Direct humidification
Advanced solutions for industrial
and commercial environments

Direct in-room humidification

Relative humidity can be controlled using systems installed in the ducting or directly in the room. For retrofits without an adequate air distribution system for traditional ducted humidification, a direct in-room solution is more effective, reducing costs and avoiding the need for major building work.

CAREL offers a wide range of in-room humidifiers, ideal for both small and large spaces. Simple and flexible installation make them perfect for retrofits.
Correct installation of the distribution system is essential to ensure uniform humidification and avoid condensation on nearby objects.

Solutions for industry and comfort

In many industrial processes, including printing, tobacco, plastics and textiles, production capacity and final product quality are considerably affected by relative humidity, which needs to be precisely managed and monitored inside the production plant.
Public and private spaces need the right humidity to ensure personal comfort.

In-room adiabatic humidification

CAREL adiabatic humidifiers have different technologies and configurations, yet all share the same purpose: to create water droplets that are as small as possible, so as to reduce the absorption distance in the air.
The water evaporates spontaneously, obtaining the dual effect of increasing the relative humidity and lowering the air temperature due to the evaporative cooling effect (each kg of evaporated water produces a cooling effect of around 690 W).
The chosen solution is always a compromise between technical performance, surrounding conditions and return on investment.
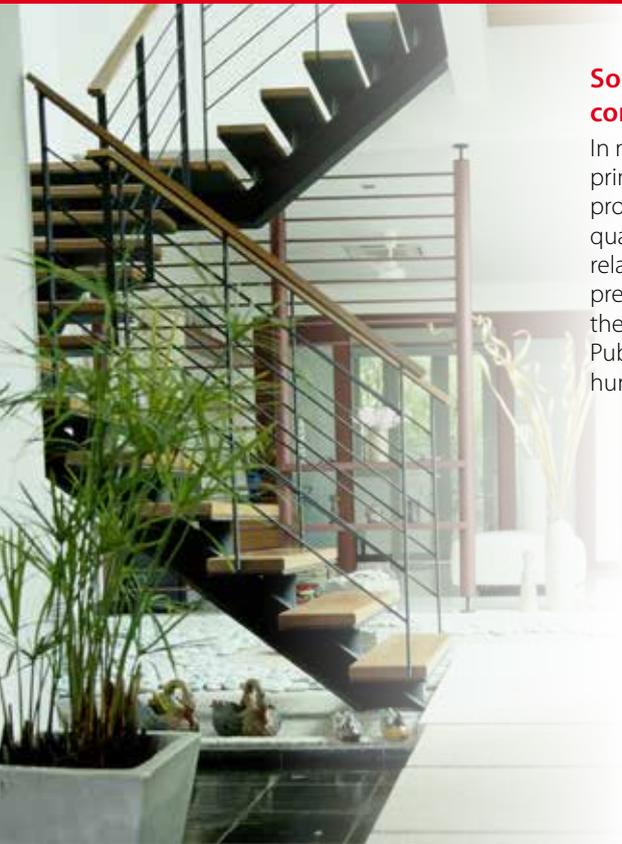
In-room isothermal humidification

The CAREL range of isothermal humidifiers guarantees total hygiene, through the use of steam. Isothermal solutions are especially suitable for tight spaces. Steam is in fact easily absorbed by the surrounding air, increasing relative humidity without significantly affecting the temperature.

Absorption distance

In-room humidification requires a suitable amount of free space for absorption, which must be carefully evaluated during the design phase.

Airborne dust

The right level of relative humidity helps reduce airborne dust, avoiding problems for both the production process and operators.
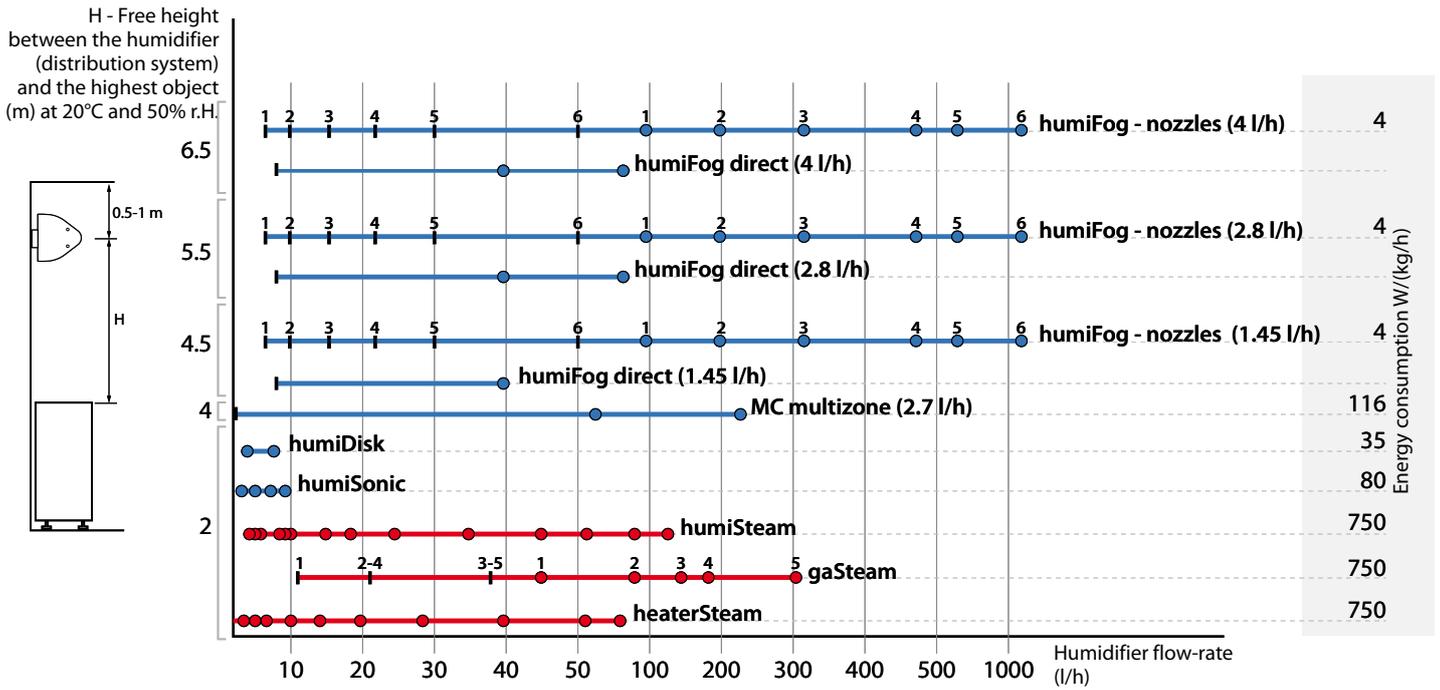
Easy installation

CAREL in-room solutions guarantee easy installation without major work to the existing structure.

Adiabatic or isothermal solution

The table below summarises the main features of CAREL's solutions. By identifying the required humidification load on the horizontal axis and moving upwards to the available free height (value on the left), the intersection represents the possible technical solutions. Where multiple solutions are possible, the choice can be made considering other requirements. The radial charts shown below compare the main key points of the different solutions.

H - Free height between the humidifier (distribution system) and the highest object (m) at 20°C and 50% r.H.

0.5-1 m

H

Energy consumption W/(kg/h)

Height	Solution	Energy consumption W/(kg/h)
6.5	humiFog - nozzles (4 l/h)	4
	humiFog direct (4 l/h)	
5.5	humiFog - nozzles (2.8 l/h)	4
	humiFog direct (2.8 l/h)	
4.5	humiFog - nozzles (1.45 l/h)	4
	humiFog direct (1.45 l/h)	
4	MC multizone (2.7 l/h)	116
	humiDisk	35
	humiSonic	80
2	humiSteam	750
	gaSteam	750
	heaterSteam	750

Humidifier flow-rate (l/h)

10 20 30 40 50 100 200 300 400 500 1000

Key

🔴🔵 humidifier size: isothermal red, adiabatic blue

❚ minimum humidifier capacity

1-1 when on the same line, these identify the minimum and maximum humidifier capacity respectively

Guaranteed hygiene

All CAREL humidifiers, except those with immersed electrodes, can be combined with a reverse-osmosis water treatment system to reduce maintenance requirements and ensure maximum hygiene.
The WTS (Water Treatment System) is available in the Large 160-1200 l/h (left) and Compact 12-80 l/h (centre) versions. The UV lamp (right) can be added to eliminate any bacteria present in the water.

Key

💧 water flow-rate

💧↔ absorption distance

▦ zone management

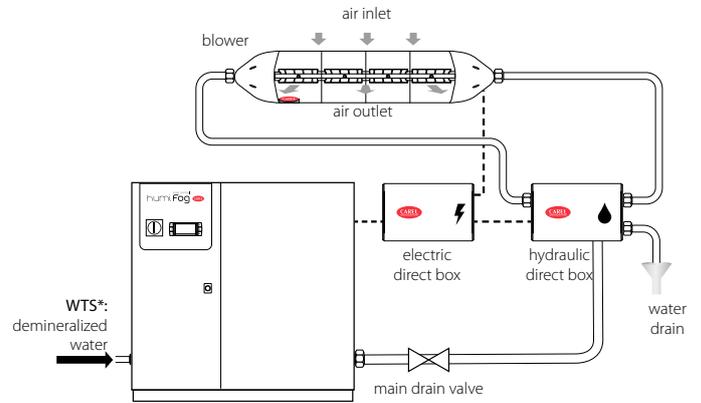🏭 commercial

🏠 residential

🏭 industrial

Adiabatic range

Humidification and evaporative cooling with very low operating costs. The absorption distances must be carefully evaluated to avoid condensation.

HumiFog multizone direct (UA)

Technology: pressurised water humidifier

>80 l/h

$\updownarrow \geq 4$ m $\leftrightarrow \geq 5$ m

up to 6 independent zones

Suitable for managing medium and high humidification loads. The possibility of up to six independent zones, and a wide range of sizes (up to 1000 l/h), make this solution ideal for retrofits in industrial environments, where traditional ducted humidification is not possible.

Operating principle

The installation configuration includes a main water line kept at high pressure by the pumping station. The modulation steps are connected to the pumping station using the direct boxes (water and electric), used to interface humiFog Multizone to the blowers.

air inlet
blower
air outlet

humiFog

WTS*: demineralized water

electric direct box

hydraulic direct box

water drain

main drain valve

Probes

DPP*: temperature and humidity probe for industrial environments

DPW*: temperature and humidity probe for civil environments

Easy installation
Precision
Capacity
Energy saving
Easy absorption
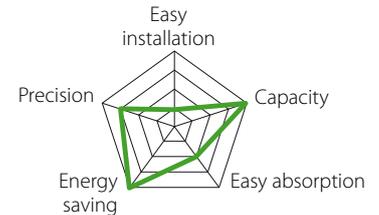
Distribution layouts

Layout 1 - Installation: simple. Flexibility: average
Suitable for installations where the length of the water line between the fill and drain valves is less than or equal to 30 m.
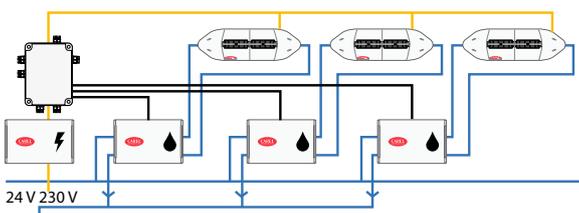
24 V 230 V
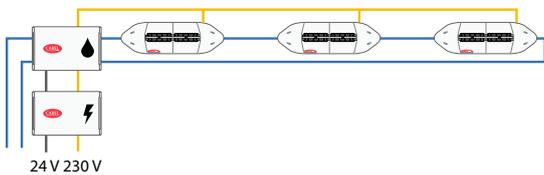
Layout 2 - Installation: simple. Flexibility: average
Suitable for large installations where water can be drained at the end of the line.
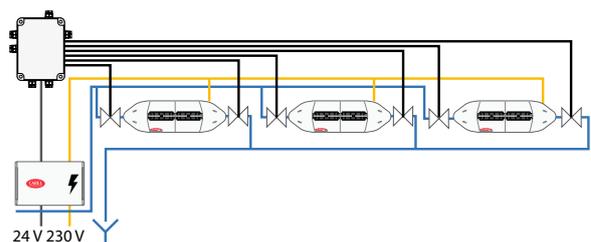
24 V 230 V
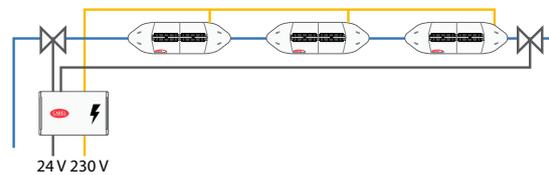
Layout 3 - Installation: complex. Flexibility: high
Suitable for installations where control is required over each blower, enabling and disabling them as needed.

24 V 230 V

Layout 4 - Installation: complex. Flexibility: high
Suitable for installations where high flexibility and precision are required.

24 V 230 V

—— water line   —— 230 V power line   —— 24 V power line

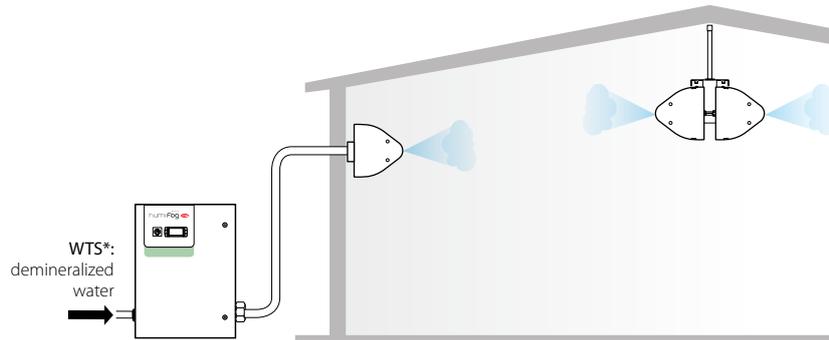## HumiFog direct (UA)

Technology: pressurised water humidifier

20 to 80 l/h

↕ ≥ 4 m ↔ ≥ 5 m

up to 2
independent zones

WTS*:
demineralized
water

probes

DPP*: temperature
and humidity
probe for industrial
environments

DPW*: temperature
and humidity probe
for civil environments

Designed for medium-sized industrial environments, combining maximum reliability with low operating costs. The electronic valves fitted inside the cabinet are used to manage the blowers and make the system easier to install, adapting to any context, even the most complex ones. The unit can be managed on a local network via webserver, and comes with the most common communication protocols: Modbus®, Bacnet™ via Ethernet and RS485.

Control cabinet

The powerful and high-performance pumping station can deliver water at a constant pressure of 70 bars, for maximum performance with very low energy consumption (4 W/(kg/h)). The system can manage two different zones, with different set points.
Capacity modulation is managed using the PWM principle (pulse width modulation), for precise and reliable humidity control. Two pumping stations are available, 40 l/h and 80 l/h.

Easy installation
Capacity
Easy absorption
Energy saving
Precision
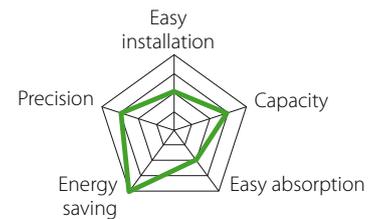
Absorption heights with 1.45 l/h nozzles depending on the set point

RH	1.45 l/h nozzles										
80	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
70	5	5	5	5	5	5	5	5	5	5	5.5
60	5	5	5	5	5	5	5	5	5	5	5
50	4.5	4.5	4.5	4.5	4.5	4.5	5	5	5	5	5
40	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
30	4	4	4	4	4	4	4	4	4	4	4
	15	16	17	18	19	20	21	22	23	24	25
	Temperature										

Absorption heights with 2.8 l/h nozzles depending on the set point

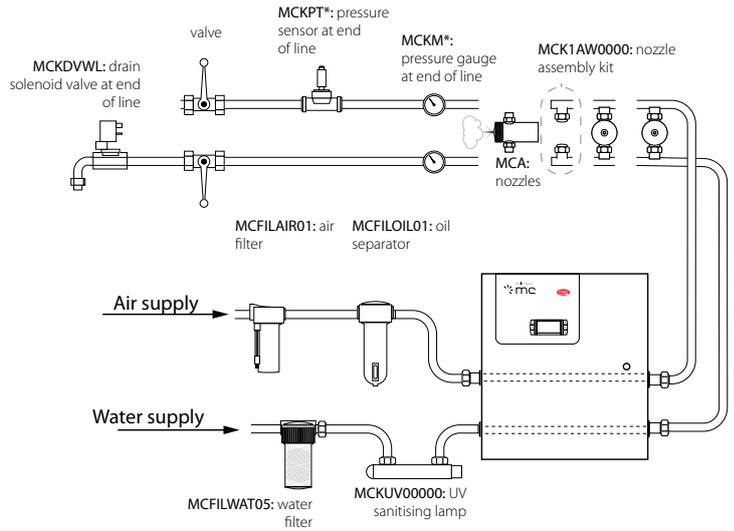| RH	2.8 l/h nozzles										
80	7	7	7	7	7	7	7	7	7	7	7
70	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
60	6	6	6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
50	5.5	5.5	5.5	5.5	5.5	5.5	6	6	6	6	6
40	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
30	5	5	5	5	5	5	5	5	5	5	5
	15	16	17	18	19	20	21	22	23	24	25
	Temperature										

mc multizone (MC)

Technology: compressed air humidifier

60 to 230 l/h

$\updownarrow \geq 4$ m $\leftrightarrow \geq 3$ m

up to 6 independent zones

Compressed air and water humidifier, the ideal solution when a compressed air system is already available in the building, as is often the case in the industrial sector. The main target applications are printing, textiles, wood industries and food cold stores.
The humidifier can communicate via Modbus®, LON, TCP/IP and SNMP using a special additional card.

MCKPT*: pressure sensor at end of line

MCKDVWL: drain solenoid valve at end of line

valve

MCKM*: pressure gauge at end of line

MCK1AW0000: nozzle assembly kit

MCA: nozzles

MCFILAIR01: air filter

MCFILOIL01: oil separator

Air supply

Water supply

MCFILWAT05: water filter

MCKUV00000: UV sanitising lamp

Control cabinet

The pumping stations are available in the 60 l/h or 230 l/h versions, while the Master/Slave configuration can be used to manage up to 6 independent zones.
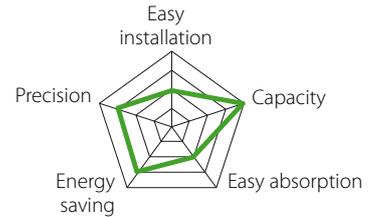
Probes

DPP*: temperature and humidity probe for industrial environments

DPW*: temperature and humidity probe for civil environments
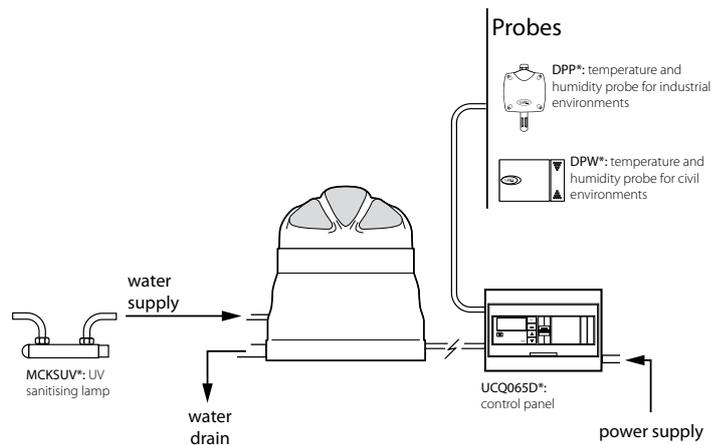
Easy installation · Capacity · Easy absorption · Energy saving · Precision

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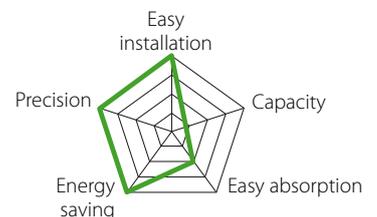## humiDisk (UC)

Technology: spinning disk humidifier

1 to 6,5 l/h

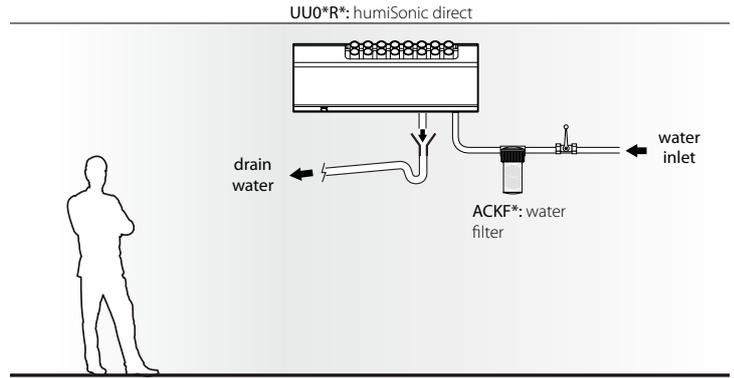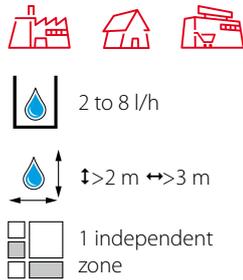$\updownarrow \geq 1,5$ m $\leftrightarrow \geq 2$ m

1

Stand-alone spinning disk humidifier available in sizes from 1 l/h to 6.5 l/h. Simple and efficient solution for cold stores or places where precision is not required and operating conditions are extreme.

The humidifier, in fact, thanks to IPX4 protection, can operate across a wide range of temperature and humidity conditions (0 to 35°C, 0 to 100% RH)

Probes

DPP*: temperature and humidity probe for industrial environments

DPW*: temperature and humidity probe for civil environments

water supply

MCKSUV*: UV sanitising lamp

water drain

UCQ065D*: control panel

power supply

Easy installation · Capacity · Easy absorption · Energy saving · Precision

humiSonic direct (UU)

Technology: ultrasonic humidifier

2 to 8 l/h

↕>2 m ↔>3 m

1 independent zone

drain water

water inlet

ACKF*: water filter

Ideal for small humidification loads (0 to 20 l/h) and where compactness, low noise and short absorption distances are required. Ease of droplet absorption and low noise make it ideal for comfort applications in public places. Its compact dimensions and high performance mean it can be used

for small- and medium-sized mission-critical applications. Available in 2-4-6 and 8 l/h sizes with 0 to 100% capacity modulation thanks to PWM technology. Energy saving is guaranteed, with power consumption of less than 80 W/(kg/h)

Easy installation

Precision

Capacity

Energy saving

Easy absorption
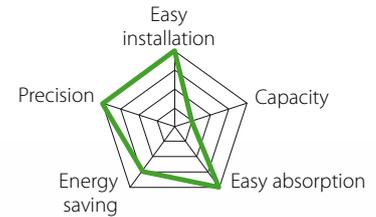
Humidification load required, based on the volume of the room or the air flow-rate

Floor area (m²)	Outside air flow-rate (m³/h)	Humidifier load (kg/h)
35	101.5	1
50	145	1.5
70	203	2
90	261	2.6
100	290	2.9
150	435	4.4
200	580	5.9
250	725	7.3
300	870	8.8
350	1015	10.2
400	1160	11.7
500	1450	14.6
600	1740	17.6

The humidification load is estimated based on the amount of outside air introduced into the room, considering the following winter conditions:
• Outside air conditions: -9.9 °C/44% rH;
• Set point conditions: 22 °C, 55% rH

The conditions vary from region to region. Contact Carel personnel for a customised evaluation.

Evaporative cooling

Atomisation of water naturally lowers the air temperature, saving on cooling system power and humidifying at the same time. In winter, however, if there is no thermal load, the heating system needs to provide heat in order to counteract the evaporative effect.

Isothermal range

High absorption efficiency and guaranteed hygiene without requiring additional components, thanks to the use of steam.
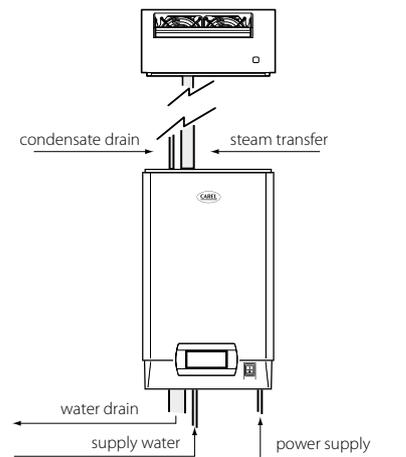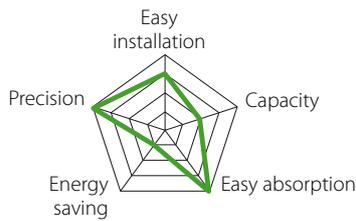
heaterSteam (UR)

Technology: heater humidifier

2 to 80 l/h

↕ > 2 m ↔ > 3 m

1 independent zone

Easy installation
Capacity
Easy absorption
Energy saving
Precision

Ideal for installations with low and medium humidification loads, where high precision, reliability, low maintenance and hygiene are required, and where the free height available for absorption is limited.
Modulation with PWM technology (0 to 100%), Master/Slave function for up to 20 units, and electronic safety systems for humidifier operating flexibility and complete reliability.

It can operate on demineralised water so as to drastically reduce the frequency of maintenance.
The humidifier can be managed on a local network via webserver, and comes with the most common communication protocols: Modbus® and Bacnet™ on both serial and Ethernet ports; CAREL protocol on BMS serial port.

condensate drain   steam transfer

water drain

supply water   power supply

Probes

DPP*: temperature and humidity probe for industrial environments

DPW*: temperature and humidity probe for civil environments
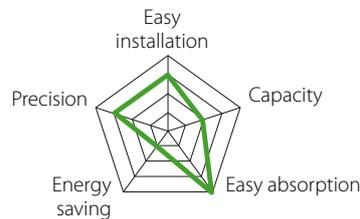
☑ UE   ☑ UR

humiSteam (UE)

Technology: immersed electrode humidifier

1,5 to 130 l/h

↕ > 2 m ↔ > 5 m

1 independent

Easy installation
Capacity
Easy absorption
Energy saving
Precision

This is the ideal solution for low and medium humidification loads, where high precision is not required but hygiene is essential. The software automatically manages the humidifier according to the type of feedwater, so as to reduce the frequency of maintenance.

It can only operate on mains water, and the cylinders are easy to replace or open and descale (optional cylinder model). The humidifier is designed to allow these to be replaced very quickly.

☑ UE   ☑ UR
☐ CH   ☑ UG

Steam blowers
CAREL steam blowers are available in two versions, depending on humidifier capacity. The distributor on the left (VSDU0A003) can handle up to 18 kg/h, while the one on the right (VSDBAS0001) can handle up to
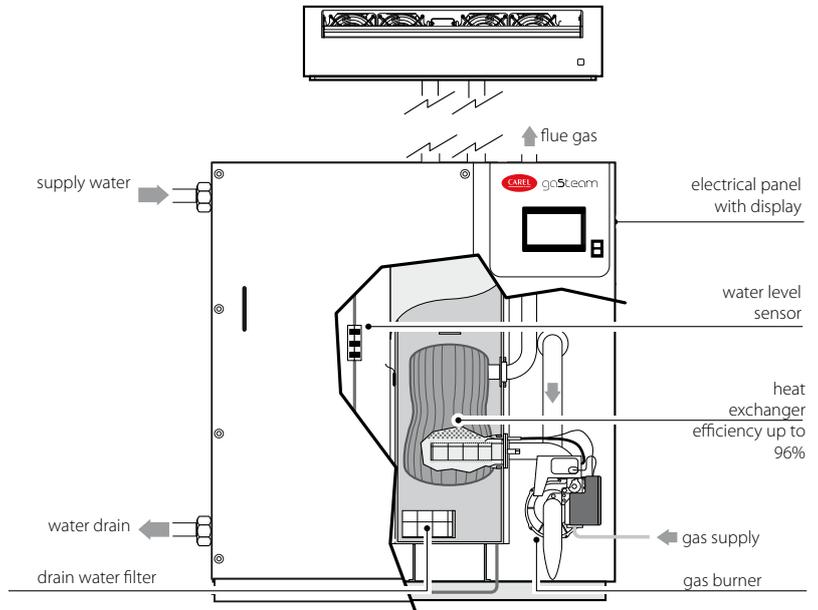
gaSteam (UG)

Technology: gas-fired humidifier

45 to 300 l/h

↕> 2 m ↔> 5 m

1 independent zone

Suitable for industrial applications where it is cost-effective to exploit the low cost of gas compared to electricity. Installation requires qualified personnel, due to the use of gas as the energy source.
The humidifier can be managed on a local network via webserver, and comes with the following communication protocols: Modbus® and Bacnet™ on serial and Ethernet ports; CAREL protocol on BMS serial port. Specific models are available for outdoor installation (IAS 12-94) to avoid having gas sources inside the building.
It can operate on demineralised water so as to drastically reduce the frequency of maintenance.

- supply water
- flue gas
- electrical panel with display
- water level sensor
- heat exchanger efficiency up to 96%
- water drain
- drain water filter
- gas supply
- gas burner

Probes

DPP*: temperature and humidity probe for industrial environments

DPW*: temperature and humidity probe for civil environments

Easy installation — Capacity — Easy absorption — Energy saving — Precision
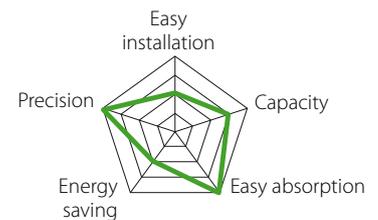
compactSteam (CH)

Technology: immersed electrode humidifier

1,6 to 3,2 l/h

↕> 1,8 m ↔> 1,5 m

1 independent

Easy installation — Capacity — Easy absorption — Energy saving — Precision

30%
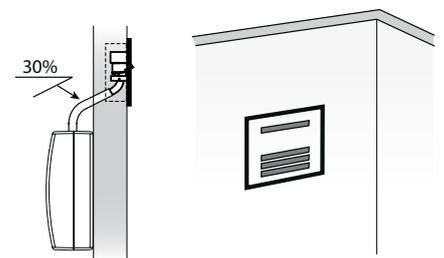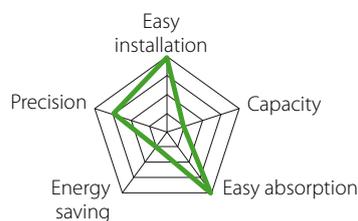
45 kg/h. For higher humidifier capacity, several blowers can be combined together, according to the steam outlets available on the humidifier.

Ideal for low loads, and available with both built-in blower and wall-mounted blower.
It can only operate on mains water, and the cylinders are a normal spare part for replacement, following the build-up of scale inside. The humidifier is designed to allow these to be replaced very quickly.

Steam blower
Flush-mount model (VRDCH*)

Services

CAREL offers a wide variety of services, ranging from technical consultancy in the design stage, to supervision systems for site monitoring and management

Local supervision

Webserver

The built-in webserver allows a simple internet browser to configure and monitor the entire humidification system from a PC or tablet, connected to the local network. The webserver is available on the following humidifiers: heaterSteam, gaSteam, humiFog Direct.

Boss

Boss is the CAREL range of local supervisors. Ample configuration flexibility, customisation of maps, integration of Bacnet™, Modbus® and LonWorks® protocols, and a humidification plug-in, guarantee ease of use and continuous monitoring of the humidified space.
Boss and boss mini differ regarding the number of devices they can manage, 300 and 50 respectively.

Variable log

List of connected devices

Remote supervision

tERA

tERA is the new CAREL cloud platform for site management and monitoring.

The tERA subscription offers simple and immediate system connectivity. Users can freely choose which communication channel to use for the system: the platform uses either a UMTS wireless channel or Ethernet line, with secure and reliable solutions.

tDisplay

Designed for the end user, this allows simple remote control of connected devices, signals any alarms, in the same way as if the user were physically in front of the unit.
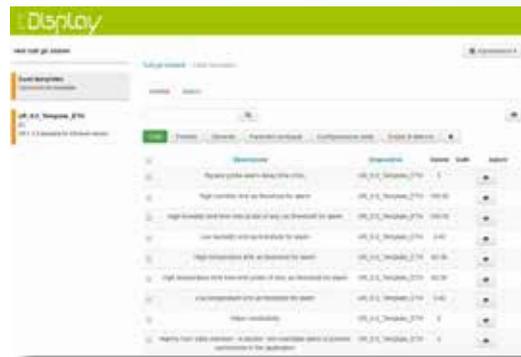
tService

tService is the tERA platform service intended for service centres. tService makes maintenance faster and more efficient, with a ready-to-go remote control solution for service centres. Functions available on activating tService:
• Read and write variables in real time;
• Alarm management with notification by email;
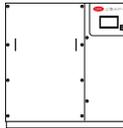• Reports and graphs with up to 300 variables;
• Live trends.

Other services

Service	Part number	Humidifier type
Technical support and site inspection	-00PSTS000	Valid for all humidifiers
Training on CAREL products	-00TRNG000	Valid for all humidifiers
Kick off meeting	-00COMMKF0	Valid for all humidifiers
Commissioning	-00COMM000	Valid for all humidifiers
Commissioning + Cloud Connectivity	-00COMMS00	Valid for heaterSteam and gaSteam

Documentation available
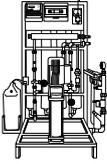
Product	P/N-language
WTS Large	+0300016IE; +0300016F; +0300016SP; +0300016C; +0300016R; +0300016SV
WTS Compact	+0300017IE; +0300017FD; +0300017ES; +0300017CS; +0300017RU; +0300017SV;
humiFog Multizone	+0300067IT; +0300067EN; +0300067FR; +0300067DE; +0300067ES; +0300067RU; +0300067ZH
humiFog Direct	+0300073IT; +0300073EN; +0300073FR; +0300073DE; +0300073ES; +0300073RU; +0300073SV;
MC	+030221980 - Italian; +030221981 - English; +030221982 - French; +030221983 - German; +030221984 - Spanish; +030221987 - Dutch
humiDisk	+030222020 - Italian/English; +030222021 - French/German; +030222022 - Spanish/English; +030222023 - Russian
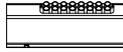
Product	P/N-language
humiSonic Direct	+0300063IT; +0300063EN; +0300063FR; +0300063DE; +0300063ES; +0300063PT; +0300063RU; +0300063SV
compactSteam	+030222070 - Italian/English; +030222071 - French/German; +030222072 - Spanish; +030222074 - Swedish
humiSteam	+0300040IT; +0300040EN; +0300040FR; +0300040DE; +0300040ES; +0300040PT; +0300040RU; +0300040SV; +0300040ZH; +0300040ET; +0300040FI
heaterSteam	+0300075IT; +0300075EN; +0300075FR; +0300075DE; +0300075ES; +0300075PT
gaSteam	+0300090IT; +0300090EN; +0300090FR; +0300090DE; +0300090ES; +0300090PT

IE: Italian/English
FD: French/German
SP: Spanish/Portuguese
IT: Italian
EN: English

FR: French
DE: German
ES: Spanish
PT: Portuguese
CS: Czech

RU: Russian
SV: Swedish
ZH: Chinese
ET: Estonian
FI: Finnish

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CAREL Nordic - www.carelnordic.se

CAREL Russia - www.carelrussia.com

CAREL South Africa - www.carelcontrols.co.za

CAREL Sud America - www.carel.com.br

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CAREL Turkey - www.carel.com.tr
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