kWh]	[kWh]	[kWh]	[kWh]
	9	-22	1	100.00	14.01	0.00	0.00	14.01	14.01	1.00	14	14	0	0
	10	-21	6	97.37	13.64	0.00	0.00	13.64	81.85	1.00	82	82	0	0
	11	-20	13	94.74	13.27	0.00	0.00	13.27	172.55	1.00	173	173	0	0
	12	-19	17	92.11	12.90	0.00	0.00	12.90	219.37	1.00	219	219	0	0
TOL (E)	**13**	**-18**	**19**	**89.47**	**12.54**	**7.11**	**7.11**	**5.43**	**103.08**	**1.44**	**238**	**197**	**135**	**94**
	14	-17	26	86.84	12.17	7.42	7.42	4.75	123.43	1.50	316	252	193	128
	15	-16	39	84.21	11.80	7.73	7.73	4.07	158.69	1.56	460	352	301	193
G	**16**	**-15**	**41**	**81.58**	**11.43**	**8.04**	**8.04**	**3.39**	**139.03**	**1.62**	**469**	**342**	**330**	**203**
	17	-14	35	78.95	11.06	8.35	8.35	2.71	94.95	1.69	387	268	292	173
	18	-13	52	76.32	10.69	8.66	8.66	2.03	105.80	1.75	556	363	450	258
	19	-12	37	73.68	10.32	8.97	8.97	1.36	50.19	1.81	382	234	332	183
	20	-11	41	71.05	9.95	9.28	9.28	0.68	27.81	1.87	408	231	380	203
Tbiv (F)	**21**	**-10**	**43**	**68.42**	**9.59**	**9.59**	**9.59**	**0.00**	**0.00**	**1.93**	**412**	**213**	**412**	**213**

	22	-9	54	65.79	9.22	9.23	9.22	0.00	0.00	2.07	498	241	498	241
	23	-8	90	63.16	8.85	8.88	8.85	0.00	0.00	2.20	796	361	796	361
A	**24**	**-7**	**125**	**60.53**	**8.48**	**8.52**	**8.48**	**0.00**	**0.00**	**2.34**	**1060**	**453**	**1060**	**453**
	25	-6	169	57.89	8.11	8.16	8.11	0.00	0.00	2.45	1371	560	1371	560
	26	-5	195	55.26	7.74	7.79	7.74	0.00	0.00	2.56	1510	590	1510	590
	27	-4	278	52.63	7.37	7.43	7.37	0.00	0.00	2.67	2050	768	2050	768
	28	-3	306	50.00	7.01	7.07	7.01	0.00	0.00	2.78	2144	771	2144	771
	29	-2	454	47.37	6.64	6.70	6.64	0.00	0.00	2.89	3013	1043	3013	1043
	30	-1	385	44.74	6.27	6.34	6.27	0.00	0.00	3.00	2413	804	2413	804
	31	0	490	42.11	5.90	5.98	5.90	0.00	0.00	3.11	2891	929	2891	929
	32	1	533	39.47	5.53	5.61	5.53	0.00	0.00	3.22	2948	915	2948	915
B	**33**	**2**	**380**	**36.84**	**5.16**	**5.25**	**5.16**	**0.00**	**0.00**	**3.33**	**1961**	**589**	**1961**	**589**
	34	3	228	34.21	4.79	5.60	4.79	0.00	0.00	3.55	1093	308	1093	308
	35	4	261	31.58	4.42	5.94	4.42	0.00	0.00	3.77	1155	307	1155	307
	36	5	279	28.95	4.06	6.29	4.06	0.00	0.00	3.99	1132	284	1132	284
	37	6	229	26.32	3.69	6.63	3.69	0.00	0.00	4.20	844	201	844	201
C	**38**	**7**	**269**	**23.68**	**3.32**	**6.98**	**3.32**	**0.00**	**0.00**	**4.42**	**893**	**202**	**893**	**202**
	39	8	233	21.05	2.95	7.20	2.95	0.00	0.00	4.63	687	148	687	148
	40	9	230	18.42	2.58	7.43	2.58	0.00	0.00	4.84	594	123	594	123
	41	10	243	15.79	2.21	7.65	2.21	0.00	0.00	5.05	538	106	538	106
	42	11	191	13.16	1.84	7.88	1.84	0.00	0.00	5.26	352	67	352	67
D	**43**	**12**	**146**	**10.53**	**1.47**	**8.10**	**1.47**	**0.00**	**0.00**	**5.46**	**215**	**39**	**215**	**39**
	44	13	150	7.89	1.11	8.33	1.11	0.00	0.00	5.67	166	29	166	29
	45	14	97	5.26	0.74	8.55	0.74	0.00	0.00	5.88	72	12	72	12
	46	15	61	2.63	0.37	8.78	0.37	0.00	0.00	6.09	22	4	22	4
		Σ	6446							Σ	34532	12794	33241	11503

SCOPon	2.70	SCOPnet	2.89
		SCOP	**2.70**

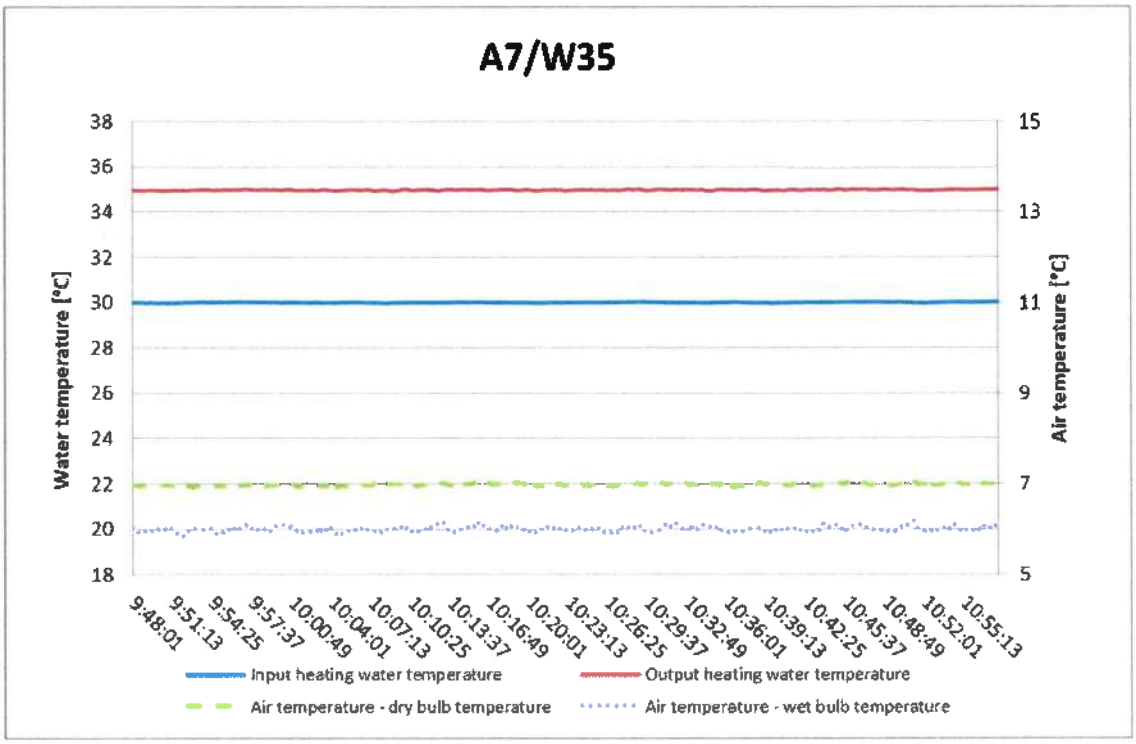
Power diagram (Heat pump **AWM1501.090.XB17.H00.C13**)
- Medium temperature application (reference water temperature 55 °C)
- Reference heating season „C" – colder

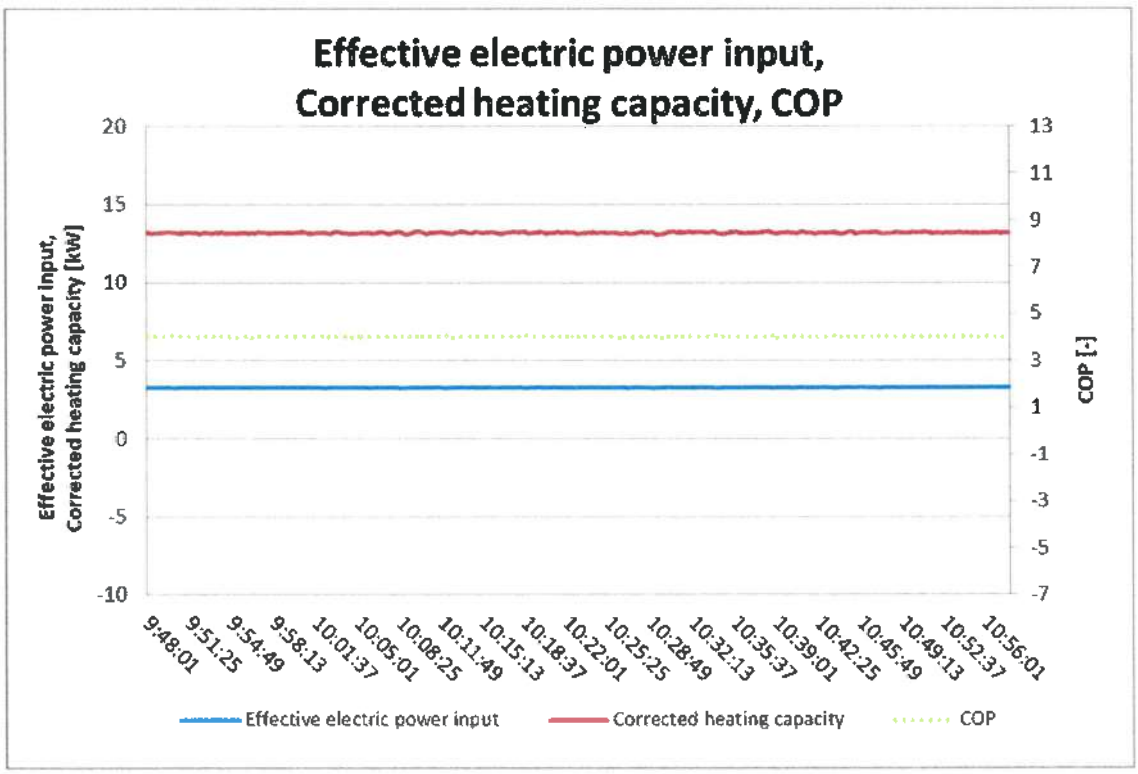


Tested by:	Ing. Dominik Šedivý	Date:	2022-04-08	Signed:	
Reviewed and approved by:	Ing. Mario Jankola	Date:	2022-04-08	Signed:	

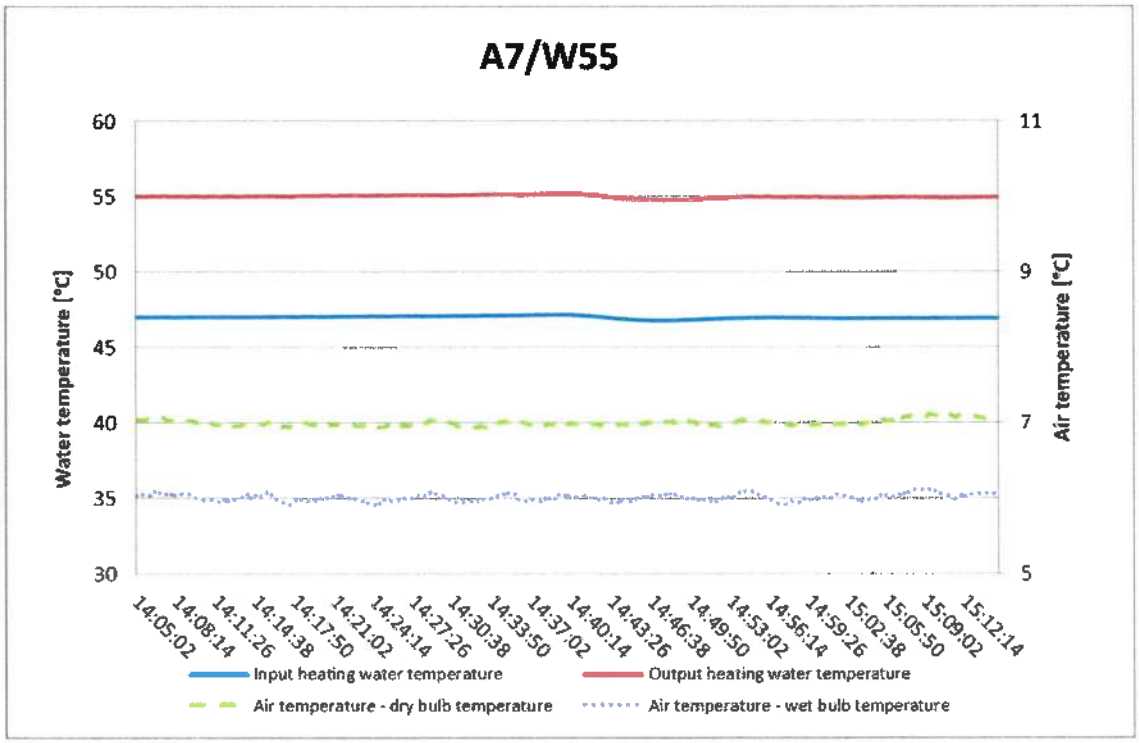
VI. Graphs

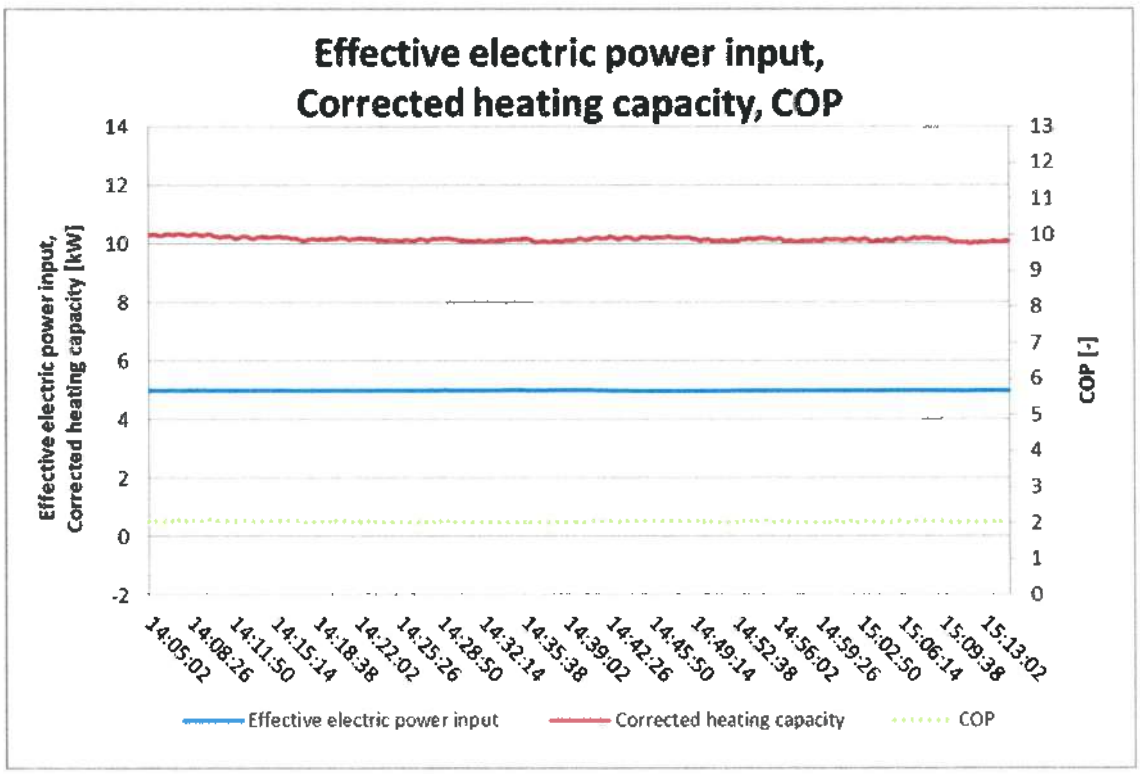
Heat Pump **AWM1501.090.XB17.H00.C13**: A7/W35 (55 rps)



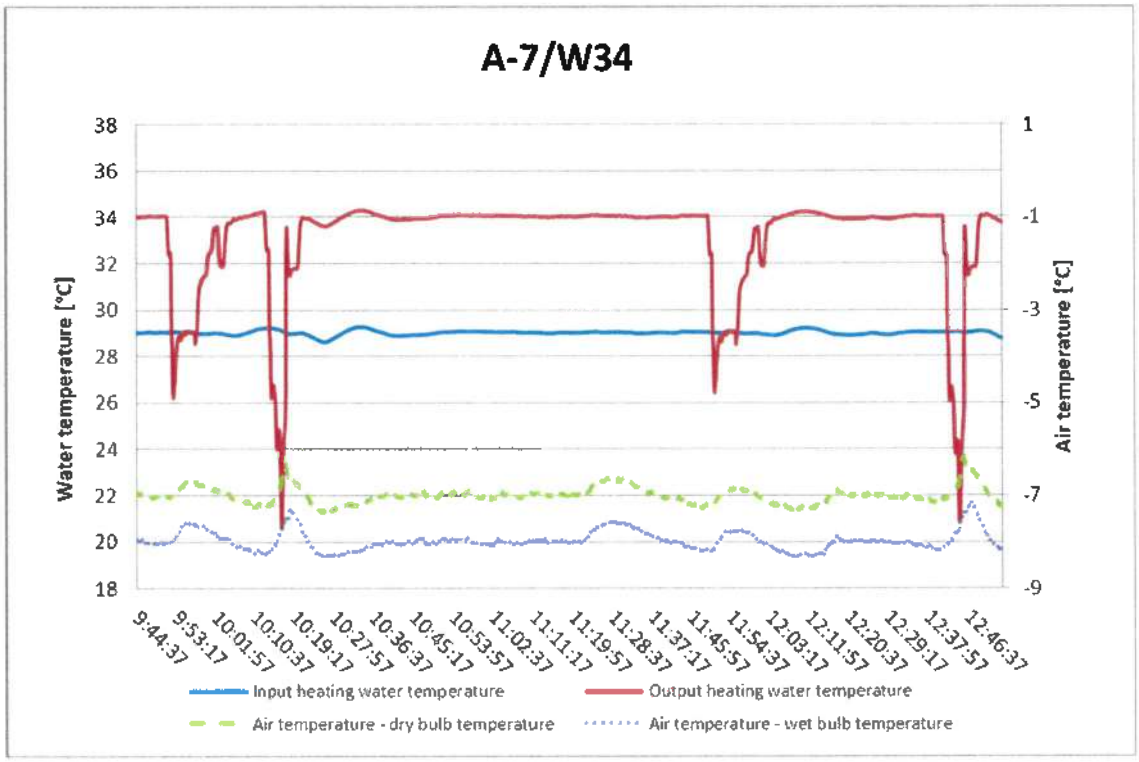


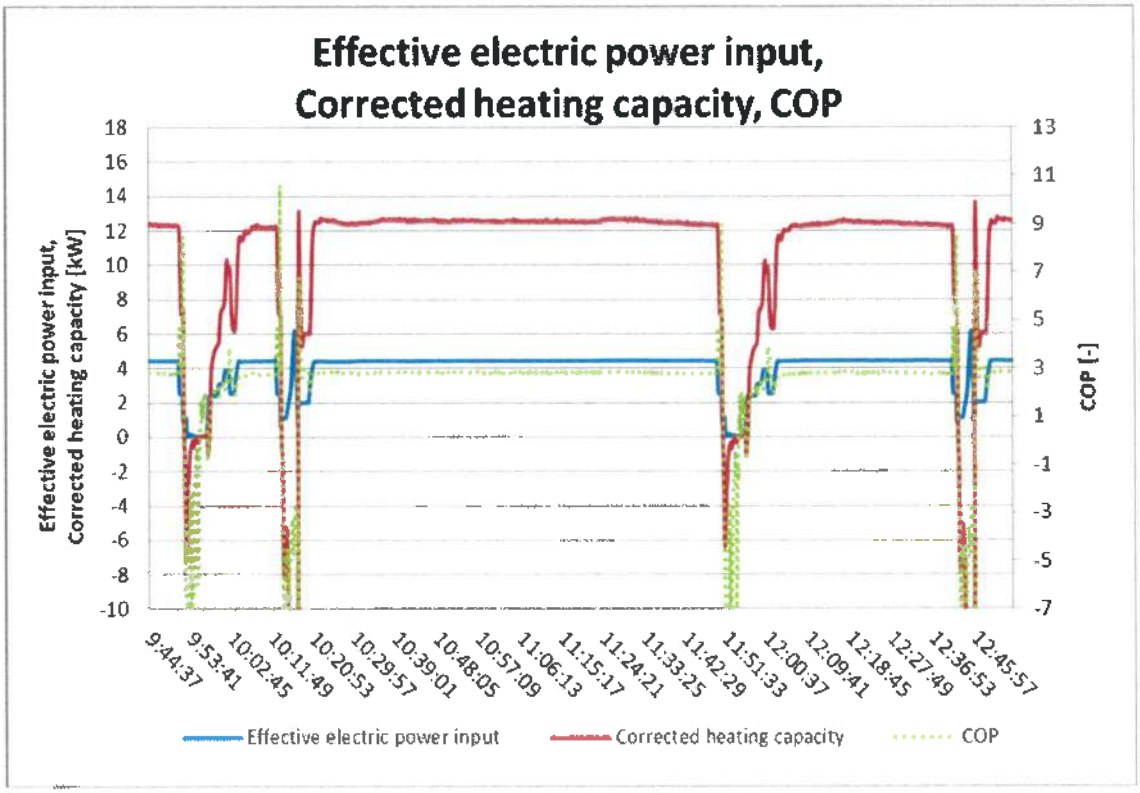
Heat Pump **AWM1501.090.XB17.H00.C13**: A7/W55 (65 rps)



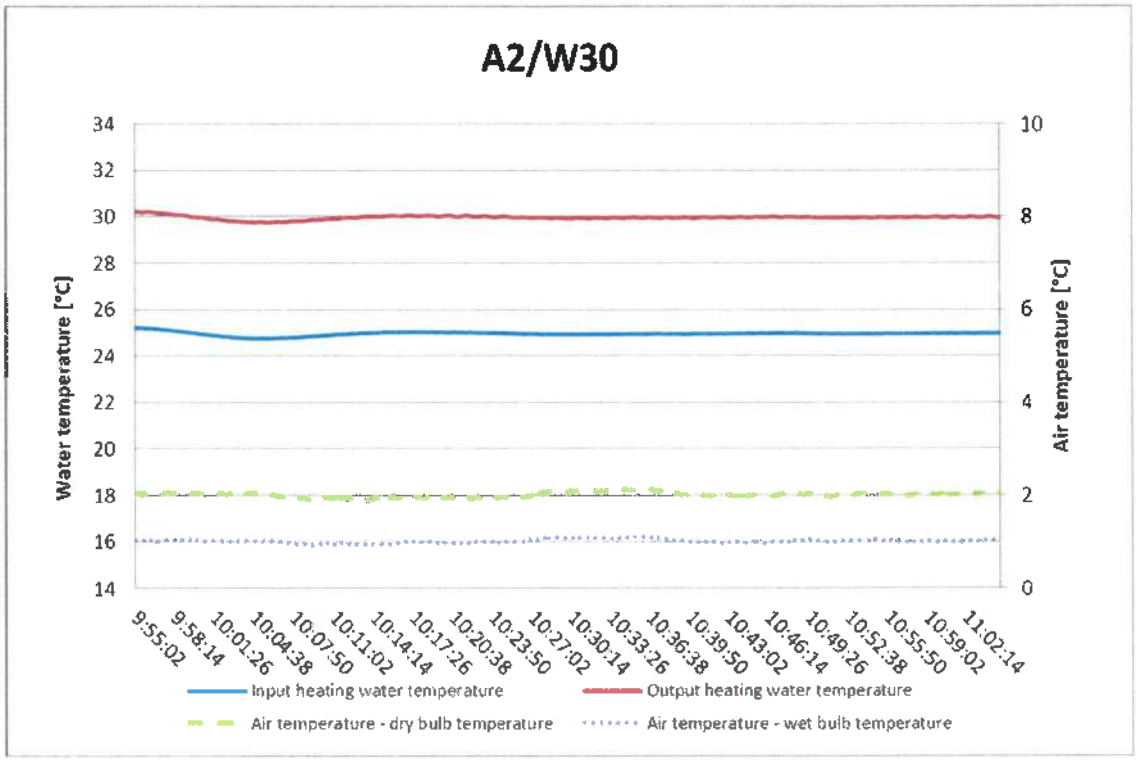


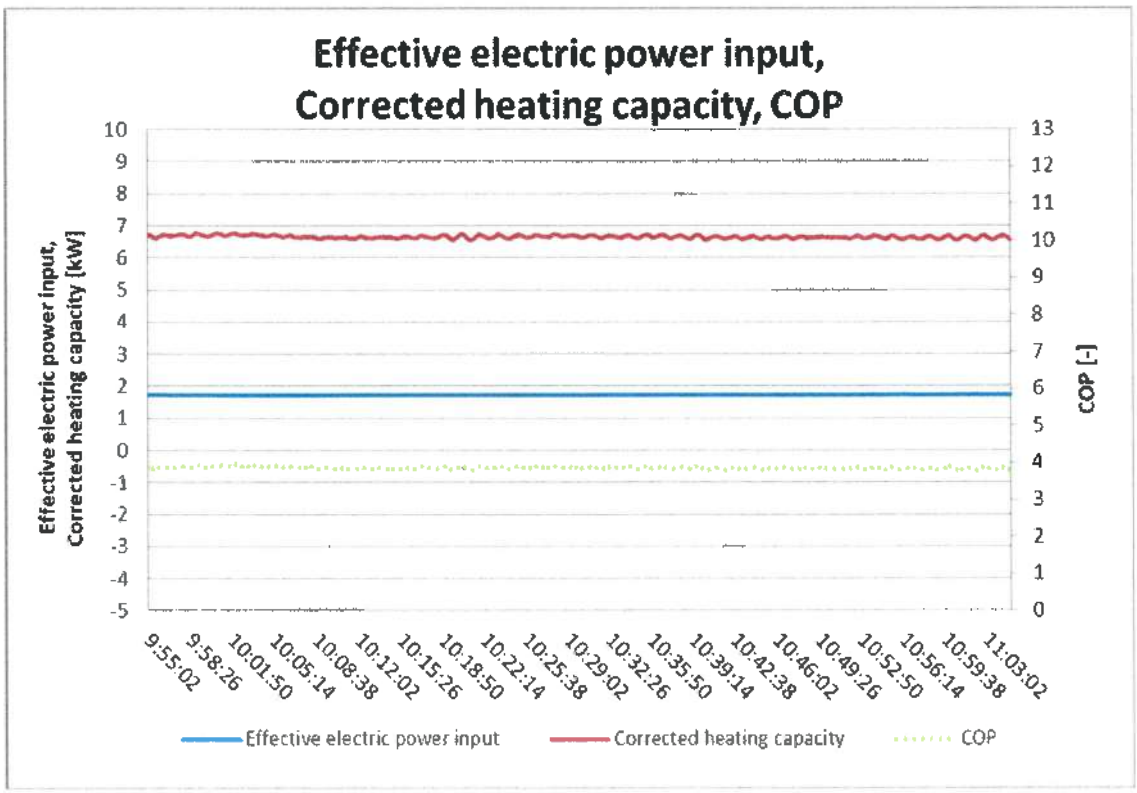
Heat Pump **AWM1501.090.XB17.H00.C13:** A-7/W34 (82 rps)



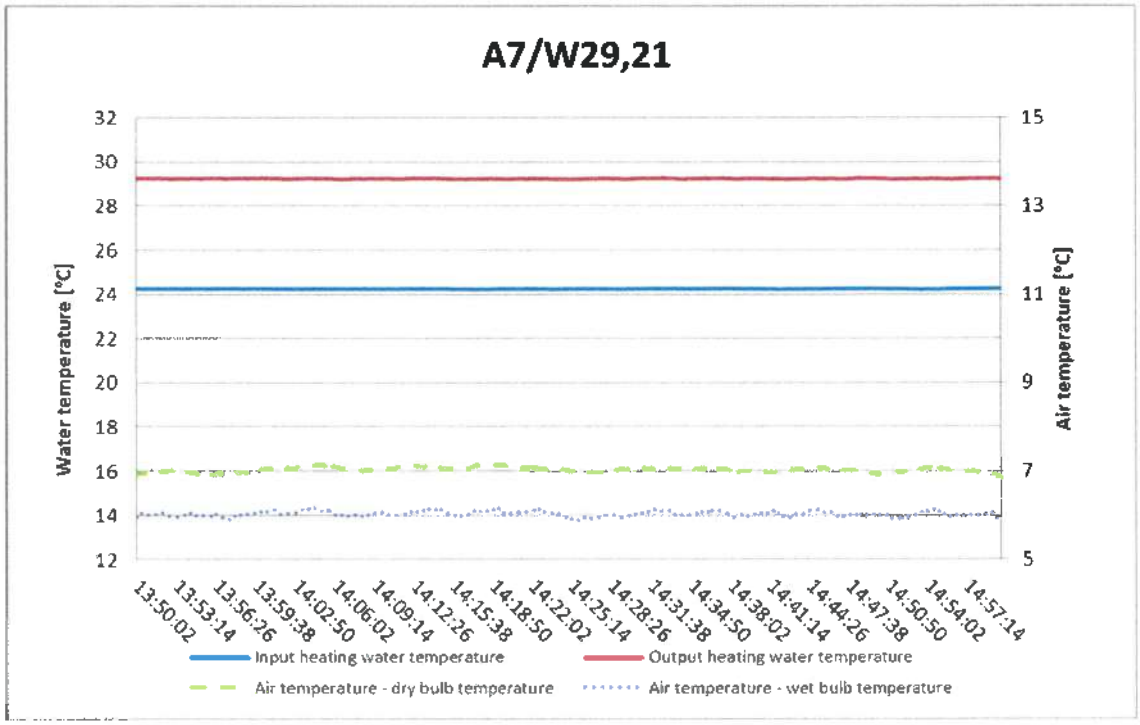


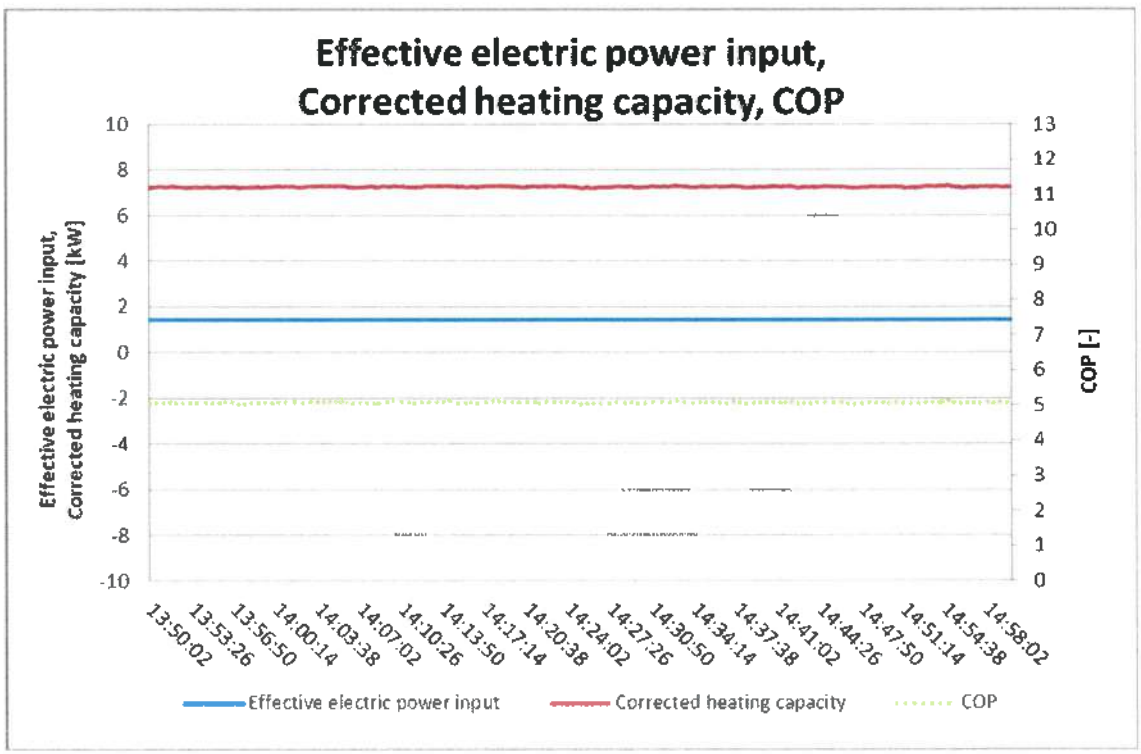
Heat Pump **AWM1501.090.XB17.H00.C13:** A2/W30 (35 rps)



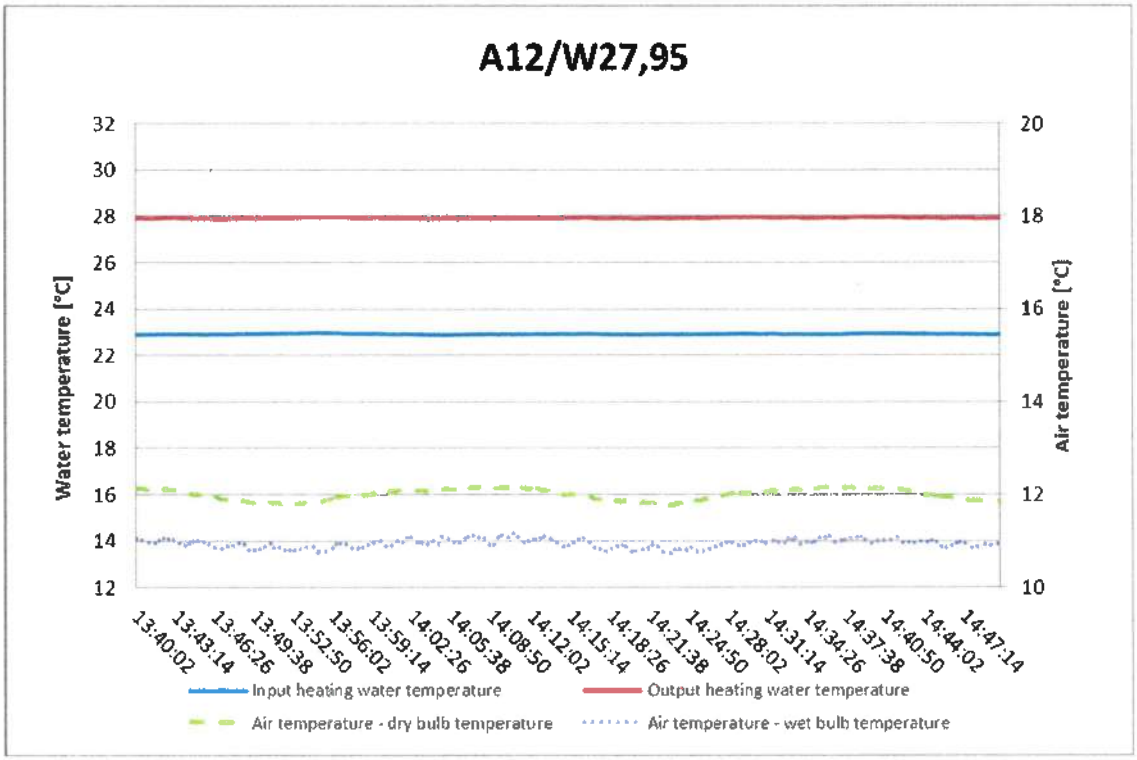


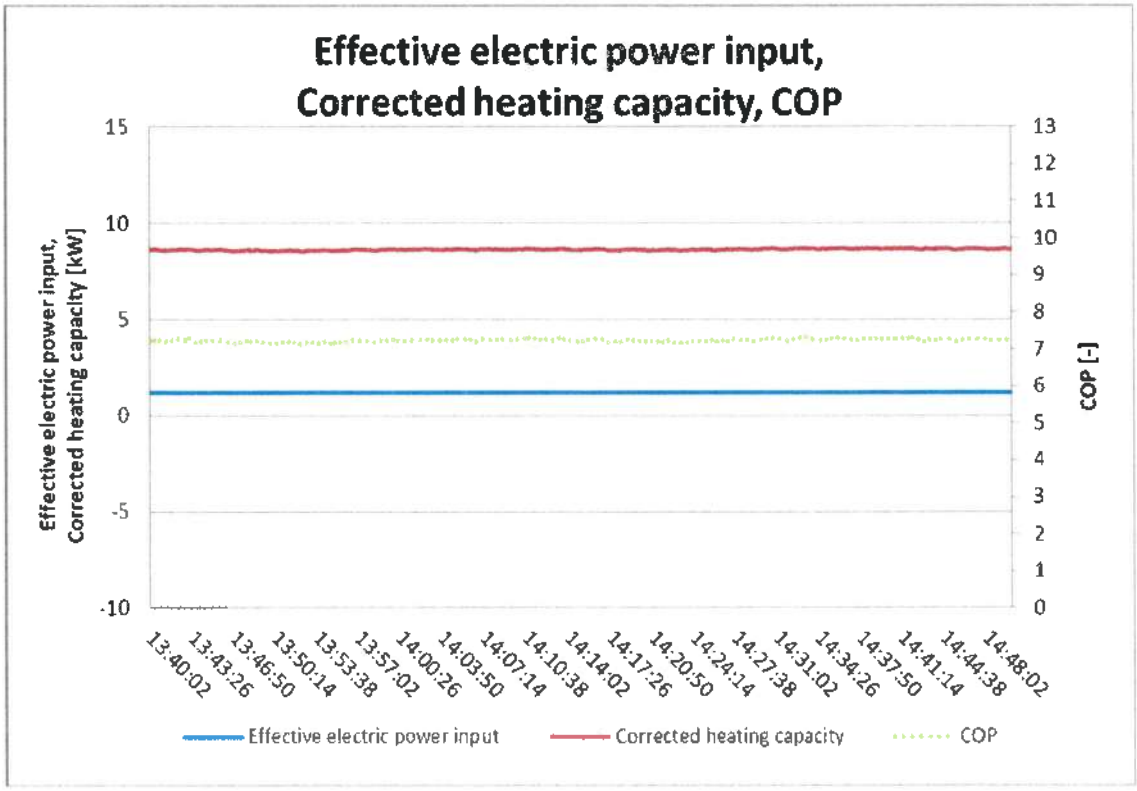
Heat Pump **AWM1501.090.XB17.H00.C13:** A7/W29.21 (30 rps)



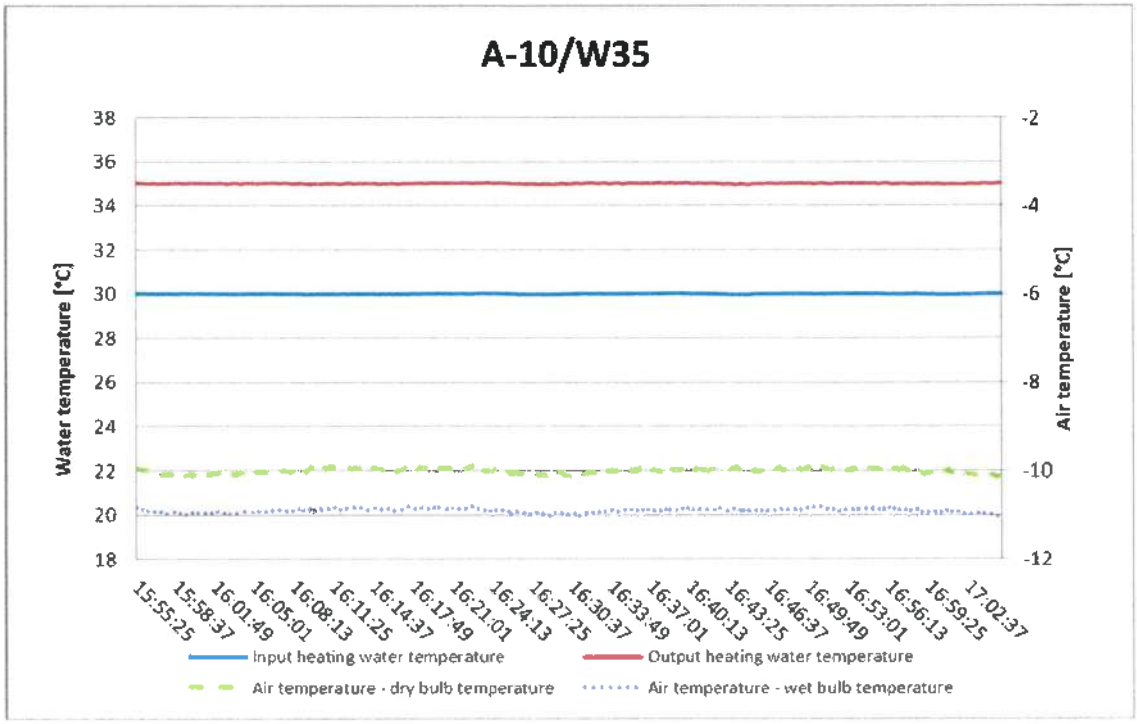


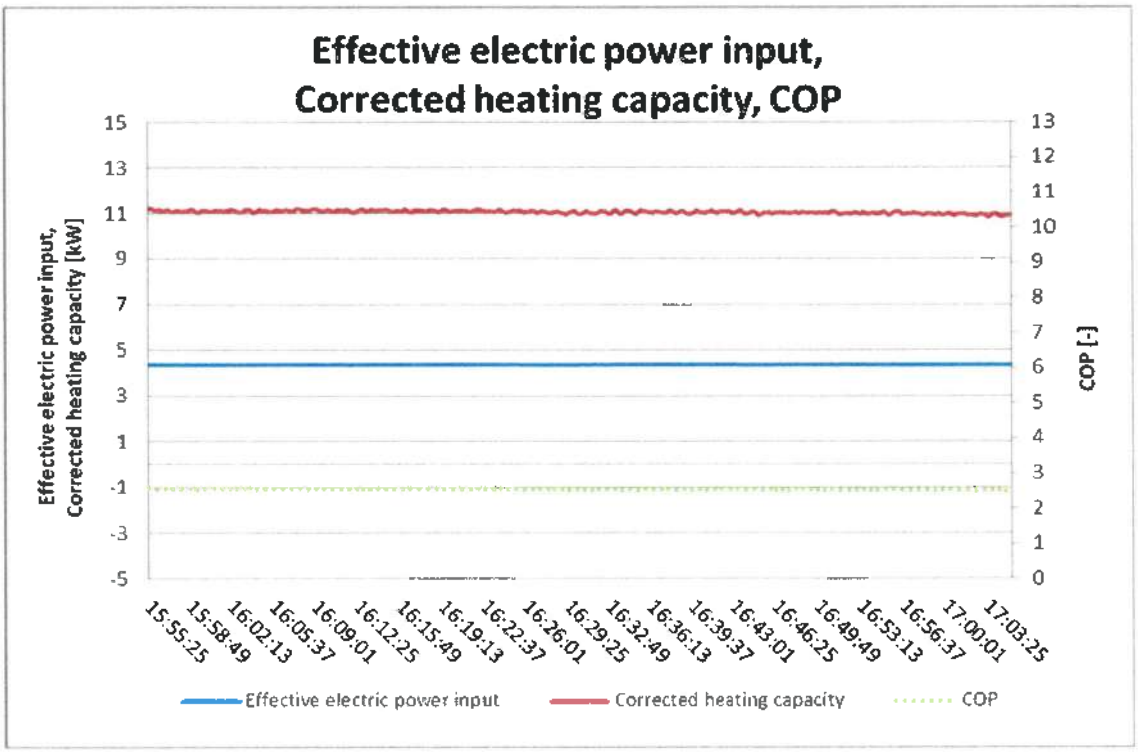
Heat Pump **AWM1501.090.XB17.H00.C13:** A12/W27.95 (30 rps)



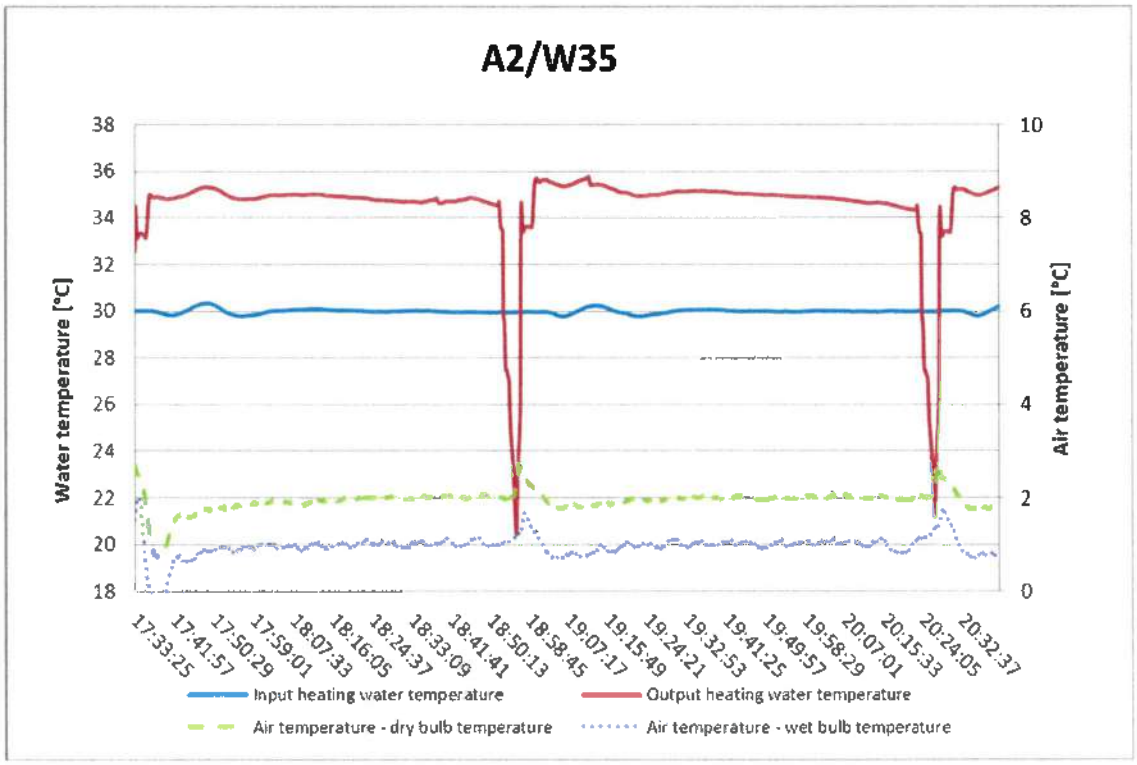


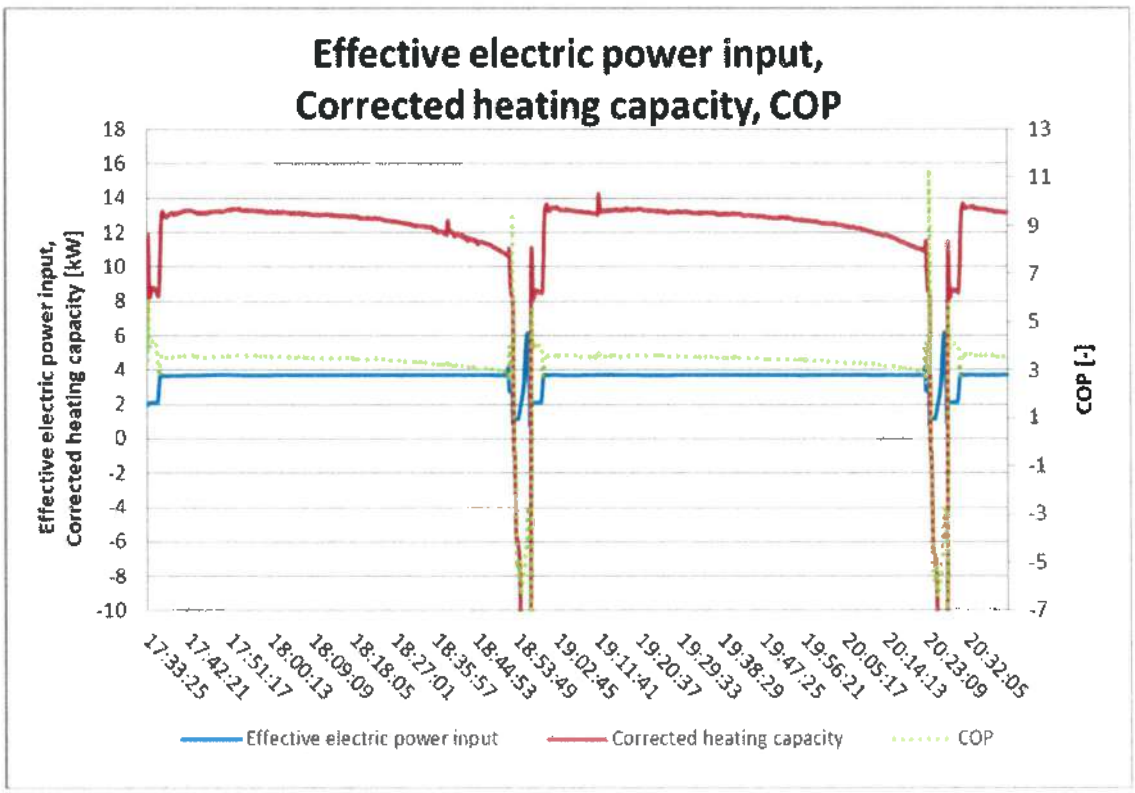
Heat Pump **AWM1501.090.XB17.H00.C13:** A-10/W35 (82 rps)



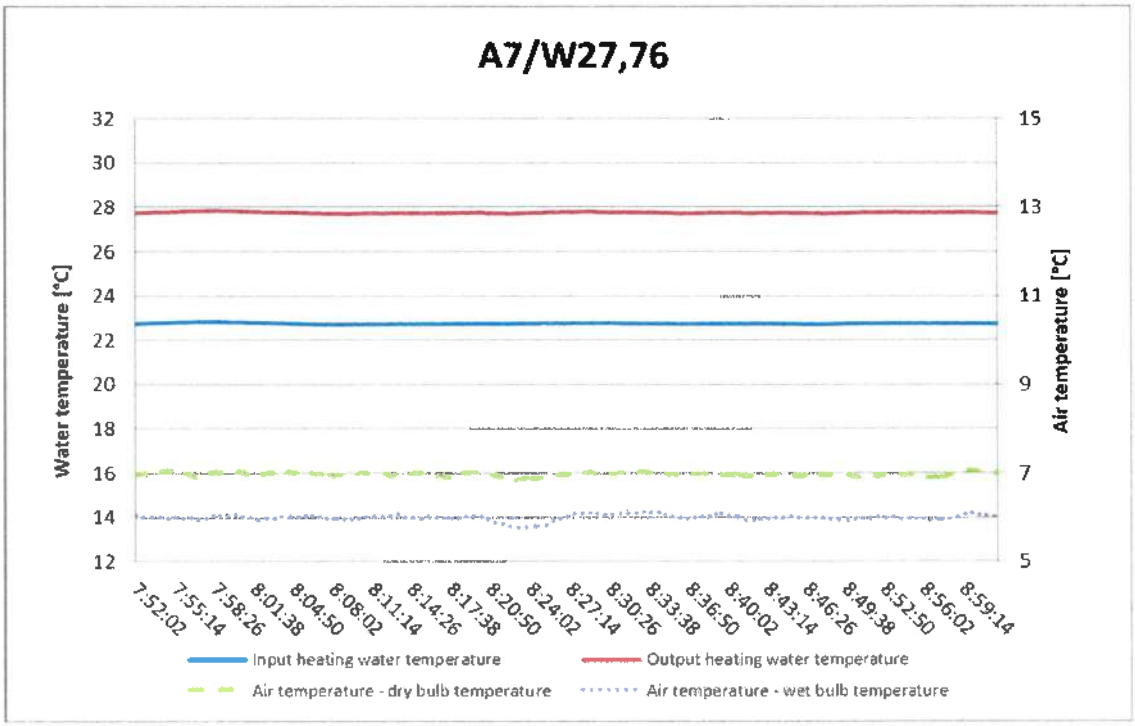


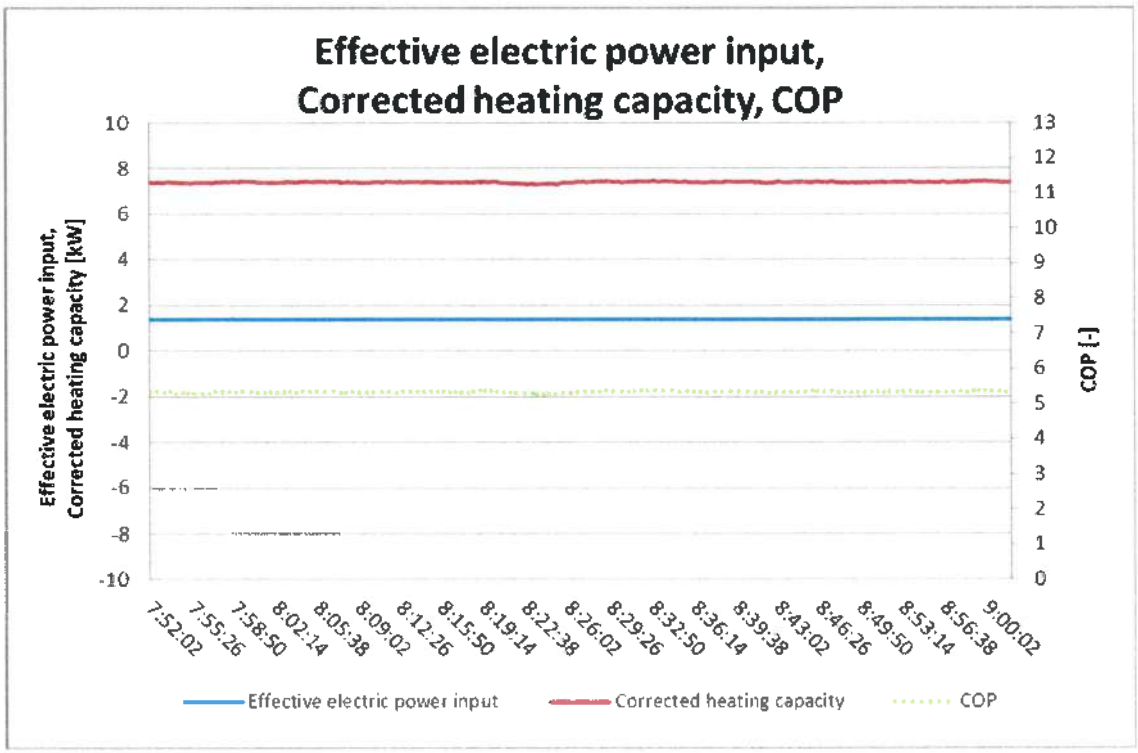
Heat Pump **AWM1501.090.XB17.H00.C13:** A2/W35 (65 rps)



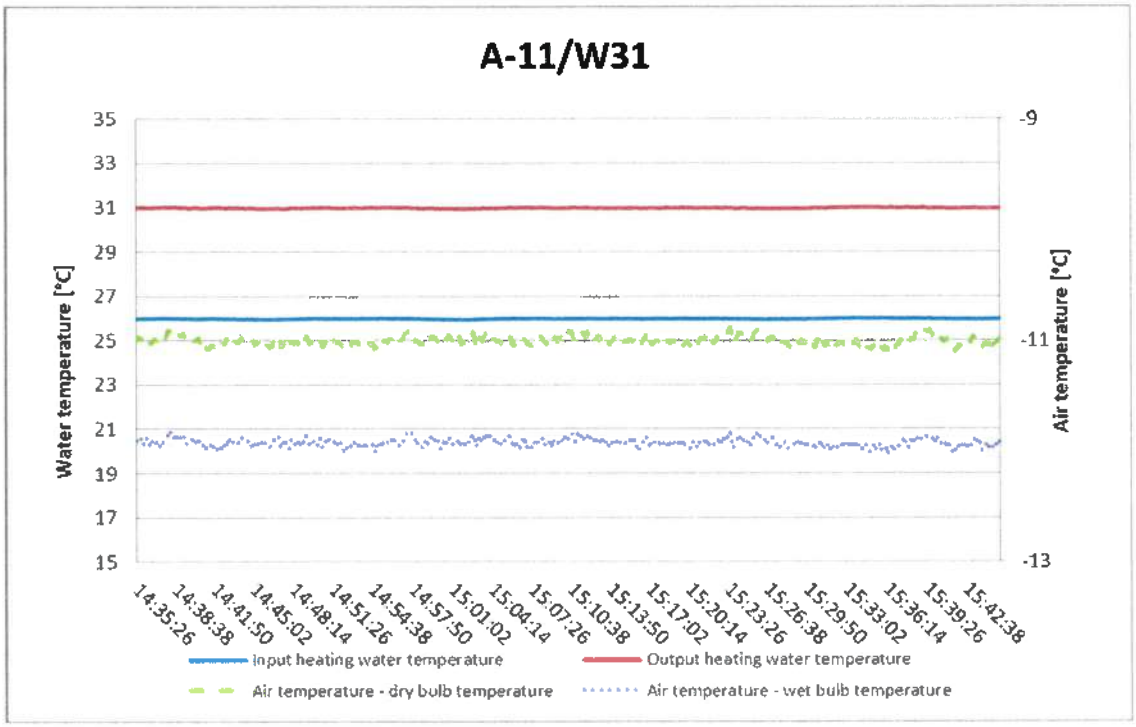


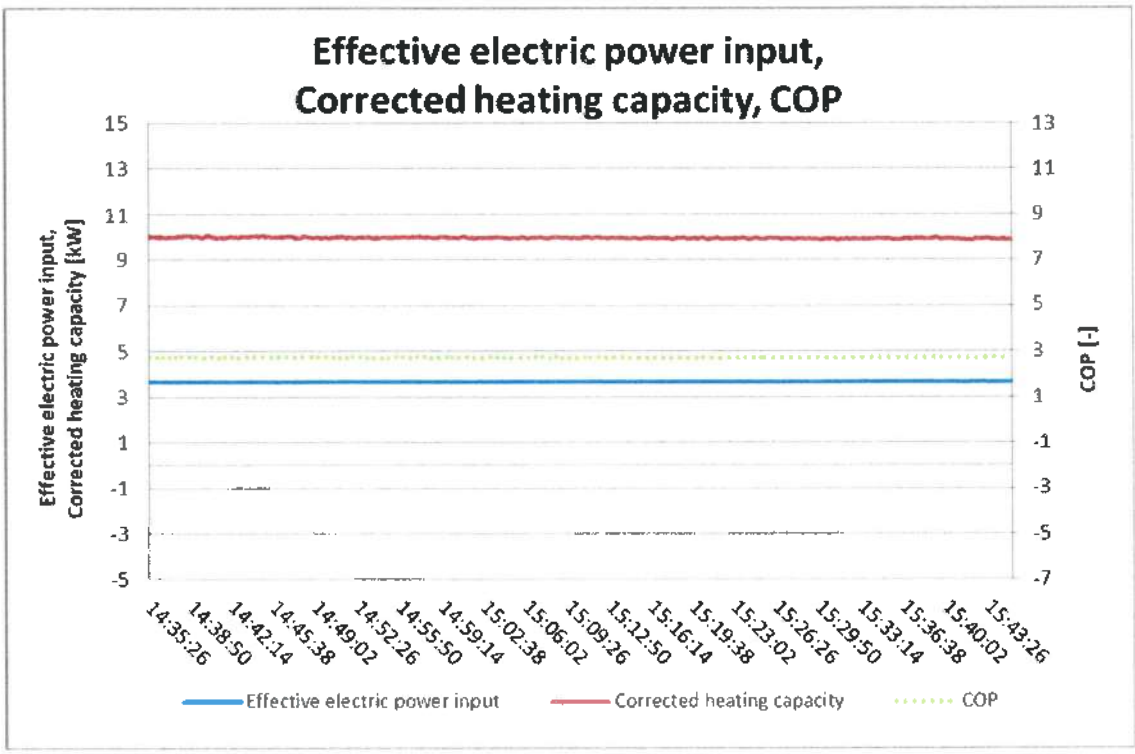
Heat Pump **AWM1501.090.XB17.H00.C13:** A7/W27.76 (30 rps)



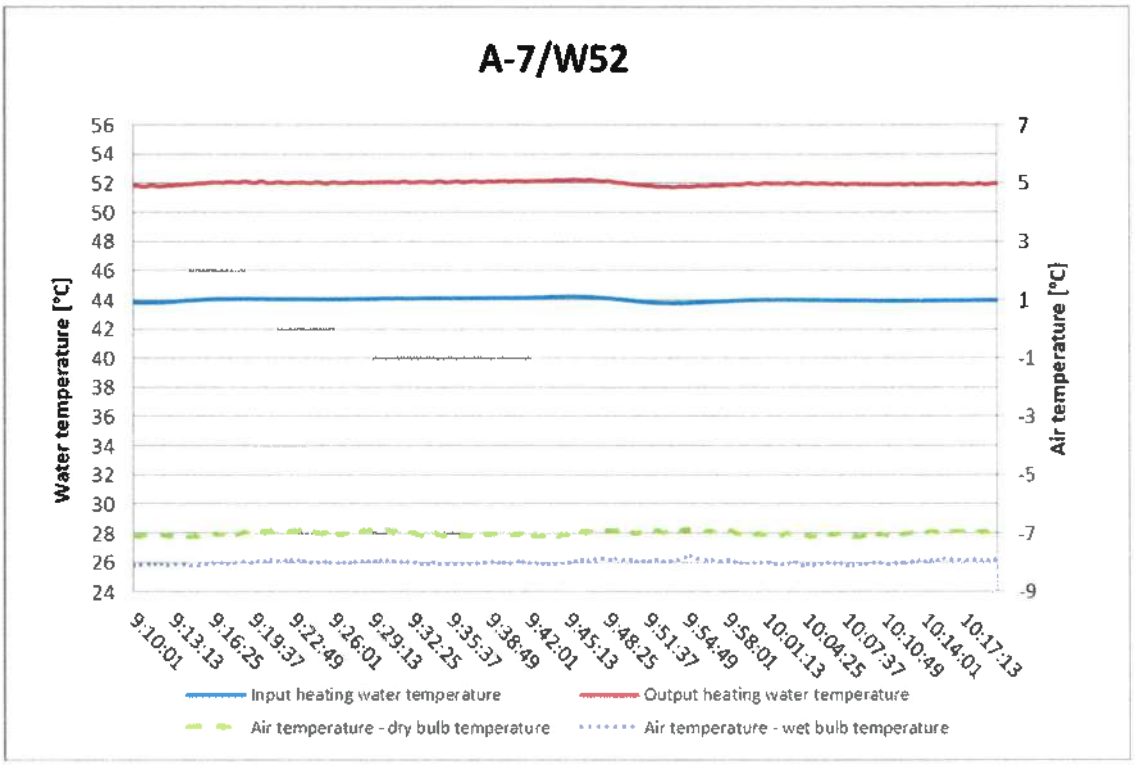


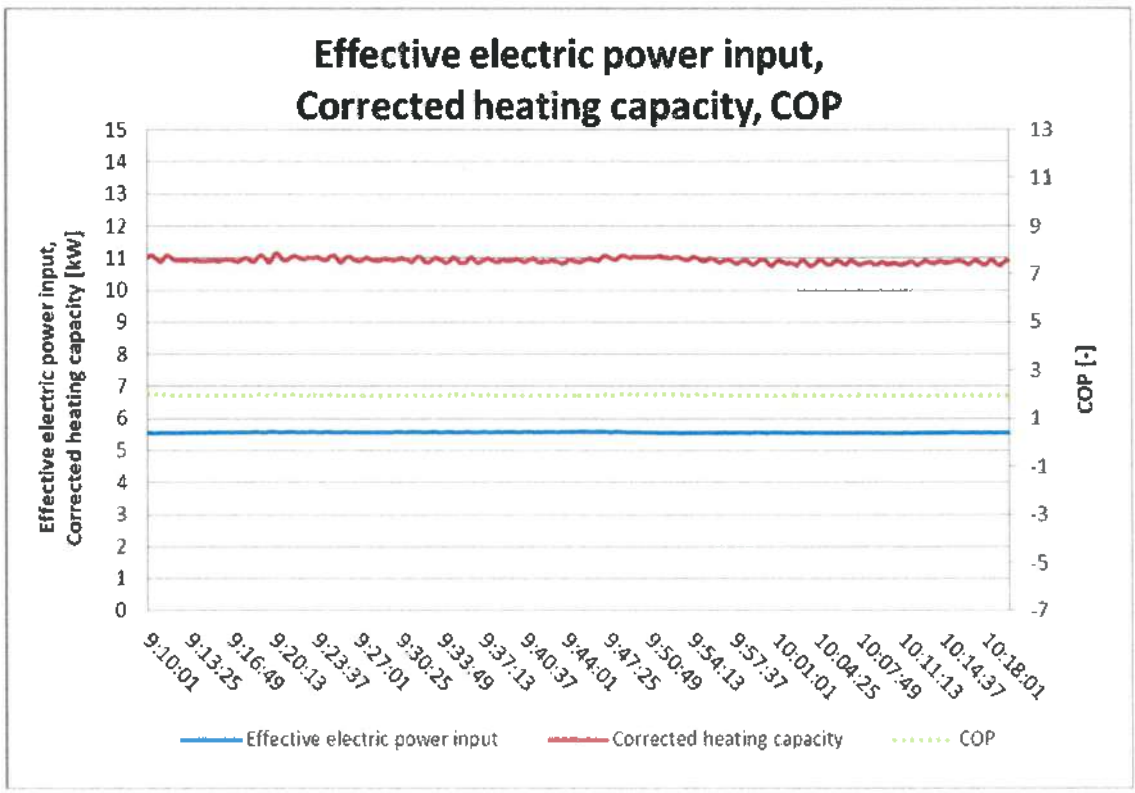
Heat Pump **AWM1501.090.XB17.H00.C13:** A-11/W31 (82 rps)



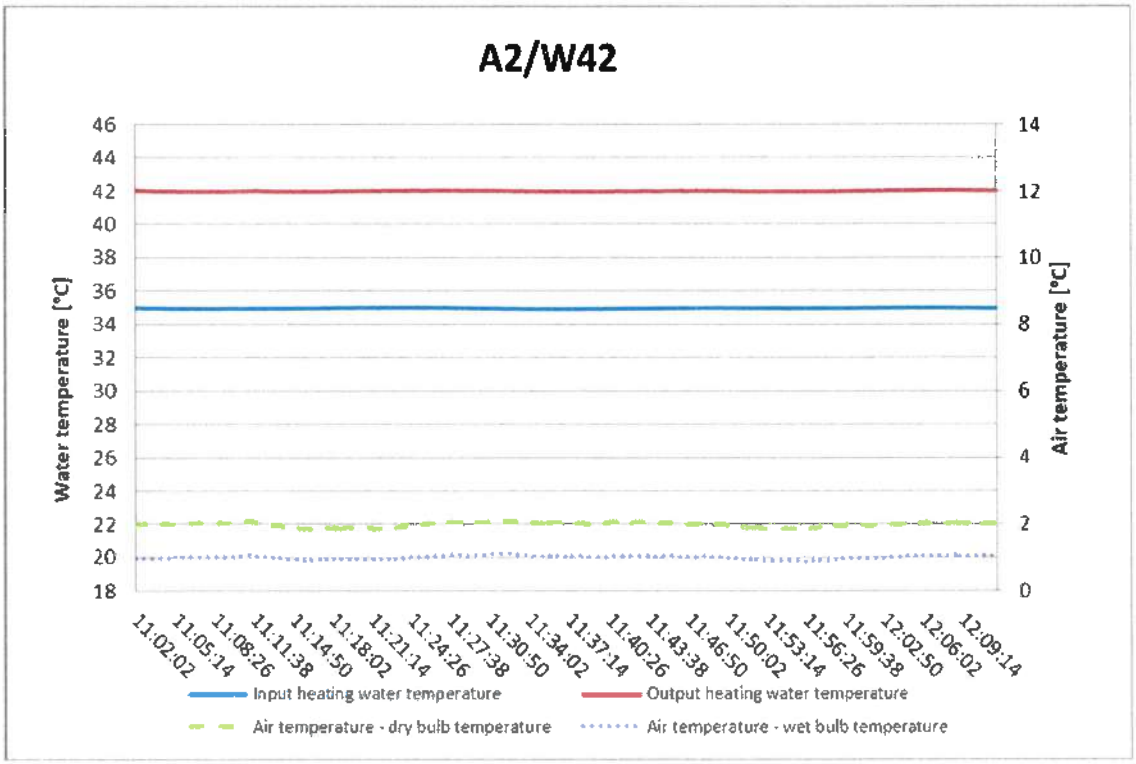


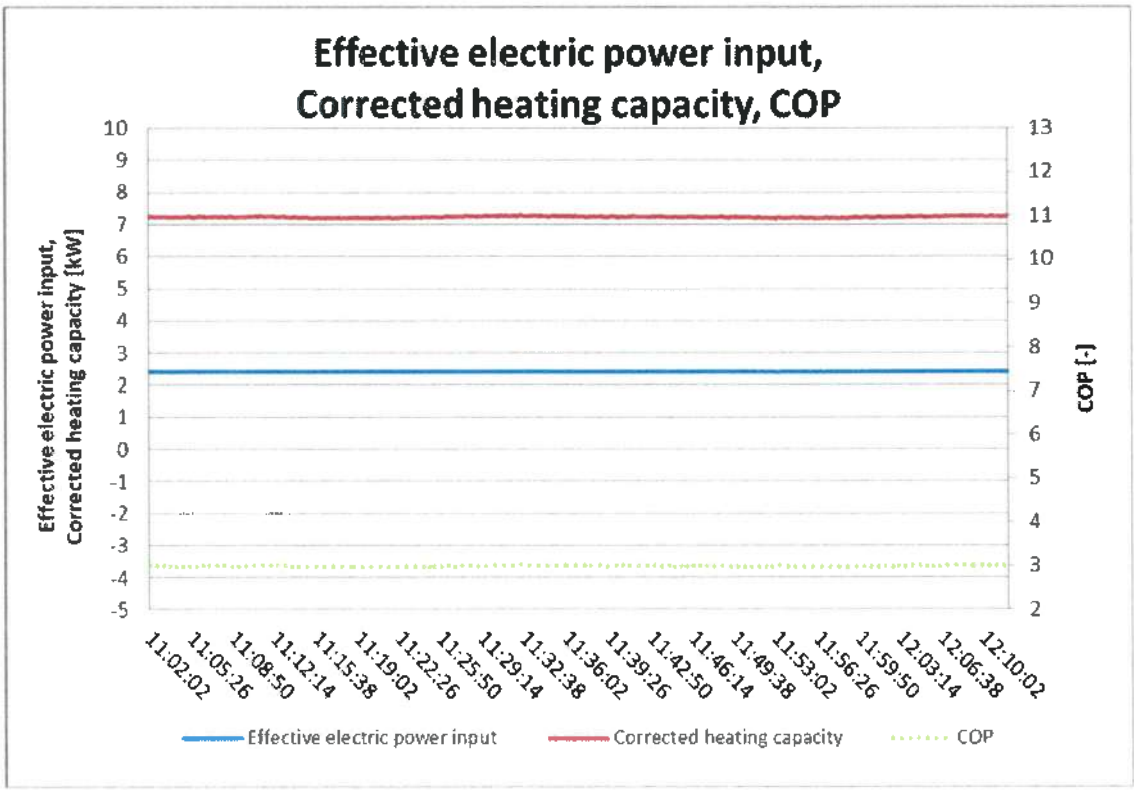
Heat Pump **AWM1501.090.XB17.H00.C13:** A-7/W52 (82 rps)



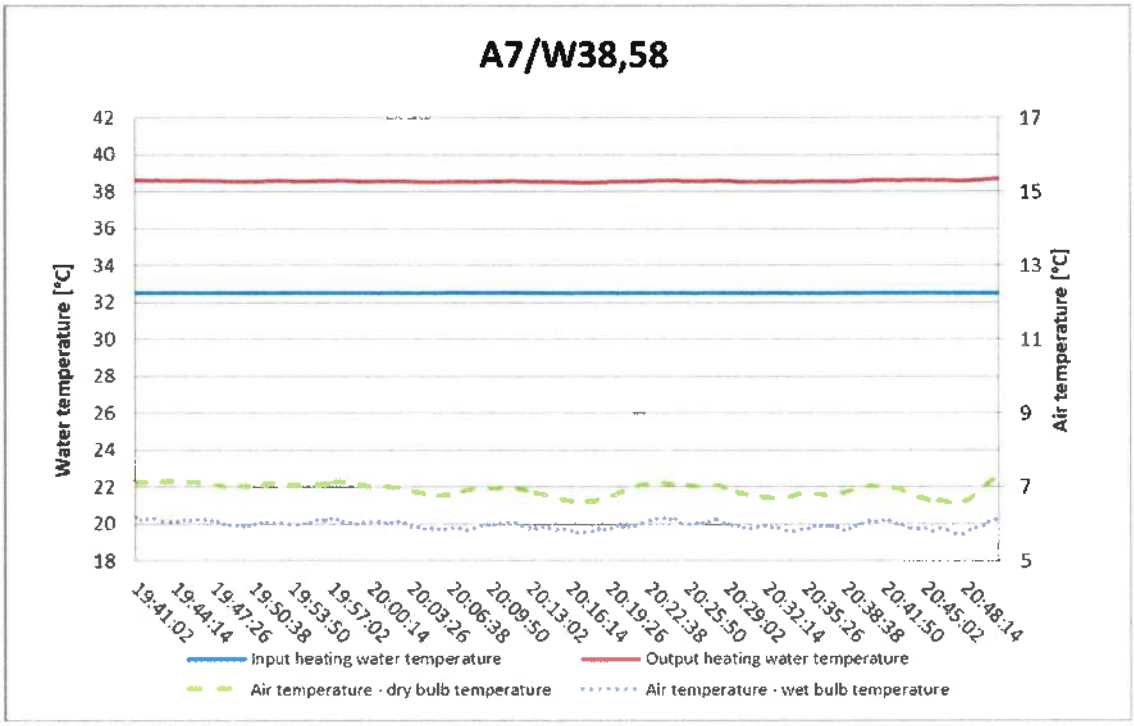


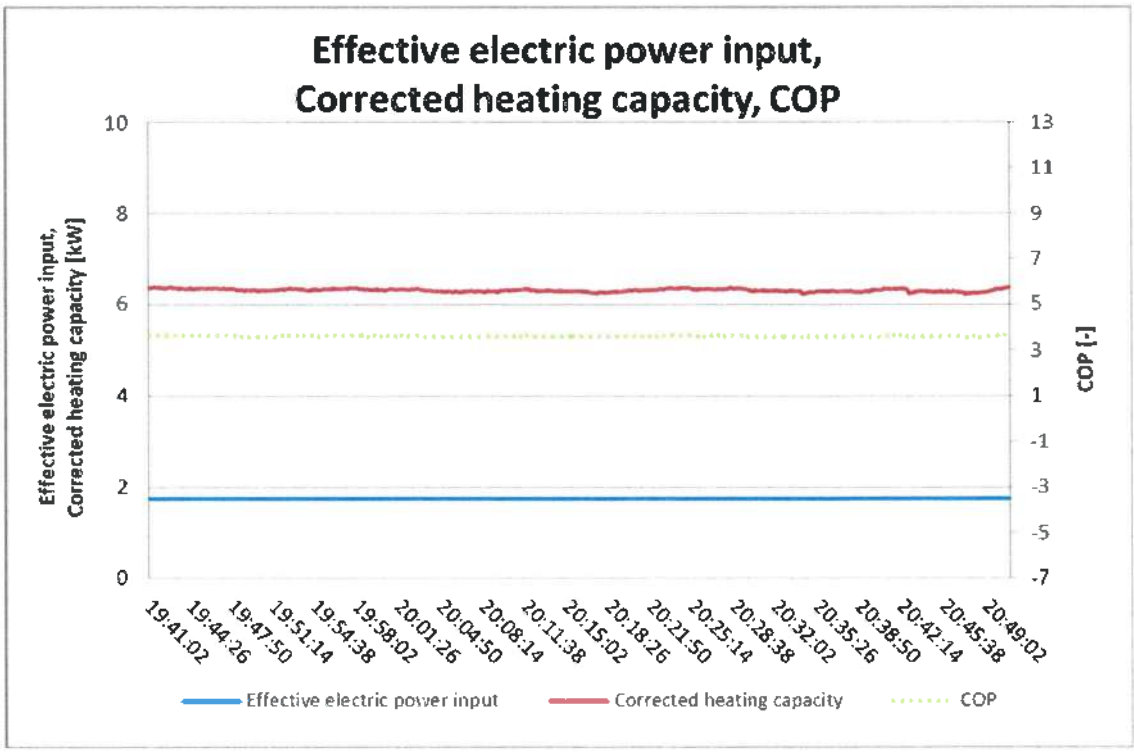
Heat Pump **AWM1501.090.XB17.H00.C13:** A2/W42 (40 rps)



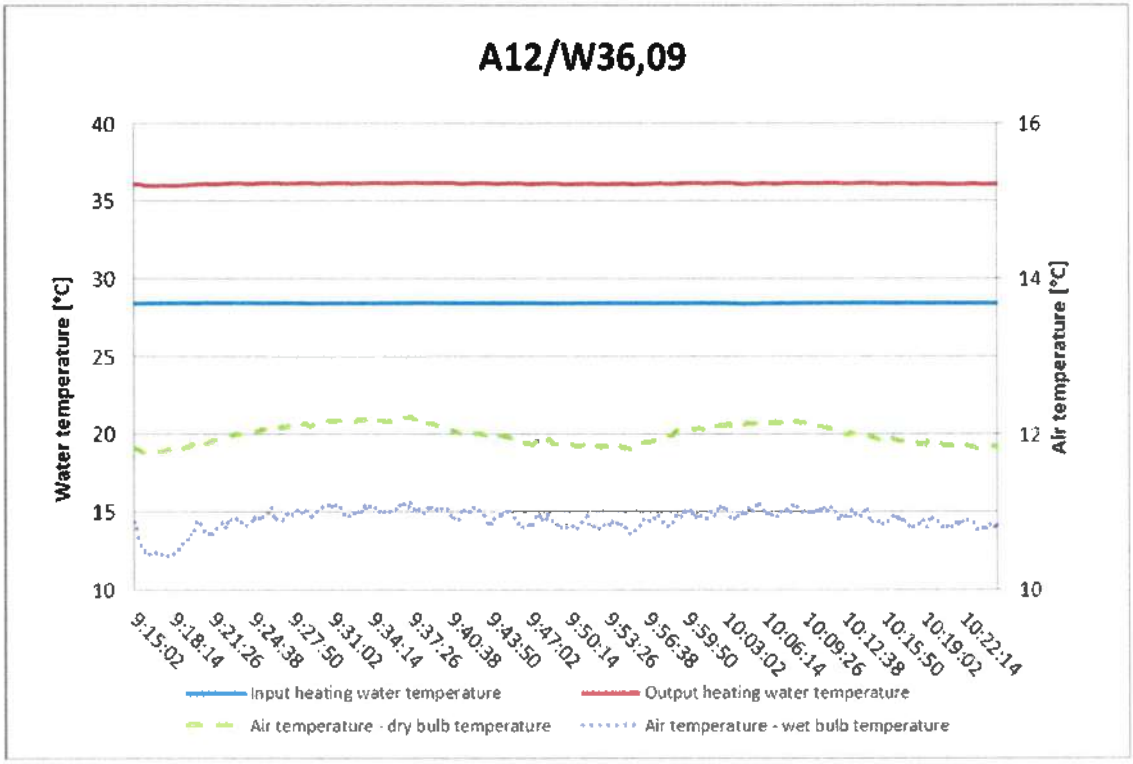


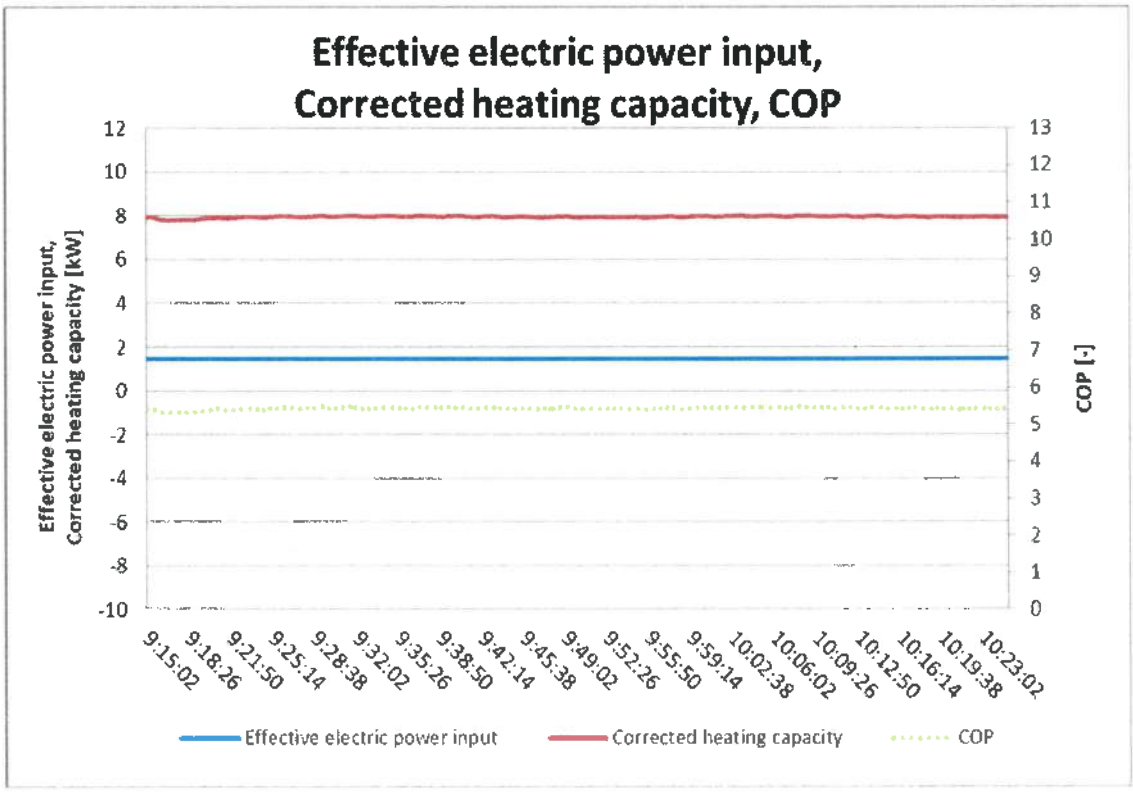
Heat Pump **AWM1501.090.XB17.H00.C13:** A7/W38.58 (30 rps)



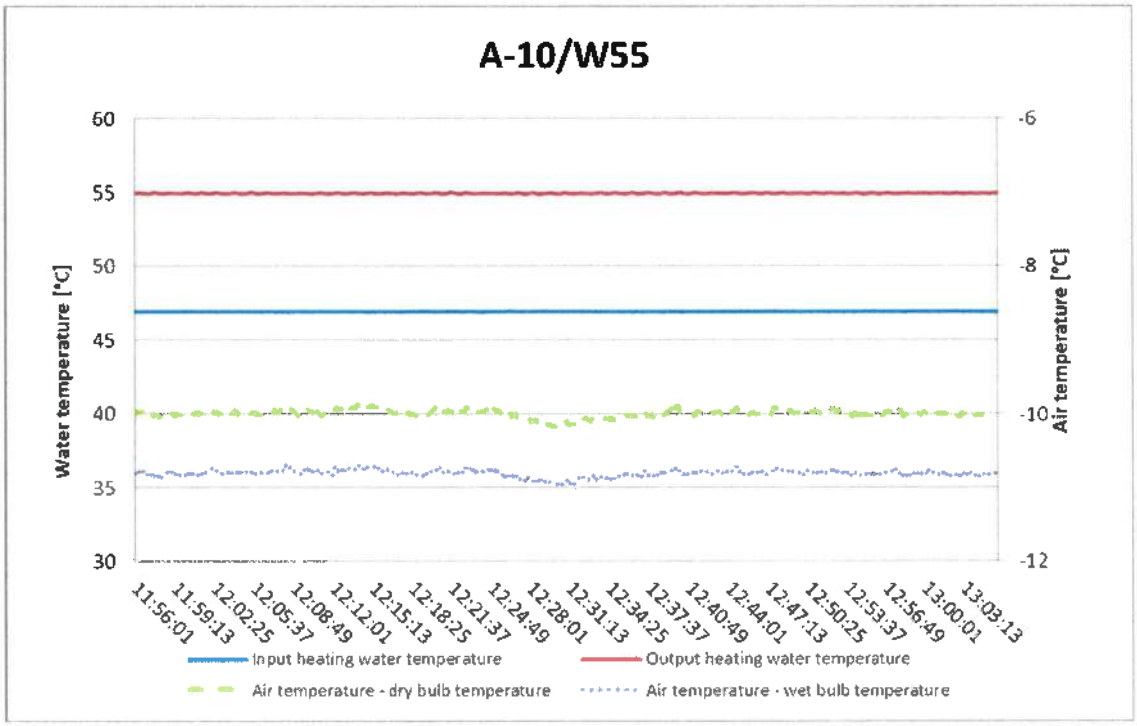


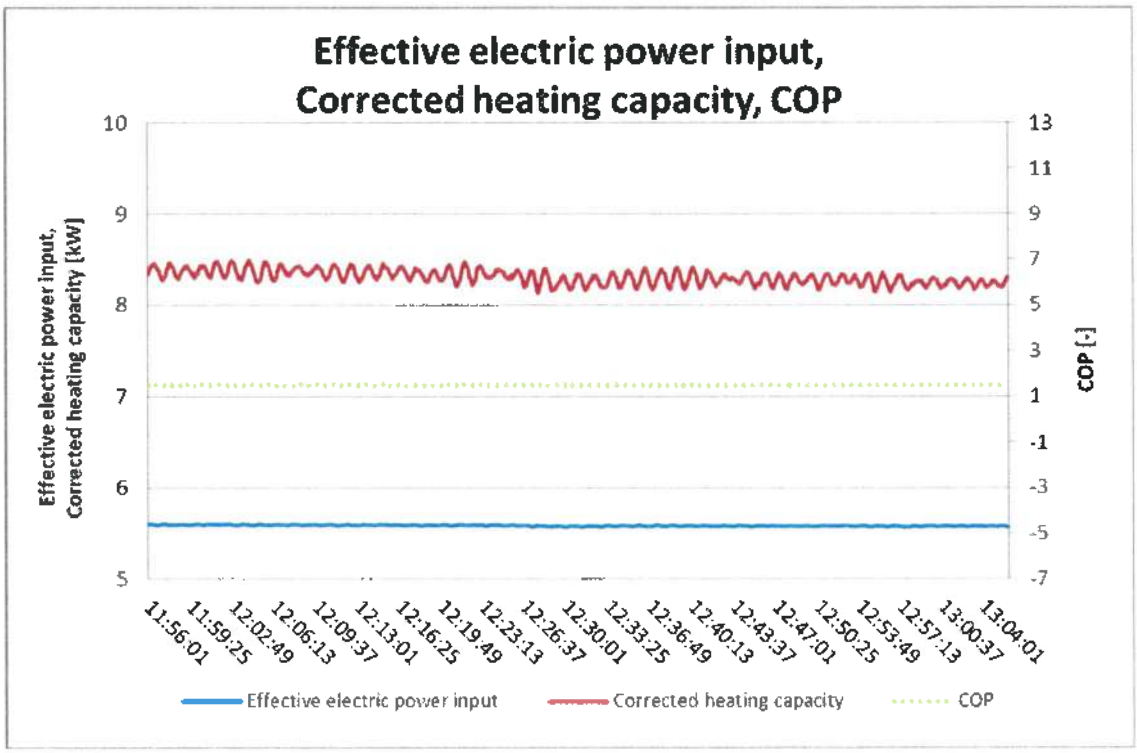
Heat Pump **AWM1501.090.XB17.H00.C13:** A12/W36.09 (30 rps)



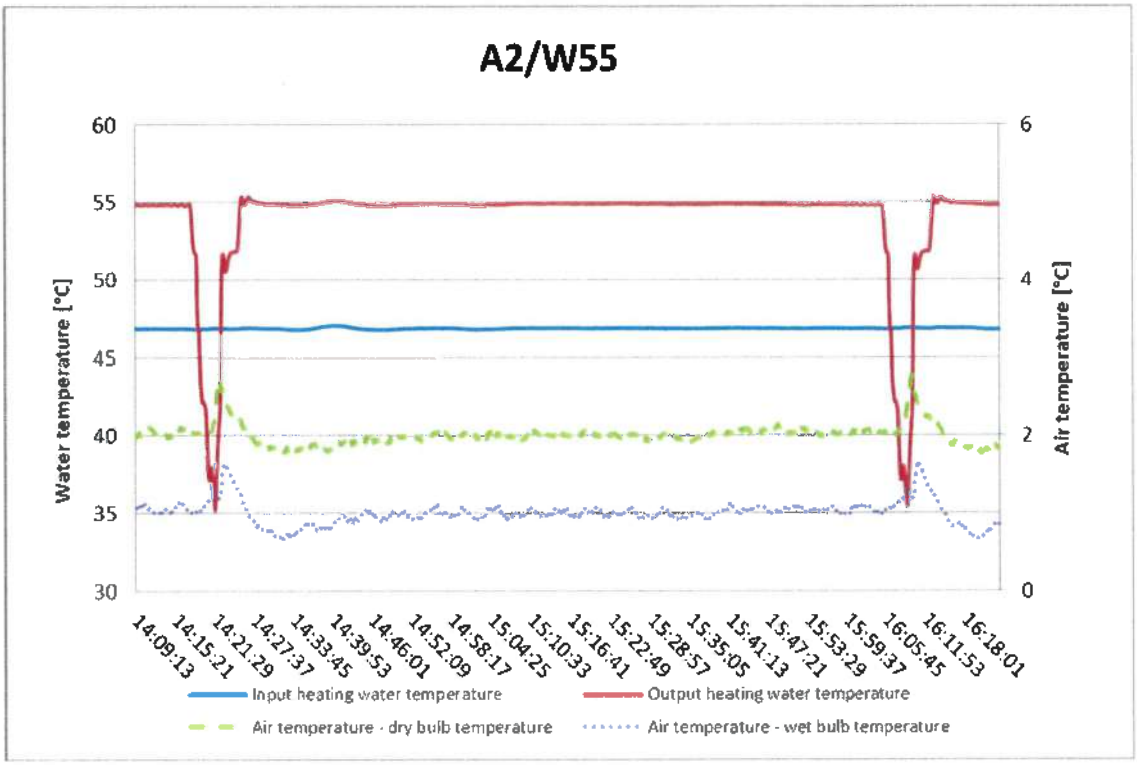


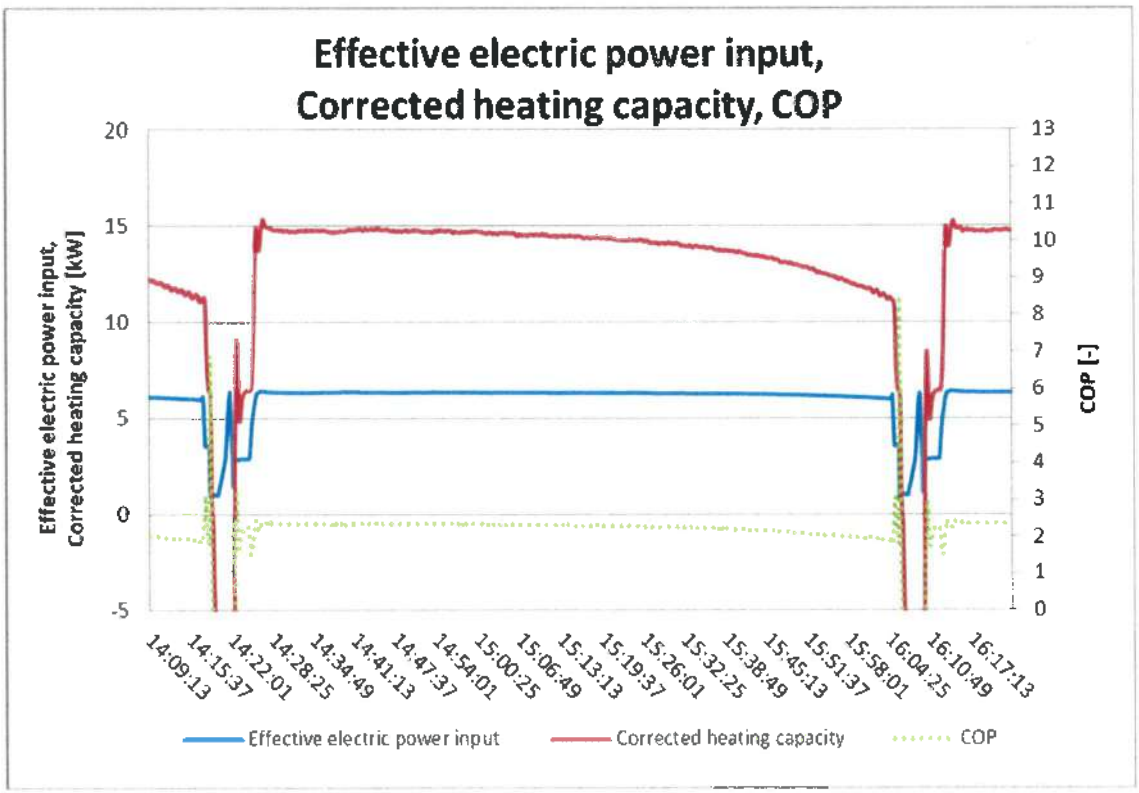
Heat Pump **AWM1501.090.XB17.H00.C13:** A-10/W55 (82 rps)



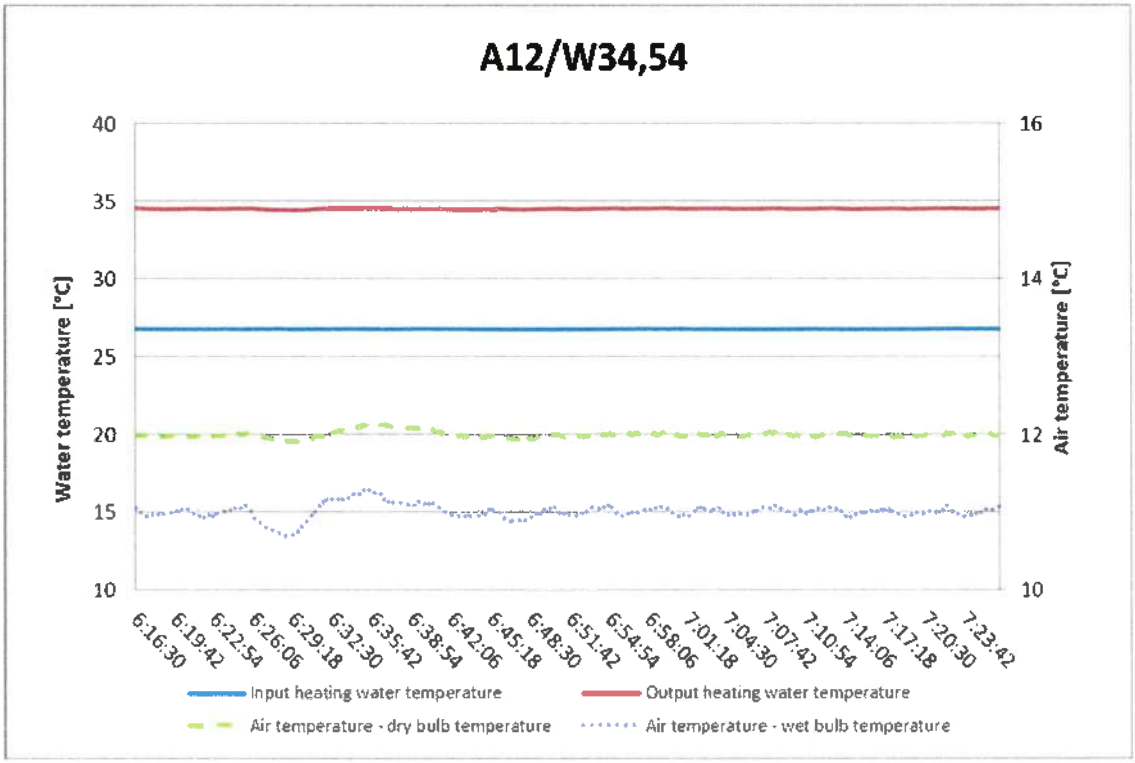


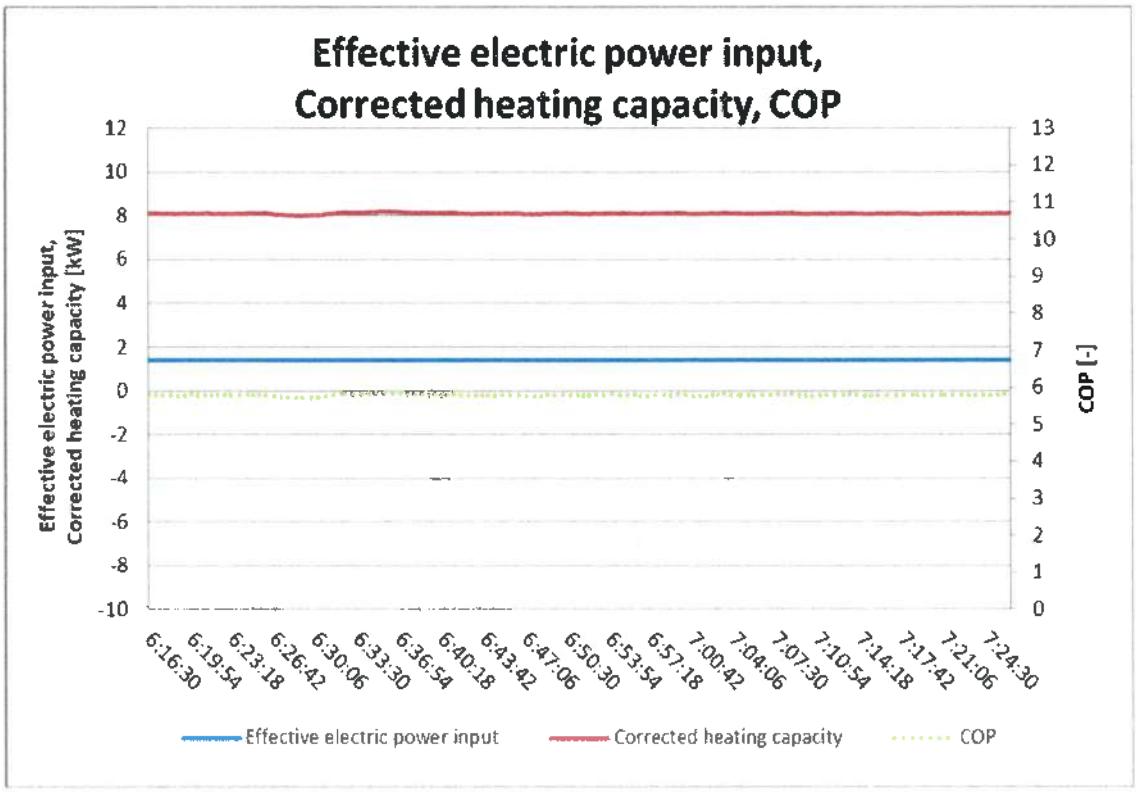
Heat Pump **AWM1501.090.XB17.H00.C13:** A2/W55 (82 rps)



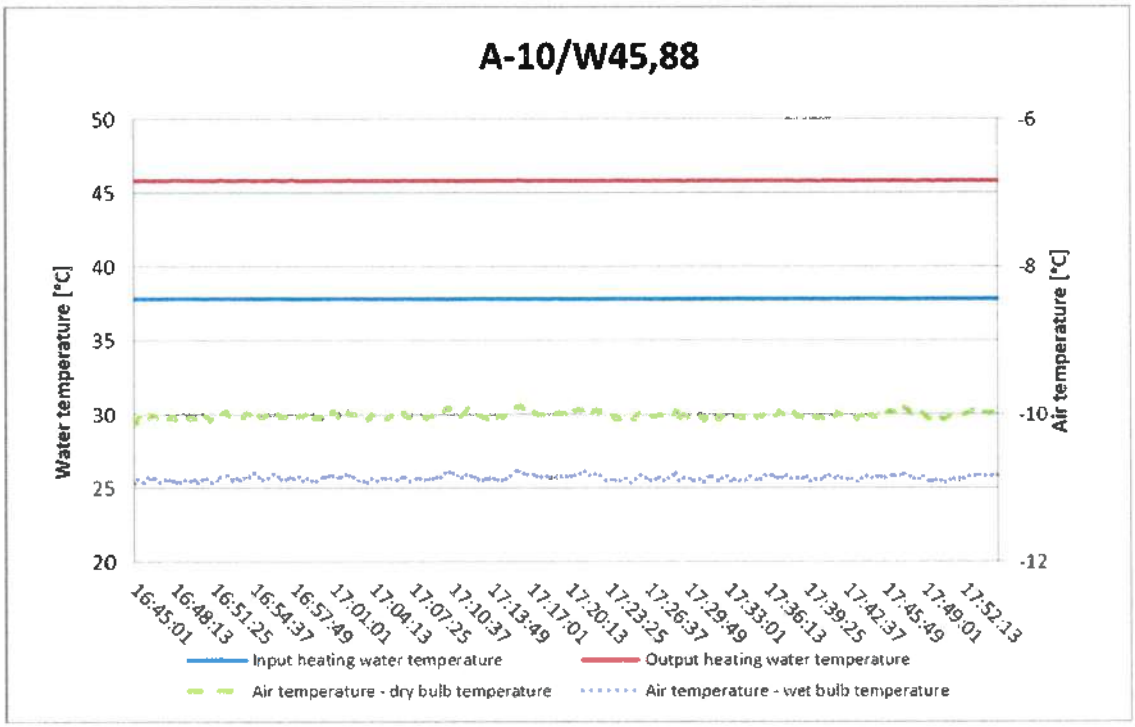


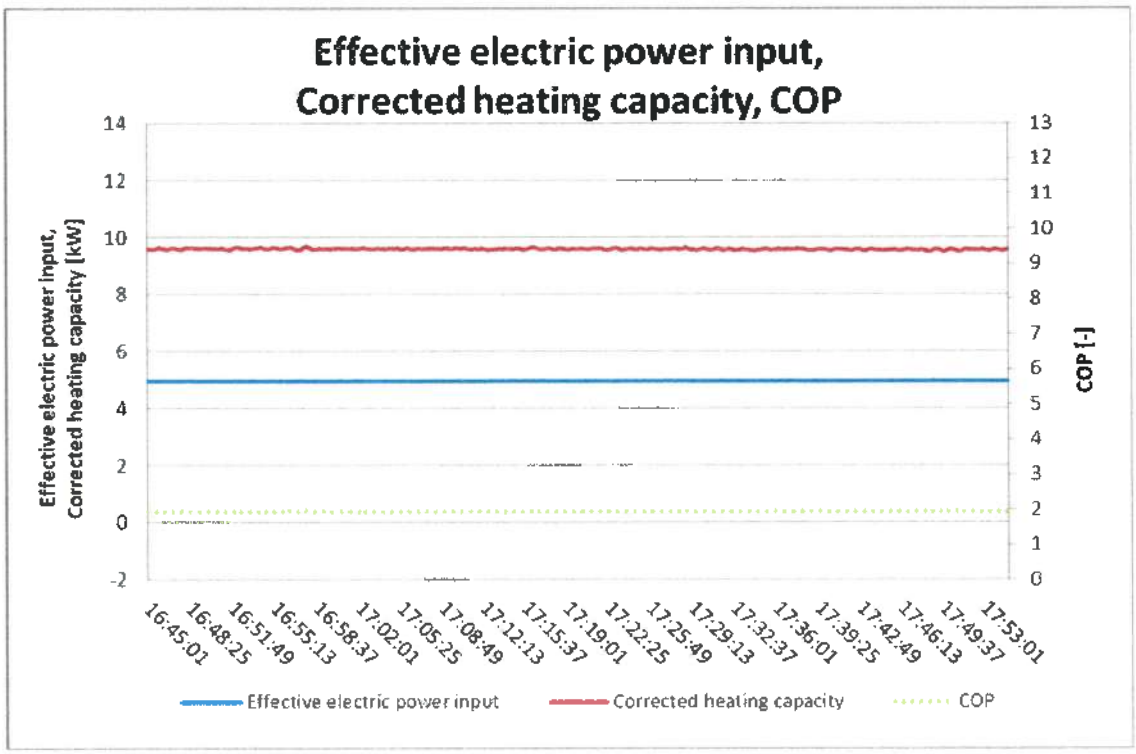
Heat Pump **AWM1501.090.XB17.H00.C13**: A12/W34.54 (30 rps)





Heat Pump **AWM1501.090.XB17.H00.C13:** A-10/W45.88 (82 rps)





VII. A list of referenced documents

- Order of 2021-08-20 (Order reg. no. B-74036, received on 2021-08-31)
- Contract B-74036/31
- Amendments to Contract and changes of implementation date:
  - B-74036.D1 of 2021-11-16
  - B-74036.D2 of 2022-01-03
  - B-74036.D3 of 2022-02-04
  - B-74036.D4 of 2022-03-25
  - B-74036.D5 of 2022-03-31

- ČSN EN 14511-2:2019 - 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 14511-3:2019 - Air conditioners, liquid chilling packages and heat pumps for space heating and cooling a process chillers with electrically driven compressors - Part 3: Test methods
- ČSN EN 14511-4:2019 - 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 14825:2020 - Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling - Testing and rating at part load conditions and calculation of seasonal performance
- EHPA Testing regulation – Testing of Air/Water Heat Pumps – Version 2.4a
- ČSN EN 12102-1:2018 - 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

Test Report compiled by: Ing. Dominik Šedivý

Test Report approved by:

Milan Holomek
Head of Heat and Environment-Friendly Equipment
Test Station

Accredited Testing Laboratory No. 1045.1 STROJÍRENSKÝ ZKUŠEBNÍ ÚSTAV, s.p. 1

– End of Test Report –

TŁUMACZENIE POŚWIADCZONE Z JĘZYKA ANGIELSKIEGO

[Na prośbę Zlecającego, tłumaczeniu podlega jedynie wskazana część dokumentu.]

[strona 1:]

Laboratorium Testujące 1045.1 akredytowane przez Czeski Instytut Akredytujący na podstawie ČSN EN ISO/IEC 17025:2018
Strojírenský zkušební ústav s.p. Zkušební laboratoř
(Instytut Badań Inżynieryjnych, Przedsiębiorstwo Publiczne, Laboratorium Testujące)
Hudcova 424/56b, Mediánky, 621 00 Brno

[dwa znaki graficzne]

SPRAWOZDANIE Z TESTÓW
31-10708/2/T

Produkt:	Zewnętrzna pompa ciepła powietrze/woda – typu split
Oznaczenie typu:	**AWM1501.090.XB17.H00.C13**
Klient:	W&H ELECTRIC POLSKA Sp. z o.o. (Znak towarowy: BeGreen) ul. Biecka 21A 38-300 Gorlice POLSKA
Producent:	W&H ELECTRIC POLSKA Sp. z o.o. (Znak towarowy: BeGreen) ul. Biecka 21A 38-300 Gorlice POLSKA
Odpowiedzialny pracownik:	inż. Mario Jankola
Data wydania sprawozdania:	2022-04-08
Lista dystrybucyjna:	1 egzemplarz dla Klienta 1 egzemplarz dla Instytutu Badań Inżynieryjnych

Kopiowanie dokumentu w całości może nastąpić bez pisemnej zgody Inżynierskiego Instytutu Badawczego. Częściowe kopiowanie podlega zatwierdzeniu. Wyniki badań i weryfikacji odnoszą się wyłącznie do produktów poddanych badaniom w takiej postaci, w jakiej zostały otrzymane lub przedstawione. Laboratorium testujące nie ponosi odpowiedzialności za dane dostarczone przez klienta określonego w raporcie.

[strona 8:]

a) **Warunki oceny:**

Wyniki badań: Pompa ciepła **AWM1501.090.XB17.H00.C13**

Numer badania		1	2
Warunek oceny		**Warunki oceny**	
Specyfikacja warunku oceny*		**A7/W35**	**A7/W55**
Data badania		**2022-01-12**	**2022-01-21**
Procedura badania przejściowego	TAK/NIE	NIE	NIE
Średni czas odmrażania 1 cyklu	[min]	--	--
Średni czas 1 cyklu	[min]	--	--
Czas obliczeń	[min]	70,0	70,0
Woda grzewcza wyjściowa - obliczenie temperatury	[°C]	34,97	54,98
Woda grzewcza wejściowa - obliczanie temperatury	[°C]	30,01	46,98
Temperatura wody grzewczej wyjściowej	[°C]	34,97	54,98
Temperatura wody grzewczej wejściowej	[°C]	30,01	46,98
Temperatura powietrza - temperatura suchego termometru	[°C]	6,98	7,00
Temperatura powietrza - temperatura mokrego termometru	[°C]	6,01	6,02
Wilgotność względna	[%]	87,12	87,04
Ciśnienie barometryczne	[kPa]	100,510	99,088
Temperatura otoczenia	[°C]	16,88	17,32
Różnica ciśnień w obwodzie wtórnym	[kPa]	15,381	12,962
Sprawność pompy cieczy wtórnej	[--]	0,229	0,164
Objętościowe natężenie przepływu wody grzewczej	$[m^3 \cdot h^{-1}]$	2,3118	1,1126
Gęstość wody grzewczej	$[kg \cdot m^{-3}]$	994,0	986,1
Właściwa moc cieplna wody grzewczej	$[kJ \cdot kg^{-1} \cdot K^{-1}]$	4,175	4,179
Napięcie	[V]	402,33	402,21
Łącznie prąd	[A]	16,67	23,36
Całkowity pobór mocy	[kW]	3,322	5,017
Korekta mocy pompy cieczy wtórnej	[W]	33,221	20,479
Korekta poboru mocy pompy cieczy wtórnej	[W]	43,10	24,48
Moc grzewcza – woda grzewcza	[kW]	13,226	10,185
Skorygowana moc grzewcza – woda grzewcza	[kW]	**13,193**	**10,165**
Niepewność skorygowanej mocy grzewczej	[kW]	± 0,230	± 0,113
Efektywny pobór mocy elektrycznej	[kW]	**3,279**	**4,992**
COP	[--]	**4,023**	**2,036**
Niepewność COP	[--]	± 0,070	± 0,023
Ustawienia sterowania	[rps]	**55**	**65**
Ustawienia pompy cyrkulacyjnej — woda grzewcza	[%]	70	45

*Komentarz do skróconego oznakowania: np. A7/W35
A (powietrze) 7 (powietrze wejściowe, temperatura suchego termometru w °C) / W (woda), 35 (temperatura wyjściowej wody grzewczej w °C)

VII. Wykaz wymienionych dokumentów

- Zamówienie z dnia 2021-08-20 (Nr zamówienia w rej. B-74036, data otrzymania 2021-08-31)
- Umowa B-74036/31
- Aneksy do Umowy i zmiany daty wdrożenia:
  - B-74036.D1 z dnia 2021-11-16
  - B-74036.D2 z dnia 2022-01-03
  - B-74036.D3 z dnia 2022-02-04
  - B-74036.D4 z dnia 2022-03-25
  - B-74036.D5 z dnia 2022-03-31

- ČSN EN ISO 14511-2:2019 - Klimatyzatory, ziębiarki cieczy i pompy ciepła do ogrzewania i chłodzenia oraz ziębiarki do procesów przemysłowych, ze sprężarkami o napędzie elektrycznym - Część 2: Warunki badania
- ČSN EN ISO 14511-3:2019 - Klimatyzatory, ziębiarki cieczy i pompy ciepła do ogrzewania i chłodzenia oraz ziębiarki do procesów przemysłowych, ze sprężarkami o napędzie elektrycznym - Część 3: Metody badania
- ČSN EN ISO 14511-4:2019 - Klimatyzatory, ziębiarki cieczy i pompy ciepła do ogrzewania i chłodzenia oraz ziębiarki do procesów przemysłowych, ze sprężarkami o napędzie elektrycznym - Część 4: Wymagania
- ČSN EN ISO 14825-2:2020 - Klimatyzatory, ziębiarki cieczy i pompy ciepła, ze sprężarkami o napędzie elektrycznym, do ogrzewania i chłodzenia – Testowanie i ocena w warunkach częściowo obciążonych i obliczenie efektywności sezonowej
- Rozporządzenie dotyczące testowania EHPA – Testowanie pomp ciepła powietrze/woda – Wersja 2.4a
- ČSN EN ISO 12102-1:2018 - Klimatyzatory, ziębiarki cieczy, pompy ciepła, ziębiarki do procesów przemysłowych i osuszacze z elektrycznie napędzanymi sprężarkami – Ustalenie gwarantowanego poziomu mocy akustycznej - Część 1: Klimatyzatory, ziębiarki cieczy, pompy ciepła do ogrzewania i chłodzenia, osuszacze i ziębiarki do procesów przemysłowych

Sprawozdanie z badań sporządził/a: inż. Dominik Šedivý

Sprawozdanie z badań zatwierdził/a:

[odręczny podpis]
Milan Holomek
Kierownik ds. Sprzętu Grzewczego i Przyjaznego Środowisku
Stacja Badawcza

[okrągła, czerwona pieczęć o treści:]
Akredytowane Laboratorium Badawcze Nr 1045.1 STROJÍRENSKÝ ZKUŠEBNÍ ÚSTAV s.p.

- Koniec Sprawozdania z Badań -

SP-2021-000012_1_2_Protokol_ZL_2022_AKR_EN

Niniejszym poświadczam zgodność powyższego tłumaczenia ze skanem dokumentu w języku angielskim.
Magdalena Sezgin, tłumacz przysięgły języka angielskiego, wpisana na listę tłumaczy przysięgłych, prowadzoną przez Ministra Sprawiedliwości pod numerem TP/30/17.
Nr Repertorium 318/2024.
Katowice, dnia 29 marca 2024 r.

Strojírenský zkušební ústav, s.p., Brno, Česká republika
Engineering Test Institute, Public Enterprise, Brno, Czech Republic

TEST CERTIFICATE

Number **O-B-00658-22 rev.1**

Customer	W&H ELECTRIC POLSKA Sp. z.o.o. (Trade Mark: BeGreen) ul. Biecka 21A 38-300 Gorlice POLAND
Product	Outdoor Air/water Hybrid Heat Pump – split
Type designation / Trade mark	**HAWM2001.240.IB08.H00.C11, HAWM2001.240.TB08.H00.C11** **HAWM2001.240.IB10.H00.C11, HAWM2001.240.TB10.H00.C11** **HAWM2001.240.IB12.H00.C11, HAWM2001.240.TB12.H00.C11** **HAWM2001.240.IB14.H00.C13, HAWM2001.240.TB14.H00.C13** **HAWM2001.240.IB17.H00.C13, HAWM2001.240.TB17.H00.C13**
Test methods	ČSN EN 14825:2020
Basis of certificate	Test reports: 31-10708/3/T of 2022-04-11, 31-10708/4/T of 2022-04-11 Technical documents of W&H ELECTRIC POLSKA Sp. z.o.o. (Trade Mark: BeGreen)
Temperature application	**LOW TEMPERATURE** (Reference water temperature 35 °C)
Reference heating season	**„A" = average** (Reference design conditions for heating $T_{designh}$ = -10 °C)

Specification of conditions:

Compressor speed control	**Variable**	Heating water volume flow rate (indoor heat exchanger)	**Variable**
Outlet water temperature (indoor heat exchanger)	**Variable**	Source liquid volume flow rate (outdoor heat exchanger)	–
Function	**Reversible**		

STROJÍRENSKÝ ZKUŠEBNÍ ÚSTAV, s.p. CZ 1

Strojírenský zkušební ústav, s.p., Hudcova 424/56b, 621 00 Brno, Česká republika
Engineering Test Institute, public enterprise, Hudcova 424/56b, 621 00 Brno, Czech Republic
www.szutest.cz

Results:

Low temperature application

(Reference water temperature 35 °C)

Model names			HAWM2001.240.IB08.H00.C11 HAWM2001.240.TB08.H00.C11	HAWM2001.240.IB10.H00.C11 HAWM2001.240.TB10.H00.C11	HAWM2001.240.IB12.H00.C11 HAWM2001.240.TB12.H00.C11	HAWM2001.240.IB14.H00.C13 HAWM2001.240.TB14.H00.C13	HAWM2001.240.IB17.H00.C13 HAWM2001.240.TB17.H00.C13
Outdoor units			OU.H.071.A 11	OU.H.090.A 11	OU.H.105.A 11	OU.H.125.A 13	OU.H.160.A 13
Indoor units			IU.AWM150 1.060.IB10. H00 (Not tested)	IU.AWM150 1.060.IB10. H00 (Not tested)	IU.AWM150 1.090.IB12. H00 (Tested)	IU.AWM150 1.090.IB17. H00 (Not tested)	IU.AWM150 1.090.IB17. H00 (Tested)
Full load heating	$P_{designh}$ [kW]	A	6.38	6.58	9.39	11.09	11.73
Fossil boiler off temperature	$T_{fb,off}$ [°C]	A	-8	-7	-7	-8	-7
Seasonal coefficient of performance	SCOP [–]	A	3.92	3.89	4.04	4.13	4.00
Seasonal Space heating energy efficiency	η_s [%]	A	153.9	152.8	158.5	162.1	157.0

(Tested) This test sample was tested at the Testing Laboratory.

(Not tested) The technical data were declared by the Manufacturer according to the model range specifications and were not tested by the Testing Laboratory.

Engineering Test Institute, Public Enterprise, confirms by this Test Certificate that the testing of the product in question was performed with the results as stated above. Engineering Test Institute, Public Enterprise, is an accredited Testing Laboratory 1045.1.

Brno, 2022-04-29

Milan Holomek

Head of Heat and Environment-Friendly Equipment Test Station

– END OF TEST CERTIFICATE –

STROJÍRENSKÝ ZKUŠEBNÍ ÚSTAV, s.p. CZ

Strojírenský zkušební ústav, s.p., Hudcova 424/56b, 621 00 Brno, Česká republika
Engineering Test Institute, public enterprise, Hudcova 424/56b, 621 00 Brno, Czech Republic
www.szutest.cz

TŁUMACZENIE POŚWIADCZONE Z JĘZYKA ANGIELSKIEGO

[logo i tekst w j. obcym]
Instytut Badań Inżynierskich, Przedsiębiorstwo Państwowe, Brno, Republika Czeska

CERTYFIKAT Z TESTÓW
Numer **O-B-00658-22 wer. 1**

Klient	W&H ELECTRIC POLSKA Sp. z o.o. (Znak towarowy: BeGreen) ul. Biecka 21A 38-300 Gorlice POLSKA
Produkt	Zewnętrzna hybrydowa pompa ciepła powietrze/woda – typu split
Oznaczenie typu / Znak towarowy	**HAWM2001.240.IB08.H00.C11, HAWM2001.240.TB08.H00.C11** **HAWM2001.240.IB10.H00.C11, HAWM2001.240.TB10.H00.C11** **HAWM2001.240.IB12.H00.C11, HAWM2001.240.TB12.H00.C11** **HAWM2001.240.IB14.H00.C13, HAWM2001.240.TB14.H00.C13** **HAWM2001.240.IB17.H00.C13, HAWM2001.240.TB17.H00.C13**
Metody testu	ČSN EN 14825:2020
Podstawa wydania certyfikatu	Raporty z badania: 31-10708/3/T z dnia 2022-04-11, 31-10708/4/T z dnia 2022-04-11 Dokumenty techniczne W&H ELECTRIC POLSKA Sp. z o.o. (Znak towarowy: BeGreen)
Zastosowanie temperatury	**NISKA TEMPERATURA** (Referencyjna temperatura wody 35 °C)
Referencyjny sezon grzewczy	**„A" = średni** (Referencyjne warunki projektu dla ogrzewania $T_{designh}$ = -10 °C)

Specyfikacja warunków:

Kontrola prędkości kompresora	**Zmienna**	Przepustowość wody grzewczej (wewnętrzny wymiennik ciepła)	**Zmienna**
Temperatura wody wylotowej (wewnętrzny wymiennik ciepła)	**Zmienna**	Przepustowość źródłowego płynu (zewnętrzny wymiennik ciepła)	-
Funkcja	**Odwracalna**		

[czerwona, okrągła pieczęć o treści:] STROJÍRENSKÝ ZKUŠEBNÍ ÚSTAV, s.p. CZ 1

[tekst w j. obcym]
Instytut Badań Inżynierskich, przedsiębiorstwo państwowe, Hudcova 424/56b, 621 00 Brno, Republika Czeska
www.szutest.cz *[okrągły hologram]*

[logo]

Wyniki:

Zastosowanie niskiej temperatury
(Referencyjna temperatura wody 35 °C)

Nazwy modeli			HAWM2001.240.IB08.H00.C11 HAWM2001.240.TB08.H00.C11	HAWM2001.240.IB10.H00.C11 HAWM2001.240.TB10.H00.C11	HAWM2001.240.IB12.H00.C11 HAWM2001.240.TB12.H00.C11	HAWM2001.240.IB14.H00.C13 HAWM2001.240.TB14.H00.C13	HAWM2001.240.IB17.H00.C13 HAWM2001.240.TB17.H00.C13
Jednostki zewnętrzne			**OU.H.071.A 11 IU.AWM150**	**OU.H.090.A 11 IU.AWM150**	**OU.H.105.A 11 IU.AWM150**	**OU.H.125.A 13 IU.AWM150**	**OU.H.160.A 13 IU.AWM150**
Jednostki wewnętrzne			**1.060.IB10. H00** (Nie zbadane)	**1.060.IB10. H00** (Nie zbadane)	**1.090.IB12. H00** (Zbadane)	**1.090.IB17. H00** (Nie zbadane)	**1.090.IB17. H00** (Zbadane)
Ogrzewanie przy pełnym obciążeniu	$P_{designh}$ [kW]	A	6,38	6,58	9,39	11,09	11,73
Temperatura przy wyłączonym kotle	$T_{fb,off}$ [°C]	A	-8	-7	-7	-8	-7
Sezonowy współczynnik wydajności	SCOP [-]	A	3,92	3,89	4,04	4,13	4,00
Sezonowa Wydajność ogrzewania przestrzeni	η_s [%]	A	153,9	152,8	158,5	162,1	157,0

(Zbadane) Próbka testowa została przetestowana w Laboratorium Badawczym.
(Nie zbadane) Dane techniczne zostały zadeklarowane przez Producenta zgodnie ze specyfikacją zakresu modelu i nie zostały zbadane przez Laboratorium Badawcze.
Inżynierski Instytut Badawczy, Przedsiębiorstwo Publiczne, potwierdza niniejszym Certyfikatem z Testów, że badanie danego produktu zostało przeprowadzone z wynikami podanymi powyżej. Instytut Badań Inżynierskich, Przedsiębiorstwo Publiczne, jest akredytowanym Laboratorium Badawczym 1045.1.

Brno, 2022-04-29

[odręczny podpis]
Milan Holomek
Kierownik Stacji Testów Sprzętu grzewczego i przyjaznego środowisku

[czerwona, okrągła pieczęć o treści:] STROJÍRENSKÝ ZKUŠEBNÍ ÚSTAV, s.p. CZ 1

- KONIEC CERTYFIKATU Z TESTÓW -

[tekst w j. obcym]
Instytut Badań Inżynierskich, przedsiębiorstwo państwowe, Hudcova 424/56b, 621 00 Brno, Republika Czeska
www.szutest.cz

Niniejszym poświadczam zgodność powyższego tłumaczenia ze skanem dokumentu w języku angielskim.
Magdalena Sezgin, tłumacz przysięgły języka angielskiego, wpisana na listę tłumaczy przysięgłych, prowadzoną przez Ministra Sprawiedliwości pod numerem TP/30/17.
Nr Repertorium 401/2024
Katowice, dnia 18 kwietnia 2024 r.

Strojírenský zkušební ústav, s.p., Brno, Česká republika
Engineering Test Institute, Public Enterprise, Brno, Czech Republic

TEST CERTIFICATE

Number **O-B-00694-22 rev.1**

Customer	W&H ELECTRIC POLSKA Sp. z.o.o. (Trade Mark: BeGreen) ul. Biecka 21A 38-300 Gorlice POLAND
Product	Outdoor Air/water Hybrid Heat Pump – split
Type designation / Trade mark	**HAWM2001.240.IB08.H00.C11, HAWM2001.240.TB08.H00.C11** **HAWM2001.240.IB10.H00.C11, HAWM2001.240.TB10.H00.C11** **HAWM2001.240.IB12.H00.C11, HAWM2001.240.TB12.H00.C11** **HAWM2001.240.IB14.H00.C13, HAWM2001.240.TB14.H00.C13** **HAWM2001.240.IB17.H00.C13, HAWM2001.240.TB17.H00.C13**
Test methods	ČSN EN 14825:2020
Basis of certificate	Test reports: 31-10708/3/T of 2022-04-11, 31-10708/4/T of 2022-04-11 Technical documents of W&H ELECTRIC POLSKA Sp. z.o.o. (Trade Mark: BeGreen)
Temperature application	**MEDIUM TEMPERATURE** (Reference water temperature 55 °C)
Reference heating season	**„A" = average / „W" = warmer / „C" = colder** (Reference design conditions for heating $T_{designh}$ = -10 °C / +2 °C / -22 °C)

Specification of conditions:

Compressor speed control	**Variable**	Heating water volume flow rate (indoor heat exchanger)	**Variable**
Outlet water temperature (indoor heat exchanger)	**Variable**	Source liquid volume flow rate (outdoor heat exchanger)	–
Function	**Reversible**		

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Strojírenský zkušební ústav, s.p., Hudcova 424/56b, 621 00 Brno, Česká republika
Engineering Test Institute, public enterprise, Hudcova 424/56b, 621 00 Brno, Czech Republic
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Results:

Medium temperature application

(Reference water temperature 55 °C)

Model names			HAWM2001.240.IB08.H00.C11 HAWM2001.240.TB 08.H00.C11	HAWM2001.240.IB10.H00.C11 HAWM2001.240.TB 10.H00.C11	HAWM2001.240.IB12.H00.C11 HAWM2001.240.TB 12.H00.C11	HAWM2001.240.IB14.H00.C13 HAWM2001.240.TB 14.H00.C13	HAWM2001.240.IB17.H00.C13 HAWM2001.240.TB 17.H00.C13
Outdoor units			OU.H.071.A 11	OU.H.090.A 11	OU.H.105.A 11	OU.H.125.A 13	OU.H.160.A 13
Indoor units			IU.AWM150 1.060.IB10. H00 (Not tested)	IU.AWM150 1.060.IB10. H00 (Not tested)	IU.AWM150 1.090.IB12. H00 (Tested)	IU.AWM150 1.090.IB17. H00 (Not tested)	IU.AWM150 1.090.IB17. H00 (Tested)
Full load heating	$P_{designh}$ [kW]	A	5.48	5.95	8.78	11.08	12.35
Fossil boiler off temperature	$T_{fb,off}$ [°C]	A	-8	-7	-6	-8	-7
Seasonal coefficient of performance	SCOP [–]	A	3.22	3.22	2.92	3.22	3.01
Seasonal Space heating energy efficiency	η_s [%]	A	125.7	125.8	113.6	125.8	117.4

(Tested) This test sample was tested at the Testing Laboratory.

(Not tested) The technical data were declared by the Manufacturer according to the model range specifications and were not tested by the Testing Laboratory.

Engineering Test Institute, Public Enterprise, confirms by this Test Certificate that the testing of the product in question was performed with the results as stated above. Engineering Test Institute, Public Enterprise, is an accredited Testing Laboratory 1045.1.

Brno, 2022-04-29

Milan Holomek

Head of Heat and Environment-Friendly Equipment Test Station

– END OF TEST CERTIFICATE –

STROJÍRENSKÝ ZKUŠEBNÍ ÚSTAV, s.p. CZ 1

Strojírenský zkušební ústav, s.p., Hudcova 424/56b, 621 00 Brno, Česká republika
Engineering Test Institute, public enterprise, Hudcova 424/56b, 621 00 Brno, Czech Republic
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TŁUMACZENIE POŚWIADCZONE Z JĘZYKA ANGIELSKIEGO

[logo i tekst w j. obcym]
Instytut Badań Inżynierskich, Przedsiębiorstwo Państwowe, Brno, Republika Czeska

CERTYFIKAT Z TESTÓW
Numer **O-B-00694-22 wer. 1**

Klient	W&H ELECTRIC POLSKA Sp. z o.o. (Znak towarowy: BeGreen) ul. Biecka 21A 38-300 Gorlice POLSKA
Produkt	Zewnętrzna hybrydowa pompa ciepła powietrze/woda – typu split
Oznaczenie typu / Znak towarowy	**HAWM2001.240.IB08.H00.C11, HAWM2001.240.TB08.H00.C11** **HAWM2001.240.IB10.H00.C11, HAWM2001.240.TB10.H00.C11** **HAWM2001.240.IB12.H00.C11, HAWM2001.240.TB12.H00.C11** **HAWM2001.240.IB14.H00.C13, HAWM2001.240.TB14.H00.C13** **HAWM2001.240.IB17.H00.C13, HAWM2001.240.TB17.H00.C13**
Metody testu	ČSN EN 14825:2020
Podstawa wydania certyfikatu	Raporty z badania: 31-10708/3/T z dnia 2022-04-11, 31-10708/4/T z dnia 2022-04-11 Dokumenty techniczne W&H ELECTRIC POLSKA Sp. z o.o. (Znak towarowy: BeGreen)
Zastosowanie temperatury	**ŚREDNIA TEMPERATURA** (Referencyjna temperatura wody 55 °C)
Referencyjny sezon grzewczy	**„A" = średni / „W" = cieplejszy / „C" = zimniejszy** (Referencyjne warunki projektu dla ogrzewania $T_{designh}$ = -10 °C / +2 °C / -22 °C)

Specyfikacja warunków:

Kontrola prędkości kompresora	**Zmienna**	Przepustowość wody grzewczej (wewnętrzny wymiennik ciepła)	**Zmienna**
Temperatura wody wylotowej (wewnętrzny wymiennik ciepła)	**Zmienna**	Przepustowość źródłowego płynu (zewnętrzny wymiennik ciepła)	-
Funkcja	**Odwracalna**		

[czerwona, okrągła pieczęć o treści:] STROJÍRENSKÝ ZKUŠEBNÍ ÚSTAV, s.p. CZ 1

[tekst w j. obcym]
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[okrągły hologram]

[logo]

Wyniki:

Zastosowanie średniej temperatury
(Referencyjna temperatura wody 55 °C)

Nazwy modeli			HAWM2001.240.IB08.H00.C11, HAWM2001.240.TB 08.H00.C11	HAWM2001.240.IB10.H00.C11, HAWM2001.240.TB 10.H00.C11	HAWM2001.240.IB12.H00.C11, HAWM2001.240.TB 12.H00.C11	HAWM2001.240.IB14.H00.C13, HAWM2001.240.TB 14.H00.C13	HAWM2001.240.IB17.H00.C13, HAWM2001.240.TB 17.H00.C13
Jednostki zewnętrzne			**OU.H.071.A 11 IU.AWM150**	**OU.H.090.A 11 IU.AWM150**	**OU.H.105.A 11 IU.AWM150**	**OU.H.125.A 13 IU.AWM150**	**OU.H.160.A 13 IU.AWM150**
Jednostki wewnętrzne			**1.060.IB10. H00** (Nie zbadane)	**1.060.IB10. H00** (Nie zbadane)	**1.090.IB12. H00** (Zbadane)	**1.090.IB17. H00** (Nie zbadane)	**1.090.IB17. H00** (Zbadane)
Ogrzewanie przy pełnym obciążeniu	$P_{designh}$ [kW]	A	5,48	5,95	8,78	11,08	12,35
Temperatura przy wyłączonym kotle	$T_{fb,off}$ [°C]	A	-8	-7	-6	-8	-7
Sezonowy współczynnik wydajności	SCOP [-]	A	3,22	3,22	2,92	3,22	3,01
Sezonowa Wydajność ogrzewania przestrzeni	η_s [%]	A	125,7	125,8	113,6	125,8	117,4

(Zbadane) Próbka testowa została przetestowana w Laboratorium Badawczym.
(Nie zbadane) Dane techniczne zostały zadeklarowane przez Producenta zgodnie ze specyfikacją zakresu modelu i nie zostały zbadane przez Laboratorium Badawcze.
Inżynierski Instytut Badawczy, Przedsiębiorstwo Publiczne, potwierdza niniejszym Certyfikatem z Testów, że badanie danego produktu zostało przeprowadzone z wynikami podanymi powyżej. Instytut Badań Inżynierskich, Przedsiębiorstwo Publiczne, jest akredytowanym Laboratorium Badawczym 1045.1.

Brno, 2022-04-29

[odręczny podpis]
Milan Holomek
Kierownik Stacji Testów Sprzętu grzewczego i przyjaznego środowisku

[czerwona, okrągła pieczęć o treści:] STROJÍRENSKÝ ZKUŠEBNÍ ÚSTAV, s.p. CZ 1

- KONIEC CERTYFIKATU Z TESTÓW -

[tekst w j. obcym]
Instytut Badań Inżynierskich, przedsiębiorstwo państwowe, Hudcova 424/56b, 621 00 Brno, Republika Czeska
www.szutest.cz

Niniejszym poświadczam zgodność powyższego tłumaczenia ze skanem dokumentu w języku angielskim.
Magdalena Sezgin, tłumacz przysięgły języka angielskiego, wpisana na listę tłumaczy przysięgłych, prowadzoną przez Ministra Sprawiedliwości pod numerem TP/30/17.
Nr Repertorium 402/2024
Katowice, dnia 18 kwietnia 2024 r.

Wyjaśnienie do oświadczenia o identyfikacji modeli

Lista modeli obejmuje dwa typoszeregi i trzy podtypy: AirMaster 8, AirMaster 12, AirMaster 17 z których zgodnie z standardem EHPA były testowani podtypy Airmaster 12 model AWM1501.090.XB12.H00.C11 ta podtyp AirMaster 17 AWM1501.090.XB17.H00.C13

Do podtypu AirMaster 8 należą modele:

SOLA AirMaster 100, 150, 200:

AWM1001.060.XS08.H00.C11, AWM1001.060.XS10.H00.C11,
AWM1501.060.XS08.H00.C11, AWM1501.060.XS10.H00.C11,
HAWM2001.240.IS08.H00.C11, HAWM2001.240.IS10.H00.C11,
HAWM2001.240.TS08.H00.C11, HAWM2001.240.TS10.H00.C11

BeGreen AirMaster 100, 150, 200:

AWM1001.060.XB08.H00.C11, AWM1001.060.XB10.H00.C11,
AWM1501.060.XB08.H00.C11, AWM1501.060.XB10.H00.C11,
HAWM2001.240.IB08.H00.C11, HAWM2001.240.IB10.H00.C11,
HAWM2001.240.TB08.H00.C11, HAWM2001.240.TB10.H00.C11

Do podtypu Airmaster 12 należą modele:

SOLA AirMaster 100, 150, 200:

AWM1001.090.XS12.H00.C11, AWM1001.090.XS12.H00.C11,
HAWM2001.240.IS12.H00.C11, HAWM2001.240.TS12.H00.C11

BeGreen AirMaster 100, 150, 200:

AWM1001.090.XB12.H00.C11, AWM1001.090.XB12.H00.C11,
HAWM2001.240.IB12.H00.C11, HAWM2001.240.TB12.H00.C11

Do podtypu AirMaster 16 należą modele:

SOLA AirMaster 100, 150, 200:

AWM1001.090.XS14.H00.C13, AWM1001.090.XS17.H00.C13,
AWM1501.090.XS14.H00.C13, AWM1501.090.XS17.H00.C13,
HAWM2001.240.IS14.H00.C13, HAWM2001.240.IS17.H00.C13,
HAWM2001.240.TS14.H00.C13, HAWM2001.240.TS17.H00.C13

BeGreen AirMaster 100, 150, 200:

W&H ELECTRIC POLSKA Sp. z o.o.
ul. Biecka 21A, 38-300 GORLICE
POLAND NIP 7382165961

AWM1001.090.XB14.H00.C13, AWM1001.090.XB17.H00.C13,
AWM1501.090.XB14.H00.C13, AWM1501.090.XB17.H00.C13,
HAWM2001.240.IB14.H00.C13, HAWM2001.240.IB17.H00.C13,
HAWM2001.240.TB14.H00.C13, HAWM2001.240.TB17.H00.C13

Różnica między modelami polega w konstrukcję jednostek wewnętrznych:

AWM1001.0x0.Xxxx.H00.Cxx – model z manualnym panelem obsługi

AWM1501.0x0.Xxxx.H00.Cxx – model z dotykowym wyświetlaczem ta szklanym frontem

HAWM2001.240.Ixxx.H00.Cxx – model z dotykowym wyświetlaczem, szklanym frontem ta wbudowanym modułem gazowym z możliwością przygotowania cieplej wody w przeplywie.

HAWM2001.240.Txxx.H00.Cxx – model z dotykowym wyświetlaczem, szklanym frontem i wbudowanym modułem gazowym z możliwością dodatkowego dogrzewania zasobnika CWU.

Żadnej różnicy w budowie układów chłodniczych oprócz deklarowanej różnicy podtypów niema.

W&H ELECTRIC POLSKA Sp. z o.o.
ul. Biecka 21A, 38-300 GORLICE
POLAND NIP 7382165961

Dmytro Ghyshov

OŚWIADCZENIE

Producent **W&H Electric Polska sp. z o. o.** oświadcza, iż pompy ciepła:

AWM1501.090.XB14.H00.C13, AWM1501.090.XB17.H00.C13,

AWM1501.090.XS14.H00.C13, AWM1501.090.XS17.H00.C13,

AWM1001.090.XB14.H00.C13, AWM1001.090.XB17.H00.C13,

AWM1001.090.XS14.H00.C13, AWM1001.090.XS17.H00.C13,

HAWM2001.240.IB14.H00.C13, HAWM2001.240.IB17.H00.C13,

HAWM2001.240.TB14.H00.C13, HAWM2001.240.TB17.H00.C13,

HAWM2001.240.IS14.H00.C13, HAWM2001.240.IS17.H00.C13,

HAWM2001.240.TS14.H00.C13, HAWM2001.240.TS17.H00.C13

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.

Gorlice 02.04.24

Miejscowość, data

Podpis osoby upoważnionej

W&H ELECTRIC POLSKA Sp. z o.o.
ul. Biecka 21A, 38-300 GORLICE
POLAND NIP 7382165961

Strojírenský zkušební ústav, s.p., Brno, Česká republika
Engineering Test Institute, Public Enterprise, Brno, Czech Republic

TEST CERTIFICATE

Number **O-B-00650-22**

Customer	W&H ELECTRIC POLSKA Sp. z.o.o. (Trade Mark: BeGreen) ul. Biecka 21A 38-300 Gorlice POLAND
Product	Outdoor Air/water heat pump – split
Type designation / Trade mark	**AWM1501.090.XB17.H00.C13**
Test methods	ČSN EN 14511-2:2019, ČSN EN 14511-3:2019, ČSN EN 14825:2020, ČSN EN 12102-1:2018, EHPA Testing regulation – Testing of Air/Water Heat Pumps, version 2.4a
Basis of certificate	Test reports: 31-10708/2/T of 2022-04-08 31-10708/2/H of 2022-03-28 Technical documents of W&H ELECTRIC POLSKA Sp. z.o.o. (Trade Mark: BeGreen)
Reference heating season	**„A" = average** (Reference design temperature $T_{designh}$ = -10 °C)

Results:

LOW TEMPERATURE (Reference water temperature 35 °C)		**MEDIUM TEMPERATURE** (Reference water temperature 55 °C)
11.73	**$P_{designh}$ [kW]** … Full load heating	**12.35**
3.99	**SCOP [–]** … Seasonal coefficient of performance	**3.01**

Outdoor temperature T_j [°C]	Heating declared capacity P_{dh} [kW]	Coefficient of performance at the declared capacity COP_d [–]	Outdoor temperature T_j [°C]	Heating declared capacity P_{dh} [kW]	Coefficient of performance at the declared capacity COP_d [–]
T_j = -7	10.376	2.579	T_j = -7	10.927	1.964
T_j = +2	6.650	3.849	T_j = +2	7.236	2.997
T_j = +7	7.273	5.071	T_j = +7	6.314	3.616
T_j = +12	8.621	7.224	T_j = +12	7.946	5.425
T_j = TOL = -10	11.059	2.533	T_j = TOL = -10	8.306	1.487
T_j = $T_{bivalent}$ = -7	10.376	2.579	T_j = $T_{bivalent}$ = -7	10.927	1.964

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Engineering Test Institute, public enterprise, Hudcova 424/56b, 621 00 Brno, Czech Republic
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LOW TEMPERATURE (Reference water temperature 35 °C)				MEDIUM TEMPERATURE (Reference water temperature 55 °C)
Power consumption in modes other than „active mode“:				
18.3	Off mode	P_{OFF}	[W]	**18.3**
18.3	Thermostat off mode	P_{TO}	[W]	**18.3**
18.3	Standby mode	P_{SB}	[W]	**18.3**
0	Crankcase heater mode	P_{CK}	[W]	**0**
Annual electricity consumption for heating according to:				
6067	ČSN EN 14825:2020	Q_{HE}	[kWh]	**8478**
Seasonal Space heating energy efficiency				
156.8	ČSN EN 14825:2020	η_s	[%]	**117.4**
Liquid flow rate in outdoor heating exchanger:				
–	Source liquid	Min/Max	[m^3/h]	–
Liquid flow rate in indoor heating exchanger:				
0.900 / 2.400	Heating water	Min/Max	[m^3/h]	**0.900 / 2.400**

Sound power level at condition A7W55* (at 55 %):

OU.H.160.C13 – outdoor unit –	L_{WA}	70.8 ± 1.5	dB(A)	Accuracy class 2 (Engineering)
IU.AWM1501.090.XB17.H00 – indoor unit –	L_{WA}	41.3 ± 1.5	dB(A)	Accuracy class 2 (Engineering)

(*) Comment to abbreviated marking:
„A“ air, „7“ inlet temperature (dry-bulb temperature) in °C, „W“ water, „35“ outlet temperature in °C.

Specification of conditions:

Compressor speed control	**Variable**	Heating water volume flow rate (indoor heat exchanger)	**Variable**
Outlet water temperature (indoor heat exchanger)	**Variable**	Source liquid volume flow rate (outdoor heat exchanger)	–
Function	**Reversible**		

Engineering Test Institute, Public Enterprise, confirms by this Test Certificate that the testing of the product in question was performed with the results as stated above. Engineering Test Institute, Public Enterprise, is an accredited Testing Laboratory 1045.1.

Brno, 2022-04-29

Milan Holomek
Head of Heat and Environment-Friendly Equipment Test Station

– END OF TEST CERTIFICATE –

STROJÍRENSKÝ ZKUŠEBNÍ ÚSTAV, s.p. CZ 1

Strojírenský zkušební ústav, s.p., Hudcova 424/56b, 621 00 Brno, Česká republika
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