EOS systems entry into PHPP Guidance

Short guide on entering the EOS B ventilation and conditioning system into PHPP – this covers only the W-series using a hydronic coil in the air handling unit.

OVERVIEW:

Unit is a central MVHR which also contains a hydronic coil which can flow hot or cold water for heating and cooling/dehumidification. As there is a single coil only heating OR cooling can be done, and the sensible/latent capacity is fixed as there is no re-heat. Dehumidification is the latent cooling that occurs for the coil temperature and air conditions and cannot be specifically controlled.

IMPORTANT NOTES:

1. Please ensure all variants sold in NZ have the 13.6 Free-cooling module (summer bypass) installed
2. Sound levels of the case are 52 dB(A) at max flow this will require sound isolation of the unit from the living space or have the typical flow setting well below the maximum.
3. It is highly likely that the sound supply silencer is required in all Passive House installations. The design sound levels from the Passive House Certification Standard are 25dB(A) in the supply spaces and 30dB(A) in the extract spaces. I'd expect large acoustic attenuators would be required on the supply side (estimate 1.2m long). For reference a soft whisper is around 30 dB(A).
4. At the higher recirculation + fresh air rates for the EOS3 and EOS6 the sound levels should be designed to meet the PHI limit of 25dB(A). Some exceedance on the hottest or coldest days could be agreed with the building occupants but high sounds levels are not well accepted by PH clients.
5. To provide cooling the air-to-water heat pump needs to be able to provide chilled water. This requires a reversing valve internally and this needs to be specified as not all of the air-to-water heat pumps have this feature. You can order the air-to-water HP in all the sizes (from Warmth.nz) to have cooling but it's a special order (overseas with possibly several months wait). The CGKS7HC and several others have the cooling as standard.

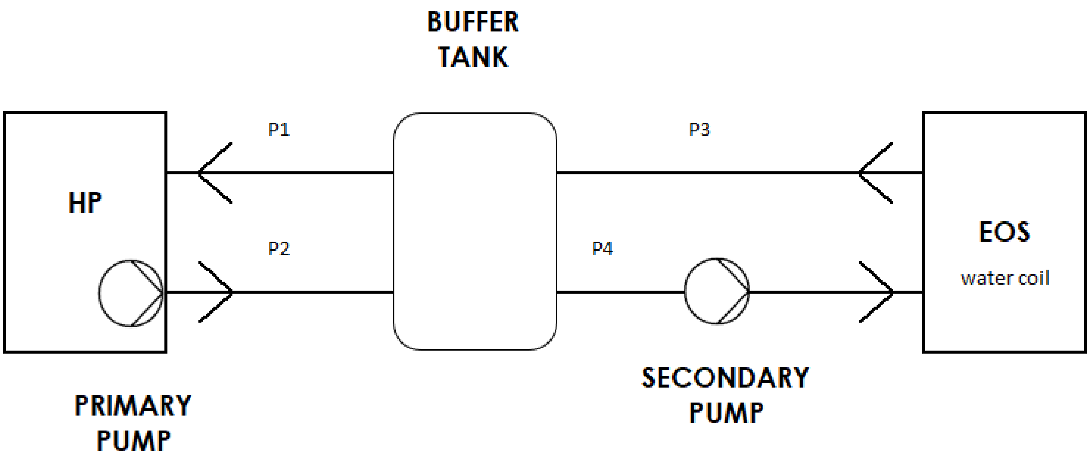


Figure 1: Typical system note the buffer tank can be inside or outside of the thermal envelope.

PHPP entry

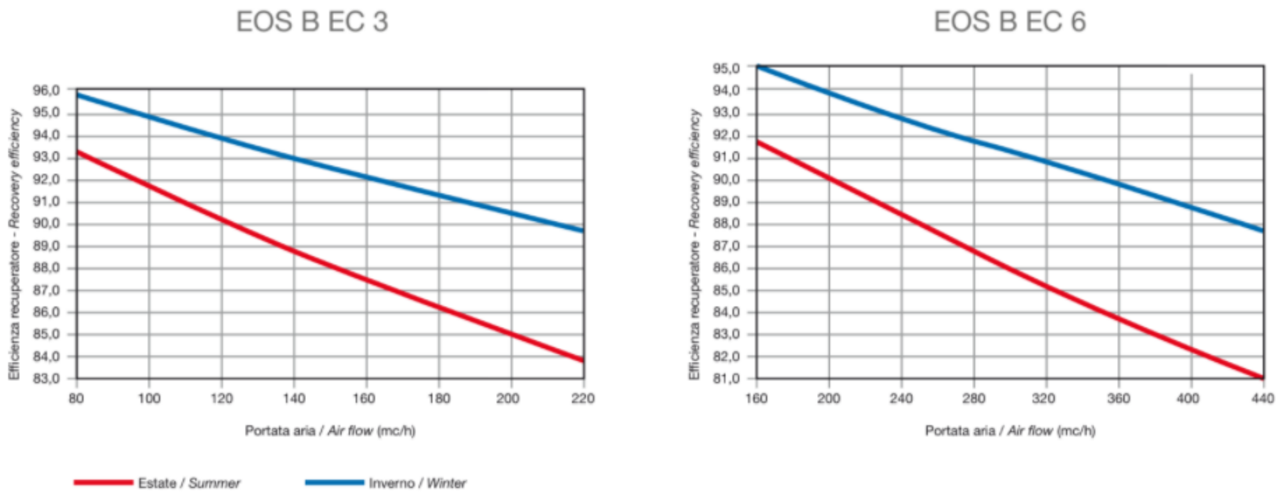
MVHR PERFORMANCE PER EMAIL 20210317 WITH PHI

Position:

The EOS B 3 from Aertesi S.r.L., Viale della Tecnica, 6, 35026 Conselve (PD) Italy can be used in Certified PH **with a heat recovery efficiency of 75% at 123 m3/hr airflow.**

Electrical consumption of the MVHR fans should be set to 0.90 Wh / m³ for design and can be measured during commissioning at the nominal flow rate. Due to inaccuracies in measurements on the construction site (air flows, electrical power), no lower values than 0.45 Wh / m³ should be used for certification.

For other flow rates and the EOS B 6 you can use the winter heat recovery discounted by 19% and the same assumption for the electrical consumption.



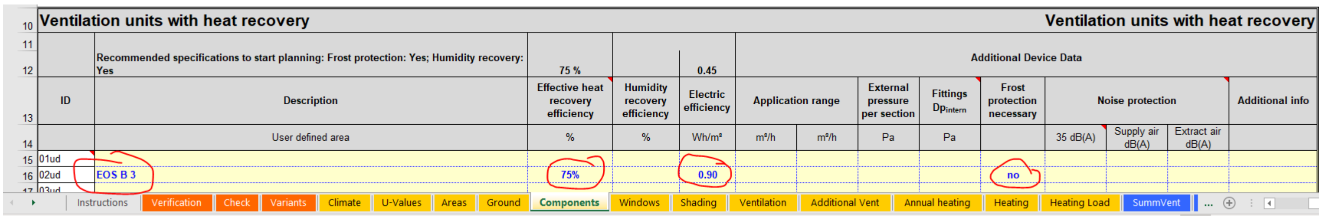
<u>Why:</u>

The primary reason for this lowering of the calculated efficiency is that we have no information regarding the thermal insulation and the leakage (internal / external).

We will note in the Certification Booklet to the client the below:

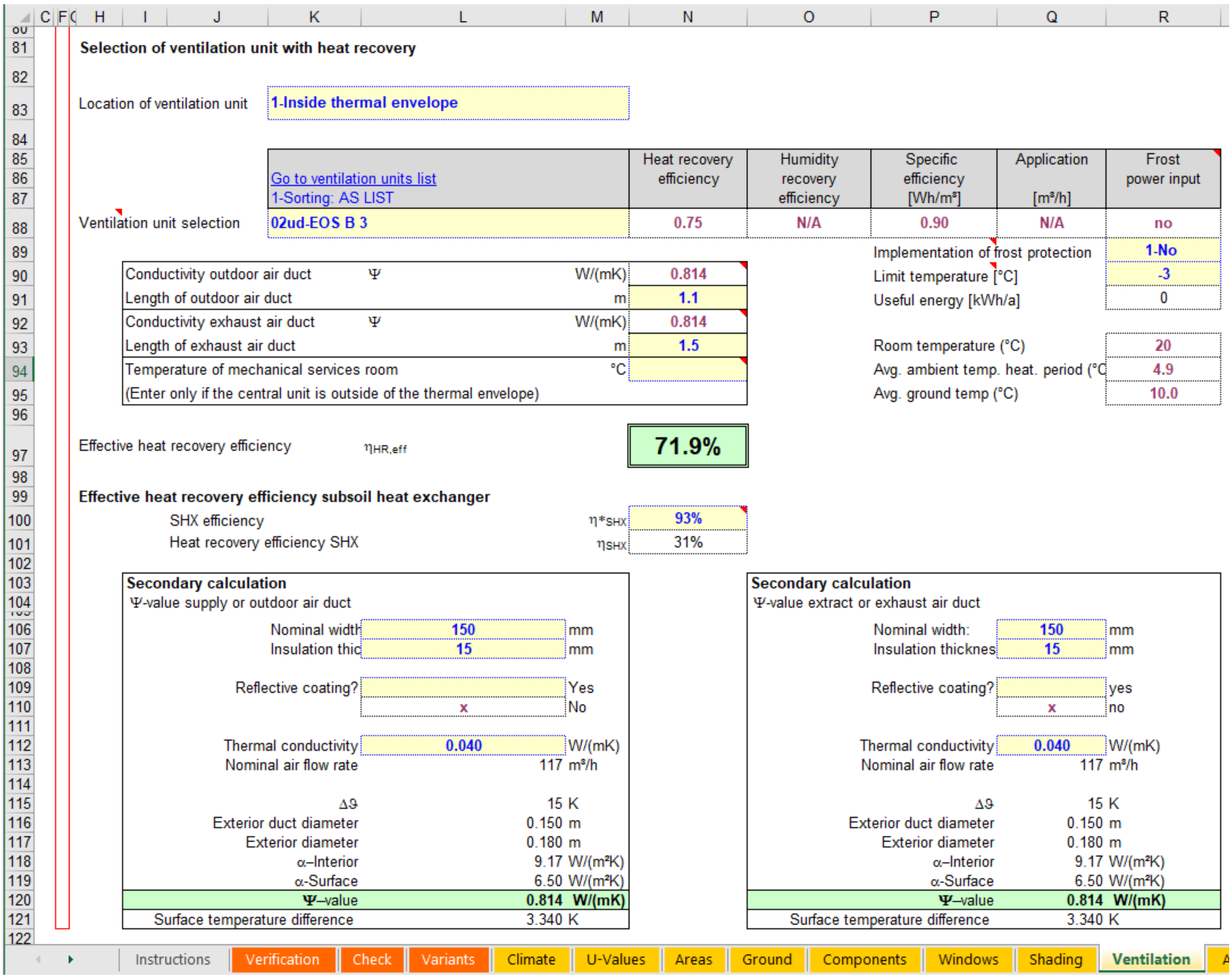
Important information for certification
Note in the certification booklet that a non PHI certified ventilation unit was used and that the values for the HR and the electrical efficiency in the energy balance are an estimate based on the manufacturer's data. The certifier assumes no liability for this

MVHR IMPLEMENTATION IN PHPP



Ventilation units with heat recovery													Ventilation units with heat recovery
	Recommended specifications to start planning: Frost protection: Yes; Humidity recovery: Yes	75 %		0.45	Additional Device Data								
ID	Description	Effective heat recovery efficiency	Humidity recovery efficiency	Electric efficiency	Application range		External pressure per section	Fittings Dp intern	Frost protection necessary	Noise protection			Additional info
	User defined area	%	%	Wh/m³	m³/h	m³/h	Pa	Pa		35 dB(A)	Supply air dB(A)	Extract air dB(A)	
01ud													
02ud	EOS B 3	75%		0.90					no				

Figure 2: Entries on components sheet.



Selection of ventilation unit with heat recovery

Location of ventilation unit: 1-Inside thermal envelope

		Heat recovery efficiency	Humidity recovery efficiency	Specific efficiency [Wh/m³]	Application [m³/h]	Frost power input
	Go to ventilation units list 1-Sorting: AS LIST					
Ventilation unit selection	02ud-EOS B 3	0.75	N/A	0.90	N/A	no

Conductivity outdoor air duct	Ψ	W/(mK)	0.814
Length of outdoor air duct		m	1.1
Conductivity exhaust air duct	Ψ	W/(mK)	0.814
Length of exhaust air duct		m	1.5
Temperature of mechanical services room		°C	
(Enter only if the central unit is outside of the thermal envelope)			

Implementation of frost protection	1-No
Limit temperature [°C]	-3
Useful energy [kWh/a]	0
Room temperature (°C)	20
Avg. ambient temp. heat. period (°C	4.9
Avg. ground temp (°C)	10.0

Effective heat recovery efficiency $\eta_{HR,eff}$ **71.9%**

Effective heat recovery efficiency subsoil heat exchanger

SHX efficiency	η^*_{SHX}	93%
Heat recovery efficiency SHX	η_{SHX}	31%

Secondary calculation

Ψ-value supply or outdoor air duct

Nominal width	150	mm
Insulation thic	15	mm
Reflective coating?		Yes
	x	No
Thermal conductivity	0.040	W/(mK)
Nominal air flow rate	117	m³/h
Δϑ	15	K
Exterior duct diameter	0.150	m
Exterior diameter	0.180	m
α–Interior	9.17	W/(m²K)
α-Surface	6.50	W/(m²K)
Ψ–value	**0.814**	**W/(mK)**
Surface temperature difference	3.340	K

Secondary calculation

Ψ-value extract or exhaust air duct

Nominal width:	150	mm
Insulation thicknes	15	mm
Reflective coating?		yes
	x	no
Thermal conductivity	0.040	W/(mK)
Nominal air flow rate	117	m³/h
Δϑ	15	K
Exterior duct diameter	0.150	m
Exterior diameter	0.180	m
α–Interior	9.17	W/(m²K)
α-Surface	6.50	W/(m²K)
Ψ–value	**0.814**	**W/(mK)**
Surface temperature difference	3.340	K

Instructions | Verification | Check | Variants | Climate | U-Values | Areas | Ground | Components | Windows | Shading | Ventilation

Figure 3: Ventilation sheet entries.

COOLING

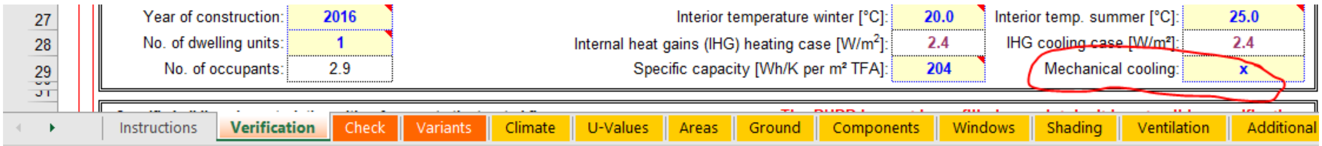


Figure 4: Active mechanical cooling on Verification Sheet.

On Cooling Units sheet you have recirculation cooling NOT supply air or Additional Dehumidification.

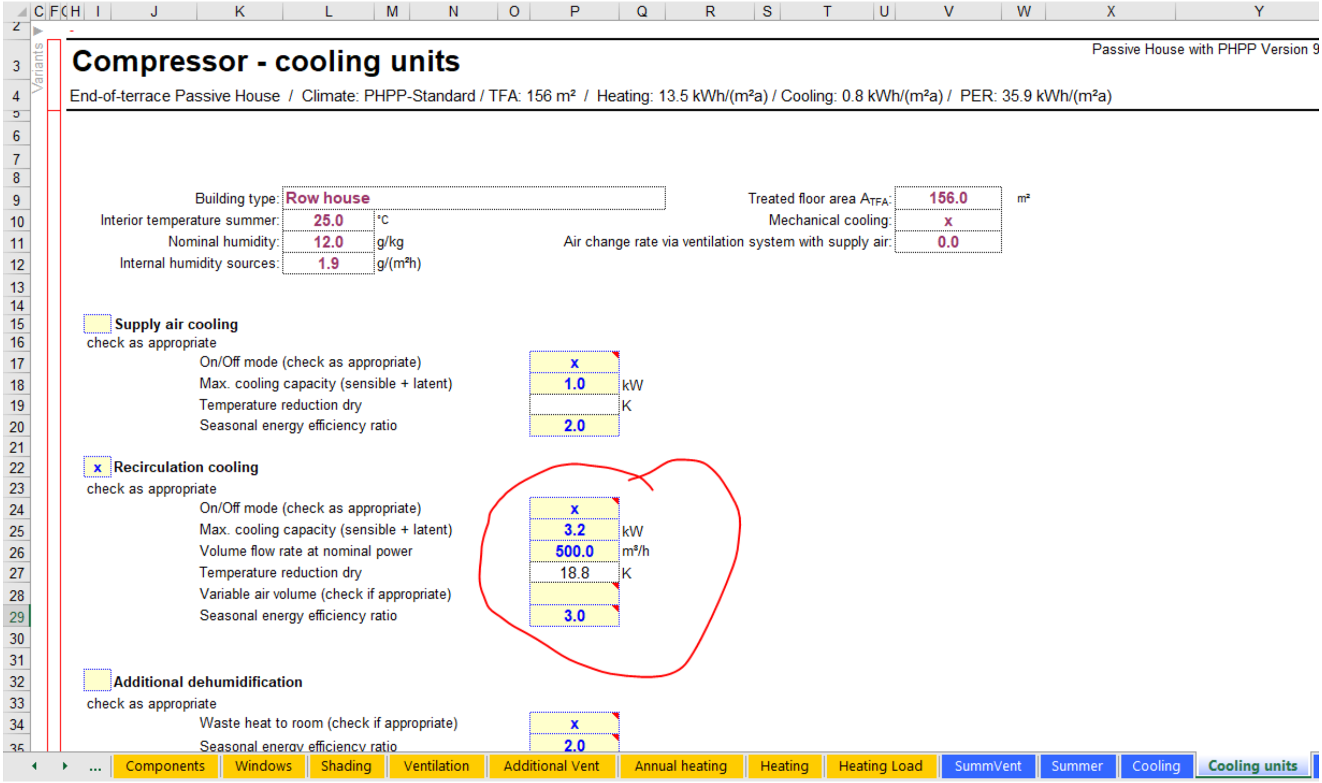
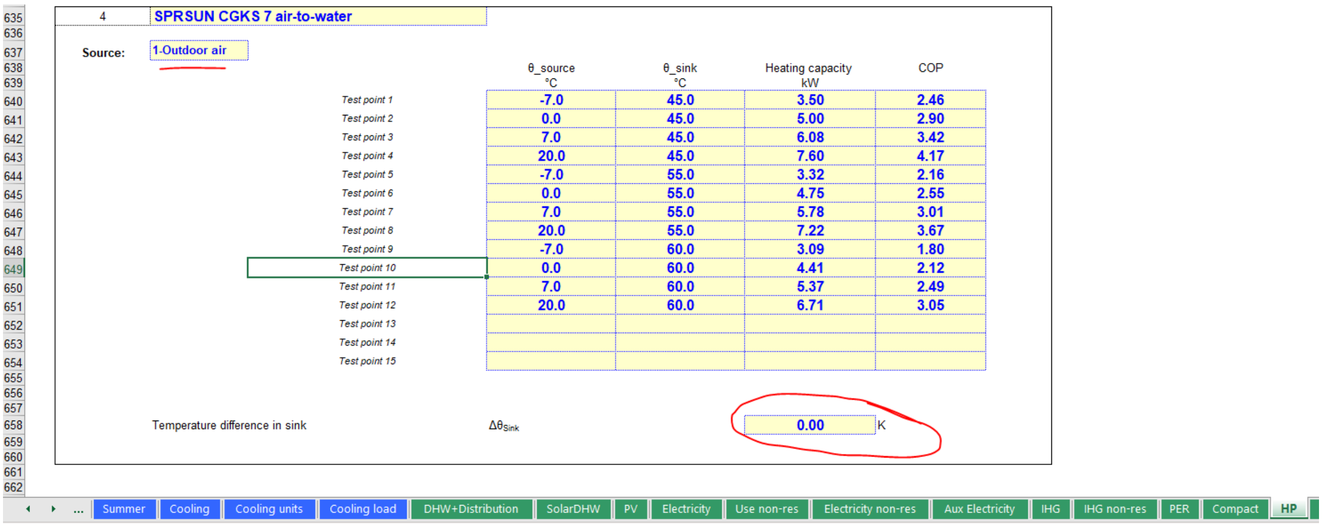


Figure 5: Add recirculation cooling on Cooling Units sheet. Set Max cooling capacity to 3.2kW for EOS 3 or 6.3kW for EOS 6. This is set by the cooling coil capacity and assumes the air-to-water heat pump is sized to this level. Set Volume flow rate to EOS max airflow. This is 500m3/hr for EOS3 or 1000m3/hr for EOS6. The Seasonal energy efficiency ration is hard to estimate without test data but SEER= 3 should be reasonably conservative for NZ.

HEATING – AIR-TO-WATER HEAT PUMP COP CURVES



	θ_source °C	θ_sink °C	Heating capacity kW	COP
Test point 1	-7.0	45.0	3.50	2.46
Test point 2	0.0	45.0	5.00	2.90
Test point 3	7.0	45.0	6.08	3.42
Test point 4	20.0	45.0	7.60	4.17
Test point 5	-7.0	55.0	3.32	2.16
Test point 6	0.0	55.0	4.75	2.55
Test point 7	7.0	55.0	5.78	3.01
Test point 8	20.0	55.0	7.22	3.67
Test point 9	-7.0	60.0	3.09	1.80
Test point 10	0.0	60.0	4.41	2.12
Test point 11	7.0	60.0	5.37	2.49
Test point 12	20.0	60.0	6.71	3.05
Test point 13				
Test point 14				
Test point 15				

Figure 6: On HP worksheet. Enter COP and Heating Capacity from the technical data sheet. Example here for the SPRSUN CGKS 7. Note Temperature difference in sink set to zero.

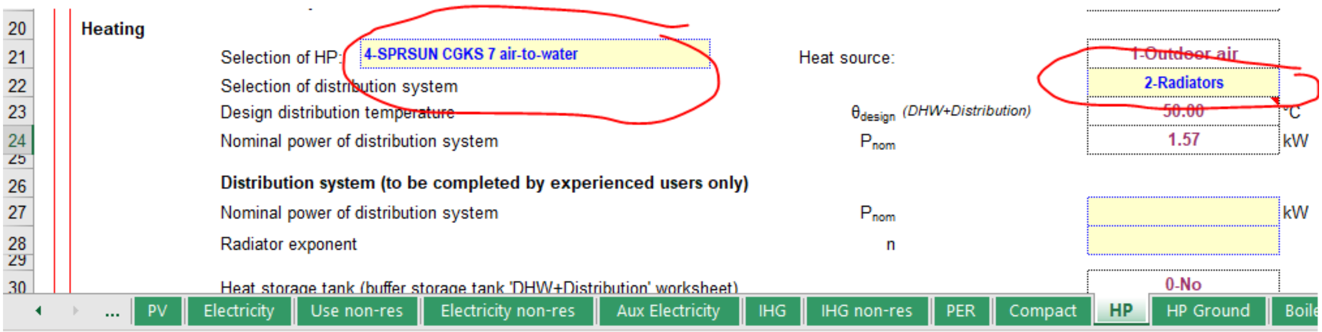


Figure 7: Also on HP worksheet select the entered air-to-water HP data you entered and then set to radiators. This is because you can flow more air than the supply air capacity with the EOS systems.

Set Design forward flow temperature to match the capacity of the water coil in the EOS system.

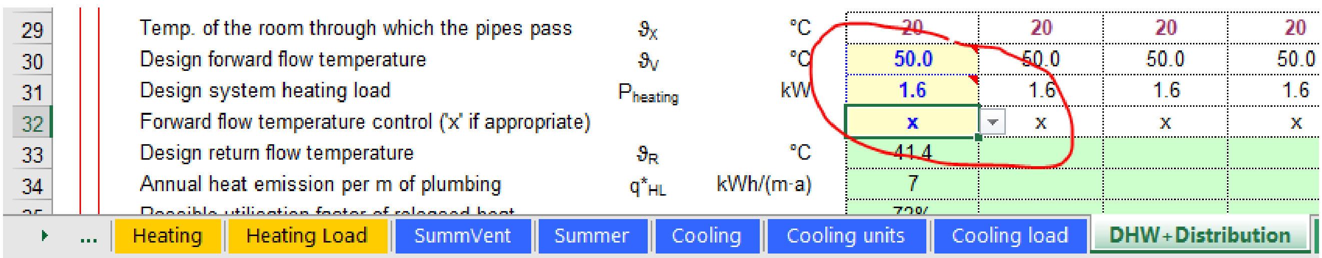
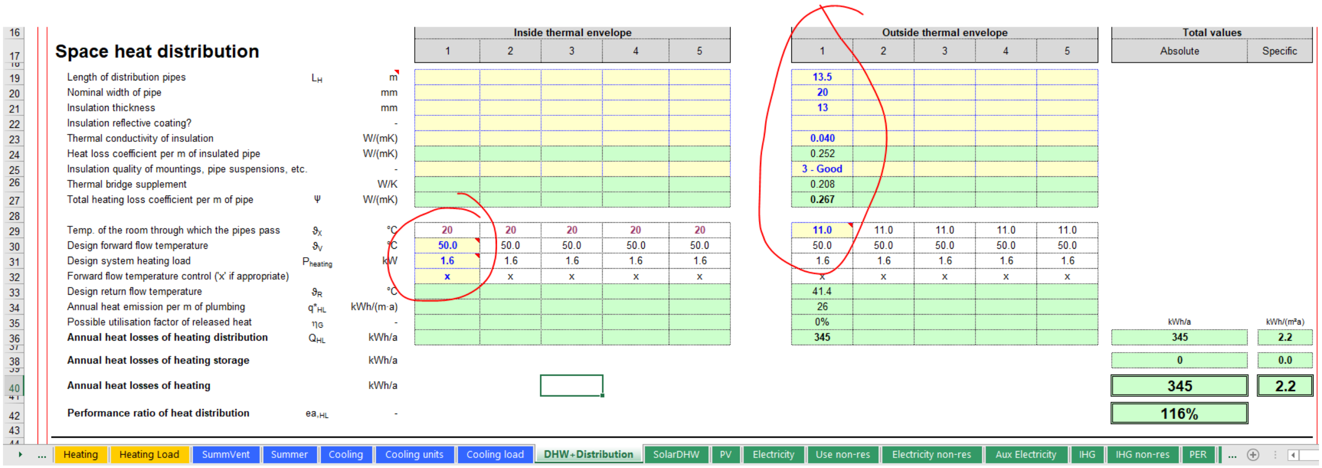


Figure 8: On DHW+Distribution sheet set the Design forward flow temperature in cell J30 to 50C as this is the coil temperature. Set the Design system heating load to the Heating Load worksheet cell Q90/1000.

Set the piping heat losses; This is only for the piping between the buffer tank and the air-to-water heat pump. And the small amount of piping from the buffer tank to the thermal envelope. The remainder of piping only has hot water in it when the EOS is heating the home so that losses here provide useful heat. They should still have minimal insulation so that if they distribute cold water there are no condensation issues on the piping.



	Space heat distribution			Inside thermal envelope 1	2	3	4	5	Outside thermal envelope 1	2	3	4	5	Total values Absolute	Specific
19	Length of distribution pipes	L_H	m						13.5						
20	Nominal width of pipe		mm						20						
21	Insulation thickness		mm						13						
22	Insulation reflective coating?		-												
23	Thermal conductivity of insulation		W/(mK)						0.040						
24	Heat loss coefficient per m of insulated pipe		W/(mK)						0.252						
25	Insulation quality of mountings, pipe suspensions, etc.		-						3 - Good						
26	Thermal bridge supplement		W/K						0.208						
27	Total heating loss coefficient per m of pipe	Ψ	W/(mK)						0.267						
28															
29	Temp. of the room through which the pipes pass	ϑ_X	°C	20	20	20	20	20	11.0	11.0	11.0	11.0	11.0		
30	Design forward flow temperature	ϑ_V	°C	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0		
31	Design system heating load	$P_{heating}$	kW	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6		
32	Forward flow temperature control ('x' if appropriate)			x	x	x	x	x	x	x	x	x	x		
33	Design return flow temperature	ϑ_R	°C						41.4						
34	Annual heat emission per m of plumbing	q^*_{HL}	kWh/(m·a)						26						
35	Possible utilisation factor of released heat	η_G	-						0%					kWh/a	kWh/(m²a)
36	**Annual heat losses of heating distribution**	Q_{HL}	kWh/a						345					345	2.2
38	**Annual heat losses of heating storage**		kWh/a											0	0.0
40	**Annual heat losses of heating**		kWh/a											345	2.2
42	**Performance ratio of heat distribution**	$ea_{,HL}$	-											116%	

Figure 9: Length of pipes outside the thermal envelope. This includes to/from the air-to-water heat pump and to/from the storage buffer tank if this is outside the thermal envelope. Also the length of pipe to/from the EOS water coil from the storage buffer tank ***outside*** the thermal envelope.

Set buffer tank losses. Convert for storage tank data sheet from kWh/day to W/K losses. Process and data shown here:

https://sustainableengineering.co.nz/dhw-tanks-w-k-from-kwh-day/

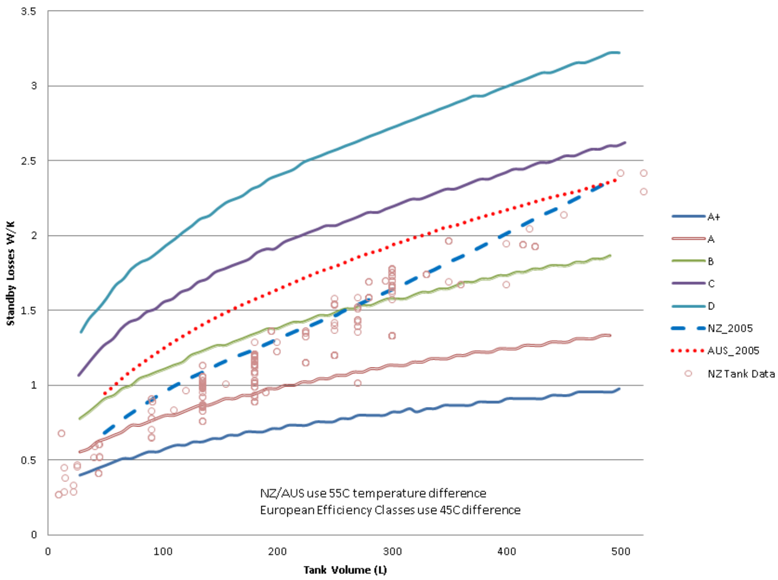
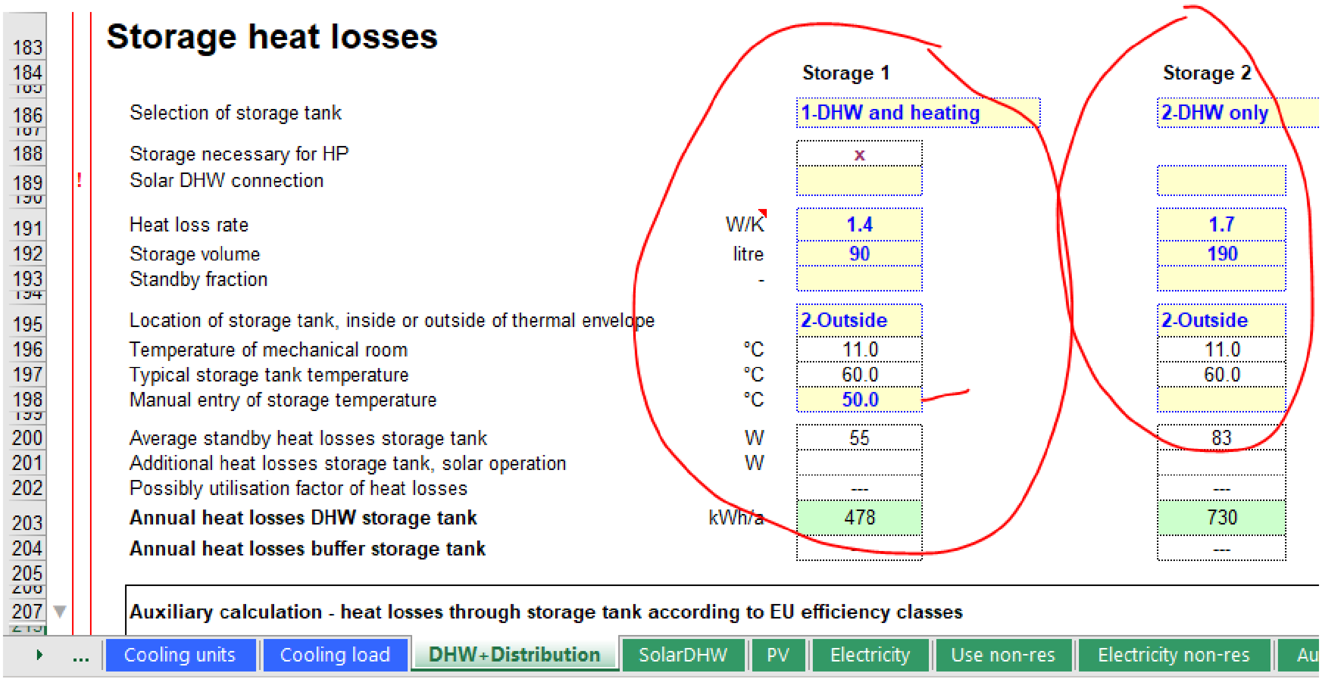


Figure 10: Assuming a 90L buffer tank the W/K standby losses would be approximately 0.9 W/K then add fitting losses per that URL for excellent fitting insulation quality this is an additional 0.5 W/K for a total of 1.4 W/K of losses.



Storage heat losses

			Storage 1	Storage 2
186	Selection of storage tank		1-DHW and heating	2-DHW only
188	Storage necessary for HP		x	
189	Solar DHW connection			
191	Heat loss rate	W/K	1.4	1.7
192	Storage volume	litre	90	190
193	Standby fraction	-		
195	Location of storage tank, inside or outside of thermal envelope		2-Outside	2-Outside
196	Temperature of mechanical room	°C	11.0	11.0
197	Typical storage tank temperature	°C	60.0	60.0
198	Manual entry of storage temperature	°C	50.0	
200	Average standby heat losses storage tank	W	55	83
201	Additional heat losses storage tank, solar operation	W		
202	Possibly utilisation factor of heat losses		---	---
203	**Annual heat losses DHW storage tank**	kWh/a	478	730
204	**Annual heat losses buffer storage tank**			---

207 **Auxiliary calculation - heat losses through storage tank according to EU efficiency classes**

Cooling units | Cooling load | DHW+Distribution | SolarDHW | PV | Electricity | Use non-res | Electricity non-res | Au

Figure 11: Buffer tank for heating in Storage 1; If separate tank for DHW put in Storage 2. Don't forget if there are two tanks to set the storage temperature for the heating system only tank to 50C.

	P	Q	R	S	T	U	V	W	X
8	**Selection of heat generation system(s)**			**Contribution margin (useful energy**					Project
9	**Primary heat generation type**			**Heating**	**DHW**	**Addl. input in following worksheets**		Heating demand incl. distrib	
10	2-Heat pump(s)			100%	100%	HP, possibly HP ground			Cooling energ
11	**Secondary heat generation type (optional & different)**								DHW c
12	-			0%	0%	-			
13									
14	**Energy demand**	**Efficiency**		**Final energy**		**PER**			
15	**Reference: Treated floor area**	Calculation	User defined value	Contribution (final energy)	**Final energy demand**	PER factor	Effective PER factor (including biomass	**PER specific value**	PE fa
16		-	-		kWh/(m²a)	kWh/kWh	kWh/kWh	kWh/(m²a)	kWh/
17									1-PE factors Certification
18								**41.7**	
19									
20	**Heating**			100%			1.34	**14.7**	1.8
21	Electricity (HP compact unit)					1.80			1.8
22	Electricity (heat pump)	2.28		100%	6.9	1.80	1.10	7.6	1.8
23	District heating: 20-Gas CHP (small) 70% CHP					0.85|1.39|1.01			0.7
24	Wood and other biomass					1.10			-
25	Natural gas / RE gas					1.75			1.7
26	Heating oil / RE methanol					2.30			1.7
27	Solar thermal system								0.0
28	Electricity (direct)					1.80			1.8
29	Other								
30	Aux. electricity (heating, wintertime ventilation)				4.1	1.80	1.74	7.1	1.8
31									
32	**Cooling and dehumidification**					1.10		**0.4**	
33	Electricity cooling (heat pump)	3.00			0.3	1.10		0.4	1.8
34	Auxiliary electricity cooling, ventilation summer					1.10			1.8
35	Electricity dehumidification (heat pump)					1.15			1.8
36	Auxiliary electricity (dehumidification)					1.15			1.8
37									
38	**DHW generation**			100%			1.30	**16.3**	1.8
39	Electricity (HP compact unit)					1.30			1.8
40	Electricity (heat pump)	2.10		100%	12.4	1.30	1.30	16.1	1.8
41	District heating: 20-Gas CHP (small) 70% CHP					0.85|1.39|1.01			0.7
42	Wood and other biomass					1.10			-

Cooling load | DHW+Distribution | SolarDHW | PV | Electricity | Use non-res | Electricity non-res | Aux Electricity | IHG | IHG non-res | PER

Figure 12: On PER worksheet set the heating system to Heat Pump. Notice the COP is 2.28 for the overall heat pump and EOS system including all the losses. Somewhere a bit over 2 is typical.

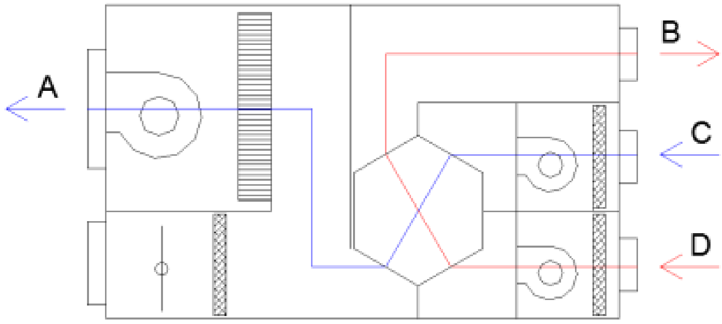
Sustainable Engineering Ltd

EOS TECHNICAL NOTES

5-OPERATING MODES

5.1 RENEWAL

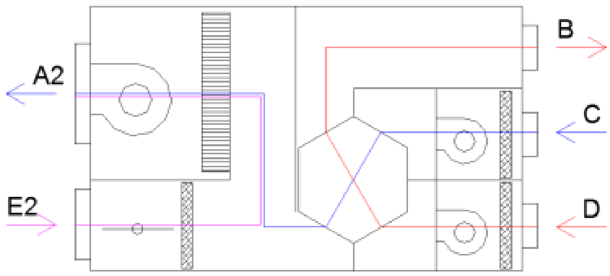
In this mode, the coil is not active. The delivery air is 100% renewal air and it is treated exclusively by flowing through the recovery unit.



Mode 5.2 without renewal is not typically used in a Passive House as you would always want fresh air when you are conditioning (ie windows closed).

5.3 RENEWAL WITH RECIRCULATION AND THERMAL INTEGRATION

In this mode, the coil is active. The delivery air is a mixture of renewal air (treated by flowing through the recovery unit) and recirculation air. Before it is supplied to the room the air is treated by the coil where, depending on requirements, it is heated or dehumidified and/or cooled.



		EOS 3	EOS 6
A	Room delivery (in renewal only)	200m3/h	400m3/h
A1	Room delivery (in recirculation only)	500m3/h	1000m3/h
A2	Room delivery (in renewal+recirculation)	500m3/h	1000m3/h
B	Exhaust	200m3/h	400m3/h
C	Outside air intake	200m3/h	400m3/h
D	Stale air return	200m3/h	400m3/h
E1	Recirculation air return (in recirculation only)	500m3/h	1000m3/h
E2	Recirculation air return (in renewal+recirculation)	300m3/h	600m3/h

7-TECHNICAL DATA

GENERAL TECHNICAL SPECIFICATIONS		EOS 3 W / DE	EOS 6 W / DE
Recovery unit nominal efficiency in summer (1)	%	85.0	82.3
Recovery unit nominal efficiency in winter (2)	%	90.5	88.7
Outside air flow rate (nominal)	m3/h	200	400
Delivery air flow rate in renewal only (nominal)	m3/h	200	400
Delivery air flow rate in recirculation only (nominal)	m3/h	500	1000
Delivery air flow rate in renewal+recirculation (nominal)	m3/h	500	1000
Sound power (*)	dB(A)	52	56
Power supply	V-Hz	230V-50Hz	
Maximum absorbed current/power	A-W	2.3A – 270W	4.2A – 510W
Weight of horizontal version (H)	kg	50	65
Weight of vertical version (V)	kg	55	70

(*) Casing-radiated, measured at the reference flow rate and 50Pa (as defined by regulation EU 1253/2014)
Performance values are referred to the following conditions:
(1) Room air 27°C, 50%RH; Outside air 35°C, 50%RH
(2) Room air 20°C, 50%RH; Outside air -5°C, 80%RH

TECHNICAL SPECIFICATIONS WATER VERSION		EOS 3 W	EOS 6 W
Total cooling capacity (3)	kW	3.2	6.3
Sensible cooling capacity (3)	kW	2.4	4.7
Coil water flow rate (3)	l/h	550	1080
Hydraulic circuit pressure drops (3)	kPa	13	12
Heating capacity (4)	kW	4.0	8.0
Hydraulic circuit pressure drops (4)	kPa	11	10

Performance values are referred to the following conditions:
Nominal air flow rate (see previous table)
(3) Room air 27°C, 47%RH; inlet/outlet water 7-12°C
(4) Room air 20°C, 50%RH; inlet water 50°C and same flow rate of condition (1)

Reference from manual "AER.MT.EOSB.GB.005.04.20.pdf" pages 10-11, 13.

HEAT PUMP TECHNICAL DATA:

warmth.nz
underfloor heating

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CGKS 3.5H Air-to-water Heat Pump

MITSUBISHI
COMPRESSOR

SPRSUN air-to-water heat pump CGKS 3.5

Please check availability

Download Specs

$3,646.00 incl. GST

Description | **Specifications**

- With 3.13kw heating capacity, input power 0.73kw (A7/W35)
- 240V/50HZ/1PH
- With R410a refrigerant
- Mitsubishi rotary compressor
- Stainless steel case
- Built-in bronze body circulation pump
- Single heating mode
- GST incl.

SPRSUN CGKS 3.5 air to water heat pump (Heating series)

Model	Unit	CGKS 3.5
Power supply	V	220V～240V/50Hz/1ph
Refrigerant		R410A
Heating capacity	KW	3.13
Input power	(A7/W35)	0.73
COP(A7/W35)		4.27
Heating capacity	KW	3.61
Input power	(A20/W55)	0.98
COP(A20/W55)		3.67
Rated current	A	4.6
Fan motor power	W	30
Fan motor quantity	Piece	1
Condenser		Tube in shell heat exchanger
Water flow	L/h	726
Water pressure drop	Kpa	≤15
Net weight	kg	40
Gross weight	kg	45
Noise	db	42
Classification of waterproof		IPX4
Electric shock proof grade		I
Pipe size (internal thread)	mm	DN20
Dimension	mm	970*300*550
Packing dimension	mm	1040*330*580
Compressor model/quantity		Mitsubishi Rotary KN104V
Water pump		Wilo RS15-6
●Rated working condition: dry-bulb temp: 20°C, wet-bulb temp: 15°C, cool water temp: 15°C, hot water temp: 55 °C.		

Heating capacity at different working condition (KW)				
Air temp ℃	Outlet water temperature ℃			
	W 35	W45	W55	W60
A -7	1.80	1.75	1.66	1.54
A 0	2.57	2.50	2.37	2.21
A 2	2.77	2.69	2.55	2.37
A 5	2.97	2.89	2.74	2.55
A 7	3.13	3.04	2.89	2.69
A 12	3.52	3.42	3.25	3.02
A 20	3.91	3.80	3.61	3.36

COP				
Air temp ℃	Outlet water temperature ℃			
	W 35	W45	W55	W60
A -7	3.07	2.46	2.16	1.80
A 0	3.85	2.90	2.55	2.12
A 2	4.07	3.08	2.71	2.25
A 5	4.26	3.28	2.89	2.39
A 7	4.27	3.42	3.01	2.49
A 12	4.74	3.79	3.34	2.77
A 20	5.13	4.17	3.67	3.05

Figure 13: Note as it is a heating series air-to-water heat pump. You can order the air-to-water HP in all the sizes to have cooling but it's a special order (overseas several months wait). The CGKS7HC and several others have the cooling as standard..

SPRSUN AIR-TO-WATER HEAT PUMPS

CGKS RANGE

Model		CGKS 3.5	CGKS 5.5	CGKS 7	CGKS 9
Image					
Features		Mitsubishi or Panasonic compressor Forced defrosting function Automatic multiple protection and breakdown High efficiency shell and tube water heat exchanger			
Heating Capacity (kW)	A7/W35	**3.13**	**4.53**	**6.26**	**7.58**
Input Power (kW)		0.73	1.06	1.47	1.78
C.O.P (kW/kW)		4.27	4.27	4.27	4.27
Heating Capacity (kW)	A20/W55	**3.80**	**5.50**	**7.60**	**9.20**
Input Power (kW)		0.92	1.33	1.84	2.23
C.O.P (kW/kW)		4.13	4.13	4.13	4.13
Cooling Capacity (kW)	A35/W7	**2.50**	**3.30**	**4.90**	**6.00**
Input Power (kW)		0.92	1.21	1.82	2.20
E.E.R (kW/kW)		2.68	2.72	2.72	2.72
Capacitor (uf)		25	30	50	60
Rated Current (A)		4.6	6.7	9.3	11.3
Max Current (A)		6.2	9.1	12.5	15.2
Power Supply (V/Hz/Ph)		220-240/50/1			
Compressor		Mitsubishi Rotary			Panasonic Rotary
Refrigerant		R410A			
Circulation Pumps		Bronze Body, Built-in			
Heat Exchanger		Tube in shell			
Casing		Powder Coating			
Water Pressure Drop (kPa)		15	18	25	27
Piping Connection (mm)		20	20	20	20
Water Flow (L/h)		726	1051	1452	1758
Noise Level (dB)		42	42	45	45
Net Dimension (mm)(L×D×H)		970*300*550	970*300*550	1006*350*618	1006*350*618
Packing Dimension (mm)(L×D×H)		1040*330*580	1040*330*580	1070*380*650	1070*380*650
Net Weight (Kg)		40	46	55	62
Gross Weight (Kg)		45	52	57	65

Figure 14: Note cooling capacity and COP is specified at 35˚C air and 7˚C water temperatures.

SPRSUN CGKS 7 air to water heat pump (Heating series)

Model	Unit	CGKS 7
Power supply	V	220V～240V/50Hz/1ph
Refrigerant		R410A
Heating capacity	KW (A7/W35)	6.26
Input power		1.47
COP(A7/W35)		4.27
Heating capacity	KW (A20/W55)	7.22
Input power		1.97
COP(A20/W55)		3.67
Rated current	A	9.3
Fan motor power	W	40
Fan motor quantity	Piece	1
Condenser		Tube in shell heat exchanger
Water flow	L/h	1452
Water pressure drop	Kpa	⩽25
Net weight	kg	55
Gross weight	kg	57
Noise	db	45
Classification of waterproof		IPX4
Electric shock proof grade		I
Pipe size (internal thread)	mm	DN20
Dimension	mm	1006*350*618
Packing dimension	mm	1070*380*650
Compressor model/quantity		Mitsubishi Rotary RN222V
Water pump		Wilo RS15-6
●Rated working condition: dry-bulb temp: 20℃, wet-bulb temp: 15℃, cool water temp: 15℃, hot water temp: 55 ℃.		

Heating capacity at different working condition (KW)				
Air temp ℃	Outlet water temperature ℃			
	W 35	W45	W55	W60
A -7	3.60	3.50	3.32	3.09
A 0	5.15	5.00	4.75	4.41
A 2	5.53	5.37	5.10	4.75
A 5	5.95	5.78	5.49	5.10
A 7	6.26	6.08	5.78	5.37
A 12	7.05	6.84	6.50	6.04
A 20	7.83	7.60	7.22	6.71

COP				
Air temp ℃	Outlet water temperature ℃			
	W 35	W45	W55	W60
A -7	3.07	2.46	2.16	1.80
A 0	3.85	2.90	2.55	2.12
A 2	4.07	3.08	2.71	2.25
A 5	4.26	3.28	2.89	2.39
A 7	4.27	3.42	3.01	2.49
A 12	4.74	3.79	3.34	2.77
A 20	5.13	4.17	3.67	3.05

Figure 15: Example heating COP / Capacity versus air and water temperatures.