

NetCol5000-C(030, 032, 065) In-row Chilled Water Smart Cooling Product

Product Description (2019)

Issue 01
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Product Description

Purpose

This document describes the NetCol5000-C smart cooling product (NetCol5000-C for short) in terms of model description, positioning, features, components, typical applications, working conditions, and technical specifications. It helps readers understand how to use and maintain the NetCol5000-C.






Intended Audience

This document is intended for:

- Sales personnel
- Technical support personnel
- System engineers

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.
	Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, and environment

Symbol	Description
	deterioration.

Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

Issue 01 (2020-02-14)

This issue is the first official release.

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1 Model Description

This document introduces the following products.

- NetCol5000-C030H9HD0
- NetCol5000-C030H90D0
- NetCol5000-C030H9HE0
- NetCol5000-C032H9HD0
- NetCol5000-C065H9HD0
- NetCol5000-C065H9HE0
- NetCol5000-C065H90D0

[Figure 1-1](#) shows the naming rule for the NetCol5000-C series products.

Figure 1-1 Naming rule

NetCol	5000	-	C	030	H	9	H	D	0
1	2	3	4	5	6	7	8	9	10
1 Data Center Smart Cooling		6 Air supply Mode			8 Heating & Humidifier Type				
2 Model Range		U - Upflow D - Downflow H - Horizontal			0 - None R - Electric Heating 1 Level & Infrared Humidifier E - Electric Heating 1 Level & Electrode Humidifier W- Electric Heating 1 Level & Wet Film Humidifier F - Electric Heating 2 Level & Wet Film Humidifier H - Wet Film Humidifier Only				
2000 - In-row Smart Cooling Product 5000 - In-row Smart Cooling Product 8000 - In-room Smart Cooling Product		7 Power Supply			9 Package				
3 Hyphen		M - 380-415V,3PH,50Hz N - 208V,3PH,60Hz P - 220-240V,3PH,50Hz Q - 380V,3PH,60Hz R - 440-480V,3PH,60Hz S - 220-240V,1PH,50Hz T - 208-230V,1PH,60Hz D - 48V DC 1 - 200-277V,1PH,50/60Hz 2 - 200-240V,1PH,50/60Hz 3 - 200-240V,3PH,50/60Hz 4 - 380-415V,3PH,50/60Hz 5 - 380-480V,3PH,50/60Hz 6 - 220V,1PH,50/60Hz 7 - 208-240V,1PH,50/60Hz 8 - 240V DC 9 - 220-240V,1PH,50/60Hz			D - China Package E - International Package				
4 Cooling Mode		10 Order Special Features			0 - None 1 - Condensate Pump 2 - Condensate Pump & Dual Power Supply 3 - Condensate Pump & Dual Power Supply 240V,DC 4 - None Condensate Pump & Dual Power Supply A - DX Backup W- CW Backup C -Left Pipe Connection D -Right Pipe Connection				
A - Air Cooled C - Chilled Water F - Free Cooling G - Glycol Cooled H - Water Cooled + Chilled Water W - Water Cooled									
5 Model Code									
030 - Model Code 030 032 - Model Code 032 065 - Model Code 065 080 - Model Code 080									

2 Positioning

With the rapid development of data centers, power consumption of core equipment in a traditional equipment room has risen from 3-5 kW per cabinet to 10 kW per cabinet. This brings challenges of heat dissipation, energy saving, and environment protection to the current cooling system.

Huawei has developed the in row cooling product for new-generation data centers. Huawei has developed the in row cooling product for new-generation data centers. The in row cooling product can be deployed with standard cabinets in use currently. The in row cooling product dissipates the heat generated by high-density equipment in a data center, reduces power consumption on cooling, and increases power usage efficiency (resulting in a lower PUE value).

The in-row cooling product is a high-heat-flux cooling solution that applies to high-density data centers or overheated areas in common data centers. High-heat-flux cooling solutions are classified into water-based or non-water-based solutions depending on the cooling medium. The in row cooling product is a water-based solution.

3 Features

The NetCol5000-C features efficient refrigerating, optimal reliability, high compatibility, intelligent monitoring, quick installation and commissioning, and easy maintenance.

Efficient Refrigerating

- The highly efficient EC fan saves more than 30% of energy than a common fan.
- Chilled water valves are used to control incremental PID parameters with precise adjustment and accurate control.
- Intelligent differential pressure control (optional): Saves energy compared with the control mode of a normal fan.
- Wet film humidifier (optional): Lowers water quality requirements and supports a long replacement interval, and saves energy by over 95% compared with a traditional electrode humidifier.

High Reliability

- Teamwork control: Enables smart cooling products to work in turn to avoid competitive operating and supports dynamic cooling capacity allocation and backup of the main control system.
- Dual power supplies: When the active power supply fails, the standby power supply takes over automatically. When the active power supply is recovered, the power supply is automatically switched back to the active power supply.
- Dual power supplies: When the active power supply fails, the standby power supply takes over automatically. When the active power supply is recovered, the power supply is automatically switched back to the active power supply.
- Intelligent differential pressure control (optional): Solves the issue of hot spots due to insufficient air volume to improve reliability.
- Temperature and humidity sensor: A maximum of ten remote ambient temperature and humidity sensors can be configured to monitor the temperature and humidity of data centers, improving reliability.

High Compatibility

- Power supply: The NetCol5000-C can run in the working condition where the input system is 220 V to 240 V, single-phase, and 50 Hz or 60 Hz. They can protect against overload and short circuits.

- Control mode: The NetCol5000-C supports multiple control modes, including air supply control, cold aisle control, return air control, hot aisle control, and pressure differential control. You can select control modes based on the characteristics of your data centers.

Intelligent Monitoring

- Users can monitor and configure the smart cooling product on a client.
- The 7-inch thin film transistor (TFT) display panel with the true-color touchscreen displays the equipment running mode and status and allows users to set equipment parameters.

Quick Installation and Commissioning

- After the equipment is leveled and secured onsite, users need only to connect pipes and cables before starting the equipment.
- Startup wizard: A startup wizard is provided to guide operators through the commissioning process. The smart cooling product running data is collected automatically, which helps O&M personnel evaluate the status of the key components of the smart cooling product, and simplifies O&M.

Easy Maintenance

- Real-time display: The cooling capacity, air volume, power, and fan speed can be displayed in real time on the control panel, which helps O&M personnel grasp the running status of smart cooling products.
- Professional diagnosis system: Common alarms and faults can be located intelligently. The intelligent and highly efficient system lowers skill requirements, simplify O&M, and reduce O&M time.
- Startup wizard: A startup wizard is provided to guide operators through the commissioning process. The smart cooling product running data is collected automatically, which helps O&M personnel evaluate the status of the key components of the smart cooling product, shortens the startup commissioning duration, simplifies the startup commissioning, and reduces the commissioning costs.
- Automatic fault diagnosis: Automatically identifies the root cause when a fault occurs and intelligently excludes irrelevant fault causes. This function helps O&M personnel perform quick maintenance, greatly simplifying O&M and reducing the troubleshooting time.
- Health management: Forecasts the life of key components and prompts for component replacement. The function allows operators to know the life span status of core components so that they can formulate an O&M strategy in advance.

4 Component

4.1 Appearance and Components

Appearance

Figure 4-1 Appearance (NetCol5000-C065)

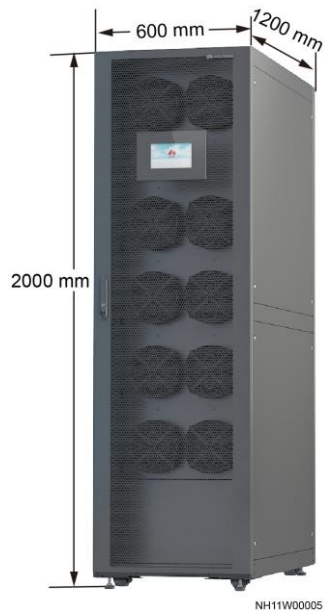
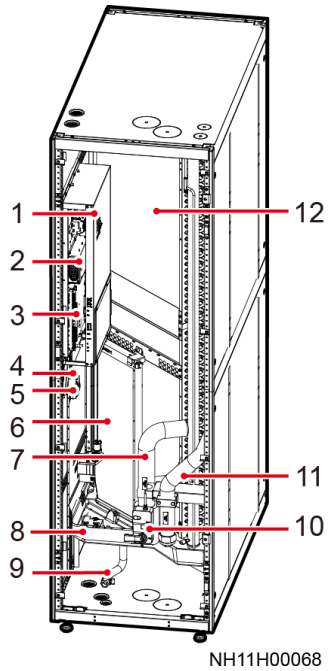


Figure 4-2 Component appearance (NetCol5000-C065)

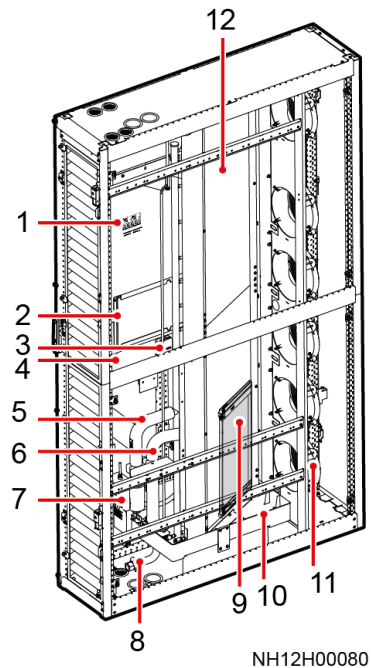


- | | | | |
|-------------------------------------|-----------------------------------|-------------------------------|----------------------------------|
| (1) Electric control box | (2) PSU | (3) Main control board | (4) Differential pressure switch |
| (5) Temperature and humidity sensor | (6) Wet film humidifier | (7) Chilled water outlet pipe | (8) Water pan |
| (9) Automatic drainpipe | (10) Chilled water valve actuator | (11) Chilled water inlet pipe | (12) Heat exchanger |

Figure 4-3 Appearance (NetCol5000-C030/C032)



Figure 4-4 Component appearance (NetCol5000-C030/C032)



- | | | |
|--------------------------------------|-------------------------------|-------------------------------------|
| (1) Electric control box | (2) Main control board | (3) Temperature and humidity sensor |
| (4) Differential pressure switch | (5) Chilled water outlet pipe | (6) Chilled water inlet pipe |
| (7) Chilled water valve actuator Fan | (8) Automatic drainpipe | (9) Wet film humidifier |
| (10) Water pan | (11) Fan | (12) Heat exchanger |

Components

The NetCol5000-C consists of the chilled water valve, EC fan, heat exchanger, air filter, wet film humidifier (optional), and micro differential pressure sensor (optional).

- Chilled water valve
The chilled water valve, also known as the chilled water proportional integral regulating valve, features incremental proportional-integral-derivative (PID) control with precise adjustment and accurate control.
- Electronic Commutation (EC) fan
 - The axial fan comes from a high-end brand and provides high reliability and a long service life.
 - The highly efficient EC fan saves more than 30% of energy than a common fan.
 - You can view the power and speed status as well as obtain fault information in real time over the LCD, allowing you to view the status and locate a fault.
- Heat exchanger

The I-type finned-tube exchanger with a high cooling efficiency adopts the synergy field principle and computational fluid dynamics (CFD) to optimize the flow path design, which greatly improves the heat exchange efficiency.

- Air filter
The G4 air filter in standard configuration meets requirements for equipment room cleanness. It can be cleaned at least twice.
- Wet film humidifier (optional)
 - The wet film humidifier has low water quality requirements and high environment adaptability. In most cases, tap water can be used without special water treatment.
 - The wet film humidifier has a simple structure and is easy to remove, clean, and maintain.
 - The wet film humidifier quickly starts and generates huge humidification capacity.
 - The wet film humidifier consumes less than over 95% of energy compared with a traditional electrode humidifier.
- Differential pressure sensor (optional)
 - It adjusts air volume based on the differential pressure to ensure precise air supply. No excessive adjustment helps save energy and reduce power consumption.
 - The air supply volume is also sufficient, which helps eliminate hotspots and improves reliability.

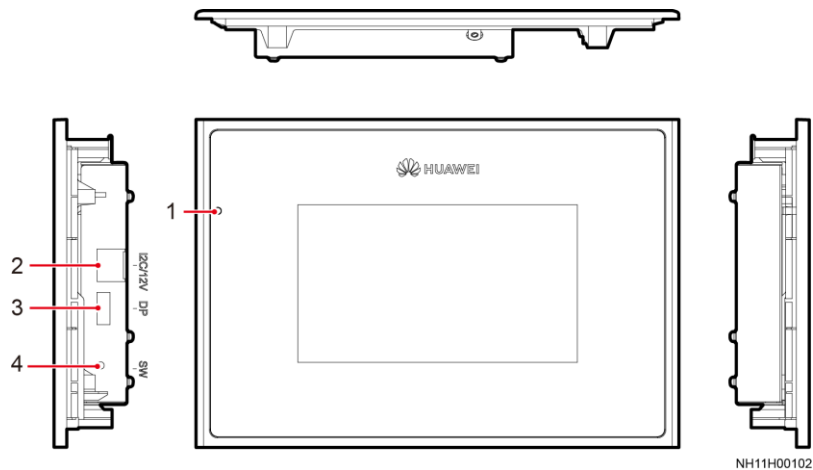
4.2 Controller

Appearance

The 7-inch display panel with the true-color touchscreen provides user interfaces for query, setting, monitoring, and maintenance.

The indicator on the panel displays operating status of the precision smart cooling product. [Figure 4-5](#) shows the location of the indicator. [Table 4-1](#) lists the relationship of the alarm status, indicator, and buzzer. If critical alarms, major alarms, and warning alarms are generated simultaneously, the indicator shows the status of the alarm with the highest severity level, and the buzzer shows the status of the alarm (not confirmed after the alarm generation) with the highest severity level.

Figure 4-5 LCD



- (1) Indicator
- (2) I2C/12V (reserved)
- (3) DP (display port)
- (4) SW (reserved)

Table 4-1 Indicator and buzzer status description

Alarm Status	Indicators	Buzzer
The device is operating properly, or a warning alarm occurs.	Green	Silent
The buzzer keeps buzzing if a major alarm is not confirmed after the alarm generation.	Yellow	Beeping intermittently
The buzzer keeps buzzing if a critical alarm is not confirmed after the alarm generation.	Red	Beeping continuously

Functions

- When only one smart cooling product is running, the controller provides logic control of components in the smart cooling product to adjust the indoor temperature and humidity.
- The 7-inch display panel with the true-color touchscreen allows you to set parameters for the smart cooling product and query its status.
- The smart cooling product has the following three remote functions.
 - Telemetry: supply air temperature, return air temperature, supply air humidity, return air humidity, and working status of the smart cooling product
 - Teleindication: startup/shutdown states, overvoltage/undervoltage, return air overtemperature/undertemperature, return air overhumidity/underhumidity, filter normal/blocked, and fan normal/faulty
 - Teleadjust: smart cooling product startup/shutdown

- A maximum of 32 smart cooling products can be connected in a teamwork group, when multiple smart cooling products work cooperatively, the controller optimally distributes the heat load to reduce power consumption and provides backup to improve reliability.
 - When a smart cooling product in the group is faulty, the backup smart cooling product starts to operate automatically to improve the reliability of the smart cooling product system.
 - Each smart cooling product enters the active mode one by one periodically.
 - The number of operating smart cooling products varies depending on the thermal load in the equipment room to meet requirements promptly, eliminate hot spots, and save energy.
 - A mechanism is adopted to prevent the smart cooling products in the same equipment room operating in opposite status (such as cooling and heating, or humidification and dehumidification), in order to save energy.
- You can monitor, manage, and upgrade one or more smart cooling products using the remote management software provided by Huawei.
- At least 1500 historical alarms can be stored.
- Access logs can be traced back. At least 1000 historical login and setting records can be stored.
- The controller can display 30 days' temperature and humidity in colored curves. O&M personnel can view the smart cooling product operating status onsite.
- A comprehensive power monitoring function is provided. Faults such as power open phase, overvoltage, undervoltage, high frequency, and low frequency are diagnosed and appropriate alarms are reported and recorded. Automatic protection, recovery, and restart are also provided.

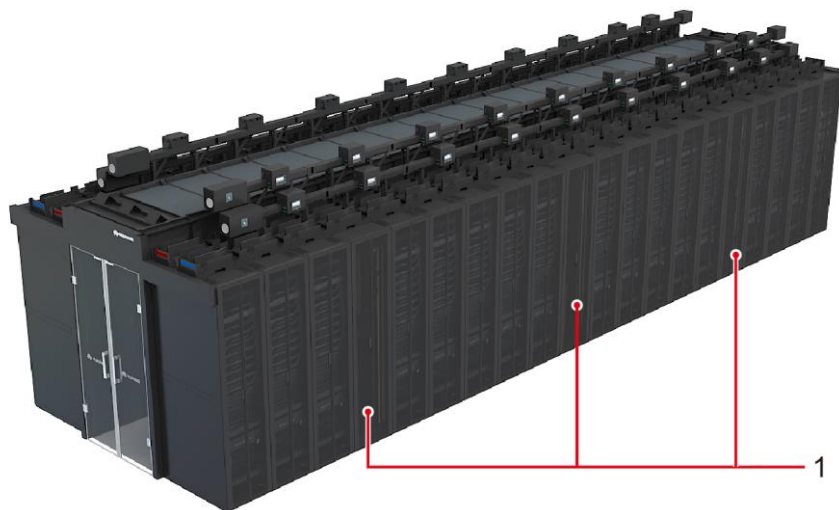
Features

- The controller provides a touchscreen with a user-friendly interface.
- The controller controls the indoor temperature precisely and responds quickly.
- The controller is protected by a multi-level password protection mechanism, avoiding misoperations.
- Password verification is required upon the first startup to ensure the system security. No password verification is required for subsequent startup if the first verification succeeds.
- The controller provides multiple protection functions, such as chilled water valve exception feedback, abnormal power-off self-recovery, and water leakage detection, ensuring system reliability.
- The controller displays the operating status and duration of the smart cooling product components in real time.
- The expert system automatically displays the information of the current fault, which facilitates the maintenance.
- The controller provides abundant external ports such as RS485 ports, CAN ports, FE ports, and USB ports that are protected by a security mechanism.
- The smart cooling product supports communications protocols such as Modbus RTU, Modbus TCP, and SNMP, facilitating connection to the network management system.
- The controller intelligently identifies abnormal parameter settings (incorrect commands) and rejects them automatically.
- If the indoor temperature fluctuates beyond the normal range, an audible and visible alarm signal is sent automatically.

5 Typical Application Scenarios (NetCol5000-C065)

The NetCol5000-C provides a high-heat-flux cooling solution that applies to high-density data centers or hot areas in common data centers. This section describes the application scenario for the NetCol5000-C.

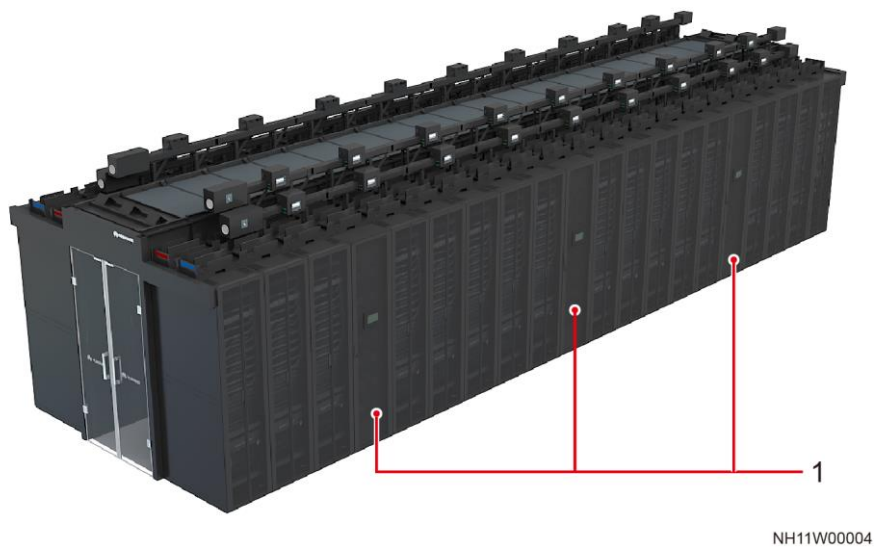
Figure 5-1 NetCol5000 in the contained cold aisle



NH11W00001

(1) NetCol5000-C

Figure 5-2 NetCol5000 in the contained hot aisle

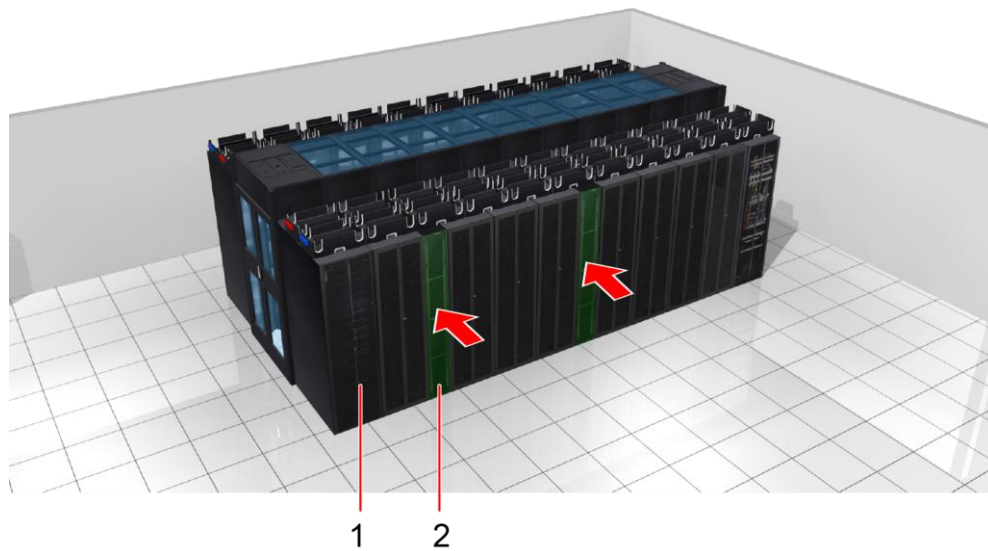


(1) NetCol5000-C

6 Typical Application Scenarios(NetCol5000-C030/C032)

The NetCol5000-C provides a high-heat-flux cooling solution that applies to high-density data centers or hot areas in common data centers. It is used in class A environments in data centers. [Figure 6-1](#) and [Figure 6-2](#) show the specific application scenarios.

Figure 6-1 Positions of NetCol5000-Cs in a modular data center

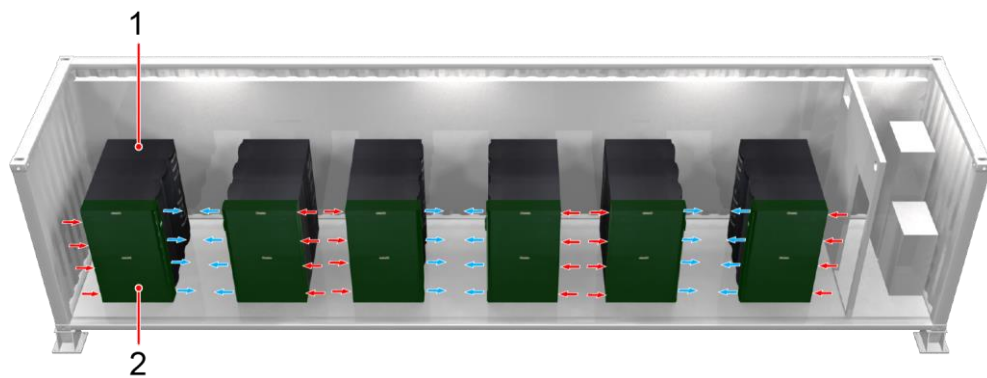


DS00000118

(1) Server

(2) NetCol5000-C

Figure 6-2 Positions of NetCol5000-Cs in a container data center



DS00000119

(1) Server

(2) NetCol5000-C

7 Application Conditions

NOTICE

- If the water inlet temperature exceeds 10°C or the total load is less than 30% of the cooling capacity of a single smart cooling product, the humidity may be high. The customer is advised to add a dehumidifier (engineering procurement).
- Do not install the smart cooling product near a noise-sensitive place such as an office or a conference room.

Pipe Ports

The following table describes the ports reserved on the device.

Table 7-1 Pipe Ports

Item	NetCol5000-C065	NetCol5000-C030/C032
Water outlet pipe	G 1–1/2inch port with inner threads	G 1inch port with inner threads
Water inlet pipe	G 1–1/2inch port with inner threads	G 1inch port with inner threads
(Optional) Humidifier water inlet pipe	G 3/4inch port with outer threads	G 3/4inch port with outer threads
Automatic drainpipe	BSPP 1/2inch port with inner threads	BSPP 1/2inch port with inner threads

Installation Requirements

Table 7-2 Installation Requirements

Item	NetCol5000-C065	NetCol5000-C030/C032
Room door	2 m high cabinet: width \geq 1.2	<ul style="list-style-type: none"> • 2 m high cabinet: width \geq 1.2 m,

Item	NetCol5000-C065	NetCol5000-C030/C032
	m, height ≥ 2.3 m. The cabinet may topple over in a short time.	height ≥ 2.3 m. The cabinet may topple over in a short time. <ul style="list-style-type: none"> 2.2 m high cabinet: width ≥ 1.2 m, height ≥ 2.5 m. The cabinet may topple over in a short time.
Floor	Floor bearing capacity $\geq 530\text{kg/m}^2$ Floor height ≥ 250 mm	
Pipe routing	Bottom pipe routing	
Cabling mode	Top cabling	
Drainage requirements	Automatic drainage	
Water supply requirements of wet film	The inlet water pressure should be in the range of 0.1–0.7 MPa (A reducing valve must be installed if the inlet water pressure exceeds 0.7 MPa.), and the temperature should be in the range of 1°C–40°C. The wet film humidifier should use tap water (no water treatment facility needed for the inlet water) that meets the following requirements: <ul style="list-style-type: none"> Non-freezing and nephelometric turbidity units (NTU): < 3 No visible substances $6.5 \leq \text{pH value} \leq 8.5$ Total hardness (in CaCO_3): ≤ 450 mg/L 	
Power distribution	Leakage circuit breakers are not used for the main power route. If leakage circuit breakers are required by the customer or by local regulations, use the residual current circuit breakers (RCCBs) that are not sensitive to the single-phase DC pulses and transient current pulses.	

Operating Specifications

Table 7-3 Operating specifications

Item	NetCol5000-C065	NetCol5000-C030/C032
Operating ambient temperature	4–55°C	
Operating ambient humidity	5%–95% RH	
Inlet water temperature of chilled water or glycol solution	7–19°C (water, glycol solution)	
Storage temperature	–40°C to +70°C	
Storage humidity	5%–95% RH (non-condensing)	

Item	NetCol5000-C065	NetCol5000-C030/C032
Altitude	0–1000 m: normal use; 1000–4000 m: derated	
Temperature adjustment range	15–35°C	
Temperature adjustment precision	±1°C	
Humidity adjustment range	20%–80% RH	
Humidity adjustment precision	±5% RH	
Air outlet static pressure	0–50 Pa	

8 Technical Specifications (NetCol5000-C065)

Table 8-1 Technical specifications of NetCol5000-C065

Item	NetCol5000-C065
Power system	220 V AC to 240 V AC 1 Ph 50/60 Hz, dual power supplies
Tolerance	Rated voltage -15% to +10%, rated frequency ± 5 Hz
Number of fans	10
Cooling capacity (kW)	65 ^a
Air volume (m ³ /h)	10000
Maximum operating current (A)	15
Maximum operating pressure (MPa)	1.6
Humidification	<ul style="list-style-type: none">• NetCol5000-C065H90D0: No• NetCol5000-C065H9HD0: Yes• NetCol5000-C065H9HE0: Yes
Humidification capacity (kg/h)	<ul style="list-style-type: none">• NetCol5000-C065H90D0: 0• NetCol5000-C065H9HD0: 3• NetCol5000-C065H9HE0: 3
External dimensions (H x W x D)	2000 mm \times 600 mm \times 1200 mm
Pipe and cable routing	Installed on the raised floor or base. It supports underfloor piping and overhead cabling.
Certification	CE, RoHS, REACH, WEEE, and IEC
Air filter level	G4
Net weight (kg)	<ul style="list-style-type: none">• NetCol5000-C065H90D0: 222• NetCol5000-C065H9HD0: 224

Item	NetCol5000-C065
	<ul style="list-style-type: none"><li data-bbox="826 286 1214 313">• NetCol5000-C065H9HE0: 224
a: Rated working conditions are that the return air temperature is 37°C; the return air relative humidity is 24%; the supply/return water temperatures are 10°C/15°C respectively; and the static pressure outside the smart cooling product is 0 Pa.	

9 Technical Specifications (NetCol5000-C030/C032)

Table 9-1 Technical specifications of NetCol5000-C030/C032

Item	NetCol5000-C030	NetCol5000-C032
Power system	220 V AC to 240 V AC 1 Ph 50/60 Hz, dual power supplies	220 V AC to 240 V AC 1 Ph 50/60 Hz, dual power supplies
Tolerance	Rated voltage -15% to +10%, rated frequency ± 5 Hz	Rated voltage -15% to +10%, rated frequency ± 5 Hz
Number of fans	6	6
Cooling capacity (kW)	30 ^a	32 ^a
Air volume (m ³ /h)	5400	5400
Maximum operating current (A)	9.5	9.5
Maximum operating pressure (MPa)	1.6	1.6
Humidification	<ul style="list-style-type: none"> • NetCol5000-C030H90D0: No • NetCol5000-C030H9HD0: Yes • NetCol5000-C030H9HE0: Yes 	NetCol5000-C032H9HD0: Yes
Humidification capacity (kg/h)	<ul style="list-style-type: none"> • NetCol5000-C030H90D0: 0 • NetCol5000-C030H9HD0: 1.5 • NetCol5000-C030H9HE0: 1.5 	NetCol5000-C032H9HD0: 1.5
External dimensions (H x W x D)	2000 mm × 300 mm × 1200 mm	2200 mm × 300 mm × 1200 mm
Pipe and cable	Installed on the raised floor or base. It	Installed on the raised floor or

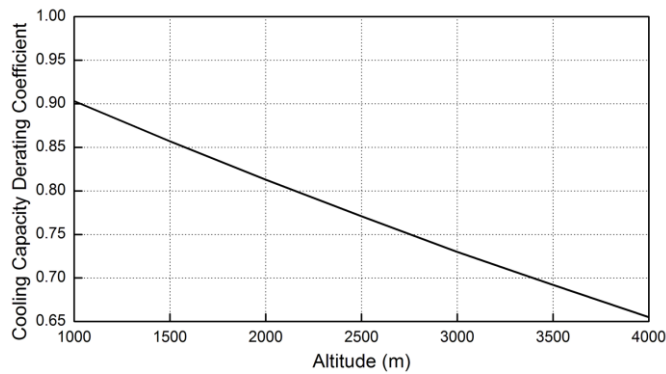
Item	NetCol5000-C030	NetCol5000-C032
routing	supports underfloor piping and overhead cabling.	base. It supports underfloor piping and overhead cabling.
Certification	CE, RoHS, REACH, WEEE, and IEC	CE, RoHS, REACH, WEEE, and IEC
Air filter level	G4	G4
Net weight (kg)	<ul style="list-style-type: none"> • NetCol5000-C030H90D0: 162 • NetCol5000-C030H9HD0: 164 • NetCol5000-C030H9HE0: 164 	NetCol5000-C032H9HD0: 175
a: Rated working conditions are that the return air temperature is 37°C; the return air relative humidity is 24%; the supply/return water temperatures are 10°C/15°C respectively; and the static pressure outside the smart cooling product is 0 Pa.		

10 Performance Curves

Figure 10-1 and Figure 10-2 show the cooling capacity derating coefficient curve in proportion to the altitude when the NetCol5000-C works under rated power and air flow.

Cooling Capacity Derating Coefficient Curve in Proportion to the Altitude

Figure 10-1 Cooling capacity derating coefficient curve in proportion to the altitude



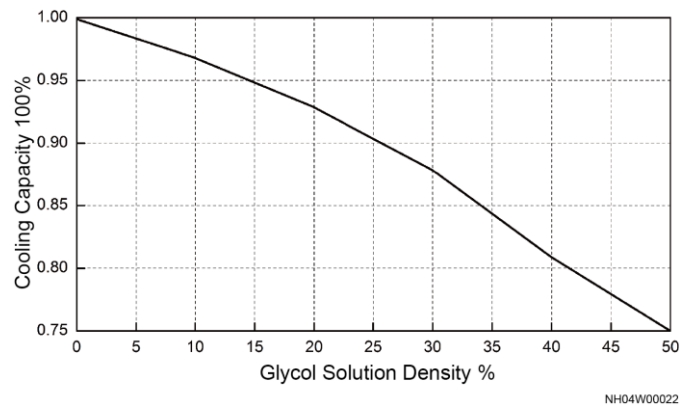
NOTE

When the altitude is within 1000 m, the cooling capacity deviation is in the tolerance range and can be ignored.

Cooling Capacity Curve in Proportion to the Glycol Solution Density

The cooling capacity is obtained by multiplying the glycol solution density by the rated cooling capacity.

Figure 10-2 Cooling capacity curve in proportion to the glycol solution density



11 Acronyms and Abbreviations

C	
CAN	controller area network
F	
FE	fast Ethernet
N	
NTC	negative temperature coefficient
P	
PSU	power supply unit
PTC	positive temperature coefficient
PUE	power usage effectiveness
R	
RCCB	residual current circuit breaker
T	
TFT	thin film transistor
U	
USB	Universal Series Bus