



heaterSteam
unprecedented precision
and reliability

Connected Efficiency

Electric heater humidification

Reliable and precise technology for high-tech applications. Steam production is modulated with the highest precision, using any feedwater.

Electric heater humidification is the ideal solution to meet the following requirements:

- use of steam;
- exceptional relative humidity control performance ($\pm 1\%$);
- a functional solution that is independent of feedwater characteristics;
- service continuity.



The features of steam humidification make this technique the preferred solution in applications where the priority is hygiene, such as research laboratories or the agriculture and food industry: steam is in fact completely aseptic and does not carry solid particles, an intrinsic quality that is assured without needing to treat the feedwater.

Nonetheless, the operation of some types of isothermal humidification technology, such as immersed electrodes, is affected considerably by feedwater quality: in applications where feedwater properties are constant over time or softened water needs to be used, immersed electrode humidification is quite complex, if not impossible.

In addition to these limits, which for example prevent the use of demineralised water (useful to drastically reduce maintenance requirements), there are also technological limits in terms of the obtainable relative humidity control precision.

The CAREL solution

From water treatment to different steam distribution systems, generated by the most advanced humidifiers on the market.

Evolving technology

The air humidification technologies currently on the market have made a significant step forwards with the upgraded CAREL heaterSteam range of high-precision heater humidifiers, available in models from 2 to 80 kg/h. The product has been overhauled in every aspect, from its mechanical components to the new electronic controller with graphic interface based on the c.pCO platform. The new software functions make heaterSteam even more reliable and versatile, while its extensive connectivity allows seamless communication with any BMS system.

Steam distribution

heaterSteam can be used for humidification in the air duct, if used with the stainless steel distributors, or alternatively directly in the room, in combination with CAREL steam blowers. In the most critical applications, for maximum performance the ideal partner for heaterSteam is ultimateSAM, the high efficiency duct steam distributor: this guarantees complete steam absorption in just a few centimetres, while at the same time minimising condensate formation. Using the special wall-mounted nozzle, heaterSteam can also be used to generate steam in steam baths.



ultimateSAM



Steam nozzles



Steam blower



Linear steam distributor

Water Treatment System

CAREL has developed a series of reverse osmosis water treatment systems designed especially for use with its range of humidifiers.

WTS is ideal for maximising the performance of heaterSteam in any application: it is available in the compact - sizes from 12 to 60 l/h - and large versions, which can deliver up to 1200 l/h.



Why use demineralised water?

- minimum maintenance, as no scale builds up inside the humidifier;
- maximum hygiene guaranteed, further assured by the UV disinfection lamp;
- compact solution, easy to install.

The heaterSteam range

heaterSteam has been completely upgraded from all points of view, with unique hardware and software functions. It is available in two versions: process and titanium.

heaterSteam process

A modular and flexible solution that represents the basis of the electric heater humidifier range.

Versatile and reliable

The ideal solution for applications requiring both reliability and operating flexibility. The Incoloy® 825 heating elements allow operation in complex conditions, even when feedwater quality is not controlled. Integrated protection against overheating (unique on the market) and the patented Anti-Foaming System are guarantees of application reliability. The modulating limit probe prevents condensate formation without abrupt interruptions in steam production.

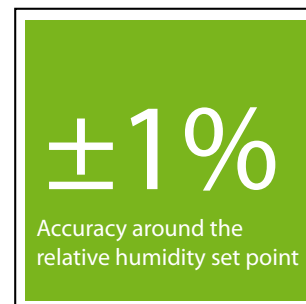
heaterSteam titanium

heaterSteam titanium, the world's only humidifier with titanium heaters, represents the pinnacle of this family of cutting-edge humidifiers.

Mission critical DNA

The reliability of titanium, combined with protection against overheating (unique on the market), makes heaterSteam titanium the natural solution for applications in which service continuity is crucial.

In particular, the unit can operate on any type of treated water, even extremely aggressive water with a conductivity below 1 µS/cm and softened down to 0° fH: the titanium heating elements are completely resistant to corrosion. Such ultra-pure water is often used in the pharmaceutical industry, and its characteristics mean it may be aggressive to the materials that are



normally to construct humidifiers. In addition, the exclusive master/slave "Endurance" function manages redundancy and rotation, guaranteeing service continuity even during maintenance.

Summary table of heaterSteam functions

Function	Process	Titanium
Heaters with thermal protection	Incoloy® 825	Titanium
Thermal shock	•	•
Master/slave function	"Mirror"	"Endurance"
Redundancy and rotation		•
Wireless sensors		•
Web server		•
BACnet™, Modbus® and CAREL protocols	•	•
USB port	•	•
tERA ready	•	•
Preheating	•	•
Thermally insulated cylinder		•
Kevlar scale removal sack		•
Start-up wizard	•	•
Evaporation cycles before drain to dilute	40	50

Certification





Operating principle

Heat is transferred to the water via the completely immersed heating elements. The solid state relays, managed by the PWM system with built-in humidity or temperature controller, modulate the quantity of heat delivered to the water so as to precisely control steam flow-rate.

The heating elements are made from titanium or Incoloy® 825, materials that are highly corrosion resistant, and feature an embedded PTC sensor to protect against overheating, for maximum reliability.

These features mean heaterSteam is independent of feedwater quality, while ensuring very precise flow-rate modulation ($\pm 1\%$ RH around the set point).

CAREL c.pHC controller

The heaterSteam c.pHC electronic controller has been designed and developed by CAREL to ensure simple set-up and commissioning and exceptional performance.

The two versions of heaterSteam, while being focused on different applications, share some important basic functions, such as:

✓ Start-up wizard

Simple and fast guided configuration of the main parameters to set up the unit

✓ AFS (Anti-Foaming System)

Automatic foam management to prevent droplets being delivered in the air.

✓ Modulating limit probe

To avoid condensate formation in the duct/AHU.

✓ Thermal shock

Periodical scale removal from the heating elements.

✓ Supervision

As standard the units come with Modbus®, BACnet™ and CAREL

communication protocols available on the BMS serial port, and Modbus®, BACnet™ on the Ethernet port.

✓ Preheating

Keeps the water in the cylinder at a set temperature for instant delivery of the required steam flow-rate.

✓ Cloud based monitoring

Two years' access to the tDisplay remote monitoring service is an important option included for no extra charge with heaterSteam. By enabling tDisplay through the Ethernet or UMTS connection, users can remotely monitor and interact with the unit, accessing data on unit operation at any time from the cloud.



Control features

Continuous modulation (with SSR)	0 to 100%
Integrated control (probes not included)	RH or temperature
External proportional signal	●
Limit probe supported	●
Remote ON/OFF	●
Alarm relay	●
Type of signal (probe or external controller)	0 to 10 V; 0 to 1 V; 2 to 10 V; 0 to 20 mA; 4 to 20 mA
RS485 interface	●

● standard

EAC



heaterSteam process

The ideal solution for applications in which reliability and operating flexibility are needed when feedwater characteristics not always under control.

- Incoloy® 825 heaters;
- fast installation using the wizard;
- automatic thermal shock;
- Modbus and BACnet™ protocols on the BMS and Ethernet ports;
- USB port;
- tERA ready;
- preheating for rapid production.



More functions

The wizard makes installation simple and fast, guiding the user step-by-step through the configuration of the main parameters to get the unit up and running. Controlled-temperature thermal shock cycles, managed in complete safety by the c.pHC controller, reduce maintenance requirements and make the unit easier to clean.

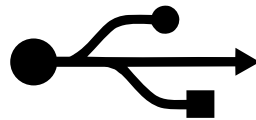
Built-in USB port

The built-in USB port, available on the entire heaterSteam range, provides immediate access to several functions:

- save data log and alarm log to USB flash drive ;
- copy and paste configuration parameters from one unit to another;
- update the software directly in the field.

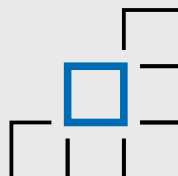
A versatile solution

The master/slave “mirror” function can be used to extend installed humidifier capacity without complications. The “mirror” function in fact allows one heaterSteam process to control, via a proportional signal, up to 19 other units, expanding the system capacity up to 1600 kg/h.



Flexibility

heaterSteam process can operate in conditions in which feedwater quality is not controlled or varies over time.



Modularity

Using the “mirror” function, humidification system capacity can be expanded up to 1600 kg/h without complications.



Simplified maintenance

Thermal shock removes any scale residues from the heating elements, thus reducing maintenance requirements.

heaterSteam titanium

The top of the range: extremely high precision, continuous humidity control modulation and unprecedented reliability.



Exclusive functions to heaterSteam titanium:

- titanium heaters;
- built-in web server;
- master/slave "endurance" function with redundancy and rotation;
- wireless sensor reception;
- Kevlar scale removal sack;
- thermally insulated cylinder.

Accurate and precise

heaterSteam titanium is the response to applications requiring precise air relative humidity control. When using demineralised water, the CAREL heater humidifier can provide the required humidity with an accuracy of $\pm 1\%$. The range of modulation from 0 to 100% of production capacity and the possibility to preheat the water in the cylinder mean heaterSteam is always ready to respond to demand for humidity.

Perfect integration

Modbus® and BACnet™ communication protocols are available as standard on both the BMS and Ethernet serial ports, without requiring optional cards. The CAREL communication protocol is available on the BMS port.

Webserver

The built-in webserver allows the entire humidification system to be configured and monitored from a PC or tablet connected to the local network, using a simple web browser.



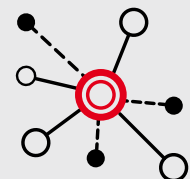
Reliability

Rotation and redundancy guarantee service continuity even during maintenance.



Performance

Accuracy of $\pm 1\%$ RH around the set point across a range of continuous modulation from 0 to 100%.



Connectivity

The Modbus® and BACnet™ protocols, available as standard without requiring additional optional cards, ensure seamless integration of heaterSteam into any system.

heaterSteam process - applications

The ideal solution for humidity control in applications that require maximum versatility

Agriculture & food industry (process and storage)

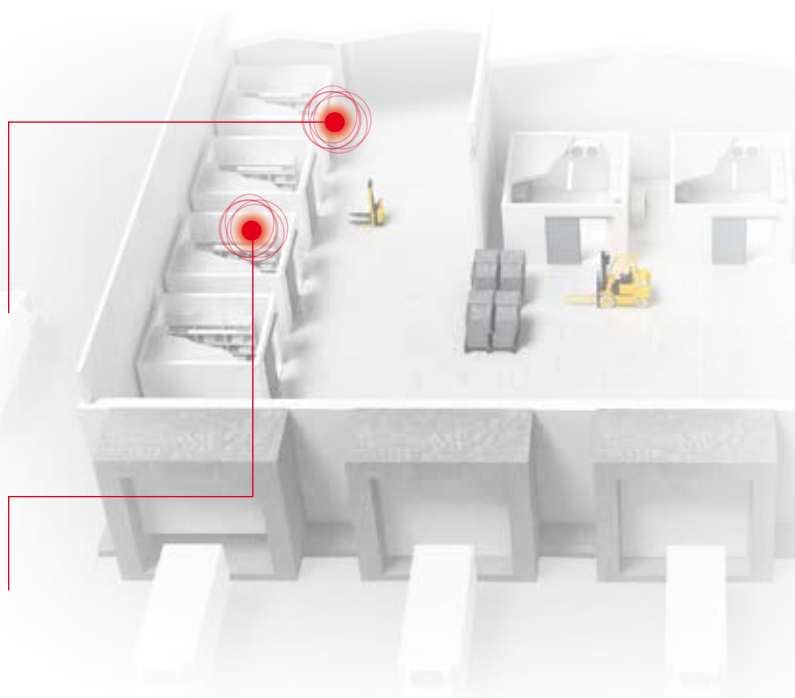
Food weight and quality are affected by the relative humidity of the surrounding air. Humidifiers are often installed in ovens to control cooking or baking processes, or alternatively are used to keep food longer, preserving its weight and features. Steam prevents solid particles from being introduced into the air.



heaterSteam process



Steam blower



Production processes (wood, paper and printing)

The production of hygroscopic materials such as paper and wood requires relative humidity control throughout the entire process. heaterSteam process is perfect for installations in all conditions, with the "mirror" function making the system easily adaptable when load is higher.



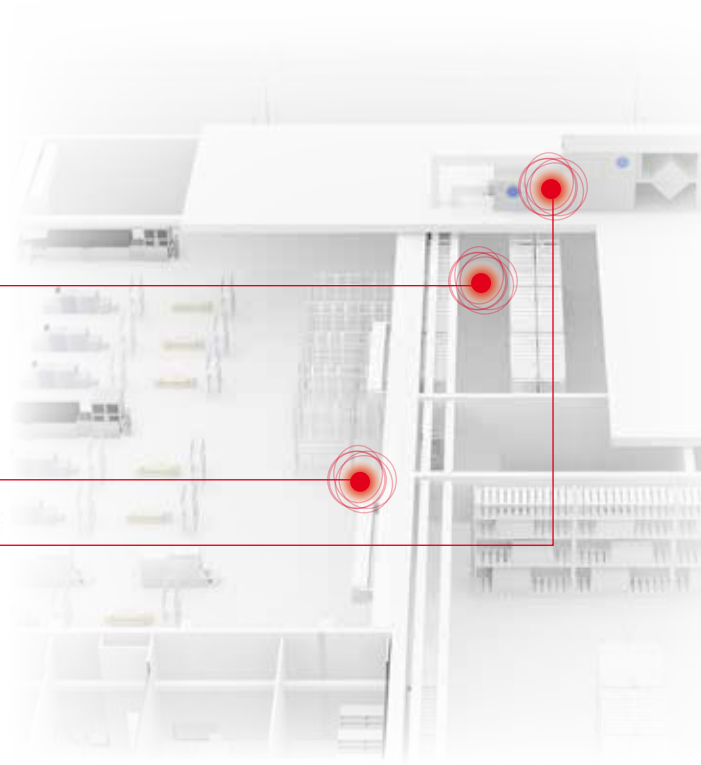
heaterSteam process



Temperature & humidity probe



Duct distributor



Health and comfort (shipping and residential)

In personal comfort applications, feedwater characteristics are usually not controlled: these may change significantly from city to city and may

even vary over time, such as in shipping applications. For heaterSteam process this is not a problem.



Steam nozzles



Active temperatura & humidity probe



heaterSteam process



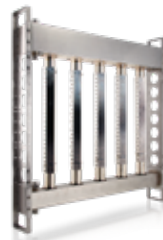
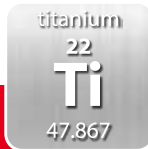
heaterSteam titanium - applications

No limits: heaterSteam titanium is the natural solution for the most demanding applications

Hospitals

(wards and operating theatres)

In addition to the hygiene guaranteed by steam, another essential function is the possibility of reduced maintenance requirements - in terms of frequency, complexity and duration - as well as maintenance operations that can be scheduled in advance.



ultimateSAM



heaterSteam titanium



WTS Large

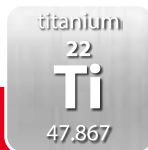


Museums and libraries

Artworks on hygroscopic materials, such as wood and paper, require constant temperature and relative humidity conditions.

Swings in these values throughout the day may be quite considerable, as a result of factors such as the weather and the number of visitors.

The humidification system must be able to operate 24 hours a day.



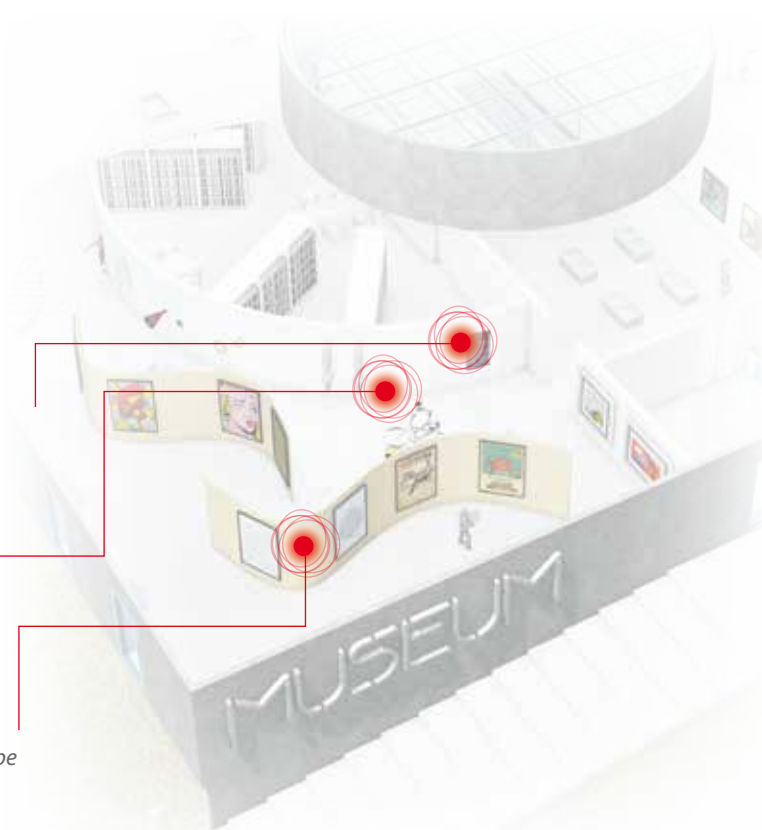
heaterSteam titanium

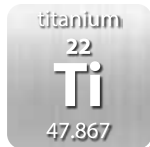


Steam blower



Wireless probe





Cleanrooms and research laboratories

Precision, reliability and service continuity are the priorities in cleanrooms, where interruptions to humidity control may place the entire process at risk.

Hygiene is guaranteed by steam, which is completely aseptic.



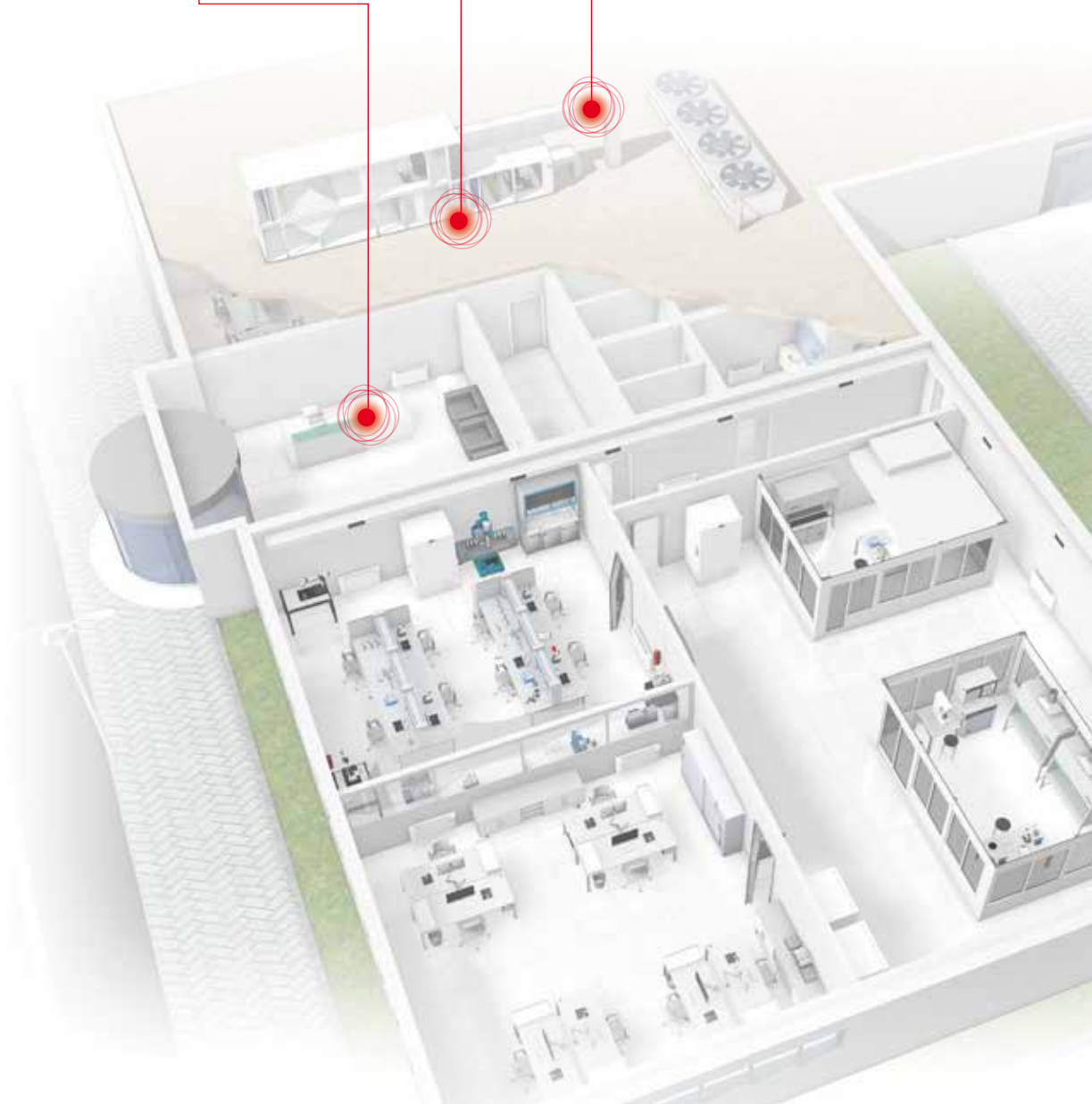
Web server



heaterSteam
titanium



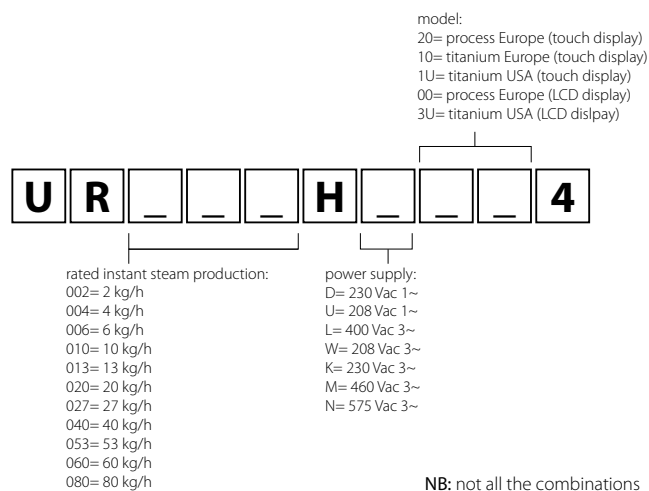
Air quality probes



Technical specifications

Specifications	UR002	UR004	UR006	UR010	UR013	UR020	UR027	UR040	UR053	UR060	UR080
General											
Rated steam production (kg/h)	2	4	6	10	13	20	27	40	53	60	80
Power consumption (kW)	1.5	3	4.5	7.5	10	15	22.5	30	40	45.7	60
Power supply (other voltages on request)											
230 Vac -15/+10%, 50/60 Hz single-phase	●	●	●								
400 Vac -15/+10%, 50/60 Hz three-phase			●	●	●	●	●	●	●	●	●
Steam connection (mm)	Ø 30					Ø 40			2x Ø 40		
Steam pressure (Pa)	0 to 1500					0 to 2000					
Number of heaters	1	1	3	3	3	3	3	6	6	9	9
Operating conditions	1T40 °C, 10 to 60% RH non-condensing										
Storage conditions	-10T70 °C, 5 to 95% RH non-condensing										
Ingress protection	IP20										
Water fill											
Connection (mm)	¾" G male										
Temperature limits (°C)	1T40										
Pressure limits (MPa – bars)	0.1 to 0.8 – 1 to 8										
Instant flow-rate (l/m)	1.1					4			10		
Total hardness (°fH)	5 to 40										
Conductivity limits (µS/cm)	1 to 1500										
Water drain											
Connection	Ø 40					Ø 50					
Temperature (°C)	<100										
Instant flow-rate (l/m)	9					22,5					

Unit code



NB: not all the combinations of codes are available.

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CAREL

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