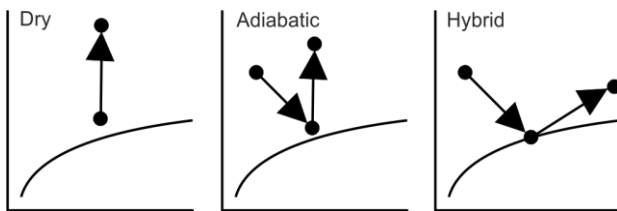




Brine-Re-cooling in Air Handling Units

If an outdoor installation is not permitted for the brine re-cooler or is not possible for other reasons, it can be positioned in the technical room in the form of an air handling unit.

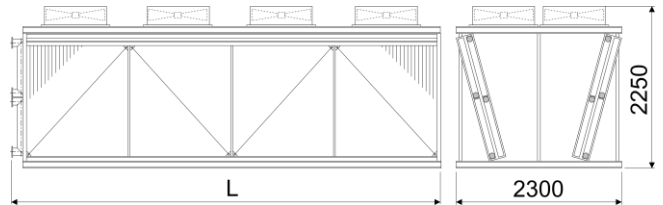
To optimize the COP of the refrigeration machine, 3 operating states as a function of the outside temperature should be provided in both cases.



Winter Transition Summer

The water treatment for adiabatic service does not make any great demands in contrast to hybrid service.

Brine-Re-cooler with container measurements
Installation on a flat roof

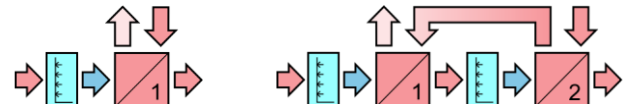


Air handling unit in a technical room



Single stage service

Two-stage service



The approximate calculation of the air handling unit was carried out using the **AHU** software, which is an integral part of the **AHH** software, which contains total 11 applications. The **AHH** software can be downloaded from www.zcs.ch and runs as a demo version without any restrictions for 30 days. There are over 6,000 licenses on the market worldwide, which is why the **AHH** software can be called a leader, not least because the cooling process is calculated in 15 steps and many helps, such as the comfort range and climate data, make the project work easier.

Air-Handling Unit (H x W = 2570 x 5010 mm) Outside air (80000 m ³ /h - Filter 1.87)	Length mm	Weight kg	Pressure drop Pa	Price EUR
Outside air			100.00	
Empty part little with flaps	350.00	240.00	27.00	4600.00
Filter G	450.00	330.00	109.00	5700.00
Filter F	650.00	490.00	144.00	8470.00
Humidifier water	1300.00	670.00	88.00	12030.00
Heater	200.00	510.00	21.00	9280.00
Humidifier water	1300.00	670.00	88.00	12030.00
Heater	200.00	510.00	21.00	9280.00
Sound absorber	1300.00	670.00	53.00	12030.00
Fan - Efficiency 70.00 % - Capacity 32.35 kW	3700.00	2730.00	88.00	47960.00
Sound absorber	1300.00	670.00	53.00	12030.00
Empty part little with flaps	350.00	240.00	27.00	4600.00
Supply air			200.00	
Total	11100.00	7730.00	1019.00	138010.00

Page 2: Single-stage design - Heat exchanger, calculation of hybrid service in summer

Page 3: Single-stage design - Heat exchanger, calculation for dry service below 10°C

Page 4: Single-stage design - Operating costs, investment costs, economy

Page 5: Single-stage design - Payback time comparison to a wet cooling tower

Page 6: Single-stage design - Heat exchanger, calculation of hybrid service in summer

Page 7: Single-stage version - Heat exchanger, calculation for dry service below 10°C

Page 8: Single-stage design - Operating costs, investment costs, economy

Page 9: Single-stage design - Payback time comparison to a wet cooling tower



Capacity	kW	600.000	----- sensible:	235.890
Surface reserve	%	1.167	latent:	364.110
Present surface	m2	4097.986		
Required surface	m2	4050.726		
k-coeff.	W/m2K	39.171		
Average temp. diff.	K	3.781		

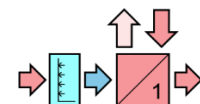
Company
Branch
Street
Country / ZIP / City

Air humid (ff=0.00005 m2K/W)		Inlet	Outlet	Definition
Height over sea level	m			450.000
Pressure	hPa			960.075
Temp. (31.500)	°C	22.469	31.500	20.000
Rel. humidity (46.930)	%	100.000	76.686	40.000
Abs. humidity (14.332)	g/kg	18.097	23.766	
Density humid	kg/m3	1.119	1.082	
Enthalpy humid	kJ/kg	68.615	92.518	
Volume flow humid	m3/h	82213.090	85474.724	80000.000
Mass flow dry	kg/h	90368.160	90368.160	
Velocity	m/s	1.881	1.955	
Pressure drop dry	Pa		144.972	
Pressure drop wet	Pa		197.279	
Evaporation total	kg/h		852.565	(15.000 °C)

Phone: xxxxxxxxxx
Fax: xxxxxxxxxx
E-Mail
Homepage

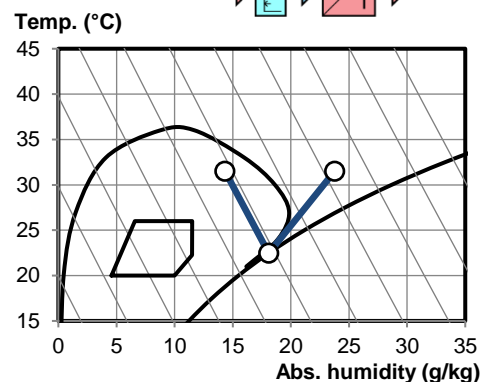
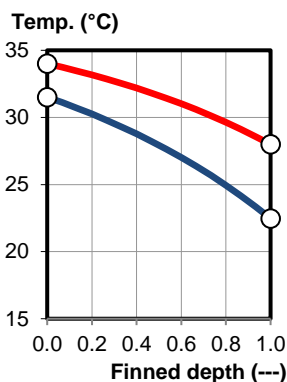
City, 05.04.2022
With the compliments of

Representative
Direct dialing
xxxxxxxxxx



30 V% Et.glycol (ff=0.00005 m2K/W)

Temp. in	°C	34.000
Temp. out	°C	28.000
Density	kg/m3	1040.834
Spec. heat	kJ/kgK	3.677
Heat cond.	W/mK	0.465
Viscosity	Pas	1.652E-03
Volume flow	m3/h	94.077
Velocity	m/s	0.978
Pressure drop	kPa	43.252

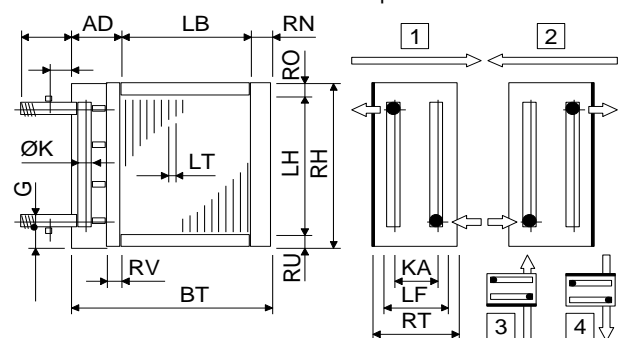


Technical data

Tubes total	Piece	1104
Tubes blank	Piece	0
Int. vent./drains	Piece	0 / 0
Tube rows on the depth	Piece	16
Tube rows on the height	Piece	69
Tube coupling in series	Piece	8
Number of circuits (NC)	Piece	138
Volume	l	1019
Weight	kg	2033
Connections	G	4"
Frame height	RH	mm 2840
Frame width	BT	mm 4668
Frame depth	RT	mm 660
Finned height	LH	mm 2760
Finned width	LB	mm 4400
Finned depth	LF	mm 554
Frame on top	RO	mm 40
Frame on bottom	RU	mm 40
Frame in front	RV	mm 40
Frame on back (~69mm)	RN	mm 69
Collector-Diameter	K	mm 108
Collector covering	AD	mm 199
Collector distance	KA	mm 520
Fin spacing	LT	mm 3.000
Fin thickness	LD	mm 0.200
Tube diameter	DA	mm 16.400
Tube thickness	S	mm 0.350
Tube interval on the height	S1	mm 40.000
Tube interval on the depth	S2	mm 34.641

Tubes:	smooth	Cu
	staggered	
Collectors:	1.05 m/s	Cu
Connections:	1.05 m/s	Cu
Fins:	ribbed	AlMg3
Frame:	2.00 mm	AISI 304
Circulations:	3	Parallel
Protection:		without

Air flow direction: horizontal
Special: Bottom plate perforated for perfect condensate drain



Delivery:	5-6 weeks
Validity:	12 weeks
Condit.:	net, prepaid address
Payment:	30 days net
Price net:	EUR 35306.00

dry: 40/35/16-16R-69T-4400A-3.0PA-138C-Cu/AlMg3/AISI 304



Capacity	kW	600.000
Surface reserve	%	0.000
Present surface	m2	4097.986
Required surface	m2	4097.986
k-coeff.	W/m2K	32.738
Average temp. diff. (98.24 %)	K	4.472

Company
Branch
Street
Country / ZIP / City

Phone: xxxxxxxxxx
Fax: xxxxxxxxxx
E-Mail
Homepage

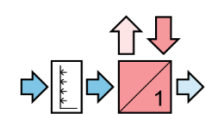
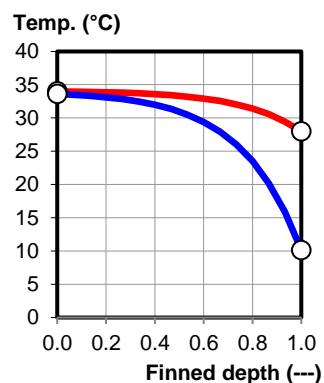
City, 05.04.2022
With the compliments of

Air humid (ff=0.00005 m2K/W)		Inlet	Outlet	Definition
Height over sea level	m			450.000
Pressure	hPa			960.075
Temp.	°C	10.155	33.615	20.000
Rel. humidity	%	80.000	19.128	40.000
Abs. humidity	g/kg	6.498	6.498	
Density humid	kg/m3	1.176	1.086	
Enthalpy humid	kJ/kg	26.588	50.490	
Volume flow humid	m3/h	77361.407	83767.312	80000.000
Mass flow dry	kg/h	90368.160	90368.160	
Velocity	m/s	1.770	1.916	
Pressure drop dry	Pa		137.369	

Representative
Direct dialing
xxxxxxxxxx

30 V% Et.glycol (ff=0.00005 m2K/W)

Temp. Inlet	°C	34.000
Temp. Outlet	°C	28.000
Temp. ø	°C	31.000
Density	kg/m3	1040.834
Spec. heat	kJ/kgK	3.677
Heat cond.	W/mK	0.465
Viscosity	Pas	1.652E-03
Volume flow	m3/h	94.077
Velocity	m/s	0.978
Pressure drop	kPa	43.252



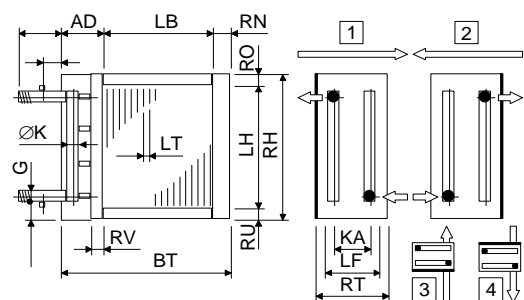
Software by www.zcs.ch

Technical data

Tubes total	Piece	1104
Tubes blank	Piece	0
Int. vent./drains	Piece	0 / 0
Tube rows on the depth	Piece	16
Tube rows on the height	Piece	69
Tube coupling in series	Piece	8
Number of circuits (NC)	Piece	138
Volume	l	1019
Weight	kg	2033
Connections	G	4"
Frame height	RH	mm 2840
Frame width	BT	mm 4668
Frame depth	RT	mm 660
Finned height	LH	mm 2760
Finned width	LB	mm 4400
Finned depth	LF	mm 554
Frame on top	RO	mm 40
Frame on bottom	RU	mm 40
Frame in front	RV	mm 40
Frame on back (~69mm)	RN	mm 69
Collector-Diameter	K	mm 108
Collector covering	AD	mm 199
Collector distance	KA	mm 520
Fin spacing	LT	mm 3.000
Fin thickness	LD	mm 0.200
Tube diameter	DA	mm 16.400
Tube thickness	S	mm 0.350
Tube interval on the height	S1	mm 40.000
Tube interval on the depth	S2	mm 34.641

Tubes:	smooth	Cu
	staggered	
Collectors:	1.05 m/s	Cu
Connections:	1.05 m/s	Cu
Fin:	ribbed	AlMg3
Frame:	2.00 mm	AISI 304
Circulations:	3	Parallel
Protection:		without

Air flow direction: horizontal
Special: Bottom plate perforated for perfect condensate drain



Delivery:	5-6 weeks
Validity:	12 weeks
Condit.:	net, prepaid address
Payment:	30 days net
Price net:	EUR 35306.00



Water demand total: 91.01 % less than an open-cooling-tower !

Year: 8760 Hours

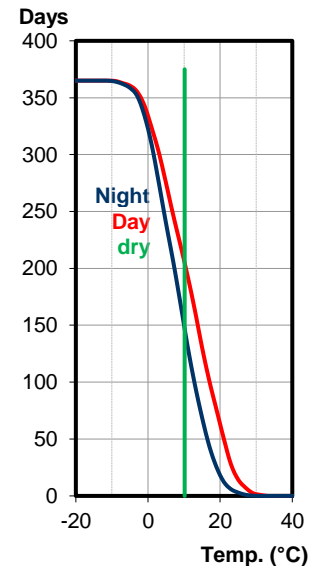
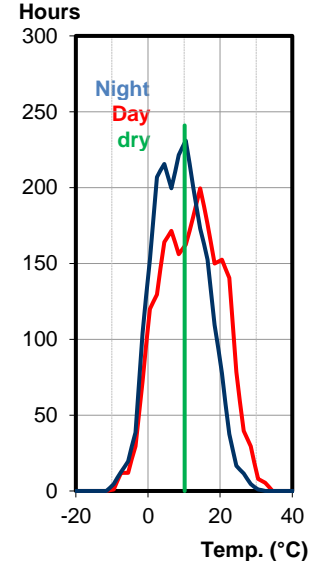
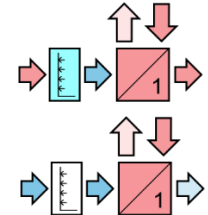
Station	Water	Year: 8760 Hours					
		Day	Night	Temp.	Day	Night	
Zürich (1995-2005)	kg/h	t/a	t/a	°C	h	h	
	0.0	0.0	0.0	40.5	0.0	0.0	
	0.0	0.0	0.0	39.5	0.0	0.0	
	0.0	0.0	0.0	37.5	0.0	0.0	
Capacity	kW	600.00	0.0	0.0	38.5	0.0	
	0.0	0.0	0.0	37.5	0.0	0.0	
30 V% Et.glycol (ff=0.00005 m	h	8760.00	0.0	0.0	36.5	0.0	
Temp. in	°C	34.00	0.0	0.0	35.5	0.0	
Temp. out	°C	28.00	0.0	0.0	34.5	0.0	
Volume flow	m3/h	94.08	932.4	2.6	0.0	33.5	
Mass flow	kg/h	97918.19	892.5	4.9	0.0	32.5	
Pressure drop	kPa	43.25	852.6	5.8	0.4	31.5	
Ext. pressure	kPa	50.00	812.6	6.5	0.8	30.5	
Pressure drop total	kPa	93.25	772.7	14.5	2.1	29.5	
Pump-Efficiency	%	80.00	732.7	21.6	3.3	28.5	
Pump power	kW	3.05	692.8	23.9	5.5	27.5	
Energy costs	EUR	2668.42	652.9	25.8	7.5	26.5	
			612.9	36.2	8.6	25.5	
			573.0	45.0	9.5	24.5	
Wet-Service (51.12%)	h	4478.25	573.0	45.0	9.5	24.5	
Temp.	°C	31.50	533.0	58.4	14.4	23.5	
Rel. humidity	%	46.93	493.1	69.3	18.5	22.5	
Abs. humidity	g/kg	18.10	453.1	66.4	26.1	21.5	
Air humid (20°/40%)	m3/h	80000.00	413.2	63.0	32.0	20.5	
Mass flow dry	kg/h	90368.16	373.3	56.5	34.9	19.5	
Pressure drop	Pa	144.97	333.3	50.0	36.5	18.5	
Pressure drop of cabinet	Pa	200.00	293.4	47.8	38.4	17.5	
Ext. pressure	Pa	200.00	253.4	44.6	38.6	16.5	
Pressure drop total	Pa	544.97	213.5	40.1	34.7	15.5	
Fan-Efficiency	%	70.00	173.6	34.6	30.0	14.5	
Fan power	kW	17.30	133.6	25.4	25.0	13.5	
Energy costs	EUR	7747.69	93.7	16.9	18.8	12.5	
			53.7	9.2	11.6	11.5	
			13.8	2.2	3.2	10.5	
Humidifier (51.12%)	h	4478.25	13.8	2.2	3.2	10.5	
Temp.	°C	0.00	0.0	0.0	9.5	159.3	
Humidification	kg/h	852.57	0.0	0.0	8.5	156.0	
Humidification (Max.)	kg/h	932.45	0.0	0.0	7.5	163.8	
Pressure drop	kPa	200.00	0.0	0.0	6.5	171.5	
Pump-Efficiency	%	80.00	0.0	0.0	5.5	167.8	
Pump power	kW	0.07	0.0	0.0	4.5	164.0	
Energy costs	EUR	31.90	0.0	0.0	3.5	146.8	
Day + 10% Waste water	t/a	848.15	0.0	0.0	2.5	129.5	
Night + 10% Waste water	t/a	440.52	0.0	0.0	1.5	124.8	
Total + 10% Waste water	t/a	1288.66	0.0	0.0	0.5	120.0	
Water	EUR	5154.65	0.0	0.0	-0.5	96.0	
			0.0	0.0	-1.5	72.0	
			0.0	0.0	-2.5	50.8	
dry-Service (48.88%)	h	4281.75	0.0	0.0	0.0	-2.5	
Temp.	°C	10.15	0.0	0.0	0.0	-3.5	
Rel. humidity	%	80.00	0.0	0.0	0.0	-4.5	
Abs. humidity	g/kg	6.50	0.0	0.0	0.0	-5.5	
Air humid (20°/40%)	m3/h	80000.00	0.0	0.0	0.0	-6.5	
Mass flow dry	kg/h	90368.16	0.0	0.0	0.0	-7.5	
Pressure drop	Pa	137.37	0.0	0.0	0.0	-8.5	
Pressure drop of cabinet	Pa	200.00	0.0	0.0	0.0	-9.5	
Ext. pressure	Pa	200.00	0.0	0.0	0.0	-10.5	
Pressure drop total	Pa	537.37	0.0	0.0	0.0	-11.5	
Fan-Efficiency	%	70.00	0.0	0.0	0.0	-12.5	
Fan power	kW	17.06	0.0	0.0	0.0	-13.5	
Energy costs	EUR	7304.38	0.0	0.0	0.0	-14.5	
			0.0	0.0	0.0	-15.5	
			0.0	0.0	0.0	-16.5	
Service - Energy costs			0.0	0.0	0.0	-17.5	
Daily hours (100.00%)	h/a	4380.00	0.0	0.0	0.0	-17.5	
Night hours (100.00%)	h/a	4380.00	0.0	0.0	0.0	-18.5	
Electric energy (MWh)	EUR	100.00	0.0	0.0	0.0	-19.5	
Water (t)	EUR	4.00	0.0	0.0	0.0	-20.5	
Life cycle	Years	15.00	0.0	0.0	0.0	-21.5	
Support costs	%	5.00	0.0	0.0	0.0	-22.5	
Capital interest	%	1.00	0.0	0.0	0.0	-23.5	
Energy increase	%	1.00	0.0	0.0	0.0	-24.5	
Inflation	%	1.00	0.0	0.0	0.0	-25.5	
Investment costs	EUR	111000.00	0.0	0.0	0.0	-26.5	
Water + Energy costs	EUR	22907.04	0.0	0.0	0.0	-27.5	
Support costs	EUR	5550.00	0.0	0.0	0.0	-28.5	
Overheads	EUR	28457.04	0.0	0.0	0.0	-29.5	
			0.0	0.0	0.0	-30.5	
Capital costs	EUR	47574.11	932.4	771.0	400.5	4380.0	

Company
Branch
Street
Country / ZIP / City

Phone: xxxxxxxxxx
Fax: xxxxxxxxxx
E-Mail
Homepage

City, 05.04.2022
With the compliments of

Representative
Direct dialing
xxxxxxxxxx



Capital interest	%	1.00
Energy increase	%	1.00
Inflation	%	1.00
Support costs	%	5.00

Investment costs

Offener Nasskühlturm	EUR	36000.00
AHU return air	EUR	111000.00
Additional costs	EUR	75000.00

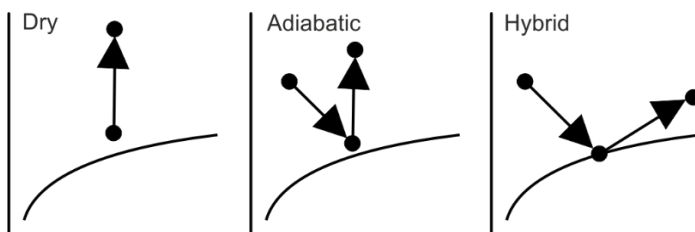
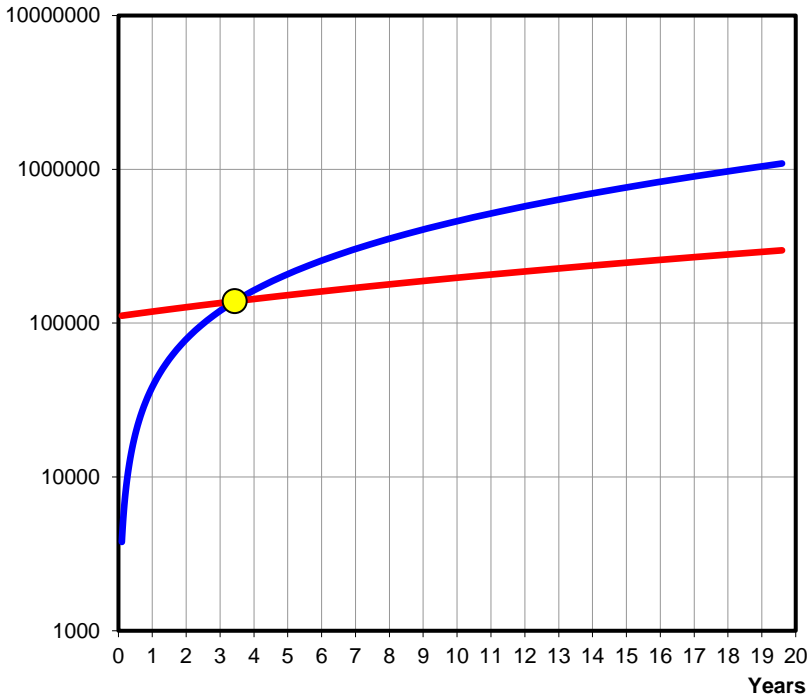
Overheads

Support costs (+)	EUR	3750.00
Energy costs: Offener Nasskühlturm (-)	EUR	61000.00
Energy costs: AHU return air (+)	EUR	22907.04
Energy costs: - 62.4 %	EUR	38092.96

Amortization

BEP (Break even point)	Years	3.44
------------------------	-------	-------------

Incomes (EUR) - Expenses (EUR) - Amortization (Years)

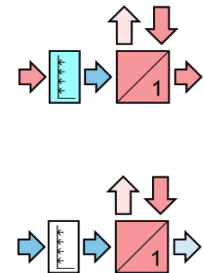


Company
Branch
Street
Country / ZIP / City

Phone: xxxxxxxxxx
Fax: xxxxxxxxxx
E-Mail
Homepage

City, 05.04.2022
With the compliments of

Representative
Direct dialing
xxxxxxxxxx



Capacity total 600 kW		Humidifier 1	Hybrid 1	Humidifier 2	Hybrid 2
Capacity	kW		297.575		302.425
Surface reserve	%		1.192		1.146
Present surface	m ²		2048.993		2048.993
Required surface	m ²		2024.864		2025.772
k-coeff.	N/m ² K		37.297		37.360
Average temp. diff.	K		3.940		3.996
Velocity	m/s		1.902		1.931
Pressure drop	Pa		90.591		91.947
Temp. in	°C	31.500	22.469	28.220	25.336
Rel. humidity in	%	46.930	100.000	79.848	100.000
Abs. humidity in	g/kg	14.332	18.097	20.397	21.610
Volume flow humid in	m ³ /h	84226.436	82213.090	84113.508	83465.916
Temp. out	°C	22.469	28.220	25.336	31.223
Rel. humidity out	%	100.000	79.848	100.000	78.351
Abs. humidity out	g/kg	18.097	20.397	21.610	23.910
Volume flow humid out	m ³ /h	82213.090	84113.508	83465.916	85416.067
Moistening temperature	°C	15.000		15.000	
Humidification	g/kg	6.065		3.513	
Humidification	kg/h	548.100		317.430	

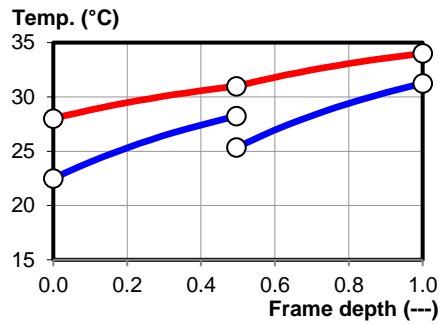


Company
Branch
Street
Country / ZIP / City

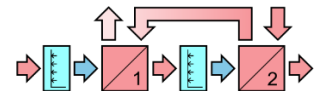
Phone: xxxxxxxxxx
Fax: xxxxxxxxxx
E-Mail
Homepage

City, 5.4.2022
With the compliments of

Definition		
Height over sea level	m	450.000
Pressure	hPa	960.075
Temp.	°C	20.000
Rel. humidity	%	40.000
Air humid	m ³ /h	80000.000
Mass flow dry	kg/h	90368.160



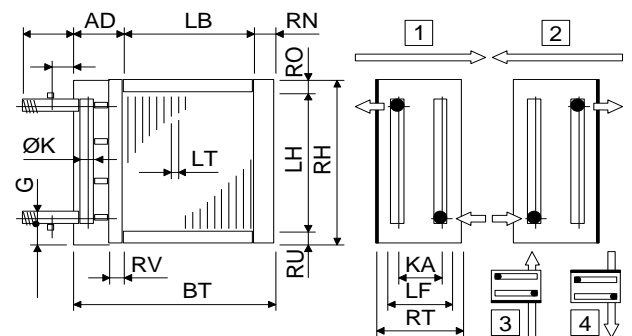
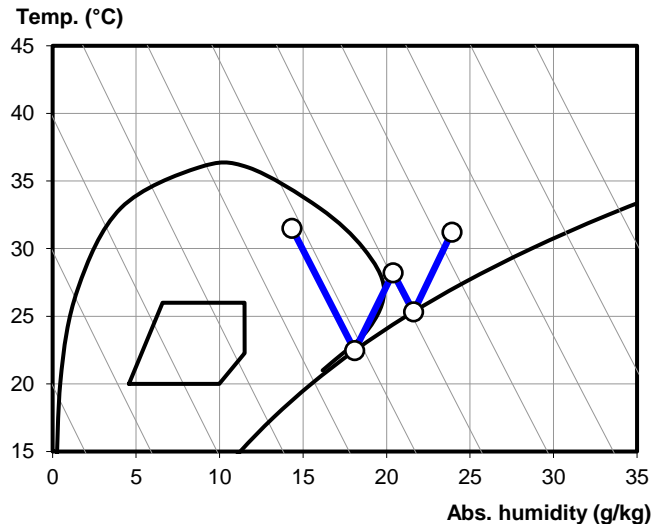
Representative
Direct dialing
xxxxxxxxxx



Software by www.zcs.ch

30 V% Et.glycol		
Temp. in	°C	34.000
Temp. out	°C	28.000
Volume flow	m ³ /h	94.077
Mass flow	kg/h	97918.205
Pressure drop total	kPa	46.908

Technical data		Hybrid 1	Hybrid 2
Tubes blank	Piece	0	0
Int. vent./drains	Piece	0 / 0	0 / 0
Tube rows on the depth	Piece	8	8
Tube rows on the height	Piece	69	69
Number of circuits (NC)	Piece	138	138
Volume	l	534	534
Weight	kg	1068	1068
Connections	G	4"	4"
Frame height	RH	2840	2840
Frame width	BT	4668	4668
Frame depth	RT	380	380
Finned height	LH	2760	2760
Finned width	LB	4400	4400
Frame on top	RO	40	4000
Frame on bottom	RU	40	40
Frame in front	RV	40	40
Frame on back (-69/69)	RN	69	69
Collector covering	AD	199	199
Fin spacing	LT	3.000	3.000
Fin thickness	LD	0.200	0.200
Tube diameter	DA	16.400	16.400
Tube thickness	S	0.350	0.350
Tube interval on the height	S1	40.000	40.000
Tube interval on the depth	S2	34.641	34.641
Tubes	Cu		Cu
Tubes	smooth		smooth
Collector	Cu		Cu
Connections	Cu		Cu
Fins	AlMg3		AlMg3
Fins	ribbed		ribbed
Frame	AISI 304		AISI 304
Protection	without		without
Protection	---		---
Price	EUR	19130.00	19130.00



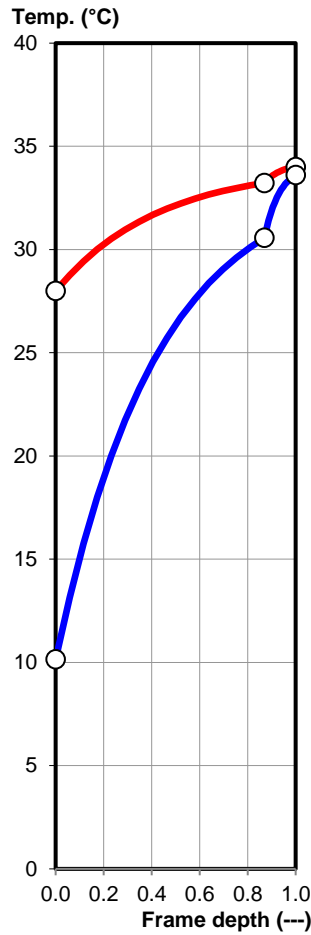
Delivery: 5-6 weeks
Validity: 12 weeks
Condit.: net, prepaid address
Payment: 30 days net

Capacity total 600 kW		dry 1	dry 2
Capacity	kW	522.216	77.784
Surface reserve	%	0.000	0.088
Present surface	m ²	2048.993	2048.993
Required surface	m ²	2048.991	2047.193
k-coeff.	N/m ² K	32.545	32.816
Average temp. diff.	K	7.831	1.158
Velocity	m/s	1.830	1.830
Pressure drop	Pa	68.800	71.891
Temp. in	°C	10.151	30.571
Rel. humidity in	%	80.000	22.705
Abs. humidity in	g/kg	6.496	6.496
Volume flow humid in	m ³ /h	77360.196	82936.035
Temp. out	°C	30.571	33.611
Rel. humidity out	%	22.705	19.128
Abs. humidity out	g/kg	6.496	6.496
Volume flow humid out	m ³ /h	82936.035	83766.105

Definition		
Height over sea level	m	450.000
Pressure	hPa	960.075
Temp.	°C	20.000
Rel. humidity	%	40.000
Air humid	m ³ /h	80000.000
Mass flow dry	kg/h	90368.160

30 V% Et.glycol		
Temp. in	°C	34.000
Temp. out	°C	28.000
Volume flow	m ³ /h	94.077
Mass flow	kg/h	97918.205
Pressure drop total	kPa	46.908

Technical data		dry 1	dry 2
Tubes blank	Piece	0	0
Int. vent./drains	Piece	0 / 0	0 / 0
Tube rows on the depth	Piece	8	8
Tube rows on the height	Piece	69	69
Number of circuits (NC)	Piece	138	138
Volume	l	534	534
Weight	kg	1068	1068
Connections	G	4"	4"
Frame height	RH	2840	2840
Frame width	BT	4668	4668
Frame depth	RT	380	380
Finned height	LH	2760	2760
Finned width	LB	4400	4400
Frame on top	RO	40	4000
Frame on bottom	RU	40	40
Frame in front	RV	40	40
Frame on back (-69/69)	RN	69	69
Collector covering	AD	199	199
Fin spacing	LT	3.000	3.000
Fin thickness	LD	0.200	0.200
Tube diameter	DA	16.400	16.400
Tube thickness	S	0.350	0.350
Tube interval on the height	S1	40.000	40.000
Tube interval on the depth	S2	34.641	34.641
Tubes	Cu		Cu
Tubes	smooth		smooth
Collector	Cu		Cu
Connections	Cu		Cu
Fins	AlMg3		AlMg3
Fins	ribbed		ribbed
Frame	AISI 304		AISI 304
Protection	without		without
Protection	---		---
Price	EUR	19130.00	19130.00

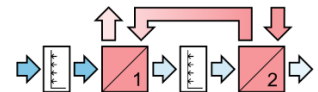


Company
Branch
Street
Country / ZIP / City

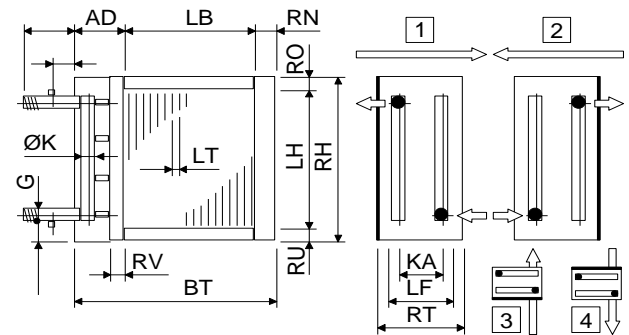
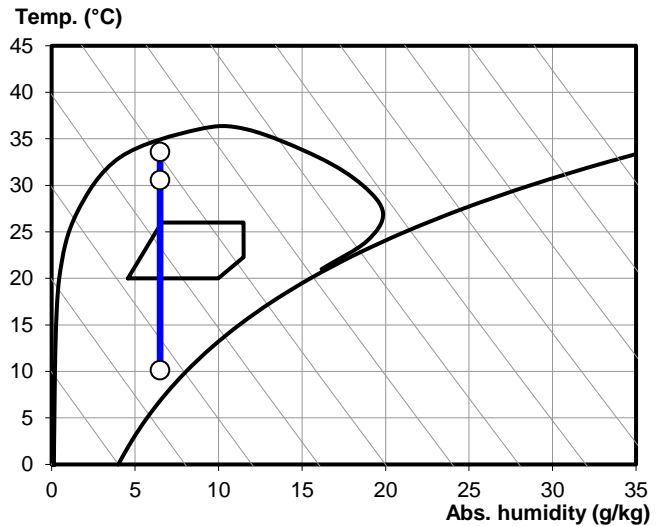
Phone: xxxxxxxxxx
Fax: xxxxxxxxxx
E-Mail
Homepage

City, 5.4.2022
With the compliments of

Representative
Direct dialing
xxxxxxxxxx



Software by www.zcs.ch



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



Water demand total: 90.91 % less than an open-cooling-tower !

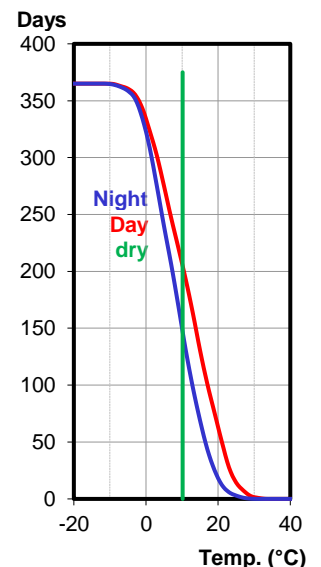
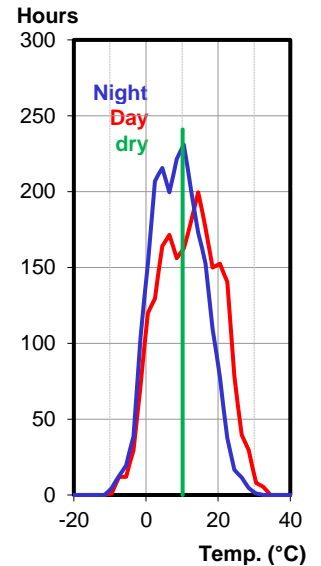
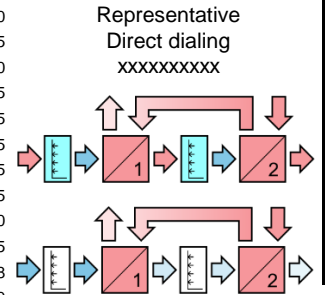
Year: 8760 Hours

Station	Water	Year: 8760 Hours					
		Day	Night	Temp.	Day	Night	
Zürich (1995-2005)	kg/h	t/a	t/a	°C	h	h	
	0.0	0.0	0.0	40.5	0.0	0.0	
	0.0	0.0	0.0	39.5	0.0	0.0	
	0.0	0.0	0.0	37.5	0.0	0.0	
Capacity Hy1+Hy2	kW	600.00	0.0	0.0	38.5	0.0	0.0
			0.0	0.0	37.5	0.0	0.0
30 V% Et.glycol	h	8760.00	0.0	0.0	36.5	0.0	0.0
Temp. in	°C	34.00	0.0	0.0	35.5	0.0	0.0
Temp. out	°C	28.00	0.0	0.0	34.5	0.0	0.0
Volume flow	m3/h	94.08	946.6	2.6	33.5	2.8	0.0
Mass flow	kg/h	97918.20	906.1	5.0	32.5	5.5	0.0
Pressure drop Hy1+Hy2	kPa	46.91	865.5	5.8	31.5	6.8	0.5
Ext. pressure	kPa	50.00	825.0	6.6	30.5	8.0	1.0
Pressure drop total	kPa	96.91	784.4	14.7	29.5	18.8	2.8
Pump-Efficiency	%	80.00	743.9	21.9	28.5	29.5	4.5
Pump power	kW	3.17	703.4	24.3	27.5	34.5	8.0
Energy costs	EUR	2773.01	662.8	26.2	26.5	39.5	11.5
			622.3	36.7	25.5	59.0	14.0
Wet-Service (51.12%)	h	4478.25	581.7	45.7	24.5	78.5	16.5
Temp.	°C	31.50	541.2	59.3	23.5	109.5	27.0
Rel. humidity	%	46.93	500.6	70.3	22.5	140.5	37.5
Abs. humidity	g/kg	14.33	460.1	67.4	21.5	146.5	57.5
Air humid (20°/40%)	m3/h	80000.00	419.6	64.0	32.5	20.5	77.5
Mass flow dry	kg/h	90368.16	379.0	57.3	19.5	151.3	93.5
Pressure drop Hy1+Hy2	Pa	182.54	338.5	50.8	18.5	150.0	109.5
Pressure drop of cabinet	Pa	200.00	297.9	48.6	17.5	163.0	131.0
Ext. pressure	Pa	200.00	257.4	45.3	16.5	176.0	152.5
Pressure drop total	Pa	582.54	216.9	40.7	15.5	187.8	162.8
Fan-Efficiency	%	70.00	176.3	35.2	14.5	199.5	173.0
Fan power	kW	18.49	135.8	25.8	13.5	190.0	186.8
Energy costs	EUR	8281.75	95.2	17.2	12.5	180.5	200.5
			54.7	9.4	11.8	171.5	215.8
2 Humidifier (51.12%)	h	4478.25	14.1	2.3	10.5	162.5	231.0
Temp.	°C	15.00	0.0	0.0	9.5	159.3	226.3
Humidification	kg/h	865.53	0.0	0.0	8.5	156.0	221.5
Humidification (Max.)	kg/h	946.61	0.0	0.0	7.5	163.8	210.5
Pressure drop	kPa	200.00	0.0	0.0	6.5	171.5	199.5
Pump-Efficiency	%	80.00	0.0	0.0	5.5	167.8	207.5
Pump power	kW	0.07	0.0	0.0	4.5	164.0	215.5
Energy costs	EUR	32.38	0.0	0.0	3.5	146.8	211.3
Day + 10% Waste water	t/a	861.32	0.0	0.0	2.5	129.5	207.0
Night + 10% Waste water	t/a	447.45	0.0	0.0	1.5	124.8	179.8
Total + 10% Waste water	t/a	1308.77	0.0	0.0	0.5	120.0	152.5
Water	EUR	5235.09	0.0	0.0	-0.5	96.0	128.3
			0.0	0.0	-1.5	72.0	104.0
dry-Service (48.88%)	h	4281.75	0.0	0.0	-2.5	50.8	71.3
Temp.	°C	10.15	0.0	0.0	-3.5	29.5	38.5
Rel. humidity	%	80.00	0.0	0.0	-4.5	20.8	29.0
Abs. humidity	g/kg	6.50	0.0	0.0	-5.5	12.0	19.5
Air humid (20°/40%)	m3/h	80000.00	0.0	0.0	-6.5	12.0	16.0
Mass flow dry	kg/h	90368.16	0.0	0.0	-7.5	12.0	12.5
Pressure drop Hy1+Hy2	Pa	140.69	0.0	0.0	-8.5	6.5	8.5
Pressure drop of cabinet	Pa	200.00	0.0	0.0	-9.5	1.0	4.5
Ext. pressure	Pa	200.00	0.0	0.0	-10.5	0.5	2.3
Pressure drop total	Pa	540.69	0.0	0.0	-11.5	0.0	0.0
Fan-Efficiency	%	70.00	0.0	0.0	-12.5	0.0	0.0
Fan power	kW	17.16	0.0	0.0	-13.5	0.0	0.0
Energy costs	EUR	7349.55	0.0	0.0	-14.5	0.0	0.0
			0.0	0.0	-15.5	0.0	0.0
			0.0	0.0	-16.5	0.0	0.0
Service - Energy costs			0.0	0.0	-17.5	0.0	0.0
Daily hours (100.00%)	h/a	4380.00	0.0	0.0	-18.5	0.0	0.0
Night hours (100.00%)	h/a	4380.00	0.0	0.0	-19.5	0.0	0.0
Electric energy (MWh)	EUR	100.00	0.0	0.0	-20.5	0.0	0.0
Water (t)	EUR	4.00	0.0	0.0	-21.5	0.0	0.0
Life cycle	Years	15.00	0.0	0.0	-22.5	0.0	0.0
Support costs	%	5.00	0.0	0.0	-23.5	0.0	0.0
Capital interest	%	1.00	0.0	0.0	-24.5	0.0	0.0
Energy increase	%	1.00	0.0	0.0	-25.5	0.0	0.0
Inflation	%	1.00	0.0	0.0	-26.5	0.0	0.0
Investment costs	EUR	138000.00	0.0	0.0	-27.5	0.0	0.0
Water + Energy costs	EUR	23671.78	0.0	0.0	-28.5	0.0	0.0
Support costs	EUR	6900.00	0.0	0.0	-29.5	0.0	0.0
Overheads	EUR	30571.78	0.0	0.0	-30.5	0.0	0.0
			0.0	0.0	-30.5	0.0	0.0
Capital costs	EUR	52794.43	946.6	783.0	406.8	4380.0	4380.0

Company
Branch
Street
Country / ZIP / City

Phone: xxxxxxxxxxx
Fax: xxxxxxxxxxx
E-Mail
Homepage

City, 5.4.2022
With the compliments of



Capital interest	%	1.00
Energy increase	%	1.00
Inflation	%	1.00
Support costs	%	5.00

Investment costs

Offener Nasskühlturm	EUR	36000.00
AHU return air	EUR	138000.00
Additional costs	EUR	102000.00

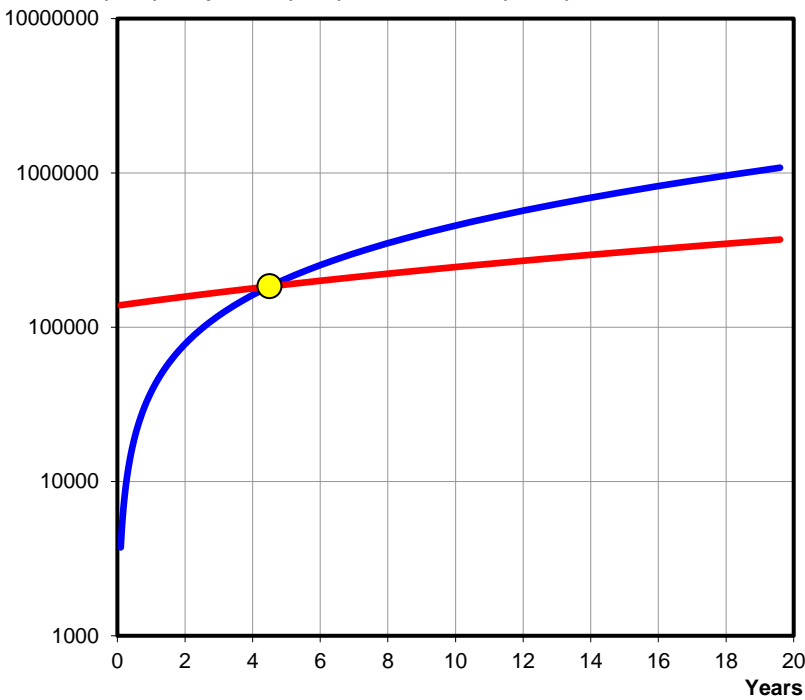
Overheads

Support costs (+)	EUR	5100.00
Energy costs: Offener Nasskühlturm (-)	EUR	61000.00
Energy costs: AHU return air (+)	EUR	23671.78
Energy costs: - 61.2 %	EUR	37328.22

Amortization

BEP (Break even point)	Years	4.50
------------------------	-------	-------------

Incomes (EUR) - Expenses (EUR) - Amortization (Years)



Company
Branch
Street
Country / ZIP / City

Phone: xxxxxxxxxx
Fax: xxxxxxxxxx
E-Mail
Homepage

City, 5.4.2022
With the compliments of

Representative
Direct dialing
xxxxxxxxxx

