Colt CoolStream

Adiabatic Cooling & Ventilation System

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Adiabatic cooling & ventilation system

DESCRIPTION

Colt CoolStream is a natural cooling and ventilation system which employs the principle of adiabatic cooling. This is an efficient and effective alternative to conventional air conditioning, particularly with storage or production facilities, where these buildings are generally simply too large for conventional air conditioning to be cost-effective. Alternatively, if CoolStream is operated with re-circulated air, it can humidify the internal space.

CoolStream draws hot air across wetted media, thereby exchanging energy and reducing the internal air temperature. The warmer and drier the outside air, the more efficiently evaporative cooling functions.

Where outside temperatures are above 30°C, the entering air can be cooled down by 10°C or more. Evaporative cooling is between four and seven times more economical than conventional air conditioning, with lower initial costs.

In addition evaporative cooling involves supplying 100% fresh air thereby maintaining good air quality. This means that CoolStream evaporative units may be used throughout the whole year providing fresh outside air, with the cooling function only being operated when conditions dictate. At the same time the hot air inside the building is normally removed at high level by natural or mechanical ventilators, providing a pleasant temperature at working level.

Even when the internal space is large, CoolStream systems lend themselves to be retrofitted into existing HVAC/ ventilation plant, where such plant cannot ensure a comfortable internal working climate.

CoolStream is well suited to industries such as plastics, metal or food and for installation in warehouses, shopping centres, leisure and exhibition centres, and data centres.

Being environmentally safe, with low installation and very low running costs, CoolStream is a reliable system with good green credentials, using proven, non-complex technology.

Colt can provide advice on all aspects of design, installation and running of such systems.

COOLSTREAM - FEATURES AND BENEFITS

- ***Adiabatic cooling is between four and seven times more efficient than conventional cooling systems.***
- ***Low cost of operation and maintenance, with a power consumption of only around 1kW and 50 litres of water per 10,000m³/h of supplied air.***
- ***Adiabatic cooling is up to 90% efficient.***
- ***Corrosion resistant aluminium housing with double layer polyester and epoxy coated drip tray.***
- ***Free from refrigerants.***
- ***Integrated water quality system. Safe circulation with temperature control and regular renewal of water to avoid the growth of bacteria and scale. CoolStream has been extensively tested and certified hygienically in compliance with VDI 6022 ("Hygienic Requirements for Ventilation Systems and Units for Internal Spaces"). This is a rigorous standard for air conditioning systems and confirms the high quality of supply air.***
- ***A choice either of axial AC fans or high efficiency EC fans.***
- ***Two speed or variable speed options.***
- ***Low noise.***
- ***Fully automatic digital touch screen controls with master/slave operation for up to 16 units with easy control routines. Optional remote access and link to a building management system.***
- ***Only 100% outside air used, so no stuffy internal air is re-circulated.***

"There is the need to develop ever more energy efficient technologies, since energy is the basis for economic growth and energy resources are limited. We must take advantage of the potential inherent in existing technologies to improve energy efficiency."

Guido Broda,
HVAC Product Manager at Colt

Colt has risen to this challenge by developing the CoolStream Adiabatic Cooling System.

CoolStream meets the highest economic and environmental requirements through the use of highly efficient technology. CoolStream is inexpensive to install, operate and maintain.

CoolStream can help to ensure that buildings are operated in an energy-efficient and sustainable way.

How CoolStream works

Hot external dry air is cooled by the evaporative cooling principle. An axial fan draws external air over a wetted medium. This process significantly reduces its air temperature and where this process is combined with either natural or mechanical ventilation, working conditions are greatly improved.

The control system ensures that the internal space is maintained at the required temperature. CoolStream is available in three sizes with three different connection options and six different types of fans.

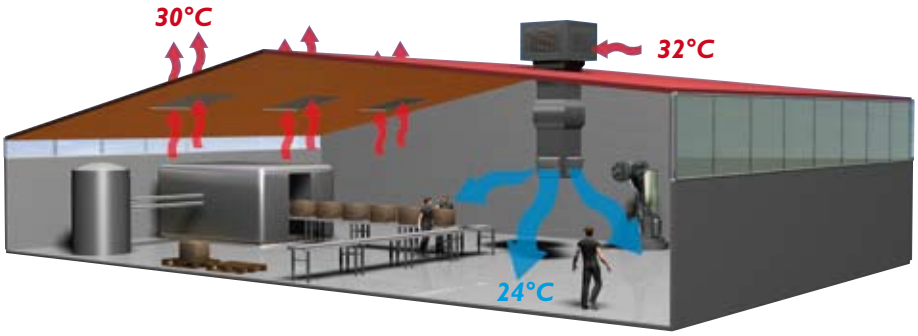
CoolStream is designed to ensure that water circulates safely and at the right temperature. The water is regularly changed to avoid the build-up of bacteria and scale.

CoolStream does not contain any refrigerants which would be harmful to the environment.

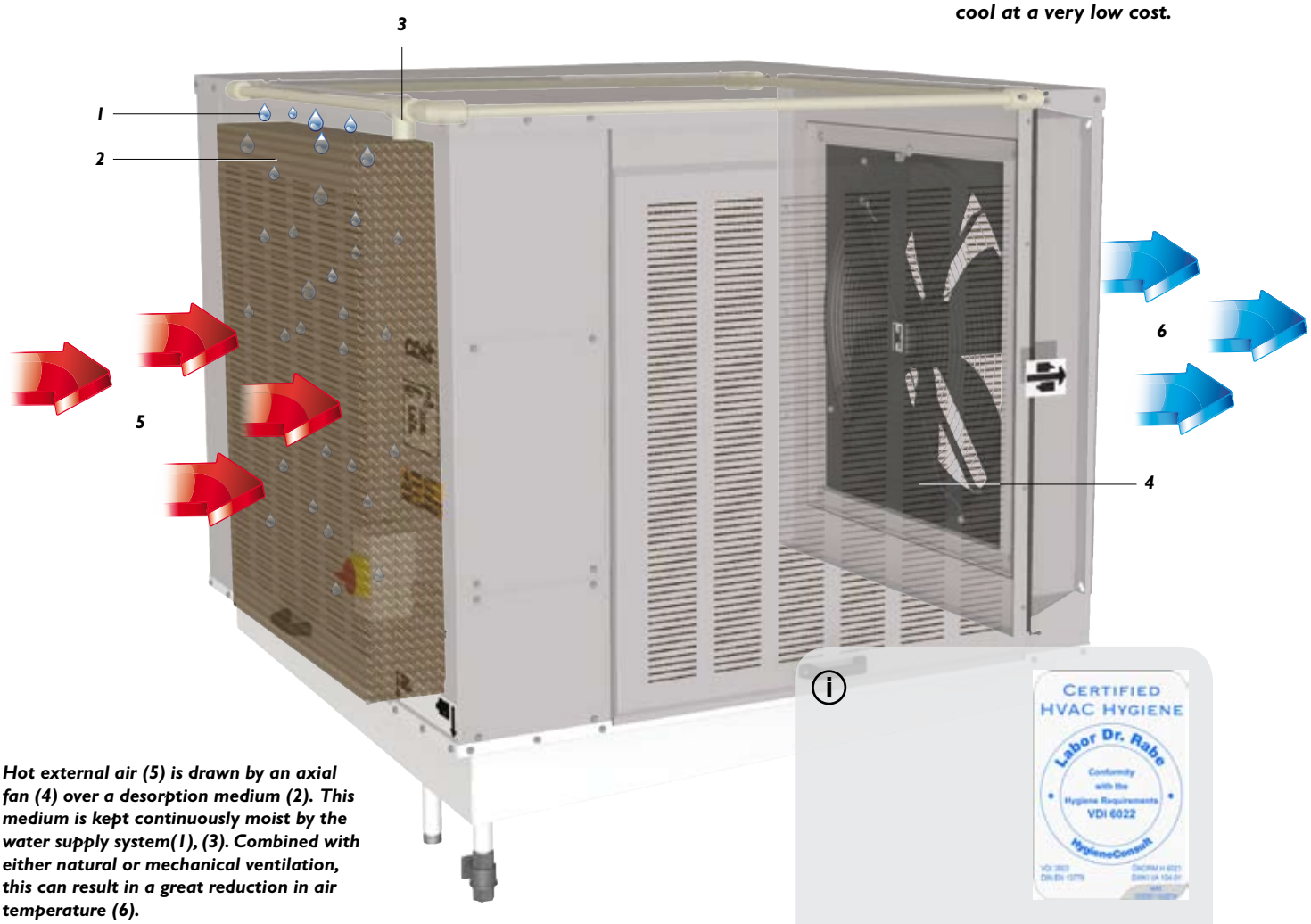
There are many different options for controls, which are always included.

There is an all "seasons" version providing ventilation, re-circulation (heat recovery) and cooling throughout the year.

"Evaporative cooling is between four and seven times more economic to run as conventional air conditioning systems.



Production facilities are kept cool at a very low cost.



Hot external air (5) is drawn by an axial fan (4) over a desorption medium (2). This medium is kept continuously moist by the water supply system(1), (3). Combined with either natural or mechanical ventilation, this can result in a great reduction in air temperature (6).

ⓘ

CERTIFIED HVAC HYGIENE
Labor Dr. Rabe
Conformity with the Hygiene Requirements VDI 6022
HygieneConsult

CoolStream has been certified in accordance with the requirements of VDI 6022.

Top and middle:
Gealan Formteile GmbH, Germany – lowered energy consumption, lowered environmental impact. This mouldings company installed the CoolStream following a review of its energy requirements for both factory and offices. Gealan had already had experience of Colt CoolStream units. Their low initial and running costs made them the units of choice. Colt provided the design of a natural and mechanical ventilation system and also supplied a Colt glazed roof. Gealan received a Sustainability Award from E.ON Bavaria for the changes that it made.

Below:
Gruschwitz GmbH, Germany – when this company was designing a new factory it took great care to ensure that running costs and CO_2 emissions were reduced. The employees are delighted with the excellent working conditions, which are the result of the installation of a scheme of CoolStream units.

Product details

1

CoolStream 10

CoolStream 16

CoolStream 27

Please refer to pages 10 and 11 for the exact dimensions.

Sizes:
Size 10: 9,000 to 15000 m³/h (2.5 m³/s to 4.2 m³/s)
Size 16: 15,500 to 22,500 m³/h (4.3 m³/s to 6.2 m³/s)
Size 27: 16,000 to 27,500 m³/h (4.4 m³/s to 7.6 m³/s)

2

[A]

[B]

[C]

Connection options:
Where CoolStream units are installed on to the roof, the bottom duct connection [A] is used. The cooled air is drawn into the room typically through a Coltair air inflow system.

Where CoolStream units are to be combined with alternative HVAC equipment, the duct connection is usually to the side [B]. Where CoolStream is installed adjacent to a building, the top duct connection [C] is generally used.

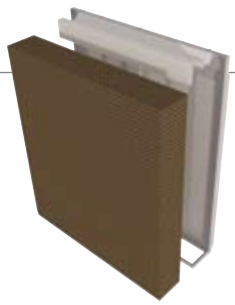
3

Six different types of fans are available. Please refer to the information on page 7 so as to make the correct choice.

1, 2

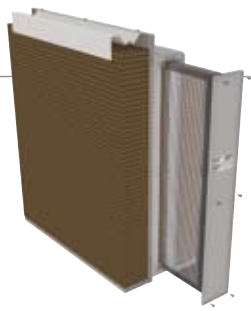
4, 5, 6

4



Standard side panel with desorption medium: aluminium fins protect the medium from the effects of weather and the unique Z shaped configuration prevents light from entering the unit. This guarantees optimum water quality.

5



Optional extended side panels with desorption medium and insect guard. The insect guard stops insects and other small particles entering the unit. The amount of dirt on this guard is monitored remotely, allowing early cleaning.

6

Extended side panel with desorption medium and filter. This unit is fitted with a G4 filter in accordance with EN 779. This option is fitted with a sensor which monitors the filter and shows a message remotely if dirt has built up.

CONFIGURING A COOLSTREAM IN ACCORDANCE WITH YOUR REQUIREMENTS

This additional information enables the correct configuration of a CoolStream unit.

The Silent CoolStream
This has a sound pressure level (at 10 metres distance free field) of not more than 48dB(A) at full power with two speed operation. The size 10 fan type A is the quietest CoolStream available.

CoolStream with continuously variable fan speed
The size 10 unit with fan type B provides continuous fan speed from 30% to 100% and is very well suited to smaller internal spaces and where cooling loads change rapidly.

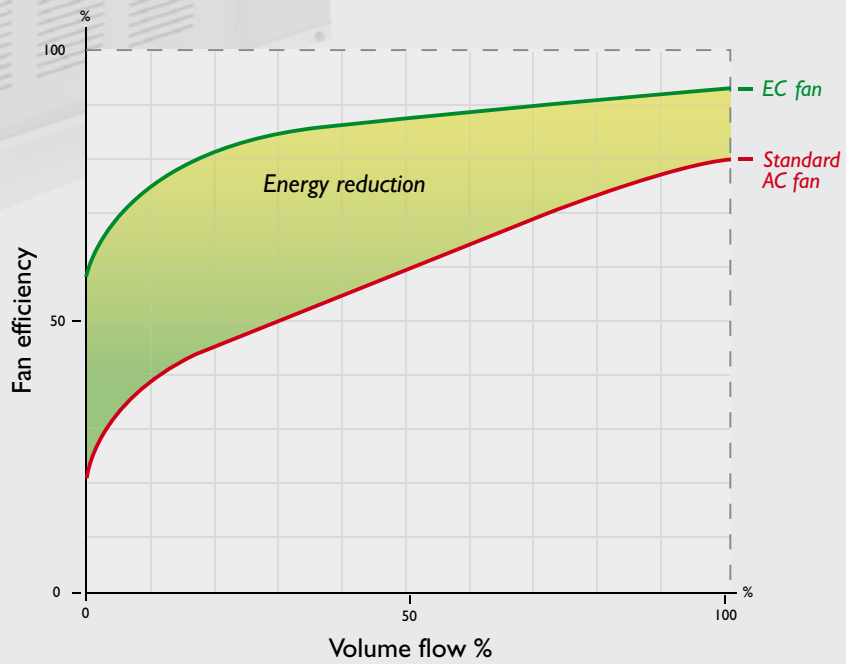
The CoolStream that provides the greatest value for money
The size 16 unit with fan type C is available with half and full speed delivering a maximum of 5.6 m³/s (20,000 m³/h). This provides the greatest amount of cooled air for your initial investment.

The largest CoolStream
The size 27 unit with fan type D provides the maximum air flow of up to 6.5 m³/s (23,500 m³/h) at two speeds and with a low sound level.

The "Eco" CoolStream
The size 10 unit with fan type E provides a volume flow of up to 4.1 m³/s (15,000 m³/h) with continuous operation from 0% to 100% and is fitted with a highly efficient EC fan. This is a real energy saver and is well suited to operate with air filters. It provides a very accurate degree of internal air temperature owing to its infinitely variable speeds.

The fully flexible CoolStream
Providing the same features and benefits as the size 10 with fan type E, the size 16 with fan type F provides an air volume of up to 6.1m³/s (22,000 m³/h) at an air pressure of 250Pa, whilst still having all advantages of axial fans.

The CoolStream that may be integrated with other systems
CoolStream units may be provided without fans where they can be incorporated into other HVAC systems providing either direct or indirect adiabatic cooling.



This chart shows the difference in performance of using EC fans (Types E and F) compared to standard fans. Energy cost savings and a very low payback period are only two advantages of the high efficiency EC fans.

CoolStream "All Seasons" option

"ALL SEASONS" OPERATION WITH COOLSTREAM

Where a CoolStream unit is combined with a Coltair inflow unit – which provides ventilation, heating and heat reclaim - then the internal environment can be controlled over the whole year. Coltair is a modular, de-centralised unit which provides fresh conditioned air into the internal space as well as re-circulated air when this is suitable. It is available in three different sizes and an abundance of different combinations.

SUMMER

During summer CoolStream "All Seasons" maintains conditions to the set point.

SPRING AND AUTUMN

Even in spring and autumn there can be a need for cooling, especially where there are high internal heat loads.
If conditions permit, controls switch off the adiabatic cooling therefore allowing fresh air only cooling.

The outside is be mixed with the internal air to pre-heat the supply air, thereby preventing the incoming air from being too cold.

WINTER

In winter it is likely that a fresh supply air and re-circulated air will be mixed.

If no residual heat is available, the re-circulation function switches to maximum inside air and brings the heat back down to the working area. Where the amount of heat is not sufficient, Colt can provide an additional heating solution such as a Comfortair unit. The CoolStream "All Seasons" distributes the heat efficiently round the internal space.

DESIGN

Whether the building is new or existing, Colt can provide the design, project management and installation of CoolStream units. The design includes the correct selection of components as well as an estimate of the running costs which comprise usage of energy and water as well as the cost of maintenance. Colt is able to compare any use CO_2 emissions and running costs with conventional solutions.

As a result of this analysis Colt can demonstrate the savings that can be achieved as well as the potential for improved working conditions.

CoolStream Controls

TOUCH SCREEN CONTROLS

Each CoolStream has its own individual control unit to enable it to operate independently of other CoolStream units. It is possible to connect a room sensor to each CoolStream unit for zone control. In a typical configuration CoolStream units are connected together in a master/slave network of up to 16 units. The central control comprises an easy to use touch screen interface.

There is the option to connect to building management systems such as Modbus, LON and BacNet. Your Colt local office will advise you of the different options here.

1. Water checked by a temperature sensor and four capacity sensors.

- *Frost protection in winter*
- *Overheating protection in summer*
- *Protection against limescale build up*
- *Automatic filling, emptying and drying*

2. Automatic control routines

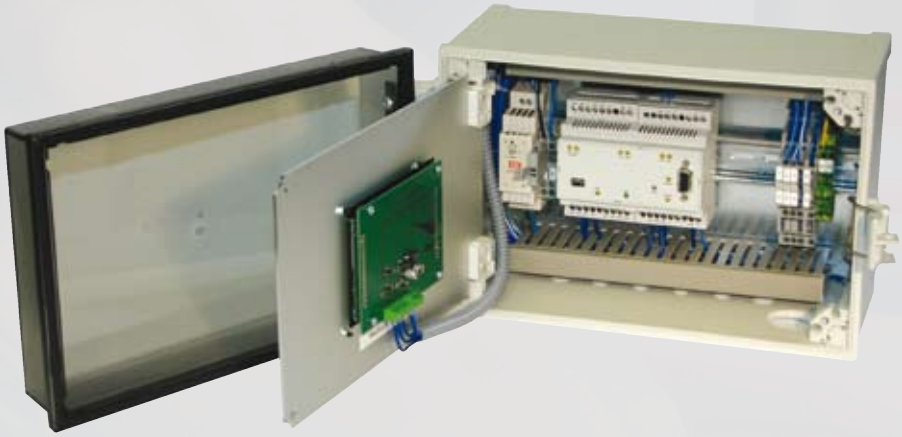
- *Fan, supply valve, run off valve, circulation pump*
- *Optional: recirculation supply air extract air*

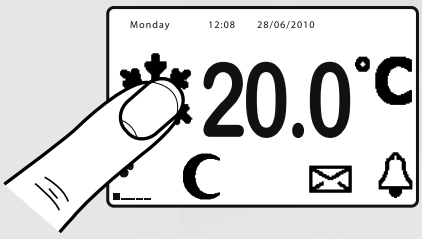
3. Flexible sensor arrangement – local or by remote control

- *External and supply temperature*
- *Internal space temperature*
- *Internal space humidity*

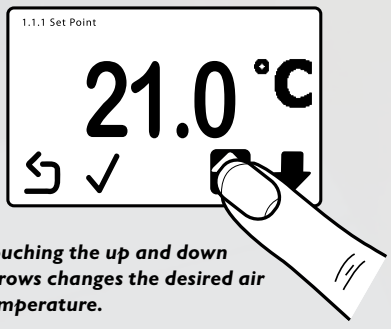
4. External control functions

- *Forced stop or fire alarm*
- *Individual two bit digital input control of the fan and cooling functions.*





Touching the operating mode symbols opens the start menu.

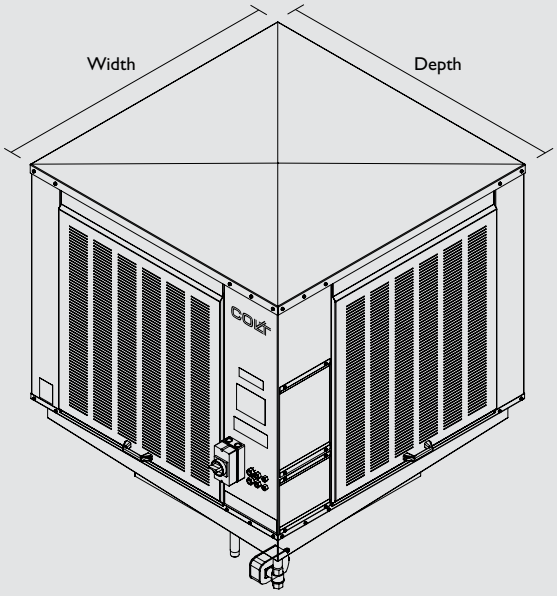


Touching the up and down arrows changes the desired air temperature.

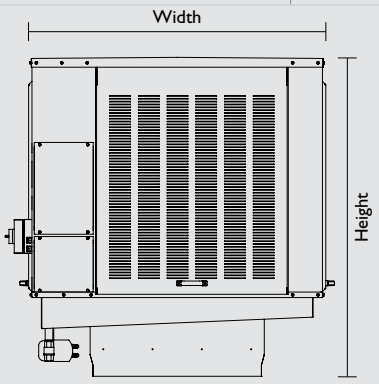
Technical Data CoolStream

	Unit	SIZE 10			SIZE 16		SIZE 27
		Fan A	Fan B	Fan E	Fan C	Fan F	Fan D
		two-stage	30 ~ 100% variable	0 ~ 100% variable	two-stage*	0 ~ 100% variable	two-stage
Fan							
Air volume flow @ 20 °C, 60% RH, 1013 hPa	m³/h	11250 / 8500 @75 / 50 Pa external	11500 (fan=100%) @75 Pa external	11750 (fan=100%) @150 Pa external	20300* / 15500 @75 / 50 Pa external	16500 (fan=100%) @200 Pa external	23500 / 15900 @50 / 50 Pa external
Cooling Capacity @ 32 °C, 40% RH 1013 hPa	kW	33 / 25	max 34	max 35	59* / 45	max. 48	68 / 46
Sensible EER @ 32 °C, 40% RH 1013 hPa	kW	31 / 30	max 32	max 38	21* / 24	max 31	29 / 28
Fan speed	rpm	900 / 690	310 ~ 890	0 ~ 1120	1300* / 990	0 ~ 1400	680 / 540
Type	mm	Axial fan direct drive Ø 710					Ø 1000
		Star/Delta	Leading edge control	EC control	Star/Delta*	EC control	Star/Delta
Power supply	V / Hz / ph	400 / 50 / 3 + N PE	230 / 50 / 1 + N PE	400 / 50 / 3 + N PE	400 / 50 / 3 + N PE	400 / 50 / 3 + N PE	400 / 50 / 3 + N PE
		External fuse protection necessary for units with fan / fan control. One single automatic circuit breaker per unit recommended					
Nominal power	kW	0.9 / 0,68	0.89	2.2	2.6* / 1.7	2.9	2.2 / 1.5
Nominal current	A	1.7 / 1.1	4.1	3.1	4.8* / 2.9	4.6	4.2 / 2.7
Maximum operating temp	°C	60	60	60	60	60	60
**Delta stage / high stage only bottom & top connection*							
Pump							
Circulation pump		1/ 30 HP 2-pole centrifugal non corrosive					
Filter type & surface		stainless mesh filter mesh width 2.0 mm, 500 cm² surface					
Water							
Water reservoir tray		6 % sloped epoxy and polyester coated aluminium tray					
Drain valve		DN 25 1" inner thread / min. 0.5 litres/s / 230 V / 50Hz / 1~ / option open/close or optional spring return (fail-safe)					
Overflow		DN 25 / 1" outer thread					
Supply water valve		230 V / 50Hz / 1~					
Water inlet		DN 20 / 3/4" outer thread / 1 - 6 bar / min. 9 litre/m					
Water distribution		Multi layer PE-X pipe 22mm outer / full removable joints					
Water consumption*	l/h	65 / 50	max 70	max 70	120 / 90	95	140 / 95
Water supply		Untreated drinking water according to local regulations					
**@ 32°C, 40% RH, 1013 hPa, bleed rate 30% (medium hard water)*							
Desorption medium							
Type		Z shape darkening pad / 150mm depth					
Internal pressure drop at nominal volume flow	Pa	18 / 10	19	21	26 / 15	18	63 / 42
Maximum adiabatic efficiency	%	90 %					
Average air speed through medium*	m/s	1.2 / 0.9	1.3	1.3	B+T: 1.5 / 1.1 S: 1.6	B+T: 1.25 S: 1.7	1.6 / 1.3
Max allowed air speed through medium	m/s	1.7					
Desorption medium front surface*	m²	B+T: 2.50 S: 1.83			B+T: 3.72 S: 2.73		B+T: 4.53 S: 3.46
Max allowed air flow*	m³/h	B+T: 15250 S: 11250			B+T: 22750 S: 16750		B+T: 27750 S: 21250
**B+T: Bottom connection + top connection, S side connection*							
Optional insect guard							
Type		Wire mesh in PP frame / no shedding / non corrosive / inherent stability / microbial inert / 100% moisture-resistant					
Optional Filter							
Type		not available		Z - line filter 100% PP / no shedding / non corrosive / inherent stability / microbial inert / 100% moisture-resistant			not available
Filter class				G4 according to EN 779			
Additional start pressure drop	Pa			45	60	40	

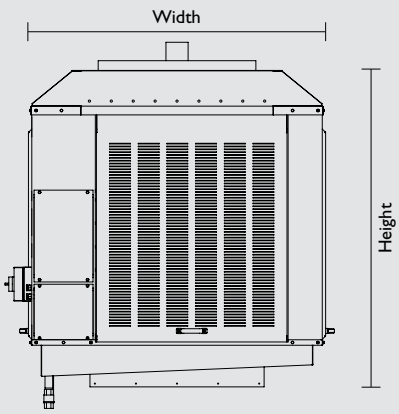
	Unit	SIZE 10			SIZE 16		SIZE 27
		Fan A	Fan B	Fan E	Fan C	Fan F	Fan D
		two-stage	30 ~ 100% variable	0 ~ 100% variable	two-stage*	0 ~ 100% variable	two-stage
Sound							
Sound power level*	dB(A)	76 / 72	max 81	max 87	90 / 83	max 90	86 / 82
Sound pressure level @ 10m, free field*	dB(A)	48 / 44	max 53	max 59	62 / 55	max 62	58 / 54
**Max fan speed can be limited by controls (max % variable speed / only low stage at two-step fan)*							
Air-side connection							
Duct size bottom connection (inside dimension)	mm	768 x 768					1060 x 1060
Duct size side connection (inside dimension)	mm	750 x 750*			900 x 900		1060 x 1060*
Duct size top connection (inside dimension)	mm	900 x 900*			900 x 900		1060 x 1060*
Flange size (side + top connection)	mm	20 (@ 750x750) / 30 (@ 900x900)			30		30
**only available without fan*							
Dimensions							
Height*	mm	B: 1125 S: 1050 T: 1210			B: 1450 S: 1430 T: 1590		B: 1510 S: 1490 T: 1595
Width, standard panel*	mm	B&T: 1360 S: 1475			B&T: 1360 S: 1500		B&T: 1600 S: 1700
Depth, standard panel*	mm	1360					1600
Width, extended panel*	mm	B&T: 1640 S: 1615			B&T: 1640 S: 1640		B&T: 1880 S: 1840
Depth, extended panel*	mm	1640					1880
**B: Bottom connection S: Side connection T:Top connection*							
Additional free space on all operating sides (4 sides for Bottom + Top connection, 3 sides for Side connection) with a minimum gap of 800 mm							
Weight							
Operating weight (without fan)	kg	130 (100)			140 (110)		290 (225)
Additional weight for insect guard or filter	kg	B&T: 32 S: 26			B&T: 40 S: 33		B&T: 47 S: 39



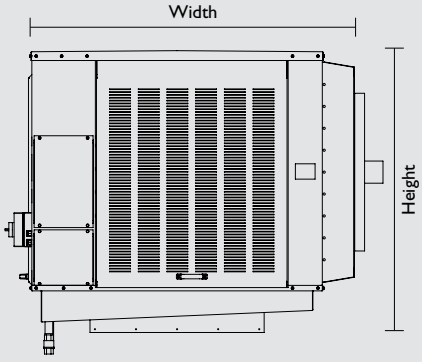
View from above - ducting to underneath



Side view - ducting to underneath



Side view - ducting to top



Side view - ducting to side

COLT CLIMATE CONTROL SYSTEMS

Natural ventilation, cooling and mechanical ventilation

Colt Climate Control Systems create ideal internal conditions by achieving the perfect balance of all the elements that determine the building's internal climate: temperature, humidity, air movement and solar intensity - the perfect balance that is a prerequisite for optimum comfort and productivity.

THE COLT PACKAGE

Colt offers comprehensive fulfilment of CoolStream projects. This can comprise:

- Initial concepts, detailed scheme design and calculations
- The supply, project management, installation and commissioning of CoolStream systems and their as sociated controls
- Service and maintenance.

OTHER REASONS TO CHOOSE COLT

- Colt CoolStream systems have been installed in many different types of manufacturing premises over the world.
- Quality and safety underpin all our activities. We operate to strict quality and environmental standards including ISO 9001and ISO 14001
- 80 years experience in the design, manufacture and installation of heat ing and ventilation systems
- Our innovative attitude and capability is backed up by our own manufacturing and test facilities.

Colt offer integrated natural ventilation, solar shading and air conditioning systems.

For further information please visit www.coltinfo.co.uk

"People feel better in Colt conditions."

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