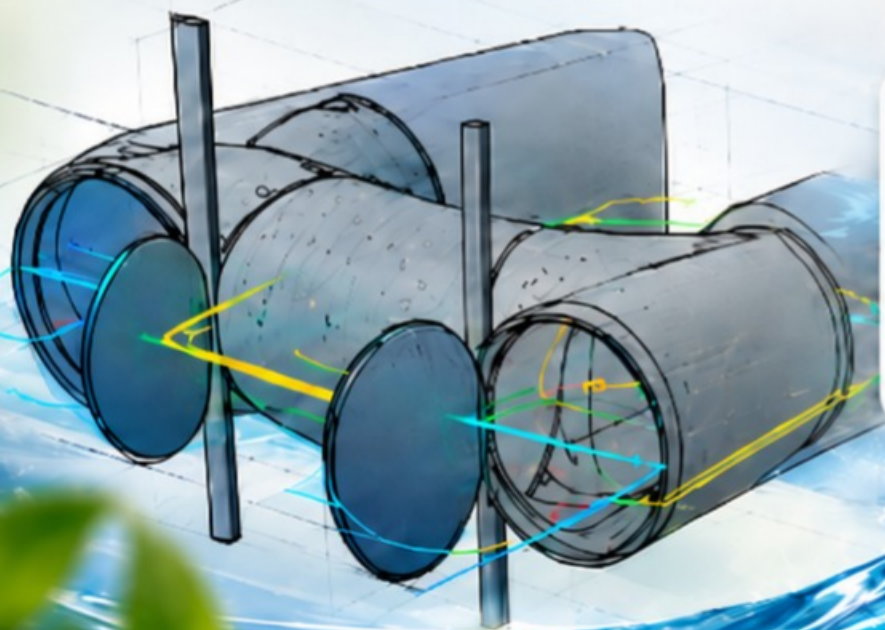


RSNKP GmbH
Wannenstrasse 29
8703 Erlenbach
Switzerland
www.rs-nkp.com
hofmann@rs-nkp.com
Phone: +41782266810



SWC

Solar Water Cooler



Heat and cold recovery Water solar system
Smart Home Preparation

Table of Contents

SWC Solar Water Cooler - Technical Presentation



No.	Topic	Page
1	Cover	1
2	Table of Contents	2
3	Characteristics of the SWC System	3
4	Solar Air Conditioning - SWC Market Capacity for Sale	4
5	Available in 3 Different Sizes	5
6	How the System Works	6
7	Advantages of Our System over Conventional Devices	7
8	Disadvantages of Our System	8
9	Energy Efficiency Comparison	9
10	Energy Saving Adjusted as follows	10
11	Electricity, Water and Air Wiring Diagram	11
12	Smart Home & BMS Integration	12
13	SWC Integration into Existing Heating & Cooling Systems	13
14	SWC-S 370 m³/h - Real Simulation Values	14
15	Counterflow Plate Heat Exchanger	15
16	Type: GS 35/350 - Technical Data	16
17	Counterflow Plate Heat Exchanger SWC-S - Psychrometric Chart	17
18	Fan Working Curve SWC-S	18
19	Water Pump Working Curve SWC-S	19
20	Installation Comparison - Wrong vs Properly Installed	20
21	Inverter Safety Container [ISC]	21
22	ISC 1MW - 2MW - 4MW	22
23	ISC Container Sizes, Inverters & Pricing	23
24	ISC-2MW Container Layout	24
25	Isolation & Thermal Performance	25
26	Cross Heat Exchanger Diagram and Ventilator Capacities	26
27	Psychometric chart	27
28	RSNKP GmbH - Switzerland / Company Information	28

Characteristics of the SWC System

The SWC system uses the thermal storage capacity of rooms and achieves an additional cooling effect by reclaiming stored energy. Electronic supervision through humidity and temperature sensors further optimizes efficiency.



Use of thermal storage capacity

Leverages the thermal storage capacity of rooms and reclaims stored energy for additional cooling.



Intelligent control

Electronic supervision via humidity and temperature sensors optimizes system efficiency.



High-pressure misting

Water is sprayed into the airflow at high pressure to create a fine mist and improve economical energy release.



Efficient heat exchange

The airflow is directed into the heat exchanger, where the enlarged surface area helps the remaining droplets evaporate. Energy is transferred to the opposite side by the heat exchanger.



Closed water circuit

Non-evaporated droplets are collected in the absorption tank and returned to the system, preventing uncontrolled evaporation.



Customizable filtration

Individual filter options are available to suit different requirements.



Antibacterial operation

The use of blue light in the CHE has an antibacterial effect.



Reduced material and space requirements

Inlet and exhaust air ducts can be replaced by tubes, reducing raw material use and saving space.



Low noise level

The overall system operates with a lower noise level.



Lower costs

Acquisition and installation costs are lower than for conventional appliances, and maintenance costs are reduced due to high system quality.



Smart integration and renewable energy

The apparatus can optionally be integrated with full-house control (BMS). Additional use of solar surplus is possible.



Positive environmental and social impact

CO₂ emissions are reduced.
Job creation potential: 53,000 jobs.

Solar Air Conditioning – SWC Market Capacity for Sale



In the MENA region there are more than
70 million apparatuses.



This means a load of more than
70,000 MW daily on the public grid.



In addition, water consumption amounts to
at least **490,000 m³/day.**



By adopting our apparatus, at least
80% of electricity consumption
and **90%** of water consumption can be saved.



With the optional Solar Package
(480 Wp per apparatus),
35,000 MW/day can be fed
into the grid.



Available in 3 Different Sizes

Description		SWC-S	SWC-M	SWC-L
	Cooling kW/h	3,2	6,5	15
	Cooling BTU	11.000	22.000	51.000
	Air volume m ³	370	800	1500
	House size m ²	130	290	580
	Fan W	2 x 65	2 x 108	2 x 145
	Water Pump W	30	60	90
	Bypass W	3	5	8
	Control system W	7	7	7
	Solar Modul Wp	350	560	800
	Sizes cm	105 x 47 x 55	120 x 50 x 65	140 x 55 x 75
	Weight	21	33	52

How the System Works

1



Fresh air and heat recovery

Warm, externally drawn fresh air is passed through a cross-flow heat exchanger inside the unit. Up to **95%** of the heat energy is transferred from the incoming outdoor air to the exhaust-air side.

2



Water atomization for additional cooling

On the same side, water is atomized under a controlled pressure of **10 to 15 bar** into the heat exchanger so that the cooling energy of the water is transferred to the warmed air. The resulting evaporation creates an additional cooling effect for the supply air delivered into the rooms.

3



Achievable supply-air temperature

At an outside-air humidity of **10%** and an outside temperature of **45 °C**, a supply-air temperature of **20 °C** can be achieved.

4



Closed, controlled circuit

The system is based on a closed, controlled circuit, which must be strictly respected so the apartment can achieve maximum efficiency.

5



Professional design and installation

The design of the various on/off flaps must be calculated by professionals and installed by qualified specialists, depending on room layout, room volume, and the use of the space.

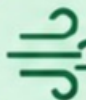
6



Controlled evaporation

Controlled evaporation removes thermal energy from the water and distributes the cooling effect evenly throughout the room.

7



Simple and conventional energy sources

The system uses two simple and conventional energy sources: wind and water energy.

8



High-efficiency design

By making maximum use of modern material development, we have created a product with outstanding efficiency.

9



Water recovery and reuse

The non-evaporated water is fully collected and automatically reused as a cooling medium. This leads to **35%** water savings.

10



Maximum efficiency through atomization

By enlarging the surface area of the water through atomization at pressures up to **20 bar**, **1.5 L per 1 kW** of cooling energy can be achieved, reducing water consumption by a further **55%**. This results in total water savings of **90%** compared with conventional apparatuses.

Advantages of Our System over Conventional Devices



The open water tanks of older machines, where fungi and bacteria may form, are no longer relevant. In our system, the opaque heat exchanger body is continuously illuminated by blue light, keeping the interior germ-safe and bacteria-free.



1

Reduction in energy consumption

Water **90%**, electricity **80%**.



2

Smaller, lighter, and more compact.



3

Improves quality of life

Adapts to the intended use; air filtration can be selected individually. Constant fresh-air supply is guaranteed. Pleasant well-being in all rooms is ensured through automated self-monitoring of every space.



4

Low noise level

28 dB to **32** dB.



5

Less effort during first installation

Tubes are used instead of large elaborate channels of old systems.



6

Control via internet and mobile app.



7

Complete home automation (BMS) and monitoring

The controller can take over complete home automation (BMS) and monitoring. When properly designed, this additional feature can save a further **15% to 25%** of energy in the entire household.



8

Solar-assisted off-grid or on-grid packages

The low power consumption allows solar-assisted off-grid or on-grid packages. This makes the package usable independently of the public electricity grid. In the on-grid system, more than **30%** excess electricity production is fed into the public network.



9

Longer service life

Intelligent automation of the control unit doubles the service life of components such as pump motors and all moving parts. A minimum service life of **15 years** can be expected, excluding small parts such as nozzles and air and water filters, which should be cleaned at least once a year and replaced when necessary.



10

Designed for closed rooms

The equipment is mainly intended for use in closed rooms. This leads to greater energy efficiency because better insulation than with free-standing equipment can also improve the lifetime of the machines.

Disadvantages of Our System



One-time purchase costs are about **30% higher** than for Herculean systems.



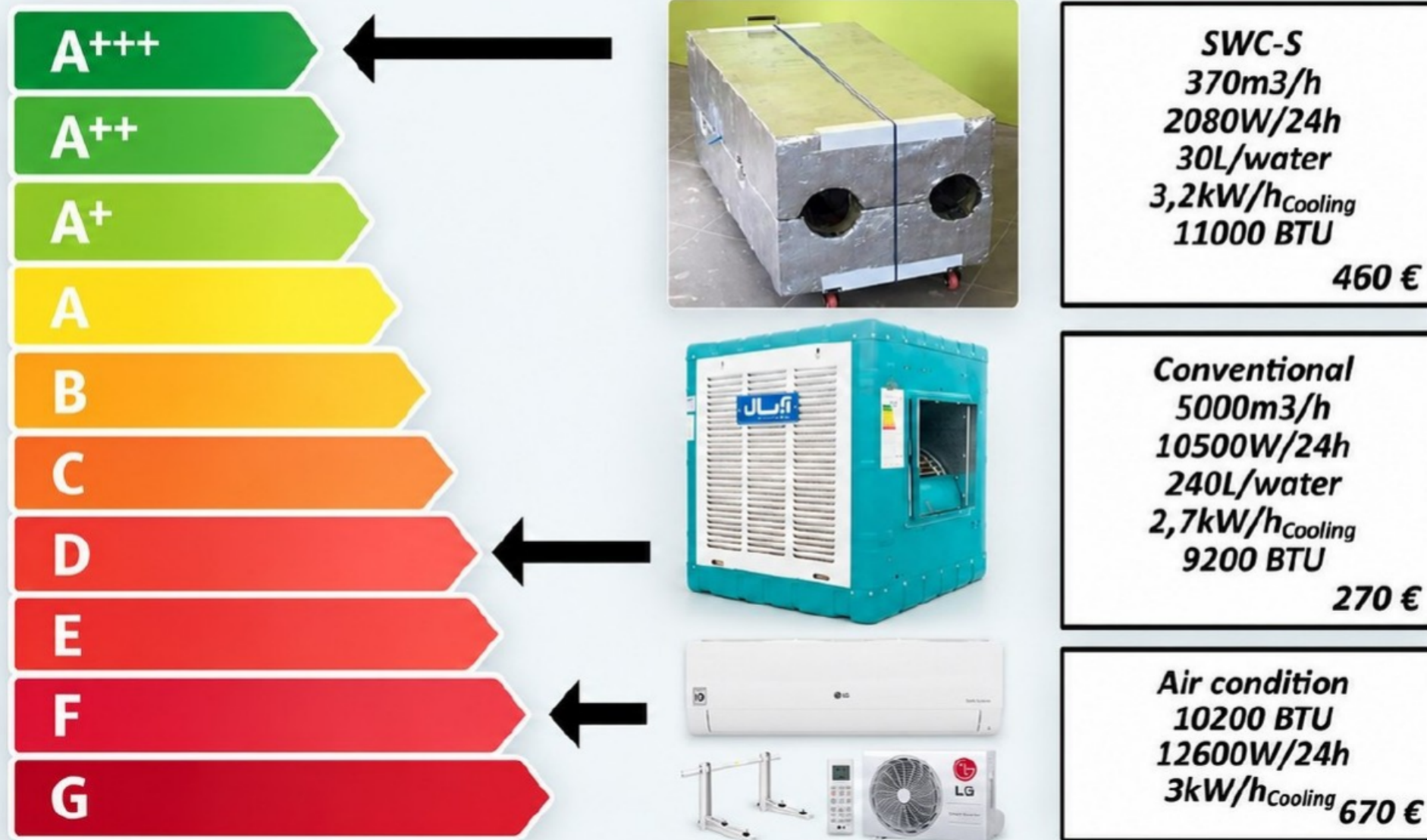
The design of the machine in each room must be calculated by engineers, and the execution must be performed by specialists and skilled personnel.



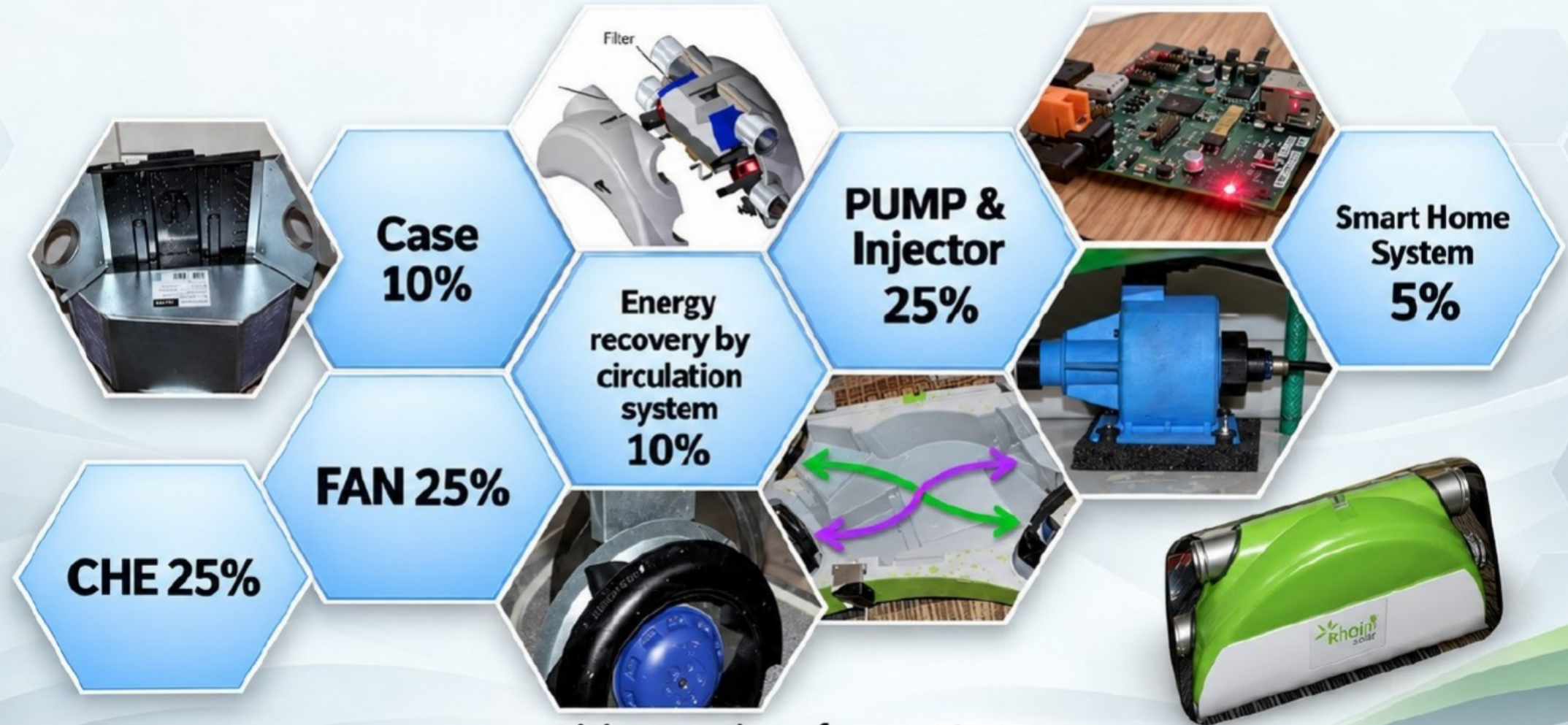
Laying the pipes for both air streams in both directions can be carried out in old duct routes, but it requires a **one-time effort**. However, this can lead to material and cost savings in first-time installations and in new construction, because large channels can be omitted and smaller, simpler CPV tubes can be used instead of sheet-metal channels.

SWC Solar Water Cooler Business Case

Energy efficiency comparison of cooling solutions



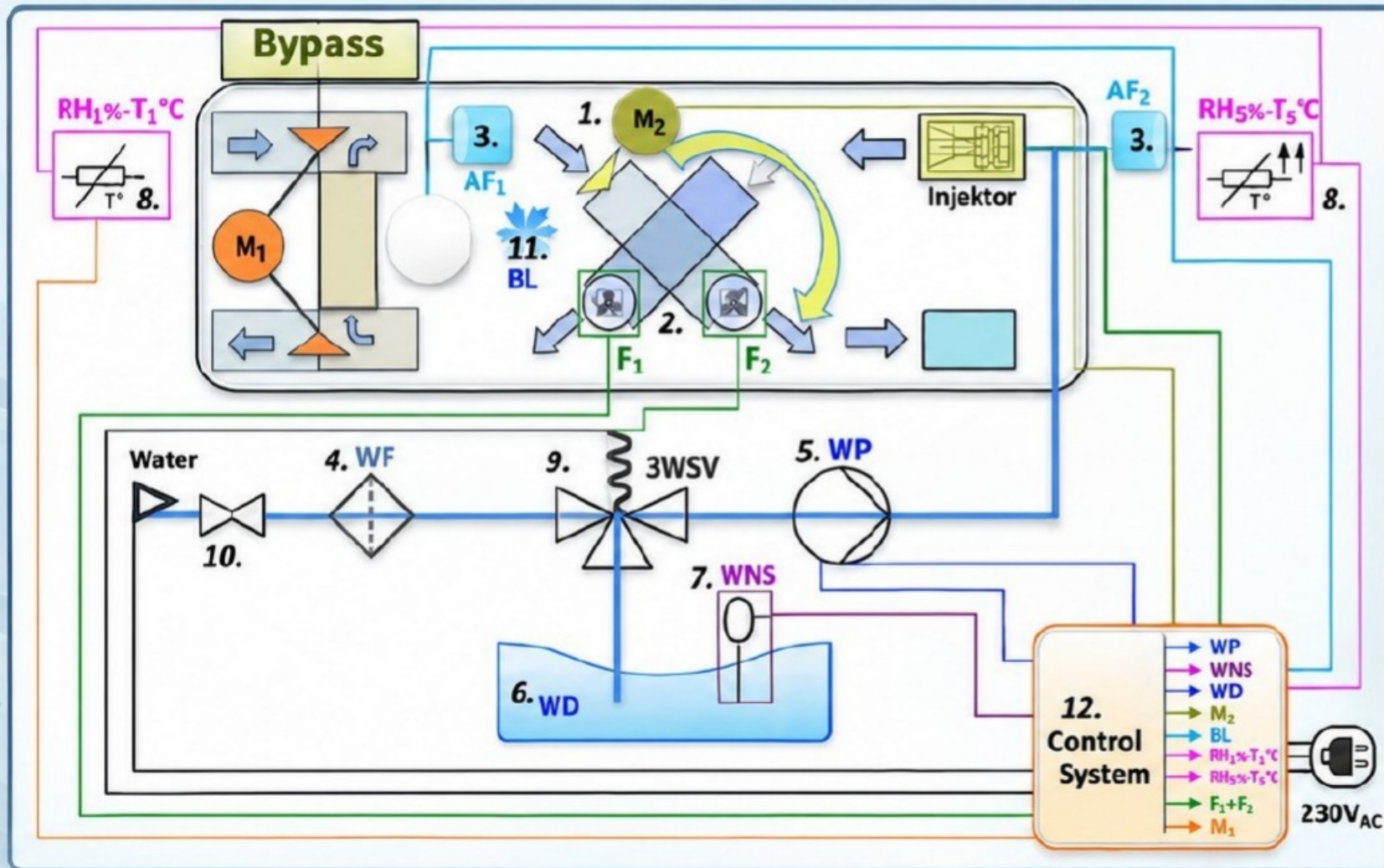
Energy Saving Adjusted as follows:



*minimum savings of new system
compared to conventional at 80% power and 90% water.*

Electricity, Water and Air Wiring Diagram

Heat and cold recovery water solar system



Main Components Legend

- | | |
|----------------------------|--|
| 1. Bypass-Motor | : M_1, M_2 |
| 2. FAN | : F_1, F_2 |
| 3. Air Filter | : AF_1, AF_2 |
| 4. water filters | : WF |
| 5. Water Pump | : WP |
| 6. water Depot | : WD |
| 7. water level sensor | : WNS |
| 8. Humidity + Temp. Sensor | : $RH_1\%-T_1^\circ C, RH_5\%-T_5^\circ C$ |
| 9. 3Way-solenoid valve | : $3WSV$ |
| 10. Way-solenoid valve | : WSV |
| 11. Blue Ligth | : BL |

12. Control System Specification



RAM 512MB SD8GB
WIFI, HDMI, Ethernet
2USB, Audio, RCA. Video

Control System Inputs

- WP
- WNS
- $W-MV$
- $3W-MV$
- F_1+F_2
- M_1

Blue light : BL
 $RH_1\%-T_1^\circ C$
 $RH_5\%-T_5^\circ C$

Electricity, water and air, wiring diagram from the Heat and cold recovery water solar system

with smart home controller, we can control the whole house - BMS



NATURAL BORN ENERGY

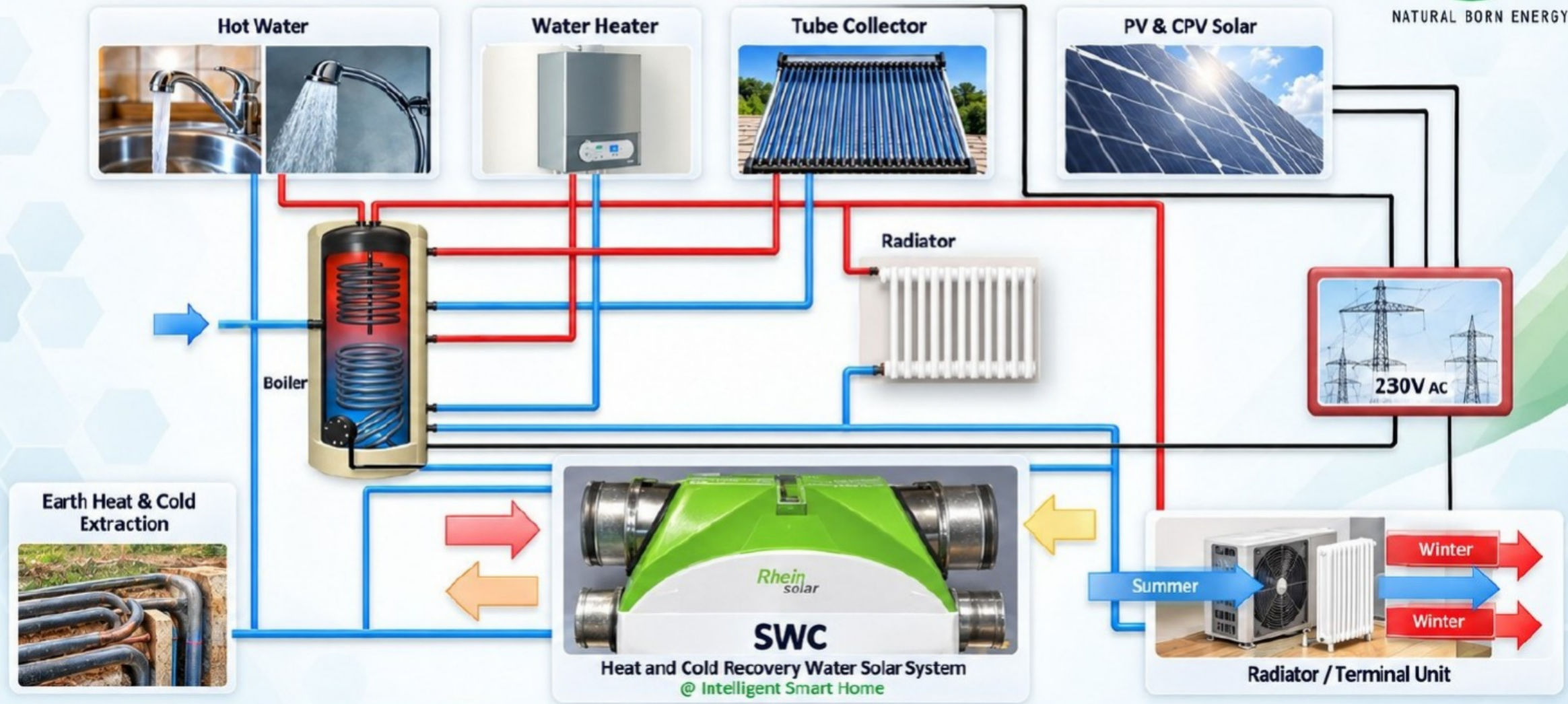


SWC Integration into Existing Heating & Cooling Systems

How the SWC unit connects to hot water, solar thermal, PV power, radiators, and ground-source energy.



NATURAL BORN ENERGY



SWC-S.370m³/h

Real simulation values



NATURAL BORN ENERGY

Time Clock	Outside T°C RH %	Bypass ¹ Fan Bypass ² Pump	Interval	Inside T°C RH %	Water Power	cooling energy
Morning 09-11	30°C RH 13%	Open mixture Closed Off 100% Open Closed Off 100%	Interval	23°C RH 30%	3L 250W	5,5 kW 1
noon 11-13	35°C RH 10%	Open mixture Closed Off 100% Open Closed Off 100%	Interval	23°C RH 35%	6L 290W	7,5 kW 2
noon 13-15	40°C RH 10%	Open mixture Closed Off 100% Open Closed Off 100%	Interval	24°C RH 43%	6L 320W	9 kW 3
3 afternoon 15-18	33°C RH 13%	Open mixture Closed Off 100% Open Closed Off 100%	Interval	22°C RH 35%	7L 380W	10,5 kW 4
Early Evening 18-20	27°C RH 15%	Open mixture Closed Off 100% Open Closed Off 100%	Interval	22°C RH 32%	3L 200W	4 kW 5
evening 20-22	24°C RH 18%	Open mixture Closed Off 100% Open Closed Off 100%	Interval	21°C RH 30%	1L 190W	1,5 kW 6
Night 22-03	20°C RH 20%	Open mixture Closed Off 100% Open Closed Off 100%	Interval	22°C RH 25%	0L 110W	4 kW 7
early 03-06	17°C RH 25%	Open mixture Closed Off 100% Open Closed Off 100%	Interval	20°C RH 25%	0L 140W	1,5 kW 8
morning 06-09	23°C RH 18%	Open mixture Closed Off 100% Open Closed Off 100%	Interval	21°C RH 30%	1L 200W	1,5 kW 9



Days during a hot day between July and August in a 130m² apartment

New System : 27L_{water} 2190W_{power} 60kW_{cooling}

Comparison with a 5000m³ old system apparatus

Old system: 240L_{water} 10500W_{power} 57kW_{cooling}



Interval

1.Pump and fans are working according to our pre- programmed interval commands sent from sensors to the control unit, depending on the setting of the consumer.

2.All bypass valves depending on the current setting of the room temperature and more included therein moisture control unit Open or closed or mixture Automatic.

3.Every time if is the values of RH,65%, RH₂ 35% and the inside RH, 50% exceeded, the system automatically to reduce the bypass outward opening the moisture.

Length, width, height	115 x 47 x 50
weight	21 kg
Pump flow capacity	14 L
Pump power consumption	30 W
Fan air flow performance	370 m ³ /h
Fan power consumption	2 x 65 W
Bypass damper motor	1 x 8 W
3way solenoid valve	5 W
control unit + sensoric	8 W
pressure	350 Pa



1L_{water}/1,5kW_{Cooling energy}



2190W/24h/27L_{water}/45kW_{Cooling}

Counterflow Plate Heat Exchanger



NATURAL BORN ENERGY

		Outside air	Return air	
Inlet condition	Standard Air Volume	360	354	m³/h
	Actual Air Volume	429	468	m³/h
	Temperature	19.0	41.0	°C
	Relative Humidity	10.0	95.0	%
	Absolute Humidity	1.62	59.58	g/kg
	Enthalpy	23.2	194.8	kJ/kg
Outlet condition	Actual Air Volume	458	459	m³/h
	Temperature	38.8	37.9	°C
	Relative Humidity	3.2	100.0	%
	Absolute Humidity	1.62	52.52	g/kg
	Enthalpy	43.2	173.2	kJ/kg
	Face air velocity	1.84	2.01	m/s
	Pressure drop	117	146	Pa
	Pressure drop (Standard density)	110	107	Pa
	Temperature efficiency dry (EN 308)		80.3	%
	Temperature efficiency wet (EN 308)		90.0	%
	Energy efficiency (DIN EN 13053)		78.2% / H1	
	Temperature efficiency dry ErP Lot 6		79.7 (2018 ready)	%
	Heat recovery dry	2.14	-2.14	kW
	Heat recovery wet 7800BTU	2.39	-2.39	kW
	Condensation		-7.06	g/kg
			-2.83	kg/h

Type: GS 35 / 350 (Technical Data)



Type: GS 35 / 350

		Outside air	Return air	
Inlet condition	Standard Air Volume	370	365	m³/h
	Actual Air Volume	436	483	m³/h
	Temperature	16.0	41.0	°C
	Relative Humidity	10.0	95.0	%
	Absolute Humidity	1.34	59.58	g/kg
	Enthalpy	19.5	194.8	kJ/kg
Outlet condition	Actual Air Volume	470	472	m³/h
	Temperature	38.6	37.6	°C
	Relative Humidity	2.7	100.0	%
	Absolute Humidity	1.34	51.51	g/kg
	Enthalpy	42.3	170.2	kJ/kg
Face air velocity		1.79	1.98	m/s
Pressure drop		103	130	Pa
Pressure drop (Standard density)		98	96	Pa
Temperature efficiency dry (EN 308)		80.7		%
Temperature efficiency wet (EN 308)		90.2		%
Energy efficiency (DIN EN 13053)		78.5% / H1		
Temperature efficiency dry ErP Lot 6		79.9	(2018 ready)	%
Heat recovery dry		2.50	-2.50	kW
Heat recovery wet	9500BTU	2.80	-2.80	kW
Condensation			-8.07	g/kg
			-3.33	kg/h
Calculation based on				
Air pressure		845	mbar	
Altitude		1500	m	

Type: GS 35 / 350

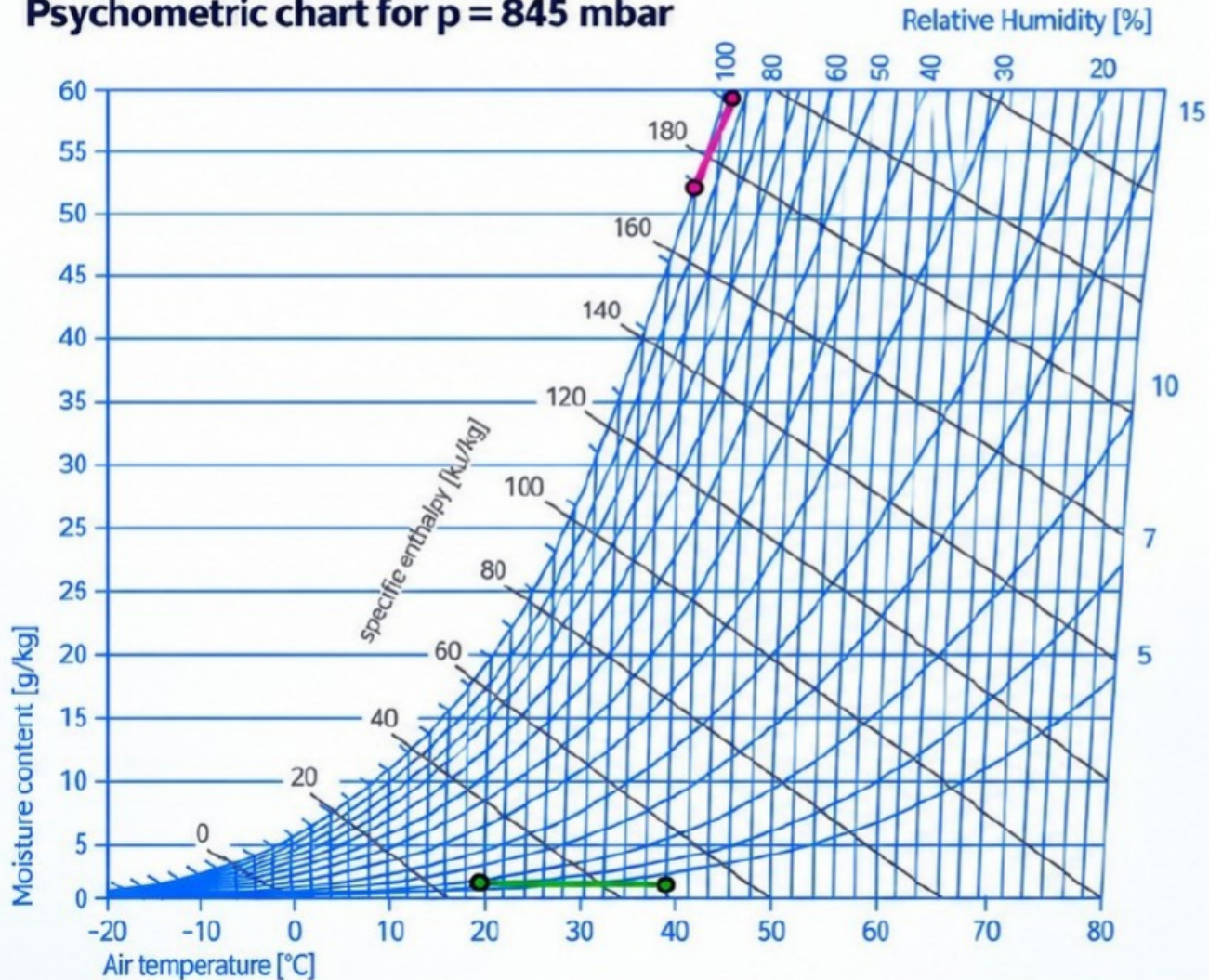
		Outside air	Return air	
Inlet condition	Standard Air Volume	370	365	m³/h
	Actual Air Volume	436	508	m³/h
	Temperature	16.0	50.0	°C
	Relative Humidity	10.0	100.0	%
	Absolute Humidity	1.34	106.26	g/kg
	Enthalpy	19.5	326.0	kJ/kg
Outlet condition	Actual Air Volume	482	496	m³/h
	Temperature	46.9	47.8	°C
	Relative Humidity	1.7	100.0	%
	Absolute Humidity	1.34	93.53	g/kg
	Enthalpy	50.7	290.4	kJ/kg
Face air velocity		1.79	2.09	m/s
Pressure drop		103	140	Pa
Pressure drop (Standard density)		98	96	Pa
Temperature efficiency dry (EN 308)		81.6		%
Temperature efficiency wet (EN 308)		90.9		%
Energy efficiency (DIN EN 13053)		78.5% / H1		
Temperature efficiency dry ErP Lot 6		79.9	(2018 ready)	%
Heat recovery dry		3.45	-3.45	kW
Heat recovery wet	1300BTU	3.84	-3.84	kW
Condensation			-12.73	g/kg
			-5.04	kg/h
Calculation based on				
Air pressure		845	mbar	
Altitude		1500	m	

Counterflow Plate Heat Exchanger SWC-S



NATURAL BORN ENERGY

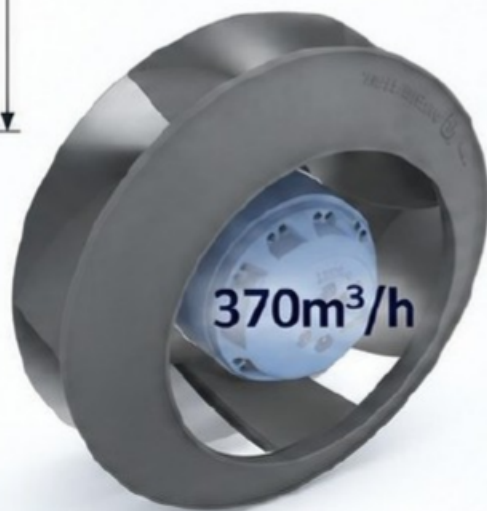
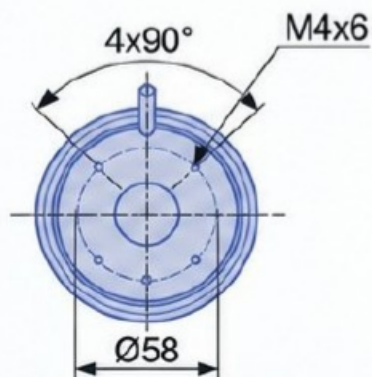
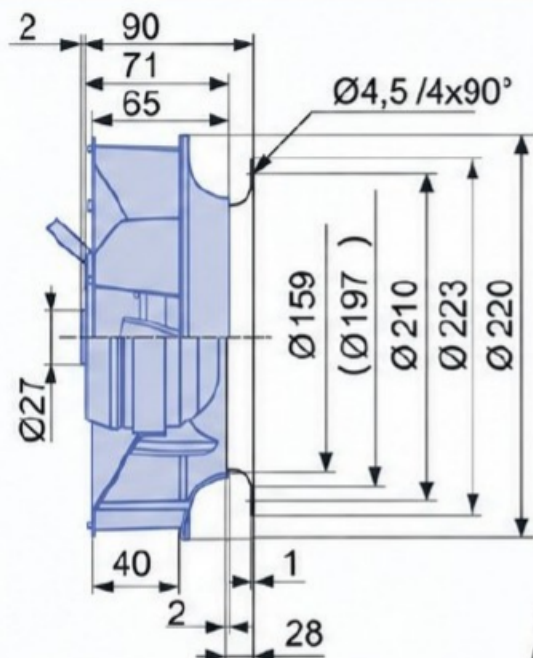
Psychrometric chart for $p = 845 \text{ mbar}$



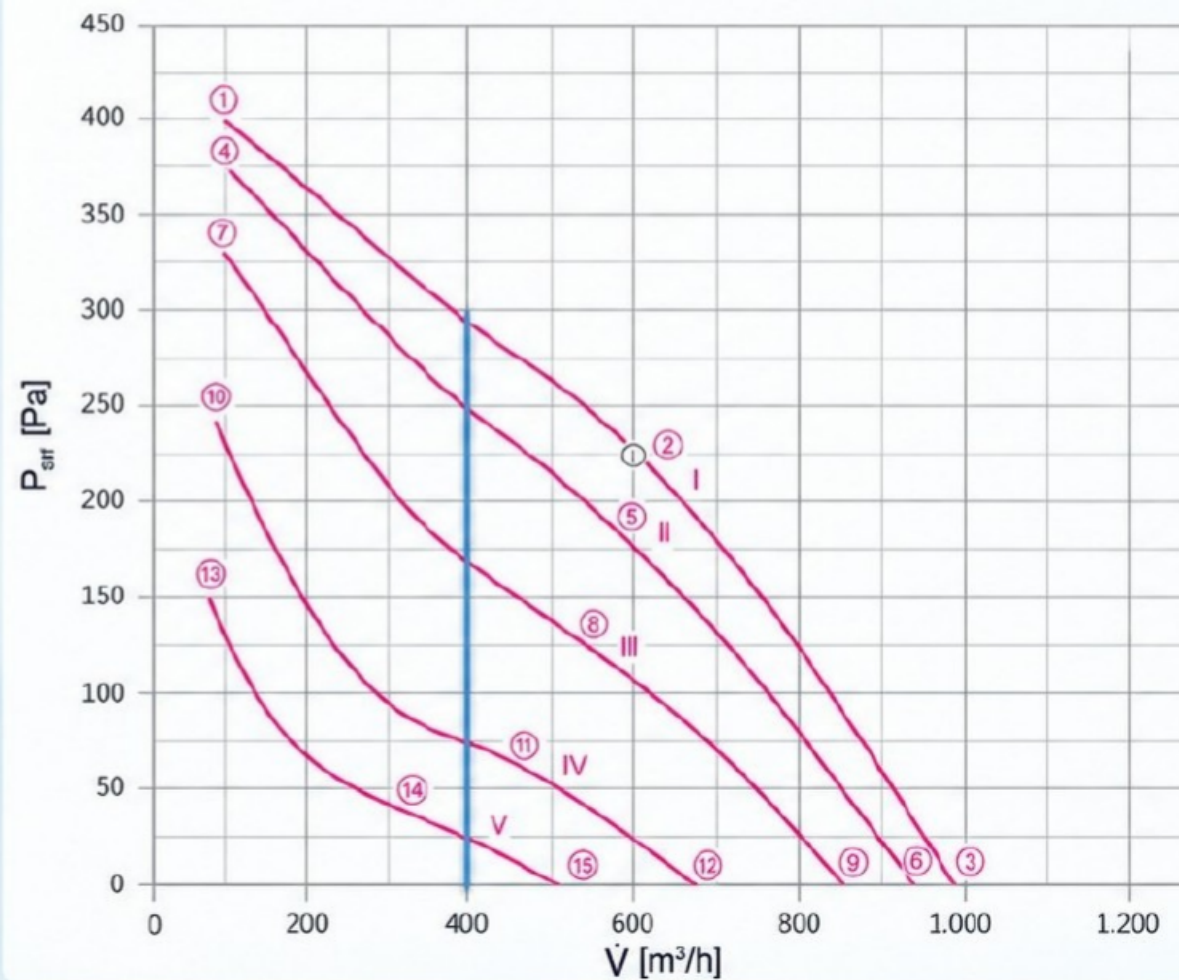
Fan working curve SWC - S



NATURAL BORN ENERGY



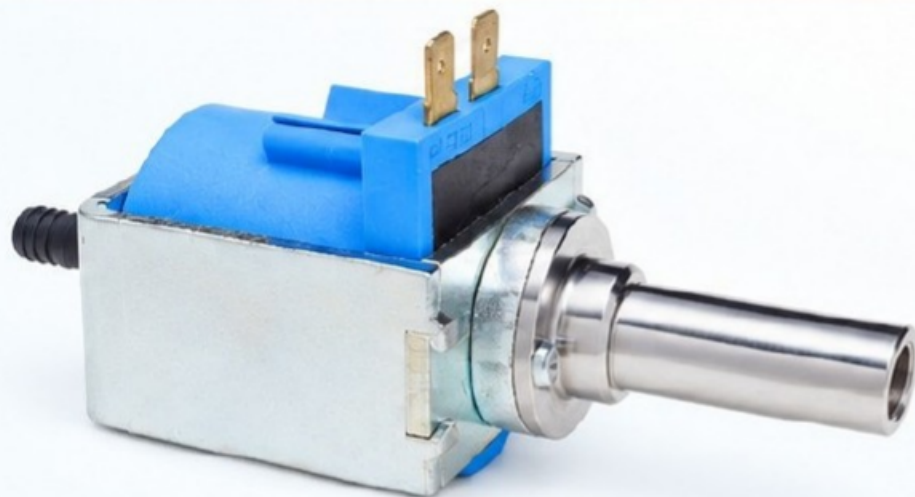
Kennlinie



Water pump working curve SWC - S

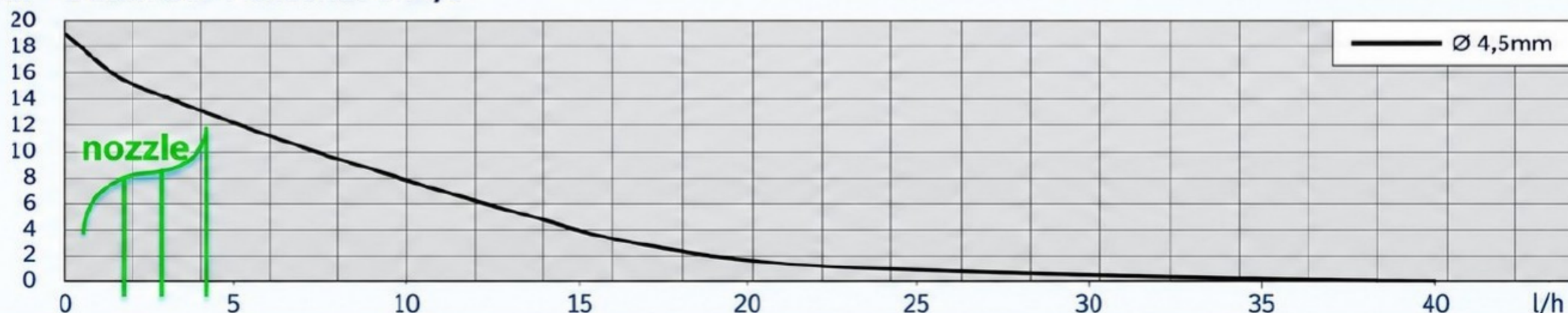


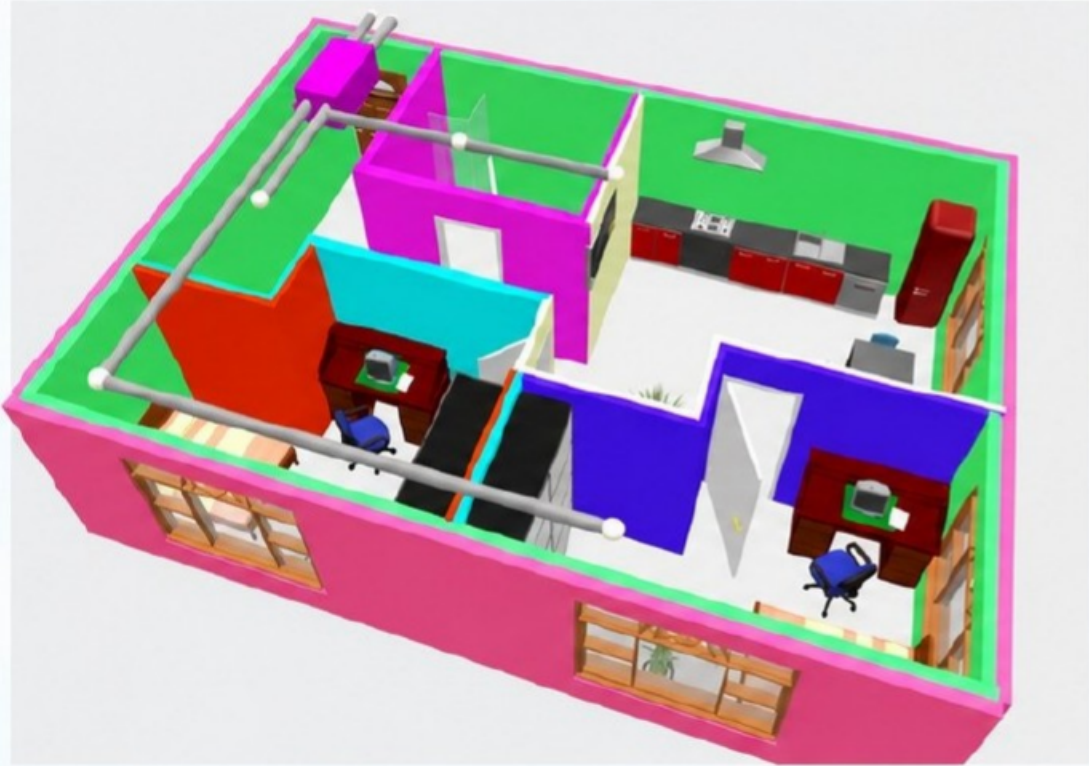
NATURAL BORN ENERGY



Max. Förderleistung: Max. Capacity:	37 l/h
Max. Staudruck: Max. Pressure:	19 bar
Max. Saughöhe: Max. Suction Lift:	1 m
Leistungsaufnahme: Power:	35 VA (230V AC)
Gewicht: Weight:	0,39 kg
Gerätestecker: Connector Plug:	Flachstecker 6,3x0,8 Contact Pin 6,3x0,8

bar Daten bei Viskosität 6m²/s





Wrong installed



Properly Istalliert

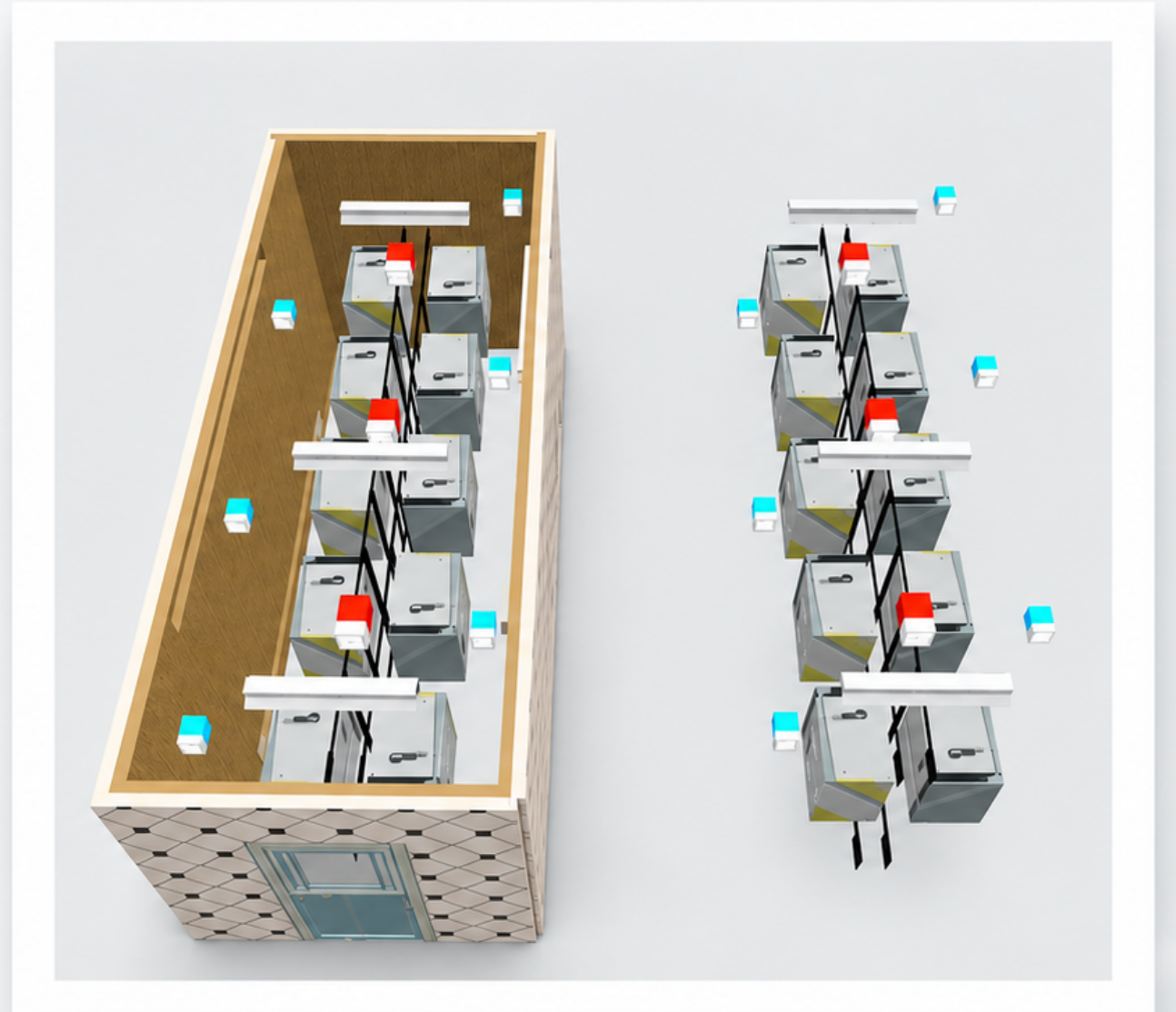


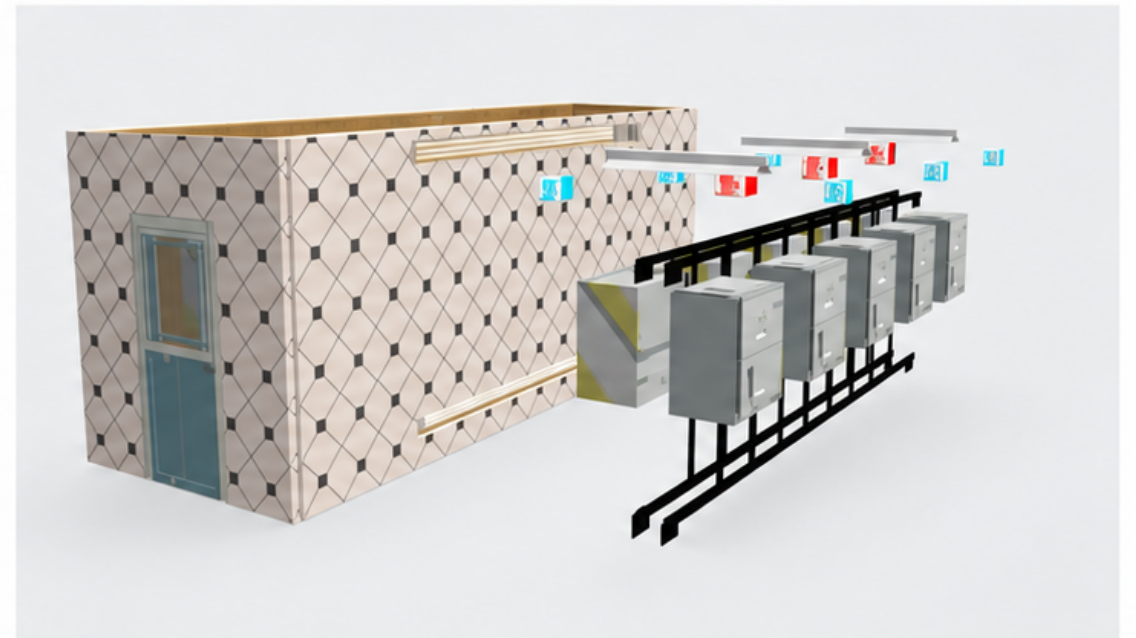
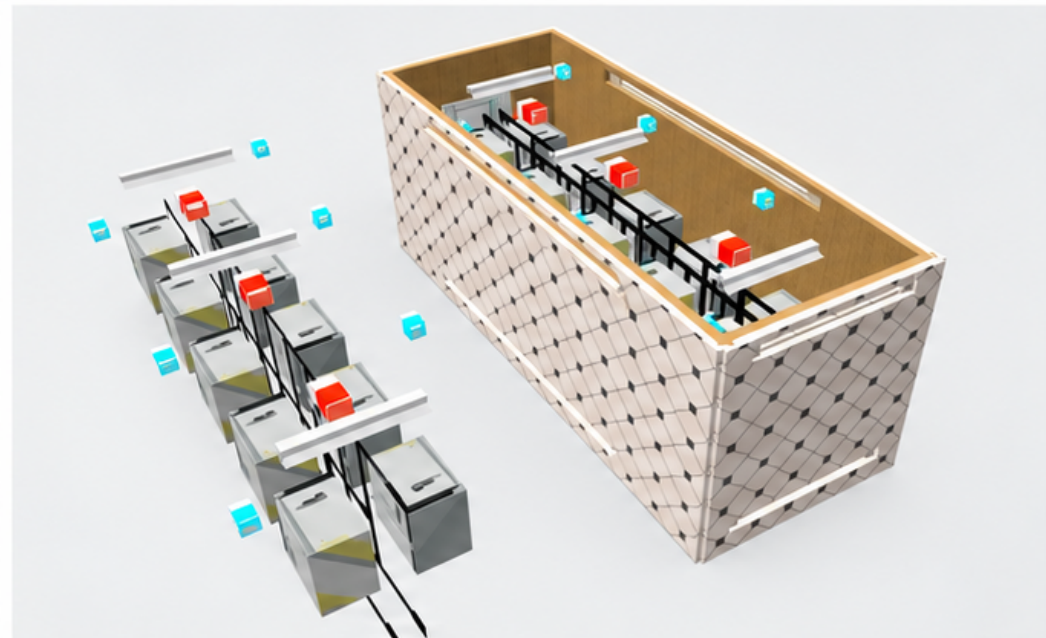
Inverter Safety Container [ISC]

ISC

1MW-2MW-4MW

- The ISC system exists in three different capacities. This is based on the existing container mass, which brings its advantages as central inverter systems.
- The prefabrication of the system components simplifies assembly, saves time and avoids errors on the part of the installer.
- Protects against external weather conditions such as temperature fluctuations and dirt.
- Extends the lifespan of components.
- Constant maximum output power through optimized air-conditioned room temperature and air filtering with 100% automatic operation.
- Simple servicing for repairs and replacements without taking entire capacity out of the production line, as each small individual unit is treated separately.





1MW

17.500€

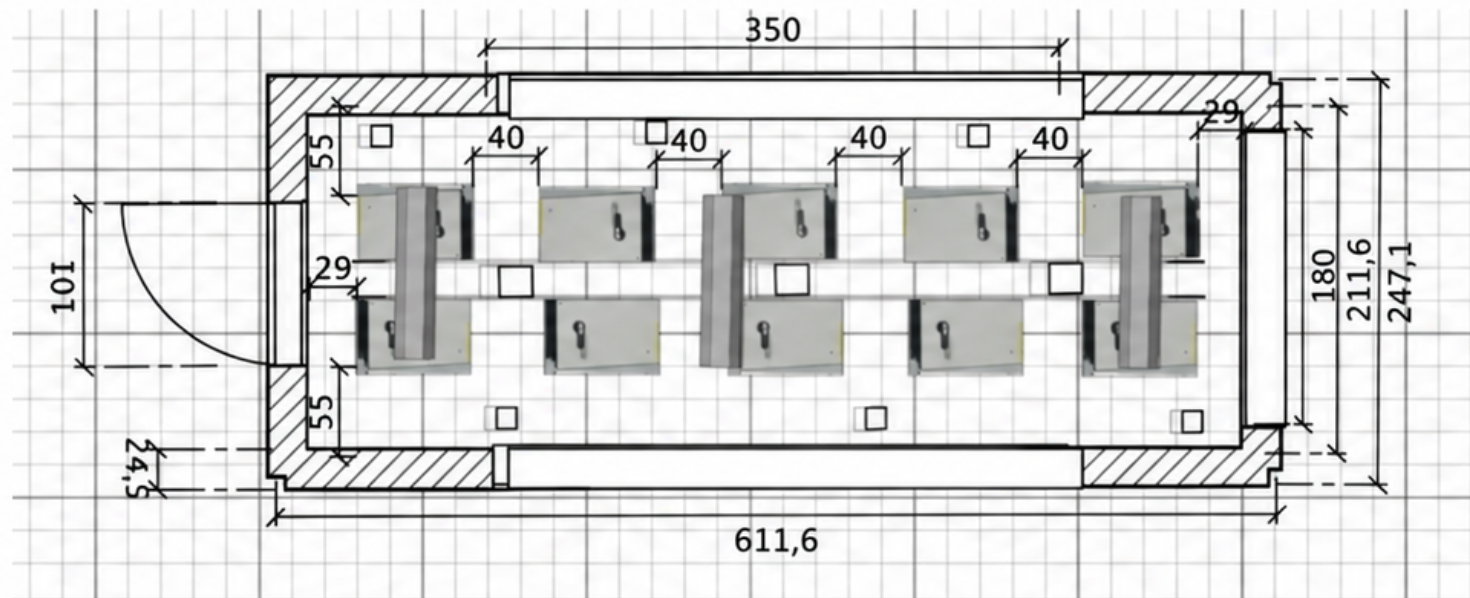
2MW

30.000€

4MW

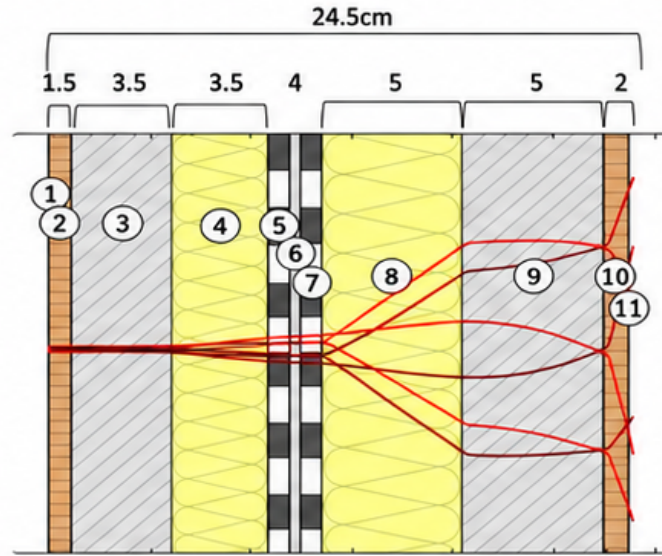
58.000€

- We create containers available in three different dimensions: 10 feet, 20 feet and 40 feet.
- Depending on customer needs, this can be done with different Kaco inverters from the Blueplanet 50 to 165 series.
- Specific individual insulation options depending on the location and needs optimally protect the inside from the outside.
- By using the SWC (Solar Watter Cooler), the air-conditioned ventilation system ensures maximum efficiency and a constant temperature with minimal energy consumption.

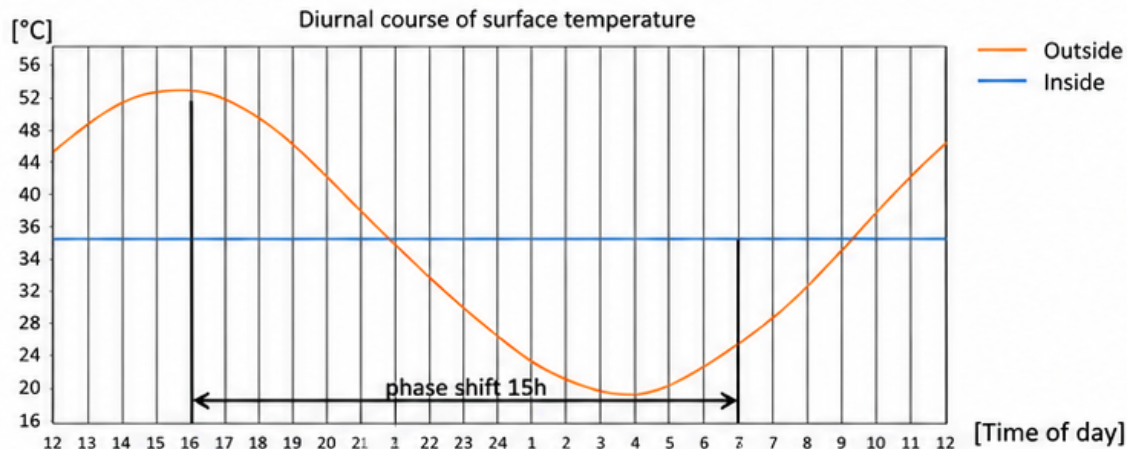


ISC-2MW

- 20 foot container with 17cm insulation
- 10 Kaco Blueplanet 165XL inverters
- Solar water cooling (SWC) 23.9kW cooling performance
- One door (2x1m T90) + 4 automatic ventilation flaps (3.5x 0.25m) + 2 automatic ventilation flaps (1.8 x 0.25m) + two DC cable holes. Two AC cable hole.



- 1-2/10-11 Clay composite (IN/OUT)
- 3-9. Pore clay fiber panels. Easy construction
- 4-8. Insulation mat Nature fiber
- 5-6-7. Container construction

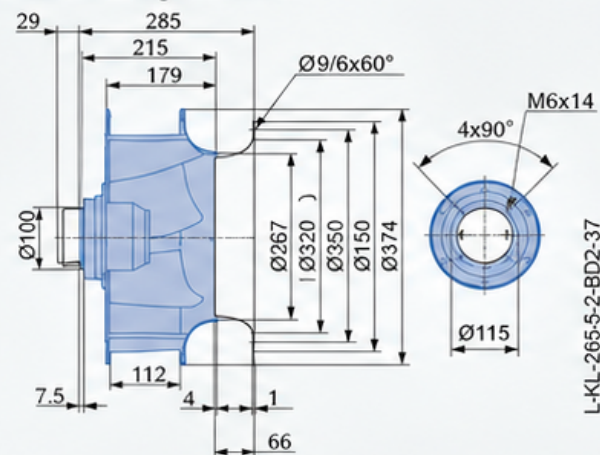


Isolation

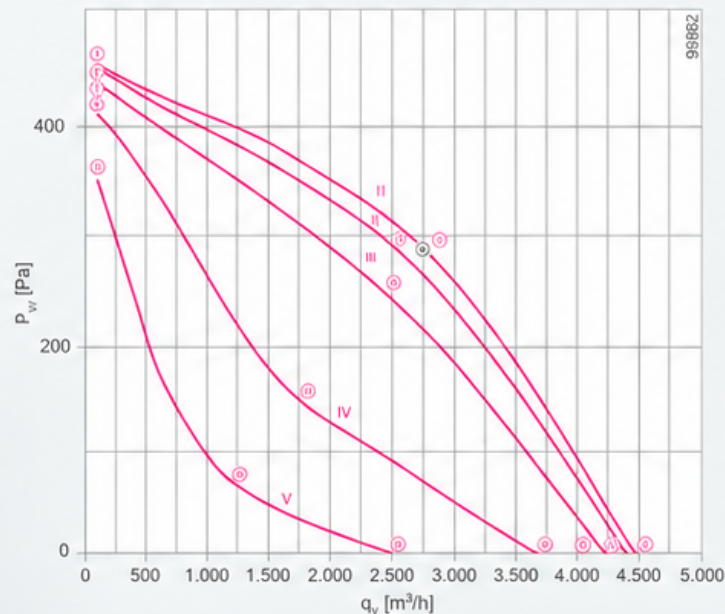
- Our optimally aligned insulation made of composite materials such as clay and hemp + bamboo and palm fibers ensure the highest level of thermal insulation from both the outside and the inside. Our U value here is $0.335\text{W/m}^2\text{K}$.
- This means our SWC system maintains a constant room temperature of 35°C .
- With a phase shift of 15 hours, we are able to maintain our system's internal temperature throughout the night, even at night, so that no high output from the SWC is required the next day when the inverter starts.
- The increase in performance of our SWC cooling system is proportional to the increase in temperature and lower humidity.

Cross Heat Exchanger Diagram and Ventilator Capacities

Freilaufendes Motorlüfterrad RH
im Einbaulage H/Vu/Vo



Kennlinie



Typ: GS 110/ 900

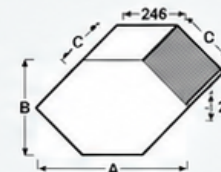
		Zuluft	Abluft	
Lufteintritt	Standardvolumen	2500	2300	m³/h
	Betriebsvolumen	2945	3201	m³/h
	Temperatur	16.0	50.0	°C
	relative Feuchte	10.0	100.0	%
	absolute Feuchte	1.34	106.26	g/kg
	Enthalpie	19.5	-326.0	kJ/kg
Luftaustritt	Betriebsvolumen	3265	3117	m³/h
	Temperatur	47.4	47.6	°C
	relative Feuchte	1.7	100.0	%
	absolute Feuchte	1.34	92.45	g/kg
	Enthalpie	51.2	-287.3	kJ/kg
Anströmgeschwindigkeit		1.40	1.53	m/s
Druckverlust		137	170	Pa
Druckverlust (Standarddichte)		131	117	Pa
Rückwärmzahl trocken (EN 308)		83.8		%
Rückwärmzahl feucht (EN 308)		92.4		%
Energieeffizienz (DIN EN 13053)		82.4% / H1		
Rückwärmzahl trocken ErP Lot 6		84.2	(2018 ready)	%
Wärmeleistung trocken		23.90	-23.90	kW
Wärmeleistung feucht		26.37	-26.37	kW
Kondensatmenge			-13.81	g/kg
			-34.42	kg/h

Die Auslegung ist gültig für

Luftdruck 845 mbar
Höhe über NN 1500 m

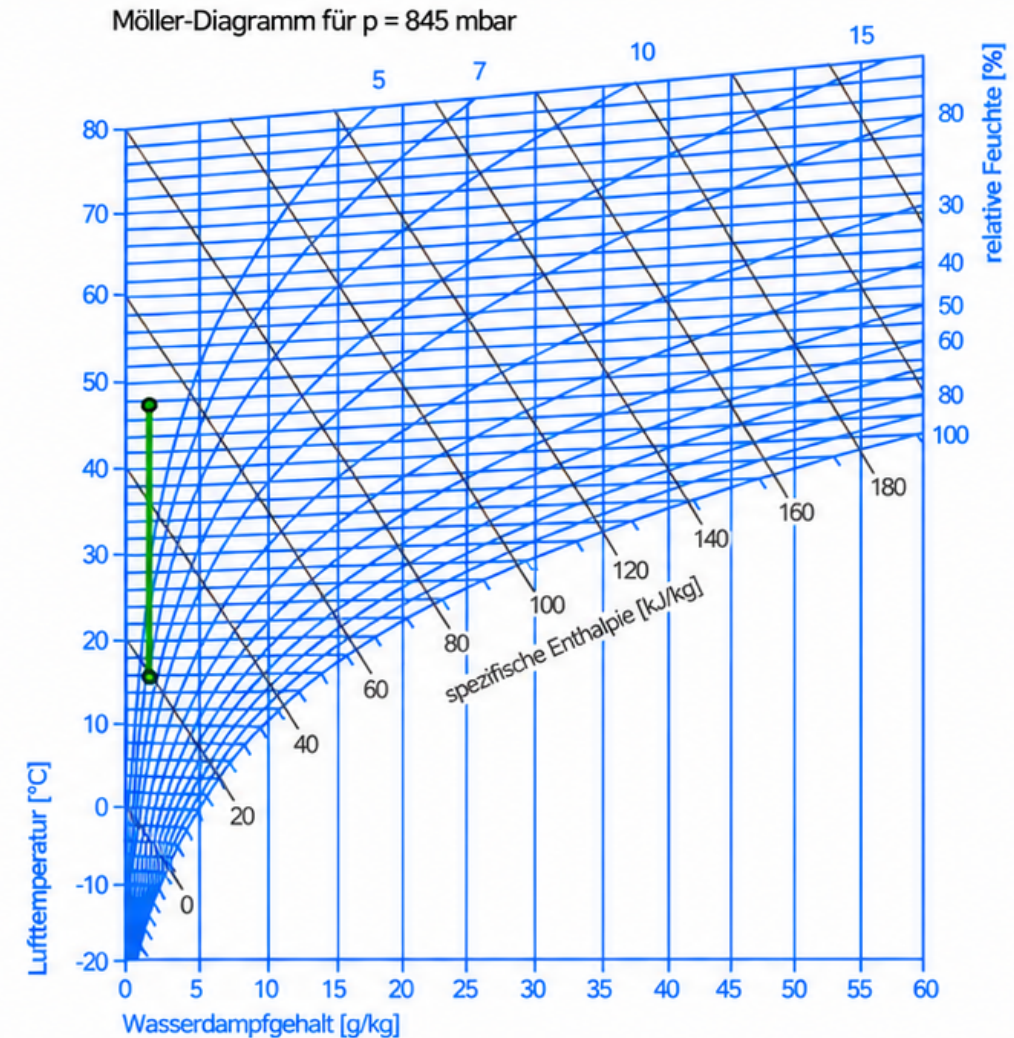
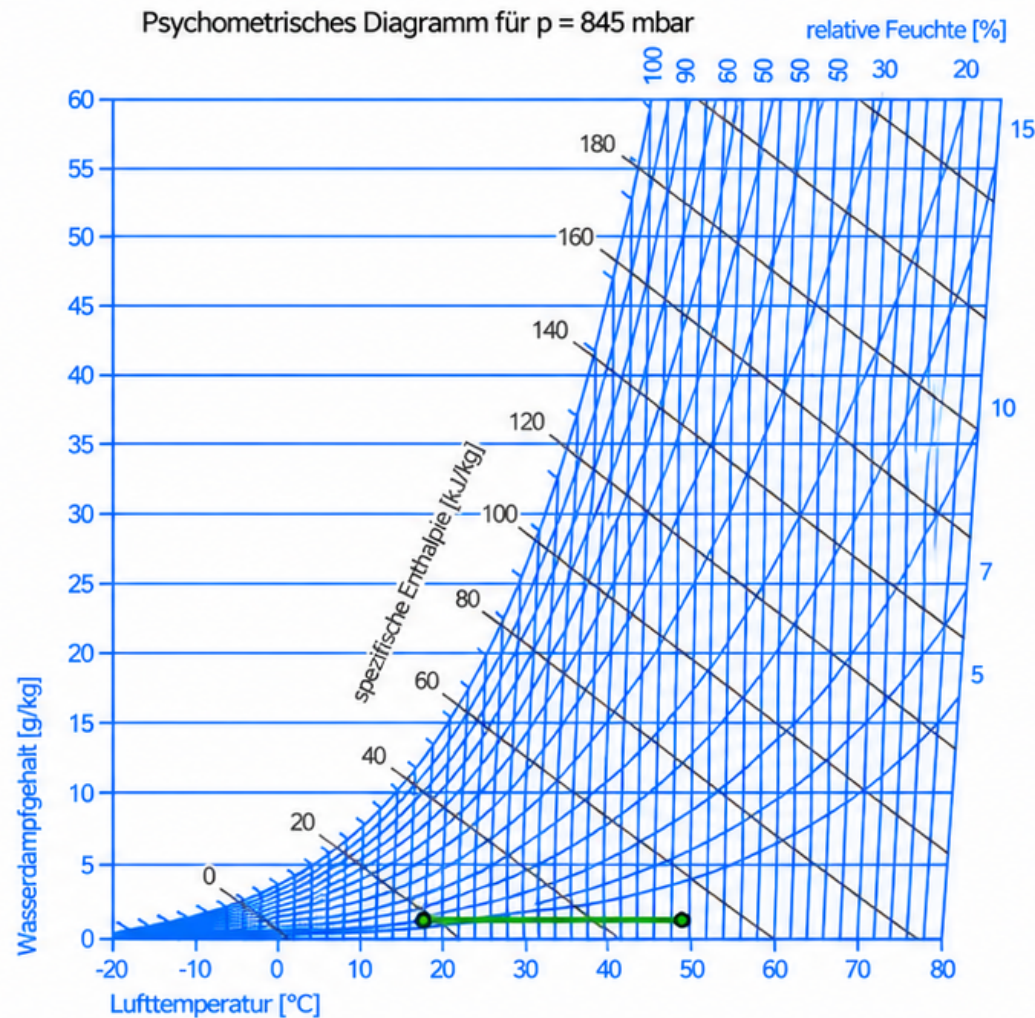
Abmessungen

A = 1182 mm
B = 957 mm
C = 900 mm
D = 647 mm



Gewicht 92.9 kg

Psychometric chart





RSNKP GmbH

Switzerland



NATURAL BORN ENERGY

RSNKP GmbH , Wannenstrasse 29,
Company ID: CHE-375.634.265
8703 Erlenbach Switzerland
CEO: Tirdad Hofmann
hofmann@rs-nkp.com
www.rs-nkp.com

