Enervent CHG

PRE-HEATING AND PRE-COOLING FOR VENTILATION SYSTEMS

enervent

Energy-efficiency in ventilation

PRE-HEATING/PRE-COOLING ALLOWS FOR SIGNIFICANT ENERGY SAVINGS

How is the pre-heating/pre-cooling implemented?

Pre-heating/pre-cooling is implemented via installation of a duct coil in the outdoor air duct before the ventilation unit. A fluid-filled coil can function both as a pre-heater and as a pre-cooler; in other words, its purpose is to pre-heat the incoming fresh air in winter and to pre-cool the incoming air during summer.

For what types of installation sites is the system suitable?

Ventilation pre-heating/pre-cooling can be implemented on all sites that have mecha- nical supply and extract ventilation and where installing a ground circuit is possible. The type of heating system used in the house is of no consequence. Therefore, the system can be installed for an older building too.

How does one create a ground circuit?

The pre-heating/pre-cooling coil is usually connected to a specially built collection circuit. The collection circuit is usually made of 40 mm plastic pipe in which non-freezing fluid circulates. The collection circuit is dug in the ground at a depth of approximately 1 m and installed in loops such that there is a gap between the pipes of at least 1.5 m. The collection circuit's total length should be 150 to 200 m. It is useful to perform the installation of the collection circuit simultaneously with a garden renovation, since soil needs to be dug from a large area. The more moisture the ground contains, the greater the pre-heating efficiency. Ground with a high water content retains heat more efficiently, which makes moist, clayey ground the best soil type for energy-efficiency, while dry, sandy soil is the most inefficient.

The pre-heating/pre-cooling coil can also be connected to the ground circuit of a ground-source heat pump, if the building has a ground-source heating system. In any case, the coil needs to have its own fluid circuit, which is separated from the fluid circuit of the heat pump via a fluid-heat exchanger, because the fluid in the heat pump ground circuit freezes in winter if it comes in connection with outside air. Therefore, a different fluid circulates in the heat pump circuit from that in the coil circuit. The coil-circuit fluid is usually a water-glycol mix (e.g., Dowcal 100) or an ethanol solution.

What benefits does pre-heating/ pre-cooling provide?

Pre-heating/pre-cooling helps to even out the effects of extremes in outdoor temperatures during winter and summer. The system provides significant energy savings by decreasing the energy consumption required to heat and cool the ventilated air. In addition, pre-heating reduces the need to defrost the ventilation unit and the demand for defrosting energy. The preheating system has a very good COP (i.e. efficiency). There is no need to design the ventilation unit for the region's most extreme temperatures; this translates into savings on the purchase price and energy consumption. At the same time, the reliability of the ventilation system is improved in extreme temperatures: when there is extremely cold or hot weather.

Heating outdoor air via a ground circuit is much more energy-efficient than using an electrical resistor, because the energy obtained from the collection circuit is free.

Pre-cooling provides some level of cooling even if the ventilation unit has no other cooling devices. The pre-cooling also dehumidifies the supply air blown inside, which makes it feel more pleasant. In houses where cooling devices have been installed as part of the ventilation system, pre-cooling decreases the amount of energy required for cooling by reducing the temperature and humidity level of the supply air.

The pre-heating/pre-cooling coil has a class-G3 coarse filter. The filter pre-filters the outside air to the ventilation unit, thereby extending the life of the ventilation unit's supply-air filter.

Design and installation of the system

DESIGNING THE SYSTEM IS BEST LEFT TO THE PROFESSIONALS

Issues to be noted in design and installation

- The coil must be installed such that the direction of air flow is as indicated by the coils air-flow markings.
- The coil's maintenance door should always open to the side. The maintenance door should not open upwards, since this will not allow condensation water to drain out.
- The coil must be installed in a horizontal duct, and it must be slightly inclined in order to allow draining of condensation water from the system.
- The coils are manufactured in both right- and left-handed models.
- Space for maintenance tasks must be left around the coil, and access to the coil must be ensured so that filter replacement and other maintenance procedures can be performed.
- A drainage connection and water seal must be installed. The water seal must be in a warm space.
- The coil and piping must be insulated, as must the outdoor-air duct between the coil and the ventilation unit. Also, the supply-air ducts of the ventilation system must be insulated to avoid condensation.
- The frost-resistance of the coil fluid must be in line with the design temperature indicated by the region's outdoor air. Glycol content in southern Finland, a minimum of 40% and in northern Finland, a minimum of 50%.
- The designer is responsible for designing a suitable collection circuit and a circulation pump, shutoff valves, pressure vessels, etc, on the basis of system data (pressure levels and flows).
  For houses with a ground-source heating system, the designer also selects a suitable fluid-heat exchanger for use between the ground circuit and the coil circuit.

System control

The Enervent MD control includes control of the pre-heating/pre-cooling system. Those Enervent devices equipped with MD control can be identified by their eAir control panel with touchscreen.

The pre-heating/pre-cooling system can also be controlled via a separate control method suggested by the designer, if the house does not have a ventilation unit with Enervent MD automation. The automation of the Enervent devices cannot be updated; that is, the system used in an Enervent device with another type of automatic control system cannot be replaced with an MD automation system.

Use and maintenance of the system

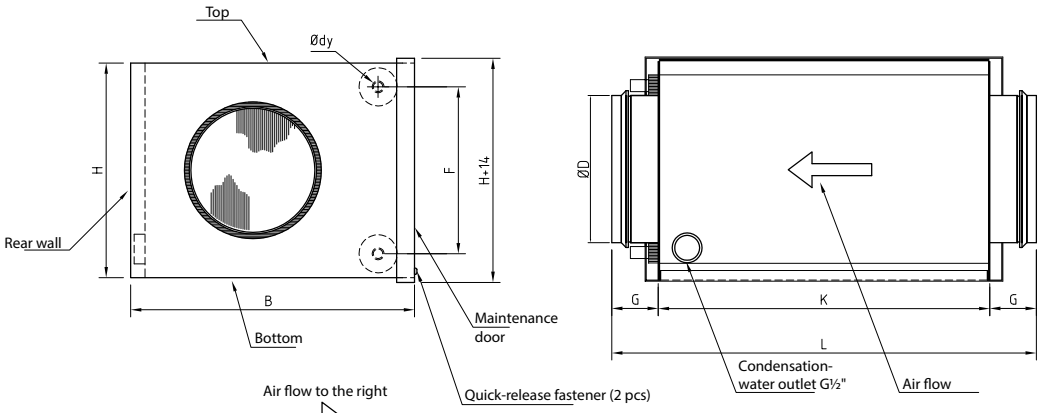
The coil requires regular maintenance. Replacement of the filter is particularly important. A dirty or clogged filter decreases air volumes and reduces the functionality of the coil and the entire ventilation system. In addition to filter replacement, cleaning of the inside of the coil must be performed when required. It is also good to ensure that condensation water is drained as is necessary, especially before the start of the cooling season. A leaking condensation-water outlet or a flooding coil can cause moisture damage to the structures of the building.

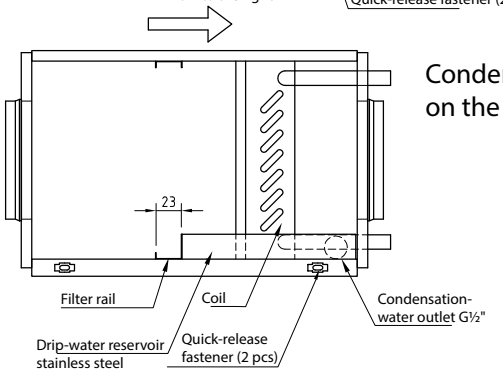
Opening the coil cover has been made easy to facilitate maintenance. The cover is attached with quick-release fasteners. Opening the fasteners requires the use of a Phillips-head screwdriver.

Technical information

DIMENSIONAL DRAWINGS

Right-handed coil



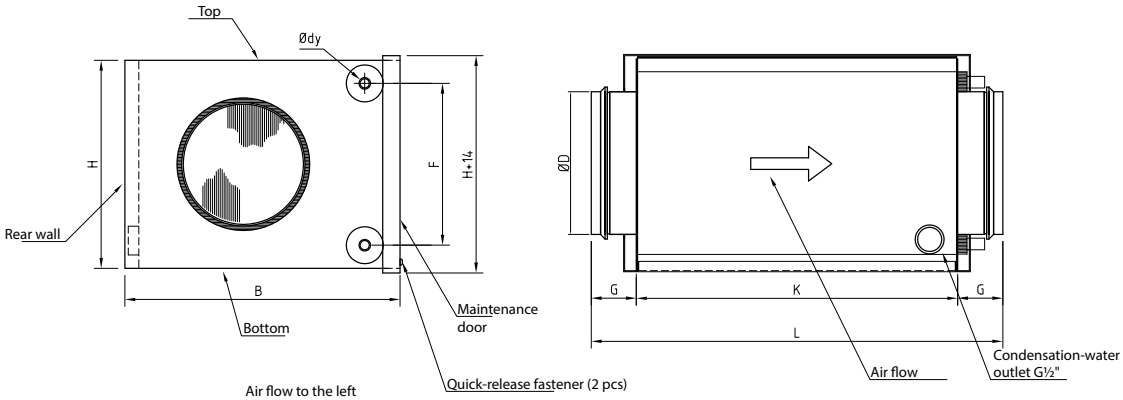


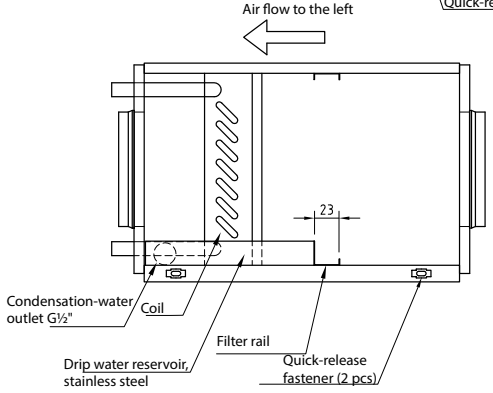
Condensation-water-insulated on the top, bottom, , on the rear wall and behind the maintenance door.

	Dimension							
Typ	ØD	H	B	ØDY	F	G	K	L
CWK 200-3-2,5 R	200	330	415	22	250	40	396	476
CWK 250-3-2,5 R	250	405	491	22	325	40	396	476
CWK 400-3-2,5 R	400	529	715	22	425	55	450	560

NOTE: Installation horizontally in the duct with the maintenance door opening to the side.

Left-handed coil





	Dimension							
Typ	ØD	H	B	ØDY	F	G	K	L
CWK 200-3-2,5 L	200	330	415	22	250	40	396	476
CWK 250-3-2,5 L	250	405	491	22	325	40	396	476
CWK 400-3-2,5 L	400	529	715	22	425	55	450	560

Condensation-water-insulated on the top, bottom, , on the rear wall and behind the maintenance door.

Technical information

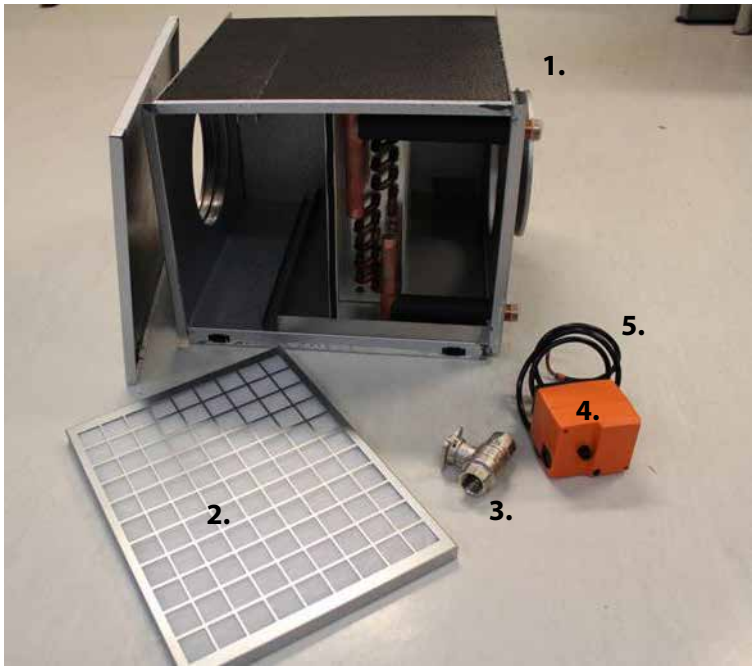
COIL RANGE AND DELIVERY CONTENTS

CHG package	CHG 200	CHG 250	CHG 400
Coil type	VEAB CWK 200-3-2.5-L/R	VEAB CWK 250-3-2.5-L/R	VEAB CWK 400-3-2.5-L/R
Product code for CHG package	L: K930040501V (left-handed) R: K930040501 (right-handed)	L: K930040502V (left-handed) R: K930040502 (right-handed)	L: K930040503V (left-handed) R: K930040503 (right-handed)
Suitable for Enervent devices (NOTE: Larger heaters can be used also for smaller devices)	Plaza, Pingvin, Pingvin XL , Pandion, LTR-2, LTR-3	Pelican, LTR-6	Pegasos, LTR-7
Coil's duct-connection size	Ø 200 mm	Ø 250 mm	Ø 400 mm
Coil's outer dimensions and weight when dry/fluid-filled	L 395 x H 330 x D 415 mm, 10/11 kg	L 395 x H 405 x D 491 mm, 12/13.5 kg	L 450 x H 529 x D 715 mm, 22/24.7 kg
Filter (plain filter)	1 filter, filtering class G3 379 x 296 x 13 mm A spare-filter set includes 6 filter pieces (no grate)	1 filter, filtering class G3 454 x 372 x 13 mm A spare-filter set includes 6 filter pieces (no grate)	1 filter, filtering class G3 679 x 472 x 13 mm A spare-filter set includes 6 filter pieces (no grate)
Fluid-pipe connections Condensation-water connection (under pressure)	22 mm ½ ", must be equipped with a water seal	22 mm ½ ", must be equipped with a water seal	22 mm ½ ", must be equipped with a water seal
Valve and actuator	Belimo R313 (R3015-4-S1), 3-way, kvs 4, DN 15 TR24-SR, 0-10V	Belimo R317 (R3020-4-S2), 3-way, Kvs 4, DN 20 HRYD24-SR, 0-10V	Belimo R322 (R3025-6P3-S2), 3-way, kvs 6.3, DN 25 HRYD24-SR, 0-10V
An additional outdoor-air sensor for Enervent MD devices	1 sensor, 5 m	1 sensor, 5 m	1 sensor, 5 m

Delivery content

The CHG package includes:

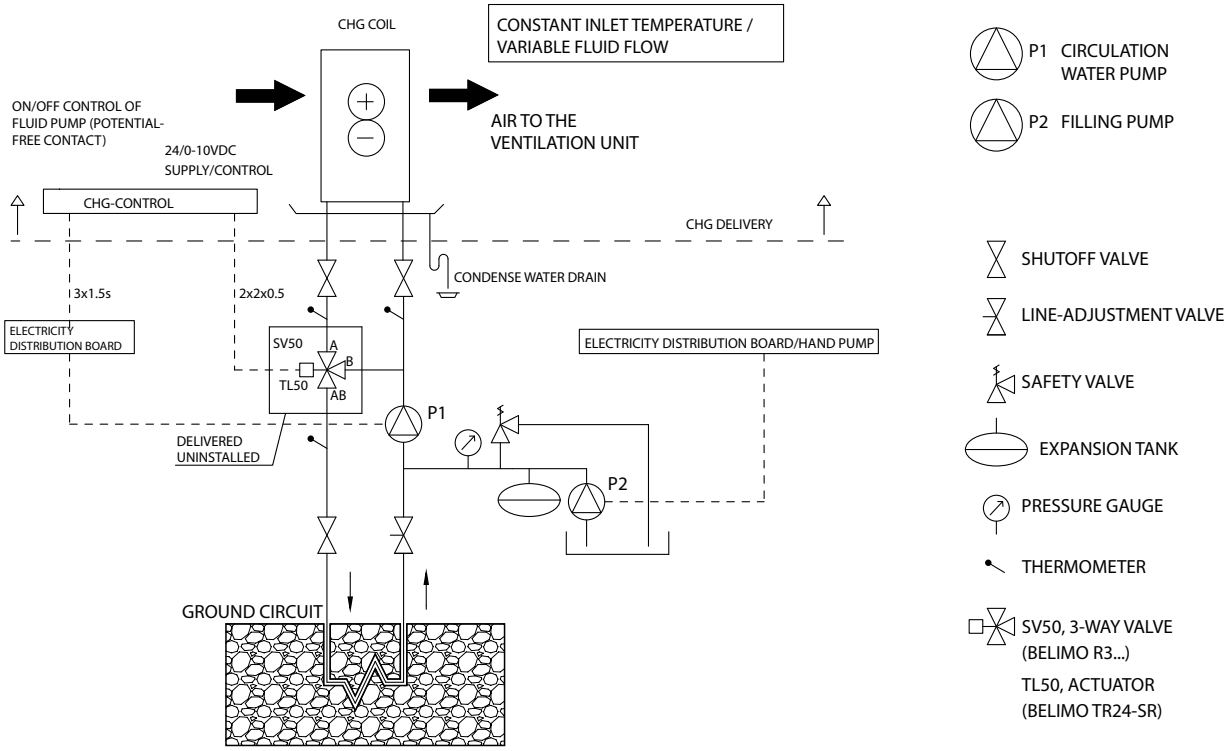
1. Duct coil
2. Level filter for the duct coil
3. Three-way valve for the fluid circuit
4. Actuator for the three-way valve
5. Outdoor temperature sensor (5 m)



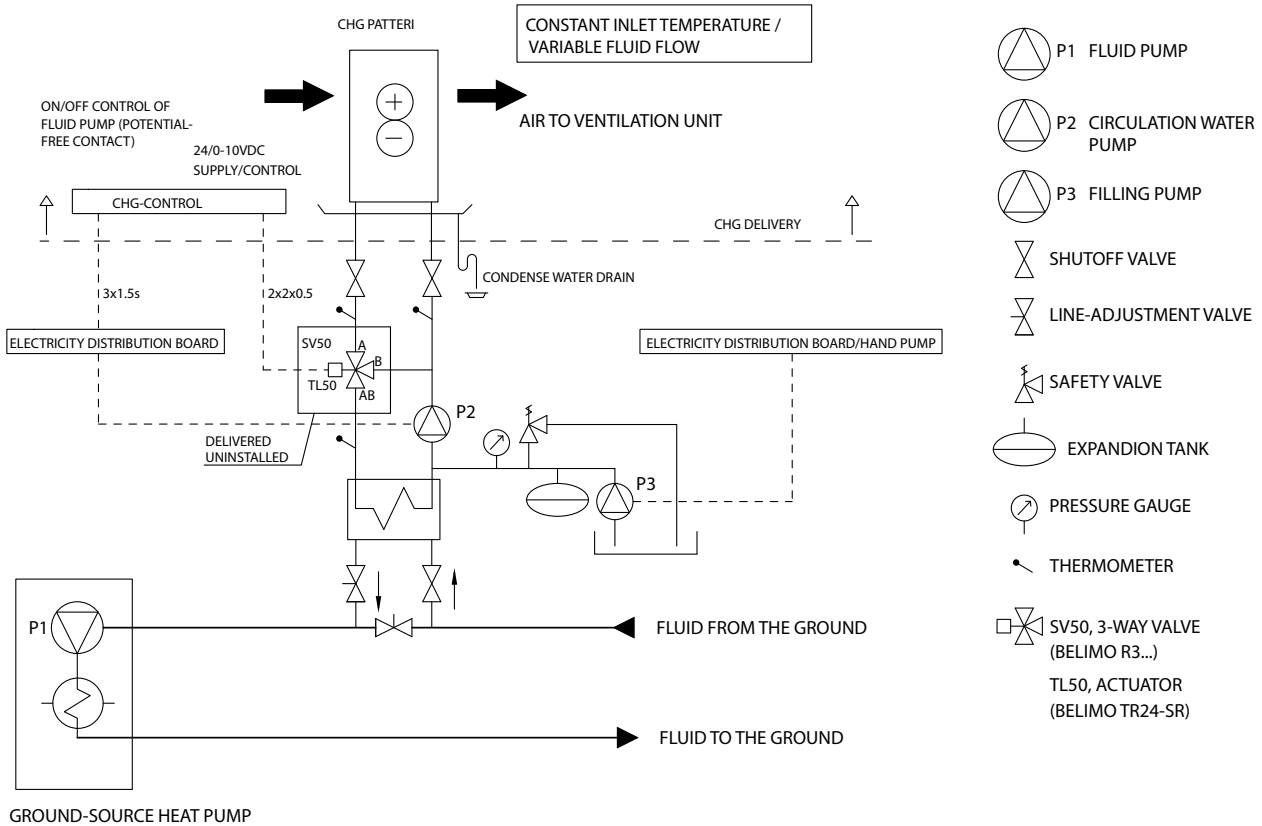
Technical information

CHG PRINCIPAL DIAGRAM

CHG principal diagram, the pre-heating/pre-cooling coil having its own collection circuit



CHG principal diagram, with the coil connected to the ground-source heating circuit via a heat exchanger



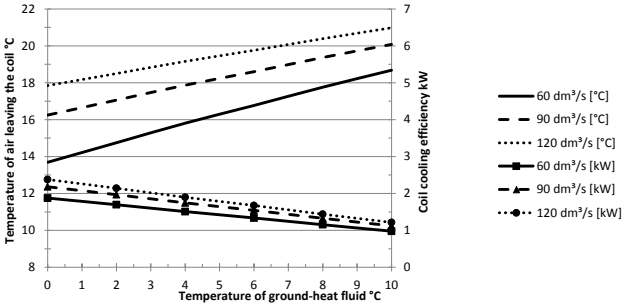
Technical information

EXAMPLES OF PERFORMANCE CHARACTERISTICS

CHG 200

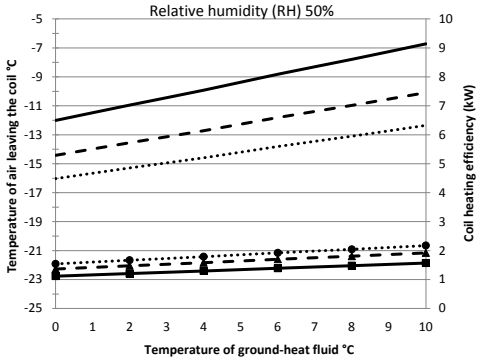
Cooling (max)

Ethylene glycol 40%,
flow rate 0.1 dm³/s, inlet air 28 °C.
Relative humidity (RH) 60%



Heating (max)

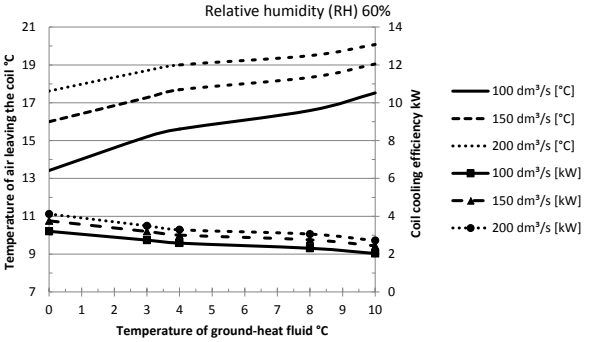
Ethylene glycol 40%,
flow rate 0.1 dm³/s, inlet air -25 °C.
Relative humidity (RH) 50%



CHG 250

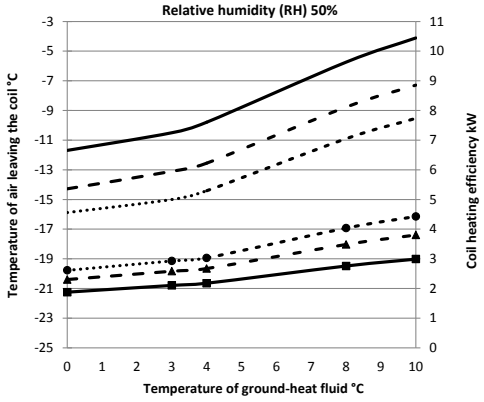
Cooling (max)

Ethylene glycol 40%, flow rate 0.1 dm³/
s, inlet air 28 °C.
Relative humidity (RH) 60%



Heating (max)

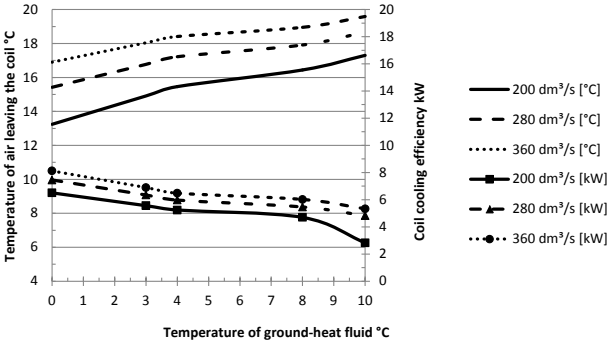
**Ethylene glycol 40%, flow rate 0.4 dm³/
s, inlet air -25 °C.
Relative humidity (RH) 50%**



CHG 400

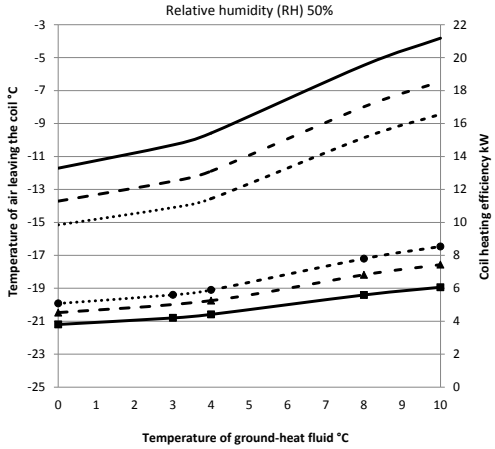
Cooling (max)

Ethylene glycol 40%, flow rate 0.1 dm³/
s, inlet air 28 °C.
Relative humidity (RH) 60%



Heating (max)

Ethylene glycol 40%, flow rate 0.1 dm³/
s, inlet air -25 °C.
Relative humidity (RH) 50%



Enervent Zehnder Oy
Kipinätie 1
FI-06150 Porvoo, Finland
Tel: +358 207 528 800
enervent@enervent.com
www.enervent.com

enervent