



www.sol-ution.com



The Sun from SOLution Solartechnik GmbH
Solar domestic hot water, heating, cooling and electricity
DERBI International Conference 11th-13th of June 2009, Perpignan



Die bessere Zukunft.

SOLution
Solartechnik



SOLution Solartechnik GmbH
The company

SOLution
Solartechnik



The company

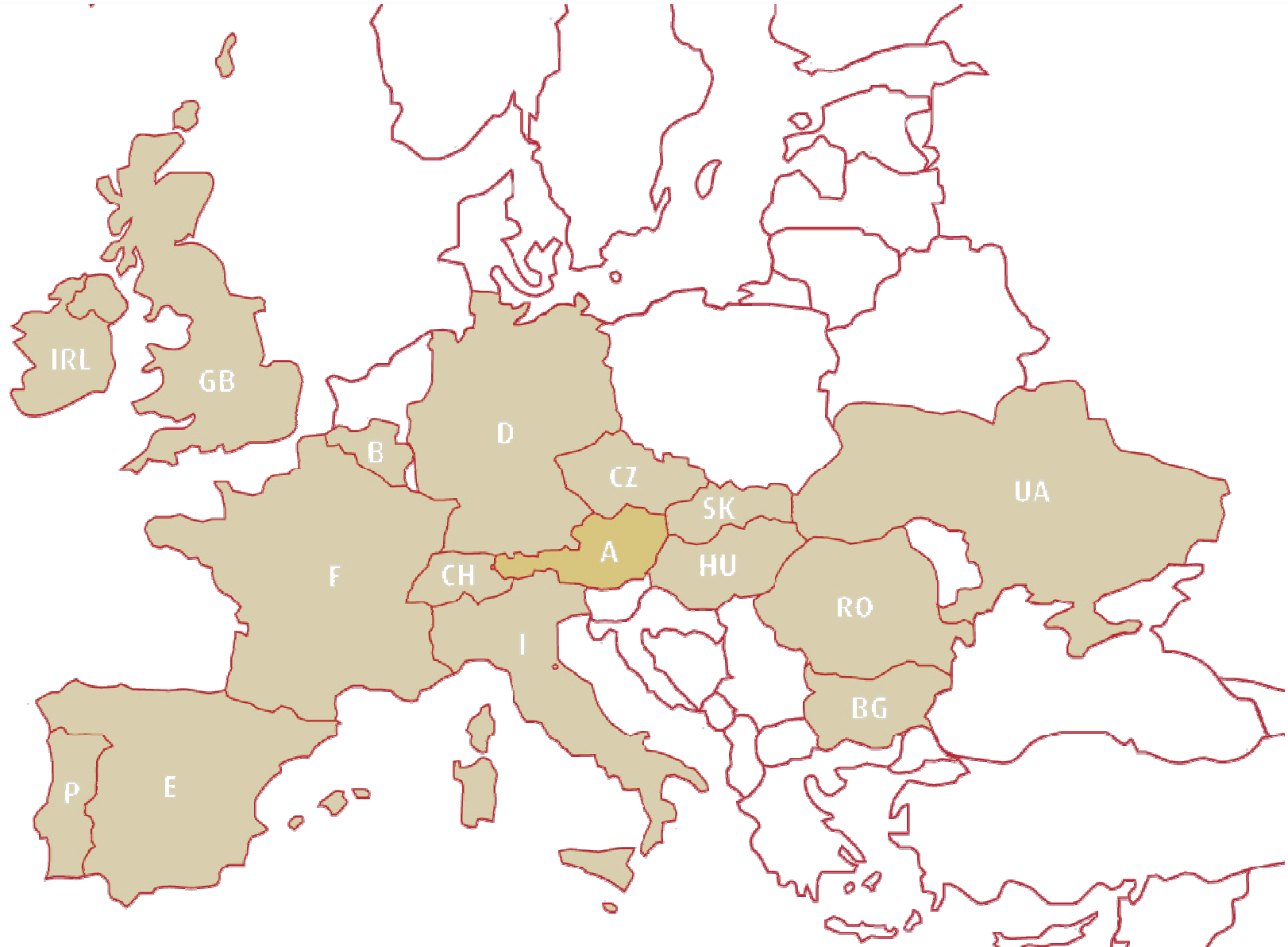


- founded in 2000
- staff 58
- principle
 - solar system distributor for
 - solar hot water preparation,
 - solar heating and cooling,
 - solar heat pumps and
 - PV installations
 - to our clients (installers)
- location
 - Gewerbestrasse 15
 - A-4642 Sattledt in **Austria**
- annual sold collector area (2008) 70.000 m²
- managers and owners
 - Mag. Andrea Dober and Ing. Gerald Jungreithmayr





The company – markets





The company –partners



Different partners in **France**, but for first contact please address to:

Elvira Ilming, Responsable Commerciale France

Elvira.Ilming@sol-ution.com



Elvira Ilming

Responsable Commerciale France



or

SOLution Solartechnik GmbH

www.sol-ution.com

office@sol-ution.com

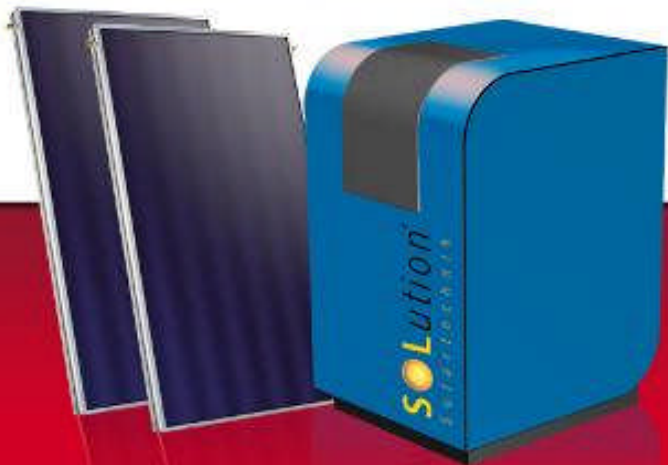


or

Franciska Klein, engineer research & development, solar cooling

Franciska.klein@sol-ution.com





Solar Cooling Systems

SOLution
Solartechnik



content:

- introduction
- principle and methods of solar cooling
- Solar cooling system with absorption chiller or adsorption chiller
- Cooling tower
- package solutions
- realised systems (examples)



solarcombi+

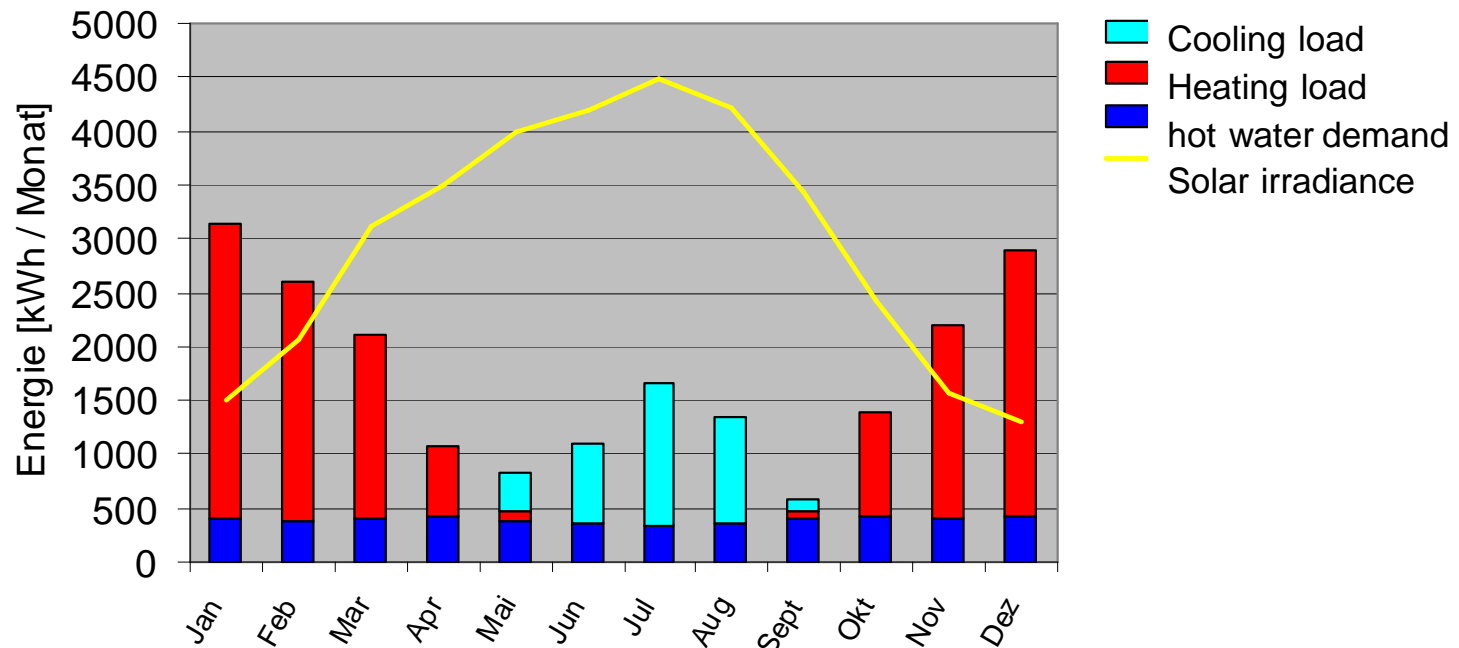




Solar Cooling Systems



correlation of cooling demand and solar energy
Example for solar thermal installation





Solar Cooling Systems



solarcombi+

advantages



- Thermally driven chillers, driven by heat from solar collectors



In summer: Solar irradiation is very high when cooling demands occur (correlation)



→ Less electricity for driving of the machines is needed



- Low driving temperatures (beginning with 70..80..90 °C)
→ ideal for flat plate collectors



- Avoiding stagnation of the collector field in summer because the heat can be used for cooling
→ High efficiency of the solar collector field for the whole course of the year (DHW preparation, cooling in summer and heating in winter)



- Existing solar collector systems can be enlarged for solar cooling



- Non toxic materials as working pair (sorbent and refrigerant) of the cooling machine
→ Refrigerant = water has no global warming potential (GWP)

- Simple construction of the machines, especially adsorption chillers



SOLution[®]
Solartechnik



Solar Cooling Systems



SOLution Solartechnik GmbH as **industrial partner** within the EU project **Solar Combi+**



for solar cooling system with **15 kW** absorption chiller



and

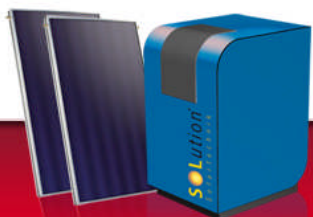


for solar cooling system with **8 kW** adsorption chiller



solarcombi+

(See following package solutions according to the simulation results of SolarCombi+)





Solar Cooling Systems

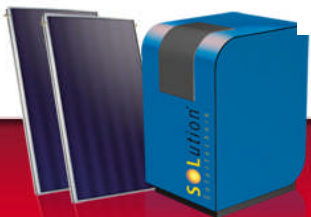
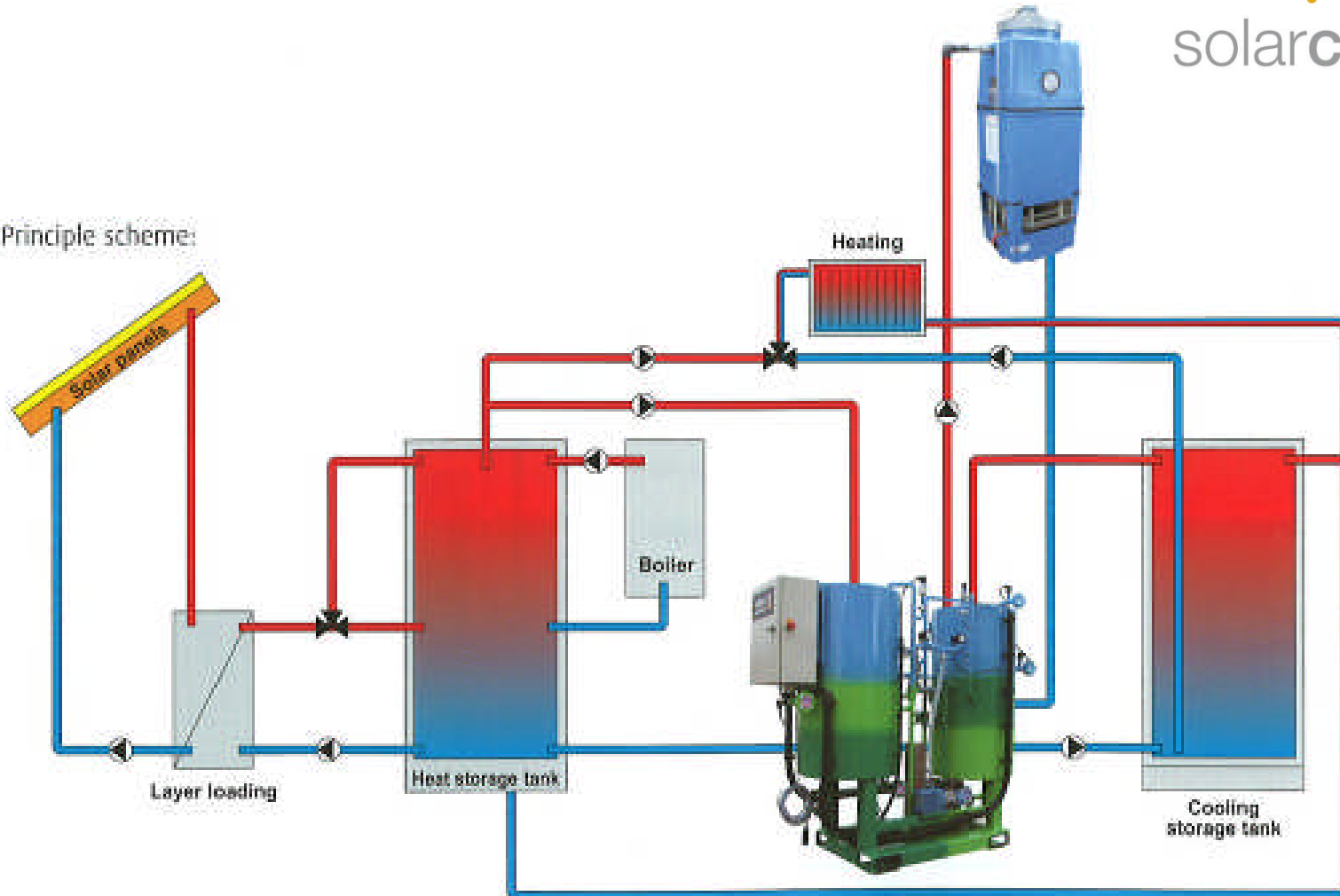


principle solar cooling (with absorption chiller)



solarcombi+

Principle scheme:



SOLution
Solartechnik



COP – Coefficient of Performance



$$COP = \frac{\text{cold energy of the cooling machine}}{\text{driving energy of the machine}} = \frac{\text{cold energy of the cooling machine}}{\text{solar energy} + \text{energy backup heater}}$$





Methods of solar cooling:

- Cold water production by **absorption** chiller
- Cold water production by **adsorption** chiller

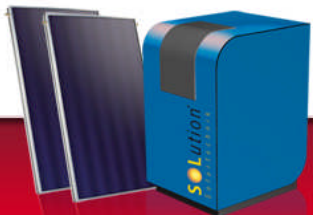
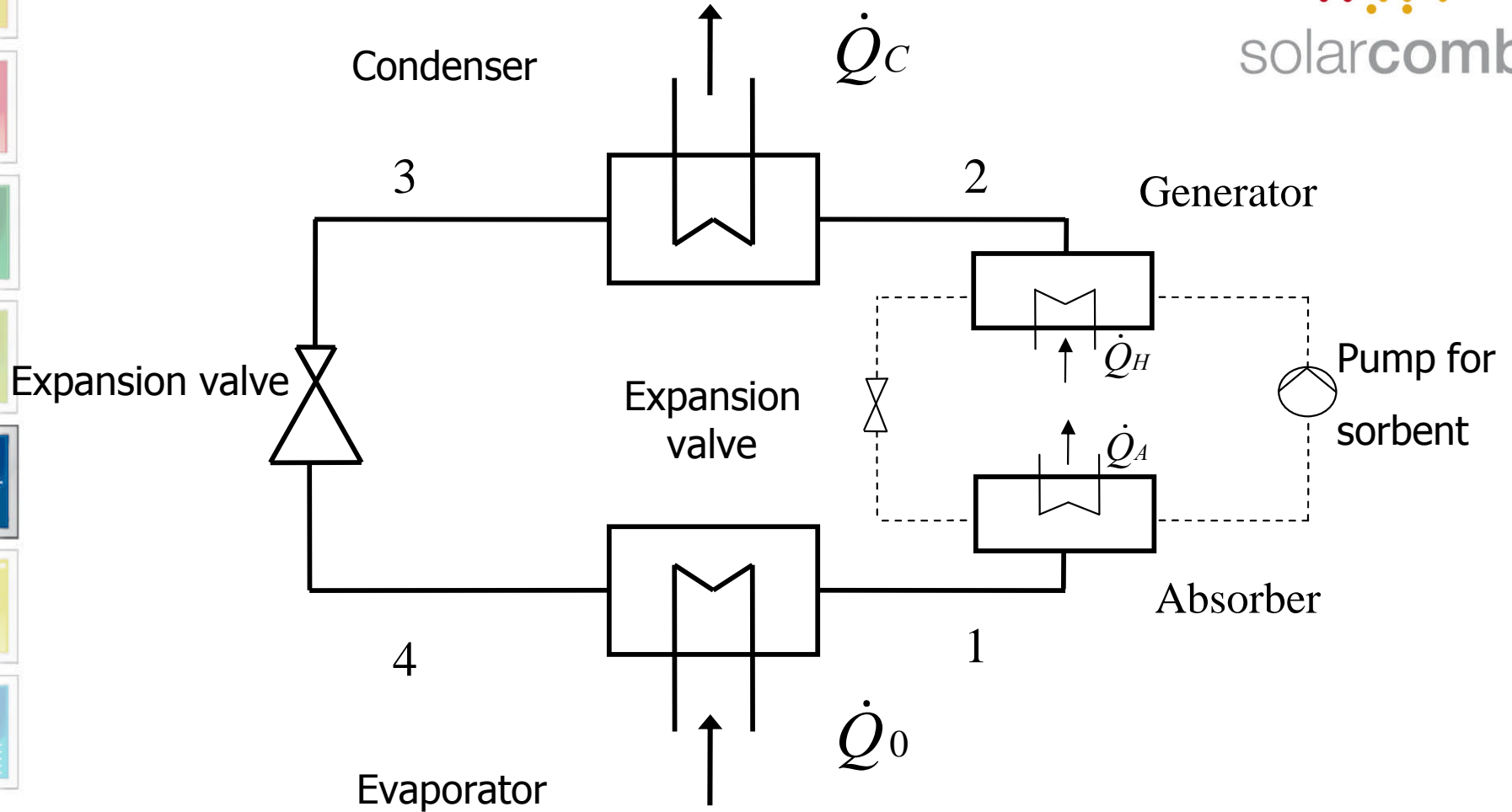




Solar Cooling Systems



Absorption process





Solar Cooling Systems

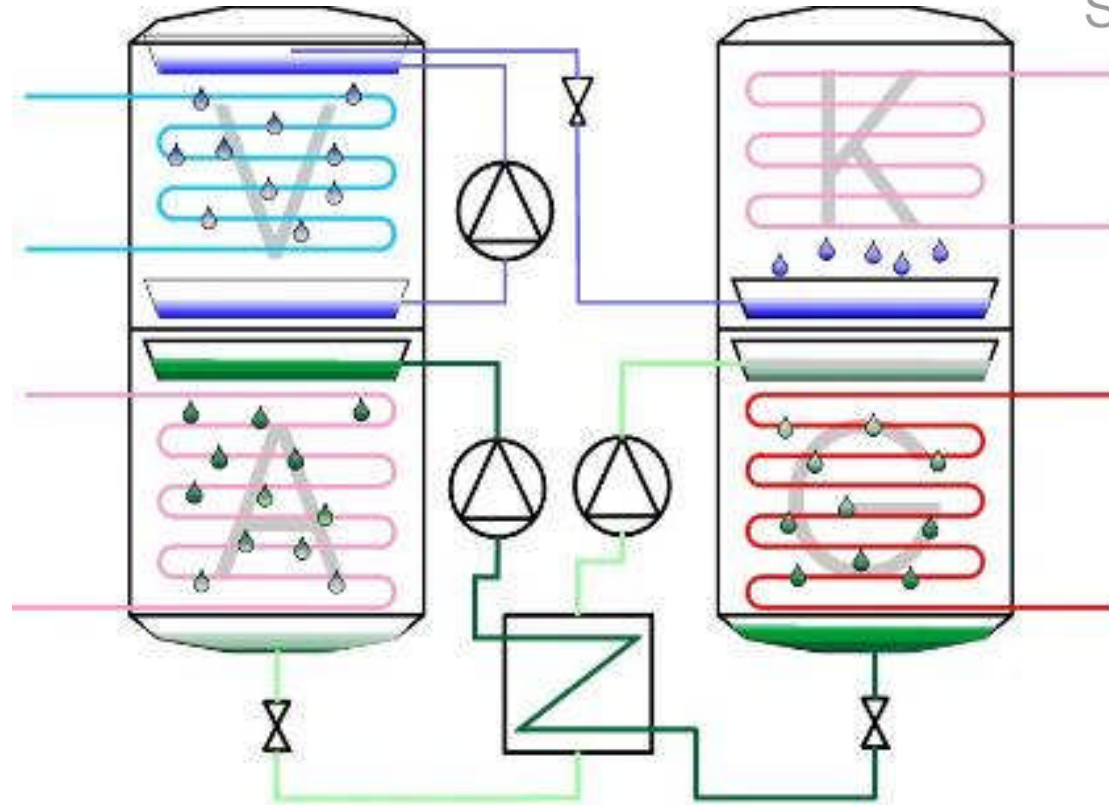


Absorption process

Cold Water



Rejected heat
Cooling tower



solarcombi+

Rejected heat
Cooling tower

Solar heat

V -- Evaporator
A -- Absorber
G -- Generator
K -- Condenser

	Cool water		Poor solution
	Hot water		Rich solution
	Cold water		Water



SOLution
Solartechnik



Solar Cooling Systems



15 kW absorption chiller



solarcombi+



SOLution
Solartechnik



Solar Cooling Systems

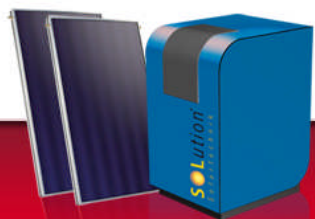
Technical data 15 kW absorption chiller



Cooling capacity		<i>kW</i>	15
Coefficient of performance	COP		0,71
Chilled water	Inlet temperature	°C	17
	Outlet temperature	°C	11
	Flowrate	<i>m³/h</i>	1,9
	Leakage of pressure	<i>mbar</i>	400
	Rated pressure PN	<i>bar</i>	6
	Connection	<i>DN</i>	25
Heating water	Thermal output	<i>kW</i>	21
	Inlet temperature	°C	90
	Outlet temperature	°C	80
	Flowrate	<i>m³/h</i>	1,8
	Leakage of pressure	<i>mbar</i>	400
	Rated pressure PN	<i>bar</i>	6
Re-cooling water	Re-cooling capacity	<i>kW</i>	35
	Inlet temperature	°C	30
	Outlet temperature	°C	36
	Flowrate	<i>m³/h</i>	5
	Leakage of pressure	<i>mbar</i>	900
	Rated pressure PN	<i>bar</i>	6
	Connection	<i>DN</i>	40
Electrical data	Voltage/Frequency	<i>V/Hz</i>	230/50
	Power consumption	<i>kW</i>	0,3
Dimensions	Length	<i>mm</i>	ca. 1.750
	Width	<i>mm</i>	ca. 760
	Height	<i>mm</i>	ca. 1.750
Weight	Transportation	<i>kg</i>	ca. 500
	Operation	<i>kg</i>	ca. 660



solarcombi+



SOLution
Solartechnik



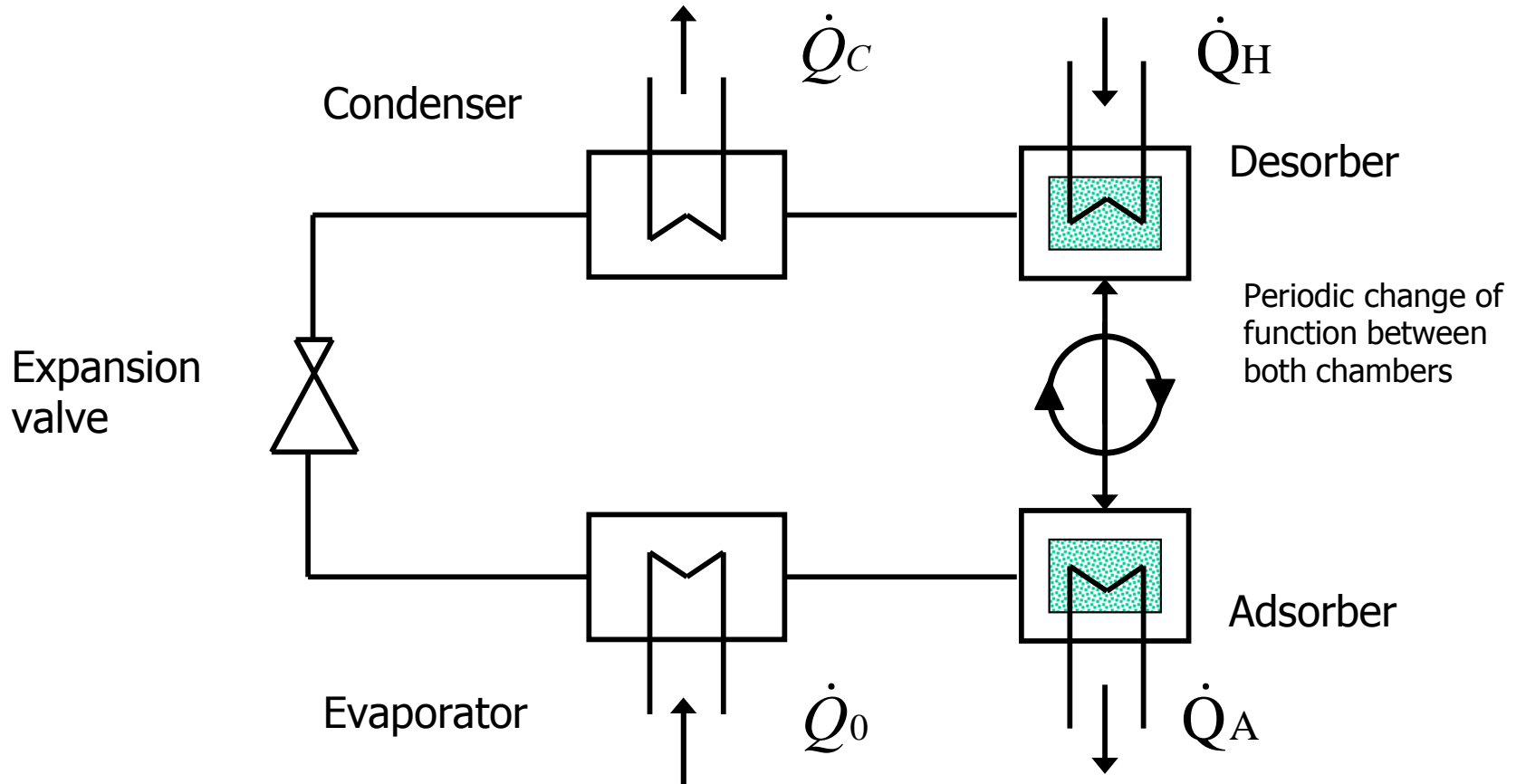
Solar Cooling Systems



Adsorption process

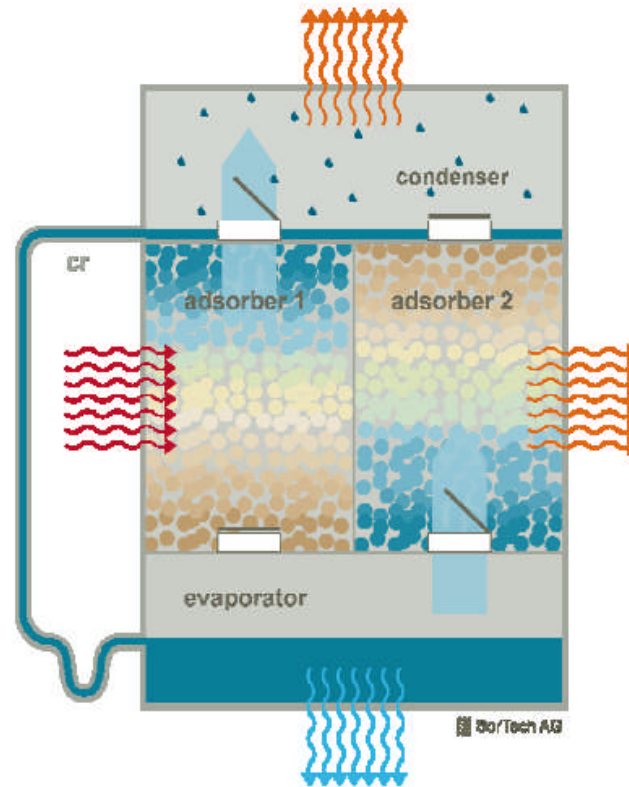









solarcombi+

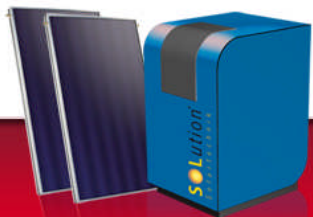




Adsorption process



-  water vapour
-  liquid process water
-  check valves
-  cr condensate return
-  driving heat
-  heat rejection
-  cold generation





Solar Cooling Systems



Technical data
8 kW
adsorption chiller

	Unit	ACS 08	ACS 15
Nominal working point			
Cooling capacity, nominal	kW	7.5	15
Cooling capacity, effective	kW	5 - 10	10 - 20
COP, nominal		0.56	0.56
Chilled water circuit			
Temperature range (out): 6-20°C			
Temperature in/out	°C	18/15	18/15
Volume flow	m³/h	2.0	4.3
Pressure loss	mbar	370	550
Operating pressure, max.	bar	4	4
Supply	external thread	1"	1 1/4"
Heat rejection circuit			
Temperature range (in): 22-37°C			
Temperature in/out	°C	27/32	27/32
Volume flow	m³/h	3.7	7.0
Pressure loss	mbar	610	850
Operating pressure, max.	bar	4	4
Supply	external thread	1"	1 1/4"
Heat supply circuit			
Temperature range (in): 60-95°C			
Temperature in/out	°C	72/65	72/66
Volume flow	m³/h	1.6	3.8
Pressure loss	mbar	300	600
Operating pressure, max.	bar	4	4
Supply	external thread	3/4"	1 1/4"
Electricity supply			
Voltage	V	230 ~	230 ~
Frequency	Hz	50	50
Power consumption ρ	W	9	12
Dimensions			
Length	mm	790	790
Width	mm	1080	1350
Height	mm	940	1450
Weight	kg	ca. 260	ca. 510

Version 07_07_2008

Subject to change without notice



solarcombi+



SOLution
Solartechnik



Solar Cooling Systems



Cooling towers (wet, open circuit)



Cooling towers (wet, closed circuit)



„adiabatic re-cooling“





8 kW adsorption package „Pinguin“



32 m² collector area

Collector mounting components



Solar pump station with primary pump

External heat exchanger

150 l solar expansion tank



Antifreeze concentrate

3-way motor switch valve

Secondary solar pump



Free programmable controller

1500 l hot buffer storage with insulation

150 l expansion tank in hot water circuit of the absorption chiller

3-way fixed value control



8 kW adsorption chiller

22 kW cooling tower (wet, open circuit)

50 l expansion tank in chilled water circuit of absorption chiller

no cold water buffer storage needed

50 l expansion tank in cooling water circuit of absorption chiller

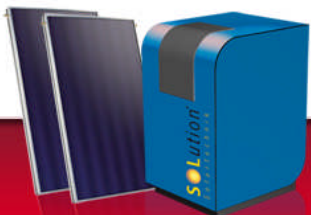
Including startup costs and maintenance costs for the first two years

Without:

Pumps in three circuits of the chiller

Cold distribution system

Euro:
33.950,-





15 kW absorption package „Grönland“

60 m² collector area

Collector mounting components



Solar pump station with primary pump

External heat exchanger



300 l solar expansion tank

Antifreeze concentrate

3-way motor switch valve



Secondary solar pump

Free programmable controller

3000 l hot buffer storage with insulation



500 l expansion tank in hot water circuit of the absorption chiller

3-way fixed value control

15 kW absorption chiller



35 kW cooling tower (wet, open circuit)

500 l expansion tank in chilled water circuit of absorption chiller

1000 l cold water buffer storage (price special cold insulation on demand)



150 l expansion tank in cooling water circuit of absorption chiller

Without:

Pumps in three circuits of the chiller

Cold distribution system

Euro:

60.120,-





Cold distribution system: on site

- Chilled ceilings



- Chilled sails



www.klimatop.info

www.klimadecke.com



<http://www.klix-deckenradiatoren.de/>

<http://www.klix-sandra.de/>

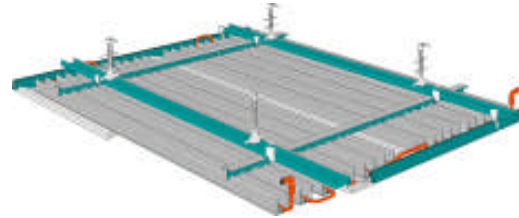
<http://www.luftkuehldecke.de/html/kuhlsegel.html>



- Fan Coils



- concrete core activation



source:

<http://www.luftkuehldecke.de/html/kuhlsegel.html>



source:

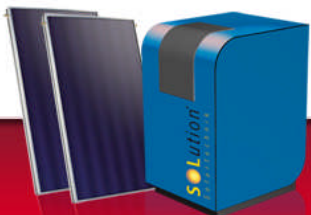
<http://www.klix-sandra.de/details/waermeprofil-badheizkoerper-klix-sandra-details.html>

EXAMPLE:

Chilled ceiling 75 W/m² ceiling area

→ cooling performance of 20 kW

result: 265 m² chilled ceiling surface





SOLution Solartechnik GmbH: first site, Sattledt



Office with 500 m²
surface area
20 persons



Cooling load
8 kW



Installed cooling capacity
15 kW with absorption chiller



Collector area 40 m²



Open cooling tower 35 kW





SOLution Solartechnik GmbH: first site, Sattledt

Cold and heat distribution system by chilled ceilings

Electronic dew point control





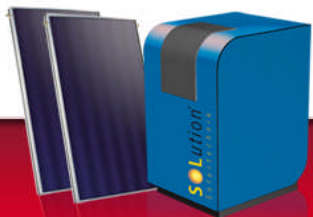
SOLution Solartechnik GmbH: first site, Sattledt



Hot water buffer storage
2.000 l

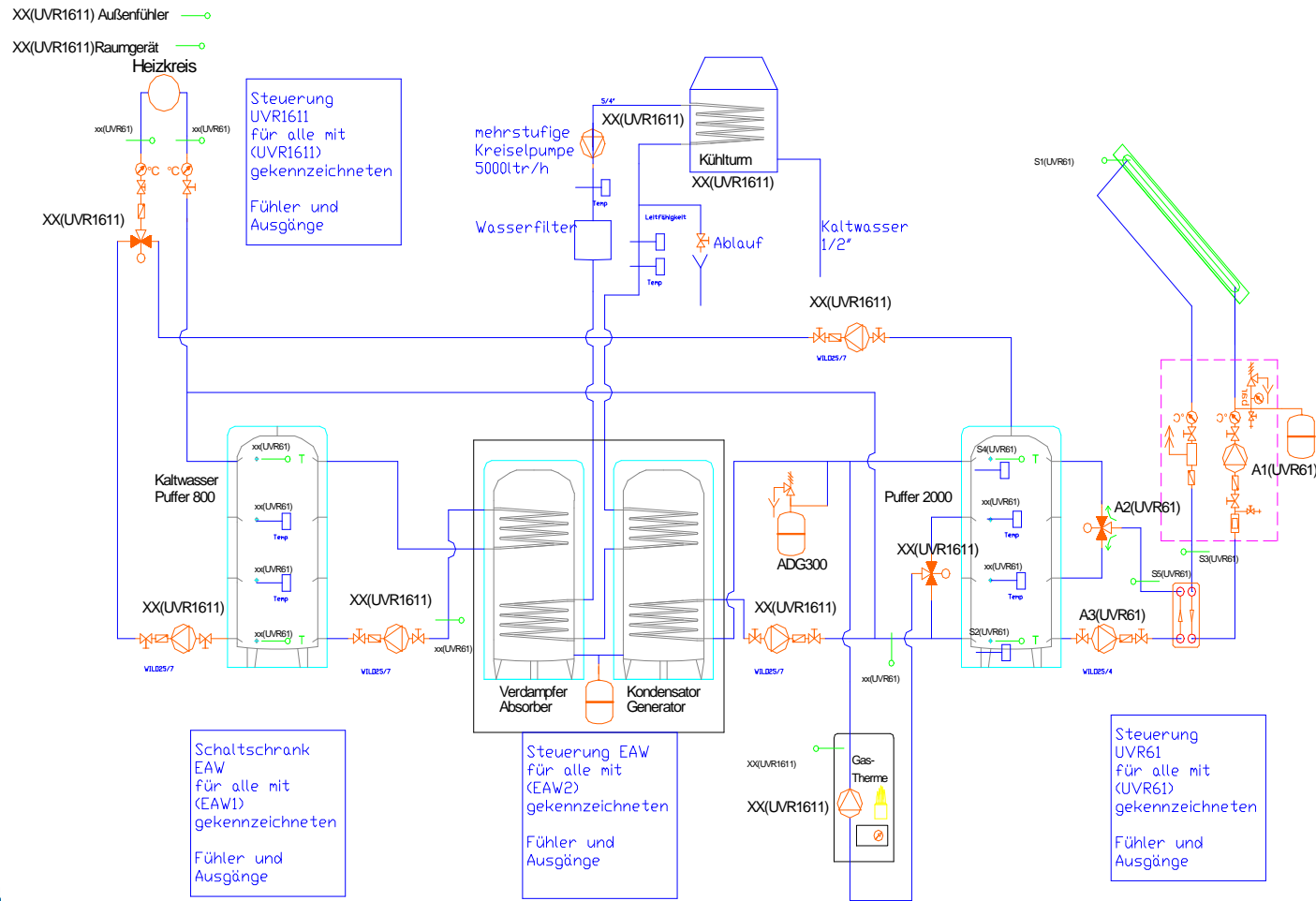


Cold water buffer storage
800 l





SOLution Solartechnik GmbH: first site, Sattledt





Manschein GmbH, Gaweinstal (Austria)

Office building and show room
of installer Manschein GmbH

32 m² Collector area





Manschein GmbH, Gaweinstal (Austria)



7,5 kW
Adsorption chiller

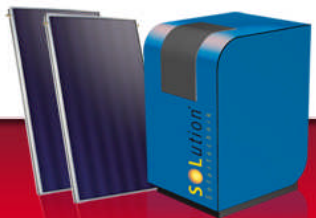
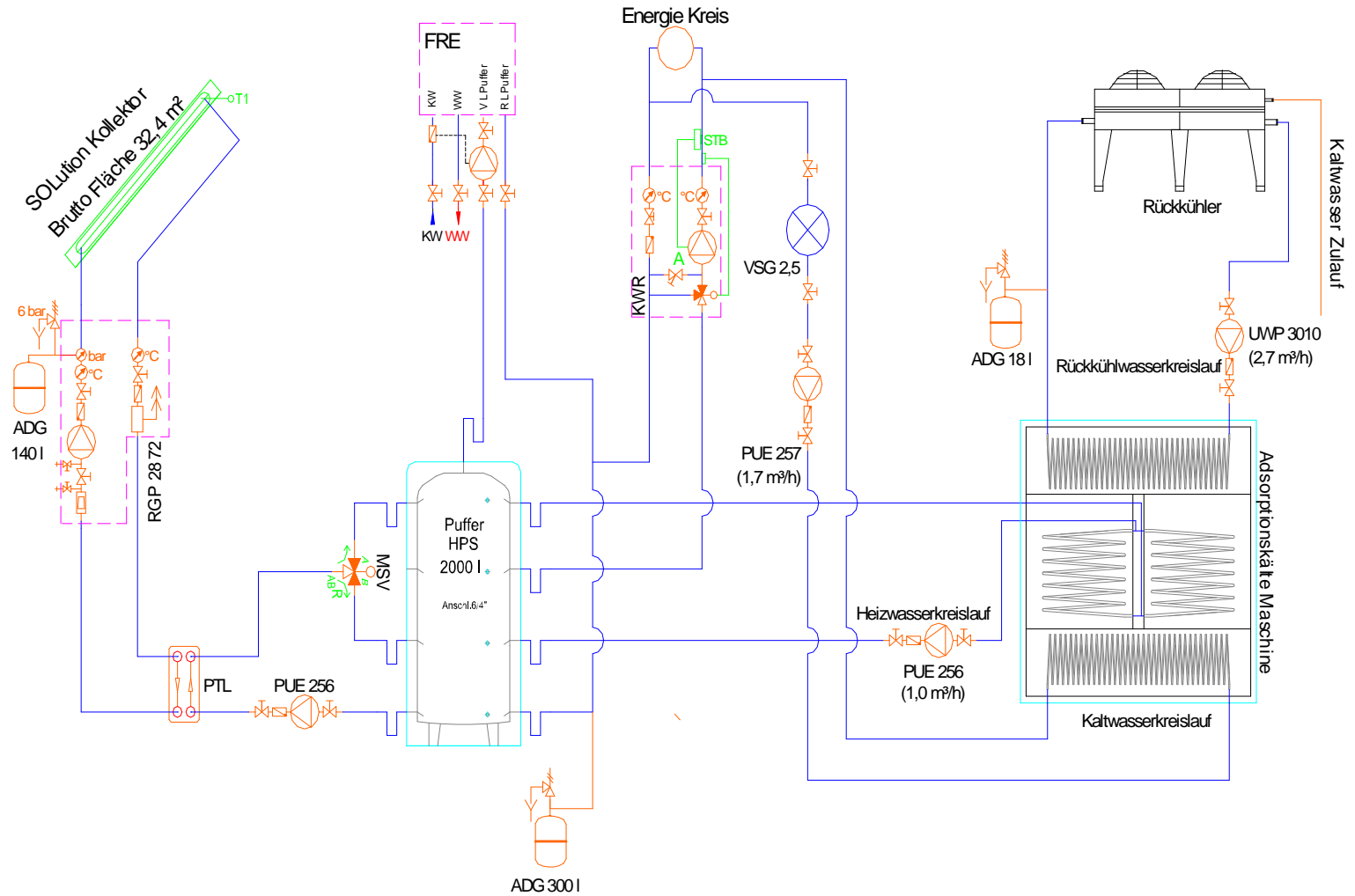
2.000 l
Hot water buffer storage

No cold water
buffer storage





Manschein GmbH, Gaweinstal (Austria)





SOLution Solartechnik GmbH: new site, Sattledt



550 m²
Collector area



25.000 l
Hot water
buffer storage



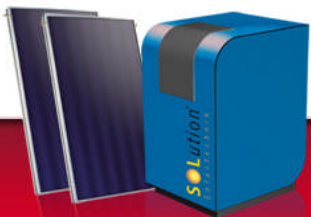
2.000 l
Cold water
buffer storage



60 kW
Installed
cooling capacity



4 x 15 kW adsorption
chillers = 60 kW





Die bessere Zukunft.

SOLution
Solartechnik

Wärmwasser, Heizen, Kühlen
und Stromerzeugung
mit der Energie aus der Sonne.



www.sol-ution.com

Planning and support



SOLution
Solartechnik



Solar Cooling Systems – planning and support



Checklist for solar cooling projects

Customer (Name, Address):
 Contact person:
 Telephone:
 Fax:
 Email:

Actual cooling system

Is there one?
 Yes
 No

Brand:
 Kind of cooling / Cooling principle:
 What is the cooling performance in kW?
 Is there an actual calculation for the cooling load?
 Yes
 No

Actual heating system

Is there one?
 Yes
 No

Functional Principle:
 Petrol
 Gas
 Wood
 Pellets
 Electricity
 Other
 Brand:
 Performance in kW:

About the building

Use of the building (private / office / etc):
 How many square meters has the building?
 Number of floors:
 Square meters per floor:
 Location:
 All the rooms have to be cooled / heated?

Kind of cooling / heating distribution:
 Heating / cooling ceiling
 Concrete Core heating/cooling
 Fan-Coil System
 Air
 Heating floor
 Heating / cooling wall
 Other

Designated chiller system (adsorption, absorption):
 Designated chilled water temperature:
 Designated recooling system (opened, closed circuit):



Place for the cooling/heating system

Is there place for:

Hot water storage (about 60-100 ltr / m² collector area)?

Cold water storage (about 30 ltr / m² collector area)?

Absorption or Adsorption chiller (about 3-10 m²)?

Cooling tower (about 1 to 5 m² outside the building)?

The collectors might be:

Inroof
 Onroof

About the roof:

Inclination:

Direction:

Kind of covering:

Maximum load capacity:

Version 06.08.2008

www.sol-ution.com

Dr. Norbert Jankoff



Version 06.08.2008

www.sol-ution.com

Dr. Norbert Jankoff





action



- Solar cooling training courses for clients, also within Solar Combi+
- Check list solar cooling filled by client
- Detailed Offer by SOLution
- Charge affirmed by client
- Delivery of components to client or end-user by SOLution
- Hydraulic installation on site by installer
- Coordination and startup of cooling system by SOLution
- Maintenance of cooling system by SOLution



Come and visit us!

SOLution Solartechnik GmbH

Gewerbestr.15

A-4642 Sattledt

AUSTRIA

www.sol-ution.com

www.hausdersolartechnik.at



contact in **France**:

Elvira Ilming, Responsable Commerciale France

Elvira.Ilming@sol-ution.com





www.sol-ution.com

SOLution Solartechnik.
Thank you for your attention.



Die bessere Zukunft.

SOLution
Solartechnik