

CC-System in summer		SA-Co1	SA-Co2	SA-He	RA-Hy
Capacity	kW	142.908	252.815	50.721	92.187
Surface reserve	%	3.051	2.502	2.198	3.092
Present surface	m2	2223.799	700.516	311.479	2223.799
Temp. in (26.000)	°C	34.000	20.950	10.000	19.496
Rel. humidity in (54.865)	%	50.000	97.995	100.000	100.000
Abs. humidity in (11.500)	g/kg	16.710	15.250	7.631	14.204
Temp. out	°C	20.950	10.000	16.000	30.267
Rel. humidity out	%	97.995	100.000	67.620	52.663
Abs. humidity out	g/kg	15.250	7.631	7.631	14.204
Velocity	m/s	2.051	2.430	1.927	2.028
Pressure drop	Pa	166.459	196.757	20.075	145.878
Moistening temperature	°C				15.000

Definition

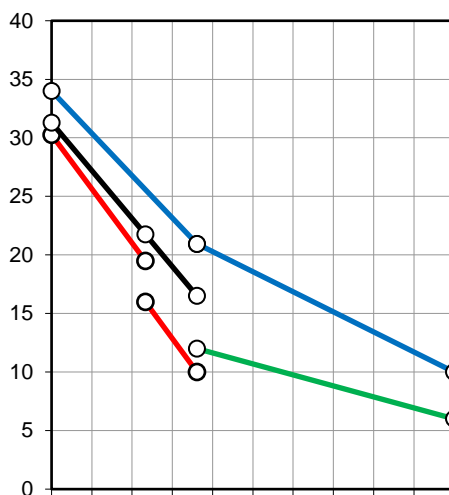
Height over sea level	m	0.000
Pressure	hPa	1013.250
Temp.	°C	20.000
Rel. humidity	%	40.000
Supply air	m3/h	25000.000
Return air	m3/h	25000.000

30 V% Et.glycol

Temp. in	°C	16.500
Temp. out	°C	31.300
Volume flow	m3/h	9.111
Pressure drop total	kPa	421.202

Water

Temp. in	°C	6.000
Temp. out	°C	12.000
Volume flow	m3/h	36.168
Pressure drop	kPa	56.495



Technical data		SA-Co1	SA-Co2	SA-He	RA-Hy	Software by www.zcs.ch
Tubes blank	Piece	0	0	0	0	
Int. vent./drains	Piece	11	0	1	11	
Tube rows on the depth	Piece	24	10	4	24	
Tube rows on the height	Piece	48	35	48	48	
Number of circuits (NC)	Piece	24	35	24	24	
Volume	l	277	171	53	277	
Weight	kg	961	359	158	961	
Connections	G	2"	4"	2"	2"	
Frame height	RH	1760	1480	1760	1760	
Frame width	BT	2296	2296	2296	2296	
Frame depth	RT	900	450	200	900	
Finned height	LH	1680	1400	1680	1680	
Finned width	LB	2100	2028	2100	2100	
Frame on top	RO	40	40	40	40	
Frame on bottom	RU	40	40	40	40	
Frame in front	RV	30	30	30	30	
Frame on back (~53/69/53/53)	RN	53	69	53	53	
Collector covering	AD	143	199	143	143	
Fin spacing	LT	2.500	2.500	3.000	2.500	
Fin thickness	LD	0.200	0.200	0.200	0.200	
Tube diameter	DA	12.400	16.400	12.400	12.400	
Tube diameter	da	12.400	16.400	12.400	12.400	
Tube thickness	S	0.400	0.400	0.400	0.400	
Tube interval on the height	S1	35.000	40.000	35.000	35.000	
Tube interval on the depth	S2	35.000	34.641	35.000	35.000	
Tubes	---	Cu	Cu	Cu	Cu	
Tubes	---	smooth	smooth	smooth	smooth	
Tubes	---	in line	staggered	in line	in line	
Tubes	Type	circular	circular	circular	circular	
Collector	---	Cu	Cu	Cu	Cu	
Connections	---	Rg7	Rg7	Rg7	Rg7	
Fins	---	Al	Al	Al	Al	
Fins	---	smooth	smooth	smooth	smooth	
Frame	---	AlMg3	AlMg3	AlMg3	AlMg3	
Protection	---	without	without	without	without	
Protection	---	---	---	---	---	
Price	EUR	14153.00	5542.00	2590.00	14153.00	



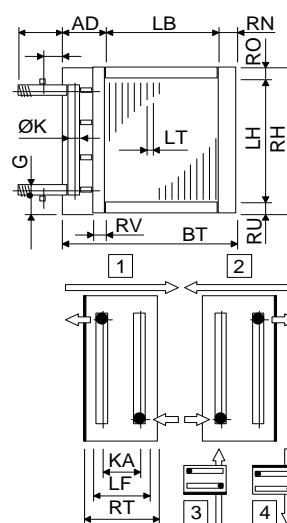
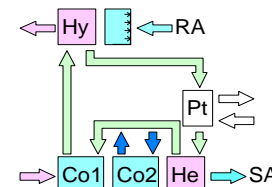
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Plant
Object
Position



Delivery: 5-6 weeks
Validity: 12 weeks
Condit.: net, prepaid address
Payment: 30 days net

CC-System in winter		SA-He1	SA-Co	SA-He2	RA-Co
Capacity	kW	286.968		38.657	213.495
Surface reserve	%	0.000		0.106	0.419
Present surface	m ²	2223.799	700.516	311.479	2223.799
Temp. in	°C	-15.000		19.372	20.000
Rel. humidity in	%	90.000		6.560	40.000
Abs. humidity in	g/kg	0.905		0.905	5.784
Temp. out	°C	19.372		24.000	-0.130
Rel. humidity out	%	6.560		4.947	100.000
Abs. humidity out	g/kg	0.905		0.905	3.736
Velocity	m/s	1.834	1.834	1.964	1.898
Pressure drop	Pa	127.197	141.059	20.377	155.025

Definition

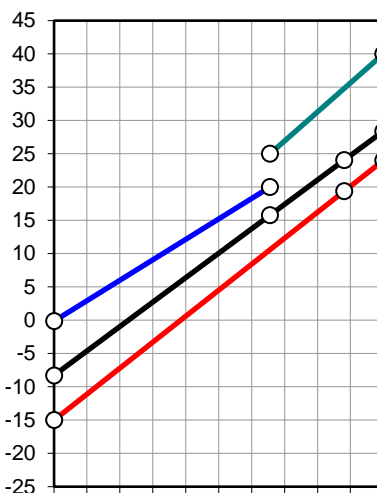
Height over sea level	m	0.000
Pressure	hPa	1013.250
Temp.	°C	20.000
Rel. humidity	%	40.000
Supply air	m ³ /h	25000.000
Return air	m ³ /h	25000.000

30 V% Et.glycol

Temp. in	°C	28.391
Temp. out	°C	-8.277
Volume flow	m ³ /h	8.427
Pressure drop total	kPa	430.982

Water

Temp. in	°C	---
Temp. out	°C	---
Volume flow	m ³ /h	---
Pressure drop	kPa	---



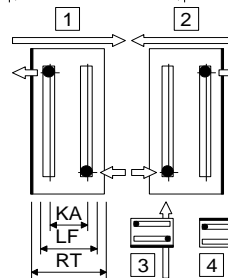
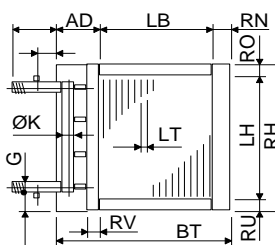
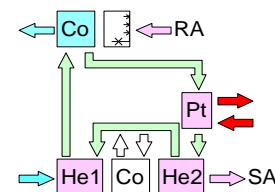
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Plant
Object
Position

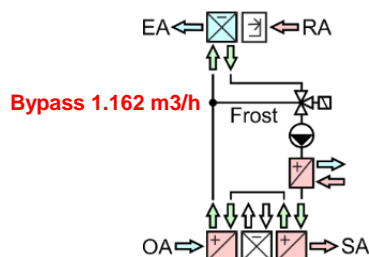
Technical data		SA-He1	SA-Co	SA-He2	RA-Co	Software by www.zcs.ch		
Tubes blank	Piece	0	0	0	0	Standard plate-HE	kW	112.129
Int. vent./drains	Piece	11	0	1	11	in	°C	40.000
Tube rows on the depth	Piece	24	10	4	24	out	°C	25.000
Tube rows on the height	Piece	48	35	48	48	in	°C	15.765
Number of circuits (NC)	Piece	24	35	24	24	out	°C	28.391
Volume	l	277	171	53	277			
Weight	kg	961	359	158	961			
Connections	G	2"	4"	2"	2"			
Frame height	RH	1760	1480	1760	1760			
Frame width	BT	2296	2296	2296	2296			
Frame depth	RT	900	450	200	900			
Finned height	LH	1680	1400	1680	1680			
Finned width	LB	2100	2028	2100	2100			
Frame on top	RO	40	40	40	40			
Frame on bottom	RU	40	40	40	40			
Frame in front	RV	30	30	30	30			
Frame on back (~53/69/53/53)	RN	53	69	53	53			
Collector covering	AD	143	199	143	143			
Fin spacing	LT	2.500	2.500	3.000	2.500			
Fin thickness	LD	0.200	0.200	0.200	0.200			
Tube diameter	DA	12.400	16.400	12.400	12.400			
Tube diameter	da	12.400	16.400	12.400	12.400			
Tube thickness	S	0.400	0.400	0.400	0.400			
Tube interval on the height	S1	35.000	40.000	35.000	35.000			
Tube interval on the depth	S2	35.000	34.641	35.000	35.000			
Tubes	---	Cu	Cu	Cu	Cu			
Tubes	---	smooth	smooth	smooth	smooth			
Tubes	---	in line	staggered	in line	in line			
Tubes	Type	circular	circular	circular	circular			
Collector	---	Cu	Cu	Cu	Cu			
Connections	---	Rg7	Rg7	Rg7	Rg7			
Fins	---	Al	Al	Al	Al			
Fins	---	smooth	smooth	smooth	smooth			
Frame	---	AlMg3	AlMg3	AlMg3	AlMg3	Delivery:	5-6 weeks	
Protection	---	without	without	without	without	Validity:	12 weeks	
Protection	---	---	---	---	---	Condit.:	net, prepaid address	
Price	EUR	14153.00	5542.00	2590.00	14153.00	Payment:	30 days net	



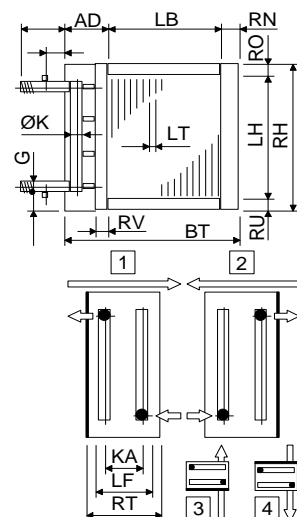
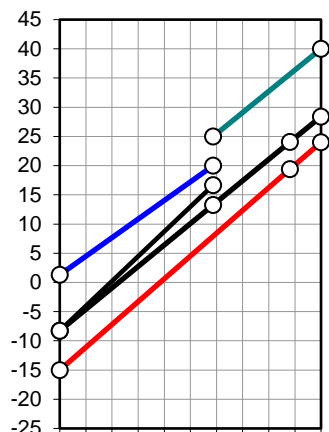
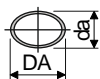
CC-System in winter		SA-He1	SA-Co	SA-He2	RA-Co
Capacity	kW	286.968	---	38.657	191.242
Surface reserve	%	0.000	---	0.106	3.423
Present surface	m2	2223.799	700.516	311.479	2223.799
Temp. in	°C	-15.000	---	19.372	20.000
Rel. humidity in	%	90.000	---	6.560	40.000
Abs. humidity in	g/kg	0.905	---	0.905	5.784
Temp. out	°C	19.372	---	24.000	1.300
Rel. humidity out	%	6.560	---	4.947	100.000
Abs. humidity out	g/kg	0.905	---	0.905	4.159
Velocity	m/s	1.834	1.834	1.964	1.903
Pressure drop	Pa	127.197	141.059	20.377	151.567
Pressure drop total	Pa			288.633	151.567

30 V% Et.glycol		SA-He1	SA-Co	SA-He2	RA-Co
Temp. in	°C	24.038	---	28.391	-8.277
Temp. out	°C	-8.277	---	24.038	16.673
Volume flow	m3/h	8.436	---	8.369	7.321
Pressure drop	kPa	188.477	---	31.575	163.302
Pressure drop total	kPa				383.354

Standard plate-HE		
Capacity	kW	134.383
Water		
Temp. in	°C	40.000
Temp. out	°C	25.000
30 V% Et.glycol		
Temp. in	°C	13.259
Temp. out	°C	28.391



Technical data		SA-He1	SA-Co	SA-He2	RA-Co
Tubes blank	Piece	0	0	0	0
Int. vent./drains	Piece	11	0	1	11
Tube rows on the depth	Piece	24	10	4	24
Tube rows on the height	Piece	48	35	48	48
Number of circuits (NC)	Piece	24	35	24	24
Volume	l	277	171	53	277
Weight	kg	961	359	158	961
Connections	G	2"	4"	2"	2"
Frame height	RH	1760	1480	1760	1760
Frame width	BT	2296	2296	2296	2296
Frame depth	RT	900	450	200	900
Finned height	LH	1680	1400	1680	1680
Finned width	LB	2100	2028	2100	2100
Frame on top	RO	40	40	40	40
Frame on bottom	RU	40	40	40	40
Frame in front	RV	30	30	30	30
Frame on back (~53/69/53/53)	RN	53	69	53	53
Collector covering	AD	143	199	143	143
Fin spacing	LT	2.500	2.500	3.000	2.500
Fin thickness	LD	0.200	0.200	0.200	0.200
Tube diameter	DA	12.400	16.400	12.400	12.400
Tube diameter	da	12.400	16.400	12.400	12.400
Tube thickness	S	0.400	0.400	0.400	0.400
Tube interval on the height	S1	35.000	40.000	35.000	35.000
Tube interval on the depth	S2	35.000	34.641	35.000	35.000
Tubes	---	Cu	Cu	Cu	Cu
Tubes	---	smooth	smooth	smooth	smooth
Tubes	---	in line	staggered	in line	in line
Tubes	Type	circular	circular	circular	circular
Collector	---	Cu	Cu	Cu	Cu
Connections	---	Rg7	Rg7	Rg7	Rg7
Fins	---	Al	Al	Al	Al
Fins	---	smooth	smooth	smooth	smooth
Frame	---	AlMg3	AlMg3	AlMg3	AlMg3
Protection	---	without	without	without	without
Protection	---	---	---	---	---
Price	EUR	14153.00	5542.00	2590.00	14153.00



Delivery: 5-6 weeks
 Validity: 12 weeks
 Condit.: net, prepaid address
 Payment: 30 days net



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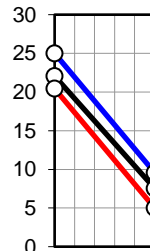
Software by www.zcs.ch

CC-System (DIN EN 308)		SA-He	RA-Co	Definition
Height over sea level	m			0.000
Pressure	hPa			1013.250
Efficiency	%	77.154	77.141	
Capacity sensible	kW	128.648	128.647	
Capacity latent	kW	---	---	
Capacity frost	kW	---	---	
Capacity total	kW	128.648	128.647	
Surface reserve	%	0.008	0.093	
Present surface	m2	2535.278	2223.799	

SA-He		Inlet	Outlet	Definition
Temp.	°C	5.000	20.431	20.000
Rel. humidity	%	0.000	0.000	40.000
Abs. humidity	g/kg	0.000	0.000	5.784
Volume flow humid	m3/h	23502.367	24806.150	25000.000
Velocity	m/s	1.850	1.953	1.968
Pressure drop	Pa		151.947	

RA-Co		Inlet	Outlet	Definition
Temp.	°C	25.000	9.572	20.000
Rel. humidity	%	0.000	0.000	40.000
Abs. humidity	g/kg	0.000	0.000	5.784
Volume flow humid	m3/h	25192.212	23888.640	25000.000
Velocity	m/s	1.984	1.881	1.968
Pressure drop (dry 137 Pa)	Pa		136.661	

30 V% Et.glycol		SA-He	RA-Co	
Temp.	in °C	22.053	7.541	
Temp.	out °C	7.541	22.053	
Volume flow	m3/h	8.394	8.396	
Velocity	m/s	0.919	0.919	
Reynolds	---	4381.576	4325.294	
Pressure drop	kPa	205.253	177.362	



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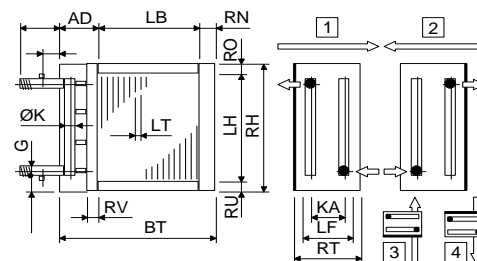
Plant

Object

Position

Software by www.zcs.ch

Technical data		SA-He	RA-Co	SA-He	RA-Co
Tubes total	Piece	1344	1152	Tubes:	Cu
Tubes blank	Piece	0	0	Tubes:	smooth
Int. vent./drains	Piece	13	11	Tubes:	in line
Tube rows on the depth	Piece	28	24	Tubes:	circular
Tube rows on the height	Piece	48	48	Collectors:	Cu
Tube coupling in series	Piece	56	48	Connections:	Rg7
Number of circuits (NC)	Piece	24	24	Fins:	Al
Volume	l	321	277	Fins:	smooth
Weight	kg	1103	961	Frame:	AlMg3
Connections	G	---	2"	Protection:	without
Frame height	RH mm	1760	1760	Protection:	---
Frame width	BT mm	2296	2296	Air flow direction:	horizontal
Frame depth	RT mm	1040	900		
Finned height	LH mm	1680	1680		
Finned width	LB mm	2100	2100		
Finned depth	LF mm	980	840		
Frame on top	RO mm	40	40		
Frame on bottom	RU mm	40	40		
Frame in front	RV mm	30	30		
Frame on back (~53/53mm)	RN mm	53	53		
Collector-Diameter	K mm	54	54		
Collector covering	AD mm	143	143		
Collector distance	KA mm	962	822		
Fin spacing	LT mm	2.561	2.500		
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	0.400	0.400		
Tube interval on the height	S1 mm	35.000	35.000		
Tube interval on the depth	S2 mm	35.000	35.000		



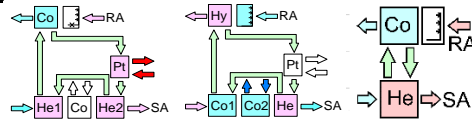
Delivery: 5-6 weeks
Validity: 12 weeks
Condit.: net, prepaid address
Payment: 30 days net

SA-He: 35/35/12-28R-48T-2100A-2.6PA-24C-Cu/Al/AlMg3
RA-Co: 35/35/12-24R-48T-2100A-2.5PA-24C-Cu/Al/AlMg3

SA-He: EUR 16743.00
RA-Co: EUR 14153.00

Economy with CC-System

Base value	Definition
Height over sea level	m 0.000
Pressure	bar 1.013
Volume flow humid at	°C 20.000
Volume flow humid at	% 40.000



CC-System		Winter	Summer	DIN EN 308
Efficiency Supply air	%	---	---	77.154
Capacity	kW	325.625	193.630	128.648
Surface reserve	%	0.107	5.249	0.008
Present surface	m2	2535.278	2535.278	2535.278

Supply air		Winter	Summer	DIN EN 308
Temp. in	°C	-15.000	34.000	5.000
Temp. out	°C	24.000	16.000	20.431
Volume flow humid	m3/h	25000.000	25000.000	25000.000
Pressure drop	Pa	288.633	383.292	151.947
Fan efficiency	---	0.700	0.700	0.700
Fan power	kW	2.863	3.802	1.507

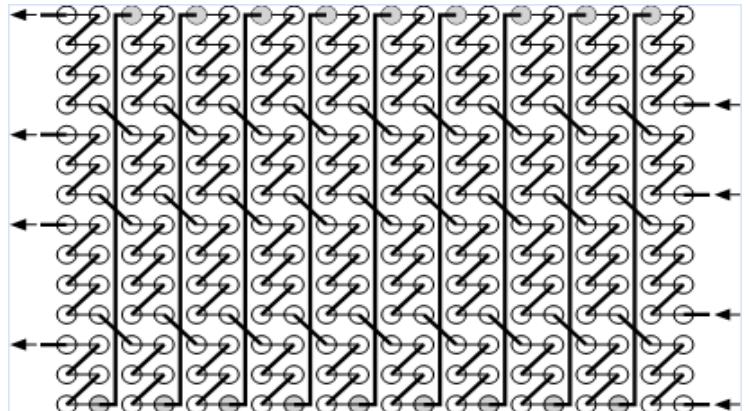
Return air		Winter	Summer	DIN EN 308
Temp. in	°C	20.000	19.496	25.000
Temp. out	°C	-0.130	30.267	9.572
Volume flow humid	m3/h	25000.000	25000.000	25000.000
Pressure drop	Pa	155.025	145.878	136.661
Fan efficiency	---	0.700	0.700	0.700
Fan power	kW	1.538	1.447	1.356

30 V% Et.glycol		Winter	Summer	DIN EN 308
Volume flow	m3/h	8.427	9.111	8.394
Pressure drop Supply air	bar	2.201	2.318	2.053
Pressure drop Return air	bar	2.109	1.895	1.774
Pressure drop Hydraulics	bar	2.000	2.000	2.000
Pressure drop Total	bar	6.310	6.212	5.826
Pump efficiency	---	0.800	0.800	0.800
Pump power	kW	1.846	1.965	1.698

Economy		Winter	Summer	DIN EN 308
Gross useful ratio with CC-System	kW	---	---	128.648
Need of energy with CC-System	kW	6.248	7.215	4.561
Net useful ratio with CC-System	kW	---	---	124.086
Coefficient of performance (COP)	---	---	---	28.204

Economy		Winter	Summer	DIN EN 308
Volume flow humid Total	m3/h	50000.000	50000.000	50000.000
Need of energy with CC-System	kW	6.248	7.215	4.561
Specific Recovery Power (SRP)	Ws/m3	449.838	519.468	328.415

Adiabatic return air cooling



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$$E = \frac{B * C}{D * 3600 * 1000}$$

$$I = \frac{F * G}{H * 3600 * 1000}$$

$$N = K + L + M$$

$$P = \frac{J * N * 100000}{O * 3600 * 1000}$$

$$Q = E + I + P$$

$$R = A - Q$$

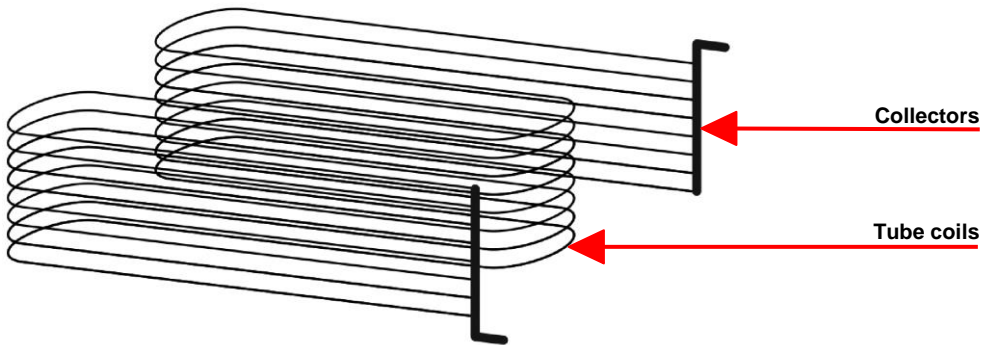
$$S = \frac{A}{Q}$$

$$T = B + F$$

$$U = \frac{Q * 3600 * 1000}{T}$$

Optimal pressure drop distribution on the tube coils and the collectors

With the optimal pressure drop distribution on the tube coils and the collectors, it is important that all tube coils receive the same amount of liquid. This is the only way to achieve optimum performance of the heat exchanger. This can only be achieved if the pressure drop in the tube coils is significantly higher than in the collectors. So it's about the pressure ratio (T/C), see below.

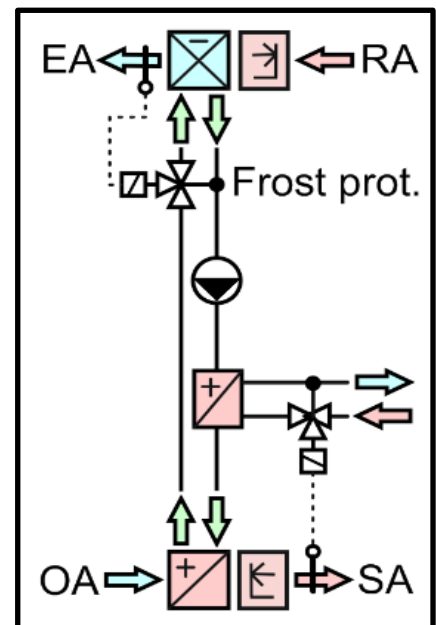
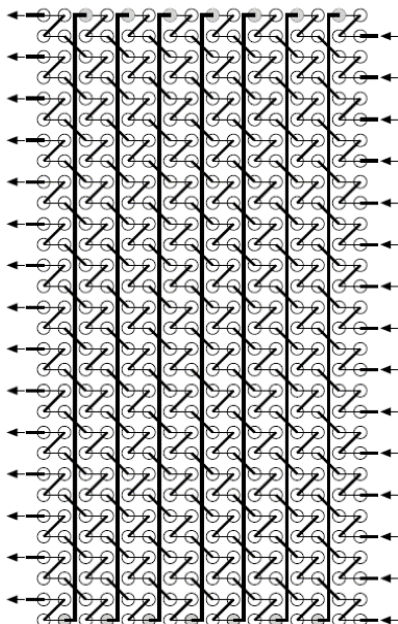


Typical applications			Heater	Cooler	CC-System
Pressure drop total	---	kPa	10.000	40.000	200.000
Coil pressure drop	T	kPa	6.500	33.000	193.000
Pressure drop collectors	C	kPa	3.500	7.000	7.000
Pressure ratio	T/C	---	1.857	4.714	27.571

So if you really want to worry about optimal liquid distribution, turn to the air heater and air cooler, but certainly not to the heat exchangers in heat recovery! And yet there are absolute idiots who have applied for patents on an injection for heat recovery, i.e. exactly where it is totally superfluous.

An optimal CC-System must therefore have a pressure drop of 2 bar per heat exchanger in order to achieve maximum performance. In addition, there is the hydraulic system with a further 2 bar pressure drop. In total, a pressure drop of 6 bar is up for debate, which is not a problem when choosing the right pump. Idiots choose centrifugal pumps with a non-linear characteristic. Those familiar with the subject choose gear pumps from www.maag.com with absolutely linear characteristics. This means, for example, that when the speed is reduced to 50 %, the flow rate is exactly 50 %, so regulation is very easy.

www.maag.com



Dehumidifying

EA: Exhaust air / RA: Return air
OA: Outside air / SA: Supply air

Co1: Cold recovery - Cooler
He1: Cold recovery - Heater

Co2: Cooler additional

D1: Wire mesh droplet eliminator (Demister)
D2: Drop eliminator: Pressure drop > 100 Pa !!!

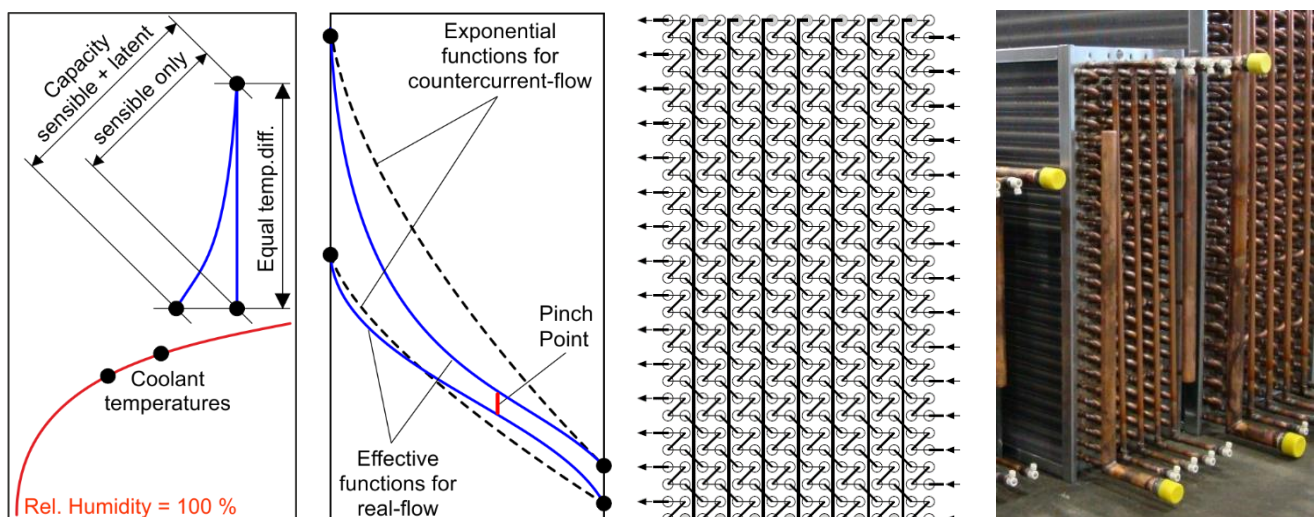
If a lot of moisture has to be extracted from the air, part of the performance can be done via cold recovery, provided the exhaust air is adiabatically pre-cooled. The rest has to be cooled from 6 to 12°C with cold water, for example, which results in high operating costs.

Both coolers must have smooth fins, which allow the condensate to drain away. The thickness of the lamellas should be at least 0,2 mm in order to generate large condensate droplets. These are combined into even larger droplets in the upstream demister and separated in the downstream droplet eliminator. Droplet eliminators must have a pressure loss of at least 100 Pa in order to ensure a high degree of fractional separation.

If this advice is not followed, you shouldn't be surprised if the air heater in the cold recovery does not reach the required air outlet temperature and the air outlet humidity is much too high. The main cause is the poor degree of condensate separation. Some of the condensate gets into the air heater, which is really not the point. Sisyphus sends his regards!

Counter-current flow in laminated heat exchangers only exists in the imagination of some producers who do not care whether the temperature efficiency of heat recovery systems is only 50 % instead of the promised 70 %! One hopes that it will not be measured. The correct procedure is described below and has been confirmed by measurements in the laboratory.

For humid air cooling, the opinions about the latent capacity deferred share far apart. Only those which calculated the cooling process with finite elements, can accurately determine, how the cooling process expires. For the humid air and the coolant, during the cooling process, Reynolds go down and Prandtl go up. That's reason the k-value go down. Once formed condensate however, the k-value go up. This can be done only by finite elements taken into account. The beautiful exponential temperature gradients in the chart right must be forgotten, just because at the beginning sensitive capacity exists only and at the end only, latent capacity can be removed. The temperature gradients deform. Since the temperature difference Δt_m must understood as surface between the two temperature gradients, this reduced that extreme, well understood in counter-current-flow too! As pinch point means in the thermodynamic process technology the smallest temperature difference between the two media, whether this value between several heat exchangers or inside a heat exchanger occurs. Conclusion: Latent heat reduce the average temperature difference!



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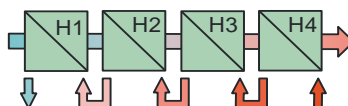
City, 9.4.2021
With the compliments of

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xxxxxxxxxx

Plant
Object
Position

Software by www.zcs.ch

Definition		
Height over sea level	m	0.000
Pressure	hPa	1013.250
Temp.	°C	20.000
Rel. humidity	%	40.000
Air humid	m3/h	25000.000
30 V% Et.glycol	m3/h	8.437



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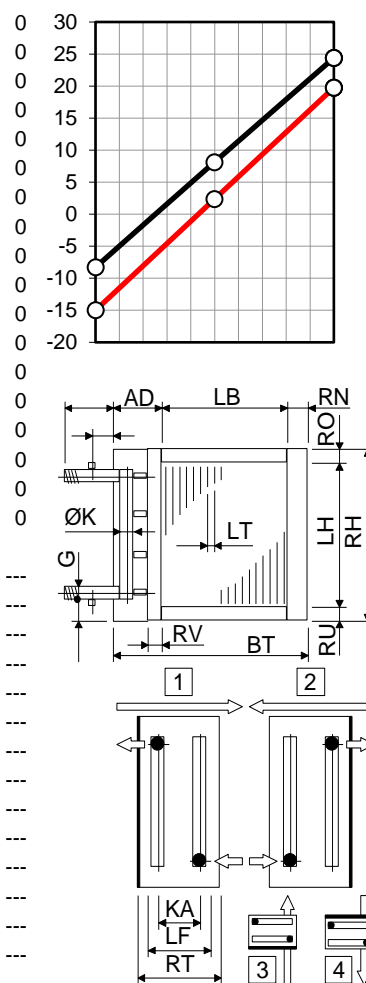
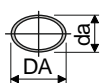
Air humid		Heater 1	Heater 2	Heater 3	Heater 4
Temp. Inlet	°C	-15.000	2.332	19.763	19.763
Rel. humidity Inlet	%	90.000	20.331	6.403	6.403
Temp. Outlet	°C	2.332	19.763	19.763	19.763
Rel. humidity Outlet	%	20.331	6.403	6.403	6.403
Pressure drop (105.09 %)	Pa	63.905	69.762	0.000	0.000

30 V% Et.glycol		Heater 1	Heater 2	Heater 3	Heater 4
Temp. Inlet	°C	8.116	24.400	24.400	24.400
Temp. Outlet	°C	-8.277	8.116	24.400	24.400
Pressure drop (103.51 %)	kPa	103.911	91.314	0.000	0.000

Heat exchanger		Heater 1	Heater 2	Heater 3	Heater 4
Capacity	kW	144.670	145.562	0.000	0.000
Surface reserve	%	0.166	0.033	0.000	0.000
Present surface	m2	1156.265	1156.265	0.000	0.000
Required surface	m2	1154.353	1155.889	0.000	0.000
k-coeff.	V/m2K	20.729	25.413	0.000	0.000
Average temp. diff.	K	6.046	4.955	0.000	0.000

Tubes blank	Piece	0	0	0
Int. vent./drains	Piece	5	5	0
Tube rows on the depth	Piece	12	12	0
Tube rows on the height	Piece	48	48	0
Number of circuits (NC)	Piece	24	24	0
Volume	l	142	142	0
Weight	kg	501	501	0
Connections	G	2"	2"	0
Frame height	RH	1760	1760	0
Frame width	BT	2296	2296	0
Frame depth	RT	480	480	0
Finned height	LH	1680	1680	0
Finned width	LB	2100	2100	0
Frame on top	RO	40	40	0
Frame on bottom	RU	40	40	0
Frame in front	RV	30	30	0
Frame on back (~53/53/0/0)	RN	53	53	0
Collector covering	AD	143	143	0

Tubes	Type	circular	circular	---
Tubes	DA / da	12.40 / 12.40	12.40 / 12.40	---
Tubes	S1 / S2	35.00 / 35.00	35.00 / 35.00	---
Tubes	---	in line	in line	---
Tubes	---	Cu	Cu	---
Tubes	---	smooth	smooth	---
Collector	---	Cu	Cu	---
Connections	---	Rg7	Rg7	---
Fins	LT / LD	2.40 / 0.20	2.40 / 0.20	---
Fins	---	Al	Al	---
Fins	---	smooth	smooth	---
Frame	---	AlMg3	AlMg3	---
Protection	---	without	without	---
Protection	---	---	---	---
Air flow direction	---	horizontal	horizontal	---



Heater 1: 35/35/12-12R-48T-2100A-2.4PA-24C-Cu/Al/AlMg3

Heater 2: 35/35/12-12R-48T-2100A-2.4PA-24C-Cu/Al/AlMg3

Heater 3: ---

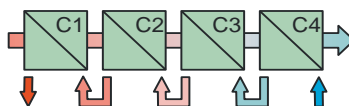
Heater 4: ---

Total

EUR	7394.00
EUR	7394.00
EUR	0.00
EUR	0.00
EUR	14788.00

Delivery: 5-6 weeks
Validity: 12 weeks
Condit.: net, prepaid address
Payment: 30 days net

Definition		
Height over sea level	m	0.000
Pressure	hPa	1013.250
Temp.	°C	20.000
Rel. humidity	%	40.000
Air humid	m3/h	25000.000
30 V% Et.glycol	m3/h	8.509



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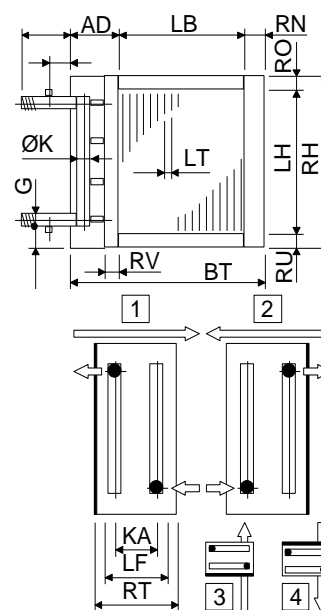
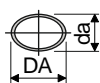
Air humid		Cooler 1	Cooler 2	Cooler 3	Cooler 4
Temp. Inlet	°C	20.000	8.374	-1.343	-1.343
Rel. humidity Inlet	%	40.000	84.800	100.000	100.000
Temp. Outlet	°C	8.374	-1.343	-1.343	-1.343
Rel. humidity Outlet	%	84.800	100.000	100.000	100.000
Pressure drop	Pa	68.492	84.391	0.000	0.000

30 V% Et.glycol		Cooler 1	Cooler 2	Cooler 3	Cooler 4
Temp. Inlet	°C	4.859	-10.266	-10.266	-10.266
Temp. Outlet	°C	15.765	4.859	-10.266	-10.266
Pressure drop (103.05 %)	kPa	96.953	107.994	0.000	0.000

Heat exchanger		Cooler 1	Cooler 2	Cooler 3	Cooler 4
Capacity	kW	97.960	134.683	0.000	0.000
Surface reserve	%	0.451	0.183	0.000	0.000
Present surface	m2	1111.899	1111.899	0.000	0.000
Required surface	m2	1106.912	1109.869	0.000	0.000
k-coeff.	V/m2K	24.655	22.993	0.000	0.000
Average temp. diff.	K	3.589	5.278	0.000	0.000

Tubes blank	Piece	0	0	0
Int. vent./drains	Piece	5	5	0
Tube rows on the depth	Piece	12	12	0
Tube rows on the height	Piece	48	48	0
Number of circuits (NC)	Piece	24	24	0
Volume	l	142	142	0
Weight	kg	489	489	0
Connections	G	2"	2"	0
Frame height	RH	1760	1760	0
Frame width	BT	2296	2296	0
Frame depth	RT	480	480	0
Finned height	LH	1680	1680	0
Finned width	LB	2100	2100	0
Frame on top	RO	40	40	0
Frame on bottom	RU	40	40	0
Frame in front	RV	30	30	0
Frame on back (~53/53/0/0)	RN	53	53	0
Collector covering	AD	143	143	0

Tubes	Type	circular	circular	---
Tubes	DA / da	12.40 / 12.40	12.40 / 12.40	---
Tubes	S1 / S2	35.00 / 35.00	35.00 / 35.00	---
Tubes	---	in line	in line	---
Tubes	---	Cu	Cu	---
Tubes	---	smooth	smooth	---
Collector	---	Cu	Cu	---
Connections	---	Rg7	Rg7	---
Fins	LT / LD	2.50 / 0.20	2.50 / 0.20	---
Fins	---	Al	Al	---
Fins	---	smooth	smooth	---
Frame	---	AlMg3	AlMg3	---
Protection	---	without	without	---
Protection	---	---	---	---
Air flow direction	---	horizontal	horizontal	---



Cooler 1: 35/35/12-12R-48T-2100A-2.5PA-24C-Cu/Al/AlMg3

EUR 7290.00

Delivery: 5-6 weeks

Cooler 2: 35/35/12-12R-48T-2100A-2.5PA-24C-Cu/Al/AlMg3

EUR 7290.00

Validity: 12 weeks

Cooler 3: ---

EUR 0.00

Condit.: net, prepaid address

Cooler 4: ---

EUR 0.00

Payment: 30 days net

Total

EUR 14580.00