

The most visionary CO₂ combined heating and cooling systems in the world

CHC-RANGE



APPLICATIONS

Industrial buildings with both heating and cooling demands, separately or simultaneously

FENAGY[®]
FUTURE ENERGY SOLUTIONS

CHC-RANGE - combined heating and cooling systems

Unlike a typical reversible system, CHC systems can supply heating and cooling both simultaneously and independently. With a CHC system, only one compressor rack is necessary to cover the complete heating and cooling demand for large-scale industrial buildings.

The systems can operate as water-to-water systems delivering both heating and cooling for buildings through the plate heat exchanger evaporator and gas cooler. When only heating is needed, the system operates as a typical air-to-water heat pump, using the air heat exchangers as energy collectors. CO₂ gas is used for defrosting the air heat exchangers in air-to-water operation.

In cooling only mode, the air heat exchangers are used as gas coolers. In combined mode, when both heating and cooling is required, the plate heat exchanger evaporators, installed on the rack frame, supply the required cooling, and the plate heat exchanger gas cooler supplies the heat.

Depending on whether it is the cooling or heating circuit that demands the most energy, the air heat exchangers are used as gas coolers or evaporators, to boost and/or balance the system respectively. To ensure high efficiency, CO₂ is used directly in the air heat exchangers. By reversing the CO₂ flow, the air heat exchanger can both collect and reject energy to the air.

CHC-1200



CAPACITY: 1,200 kW PU

DIMENSIONS: 2.5/8.0/1.3m

CHC-1800



CAPACITY: 1,800 kW PU

DIMENSIONS: 2.5/10.0/1.3m

CHC-2600



CAPACITY: 2,600 kW PU

DIMENSIONS: 2.8/12.0/1.3m

Easy installation with enclosure

All the heat pumps in the CHC-range can be delivered in an industrial walk-in enclosure, which is a fully approved machine room with lighting, ventilation, CO₂ alarm and sound dampening panels. The enclosure is available in any colour and with extra space for installation of an electrical supply panel, pumps, valves on the water circuit, etc.

Enclosures are usually delivered with a self-supporting concrete foundation, so only a levelled sand pad is needed on site for the installation.

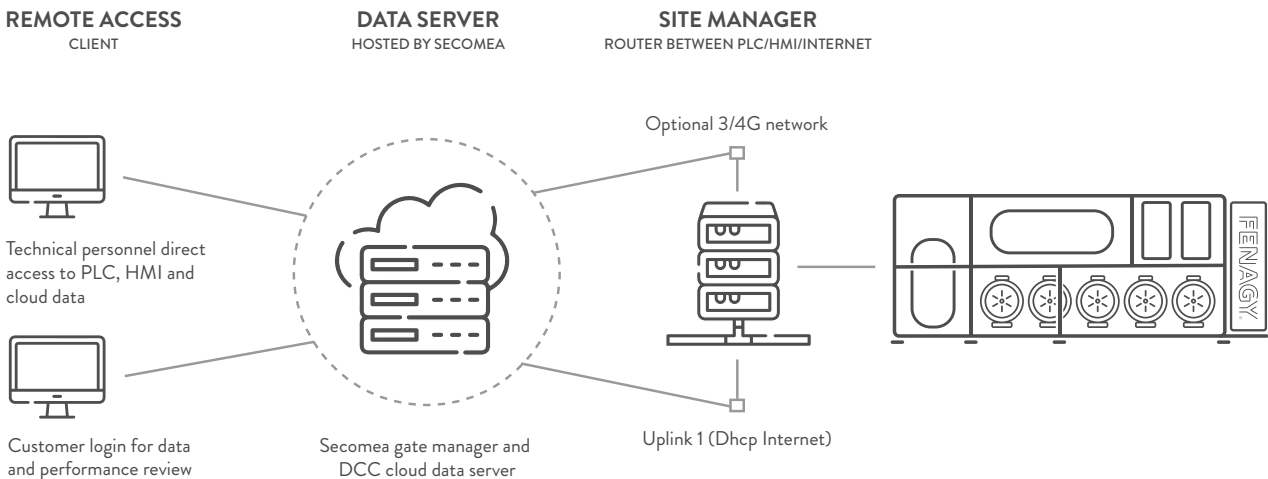




Control systems

The complete range uses a standard Siemens PLC controller, and Fenagy has developed its own PLC algorithms for the most essential functions to ensure optimal control and monitoring. Our PLC solutions can communicate with most of the platforms the customer will need to communicate with. The onboard HMI panel offers direct monitoring of the system and its operating conditions. Furthermore, our PLC solutions support several communication protocols and can integrate with the overall SCADA system.

For all systems, Fenagy aspires to minimise start-up and shutdown times, enabling the system to help balance the electrical grid in a future with an increasing demand for such functions. Last, but not least, the system can deliver high supply temperatures, and Fenagy is continuously pushing the boundaries with new functions and features in the PLC development.



Technical specifications

CHC-RANGE		CHC-1200	CHC-1800	CHC-2600
Compressors	qty	4-8	6	8
Capacity control	-	VSD/cyl. unloader	Cyl. unloader	
Receiver size	L	750	1,000	1,800
Refrigerant charge	kg	500	700	1,260
Electrical supply	-	3~400V 50 Hz	3~400V 50 Hz/3~690V 50 Hz	
Heating capacity range	kW	1,200	1,800	2,600
COP heat range	-	3.0 - 3.5		
Dimensions (H/L/W)	m	2.4/8.0/1.4	2.4/11.0/1.4	2.4/12.0/1.6
Weight	kg	7,500	12,000	16,000
Est. sound power level (LpA)	dB(A)	101	102	105
Connections, waterside	mm	DN80	DN100	DN200
Connection, refrigerant	mm	DN80/DN80	DN80/DN100	DN100/DN125
Design pressure HP/LP	bar	130/80		
Controller type	-	Siemens PLC		
Communication protocol	-	MODBUS / PROFINET		
AIR HEAT EXCHANGERS				
Function	-	Used as air-source evaporator during heating mode and gas cooler during cooling mode		
Evaporators	qty	4	6	8
Fan consumption	kW	8	12	16
Fin material	-	Epoxy-coated aluminum fins		
Casing material	-	Corrosion class C4		
Defrost method	-	Gas		
Type	-	Flatbed / Up flow		
Fan regulation	-	EC fans		
Sound pressure level (pr. evap.)	dB(A)	40 in 10 m		
Footprint	m ²	100	150	200
EVAPORATOR FOR WATER				
Type	-	Plate heat exchanger (80 bar)		
Connections, cold waterside	mm	DN80	DN100	DN200

Key features

- Simultaneous heating and cooling
- Suitable for large industrial buildings where both heating and cooling is needed
- Only one system for one building
- Direct CO₂ air heat exchangers used as evaporator and gas cooler
- Patented ejector technology for optimisation of capacity and COP
- Efficient and robust CO₂ gas defrosting of air-source evaporators
- Industrial design with stainless steel piping
- Fast start and stop for balancing the electrical grid
- Internal heat exchangers and receiver designed for the purpose by Fenagy
- Water pump, energy meter and various valves can be integrated on the rack
- PLC control of the entire heat pump, including optimised air-source evaporators



We only work with natural refrigerants

R744 - CO₂

APPLICATIONS

District heating, heat networks, industrial processes, food industry, green houses, data centres, logistics centres, offices, hospitals and HVAC in general

- Natural refrigerant with a wide temperature range
- Non-toxic and non-flammable
- Excellent choice for air-sourced heat pumps for direct use in the energy collectors and with high delta T on the heat sink side
- Optimal for medium-temperature water-sourced heat pumps, chillers and combined heating and cooling applications
- Medium-high temperature level on heat sink (up to 85°C supply temp) with high delta T on the heat sink (dT: 30-40K)

R600a - Isobutane

APPLICATIONS

Heat networks, biogas, PtX, geothermal, carbon capture, CO₂ heat pump sub-cooler, industrial processes and the food industry

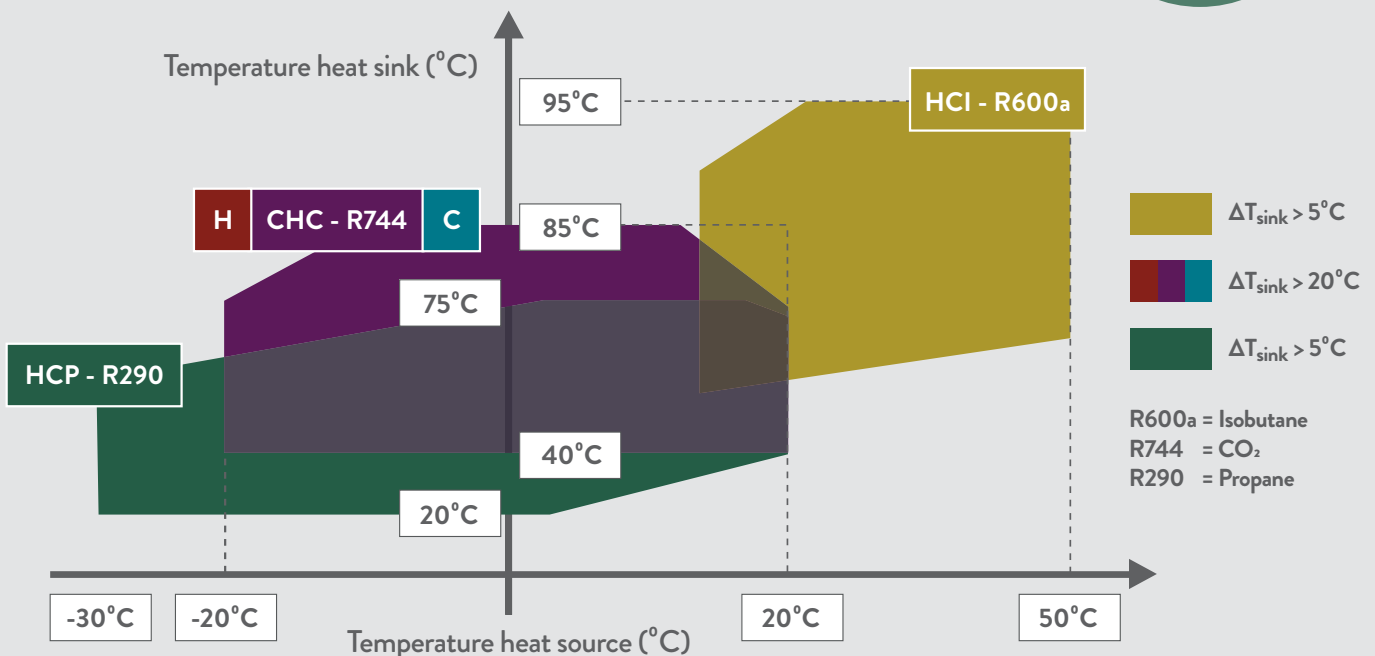
- High-temperature natural refrigerant
- Suitable for water-sourced heat pumps and chillers
- Can be used in a wide temperature range on both the heat source and heat sink sides
- Robust operation under various operating conditions
- Use of efficient screw compressors and high COP of the cycle
- High temperature level on heat source (up to 40°C evap. temp)
- High temperature level on heat sink (up to 95°C supply temp) and ideal with low delta T on heat sink - serial coupling on water side at higher delta T

R290 - Propane

APPLICATIONS

Heat networks, industrial processes, food industry, data centres, offices, hospitals and HVAC in general

- Low-temperature natural refrigerant
- Suitable for lower temperature water-sourced heat pumps and chillers
- Low temperature level on heat source (down to -30°C evap. temp)
- Medium temperature level on heat sink (up to 75°C supply temp)
- Ideal with low delta T on sink and heat source
- High refrigeration capacity ensures compact solutions with small footprint
- Can be combined with isobutane in serial hydraulic couplings



Developing and manufacturing future energy solutions



Fenagy develops and manufactures refrigeration and heat pump systems based on the natural refrigerants CO₂ and hydrocarbons. We always use natural refrigerants because they are efficient and have no harmful effects on the environment and climate - unlike all alternative synthetic refrigerants. Natural refrigerants are the refrigerants of the future, not just in Denmark.

We are constantly developing new solutions and services that play an active role in future energy systems, based on power from renewable energy sources, such as solar and wind. This puts great demands on the power grid and thus also on electricity-consuming devices, which must be able to react fast - and this is exactly what Fenagy machines can.

We are also looking into a future where it will be legally required or a social norm not to release valuable waste heat into the environment if it can be utilised. But what about waste cooling? At Fenagy, we aim to utilise both the cooling and heating capabilities of our solutions, either separately or in combination.

Fenagy is an OEM, but also a project-oriented company that secures professional and close cooperation with our partners, from quotation to final handover of our systems to the customers.