NOVENCO

Climaster ZerAx®

Air Handling Units

Product data

Product

Novenco Climaster ZerAx air handling units for ventilation and air conditioning are produced in accordance with current CEN standards.

Scope

Climaster ZerAx model ZCN is offered in 8 construction sizes with air volumes from 0.4 to 15 m^3/s. The maximum negative pressure is 2000 Pa and the max. positive pressure is 1500 Pa.

Construction

The construction is a frame construction with insulated panels and with integrated, easily accessible components.

Materials

Frame: 2 mm alu-galvanized steel profiles.

Panels: 50 mm with external and internal 0.7 mm alu-galvanized steel plates.

Panel insulation: Mineral wool, 70 kg/m^3

Ambient temperatures

-20 to +40 °C

Delivery

In sections or as assembled units depending on available means of transport.

Classifications

Mechanical performance: In accordance with DS/EN 1886

Unit housing strength: Class D2

Tightness at -400 Pa negative pressure: L1

Tightness at +700 Pa positive pressure: L2

Filter bypass leakage: F9 at negative pressure and positive pressure

Thermal transmission: Class T3

Thermal bridge factor: Class TB3

By default the units are delivered for operation in an unheated low-corrosive environment.
Standard: DS/EN ISO 12944-2
Corrosion category: C4

Climaster ZerAx is Eurovent certified and carries an energy label with the model designation ZCN.

The calculation of technical air data is made with Climaster Designer in which data is validated and certified by Eurovent. Energy labels for the solutions are calculated and shown by the program. Climaster Designer can be downloaded for free on **www.novencogroup.com**.

Example of A-labelled unit

Further information about Eurovent can be found on **www.eurovent-certification.com**.

Novenco is EN 29001, BS 5750 part 1, ISO 9001, and ISO 14001 certified.

Contents

Important

This document is made available "as is". Novenco reserves the right to modify this document without notice due to the continued development of the product.

Trademarks

Novenco is a trademark of Novenco A/S.

The ZerAx® trademark and ZerAx design is registered by Novenco A/S.
The ZerAx manufacturing processes and technologies are patent pending. Patent no. PA200901117, PA200901118, PA200901119.

Other trademarks mentioned in this document are the property of their respective owners.

Quality and environment

Novenco is certified according to ISO 9001 and ISO 14001.

MU 14460 0211

Description

Novenco Climaster ZerAx model ZCN with cross-flow heat exchanger

Novenco Climaster ZerAx is a flexible, compact, and high-performance system for assembly of air handling components into complete units. The large number of possible combinations allows for maximum tailoring of individual solutions.

Intended use

Climaster ZerAx is designed for comfort ventilation, for industrial units with specific requirements for the air condition, and for units with strict environmental requirements.

Scope

The Series comprises a total of 8 construction sizes with air flow rates from 0.4 to 15 m^3/s. The maximum air flow rates are determined by the used components.
See "Arrangements and functions" on page 6.

Functions and sections

The air handling functions are integrated in sections that are combined to form the final units.

Descriptions of functions and sections is found in "Dimensions" on page 7 and in "Function descriptions" on page 17.

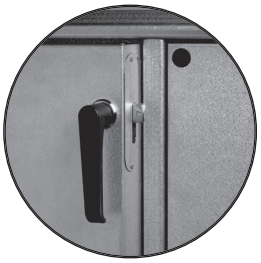
Construction

The sections are built up of frames covered by panels. The panels consist of two layered aluzink steel plates with insulation in between. The frames are assembled with corner inserts and have smooth, rounded edges. Easy internal cleaning of unit housings is ensured by smooth surfaces.

Rounded corners and edges

The side panels are attached with screws and are easy to remove. End, top, and bottom panels are attached with screws from the inside. The access sides have tight-fitting doors with the same construction principle as the panels, but supplied with mechanically attached rubber seals. The hinges are adjustable and attached to the rear edge of the doors for optimum suspension strength.

The doors have point-lever locks that are operated with the supplied four-square Allen key, or are installed with handles. The doors can be opened 180°, which ensures easy access for inspection and service.



Handle installed with point-lever lock

Integrated functional components are mounted on rails that can easily be pulled out for service.

The individual sections are joined with internal bolted joints for easy and fast installation. Internal joints require an inspection part. That can be either through filter, fan, cross-flow heat exchanger, or an actual inspection part.

Materials

Climaster ZerAx is produced with frames and panels made of alu-galvanized steel plates. The panel insulation is made of mineral wool.

Frame profiles and panels are aluzinc-coated and therefore comply with the requirements for operation in an unheated low-corrosive environment.

Standard: In accordance with DS/ EN ISO 12994-2

Corrosion category: C4

Drains

Wet sections such as cross-flow heat exchangers and air coolers are supplied with bottom trays made of a corrosion-proof material with drain pipes that run through the access sides.

For connection to drain can be delivered special water traps with balls designed for negative pressure. See section "Water trap for wet functions" on page 27.

Delivery and installation

The units can be delivered assembled or in sections for assembly at the installation site. Note that when the units are separated the sections are easy to assemble and installation guide is included.

Accessories

The units may be fitted with foundations made from hot-galvanized steel profiles. For set up and installation can be delivered adjusting screws with ball feet. For duct connections for inlet and outlet can be delivered flexible connections made of a non-flammable material.

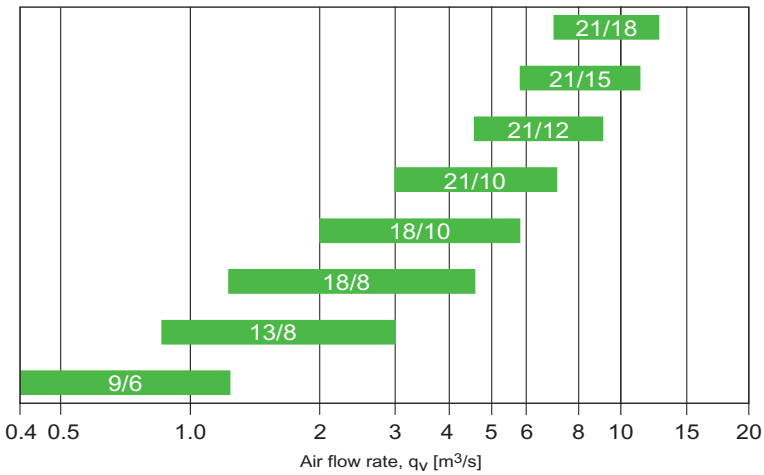
For outdoor installation the units can be fitted with roof and wire guards and inlet boxes for intake and weather-proofed exhaust grids.

Also see "Accessories" on page 27.

Certification

Calculations made with the Climaster Designer program are certified in accordance with Eurovent. Selected units have been measured and tested in independent labs in accordance with the international test standards EN 13053 and EN 1886. The program is Eurovent-certified.

Use Climaster Designer to calculate the unit types suiting individual needs. The program can be downloaded from **www.novencogroup.com**.
Contact a Novenco sales department for further information.



Capacity diagram for ZCN

Arrangements and functions

Climaster ZerAx units are produced in a large number of varieties with possibility of adaptation for most needs.

The units are divided into the following main groups.

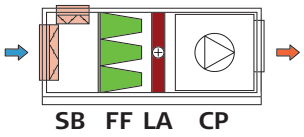
- Heating and ventilation
- Heat recovery
- Air conditioning and cooling

Construction

The variant ZCN is produced as a single-string or two-string unit. For heat recovery there is a choice between rotary heat exchangers, cross-flow heat exchangers, or twin-coil heat exchangers.

Single-string unit

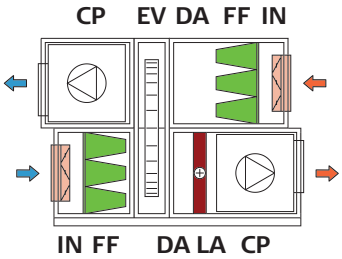
Units of this type consist of a single airflow, which, depending on the added features, is either heated, filtered, or recirculated.



Arrangement with filter and mixing

Two-string unit

The two-string unit functions with completely or partially separated airflows. The supply air and air exhaust strings are thus kept in the same unit.



Arrangement with heat recovery and rotary heat exchanger

Heat recovery

The core of the units is the method by which heat is recovered. The most commonly used are rotary heat exchangers due to the high efficiency rate. Then follows to a somewhat lesser extent cross-flow heat exchangers and twin-coil heat exchangers.
All methods are optimised for heat transfer.

Functions

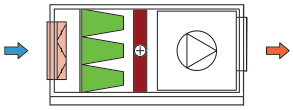
The individual adaptation of the units is made through addition of features from the comprehensive function program that are then fitted to make up the final unit.

Designations	Functions
AC	Axial flow fan
CP	Plug fan
BA	Mixing and recirculation
DA	Inspection room
EK	Cross-flow heat exchanger
EV	Rotary heat exchanger
FF	Pocket filter
FG	Pocket filter
IN	Inlet
LA	Heating surface
SB	Mixing
UN	Outlet
QA	Cooling coil
YA - YB - YC	Sound damper

Function overview

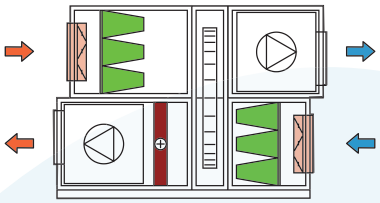
Position designations

The route by which the air is lead through a unit is seen from the access side and is named position R or L for airflow direction right or left respectively.

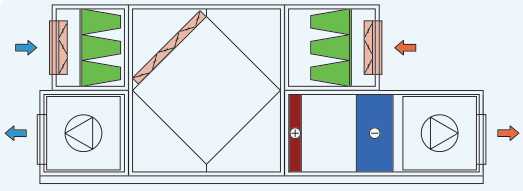


Pos. R — single string with airflow direction right

On two-string units the position designation is dependent upon the direction of the inlet air.

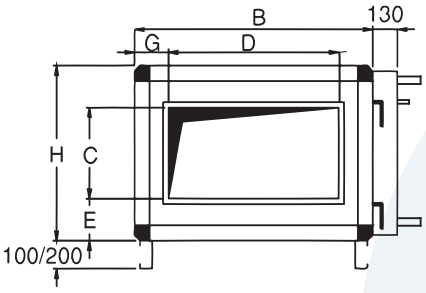


Pos. L — rotary heat exchanger with airflow direction left

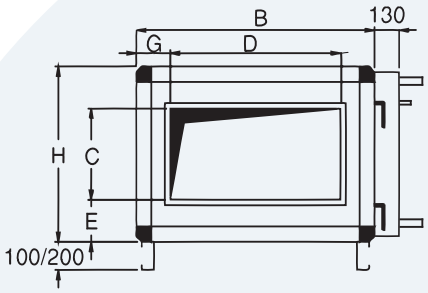


Pos. R — cross-flow heat exchanger with airflow direction right

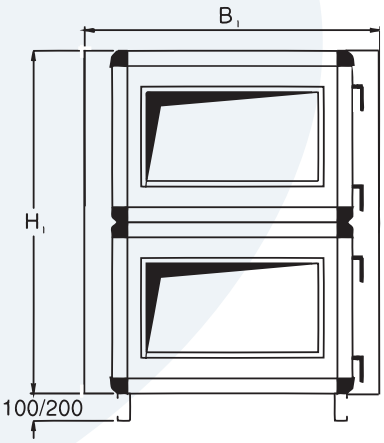
Dimensions



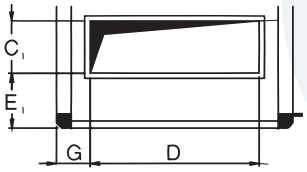
Inlet



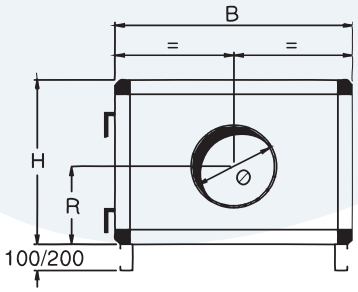
Outlet – Plug fan



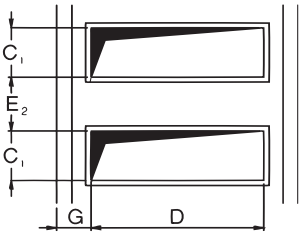
Rotary heat exchanger and end of mixing function



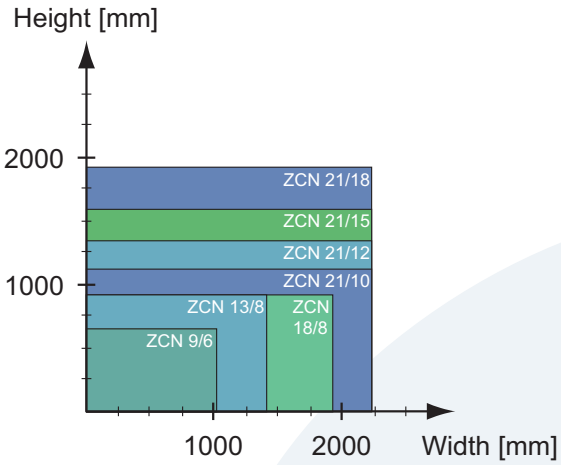
Inlet – SB top



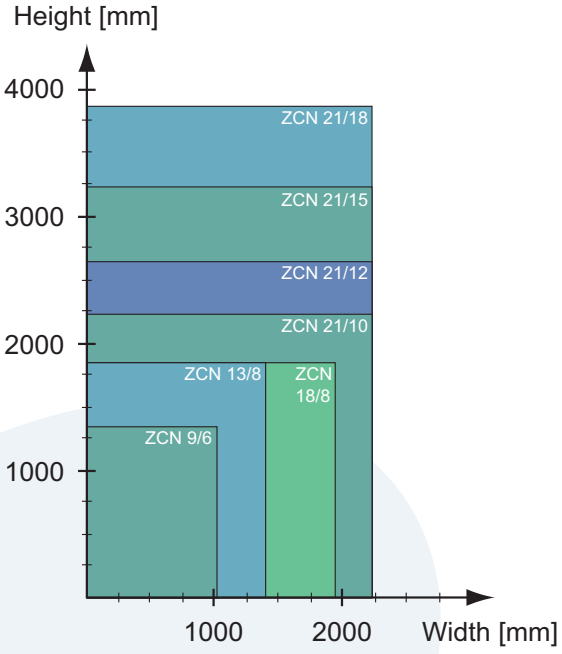
Outlet – Axial flow fan



Inlet – SA top



End face area for single-string plant



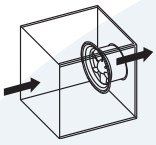
End face areas for tall plants

ZCN types	B	H	B_1	H_1	C	C_1	D	G	E	E_1	E_2
9/6	1027	667		1334	300	200	600	213,5	183,5	208	378
13/8	1417	917		1834	500	300	1000	208,5	208,5	208	378
18/8	1947	917		1834	500	300	1500	223,5	208,5	208	378
18/10	1947	1117		2234	700	400	1500	223,5	208,5	208	378
21/10	2217	1117	2217	2234	700	400	1800	223,5	208,5		
21/12	2217	1317	2637	2634	900	500	1800	223,5	208,5		
21/15	2217	1617	3250	3234	1200	700	1800	223,5	208,5		
21/18	2217	1917	3500	3834	1500	900	1800	223,5	208,5		

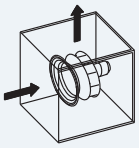
Main dimensions and inlet [mm]

ZCN sizes	ZerAx fan	Ø [mm]	R [mm]
9/6			
13/8	AZN-500 AZN-560	500 560	458,5
18/8	AZN-500 AZN-560	500 560	458,5
18/10	AZN-500 AZN-560 AZN-630 AZN-710	500 560 630 710	558,5
21/10	AZN-560 AZN-630 AZN-710	560 630 710	558,5
21/12	AZN-560 AZN-630 AZN-710	560 630 710	658,5
21/15	AZN-710 AZN-800	710 800	808,5
21/18	AZN-710 AZN-800 AZN-900 AZN-1000	710 800 900 1000	958,5

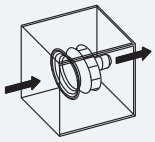
Fan outlet



Outlet horizontal – ZerAx



Outlet top – plug fan



Outlet horizontal – plug fan

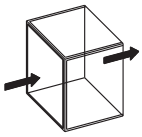
Fan positions

Section lengths

All functions are assembled in sections and has the following effect on unit lengths.

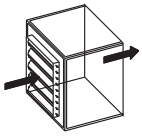
Section lengths:	Sum of function lengths +37 mm
Total length of unit:	Sum of section lengths +3 mm per assembly
Smallest section length:	240 + 37 = 277 mm
Largest section length:	3120 + 37 = 3157 mm

Inlet function IN



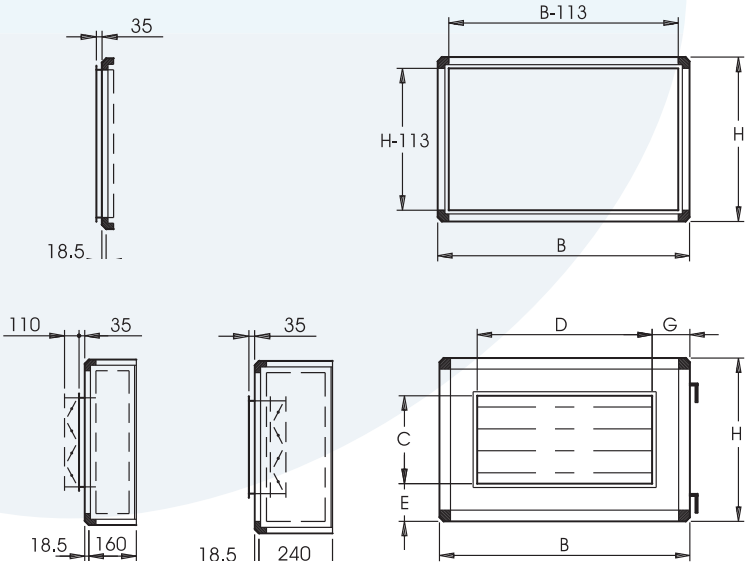
Pos. 2-0

Full face



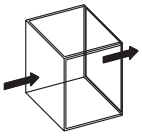
Pos. 2-0

With damper



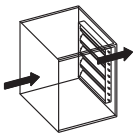
See dimensions under "Silencing" below.

Silencing



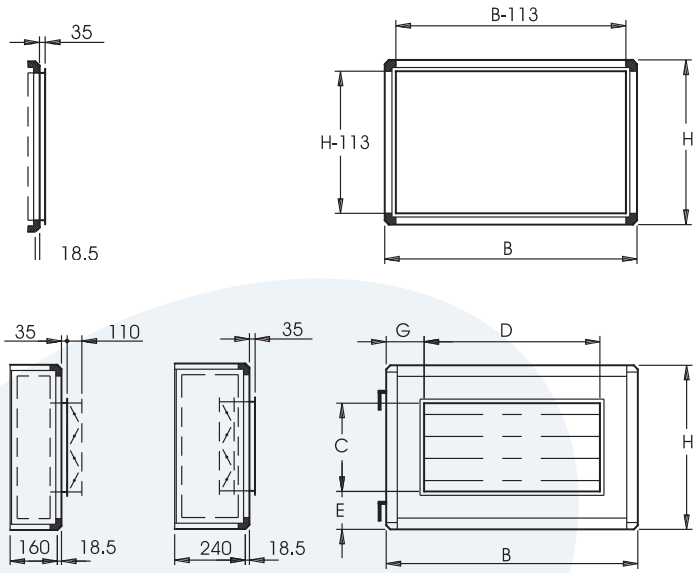
Pos. 0-7

Full face



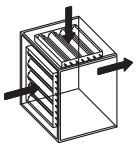
Pos. 0-7

With damper

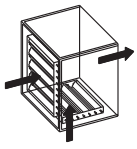


ZCN sizes	B	H	C	D	E	G
9/6	1027	667	300	600	183,5	213,5
13/8	1417	917	500	1000	208,5	208,5
18/8	1947	917	500	1500	208,5	223,5
18/10	1947	1117	700	1500	208,5	223,5
21/10	2217	1117	700	1800 (IN) / 1500 (UN)	208,5	223,5
21/12	2217	1317	900	1800 (IN) / 1500 (UN)	208,5	223,5
21/15	2217	1617	1200	1800 (IN) / 1500 (UN)	208,5	223,5
21/18	2217	1917	1500	1800 (IN) / 1500 (UN)	208,5	223,5

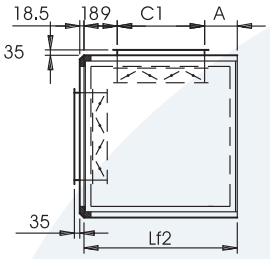
Mixing damper function SB

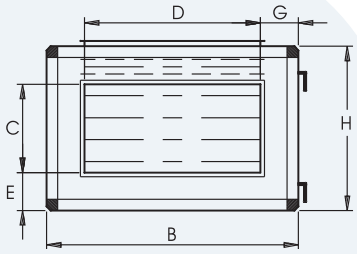


Pos. 2-1



Pos. 2-4

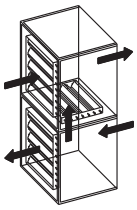




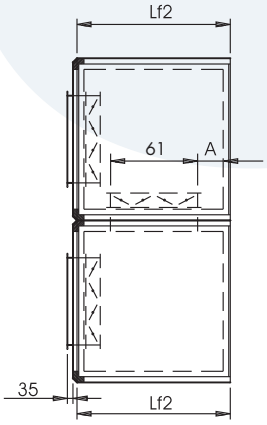
Top or bottom

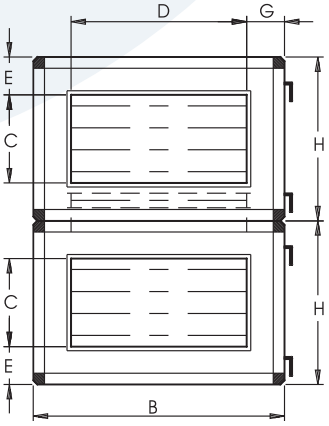
See dimensions under "Mixing and recirculation damper function BA" below.

Mixing and recirculation damper function BA



Pos. 2-4-7

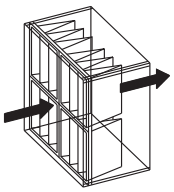


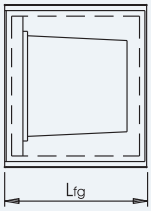


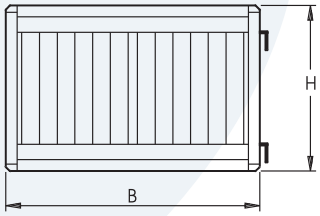
Top or bottom

ZCN sizes	B	H	Lf2	C	C1	D	E	G	A
9/6	1027	667	480	300	200	600	183,5	213,5	91
13/8	1417	917	560	500	300	1000	208,5	208,5	71
18/8	1947	917	560	500	300	1500	208,5	223,5	71
18/10	1947	1117	720	700	400	1500	208,5	223,5	131
21/10	2217	1117	720	700	400	1800	208,5	208,5	131
21/12	2217	1317	800	900	500	1800	208,5	208,5	111
21/15	2217	1617	960	1200	700	1800	208,5	208,5	71
21/18	2217	1917	1200	1500	900	1800	208,5	208,5	111

Filter function FF - FG

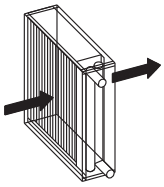


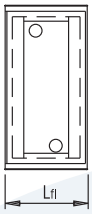


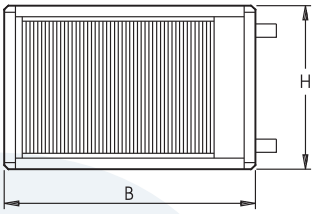


ZCN sizes	B	H	Lfg (FF)	Lfg (FG)
9/6	1027	667	720	480
13/8	1417	917	720	480
18/8	1947	917	720	480
18/10	1947	1117	720	480
21/10	2217	1117	720	480
21/12	2217	1317	720	480
21/15	2217	1617	720	480
21/18	2217	1917	720	480

Heating coil function LA for water

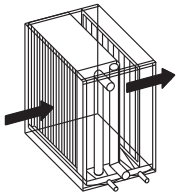


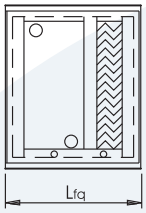


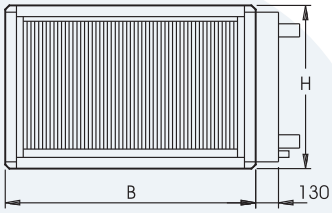


ZCN sizes	B	H	Lf
9/6	1027	667	240
13/8	1417	917	240
18/8	1947	917	240
18/10	1947	1117	240
21/10	2217	1117	240
21/12	2217	1317	240
21/15	2217	1617	240
21/18	2217	1917	240

Cooling coil function QA

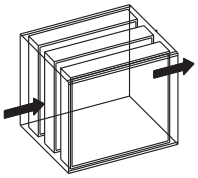


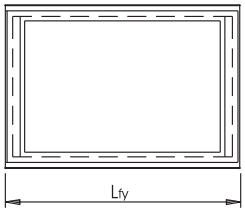


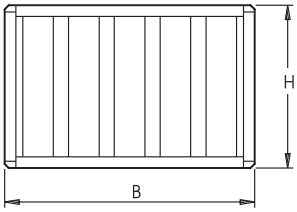


ZCN sizes	B	H	Lfq
9/6	1027	667	560
13/8	1417	917	560
18/8	1947	917	560
18/10	1947	1117	560
21/10	2217	1117	560
21/12	2217	1317	560
21/15	2217	1617	560
21/18	2217	1917	560

Silencer function YA - YB - YC



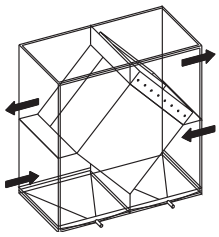




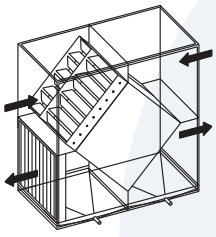
ZCN sizes	B	H	Lfy (YA)	Lfy (YB)	Lfy (YC)
9/6	1027	667	720	1040	1280
13/8	1417	917	720	1040	1280
18/8	1947	917	720	1040	1280
18/10	1947	1117	720	1040	1280
21/10	2217	1117	720	1040	1280
21/12	2217	1317	720	1040	1280
21/15	2217	1617	720	1040	1280
21/18	2217	1917	720	1040	1280

See damping values in the section “Silencing” on page 9.

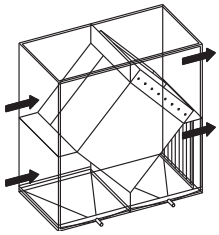
Cross-flow heat exchanger section EK



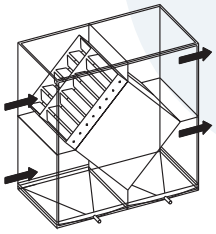
Pos. A



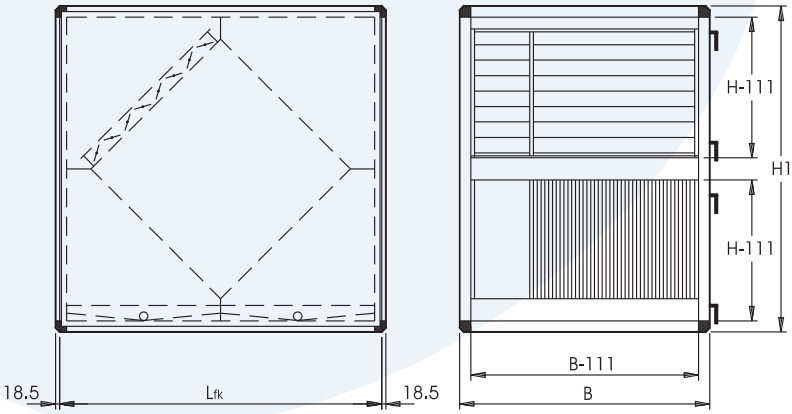
Pos. B



Pos. C



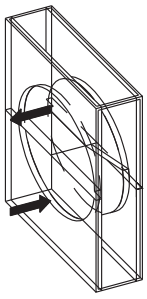
Pos. D



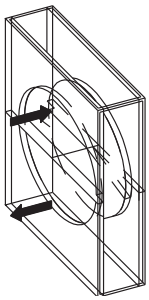
Counterflow or forward flow

ZCN sizes	B	H	H1	Lfk
13/8	1417	917	1834	1680
18/10	1947	1117	2234	2000
21/12	2217	1317	2634	2560

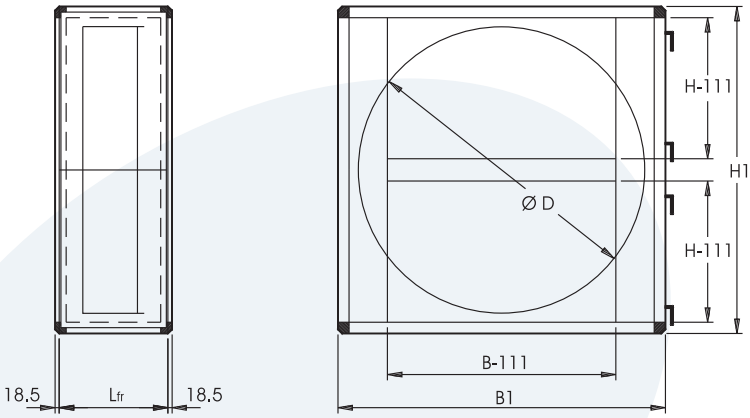
Rotary heat exchanger section EV



Pos. A



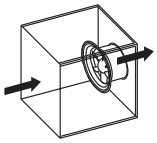
Pos. B



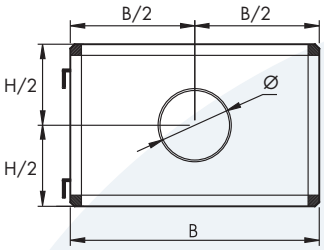
Top or bottom

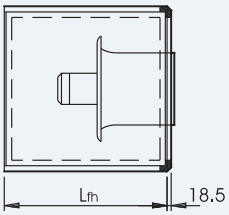
ZCN sizes	B	H	B1	H1	Lfr	ØD
9/6	1027	667	1027	1334	320	570
13/8	1417	917	1417	1834	320	1250
18/8	1947	917	1947	1834	400	1525
18/10	1947	1117	1947	2234	400	1780
21/10	2217	1117	2217	2234	400	2020
21/12	2217	1317	2637	2634	480	2420
21/15	2217	1617	3250	3234	550	2900
21/18	2217	1917	3500	3834	550	3200

ZerAx fan function AC



Pos. B





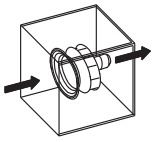
Outlet horizontal

	13/8	18/8	18/10	21/10	21/12	21/15	21/18
B	1417	1947	1947	2217	2217	2217	2217
H	917	917	1117	1117	1317	1617	1917

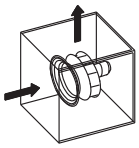
		13/8		18/8		18/10		21/10		21/12		21/15		21/18	
		Ø	Lfh	Ø	Lfh	Ø	Lfh	Ø	Lfh	Ø	Lfh	Ø	Lfh	Ø	Lfh
AZN 500/350															
Motors	090/100/112	500	1040	500	1120	500	1120								
	132		1120		1200		1200								
	160		1440		1520		1520								
AZN 560/350															
Motors	090/100/112	560	1040	560	1120	560	1120	560	1200	560	1200				
	132		1120		1200		1200		1280		1280				
	160		1440		1520		1520		1600		1600				
AZN 630/350															
Motors	090/100/112					630	1120	630	1200	630	1200				
	132						1200		1280		1280				
	160						1520		1600		1600				
AZN 710/350															
Motors	090/100/112					710	1120	710	1200	710	1200	710	1200	710	1200
	132						1200		1280		1280		1280		1280
	160						1520		1600		1600		1600		1600
AZN 800/350															
Motors	090/100/112											800	1200	800	1200
	132												1280		1280
	160												1600		1600
AZN 900/350															
Motors	090/100/112/132													900	1280
	160/180														1600
AZN 1000/350															
Motors	090/100/112/132													1000	1280
	160/180														1600

Horizontal flow direction pos. B

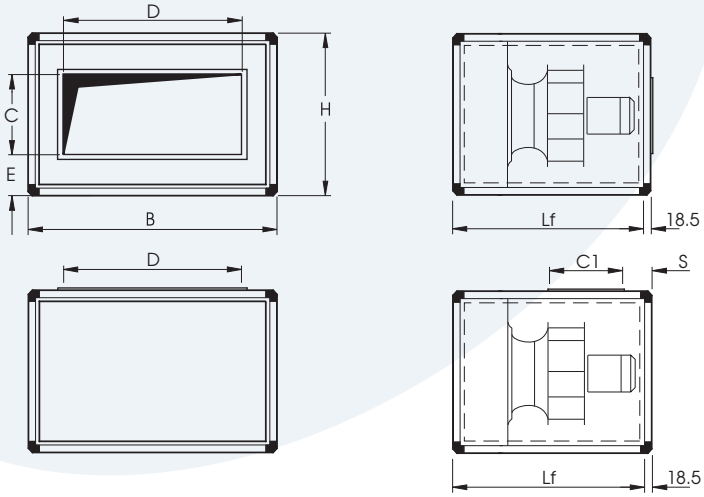
Plug fan function CP



Pos. B



Pos. B



Outlet horizontal or at top

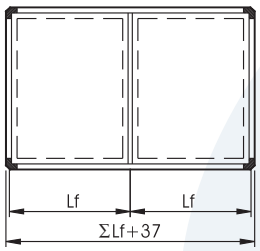
	ZCN sizes divided into fan sizes (CCL)															
	9/6		13/8		18/8		18/10		21/10		21/12		21/15		21/18	
	280	315	400	500	500	560	560	710	630	710	710	800	800	900	900	1000
Lf	800	800	960	1120	1120	1200	1200	1520	1440 / 1520	1520 / 1600	1520 / 1600	1680	1680	1920	1920	1920
S	188	188	128	208	208	208	108	108	108	108	128	128	218	218	218	218
C	300		500		500		700		700	700	900	900	1200	1200	1500	1500
C1									700	700	900	900	900	1200	1200	1200
D	600		1000		1500		1500		1800	1800	1800	1800	1800	1800	1800	1800
E	183,5		208,5		208,5		208,5		208,5	208,5	208,5	208,5	208,5	208,5	208,5	208,5

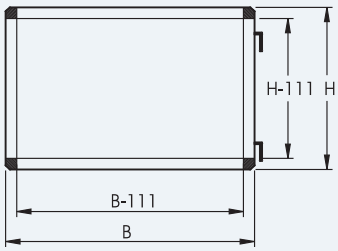
Sections

The air handling unit consists of one or more sections that each may comprise one or more functions.

For construction purposes the cross-flow heat exchanger function EK and rotary heat exchanger EV must be made as independent sections and cannot be combined with other functions.

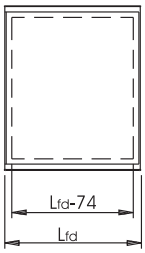
The other functions may be combined. The section length is the sum of the lengths of the individual functions + 37 mm.

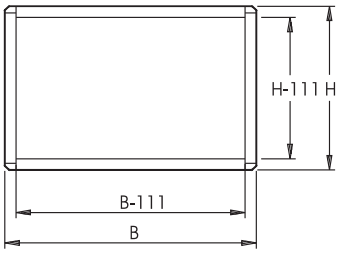




	ZCN sizes							
	9/6	**13/8**	**18/8**	**18/10**	**21/10**	**21/12**	**21/15**	**21/18**
B	1027	1417	1947	1947	2217	2217	2217	2217
H	667	917	917	1117	1117	1317	1617	1917
Section length	Minimum 277 mm - maximum 3157 mm							

Inspection room function DA



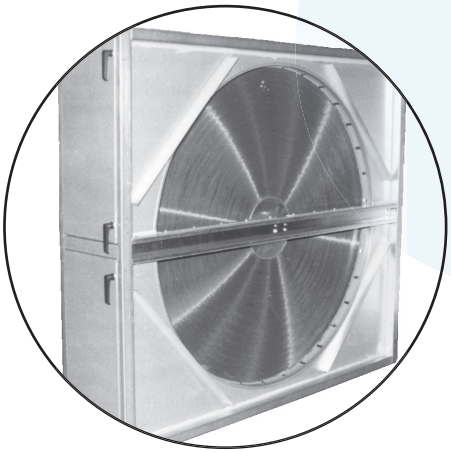


	ZCN sizes							
	9/6	**13/8**	**18/8**	**18/10**	**21/10**	**21/12**	**21/15**	**21/18**
B	1027	1417	1947	1947	2217	2217	2217	2217
H	667	917	917	1117	1117	1317	1617	1917
Lfd	240 / 320 / 400 / 480 / 560 / 640 / 720 / 800							

Function descriptions

Rotary heat exchangers

In the units the frame constructions that hold the rotary heat exchangers are integrated across the counter airflows for inlet air and exhaust air. The energy transfer happens through passage of the airflows through the rotors and the many small channels of this.



Rotary heat exchanger

The brush seal facing the rotors and the correct air balance together ensure least possible leakage between inlet air and outlet air.

The efficiency rate for the rotary heat exchangers is high and normally lie between 80 to 90 %.

Rotor types

Basically there are two types of rotors.

- Non-hygroscopic – that only transfer free noticeable heat and
- hygroscopic – that transfers both free and bound (latent) heat. These are also called enthalpy exchangers.

ZCN is available with the following types.

- Type 1 – non-hygroscopic aluminium rotor
- Type 1A – non-hygroscopic epoxy-coated aluminium rotor for use in corrosive environments.
- Type 2 – hygroscopic aluminium rotor
- Type 2A – hygroscopic aluminium rotor with reinforced edges for use in corrosive environments as a special option on demand.

Rotor operation and control

All units are delivered with installed unit drive and rotation guard and are prepared for connection to the control package from Novenco. The solution can, however, also be used together with other control systems.

The drive system consists of a belt drive along the rotor periphery through control box and motor. The system is normally controlled by a 0-10 V signal with which the engine rpm is controlled. This forms a solid basis for stable regulation.

Selected control functions

- Automatic purging
- Rotation monitoring through external rotation sensor
- Alarm relay
- Test switch
- Priority switch/defrosting
- Cold recovery with external differential thermostat

Purging

The rotors are delivered with adjustable purging sectors.

The purging function comes in the shape of an adjustable sector in the frame construction of the exchanger and together with the brush seal it forms a purging sector. This minimises the transfer of polluted exhaust air to the outdoor air.

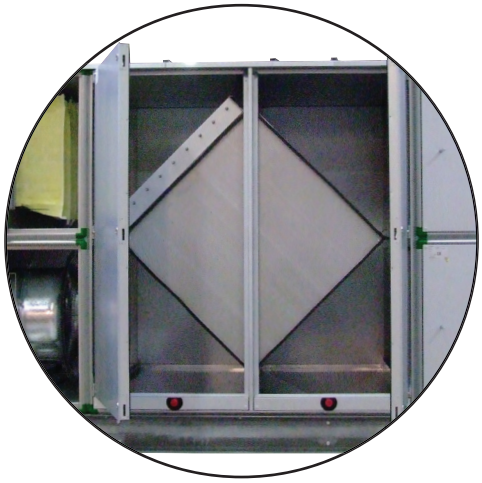
It is a precondition that the static pressure on the inlet side is higher than on the outlet side both before and after the rotor.

The rotary heat exchanges are dimensioned with the Climaster Designer program.

Cross-flow heat exchangers

Climaster ZerAx model ZCN in sizes 13/8, 18/10, and 21/12 can also be delivered with cross-flow heat exchangers.

Characteristic for cross-flow heat exchangers are the heat recovery units in which the exhaust air and the outdoor air pass each other in a large number of narrow channels separated by thin aluminium plates. Together, this gives a very large heat transfer area and a high efficiency rate in the transfer process. Since the two airflows are completely separated no humidity is transferred. At low outdoor temperatures condensation is formed in the warm airflow so that a part of the bound heat is recovered.



Cross-flow heat exchanger in ZCN

The function is fitted with drip pans made of corrosion-proof material with sloping toward the drain to ensure that water does not collect.

The Ø32 mm drains have smooth surface and run through the panel in the access side where they are fitted with water traps.

Bypass

For regulation of the heat exchanger performance bypass channels with regulation dampers are integrated. This allows complete or partial bypass of the outdoor air around the heat exchanger.

The exchanger block is split in two and the bypass channel is placed in the middle between the two halves. The regulation damper is placed directly on the heat exchanger.

The rotary heat exchangers are dimensioned with Climaster Designer.

ZCN type	Heat exchanger [Nm]	Bypass damper [Nm]
13/8	30	14
18/10	40	14
21/12	40	14

Regulation torques for damper

Twin-coil heat exchangers

By twin-coil heat exchangers is meant a heat recovery system where the exhaust air passes a fin cooling coil that is connected to a fin heating coil in the outdoor air by means of a pipe. Solutions are offered for Climaster ZerAx variant ZCN in the sizes 13/8 - 18/8 - 21/10, and 21/18.

The system is used in places where it is inappropriate to combine the inlet air and outlet air function in one unit.

The transfer medium is water with added glycol. This medium is circulating through the pipe system and thereby transfers the heat from the exhaust air to the outdoor air.

On the exhaust air side a cooling coil function is used. This means that extracted condensate is collected in the section bottom tray. The tray is fitted with a drain pipe.

The pipe system

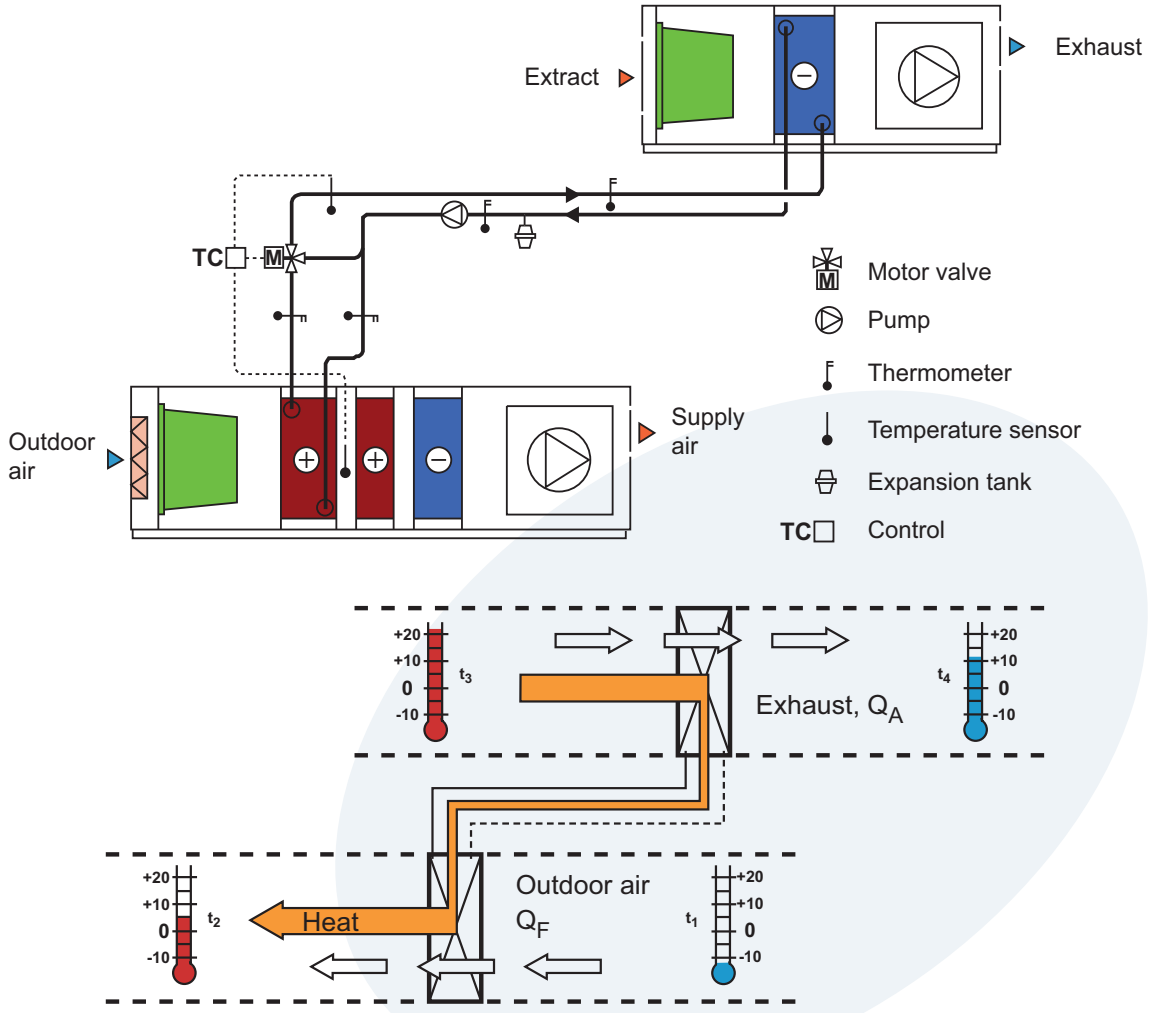
The pipe system that connects the heat exchangers is fitted with pump, control, safety, and monitoring equipment.

The pipes must be insulated based on the actual temperature conditions in and around the system.

Control

The control unit TC controls the motor valve after signal from duct sensor in the outdoor air.

When there is a risk of freeze up of the exhaust air cooling coil, the duct sensor regulation forces the motor valve the position in which the heating coil is bypassed.



Principle diagram for twin-coil heat exchangers

ZerAx® fans

With ZerAx fans as part of the air extraction the capacity and efficiency rate is increased to world class level. ZerAx is Novenco's latest generation of axial flow fans and offers significantly improved performance, reduction of both sound level and energy consumption.

The version integrated in ZCN units is of the AZN type with inlet nozzle. It optimises the performance of pressure and sound levels.

Note: ZerAx fans are unavailable for ZCN 9/6.

ZerAx AZN fan installed in ZCN section

The efficiency rates for ZerAx fans are above 90 %. Concurrent use of frequency controlled operation may reduce the energy consumption to a minimum.

ZerAx fans are especially efficient at moderate pressures and air volumes.

Other characteristics of this fan type is the minimum maintenance requirements and short built-in lengths.

In comparison with other fan types, with the same operating conditions and performances, ZerAx fans have very low sound levels. Silencing is, however, recommended and is easily done, for instance by installing an acoustic diffuser in the duct after the fan. Apart from the silencing a part of the dynamic pressure is also recovered.

The rotor units

The rotor unit is integrated at the inlet, is equipped with wire guard, and is installed with the motor in the air outlet.

The motor is a flange motor connected in a terminal box.

Rotor, hub parts, and vanes are cast in aluminium and installed on the motor axle. The entire construction is built into a circular casing and has minimum tip clearance. On the motor mount are installed cast profiled guide vanes.

The high fan efficiency rate is guaranteed by the precisely manufactured components, the minimum tip clearance, and the accurately calculated vane angles.

Construction of fans

On the exhaust side the fan is equipped with guide unit and a flexible connection to the exhaust panel.

The entire construction is fitted with a foot console that is placed on anti-vibration mountings in the bottom of the section.

Note that the maximum rpm is reduced at higher and lower temperatures.

Hub diameter [mm]	Rotor diameters [mm]						
	Ø500	Ø560	Ø630	Ø710	Ø800	Ø900	Ø1000
Ø350	3660	3460	3238	3000	2751	2498	2270

Maximum rpm at standard temperatures

Accessories

The following accessories are relevant with ZerAx fans.

- Baffle – for installation after exhaust opening
- Acoustic diffuser
- Air flow meter

Fan curves

Unit, fans, fan curves, etc. are calculated with Climaster Designer. The program can be downloaded from **www.novencogroup.com**.

Stepless regulation

All Climaster ZerAx units use stepless regulation of the fans through frequency-modulated motor operation. The operation is limited by the number of revolutions for the fan and by the motor rating. See that table "Maximum rpm at standard temperatures" above.

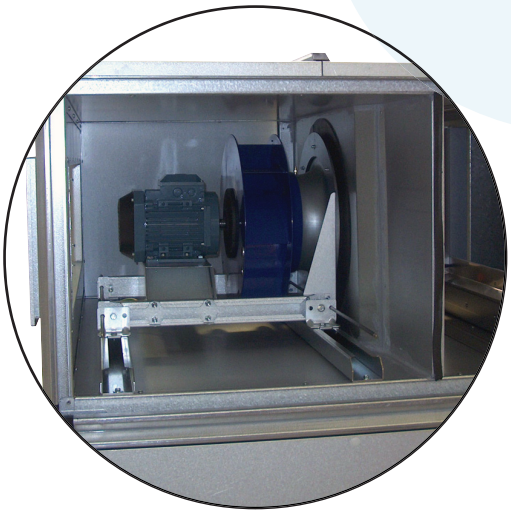
The use of frequency exchangers offers a real alternative to directly coupled centrifugal fans for control of varying air volumes. Directly compared with other fan types with the same technical air conditions ZerAx fans offer lower investment, operation costs, and space requirements.

Dimensioning of motors for frequency-regulated operation with ZerAx or plug fans are done with Climaster Designer.

Plug fans

The plug fans offered with ZCN units are directly driven, single-inlet centrifugal fans without fan housing and with backward-curved blades. The unit consists of fan wheel mounted directly on the drive shaft of a single-speed motor. The motor with wheel is installed on a fan mount with anti-vibration mountings that can be pulled out on rails in the bottom of the unit for service and cleaning.

The motor is a standard motor in a terminal box. To attain the optimum efficiency rate a frequency converter is required.



Ready-installed plug fan

On the suction side the inlet nozzle is installed up against the suction chamber. Metallic contact is prevented by means of a flexible rubber seal that ensures that the fan can operate without vibrations spreading to other parts of the unit.

Mode of operation

The fan creates a static pressure in the chamber with the exhaust opening placed in the end or top of the unit. Outside there may be installed flanges for duct installation.

The fan is not particularly sensitive to improper ducting on the exhaust side. However, a minimum distance of 1 x the fan diameter to the nearest bend is recommended.

Applications

The fan type is ideal for smaller air volumes and moderate pressure.

Operating economy

Efficiency rates of up to 78 % is obtained by use of a frequency converter. This ensures operation at optimum rotational speed and a good operation economy of the plant.

Comfort

The plug fan sound level is low and may in some cases remove the need for silencers.

Dimensioning

Units with plug fans are dimensioned in Climaster Designer. For each unit size there are two different plug fan sizes. This allows for optimum operation in the entire capacity area.

CCL types	ZCN sizes								Power motor [kW]
	9/6	13/8	18/8	18/10	21/10	21/12	21/15	21/18	
280	4775								1,1
315	4245								2,2
400		3340							3
500		2675	2675						4
560			2310	2310					7,5
630					2060				11
710				1840		1840			15
800						1620			18,5
900							1465	1465	18,5
1000							1280	1280	22

Maximum RPM for fan wheel

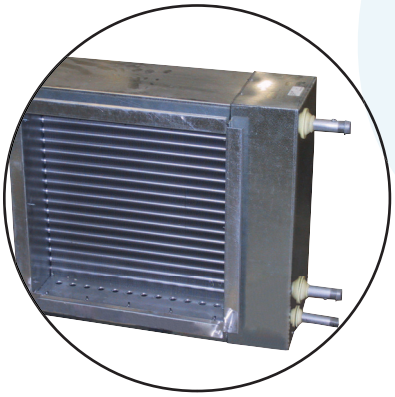
Heating and cooling coils for water

The heating and cooling coils that are used in ZCN are of the same construction and are therefore referred to collectively below.

The coils consist of copper tubes with aluminium fins mounted in steel plate frames. Alternatively, the fins can be made of copper.

The number of tubes and circuits depends on the actual heating or cooling need. All coils are tested with pressurized air below water at 15 bar.

The water is fed and led away through headers that run through the side of the unit and are terminated with threaded connections.



Cooling coil

In the units the coils are mounted in rails for pulling out, inspection, and maintenance. Pipe connections and panels must be removed before pull out.

The cooling function has corrosion-proof drip pan with drain under the cooling coils and has room for eliminator mat, which must be installed for wet cooling and air speeds above 2.5 m/s.

There is a separate drip pan under the eliminator mat. Next to the eliminator there is an inspection door.

The drip pan slopes toward the drain to ensure that water does not collect.

The Ø32 mm drains are smooth and run through the panel in the access side where they must be fitted with water traps. See section "Water trap for wet functions" on page 27.

Dimensioning

The heating and cooling coils are dimensioned with Climaster Designer. The program calculates all specifications for the coils.

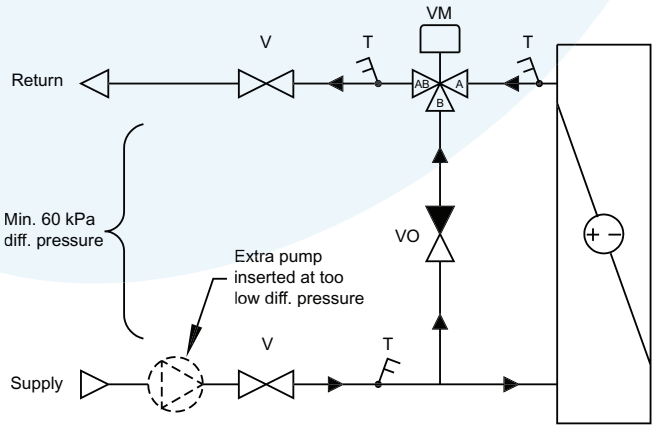
In large units the collector pipes from the heating and cooling coils are outside the housing, e.g., in the shape of a bay.

Connection

It is important that the flow through the coils is correct. When boiler water is used as a heating source a shunt arrangement is introduced at the coils in the shape of an overflow valve. This ensures exact regulation without variation of the air temperature.

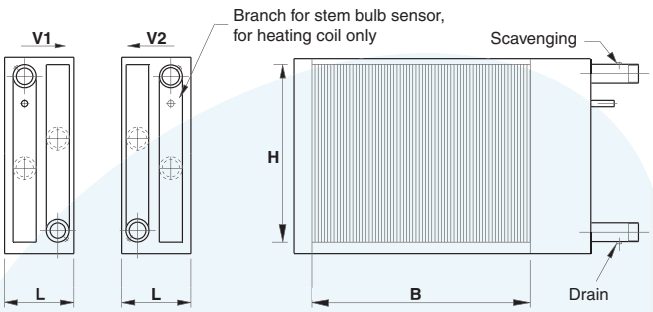
Units using district heating water have no shunt arrangements.

Also, it is recommended that the unit is fitted with control and thermometers.



V	=	Shut-off valve	VO	=	Overflow valve
VM	=	Motorised valve	T	=	Thermometer

The principle of a regulation arrangement



Connection in counterflow

Filters

The filter components for the units are delivered installed in special frames and are of the pocket filter type. Depending on the requirements for cleanness and separation of the ventilation air the filters can be delivered in different classes.

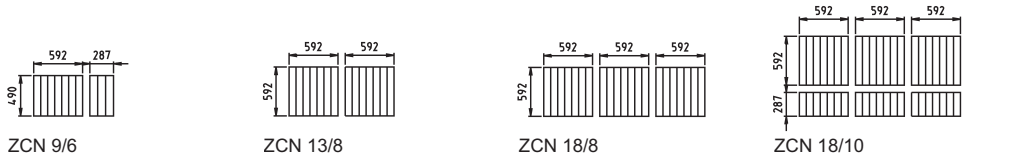
The filters comply with the requirements in accordance with EN 779 and ASHRAE 52-76. The EN 779 classifications for the individual filters are stated before the filter types.

Note that the filters have vertical pockets.

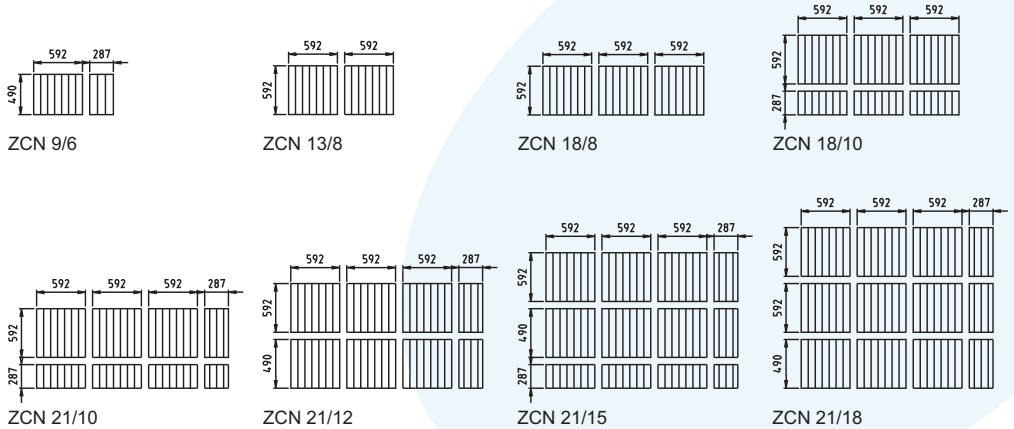
Descriptions	Types	Classes	Designations	Materials	Discolouration [%]	Lengths of filter units [mm]
Fine filter with separation rate above 80 %	Pocket filters	F5	FF	Disposable fibreglass filters	55	305
		F7			85	635
		F8/F9			95	635

Overview of filters

Filter arrangements



Filter section without drip pans



Filter section with drip pans

Dampers

Types

The integrated dampers are of the louvre type and comprise the following.

- Inlet, IN with SF – for closing during unit stops.
- Mixing damper, SB – for mixing 2 airflows at inlet
- Mixing and recirculation damper, BA – for closing during unit stop as well as mixing of outdoor air and recirculated air and corresponding differentiation of exhaust air.
- Bypass damper for cross-flow heat exchanger – for bypassing outdoor air at falling heating needs or at risk of freeze up in heat exchanger.

Construction

The damper plates are made in extruded aluminium and integrated in steel plate frames with plastic bushes.

The dampers have stainless drive shafts that can be connected directly to damper motors or linked to each other with rodding.

ZCN sizes	Max. torque [Nm]
9/6	8
13/8	14
18/8	14
18/10	20
21/10	25
21/12	25
21/15	30
21/18	30

Regulation torques

Classification

When closed the dampers comply with the tightness requirements in accordance with DS/EN 1751, class 3.

Special fitting conditions

All dampers can be delivered for motors mounted externally on the unit. The exception is dampers for cross-flow heat exchangers.

External dampers

The IN function is available with external SF dampers.

Inspection and empty functions

These are used in the following cases.

- In rotary heat exchangers and other places where functions cannot be inspected from adjoining sections.
- As support for protruding, overlying sections at inlet and outlet in tall units.
- As extension of an overlying section in order to avoid that vertical piping close to the unit prevents door opening in a section.
- As extension of overlying part of a tall unit to full length at outdoor installation.
- As preparation for later expansion of functions or as room for sensors, thermometers, etc.

Inspection rooms have doors. Empty functions are fitted with panels. The length is increased by 37 mm when delivered as an independent section.

Silencing

Attenuation through unit wall

In air handling units the components (heating coils, heat exchangers, filters, etc.) have sound-absorbing properties and therefore absorb a part of the sound energy from the main sound source (the fan). The calculation results therefore show better damping values through the unit wall than stated.

Octave band [Hz]						
125	250	500	1k	2k	4k	8k
11	21	29	33	32	37	40

Correction values (C_{corr})

Acoustic emissions into the room is calculated by subtracting the correction values from the fan values.

The values in the table were measured on a model box, i.e., a completely closed unit housing in accordance with DS/EN 1886 and is certified according to Eurovent.

Silencers YA, YB, and YC

The silencers YA, YB, and YC consist of functions with lengths of 720, 1040, and 1280 mm respectively.

The silencers may be connected directly to other functions with face area. In fan outlets it is, however, necessary to install a DA function between the fan and the silencer to house the baffle plate.

Duct connections to silencers must be installed with outlet on exhaust sides (L = 160 mm).

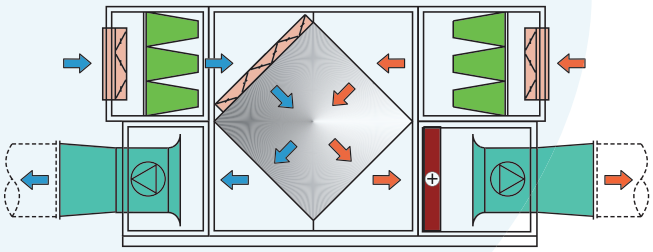
Lengths [mm]	Damping [dB] after average frequency [Hz]							
	63	125	250	500	1k	2k	4k	8k
720	-2	-4	-9	-19	-26	-24	-17	-11
1040	-2	-6	-15	-26	-37	-34	-21	-13
1280	-3	-7	-18	-30	-42	-41	-25	-16

Damping for silencers

Acoustical diffusers type YAD

The use of acoustical diffusers is an effective and easy way of achieving damping in connection with axial flow fans.

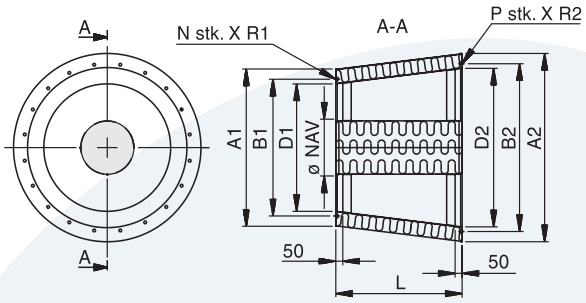
An acoustic diffuser is mounted directly on the unit using the included flanges. Note that the diffuser should be supported separately at installation.



Climaster ZerAx model ZCN with acoustic diffusers

If there is a need for further damping silencers of type YAH can be installed later. Alternatively, extension with the types YA, YB, or YC can also be done.

Dimensions, weights, and damping values for YAD diffusers can be found in the tables on the following pages.



Size	Hub [mm]	Fan side				Duct side				L [mm]	Weight [kg]
		A1 [mm]	B1 [mm]	D1 [mm]	N x R1	A2 [mm]	B2 [mm]	D2 [mm]	N x R2		
500	330	716	560	504	12 x M10	846	690	634	12 x M10	500	40
560	380	776	620	564	12 x M10	926	770	714	16 x M10	560	46,5
630	380	846	690	634	12 x M10	1011	860	804	16 x M10	630	56
710	380	926	770	714	16 x M10	1116	960	904	16 x M12	710	73
800	380	1016	860	804	16 x M10	1216	1070	1004	16 x M12	800	86,5
900	380	1116	970	904	16 x M12	1336	1190	1124	20 x M12	900	108,5
1000	380	1216	1070	1004	16 x M12	1466	1320	1254	20 x M12	1000	122

Dimensions and weight of acoustic diffusers type YAD

Outside diameter [mm]	Hub diameter [mm]	Damping [dB] after octave band [Hz]							
		63	125	250	500	1k	2k	4k	8k
500	330	0	2	3	15	18	18	13	8
560	380	0	2	3	15	19	18	14	8
630	380	0	2	11	15	15	15	11	6
710	380	0	1	5	14	16	13	9	6
800	380	1	3	8	16	15	11	7	6
900	380	0	1	9	16	15	11	7	5
1000	380	1	3	7	14	11	8	6	6

Damping for acoustic diffusers type YAD

Accessories

Base frames

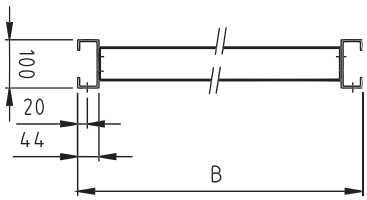
Units that are delivered in sections may be delivered with base frames in the total length.

The base frames are 100 mm high and consist of two longitudinal profiled bearers with transverse stabilisation bearers.

The base frame bearers can be fitted with adjusting screws with feet. The maximum distance between adjusting screws is 1300 mm.

In some lengths the longitudinal bearers consist of several pieces. If this is the case a fish joint and a transverse bearer is included and can be assembled into a complete base frame.

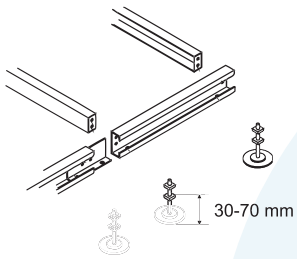
Assembled units are delivered on base frames in full length. The height is 200 mm and the design is as C profile for lengths <4 m and as UNP 200 for lengths >4 m. All base frames are hot-galvanized.



Cross-section of base frame

ZCN sizes	B dimensions [Nm]
9/6	996
13/8	1386
18/8 - 18/10	1916
21/10 - 21/18	2186

Outside distance between bearers



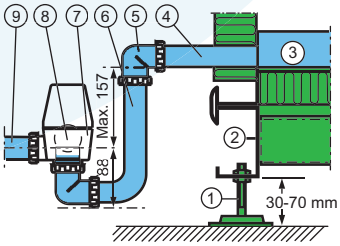
Adjustable height of adjusting screws

U-cleats for duct connections

For rectangular inlet and outlet openings can be delivered u-cleats that after installation form air tight connections with the connected ducts.

Water trap for wet functions

Drains from wet functions (cooling coils and cross-flow heat exchangers) must be fitted with water traps. As accessory can be delivered a water trap in plastic. The water trap is for use with low pressure and is fitted with a ball to ensure tightness without being filled with water. The water trap is connected to the drain from the drip pan of the unit. All drains are smooth and Ø32 mm external.



1. Adjusting screw with foot
2. Base frame
3. Drip pan
4. Drain connection Ø32 mm external, smooth
5. Angle
6. Pipe Ø32 mm
7. Water trap
8. Ball
9. Drain Ø32 mm external, smooth

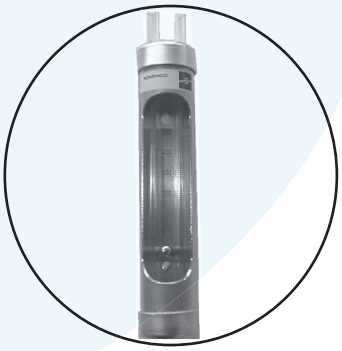
Water trap

Light and inspection windows

For empty sections and fan sections are offered light and inspection windows with glass (Ø200 mm). The inside of the unit can be inspected through these from the outside.

Filter guard

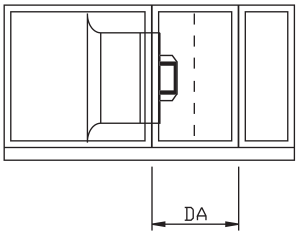
For units without integrated control can be delivered a U-pipe manometer for visual control of filter contamination.



Filter guard of the type U-pipe

Baffle plates for outlet

At free exhaust in the following functions, e.g. silencers or mixing functions, baffle plates are installed after the fan outlet. This ensures good air distribution over the entire face area. Between fan and following function is installed a DA function for installation of baffle plate.



Placement of baffle plate in axial flow fan

Sizes	Lengths [mm]
-400	400
-500	480
-560	560
-630	560
-710	640
-800	720
-900	800
-1000	880
-1120	1040

Lengths of DA functions with ZerAx fans

Flexible connections

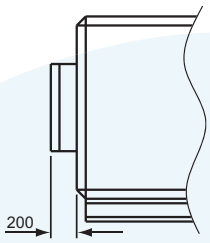
For inlet and outlet openings can be delivered flexible connections. These are installed with air tight u-cleats for direct duct connection.

Flexible connections are delivered in non-flammable material for use in the temperature range -30 to + 80 °C.

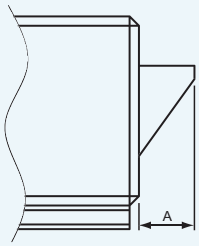
Accessories for outdoor installation

Units for outdoor installation can be delivered with roof cover of plastic or aluzinc plate. Air intakes can also be fitted with special inlet box with wire guard, and the exhaust can be fitted with an exhaust box made of a diagonally cut duct piece with net.

For all ZCN units the inlet boxes stick out 200 mm from the unit walls.



Inlet box



Exhaust box

ZCN sizes	A dimensions [mm]
9/6	405
13/8	540
18/8	600
18/10	730

Lengths of overhang of exhaust boxes

Controls

All Climaster ZerAx of the variant ZCN are available with integrated controls for control of among others air volumes, heating, and cooling. How and when the controls changes between the built-in features is configured in the operation program. The program may be overruled during temporary forced operations if necessary. Thereafter the active operation program takes over again.

Features built into the controls

- Automatic change between summer and normal time
- Heating coil with frost guard
- E-mail function for alarms
- Constant operation
- Automatic operation controlled by internal clock
- Time-controlled extended or forced operation
- External start or stop
- Program updates and data logging through use of SD card
- Monitoring of 20 units through portal solution (option)

Configuration and control is done with a browser or with the handheld terminal. The available features of the latter are limited to the most commonly used. The web solution is integrated in the controls. Examples of screen shots are shown on next page.

Selection of user profile in handheld terminal

Network communication supports BacNet over TCP/IP and Modbus over RS485 or TCP/IP. As an option communication with LonWorks may be supported.

Operation parameters

Factory setting of standard operation parameters and setpoints are made in accordance with the standards for comfort ventilation. Further adaption for the final operation situation is made at test and startup of the unit.

Choice of control type and regulation

The number of control modes of the control allows for adaptation to all possible installation conditions.

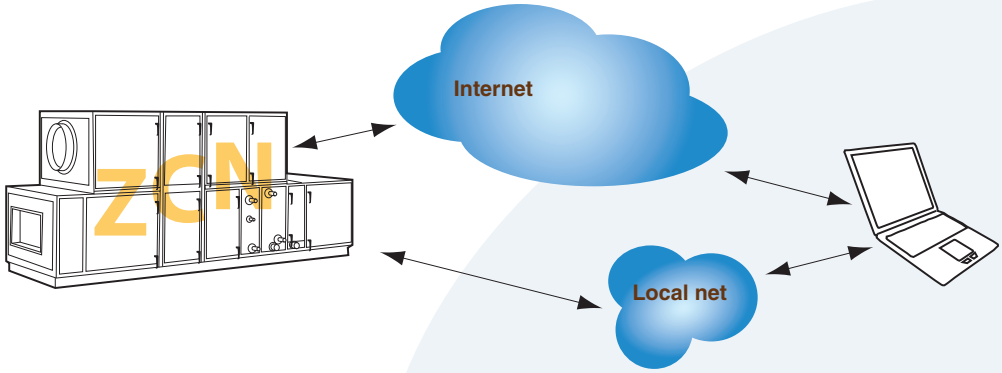
Control modes

- Pressure
- Flow
- Slave (inlet air or outlet air)
- CO_2

Temperature regulation

- Constant air supply temperature
- Constant extract air temperature
- Constant room temperature
- Constant difference between extract and supply
- Summer and winter compensation
- Recirculated air heating (option)
- Summer night cooling

Web solution

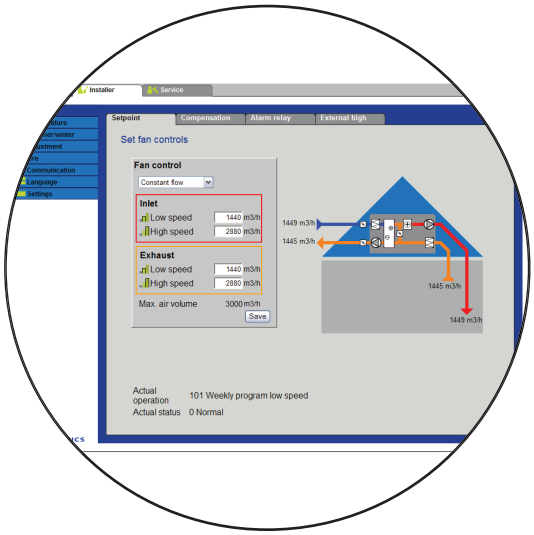


Web-based access to setup and control of the controls is possible over both the internet and local networks. This lets the user operate the unit from wherever and in which ever way.

The available features are determined by the profile that is used to logon to the unit. The most common for operation are collected under the profile User. The profiles Installer and Service give access to features that are intended for the initial setup.

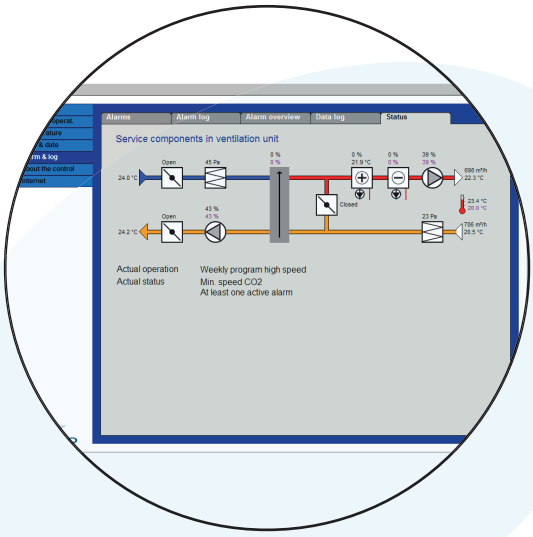
Setup of the weekly program

The current status of the unit and the configured set-points are shown in a flow diagram.



Control of unit

When the weekly program has been configured the unit may function without supervision or intervention. Any needs for overrides and thus deviations from the weekly program are of course also possible.



Showing of status for unit and components

MU 14460 0211

NOVENCO

Novenco develops and manufactures ventilation and fire-fighting systems that are marketed and distributed worldwide through subsidiaries and agents.

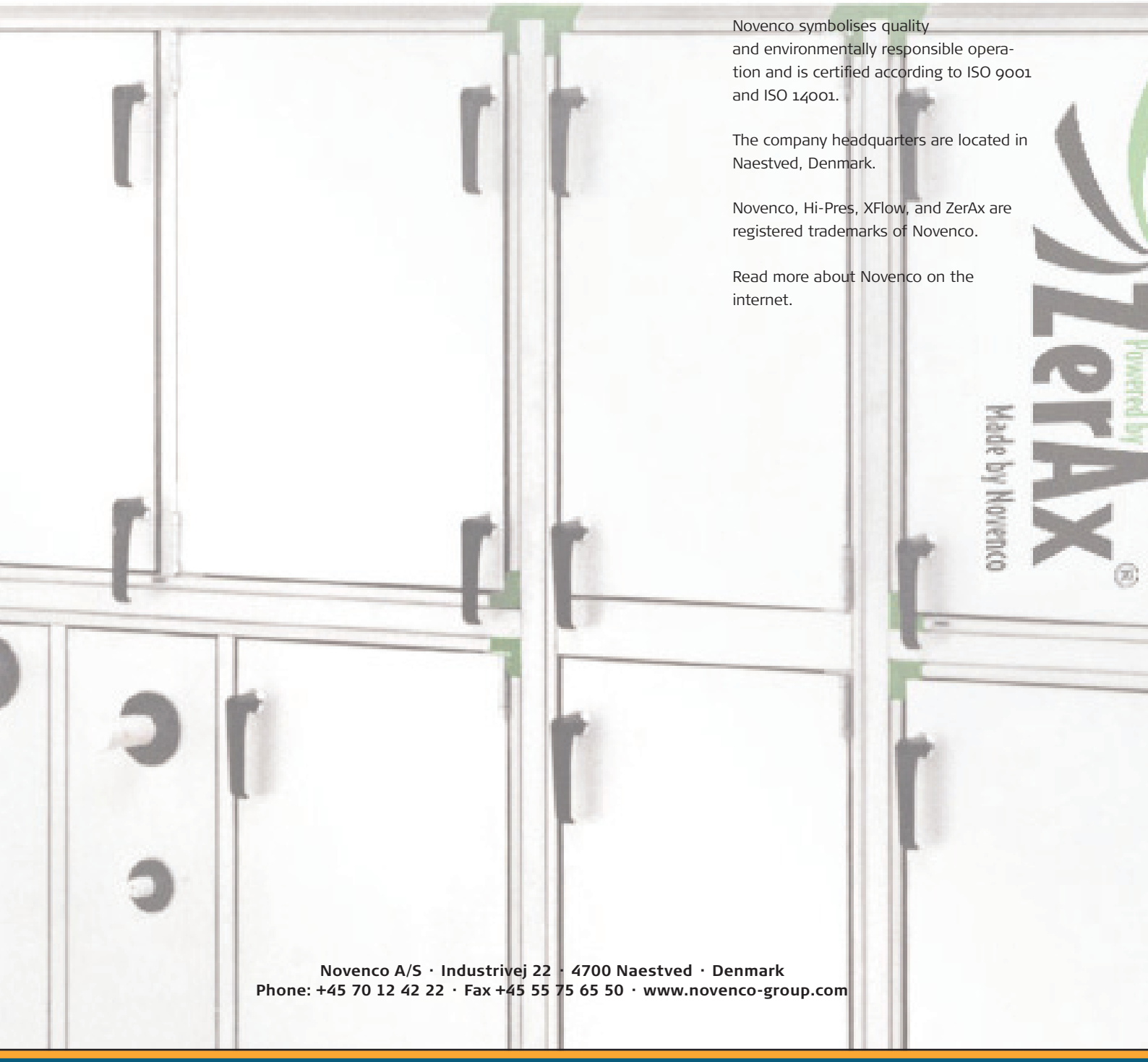
The company was founded in Denmark 1947 and has become one of the world-leading suppliers.

Novenco symbolises quality and environmentally responsible operation and is certified according to ISO 9001 and ISO 14001.

The company headquarters are located in Naestved, Denmark.

Novenco, Hi-Pres, XFlow, and ZerAx are registered trademarks of Novenco.

Read more about Novenco on the internet.



Novenco A/S · Industrivej 22 · 4700 Naestved · Denmark
Phone: +45 70 12 42 22 · Fax +45 55 75 65 50 · www.novenco-group.com