GREEN® & COOL

Low carbon heating production

HeatCOOL CO_2

High-temperature Industrial heat pumps with CO_2 refrigerant

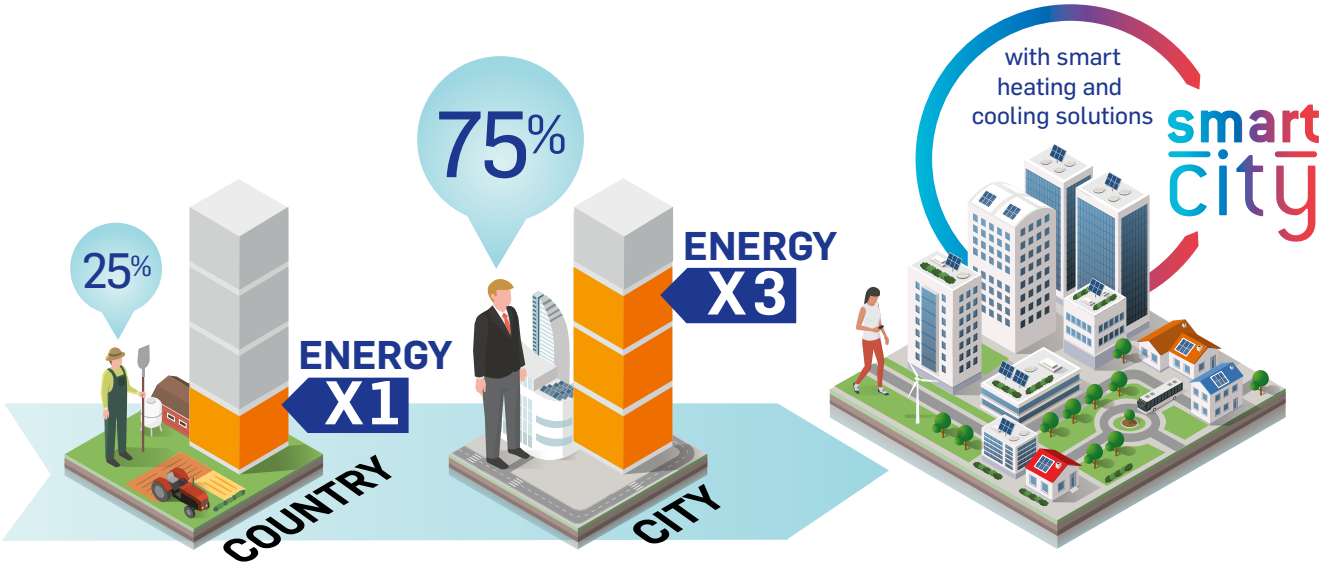
CO_2 NATURAL REFRIGERANT

NET ZERO 2030

400 to 2200 kW

Smart urbanisation

Developing smarter cities to anticipate the increase of urbanisation



75% of the people in Europe live in a city setting. **People in cities use three times as much energy as people who live in the country.** This has tremendous implications for the environment today and in the future if we do nothing. More and more, developers, consultants, cities, politics will need to imagine intelligent, sustainable cities **with smart heating and cooling solutions**.

Heat recovery potential for smarter cities

Using renewable energy from both natural and wasted heat sources are great opportunities for more sustainable cooling and heating solutions.

Value natural heat source

Smart cities can value natural heat sources as an advanced and cost effective alternative to fossil fuels. It is available free of charge and offers independence from oil and gas:

- Groundwater
- Lake water
- Sea water
- Geothermal

Value wasted heat source

Recent European surveys have demonstrated that there is enough waste heat produced in the European Union to heat the entire building stock. All this waste energy too frequently released into the air or into water bodies. Why not recover it? Smart cities shall value:

- Waste heat from grey waters
- Waste heat from industrial process
- Waste heat from boilers (wood, gas...)
- Waste heat from chillers

Multiple heating applications

The Green&Cool HeatCO$_2$OL™ heatpumps can value both natural and wasted heat sources to offer sustainable energy solutions for multiple heating applications.

By using renewable energy sources for air, water and ground, HeatCO$_2$OL™ pumps offer smart cities a more sustainable energy supply solution.

Delivering hot water up to 90°C, the HeatCO$_2$OL™ heatpumps can supplement traditional boilers in applications such as:

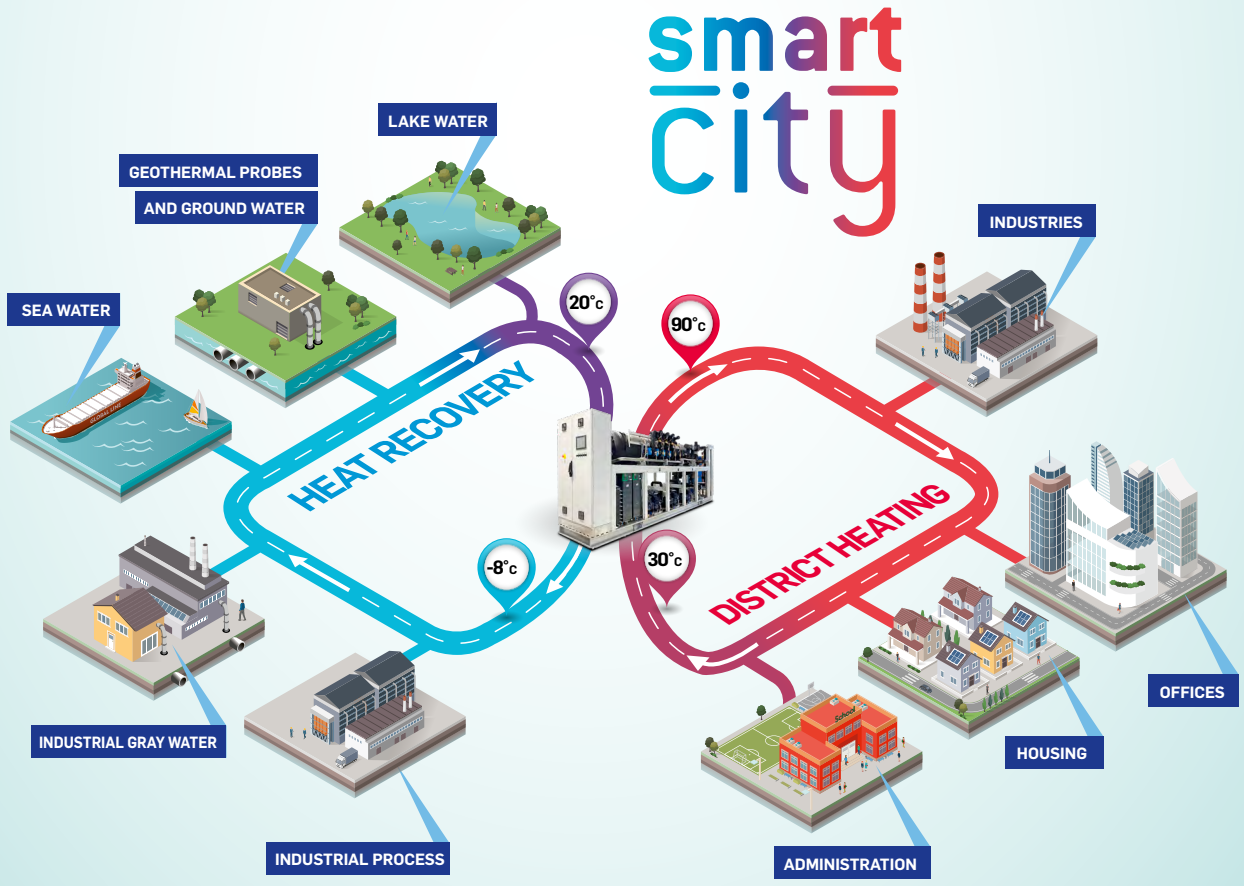
- Commercial building heating
- District heating
- Industrial process heating

3 different heating temperature grades can be managed simultaneously on the same unit.

Reach your Net zero target

Implementing a CO_2 natural refrigerant heat pump is a clear step forward in reaching your Net Zero and ESG objectives.
It provides a decarbonated heating system together with a net-zero greenhouse gas emissions cooling system.

NET ZERO 2030



**HeatCO$_2$OL™, at the heart of smart city,
providing both natural and wasted heat sources to multiple applications.**

HeatCOOL

Natural refrigerant solutions

CO_2 NATURAL REFRIGERANT

Preserving the environment

- Low Global Warming Potential (GWP) $CO_2 = 1$
- Zero impact on Ozone layer depletion (ODP = 0)
- Non-flammable, non-corrosive
- CO_2 has minimal impact on water quality when released in the atmosphere

Faster approval, more incentives

- No special approval needed from local authorities
- Eligible for incentives & subsidies in lots of European countries

CO_2 – a polyvalent refrigerant

Sustainable

- Neutral environmental impact
- Non-flammable, non-toxic, non-corrosive and non-explosive
- Not concerned by F-GAS / P-FAS

Polyvalent

- Air heating
- Hot tap water
- District heating
- Air conditioning
- Low temperature
- Medium temperature

Inexpensive

- The cheapest refrigerant
- Not taxed
- Low refrigerant charge

Efficient

- Significant energy savings measured on real applications
- Even more profitable when both heating and cooling technolgies are combined

CO_2 is providing a good balance between environmental footprint and energy efficiency:

A complete CO_2 system can replace a traditional cooling system + fuel heater + air conditioning

Smart heating production

90°C hot water production

- The combination of our technology and CO_2 refrigerant offers a high temperature heat pump capable of delivering hot water up to 90°C. By selecting the HeatCO_2OL™ system, you can now supplement traditional boilers in applications such as district heating and industrial processes and acheive your decarbonatrion target.
- The HeatCO_2OL™ units can also simultaneously produce chilled and hot water to supplement boilers and replace comfort or process chillers.

Up to 4 temperature levels

- The various combination of compressors and heat exchangers allow customers to manage 3 different temperature levels simultaneously on the heating side for different applications (for example domestic hot water + floor heating + pool heating) and one level on the cooling side, from air conditioning applications to freezing process applications.

High reliability and peace of mind for our customers

- Every HeatCO_2OL™ heatpump is factory assembled on a dedicated production line, leak-tested and electrical factory tested.

Eligible for financial incentives

- Many government environmental programs provide financial incentives for heat pumps to support renewable heat production in the industry, district heating sector, multi-family buildings and natural refrigerant solutions.

Low total cost of ownership

- HeatCO_2OL™ manufacture is based on premium quality components to guarantee an absolute reliability and peace of mind for our customers. During operation, the bearing lifetime of the compressors is 100,000 hours without expensive mechanical revision and oil renewal. In regard to preventive maintenance, the cost of the replacement of components is also limited. Only oil filter, motor expansion valves and liquid line core dryer are periodically reviewed.

Low environmental impact

- HeatCO_2OL™ heatpumps use CO_2, a natural refrigerant, with a GWP = 1 and ODP = 0. In addition, CO_2 in not flammable and non-toxic for the environment. Furthermore, these units are highly efficient as they reach a COP of 5 or more depending on the running conditions. This results in reducing both direct and indirect emissions that contribute to global warming.

Other advantages

HeatCO_2OL™ have many other advantages to meet every single customer needs and project constraints. It includes:

- Compact design (from 1,000mm wide) to save space into technical rooms.
- Low water temperature on inlet side (down to 15°C) to reach a high temperature lift with one unit (up to 70K lift).
- Several units can be connected in parallel for very large applications.
- Connectivity capability to enable remote monitoring and preventive maintenance operations.

* Temperatures up to 90°C depending on return flow temperature and water quality

Up to 90°C

Heating & cooling

Full reliability

Financial incentives & Low total cost of ownership

Low environmental footprint

A tried and trusted solution

Padborg District heating – Denmark

District heating heat pump for a 4,500 inh city

Customer requirement

- Provide 1,200kW of district heating for the city loop at 70°C with a return temperature of 35°C with the best performance

OUR SOLUTION

- 1 HeatCO$_2$OL™ with CO$_2$ natural refrigerant connected to grey water from the local dairy factory.

Green&Cool is reaching the promised performance with a COP of 3.7.

VIA 26 shopping and business center – Norway

Heating and AC for exclusive shops, high-end offices and parking facilities

Customer requirement

- Natural refrigerant solution for hot tap water, air heating, floor heating, snow melting and air conditioning for 58,500m^2 building

OUR SOLUTION

- 2 HeatCO$_2$OL™ using ground as a heat source (2,000kW of AC, 600kW water at 75°C and 1,500kW at 50°C)

Integration of the units in the basement, connected on same water loops as refrigeration system

Fish farm – Denmark

Process cooling and heating combined with district heating

Customer requirement

- Natural and sustainable solution for 6MW of process chiller 10/4°C and valorization of the rejected heat.

OUR SOLUTION

- 4 HeatCO$_2$OL™ combining chiller and heat pump connected to the city heating grid at 40/70°C to supply up to 8MW of heat

Smart solution and smart control. Combined priority of cooling and heating demand

HeatCO2OL

Technical insight

Water-source heat pumps with CO_2 natural refrigerant

CO2OLtec® Evo

High efficiency technology

CO2 NATURAL REFRIGERANT

- Long term refrigerant solution
- GWP = 1
- ODP = 0
- A1 class

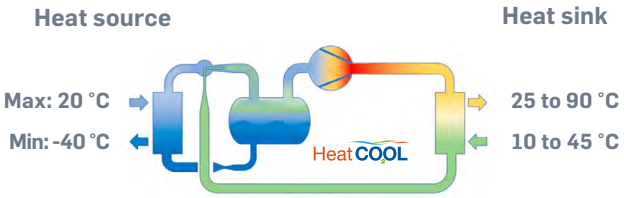
Maximizing performance

The HeatCO$_2$OL™ range covers heating capacity from 400kW to 2,2 MW. Units can be placed in parallel to reach higher capacities. The lowest is the heat sink return temperature, the better performance you can reach. To achieve this, you can connect several heating circuits on the same unit.

From 1 hot water circuits to 3

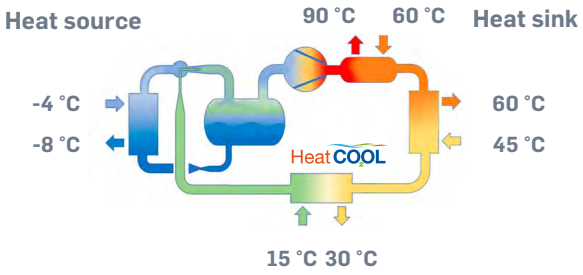
SOLUTION 1

1 heating circuit



SOLUTION 2

3 heating circuits

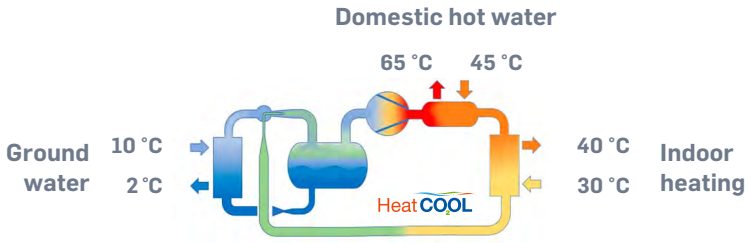


Combining heat source and usages to maximize energy savings

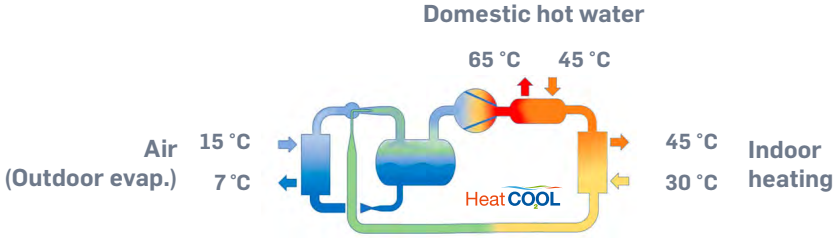
HeatCO$_2$OL™ are compatible with a wide range of heat sources and can provide water up to 90°C. Combining heat source , heat usage and cold water usage on same plant will drive annual performance at its maximum.

Example:

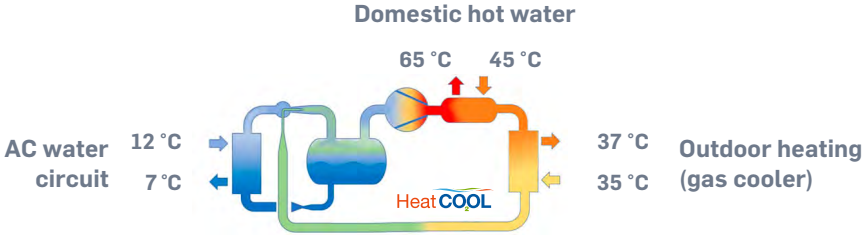
Winter mode



Mid season



Summer



HeatCO2OL IS

Technical characteristics

HeatCO2OL IS WW		IS 460WW	IS 580WW	IS 650WW	IS 790WW	IS 910WW
Nominal point: heating water in 30°C, out 60°C. Cooling water in 12°C, out 7°C						
Heating capacity (water in / out: 30/60°C)	kW	460	580	650	790	910
Cooling capacity (water in/out: 12/7°C)	kW	370	470	530	640	740
COP		3,6	3,7	3,6	3,7	3,6
EER		3,0	3,0	3,0	3,0	3,0
Eq. SEER (1)		4,5	4,5	4,3	4,5	4,5
Total COP (Cooling and heating)		6,5	6,7	6,5	6,7	6,5
Input Power	kW	121	154	176	213	249
Flow rate heating 30/60°C	m³/h	13	17	19	23	26
Flow rate cooling 12/7°C	m³/h	64	81	91	110	128
Nominal point: heating water in 30°C, out 70°C. Cooling water in 12°C, out 7°C						
Heating capacity (water in / out: 30/70°C)	kW	460	580	650	790	915
Cooling capacity (water in/out: 12/7°C)	kW	370	470	530	640	740
COP		3,5	3,6	3,5	3,6	3,5
EER		3,0	3,0	3,0	3,0	3,0
Eq. SEER (1)		4,5	4,5	4,3	4,5	4,5
Total COP (Cooling and heating)		6,3	6,5	6,4	6,5	6,3
Input Power	kW	121	154	176	213	249
Flow rate heating 30/70°C	m³/h	10	13	14	17	20
Flow rate cooling 12/7°C	m³/h	64	81	91	110	128
Physical properties						
Number of compressors		4	5	5	5	5
CO_2 charge (2)	kg	510	510	520	550	550
Connection water side hot	DN	50	65	65	65	65
Connection water side cold	DN	100	125	125	150	150
Indoor version*						
Dimensions L	mm	5200	6145	6145	6145	6145
Dimensions W	mm	1000	1000	1000	1000	1000
Dimensions h	mm	2200	2200	2200	2200	2200
Operationnal weight (CO_2 + water included) (2)	kg	6400	6400	6700	7300	7500
Sound pressure level @10 m (3)	dB(A)	58,4	59,4	59,2	61,6	62,7
Electrical data for 400/3/50 + N / EN / Short circuit current 15kA						
Maximum operating current	A	282	353	468	437	437
Nominal electric current	A	218	267	341	363	413

** outdoor version available*
(1) SEER, we use Directive 2009/15/EC of the European Parliament and of the Council with regard to Ecodesign requirements as a reference.
(2) Estimated Value – to be charged and adjusted on site
(3) The sound presure levels are mentioned in free field. Running the equipment in other conditions may lead to different results. The results obtained on the installation site may differ from those in this leaflet, due to sound reflections from walls, etc. The reduction of sound level as a function of distance is theoretical and sound reflection and resonance may alter the results, either on total sound level or on certain frequencies.

Main options:

- Outdoor housing version with / without sound proofing
- Hydraulic pumps control
- Modbus, RS485/RTU communication
- Electrical energy measurement for compressor
- Electrical energy measurement for pumps
- Inverter drive on compressor N°2
- Up to 2 hot water temperature levels to maximize performance
- Other options on request

Heat CO_2OL IM

Technical characteristics

HeatCO₂OL IM WW		IM 900WW	IM 1070WW	IM 1120WW	IM 1160WW	IM 1340WW
Nominal point: heating water in 30°C, out 60°C. Cooling water in 12°C, out 7°C						
Heating capacity (water in / out: 30/60°C)	kW	900	1070	1120	1160	1340
Cooling capacity (water in/out: 12/7°C)	kW	720	870	900	940	1085
COP		3,4	3,6	3,4	3,5	3,6
EER		2,8	2,9	2,8	2,9	2,9
Eq. SEER (1)		4,1	4,3	4,1	4,2	4,3
Total COP (Cooling and heating)		6,1	6,5	6,1	6,3	6,5
Input Power	kW	256	296	320	323	370
Flow rate heating 30/60°C	m³/h	26	31	32	33	39
Flow rate cooling 12/7°C	m³/h	124	150	155	162	187
Nominal point: heating water in 30°C, out 70°C. Cooling water in 12°C, out 7°C						
Heating capacity (water in / out: 30/70°C)	kW	900	1070	1130	1170	1350
Cooling capacity (water in/out: 12/7°C)	kW	720	870	900	940	1085
COP		3,4	3,5	3,4	3,5	3,5
EER		2,7	2,8	2,7	2,8	2,8
Eq. SEER (1)		4,1	4,3	4,1	4,2	4,3
Total COP (Cooling and heating)		6,1	6,3	6,1	6,3	6,3
Input Power	kW	267	311	333	336	388
Flow rate heating 30/70°C	m³/h	19	23	24	25	29
Flow rate cooling 12/7°C	m³/h	124	150	155	162	187
Physical properties						
Number of compressors		4	4	5	4	5
CO_2 charge (2)	kg	750	780	780	790	790
Connection water side hot	DN	65	80	80	80	80
Connection water side cold	DN	150	150	200	200	200
Indoor version*						
Dimensions L	mm	7750	7750	7750	7750	7750
Dimensions W	mm	1200	1200	1200	1200	1200
Dimensions h	mm	2200	2200	2200	2200	2200
Operationnal weight (CO_2 + water included) (2)	kg	9200	9700	10300	10200	10400
Sound pressure level @10 m (3)	dB(A)	67,2	68,3	68,2	69,4	69,3
Electrical data for 400/3/50 + N / EN / Short circuit current 15kA						
Maximum operating current	A	592	680	740	680	850
Nominal electric current	A	485	558	597	590	687

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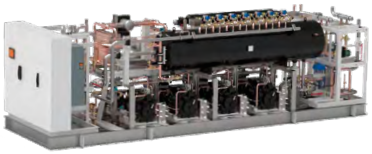
HeatCO2OL IL



Technical characteristics

HeatCO2OL IL WW			IL 1450WW	IL 1600WW	IL 1740WW	IL 1870WW	IL 2030WW
Nominal point: heating water in 30°C, out 60°C. Cooling water in 12°C, out 7°C							
Heating capacity (water in / out: 30/60°C)		kW	1450	1600	1740	1870	2030
Cooling capacity (water in/out: 12/7°C)		kW	1175	1300	1410	1520	1645
COP			3,5	3,6	3,5	3,6	3,5
EER			2,9	2,9	2,9	2,9	2,9
Eq. SEER (1)			4,2	4,3	4,2	4,3	4,2
Total COP (Cooling and heating)			6,3	6,5	6,3	6,5	6,3
Input Power		kW	404	443	484	518	565
Flow rate heating 30/60°C		m^3/h	42	46	50	54	58
Flow rate cooling 12/7°C		m^3/h	203	224	243	262	284
Nominal point: heating water in 30°C, out 70°C. Cooling water in 12°C, out 7°C							
Heating capacity (water in / out: 30/70°C)		kW	1470	1620	1760	1890	2055
Cooling capacity (water in/out: 12/7°C)		kW	1185	1305	1420	1525	1655
COP			3,4	3,5	3,4	3,5	3,4
EER			2,8	2,8	2,8	2,8	2,8
Eq. SEER (1)			4,2	4,3	4,2	4,3	4,2
Total COP (Cooling and heating)			6,1	6,3	6,1	6,3	6,1
Input Power		kW	423	466	507	545	591
Flow rate heating 30/70°C		m^3/h	32	35	38	41	44
Flow rate cooling 12/7°C		m^3/h	204	225	245	263	285
Physical properties							
Number of compressors			5	6	6	7	7
CO_2 charge (2)		kg	1400	1900	1900	1950	1950
Connection water side hot		DN	100	100	100	100	100
Connection water side cold		DN	200	200	200	250	250
Indoor version*							
Dimensions	L	mm	6345	8340	8340	8340	8340
	W		2200	2200	2200	2200	2200
	h		2200	2200	2200	2200	2200
Operationnal weight (CO_2 + water included) (2)		kg	14600	16100	16600	17700	18200
Sound pressure level @10 m		dB(A)	70,4	70,1	71,2	70,7	71,8
Electrical data for 400/3/50 + N / EN / Short circuit current 15kA							
Maximum operating current		A	850	1020	1020	1190	1190
Nominal electric current		A	730	817	871	946	1011

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Proven Solutions.
Cooling | Heating
Sustainable. Efficient.

PowerCOOL L
Industrial processes
large warehouses

CO2Y
Small stores | extensions

PowerCOOL S/M
Warehouses
food processes

Mistral / Crystal S
CO2Y MC
Convenience stores
cold rooms

Mistral / Crystal / Sirocco
Hypermarkets | storages
processes

Mistral / Crystal SX
Supermarkets | storages
processes

All applications

All climates

from 1 kW to 2,2 MW

- **Water source / Air source**
- **Packaged evaporator / split versions for commercial AW ranges**
- **Reversible: Heat in winter / AC and domestic hot water in summer**

HeatCOOL IL
District heating

HeatCOOL IM
Apartment
blocks

HeatCOOL CS
School | offices | hospital
commercial building | hotel

HeatCOOL IS
Industry | hotel

HeatCOOL CM
School | offices | hospital
commercial building | hotel

Up to 90°C water production

Heating Cooling Simultaneous

All climates

More than
23 000 CO_2
units produced

GREEN & COOL®

Green & Cool reserves the right to change certain information and specifications contained in this document at any time and without prior notice. Since standards, specifications and designs are subject to occasional change, please ask for confirmation of the information given in this publication

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