ThermoCooler HP

Integrated reversible DX heat pump
with stepless cooling and heating
power for the Envistar range

Creates opportunities for a green roof

IV PRODUKT

Air handling with focus on LCC

We’ve been conserving the Earth’s **resources** for more than fifty years

Airports, concert halls, sports arenas, schools, offices, hospitals, shopping centres and homes in a number of countries all have low energy use thanks to IV Produkt. We have been involved in a long list of projects. With energy-efficient air handling units, we make it possible to recover energy, increase property value and conserve the Earth’s resources.

IV Produkt is a privately-owned company based in Växjö in the Swedish county of Småland that develops and manufactures innovative solutions for air handling. We have been doing this since 1969. Today, we are the market leader and have the fastest development rate in the industry. Quick turnaround times make us efficient, and the way in which we take responsibility makes things both safe and easy for you as a customer.

Energy efficiency and environmental considerations have been part of our business concept since 1991, prompting us to focus on the life cycle cost, LCC. In other words, the total cost of installation, operation, service and environmental impact. We want this cost to be as low as possible and regard it as a natural aspect of our product development. We comply with ISO-9001 and ISO-14001, which we believe is important.

Our products and many years of experience enable us to identify innovative solutions for air handling that are perfect for your particular project. We will help you achieve our common goal of protecting the Earth's resources.

Our Envistar and Flexomix air handling units have been tested by Eurovent in accordance with EN 1886 and EN 13053.

EUROVENT CERTIFIED PERFORMANCE
AHU 00.09.027 and AHU 05.07.300
Flexomix and Envistar
www.eurovent-certification.com

Smart ventilation design with the reversible heat pump of the future

The integrated cooling unit and heat pump are a huge success for us at IV Produkt with over 16 000 deliveries. Our first reversible heat pump was launched as early as 1974.

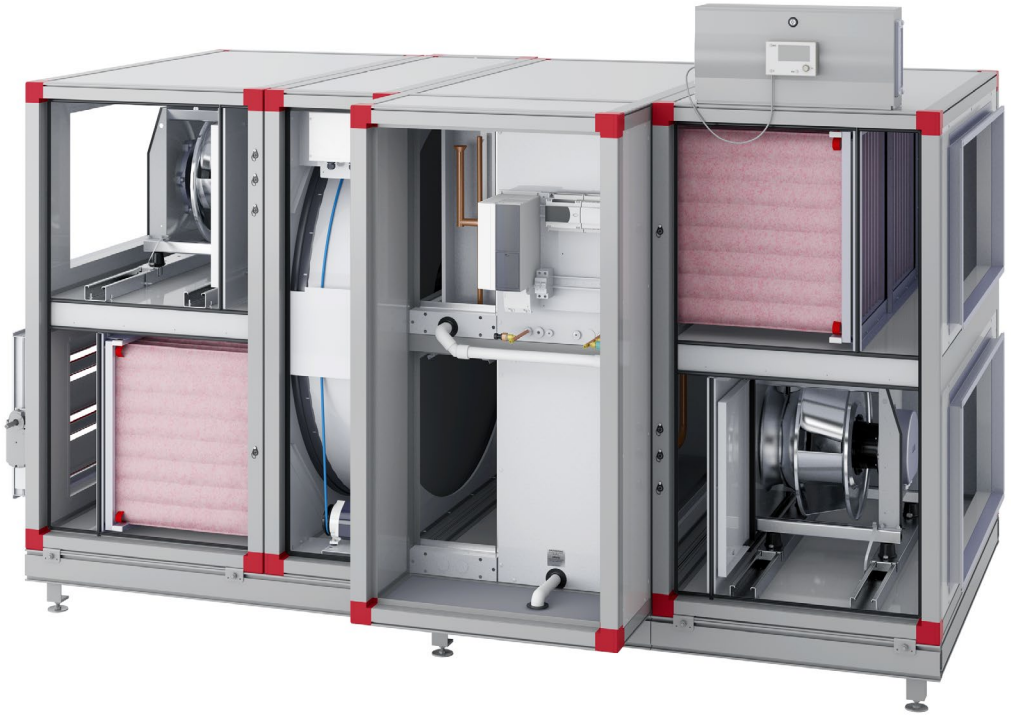
When we at IV Produkt develop our products, we try to imagine the full life-cycle chain of the air handling unit. We want to simplify the installations, reduce the operating costs and the ThermoCooler HP also allows us to reduce the capital cost.

With our latest product, ThermoCooler HP, we satisfy all these criteria.

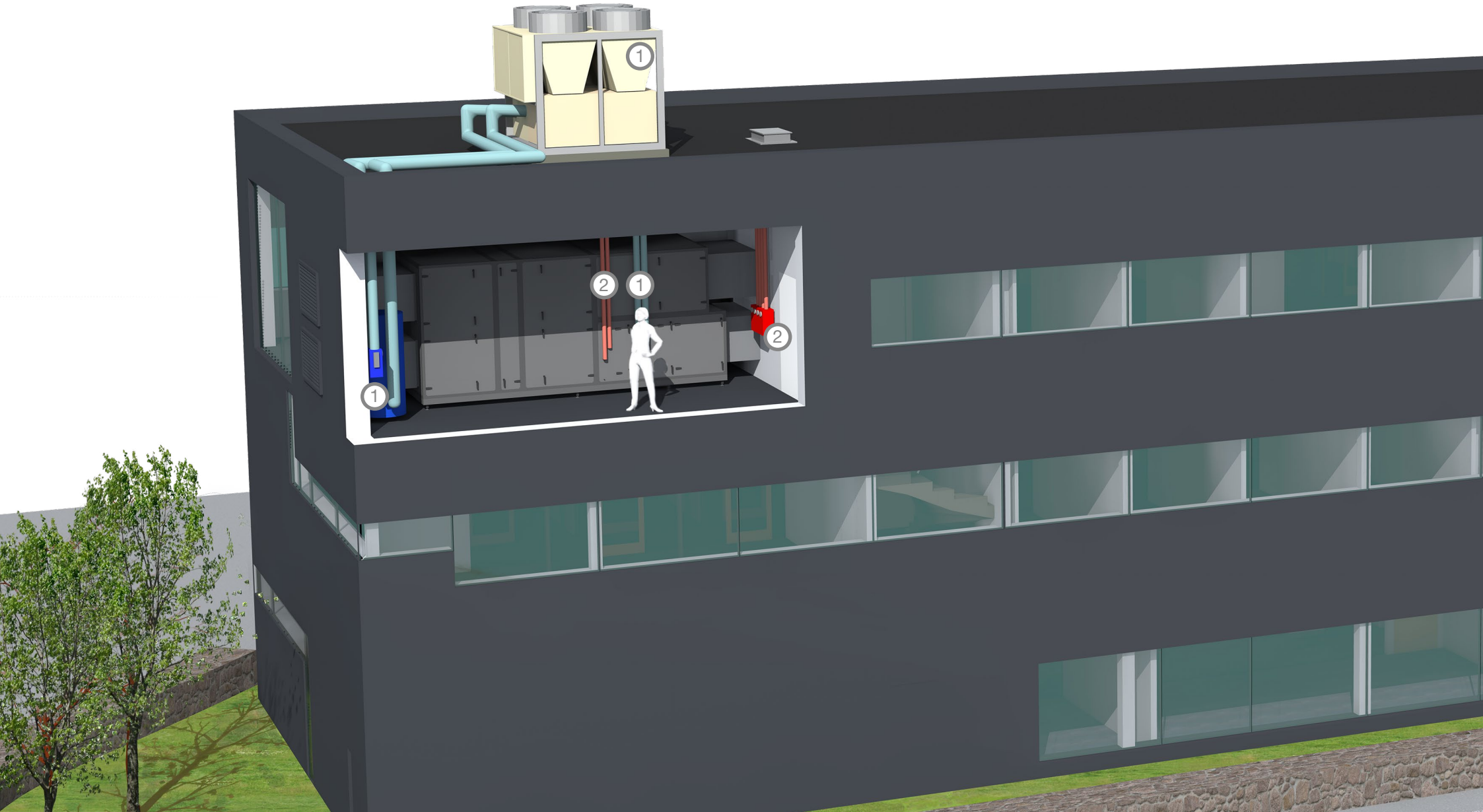
By using smart functions in the unit there is no need for a defrost cycle, additional re-heat coils or outdoor condensers. ThermoCooler HP frees up space within the plant room and on the roof.

ThermoCooler HP

- High reliability and long service life
- No defrost cycle required
- Low installation and operating costs
- Requires no outdoor installations
- Saves floor space



Imagine ...



Imagine if the installation for cooling (1) and heating (2) were integrated in the air handling unit instead of being separate installations. There is no need for external pipe work, valves or lagging. The roof surface can therefore be used for more pleasant purposes than installations (3). The property becomes more attractive, space is freed up (4) and the value and rental income increase. Do you need to rethink your project?

Heat pump and cooling unit in one

ThermoCooler HP is an optimal integrated reversible heat pump for the Envistar range.

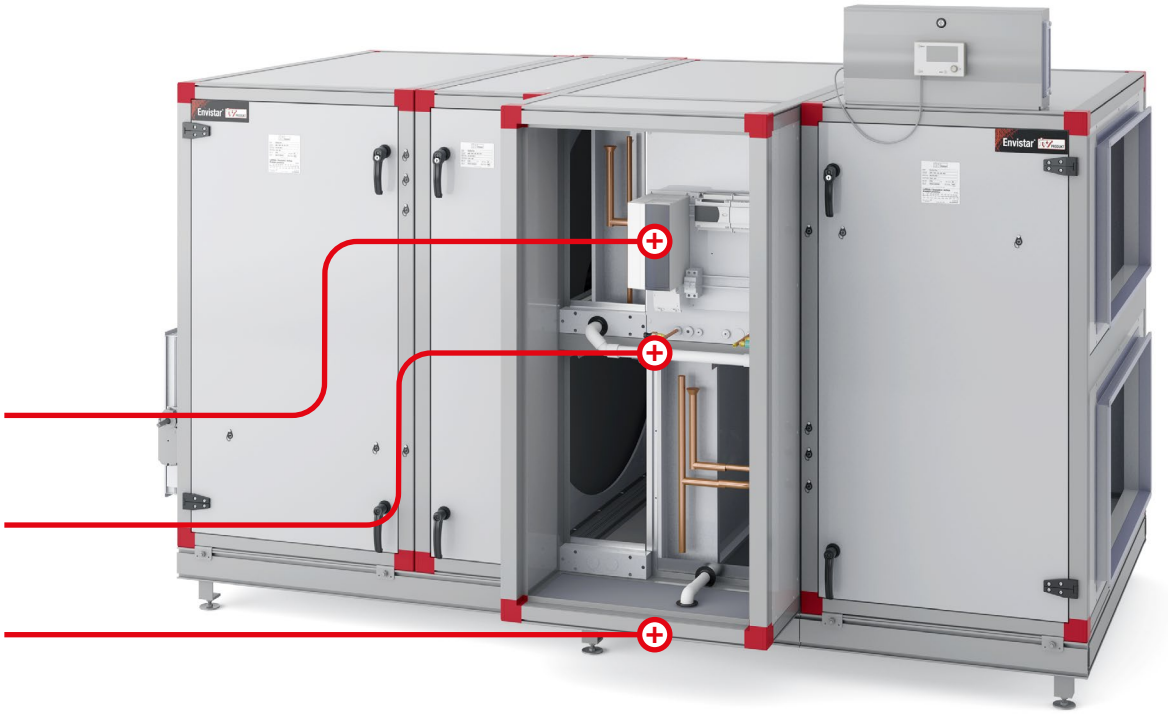
All parts of the cooling/heating pump are incorporated in a module section, which is located in the air handling unit. This means that you receive a total solution for heating ventilation air and comfort cooling in one unit. Since everything is integrated in the air handling unit, there is no need for re-heat coils, pumps, pipe work or outdoor installations. This can result in shorter and more simplified construction programmes.

The ThermoCooler HP reversible heat pump, together with the thermal wheel can achieve a dry temperature efficiency in excess of 90 %.

Speed controlled scroll compressors with PM motors

Electronic expansion valves

Separate module to simplify transport into the building



- Complete CE-marked cooling and heating installation
- 6 sizes for Envistar Top series,
  air flow 0.25 – 2.00 m^3/s with
  cooling power 3 – 32 kW
- 12 sizes for Envistar Flex series,
  air flow 0.25 – 8.60 m^3/s with
  cooling power 3 – 140 kW
- High EER up to 6.0 in the chilling mode,
  high COP 6 – 15 in the heating mode,
  depending on outdoor temperature
- Ideal for large variable air flows, VAV
- Also available as an outdoor version for Envistar Flex

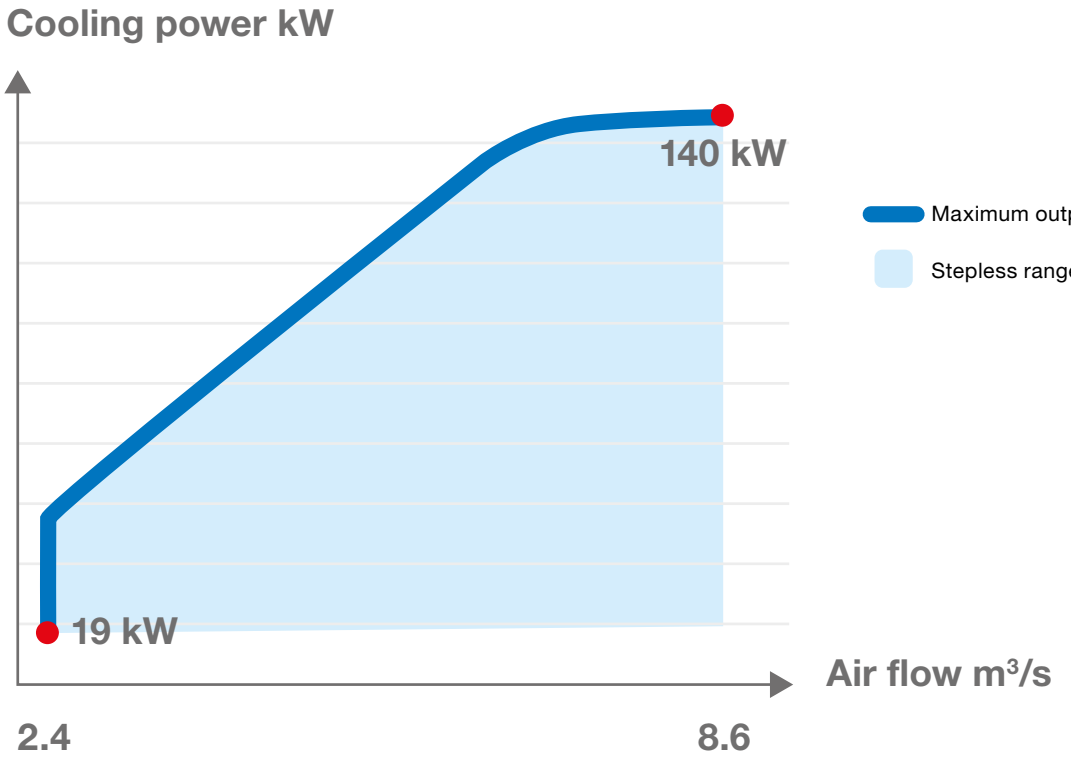
Envistar Top with ThermoCooler HP.
The new hand-held terminal with touch screen is now available as option for the whole Envistar series.

Stepless control

In some buildings, the air flow varies greatly, but there is still a requirement for close control of the supply air temperature. ThermoCooler HP meets the requirements through stepless control of the cooling and heating power via a frequency inverter.

The benefits of stepless control are:

- low minimal air flow
- optimal variable performance



The diagram shows the operating range of the Envistar Flex with ThermoCooler HP in size 980. ThermoCooler HP is controlled by a frequency inverter which means that the unit can cool the air steplessly from **19 – 140 kW** for an air flow from **2.4 – 8.6 m³/s**. ThermoCooler HP in our smallest size 06, to Envistar Top, has a cooling power from 3.0 – 13.0 kW at air flows from 0.25 – 0.60 m³/s.

Designed dimensions

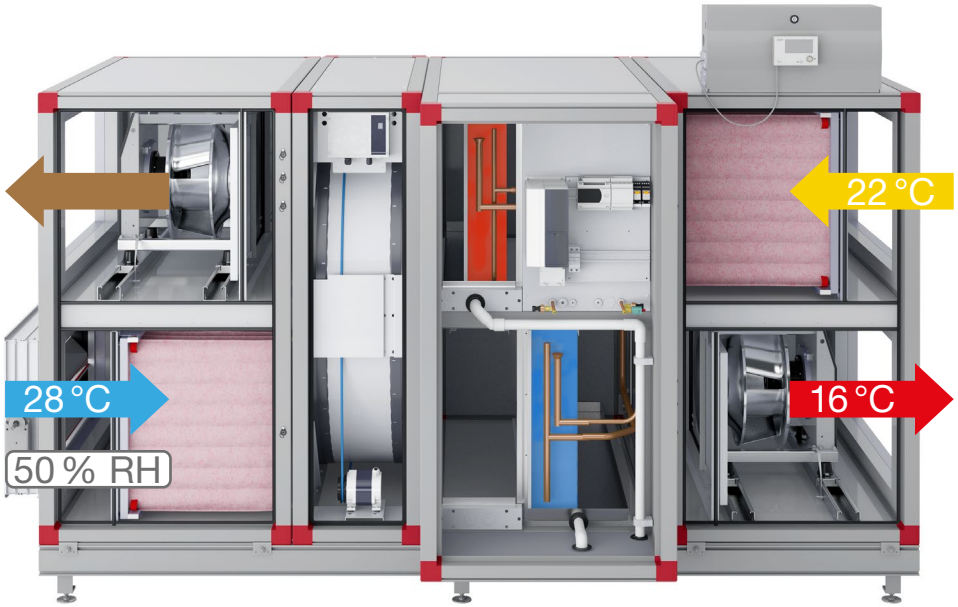
When we develop products, we place great emphasis on making it easy and cost effective to transport them into buildings. ThermoCooler HP has been designed in a separate module that will fit through an opening of 900 mm. We hope this will make it easier for you to get the unit into the building, and even into narrow lifts.

Top-connected units in the smaller sizes can be placed behind double doors and only require a few small square metres of floor space to be installed. The area in front of the unit can be used for servicing and maintenance of the unit.

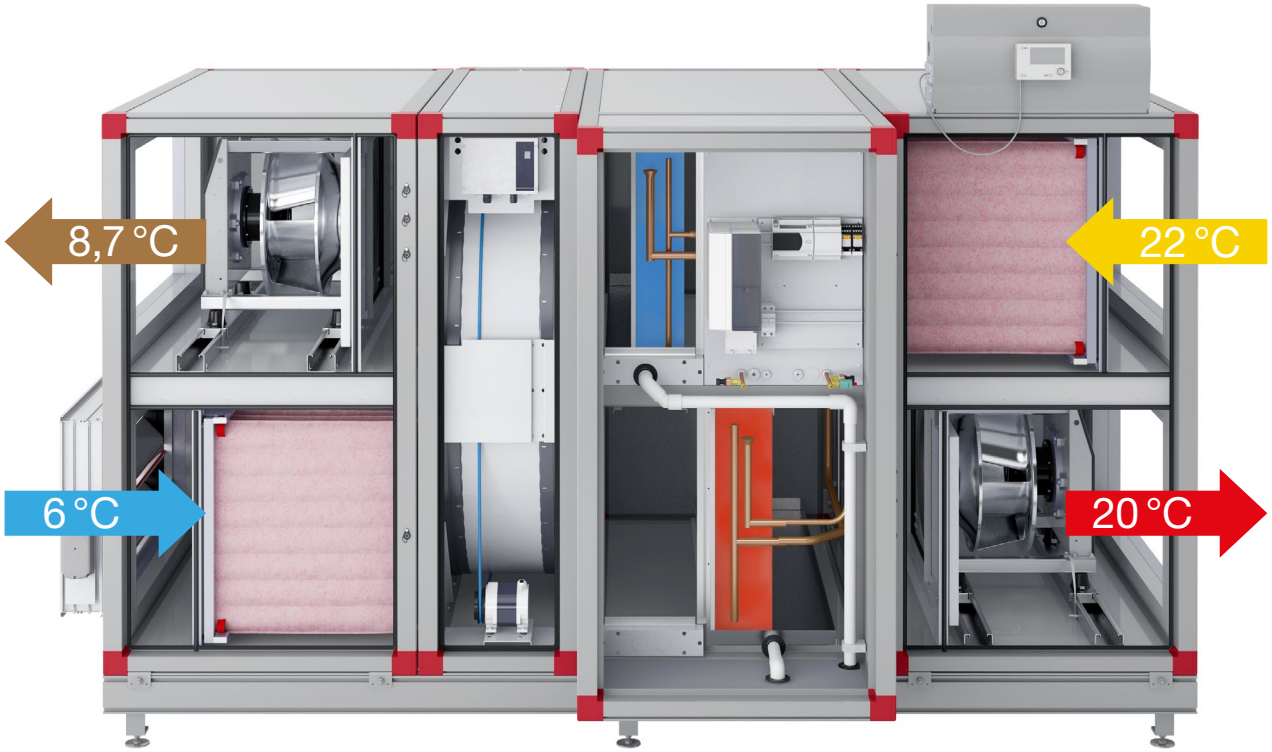
From summer to winter

ThermoCooler HP is an energy efficient reversible heat pump for every day of the year.

When it is warm outside, ThermoCooler HP works as an efficient cooling unit to create a comfortable indoor climate. If the reversible heat pump's extract air coil is placed on the warm side of the thermal wheel there is no risk of frost on the coil when the temperatures falls below 0 °C. Unnecessary defrosting cycles are avoided and the unit therefore has a very high reliability and long service life.

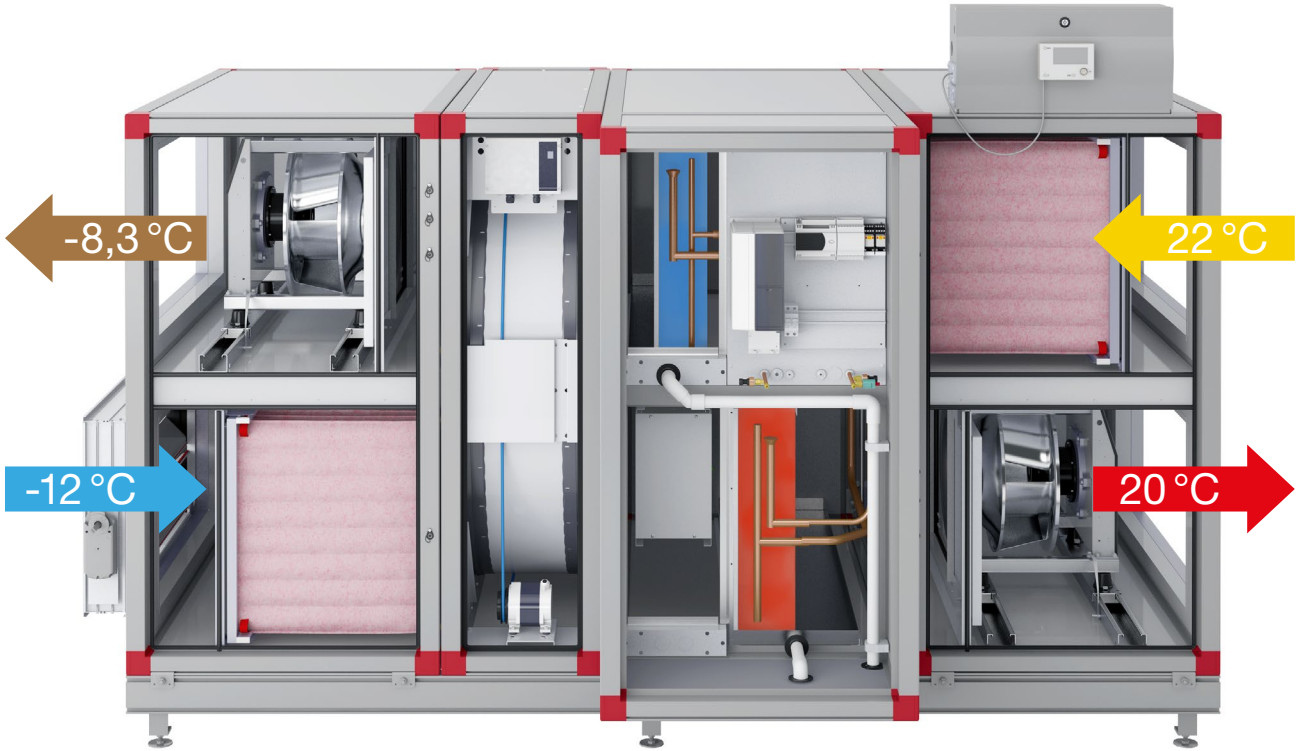


On a warm summer's day with an outdoor temperature of 28 degrees, we want to cool the air down to 16 degrees. ThermoCooler HP does this in an energy-efficient way. For example, an office space of 300 m^2 can be cooled with approx. 1100 kWh/year, which results in a very low cost. These operating conditions can yield an EER of up to 6.0.



On a rainy day in autumn when the temperature falls to 6 °C, we can supply air at 20 °C without starting the heat pump, because the thermal wheel is always prioritised.

In this example, the thermal wheel has a temperature efficiency of 83 % and the return air temperature is 22 degrees.

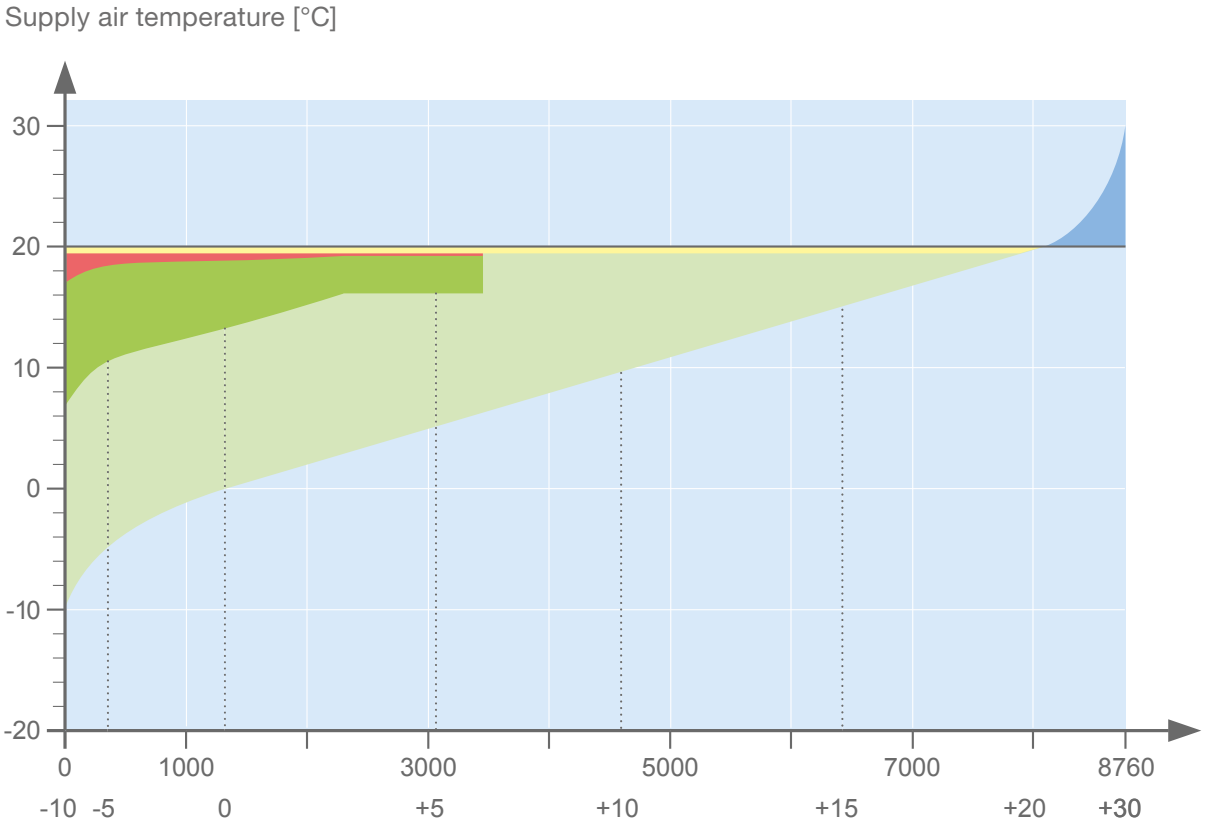


On a cold winter's day when it is -12 °C we can still supply air at 20 °C. If we run the compressor in the ThermoCooler HP at 60 %, we can achieve this with a return air temperature of 22 °C. Together with the thermal wheel, we achieve a dry temperature efficiency in this example of 88 %.
The return air temperature needs to be guaranteed by radiators, underfloor heating or another heating source.

If there is a risk of the return air temperature becoming colder than the designed temperature, or if there is an imbalance in the air flow, a trim heater is available as an option. The trim heater uses the same electrical feed to the ThermoCooler HP, and can be easily installed retrospectively, if necessary. With design outdoor temperatures under -18 °C the trim heater comes as standard.

Energy efficient all year round

To gain an overview of how energy efficient an Envistar unit with ThermoCooler HP is, we have produced an energy diagram. The green areas show energy recovery, while the red area shows how much electrical energy goes to the compressor during heating mode. For an air flow of 1 m^3/s and an operating time of 3000 h, this is as little as approx. 600 kWh.



- Cooling load
- The thermal wheel's energy recovery
- ThermoCooler HP heat recovery
- Electricity for compressor, which becomes heat
- Electricity for supply air fan, which becomes heat

Return air temperature:	22 °C
Temperature efficiency thermal wheel:	83 %
Annual mean temperature:	9 °C

Reduces installation and operating costs

Because all of the reversible heat pump's parts are built into the air handling unit, you get a total solution for heating ventilation air, comfort cooling and controls all in one unit. Pumps, pipe work, lagging and outdoor installations can be avoided.

A unit with ThermoCooler HP is more energy efficient than a traditional installation, with external chillers/condensers/ boilers, etc. Let us show you a few calculation examples.

Traditional installation

Cooling installation	32 500 €
Heating installation, ventilation	10 100 €
AHU	32 500 €
Total:	**75 100 €**

Envistar Flex with ThermoCooler HP

Complete unit with integrated cooling and heating from one supplier

Total:	**50 300 €**

33 % lower cost

Saving: 24 800 €

The energy used to operate the fans is somewhat lower in ThermoCooler HP compared to a traditional installation. Cooling mode will be approximately 30 percent lower since the energy efficiency ratio (EER) is high. Heating mode decreases by 63 % thanks to the high energy efficiency of the heat pump.

In total, this produces a saving of 6 800 kWh, which means energy use for Envistar with ThermoCooler HP is 20 percent lower than a traditional installation.

Traditional installation	
Fan energy	21 700 kWh
Cooling mode	5 900 kWh
Heating mode	7 150 kWh
Total energy use:	**34 750 kWh**

Envistar Flex with ThermoCooler HP	
Fan energy	21 150 kWh
Cooling mode	4 150 kWh
Heating mode	2 650 kWh
Total energy use:	**27 950 kWh**

20 % lower energy use

Savings: 6 800 KWh

Calculation of a building of 1 500 m^2 with an operating time of 3 000 h/year.

Save floor space with top connection!

To achieve a comfortable indoor climate, air handling units are often installed in combination with cooling units on the roof. By integrating ThermoCooler HP, the roof can instead be used for something much more pleasant than equipment.

ThermoCooler HP is also available for our Envistar Top series, which saves floor space. An example from a recent construction shows that as much as 20 m^2 of floor space could be saved when installing three top-connected units compared to one end-connected unit.

Potential exists to significantly reduce the total construction cost or to create more leasable space.

43 %
lower cost

Traditional installation

Gable connected unit	25 000 €
Heating installation, ventilation	9 500 €
External cooling installation	28 000 €
Total:	**62 500 €**

Envistar Top with ThermoCooler HP

Three units with integrated cooling and heating from **one** supplier	59 000 €
Savings corresponding to floor space	-23 000 €
Total:	**36 000 €**

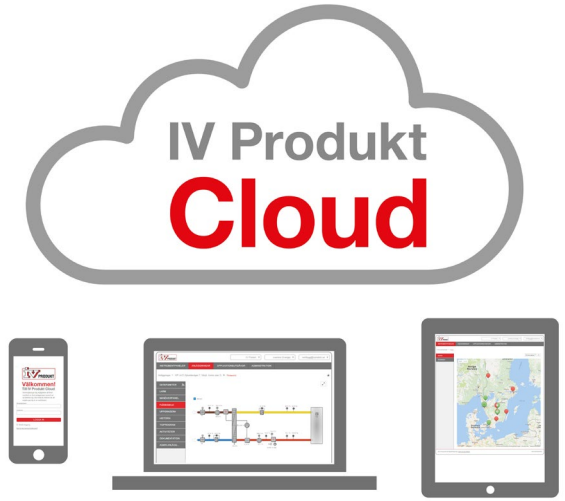
Saving: 26 500 €

Since ThermoCooler HP is integrated into the top-connected units, valuable roof space is freed up.

The units are located behind double doors and the adjacent area can be used for service and inspection.

The space savings mean that fewer square metres need to be built, or that the space can be used for something much more pleasant, such as more offices and a functional roof terrace. This solution also raises the value of the property.

IV Produkt Cloud gives you full **control** – wherever you are



IV Produkt Cloud service

- Allows you to monitor your systems wherever you are
- Always accessible wherever there is Internet access
- 4G router as option
- Alarm monitoring via e-mail or text message
- You can quickly analyse and take action for optimum operation

Control and **set** using our IV Produkt AHU Controls **app**

You can now control our unit using the IV Produkt AHU Controls app. You connect the unit to the internal network in the property, if the building has Wi-Fi.

If you cannot connect the unit to the internal network, we can provide a Wi-Fi router for the unit.

IV Produkt AHU Controls app

- Control your unit easily via smartphone or tablet
- Start up the unit and adjust the values
- React quickly in the event of an alarm
- See event logging and history
- Clear interface and summary flow chart

AHU Controls IV PRODUKT

Download on the App Store

GET IT ON Google Play

The app is available to download for free for iOS and Android™.

Partnership for future nursing home

Outside the suburb Alna in north-east Oslo, a new nursing home is being built at the site of what was originally the largest nursing centre in Oslo. The entire area is being rejuvenated with green spaces and open waterways. Lindeberg Nursing Home will have 144 beds spread over six floors. The building comprises four wings, which form a star-shaped structure around the centre.

One of the objectives of the project is to keep life-cycle costs (LCC) down as much as possible. A requirement for the nursing home is for it to be certified according to BREEAM NOR – Excellent, which corresponds to a point total of 70 out of 100. The project has a clear environmental profile. One way of achieving this is by means of solar panels on the roof and parts of the exterior, which also results in cost savings.

Following careful calculations and planning, the project culminated in eight Envistar Flex units with the integrated ThermoCooler HP reversible heat pump. Requirements for an SFP below 1.0 and a rotor efficiency of 90 % in combination with the reversible heat pump were fulfilled. This resulted in highly energy efficient units with low operating costs. In addition, the installation costs could also be kept down since neither a space-consuming circulation unit nor pipework was necessary.

Pictures from HUS Arkitekter.

Results

- Certification according to BREEAM – Excellent
- No outdoor cooling installations
- A single supplier of the unit, ventilation air heating, and comfort cooling, as well as monitoring and control

New vibes for the Grade II listed building

Next to London's landmark Tower Bridge, in the heart of the vibrant capital, the newly built boutique hotel accommodates 193 rooms. The Dixon hotel, is named after the architect John Dixon Butler who originally designed the iconic building.

The building served as a police station and court until the turn of the millennium. After an extensive refurbishment and extension, it has transformed into a hotel complete with conference facilities and a unique restaurant and bar with the atmosphere of the old police station ever present.

We are proud to have been selected as the supplier of air handling units for this project.

The floor space was limited so our space-saving Envistar Top range was ideal. A comfortable indoor climate with comfort cooling was a matter of course, so the units were equipped with EcoCooler – our integrated cooling.

Envistar Flex units with the integrated reversible heat pump ThermoCooler HP supplies the bedrooms with comfort cooling and heating of ventilation air. Thanks to this, neither costly and space-consuming pipe work, lagging nor external outdoor DX condensers were required.

Pictures from The Dixon.

Results

- The cultural heritage values of the area's architecture can be retained thanks to ThermoCooler HP
- No costly and space-consuming pipe work, valves, lagging and external chillers or condensers are needed
- Low operating costs due to energy efficient units

A meeting that made a **difference**

An office property in Gothenburg needed to expand its ventilation, and comfort cooling was part of the project plan. In the end the solution turned into something completely different than a traditional installation.

The initial idea was to place a new unit in an existing plant room on the ground floor and another on the roof of the property. The project went ahead as planned, but it was later discovered that it it would be very costly to undertake the necessary structural works to the roof to support an externally mounted unit. An additional installation on the roof would also not be so aesthetically pleasing.

While the contractor was calculating the project, we gave a presentation on our new integrated ThermoCooler HP reversible heat pump, which resulted in the contractor being able to present an alternative solution. Thanks to the compact dimensions of our unit, the existing plant room could be used to install one unit instead of two – despite the increased air volume. The existing chiller was retained to serve the chilled beams, while the cooling of the supply air was integrated into the new AHU.

The property owner saved approximately half of the installation cost, and didn't need to connect the district heating system to the 7th floor. There was also an added bonus that no further installations were needed on the roof.

The project was supplied with our Envistar Flex unit with integrated ThermoCooler HP reversible heat pump in the largest size, 980. Since the unit, as with many of our units, is modular, it was easy to get it into the building.

Result

- 50 % lower installation cost than calculated
- No installation on the roof

Property owner: Klövern, **Contractor:** JVT Vent

Primary school full of energy

In Oslo, a school is being built with ten departments for a total of 180 children. The new primary school will be an energy-plus building, which means that the building will be self-sufficient in the energy it uses over the course of the year.

When it comes to the air handling unit, they needed to have the lowest possible SFP value, as well as the highest possible energy recovery, which means the highest possible energy efficiency.

The SFP value is a measurement of the fans' specific fan power. To achieve the aim of making the primary school an energy-plus building, the maximum SFP value should be 1.0. The unit's total heat recovery should be around 90 %.

Using a unit from our Envistar range with a thermal wheel and ThermoCooler HP, we can meet the energy efficiency requirements of the primary school.

Since the whole installation for cooling and heating is integrated in one air handling unit, there is no need for additional pumps, pipe work or ancillary items. In this instance there is no need to connect to the district heating network, which also shortens the installation time.

Photo: Omsorgsbygg

Result

- ThermoCooler HP makes the energy-plus project possible
- Extremely energy efficient solution, resulting in savings in energy and money
- Pleasant indoor climate throughout the year which stimulates learning

Property owner: KF Omsorgsbygg, **Client:** Skanska Husfabrikken AS

Project with multiple winners

In 1931, an architectural competition was announced for the design of the new town hall in Sønderborg, Denmark. The competition was won by architect Holger Mundt, whose new building stood ready in 1933. This traditional building on Rådhustorget would go on to become one of the major works of Danish neoclassicism and is still the administrative centre of Sønderborg Municipality.

Over the years, the town hall has been renovated on a number of occasions. The latest project included an overhaul of the ventilation system. In the interests of creating a pleasant indoor climate, one of the requests was for comfort cooling in the building, the principal drawback of which was that the installation of a chiller on the roof would be an unwelcome change to the building's beautiful architecture.

The contractor and the property owner saved a lot of money, as the floor area could be used effectively, and the installation costs could also be lowered. A DX coil and outdoor condenser were not needed as the entire cooling process is integrated into the air handling unit. This meant that the building's exterior architecture could be preserved without disruptive noise in the town centre.

Results

- Preserved architecture with the best indoor climate all year round at the lowest energy cost
- Because the units could be delivered in modules, it was easy to get them into the building
- Using IV Produkt Cloud, the units can be controlled and monitored remotely and the energy efficiency can continuously be followed

Contractor: DP ventilation

Made space for working and living

Nestled between lively Covent Garden and the Strand, this London office space provides an incredible location for creative designers, innovative tech companies, financial institutions, and more. Aldwych House is boldly designed office space in a chic, historic building. A private terrace can be utilised by all for relaxing breaks.

The building is old and was in need of refurbishment and so was the air handling. The previous unit was placed in the basement level where space is very limited. The external condensers took up the terrace space. We suggested our solution with integrated cooling and heating which was very well received. With its compact dimensions, Envistar Flex with ThermoCooler HP fits perfectly in tight spaces.

Since there was no need for an external chiller or condensers the complete installation was in the plantroom. The terrace could then be used as a breakout space rather than a plant space.

Result

- Due to the integrated cooling/heating pump ThermoCooler HP the outdoor terrace can be used
- Installation of AHU with ThermoCooler HP took place in the basement, although the space was limited
- Since the units can be delivered in modules it was easy to get through narrow passages to the basement level

Property owner: Aldwych House, **Contractor:** Celsius

Envistar® Top with ThermoCooler HP

Dimensions (mm)					Air flow (m^3/s) [a]								
Size	Width	Height	Length	Duct connection	Min.	SFP_V 1.5	SFP_V 1.8	Max.	Cooling power (kW) [b]	Refrigerant volume (kg) [c]	External fuse protection [d]	External fuse protection [e]	Weight (kg)
06	890	1910	1720	600 × 250	0.25	0.45	0.58	0.60	13	1.75	16A	Common	310
09	1020	1435	2790 [f]	700 × 300	0.30	0.64	0.78	0.98	15	2.80	16A	Common	450
10	1020	1980	1990	700 × 300	0.30	0.70	0.82	0.98	16	2.70	16A	Common	400
12	1200	1530	2790 [f]	900 × 300	0.43	0.94	1.16	1.20	24	4.10	25A	Common	540
16	1295	1741	2990 [g]	900 × 350	0.49	1.21	1.40	1.60	27	4.90	25A	Common	650
21	1616	1885	2990 [g]	1200 × 350	0.70	1.55	1.84	2.10	33	6.68	32A	Common	830

For heating powers and project specific data please use the product selection program IV Produkt Designer

a - For units with damper, ePM1-50% / F7 filter supply air, ePM10-60% / M5 filter extract air, Blank NE rotor and duct pressure 200 Pa. The max flow is the technical air flow range for the various sizes.

b - Outdoor temperature at +28 °C, 50 % RH and extract air temperature at +22 °C.

c - Refrigerant R410a.

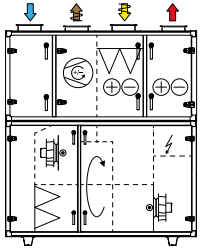
d - 3×400 V+N+PE 50 Hz, fuse with type C characteristics.

e - External fuse protection for the ThermoCooler HP reversible heat pump.

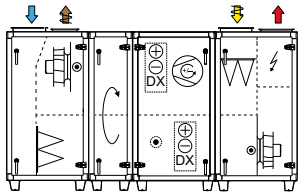
f - Supplied in four sections that have a max. width of 790 mm.

g - Supplied in four sections that have a max. width of 890 mm.

Right or left handed configuration selected during planning.
Below is an example of a right-handed configuration.



The configuration for size 06 and 10.



The configuration for sizes 09, 12, 16 and 21.

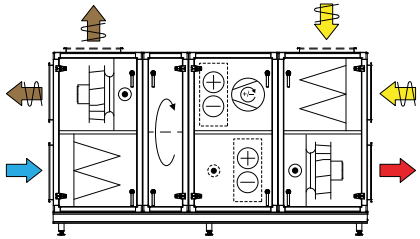
outdoor air | exhaust air | extract air | supply air

The **IV Produkt Designer** product selection program will enable you to select a unit for your project. Download it for free at **ivprodukt.com** or contact us and we will help you.

Envistar® Flex with ThermoCooler HP

Dimensions (mm)						Air flow (m^3/s) [c]								
Size	Width	Height[a]	Length[b]	Duct connection	Power variant	Min.	SFP_V 1.5	SFP_V 1.8	Max.	Cooling power (kW)[d]	Refrigerant volume (kg)[e]	External fuse protection[f]	External fuse protection[g]	Weight (kg)
100	1360	1090	2550	700 × 300	2V	0.25	0.52	0.72	0.95	13.2	2.8	10A	10A	620
150	1460	1470	2850	800 × 500	2V	0.38	0.88	1.11	1.61	21.3	4.6	10–16A	16A	820
190	1740	1470	2850	1000 × 500	2V	0.50	1.29	1.65	2.12	27.1	5.8	10–16A	20A	940
240	1740	1686	2990	1000 × 600	2V	0.58	1.48	1.86	2.48	29.1	7.0	10–25A	20A	1070
300	1956	1686	3020	1200 × 600	2V	0.68	1.89	2.42	2.91	40.1	8.2	10–25A	25A	1160
360	1956	2060	3550	1200 × 800	2V	0.85	2.10	2.72	3.64	48.3	10.1	16–25A	32A	1465
400	2200	1900	3090	1400 × 700	2V	0.92	2.70	3.32	3.93	51.0	10.7	16–25A	32A	1380
480	2330	2060	3850	1400 × 800	2V	1.07	3.13	3.98	4.61	65.1	13.2	16–40A	40A	1930
600	2540	2270	3850	1600 × 800	2V	1.34	3.85	4.83	5.75	81.7	10.4 / 5.8	16–40A	50A	2165
740	2820	2675	4150	2000 × 900	2V	1.71	4.78	5.96	7.34	99.5	14.0 / 6.0	16–63A	63A	2500
850	2900	2935	4150	2200 × 1000	2V	1.98	5.67	6.82	8.47	113.3	14.0 / 9.0	25–80A	80A	2800
980	3200	3085	4150	2400 × 1100	2V	2.38	6.50	8.00	9.95	129.1	17.4 / 12.6	25–80A	80A	3200

Connections for outdoor air, supply air, extract air and exhaust air can be positioned on the upper or lower level. The unit can be supplied in right or left handed configuration. Below is an example of a right-handed configuration.



outdoor air | exhaust air | extract air | supply air

For heating powers and project specific data please use the product selection program IV Produkt Designer

a - Base frame increases the height by 200 mm on sizes 100–600. For sizes 740–980, the base frame is standard. Control cabinet increases the height by 290 mm on sizes 100–190.

b - Control cabinet increases the length by 290 mm on sizes 240–600.

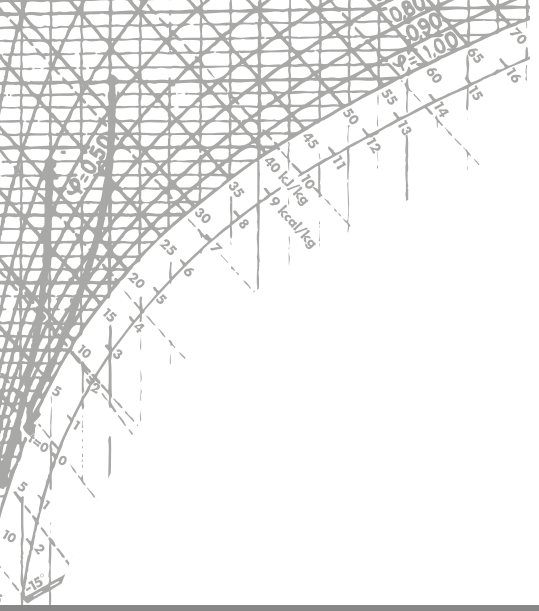
c - For units with dampers, ePM1-50 % / F7 filter supply air, ePM10-60 % / M5 filter extract air, thermal wheel with supply air temp +20 °C and duct pressure 200 Pa. The max flow is the technical air flow range for the various sizes.

d - For outdoor temperature +26 °C, 50 % RH and return air temperature +22 °C.

e - Refrigerant R410a.

f - External fuse protection for the Envistar Flex unit. 3×400V+N+PE 50Hz, fuse with C-characteristics. Fuse protection varies depending on selection of fans/output variants.

g - External fuse protection for the ThermoCooler HP reversible heat pump.



Air handling with focus on LCC

You are welcome to visit us at **www.ivprodukt.com**
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