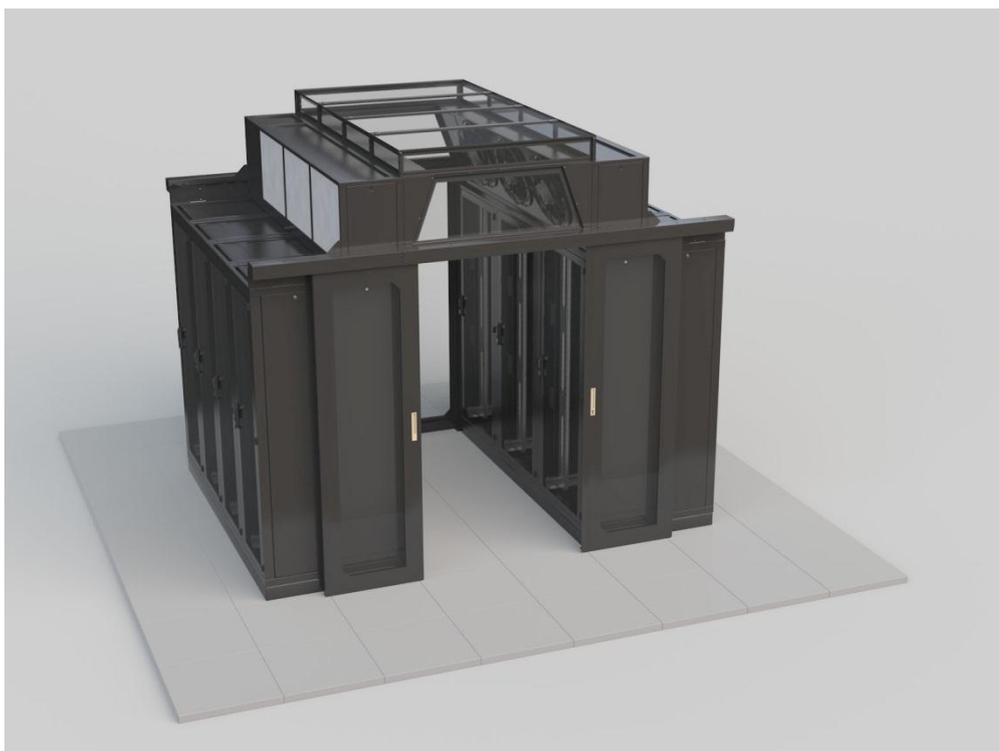


CoolTop

A unique water cooled air-conditioning unit for server room cooling from the top AC-TOPx-CW-240/60



Application

CoolTop is a new, unique air conditioning unit especially designed for datacenters. It can either be installed on top of the IT rack or hung from the ceiling above. This new generation unit works on the chilled water principle, so has to be connected to the chilled water system. CoolTop's main task is to supply cold air to the cold zone in front of the racks and ensure precise temperature, humidity and airflow.

The units don't occupy any floor space, so the Data center can use this free area for IT equipment, resulting in higher profitability.

CoolTop units fit perfectly onto Conteg racks, having the same design, material, color and suitable dimensions. A 2400 mm length responds to 3 x 800mm wide racks or 4 x 600mm racks, though it is possible to use them universally.

The units are available in two cooling capacity versions: CoolTop2 (equipped with 2 fans) and CoolTop3 (equipped with 3).

Benefits

- Unique market solution
- Doesn't occupy server room floor space
- High cooling capacity, of up to 48kW per 3 racks
- Best purchase price for 1 kW of cold in the market
- Fully compatible with Conteg racks, with a length of 2400 mm for 3x800mm or 4x600mm racks
- Remarkably high energy efficiency ratio. EER = 42.4 at 35°C (air) and 10/15 °C (water)
- Power consumption only 0.71 kW for CoolTop2 and 1.1 kW for CoolTop3
- Axial EC fans with very low power consumption
- Modern control and communication
- Horizontal heat exchanger with low pressure drop on air and water side
- 2 or 3-way water control valve, upon customer request
- Communication protocol: ModBus, SNMP, etc.
- Suitable for either contained cold or hot-aisle systems, according to the project.
- Maximum safety against water leakage
- Optional droplet separator (in case of water temperatures below dew point)
- Stainless steel condensate pan below heat exchanger, equipped with water level sensor
- Secondary (metal) water safety receiver built into the casing
- Safety (metal) filter in front of the cooler
- Optional condensing sensor
- Optional rope water leakage sensor, leading to the safety pan
- Solenoid valves signal



Function

Heat exchanger

The CoolTop unit is an air/water heat exchanger, transferring the heat load from hot air to cold water by the most efficient way. It is positioned horizontally and is comprised of copper piping with aluminum fins for maximal cooling efficiency. The fin's hydrophilic surface keeps droplets of condensate on the heat exchanger's surface, so they drain into the condensate pan.

Condensate pan

Positioned on the bottom of the unit, the condensation pan collects water, which then flows to the drainage. Made of stainless-steel, is positioned inside the sump tray, which is part of the CoolTop frame. This ensures double the safety. The condensate generated on the cold surface of the heat exchanger flows down into the condensate pan. The bottom of the pan is tilted, with the lowest point ending in a G1 thread, for easy assembly of the drainage hose.

Fans

Fans transfer air from the hot zone through the air-conditioning unit to the cold zone. We use high efficiency axial fans with EC motors, with step-less speed control to maintain airflow according to the actual request (based on the temperature or pressure difference between cold and hot zones). Any failure is reported to the controller. The CoolTop2 unit is equipped with two fans, while the CoolTop3 unit is equipped with three.

Filters

Filters are installed for air filtration and internal component protection against intrusion of unwanted objects. The filter consists of a braided medium placed in a U-profile metal frame. The unit is equipped with 3 separate G2-class filters, which are fixed to the unit with springs and brackets, allowing easy replacement and maintenance from the hot side of the unit. The filters are washable.

3-way valve

The 3-way valve (2-way valve available upon request) comes equipped with an actuator, ensuring precise cooling capacity control. The valve works continuously according to controller command. The Kv value of the 3-way valve is selected for the best control characteristic.

Sensors

The CoolTop unit is equipped with two temperature sensors on the exhaust side (left and right), another on the suction side (right), and one combined temperature/humidity sensor on the suction side. The controller evaluates the data being measured. Based on the calculated value (max or weighted average), the controller changes fan speed and the opening of the valve. CoolTop units come equipped with a condensation sensor which signals a warning, starting up the condensate pump. An optional rope leakage sensor (stopping the unit in case of contact with water) is also available.

Electro-box

The Electro-box is the control center of the unit, ensuring electrical supply, functionality, control logic, safety and communication between grouped units. Two circuit breakers are located inside— one for the fans and another for the controller. The controller (delivered with preinstalled Conteg software) manages all the cooling unit's functions. The controller changes the fan speed and 3-way valve opening (according to set values), and governs the electrical accessories. Accessible from the front side of the unit, the Electro-box includes terminals for digital input and output (unit operation notification, warning, emergency OFF switch and remote authorization of unit operation, and an optional pressure control sensor. The main power switch is located on the back of the unit exterior next to the C14 power supply socket.

Cooling unit connection

Power supply

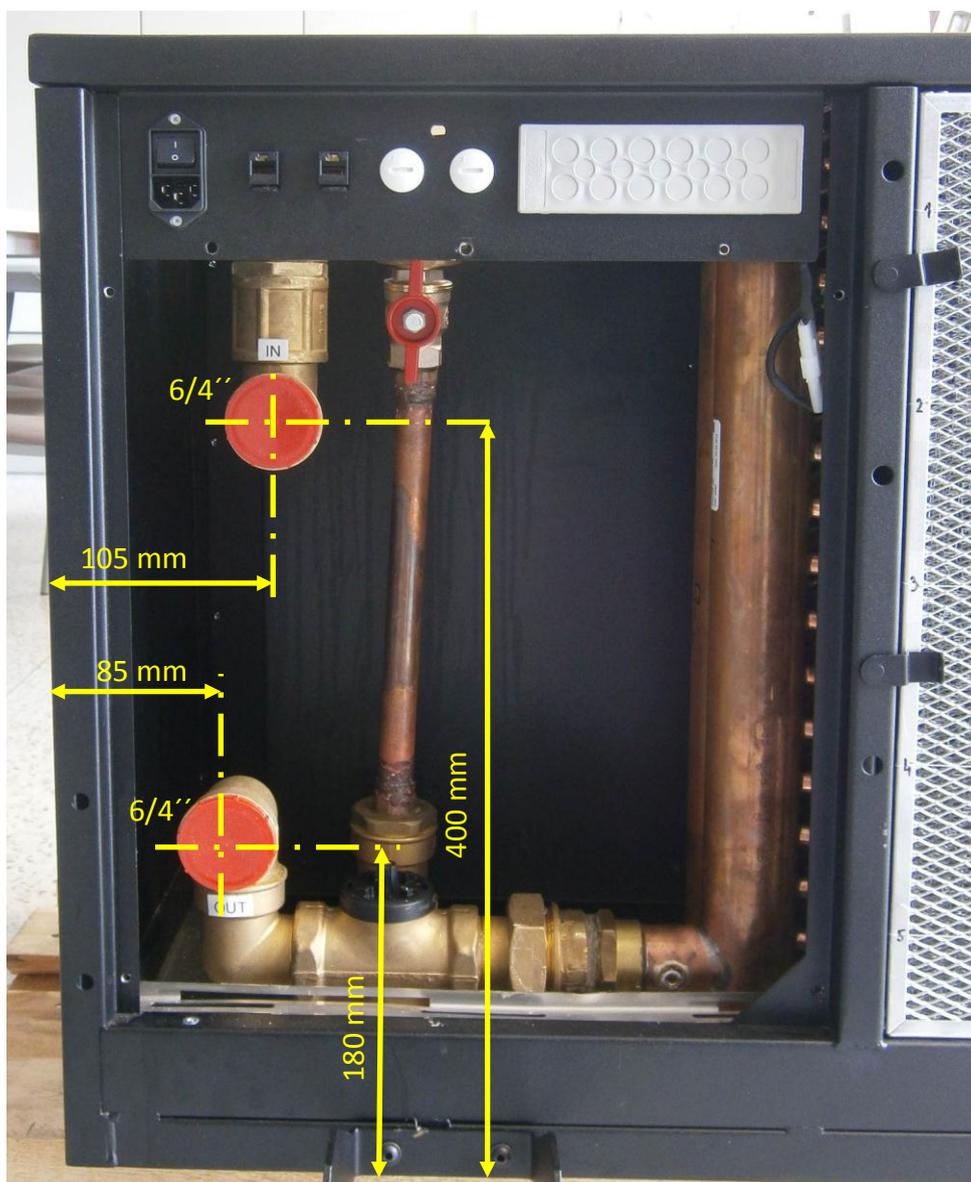
To connect the cooling unit with an electrical supply, use the cable (2 m long, supplied with the unit) with a C13 plug with protection against accidental disconnection. An IEC C14 socket is located on the rear of the unit. The main switch is located next to the socket. The power supply must be 230 V; 50/60 Hz, 8 A.

Water piping connection

CoolTop units can be connected to the cooling system with either a pure water or standard anti-freeze mixture (glycol), and are suitable for free-cooling systems. The inlet liquid temperature must be between +6 and +30 °C. The maximum operating pressure is 10 bar (PN 10).

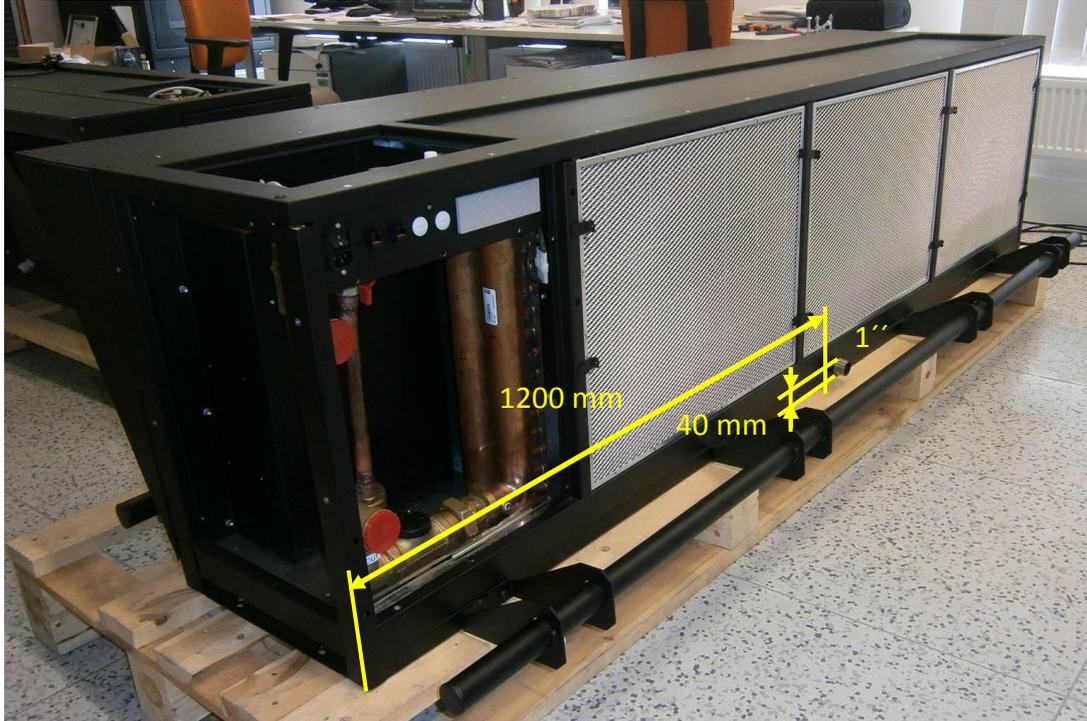
Conteg recommends connection of the unit to the cooling system using DN40 flexible hoses. The CoolTop unit comes equipped with DN40 piping, with an internal thread.

Water piping connection

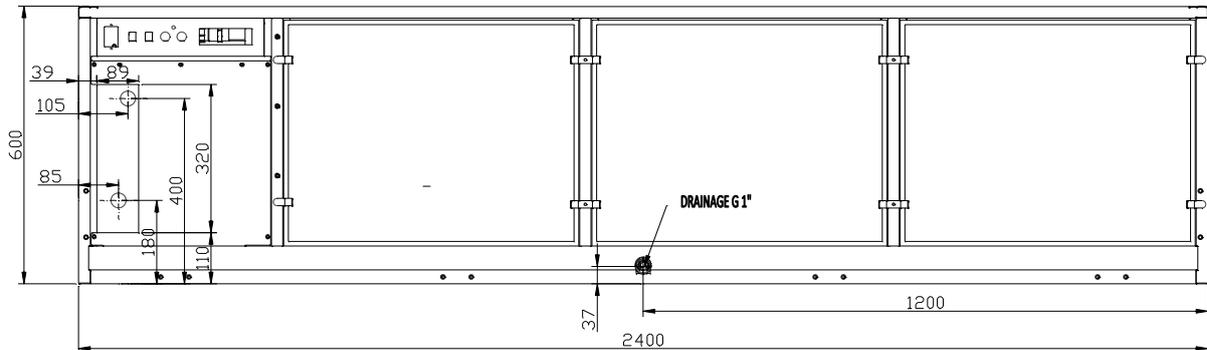


Drainage

Each unit must be positioned horizontally and connected to a drainage system. Condensate is removed by either gravity or condensate pump through the syphon (not part of the delivery). The outlet from the condensate tank (a tube within a tube) is fitted with 25 mm G1 thread.



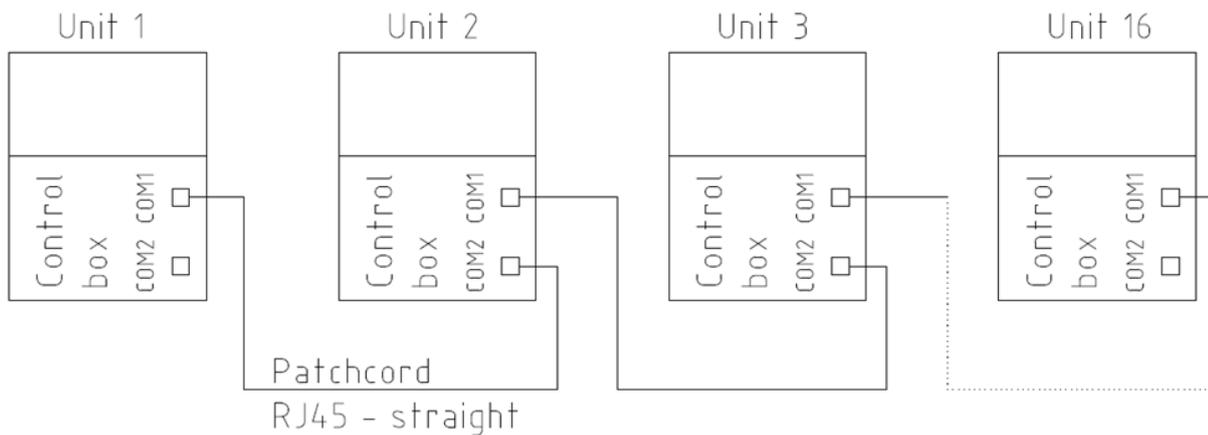
Connection dimensions



Communication

CoolTop units can communicate within individual zones. The cooling unit's electronic board includes 2 identical communication ports: COM1 and COM2 (RJ45 socket), allowing unit connection. CoolTop units are controlled by a display which allows the user to both switch-on and set its parameters. The display port is situated on the front door of the electric box, and is not needed in normal operation.

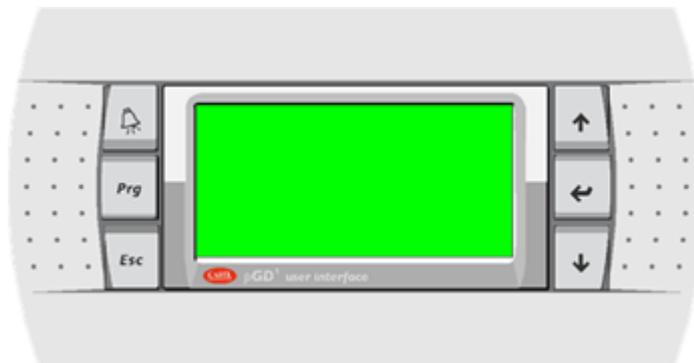
Wiring diagram – series connection



Accessories

Display

Button display allows users to both switch-on the unit and set all its parameters. When connected, it controls any units within the zone. During standard operation, the display does not have to be plugged-in. The delivery does not include the display, it is an optional part.



Droplet separator (eliminator)

Situated behind the water cooler (heat exchanger) in the direction of airflow, the droplet separator prevents condensation from entering the fans. We recommend it for use in case of high relative humidity and low water temperature (lower than the dew point, causing condensation).

Pressure control

This accessory enables fan control of the whole CoolTop group, based on the pressure difference between hot and cold zones. Users can adjust desired overpressure in the cold zone. If the overpressure is lower, it means the ICT has increased the airflow; thus all connected units will automatically increase fan speed to provide the required amount of air. It is recommended that CoolTop unit fans keep a slight overpressure (2 Pa) in the cold zone. The pressure control reduces pressure generated by CoolTop fans on the servers in contained cold/hot aisles. This solution extends server lifetime and reduces power consumption.

Maintenance handle

A special steel construction designed for easy CoolTop manipulation. The connection with CoolTop is solved by screws. It is delivered in a pair (2 pieces).

Water leakage rope detector

Situated on the top edge of the condensate pan, the water leakage rope detector is supplied directly from the controller. If wetted, the digital input switches off the cooling unit (Emergency OFF).

Condensate pump

Positioned at the rear of the unit above the condensate pan and bracketed to the frame. The suction piping is situated in the lowest region of the condensate pan.

ModBus Communication card

The optically isolated ModBus RTU serial card is designed for continuous, reliable and accurate remote monitoring. It uses an RS485 connector.

SNMP Communication card

Designed for direct unit connection to (LAN) data networks. The card supports unit monitoring in real time, by either standard web browser or SNMP. The extending card is intended for communication via TCP/IP protocol, allowing for monitoring via web server, Modbus TCP or BACnet.

Control function

Each CoolTop unit has an independent controller inside the electro-box, which changes fan speed (airflow) while opening a 3-way valve for water flow modulation. The controller evaluates temperature and humidity values, eventually a differential pressure.

Temperature set-point in cold zones

The 3-way valve changes its aperture according to the difference between actual (measured) and desired temperatures in the cold zone. Users can adjust limitations for minimal and maximal opening of the valve, as well as setting minimum, maximum or weighted averages of the two temperature sensors.

Set point - pressure difference

We recommend using a fan speed control based on the pressure difference for projects with perfectly separated hot and cold zones. The fans change speed to keep the set pressure difference between hot and cold zone. Users can select an overpressure ranging from -10 to +10 Pa, as well as limitations for maximal and minimal fan speed. As the controller includes a differential pressure meter, an additional accessory is necessary for this function, the aim of which is to keep balanced airflow within the entire system (cooling units and IT devices), thus avoiding long-term server degradation due to under or overpressure.

Set point - temperature difference

The fans change speed to ensure optimal temperature difference between hot and cold zones. The aim is to keep the airflow balanced within whole system (cooling units and IT devices). Users can set limits for maximal and minimal fan speed. We recommend this system mainly in projects without mechanical separation of hot and cold zones, where it is not possible to measure pressure difference.

Communication

Up to 16 units can be interconnected to form a group, via pLAN protocol. Units are connected via straight-through network cable (ports COM1 and COM2), controlling the group from a single unit display. Set-point sharing is also possible.

In addition to the extension cards mentioned above (which can be connected to each controller, allowing unit parameter supervision via superior system), it is also possible to equip the unit with dry contacts for basic status signalization (ON/ warning/ emergency OFF). The unit comes prepared for basic input connection, such as operation permit or external fire alarm.



Technical data

CoolTop

		CoolTop2	CoolTop3
Unit type		AC-TOP2-CW-240/60...	AC-TOP3-CW-240/60...
Basic information			
Cooling system		Chilled water system	
Architecture ⁽¹⁾		Open	Open
Nominal cooling capacity ⁽²⁾	kW	38,2	48,0
Nominal net cooling capacity ⁽³⁾	kW	37,5	46,9
Power supply	V/f/Hz	230 / 1 / 50	230 / 1 / 50
Power consumption	W	710	1100
Nominal current	A	3,4	5,0
Maximum current	A	4,6	6,8
Main circuit breaker ⁽⁴⁾	A	8	8
Recommended superior circuit breaker	A	10	10
Nominal airflow ⁽⁵⁾	m ³ /h	7700	11000
Nominal airflow without droplet separator	m ³ /h	7400	10200
Number of fans	Ks	2	3
Fans motor type		EC	
Nominal water flow	kg/h	6200	8200
Air filter class		G2 + droplet separator	
Dimensions			
Height ⁽⁶⁾	mm	600	
Width	mm	2400	2400
Depth ⁽⁷⁾	mm	400 (600)	
Weight ⁽⁸⁾	kg	175	184
Piping connection dimension			
Inlet piping connection dimension		6/4"	6/4"
Outlet piping connection dimension		6/4"	6/4"

(1)... CoolTop can be used on row of racks

(2)... Cooling capacity can be changed by electronic controller. Nominal cooling capacity is stated for: air temperature of 35°C in hot zone, without condensation (relative humidity under dew point). Water temperature is 10/15°C, clean filters.

(3)... Net cooling capacity is stated without heat from fans. It is usable cooling capacity of entire system.

(4)... Fans circuit breaker 8 A; controller circuit breaker 1.6 A.

(5)... Airflow is changed by control needs. Nominal airflow equals nominal cooling capacity.

(6)... Without plinths and transport tools.

(7)... Down side edge length 400 mm; top side edge length 600 mm.

(8)... For weight with droplet separator, add 11kg.

Operation limits

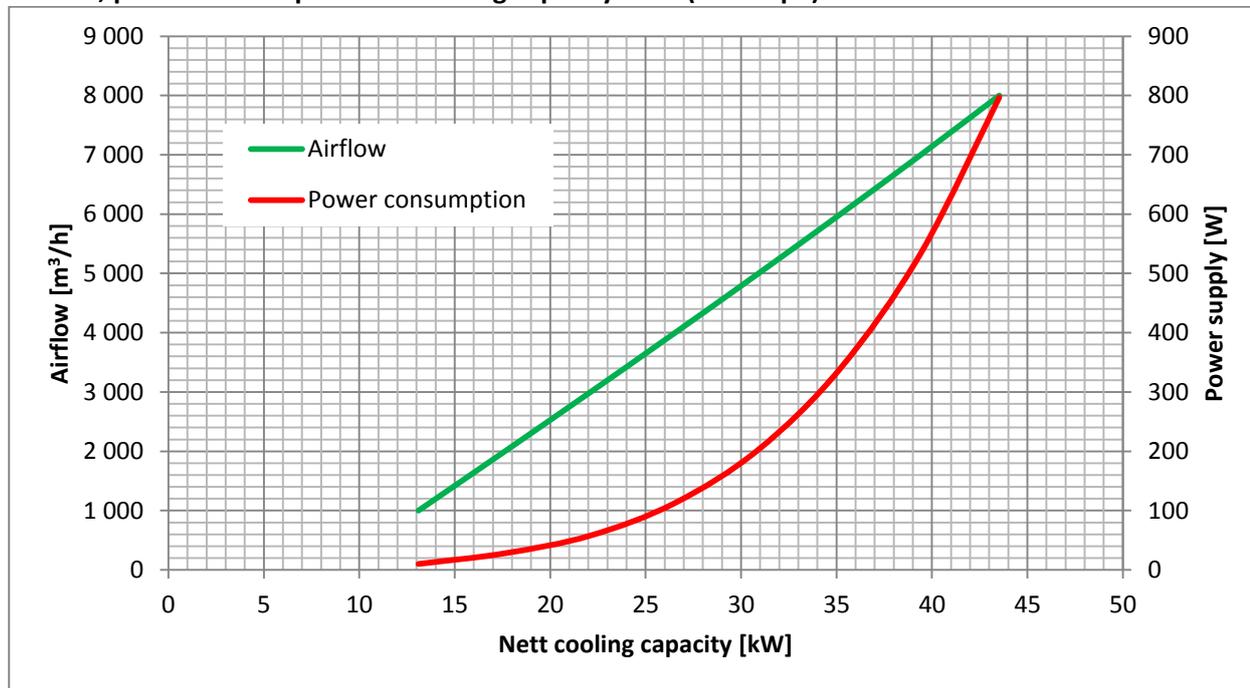
Air temperature from +4°C to 50°C

Relative humidity from 10 % to 80 %

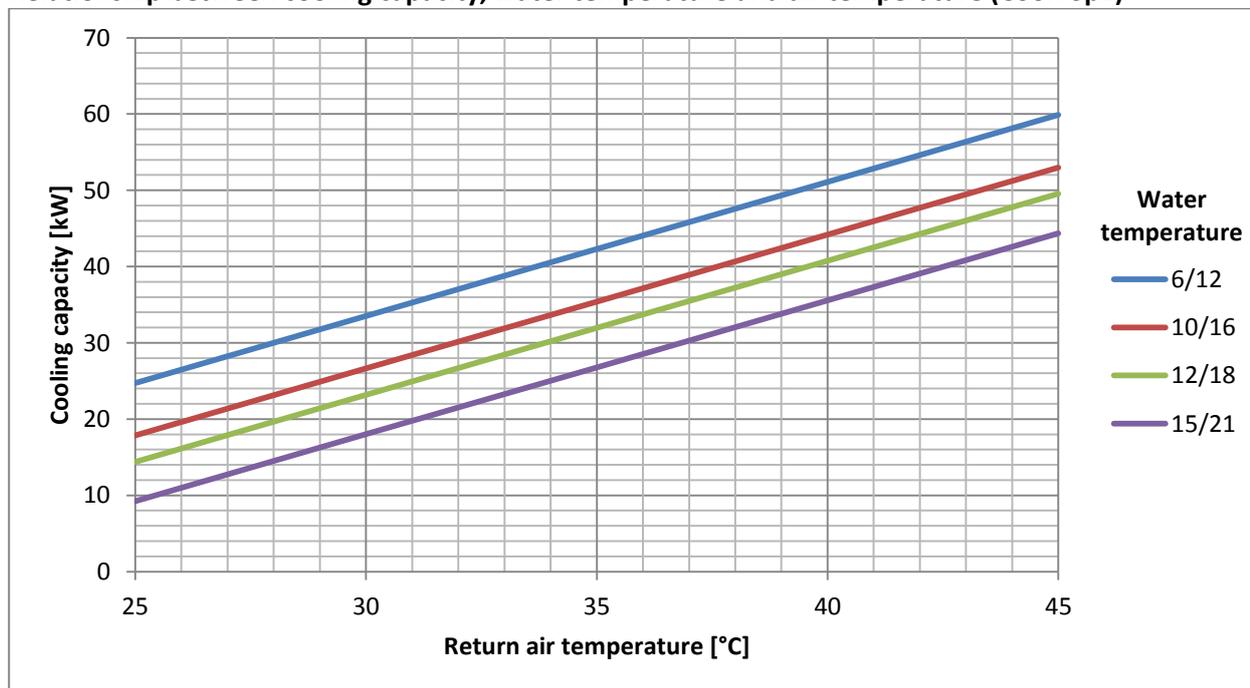
Air going through the unit must not contain any aggressive or corrosive substance, nor an excessive amount of solid particles.

Cooling capacity diagram

Airflow, power consumption and cooling capacity ratio (CoolTop2)

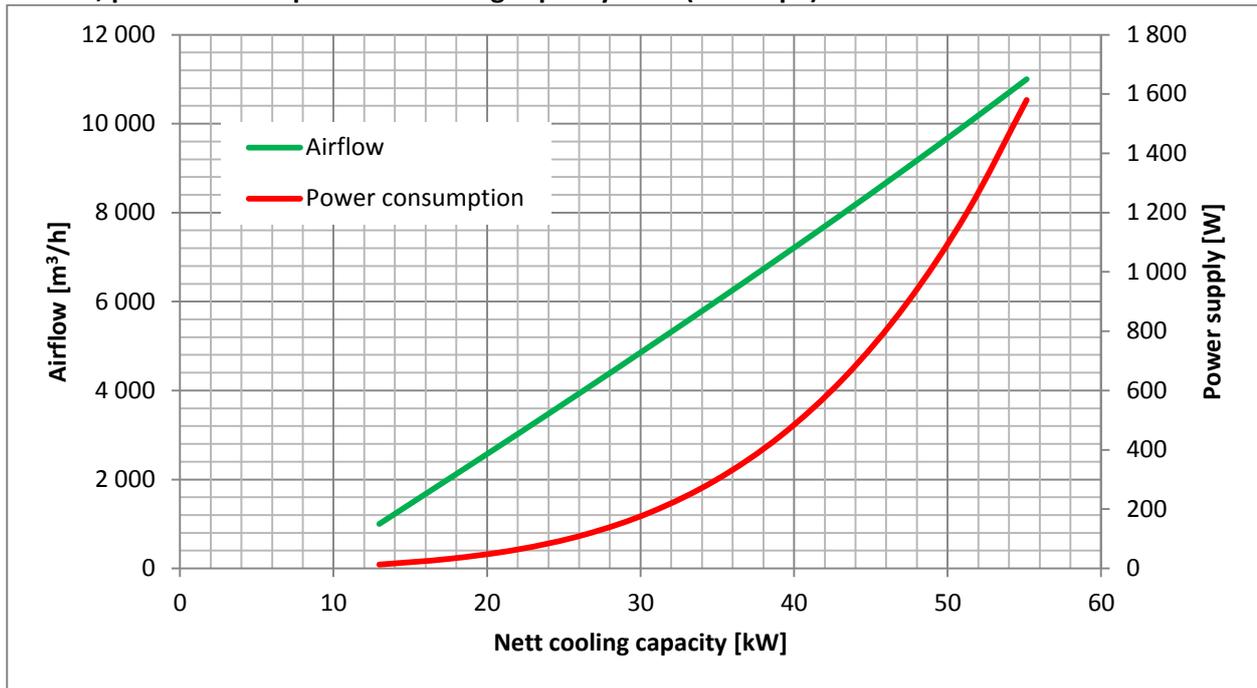


Relationship between cooling capacity, water temperature and air temperature (CoolTop2)

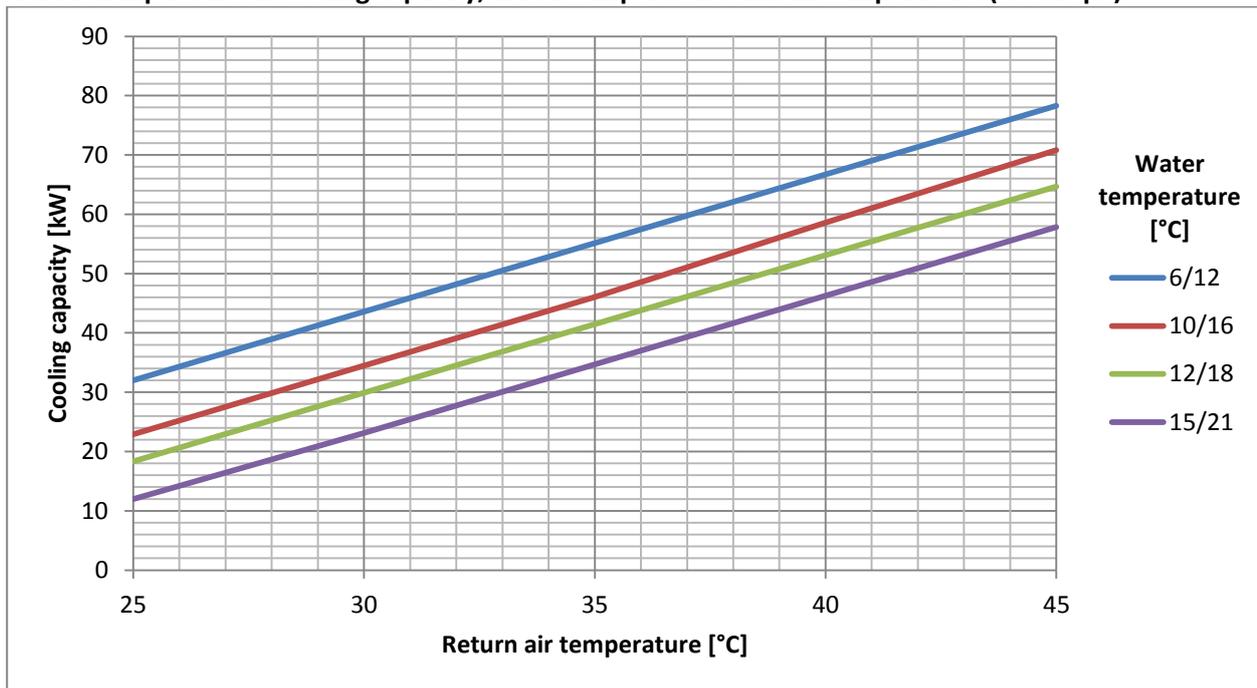


Conditions: maximal opening of 3-way valve.

Airflow, power consumption and cooling capacity ratio (CoolTop3)



Relationship between cooling capacity, water temperature and air temperature (CoolTop3)



Conditions: maximal opening of 3-way valve.

3D model

