New software (EXE & DLL)

The **neutral HES software** includes 9 applications, that can be downloaded, installed and tested by www.zcs.ch for 30 days free of charge without restrictions. After opening, a gray window will appear, where you just have to click on the **Register Later** button. After purchasing the software, it will be unlocked and the gray window will no longer appear.

1. Fin coil air Heaters
2. Fin coil air Coolers
3. Fin coil condensers
4. Fin coil injection evaporators

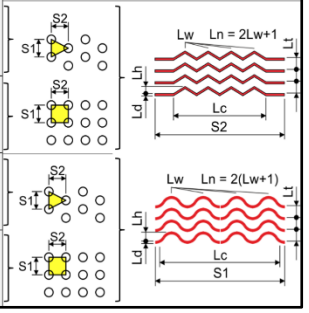
5. Heat recovery system CCSB
6. Heat recovery system CCSD
7. Heat recovery system CCSF

8. Coupling for positions 1 to 4
9. Coupling for positions 5 to 7

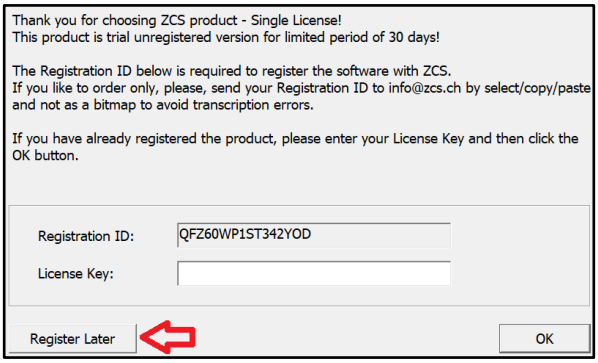
6 interactive languages (German, English, French, Italian, Spanish, Russian). Calculate 40 different fin coil geometries in 1 second. Compare prices, weights, contents, installation lengths and pressure drops. Neutral DLL offers the same possibilities as the EXE.

Tube interval on the height	Tube interval on the depth	Tube diameter	Tube diameter	Tube thickness	Tube arrangement	Fin stamp	Fin thickness	Corrugated fin height	Corrugated fin region	Fin stamp	Number of fin creases	Price
S1 mm	S2 mm	DA mm	da mm	S mm	T ---	F ---	Ld mm	Lh mm	Lc mm	Lw mm	Ln Piece	P EUR
0.000	35.000	15.400	15.400	0.350	1	1	0.200	0.500	33.000	3	7	21636
7.500	32.476	13.100	13.100	0.350	1	1	0.200	1.200	30.476	4	9	20539
2.000	27.713	12.400	12.400	0.350	1	1	0.200	1.000	25.713	3	7	20148
0.000	25.981	12.400	12.400	0.350	1	1	0.200	1.000	23.981	3	7	19680
5.000	21.651	10.400	10.400	0.350	1	1	0.200	0.500	19.651	3	7	21552
0.000	50.000	15.400	15.400	0.350	2	1	0.200	0.500	48.000	3	7	24672
5.000	35.000	12.400	12.400	0.350	2	1	0.200	0.500	33.000	3	7	22220
2.000	32.000	12.400	12.400	0.350	2	1	0.200	1.000	30.000	3	7	22497
0.000	30.000	12.400	12.400	0.350	2	1	0.200	1.000	28.000	3	7	22327
5.000	25.000	10.400	10.400	0.350	2	1	0.200	1.000	23.000	3	7	22316
0.000	34.641	16.400	16.400	0.350	1	2	0.200	2.600	40.000	4	10	18092
5.000	30.311	12.400	12.400	0.350	1	2	0.200	2.600	35.000	4	10	17288
3.333	28.867	12.400	12.400	0.350	1	2	0.200	2.600	33.333	4	10	17355
0.000	25.981	12.450	12.450	0.350	1	2	0.200	2.600	30.000	4	10	17769
5.000	21.651	10.400	10.400	0.350	1	2	0.200	2.600	25.000	4	10	17462
0.000	40.000	16.400	16.400	0.350	2	2	0.200	2.600	40.000	4	10	20219
5.000	35.000	13.100	13.100	0.350	2	2	0.200	2.600	35.000	4	10	19991
2.000	32.000	12.400	12.400	0.350	2	2	0.200	2.600	32.000	4	10	19514
0.000	30.000	12.400	12.400	0.350	2	2	0.200	2.600	30.000	4	10	18894
5.000	25.000	10.400	10.400	0.350	2	2	0.200	2.600	25.000	4	10	18490

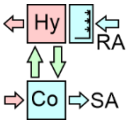
Price	Weight	Volume	Frame depth	Fin spacing	Pressure drop	Pressure drop	Factor
P EUR	W kg	V l	RT mm	LT mm	Air Pa	Agent kPa	T/C ---
21636	1346	540	1260	2.7	230	274.52	28.40
20539	1254	420	1180	2.8	329	247.87	25.43
20148	1144	412	1000	2.6	253	333.97	29.98
19680	1091	408	920	2.5	276	314.18	25.71
21552	1073	386	900	2.7	210	380.29	39.58
24672	1819	467	1760	2.5	199	357.87	36.90
22220	1397	402	1240	2.6	173	369.02	37.08
22497	1336	438	1180	2.6	220	291.56	29.98
22327	1260	466	1120	2.8	210	374.21	38.13
22316	1159	386	980	2.7	206	380.33	39.58
18092	1153	464	980	2.5	185	381.19	39.88
17288	1089	306	880	2.5	156	368.97	36.72
17355	1062	318	860	2.5	159	362.83	37.82
17769	1018	356	800	2.6	167	297.04	30.73
17462	922	294	720	2.8	152	372.69	38.63
20219	1330	501	1140	2.6	156	359.88	35.15
19991	1296	368	1050	2.5	139	299.30	23.83
19514	1204	359	980	2.5	131	327.11	30.56
18894	1141	352	880	2.5	134	303.02	31.36
18490	1031	294	780	2.7	119	372.66	38.63



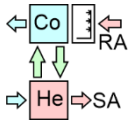
30-day demo window



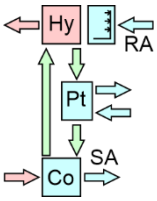
CCSB-Summer



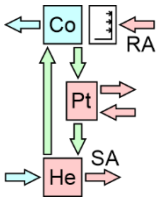
CCSB-Winter



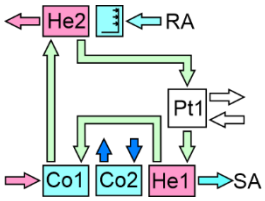
CCSD-Summer



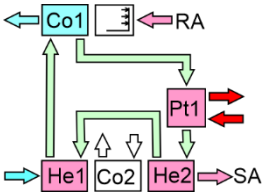
CCSD-Winter



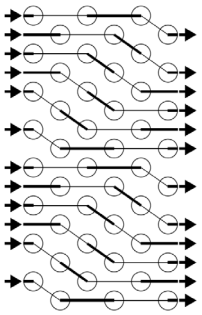
CCSF-Summer



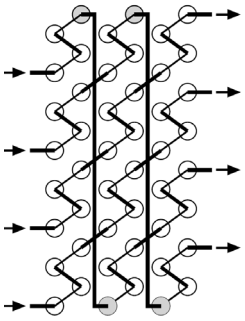
CCSF-Winter



Coupling 1 to 4

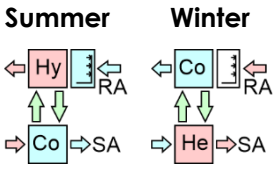


Coupling 5 to 7



All EXE and DLL were developed in the high-level language C# and offer results within 1 second. Before the turn of the millennium, results were possible in Excel in 1 minute. Then Microsoft packed so much nonsense into Excel, that you have to wait 10 minutes for results. This is the reason, why we are now successively developing all Excel applications in C#.

Using the example of the simplest **heat recovery system type CCSB**, it is shown, that this software not only calculates the two heat exchangers, but also the cost-effectiveness, of course, in terms of energy and money. In addition, SWKI guidelines were shamelessly manipulated by Pfe (Kon), Hil (HSLU), Gö (BBL) and consorts for decades.



Only the net energy efficiency of the heating energy was listed in the SWKI guidelines, omitting various energies. The following were not taken into account:

- Latent heat demand of the outside air (Humidification in winter)
- Sensible heat demand of the recirculated air (Heating in winter)
- Latent heat demand of the recirculated air (Humidification in winter)
- Sensible cooling requirements of the outside air (Cooling in summer)
- Latent cooling requirements of the outside air (Dehumidification in summer)
- Sensible cooling requirements of the recirculated air (Cooling in summer)
- Latent cooling requirements of the recirculated air (Dehumidification in summer)
- Adiabatic humidification of the exhaust air (Higher cooling recovery in summer)
- Total electric power demand for the supply air and exhaust air fans

The aim was to fool the investors into believing, that they had high efficiencies for heat recovery in order to be able to sell Pfe (Kon's) exorbitantly overpriced products at all. They did not shy away from advertising manipulated energetic annual utilization rates (JNG) of over 90%. No problem: firstly, the exhaust air was raised to values of up to 25°C/50% in winter, secondly, the supply air temperature in winter was set much too low to 18°C and thirdly, all outside temperatures above 18°C were deleted. In addition, the monetary net efficiency, which looks worse than the energy efficiency, was swept under the table for the sake of simplicity.

Which brings us to the meteorological data, for example for Bern:

1. SIA 2028, 2010 edition, minimum temperature -13.5°C, maximum temperature 32.7°C
2. Meteonorm standard values 2000-2009, minimum temp. -7.7°C, maximum temp. 32.4°C
3. Meteonorm with extreme values, minimum temp. -18.3°C, maximum temp. 35.1°C

We use the Meteonorm extreme values, all of them, including values above 18°C, in order to be able to determine the calculation for cooling in summer.

Consideration by our software

Tag	1	3	5	7	9	11	13	15	17	19	21	23	25	
40														0
38														0
36								4	1					5
34							5	5						10
32						3	4	7	1					15
30					3	15	12	10						40
28				5	14	34	12	7						72
26				10	34	27	19	8	4					102
24				22	53	46	22	10	5					158
22			9	58	71	50	28	14	1					231
20			18	70	114	58	45	4	1					310
18		5	35	95	115	80	26							356
16		9	58	113	119	60								359
14		16	85	124	131	26								382
12		24	113	137	44									318
10		43	143	132	2									320
8		59	204	83										346
6		103	213	15										331
4		107	179											286
2	1	153	65											219
0	2	165	6											173
-2	6	122												128
-4	16	77												93
-6	21	14												35
-8	34	3												37
-10	24													24
-12	17													17
-14	9													9
-16	4													4
-18														0
-20														0
-22														0
-24														0
-26														0
-28														0
-30														0
	134	900	1128	864	700	399	173	69	13	0	0	0	0	4380

Consideration by Pfe (Kon) software

Tag	1	3	5	7	9	11	13	15	17	19	21	23	25	
40														0
38														0
36														0
34														0
32														0
30														0
28														0
26														0
24														0
22														0
20														0
18														0
16		2	51	130	119	52	1							355
14		19	113	117	60	9								318
12		28	138	106	11									283
10		43	155	133	9									340
8	1	72	218	42										333
6	5	123	203	6										337
4	5	156	207											368
2	9	191	63											263
0	9	144	2											155
-2	4	119												123
-4	11	39												50
-6	19	12												31
-8	29	1												30
-10	6													6
-12	9													9
-14	7													7
-16	2													2
-18	9													9
-20														0
-22														0
-24														0
-26														0
-28														0
-30														0
	125	949	1150	534	199	61	1	0	0	0	0	0	0	3019

Of course, the same procedure also applies to the night, which results in 8,760 hours per year for us and only 3,019 during the day and 3,911 at night for Pfe (Kon), i.e. a total of only 6,930 per year, a shortcoming of 20.89%, although we have known, how warm it can get since 2003 at the latest! Now it's the year 2026 and in Switzerland we have reached temperatures of 40°C in the fourth heat wave, which totally misses the ass of certain criminal so-called ***engineers***. This is followed by a calculation using the high-level software CCSB.

Page 3 Calculation of heat exchangers with sinusoidal fins of www.tps-imp.si in winter
Page 4 Calculation of heat exchangers with sinusoidal fins from www.tps-imp.si in summer
Page 5 Calculation of heat exchangers with sinusoidal fins from www.tps-imp.si to DIN EN 308
Page 6 Calculation of profitability according to www.zcs.ch
Page 7 Calculation of profitability according to SWKI, manipulated by Pfe (Kon)

Calculation	Unit	www.zcs.ch	SWKI	Deviation
Energy demand total	MWh	1111.54	1030.26	-7.31%
Recovery of heating energy	MWh	600.85	647.34	7.74%
Recovery of cooling energy	MWh	51.38	0.00	∞
Effort of CC-System	MWh	-37.52	-37.52	0.00%
Energy recovery total	MWH	614.71	609.82	-0.80%
Net benefit per year	%	55.30	59.19	7.03%
Energy demand total	EUR	77'436.77	keine Ang.	---
Recovery of heating energy	EUR	36'051.00	keine Ang.	---
Recovery of cooling energy	EUR	4'110.00	keine Ang.	---
Effort of CC-System	EUR	-3'752.00	keine Ang.	---
Net benefit per year	EUR	36'409.00	keine Ang.	---
Net benefit per year	%	**47.02**	keine Ang.	---
AHU costs without CC-System	EUR	130'000.00	keine Ang.	---
AHU costs with CC-System	EUR	223'000.00	keine Ang.	---
Monetary amortization (BEP)	Years	**2.95**	keine Ang.	---
Temperature efficiency on winter (TWG)	%	70.00	70.00	0.00%
Annual utilization rate (JNG)	%	70.00	**93.29**	33.27%
Electrothermal amplification factor (ETV)	---	20.02	21.56	7.69%

We still owe an explanation of the additional costs involved in the use of CC-Sstems. The two heat exchangers together cost only EUR 30,314, although we are talking about additional costs of EUR 93,000, which are fortunately already amortized in 2.95 years. Directly related residual costs of EUR 62,686 caused by CC-Systems are the intermediate carrier medium, pumps for the intermediate carrier medium, hydraulics, controllers, longer air handling units, more powerful fans, more volume requirements in the technical room and higher maintenance costs.

In this way, we have proven, that according to SWKI and its criminal exponents, annual utilization rates of over 90% can be achieved.

In this way, the investor is suggested, that he can reduce energy costs **from 100.00% to 6.71%** by means of excessively overpriced KV systems from Pfe (Kon).

In fact, with the best CC-Systems from www.tps-imp.si which have sinusoidal fins and cost only half as much, you can only reduce energy costs **from 100.00% to 47.02%**.

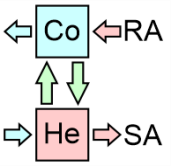
Anyone who still wants to be deceived can confidently turn to Pfe (Kon).

CC-System in winter		SAHe	RACo	Definition
Height over sea level	m			540.000
Pressure	hPa			949.653
Efficiency	%	70.000	54.448	
Capacity sensible	kW	394.122	308.417	
Capacity latent	kW	0.000	80.908	
Capacity frost	kW	---	4.797	
Capacity total	kW	394.122	394.122	
Surface reserve	%	0.893	0.420	
Present surface	m²	2003.071	2003.071	

SAHe		Inlet	Outlet	Definition
Temp.	°C	-16.000	9.200	20.000
Rel. humidity	%	100.000	12.806	40.000
Abs. humidity	g/kg	0.978	0.978	6.174
Volume flow humid	m³/h	43497.252	47759.699	50000.000
Velocity	m/s	1.795	1.971	2.064
Pressure drop	Pa		88.914	

RACo		Inlet	Outlet	Definition
Temp.	°C	20.000	0.399	20.000
Rel. humidity	%	40.000	99.065	40.000
Abs. humidity	g/kg	6.174	4.119	6.174
Volume flow humid	m³/h	50000.000	46504.259	50000.000
Velocity	m/s	2.064	1.920	2.064
Pressure drop	Pa		108.596	

30 V% Et.glycol			SAHe	RACo
Temp.	in	°C	14.300	-8.300
Temp.	out	°C	-8.300	14.300
Volume flow		m³/h	16.608	16.613
Velocity		m/s	1.192	1.192
Reynolds		---	3917.858	3846.638
Pressure drop		kPa	196.343	197.422



Company
Branch
Street
Country / ZIP / City

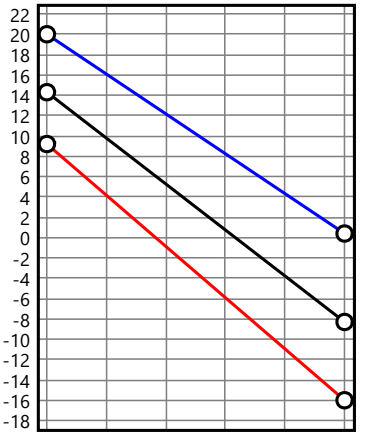
Phone: xxxxxxxxxx
Fax: xxxxxxxxxx
E-Mail
Homepage

02-08-2026

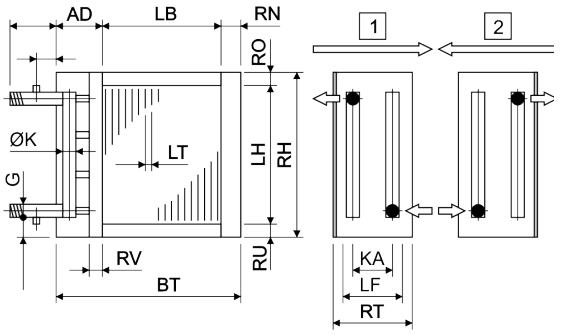
Representative

Plant
Object
Position

Temperature (°C)



Technical data			SAHe	RACo			
Tubes total		Piece	864	864	Tubes:	Cu	Cu
Tubes blank		Piece	0	0	Tubes:	smooth	smooth
Int. vent./drains		Piece	5	5	Tubes:	staggered	staggered
Tube rows on the depth		Piece	12	12	Tubes:	circular	circular
Tube rows on the height		Piece	72	72	Collectors:	Cu	Cu
Tube coupling in series		Piece	24	24	Collectors:	1.13 m/s	1.13 m/s
Number of circuits (NC)		Piece	36	36	Connections:	Rg7	Rg7
Volume		l	292	292	Connections:	1.13 m/s	1.13 m/s
Weight		kg	930	930	Fins:	Al	Al
Connections	G	---	2 ½"	2 ½"	Fins:	Wave structure	Wave structure
Frame height	RH	mm	2480	2480	Frame:	AISI304	AISI304
Frame width	BT	mm	3000	3000	Frame:	2.00 m/s	2.00 mm
Frame depth	RT	mm	470	470	Protection:	without	without
Finned height	LH	mm	2400	2400	Protection:	---	---
Finned width	LB	mm	2804	2804			
Finned depth	LF	mm	346	346			
Frame on top	RO	mm	40	40			
Frame on bottom	RU	mm	40	40			
Frame in front	RV	mm	30	30			
Frame on back	RN	mm	53	53			
Collector-Diameter	K	mm	76	76			
Collector covering	AD	mm	143	143			
Collector distance	KA	mm	369	369			
Fin spacing	LT	mm	2.600	2.600			
Fin thickness	LD	mm	0.200	0.200			
Tube diameter	DA	mm	12.400	12.400			
Tube diameter	da	mm	12.400	12.400			
Tube thickness	S	mm	0.350	0.350			
Tube interval on the height	S1	mm	33.333	33.333			
Tube interval on the width	S2	mm	28.867	28.867			



SAHe: 33/29/12-12R-72T-2804A-2.6PA-36C-Cu/Al/AISI304 **SAHe: EUR 15157.00**

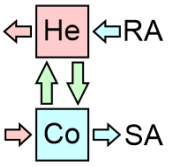
RACo: 33/29/12-12R-72T-2804A-2.6PA-36C-Cu/Al/AISI304 **RACo: EUR 15157.00**

CC-System in summer		RAHe	SACo	Definition
Height over sea level	m			540.000
Pressure	hPa			949.653
Efficiency	%	69.875	69.166	
Capacity sensible	kW	111.490	111.489	
Capacity latent	kW	0.000	0.000	
Capacity frost	kW	---	0.000	
Capacity total	kW	111.490	111.489	
Surface reserve	%	0.376	0.250	
Present surface	m²	2003.071	2003.071	

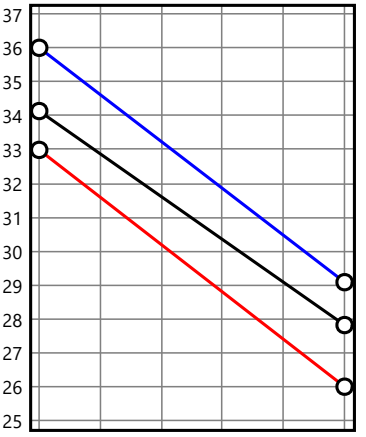
RAHe		Inlet	Outlet	Definition
Temp.	°C	26.000	32.987	20.000
Rel. humidity	%	51.000	34.126	40.000
Abs. humidity	g/kg	11.401	11.401	6.174
Volume flow humid	m³/h	51447.910	52649.582	50000.000
Velocity	m/s	2.124	2.173	2.064
Pressure drop	Pa		104.157	

SACo		Inlet	Outlet	Definition
Temp.	°C	36.000	29.083	20.000
Rel. humidity	%	42.684	62.969	40.000
Abs. humidity	g/kg	17.000	17.000	6.174
Volume flow humid	m³/h	53637.552	52437.562	50000.000
Velocity	m/s	2.214	2.164	2.064
Pressure drop	Pa		106.818	

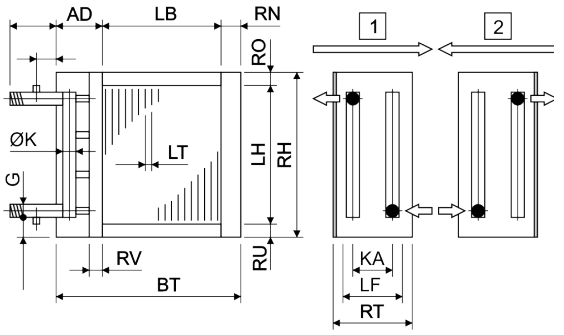
30 V% Et.glycol			RAHe	SACo
Temp.	in	°C	34.134	27.818
Temp.	out	°C	27.818	34.134
Volume flow		m³/h	16.608	16.609
Velocity		m/s	1.192	1.192
Reynolds		---	8782.806	8740.977
Pressure drop		kPa	161.735	161.937



Temperature (°C)



Technical data			SAHe	RACo			
Tubes total		Piece	864	864	Tubes:	Cu	Cu
Tubes blank		Piece	0	0	Tubes:	smooth	smooth
Int. vent./drains		Piece	5	5	Tubes:	staggered	staggered
Tube rows on the depth		Piece	12	12	Tubes:	circular	circular
Tube rows on the height		Piece	72	72	Collectors:	Cu	Cu
Tube coupling in series		Piece	24	24	Collectors:	1.13 m/s	1.13 m/s
Number of circuits (NC)		Piece	36	36	Connections:	Rg7	Rg7
Volume		l	292	292	Connections:	1.13 m/s	1.13 m/s
Weight		kg	930	930	Fins:	Al	Al
Connections	G	---	2 ½"	2 ½"	Fins:	Wave structure	Wave structure
Frame height	RH	mm	2480	2480	Frame:	AISI304	AISI304
Frame width	BT	mm	3000	3000	Frame:	2.00 m/s	2.00 mm
Frame depth	RT	mm	470	470	Protection:	without	without
Finned height	LH	mm	2400	2400	Protection:	---	---
Finned width	LB	mm	2804	2804			
Finned depth	LF	mm	346	346			
Frame on top	RO	mm	40	40			
Frame on bottom	RU	mm	40	40			
Frame in front	RV	mm	30	30			
Frame on back	RN	mm	53	53			
Collector-Diameter	K	mm	76	76			
Collector covering	AD	mm	143	143			
Collector distance	KA	mm	369	369			
Fin spacing	LT	mm	2.600	2.600			
Fin thickness	LD	mm	0.200	0.200			
Tube diameter	DA	mm	12.400	12.400			
Tube diameter	da	mm	12.400	12.400			
Tube thickness	S	mm	0.350	0.350			
Tube interval on the height	S1	mm	33.333	33.333			
Tube interval on the width	S2	mm	28.867	28.867			



RAHe: 33/29/12-12R-72T-2804A-2.6PA-36C-Cu/Al/AISI304 **RAHe:** **EUR** **15157.00**

SACo: 33/29/12-12R-72T-2804A-2.6PA-36C-Cu/Al/AISI304 **SACo:** **EUR** **15157.00**

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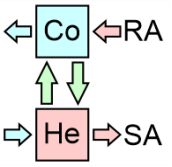
CC-System - (DIN EN 308)		SAHe308	RACo308	Definition
Height over sea level	m			540.000
Pressure	hPa			949.653
Efficiency	%	68.062	68.047	
Capacity sensible	kW	212.591	212.591	
Capacity latent	kW	0.000	0.000	
Capacity frost	kW	---	0.000	
Capacity total	kW	212.591	212.591	
Surface reserve	%	0.196	0.457	
Present surface	m²	2003.071	2003.071	

SAHe		Inlet	Outlet	Definition
Temp.	°C	5.000	18.613	20.000
Rel. humidity	%	0.000	0.000	40.000
Abs. humidity	g/kg	0.000	0.000	6.174
Volume flow humid	m³/h	46975.473	49274.343	50000.000
Velocity	m/s	1.939	2.034	2.064
Pressure drop	Pa		94.281	

RACo		Inlet	Outlet	Definition
Temp.	°C	25.000	11.391	20.000
Rel. humidity	%	0.000	0.000	40.000
Abs. humidity	g/kg	0.000	0.000	6.174
Volume flow humid	m³/h	50353.060	48054.700	50000.000
Velocity	m/s	2.078	1.984	2.064
Pressure drop	Pa		96.631	

30 V% Et.glycol			SAHe308	RACo308
Temp.	in	°C	20.948	8.872
Temp.	out	°C	8.872	20.948
Volume flow		m³/h	16.669	16.673
Velocity		m/s	1.196	1.197
Reynolds		---	5770.093	5691.544
Pressure drop		kPa	179.620	180.266



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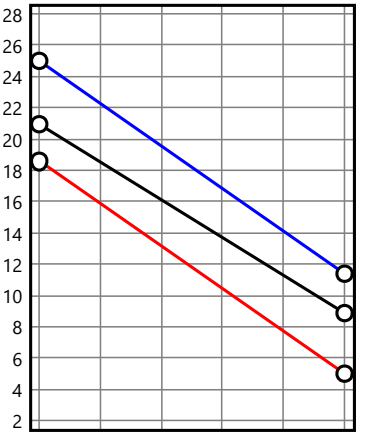
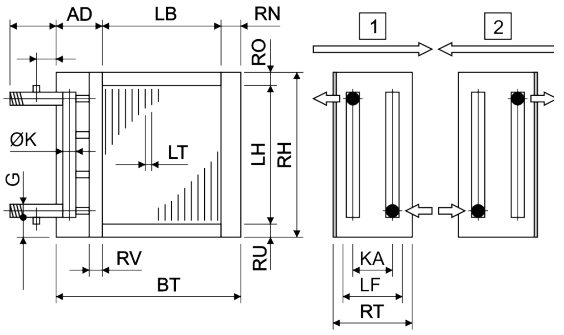
Plant
Object
Position

Temperature (°C)



Technical data			SAHe	RACo			
Tubes total		Piece	864	864	Tubes:	Cu	Cu
Tubes blank		Piece	0	0	Tubes:	smooth	smooth
Int. vent./drains		Piece	5	5	Tubes:	staggered	staggered
Tube rows on the depth		Piece	12	12	Tubes:	circular	circular
Tube rows on the height		Piece	72	72	Collectors:	Cu	Cu
Tube coupling in series		Piece	24	24	Collectors:	1.13 m/s	1.13 m/s
Number of circuits (NC)		Piece	36	36	Connections:	Rg7	Rg7
Volume		l	292	292	Connections:	1.13 m/s	1.13 m/s
Weight		kg	930	930	Fins:	Al	Al
Connections	G	---	2 ½"	2 ½"	Fins:	Wave structure	Wave structure
Frame height	RH	mm	2480	2480	Frame:	AISI304	AISI304
Frame width	BT	mm	3000	3000	Frame:	2.00 m/s	2.00 mm
Frame depth	RT	mm	470	470	Protection:	without	without
Finned height	LH	mm	2400	2400	Protection:	---	---
Finned width	LB	mm	2804	2804			
Finned depth	LF	mm	346	346			
Frame on top	RO	mm	40	40			
Frame on bottom	RU	mm	40	40			
Frame in front	RV	mm	30	30			
Frame on back	RN	mm	53	53			
Collector-Diameter	K	mm	76	76			
Collector covering	AD	mm	143	143			
Collector distance	KA	mm	369	369			
Fin spacing	LT	mm	2.600	2.600			
Fin thickness	LD	mm	0.200	0.200			
Tube diameter	DA	mm	12.400	12.400			
Tube diameter	da	mm	12.400	12.400			
Tube thickness	S	mm	0.350	0.350			
Tube interval on the height	S1	mm	33.333	33.333			
Tube interval on the width	S2	mm	28.867	28.867			



SAHe308: 33/29/12-12R-72T-2804A-2.6PA-36C-Cu/Al/AISI304 **SAHe308: EUR 15157.00**

RACo308: 33/29/12-12R-72T-2804A-2.6PA-36C-Cu/Al/AISI304 **RACo308: EUR 15157.00**

Energy recovery / Year (Service at 100% Air flow = 5110 Hours)

No	Outside air °C	Outside air %	CCSB °C	CCSB %	Return air °C	Return air %	Exhaust air °C	Exhaust air %	Efficiency %	Capacity kW	Energy MWh
1	-8.7	84.0	16.2	13.2	25.0	50.0	8.5	100.0	74.0	390.1	49.8
2	-3.3	78.4	17.2	18.5	25.0	50.0	10.4	97.9	72.5	321.9	41.1
3	-1.4	79.2	17.6	21.4	25.0	50.0	11.2	97.0	71.9	298.2	38.1
4	-0.2	78.5	17.8	23.1	25.0	50.0	11.6	96.2	71.5	283.1	36.2
5	0.8	76.3	18.0	24.1	25.0	50.0	12.0	95.5	71.1	269.9	34.5
6	1.6	79.2	18.0	26.2	25.0	50.0	12.3	95.0	70.8	257.1	32.8
7	2.4	77.1	18.0	26.7	25.0	50.0	12.6	94.5	70.5	245.3	31.3
8	3.0	77.3	18.0	27.8	25.0	50.0	12.9	94.1	70.2	235.4	30.1
9	3.6	76.2	18.0	28.3	25.0	50.0	13.1	93.6	70.0	226.2	28.9
10	4.2	75.3	18.0	28.8	25.0	50.0	13.3	93.2	69.8	217.6	27.8
11	4.7	75.9	18.0	30.0	25.0	50.0	13.5	92.8	69.5	209.0	26.7
12	5.3	73.8	18.0	30.1	25.0	50.0	13.7	92.4	69.3	200.3	25.6
13	5.9	75.2	18.0	31.7	25.0	50.0	13.9	91.8	69.0	190.7	24.4
14	6.5	72.4	18.0	31.6	25.0	50.0	14.2	91.2	68.7	180.7	23.1
15	7.1	73.7	18.0	33.2	25.0	50.0	14.4	90.7	68.5	171.8	21.9
16	7.7	72.1	18.0	33.5	25.0	50.0	14.6	90.1	68.2	162.9	20.8
17	8.3	73.0	18.0	35.1	25.0	50.0	14.9	89.4	67.9	152.6	19.5
18	9.0	73.9	18.0	36.7	25.0	50.0	15.2	88.6	67.7	142.2	18.2
19	9.6	73.3	18.0	37.7	25.0	50.0	15.4	87.8	67.4	131.9	16.9
20	10.3	71.7	18.0	38.0	25.0	50.0	15.7	86.8	67.2	122.3	15.6
21	10.9	72.5	18.0	39.6	25.0	50.0	16.0	85.8	66.9	112.4	14.4
22	11.5	68.9	18.0	38.9	25.0	50.0	16.3	84.6	66.8	102.1	13.0
23	12.3	68.7	18.0	40.2	25.0	50.0	16.7	83.0	66.6	90.4	11.6
24	13.1	69.7	18.0	42.2	25.0	50.0	17.1	81.0	66.5	78.3	10.0
25	13.7	67.7	18.0	42.2	25.0	50.0	17.5	78.9	66.5	67.9	8.7
26	14.3	69.5	18.0	44.5	25.0	50.0	17.9	77.0	66.4	58.8	7.5
27	14.9	71.2	18.0	46.9	25.0	50.0	18.3	75.0	66.4	48.7	6.2
28	15.5	71.6	18.0	48.3	25.0	50.0	18.7	73.3	66.4	39.5	5.0
29	16.1	71.0	18.0	49.2	25.0	50.0	19.1	71.5	66.4	29.9	3.8
30	16.7	67.3	18.0	47.9	25.0	50.0	19.5	69.7	66.4	20.0	2.6
31	17.4	64.6	18.0	47.3	25.0	50.0	19.9	67.9	66.4	10.1	1.3
32	18.0	64.9	18.0	48.7	25.0	50.0	20.4	66.2	66.4	0.1	0.0
33	18.6	63.9	18.6	49.3	25.0	50.0	20.8	64.5	66.4	10.3	1.3
34	19.3	64.2	19.3	51.0	25.0	50.0	21.2	62.7	66.3	21.0	2.7
35	20.1	64.5	20.1	53.0	25.0	50.0	21.8	60.7	66.3	33.9	4.3
36	21.0	60.2	21.0	51.3	25.0	50.0	22.4	58.6	66.3	48.2	6.2
37	22.0	62.1	22.0	55.2	25.0	50.0	23.0	56.3	66.3	64.1	8.2
38	23.2	60.1	23.2	56.0	25.0	50.0	23.8	53.7	66.3	83.2	10.6
39	24.8	56.4	24.8	56.0	25.0	50.0	24.9	50.4	66.2	108.5	13.9
40	28.3	50.1	26.1	56.9	25.0	50.0	27.2	43.9	66.2	165.1	21.1

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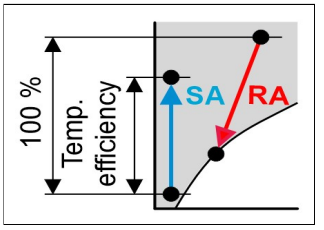
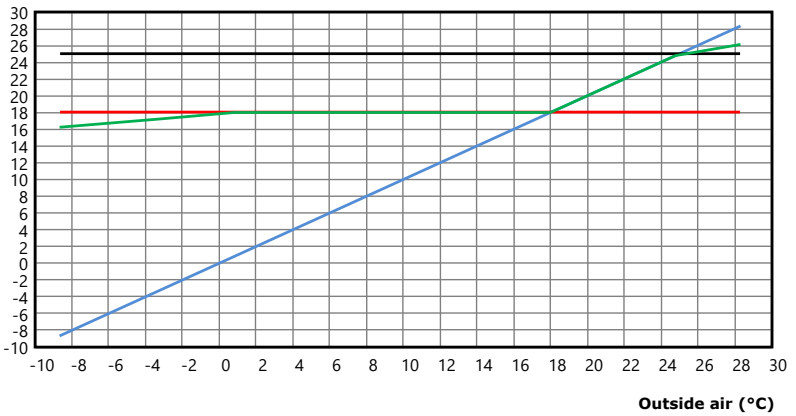
Plant
Object
Position



Air (%)	Service (h/a)
100.00	2920
50.00	2920
25.00	2920
▼	▼
100.00	5110

EU: Energy recovery: Heat energy	MWh	647.34	EUR	38840.00	(60.00 EUR/MWh)
EU: Energy recovery: Cold energy	MWh	21.09	EUR	1687.00	(80.00 EUR/MWh)
EU: 2 Fan: Glycol pump	MWh	-37.52	EUR	-3752.00	(100.00 EUR/MWh)
EU: Energy recovery: Net useful ratio / Year	MWh	630.91	EUR	36775.00	(58.29 EUR/MWh)
EU: Need of energy total / Year	MWh	1030.26	EUR	73955.51	(71.78 EUR/MWh)
EU: Net useful ratio / Year	%	61.24	%	49.73	TWG = 70.00%
CH: Guidelines from associations such as SIA and SWKI: TWG>70.00% & JNG>75.00% & ETV>15.00					JNG = 93.29%
					ETV = 21.56

Outside air (°C) **Return air (°C)** **Supply air (°C)** **Energy recovery (°C)**



Station		Bern
Height over sea level	m	540.00
Pressure	hPa	949.65
Outside air	m³/h	50000.00
Return air	m³/h	50000.00
Adiabatic return air cooling	h/a	0.00
Service at 100% Air flow	h/a	5110.00
Capital interest	%	1.00
Energy increase	%	1.00
Inflation	%	1.00
Support costs	%	5.00
Costs without CC-system	EUR	130000.00
Costs with CC-system	EUR	223000.00
Additional costs	EUR	93000.00
BEP (Break even point) after	**Years**	**2.92**

Energy recovery / Year (Service at 100% Air flow = 5110 Hours)

No	Outside air °C	Outside air %	CCSB °C	CCSB %	Return air °C	Return air %	Exhaust air °C	Exhaust air %	Efficiency %	Capacity kW	Energy MWh
1	-8.7	84.0	16.2	13.2	25.0	50.0	8.5	100.0	74.0	390.1	49.8
2	-3.3	78.4	17.2	18.5	25.0	50.0	10.4	97.9	72.5	321.9	41.1
3	-1.4	79.2	17.6	21.4	25.0	50.0	11.2	97.0	71.9	298.2	38.1
4	-0.2	78.5	17.8	23.1	25.0	50.0	11.6	96.2	71.5	283.1	36.2
5	0.8	76.3	18.0	24.1	25.0	50.0	12.0	95.5	71.1	269.9	34.5
6	1.6	79.2	18.0	26.2	25.0	50.0	12.3	95.0	70.8	257.1	32.8
7	2.4	77.1	18.0	26.7	25.0	50.0	12.6	94.5	70.5	245.3	31.3
8	3.0	77.3	18.0	27.8	25.0	50.0	12.9	94.1	70.2	235.4	30.1
9	3.6	76.2	18.0	28.3	25.0	50.0	13.1	93.6	70.0	226.2	28.9
10	4.2	75.3	18.0	28.8	25.0	50.0	13.3	93.2	69.8	217.6	27.8
11	4.7	75.9	18.0	30.0	25.0	50.0	13.5	92.8	69.5	209.0	26.7
12	5.3	73.8	18.0	30.1	25.0	50.0	13.7	92.4	69.3	200.3	25.6
13	5.9	75.2	18.0	31.7	25.0	50.0	13.9	91.8	69.0	190.7	24.4
14	6.5	72.4	18.0	31.6	25.0	50.0	14.2	91.2	68.7	180.7	23.1
15	7.1	73.7	18.0	33.2	25.0	50.0	14.4	90.7	68.5	171.8	21.9
16	7.7	72.1	18.0	33.5	25.0	50.0	14.6	90.1	68.2	162.9	20.8
17	8.3	73.0	18.0	35.1	25.0	50.0	14.9	89.4	67.9	152.6	19.5
18	9.0	73.9	18.0	36.7	25.0	50.0	15.2	88.6	67.7	142.2	18.2
19	9.6	73.3	18.0	37.7	25.0	50.0	15.4	87.8	67.4	131.9	16.9
20	10.3	71.7	18.0	38.0	25.0	50.0	15.7	86.8	67.2	122.3	15.6
21	10.9	72.5	18.0	39.6	25.0	50.0	16.0	85.8	66.9	112.4	14.4
22	11.5	68.9	18.0	38.9	25.0	50.0	16.3	84.6	66.8	102.1	13.0
23	12.3	68.7	18.0	40.2	25.0	50.0	16.7	83.0	66.6	90.4	11.6
24	13.1	69.7	18.0	42.2	25.0	50.0	17.1	81.0	66.5	78.3	10.0
25	13.7	67.7	18.0	42.2	25.0	50.0	17.5	78.9	66.5	67.9	8.7
26	14.3	69.5	18.0	44.5	25.0	50.0	17.9	77.0	66.4	58.8	7.5
27	14.9	71.2	18.0	46.9	25.0	50.0	18.3	75.0	66.4	48.7	6.2
28	15.5	71.6	18.0	48.3	25.0	50.0	18.7	73.3	66.4	39.5	5.0
29	16.1	71.0	18.0	49.2	25.0	50.0	19.1	71.5	66.4	29.9	3.8
30	16.7	67.3	18.0	47.9	25.0	50.0	19.5	69.7	66.4	20.0	2.6
31	17.4	64.6	18.0	47.3	25.0	50.0	19.9	67.9	66.4	10.1	1.3
32	18.0	64.9	18.0	48.7	25.0	50.0	20.4	66.2	66.4	0.1	0.0
33											
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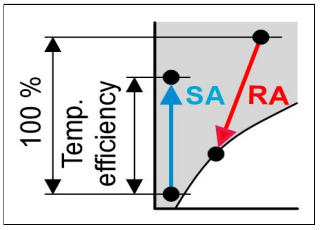
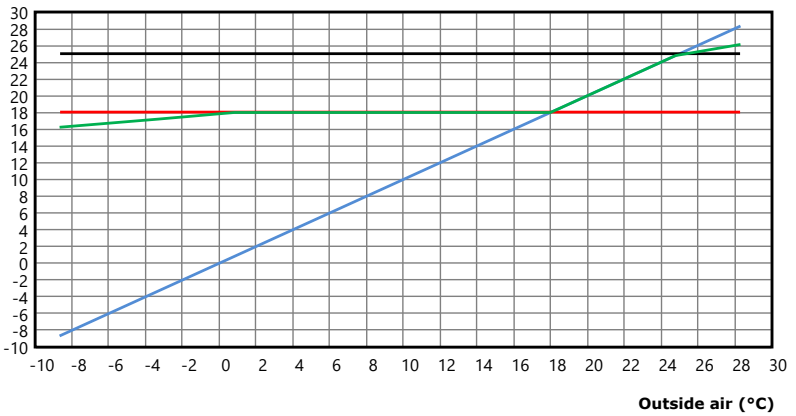
Plant
Object
Position



Air (%)	Service (h/a)
100.00	2920
50.00	2920
25.00	2920
▼	▼
100.00	5110

EU: Energy recovery: Heat energy	MWh	647.34	EUR		
EU: Energy recovery: Cold energy	MWh	00.00	EUR		
EU: 2 Fan: Glycol pump	MWh	-37.52	EUR		
EU: Energy recovery: Net useful ratio / Year	MWh	609.82	EUR		
EU: Need of energy total / Year	MWh	1030.26	EUR		
EU: Net useful ratio / Year	%	61.24	%		TWG = 70.00%
CH: Guidelines from associations such as SIA and SWKI: TWG>70.00% & JNG>75.00% & ETV>15.00					JNG = 93.29%
					ETV = 21.56

Outside air (°C) **Return air (°C)** **Supply air (°C)** **Energy recovery (°C)**



Station		Bern
Height over sea level	m	540.00
Pressure	hPa	949.65
Outside air	m³/h	50000.00
Return air	m³/h	50000.00
Adiabatic return air cooling	h/a	0.00
Service at 100% Air flow	h/a	5110.00
Capital interest	%	1.00
Energy increase	%	1.00
Inflation	%	1.00
Support costs	%	5.00
Costs without CC-system	EUR	
Costs with CC-system	EUR	
Additional costs	EUR	
BEP (Break even point) after	**Years**	