

# EcoCooler

Integrated, energy-efficient cooling units  
for the Envistar and Flexomix ranges



Creates opportunities  
for a green roof



*Air handling with focus on LCC*





## We have 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.



# Simplified cooling installations free up roof space

Integrated cooling units and heat pumps are a huge success for us here at IV Produkt, with over 20,000 deliveries. Our first integrated cooling unit was launched in the 1980s. 2010 saw the launch of the first EcoCooler – and now we have developed a new generation.

When we develop our products at IV Produkt, we visualise the entire life-cycle chain of the air handling unit. We want to simplify installations, reduce operating costs and minimise

overall capital costs as well. The EcoCooler allows us to meet all these criteria. This cooling unit is fully integrated in air handling systems from the Envistar and Flexomix ranges.

A simplified installation approach means no more coolant coolers on the roof, and less complex cooling systems.

The EcoCooler gives you a complete CE-marked cooling installation which also frees up space on the roof.

## EcoCooler

- Stepless control of temperature
- Capable of handling considerable variations in air flow and cooling power
- Even lower energy consumption
- Low installation and operating costs
- Requires no outdoor installations

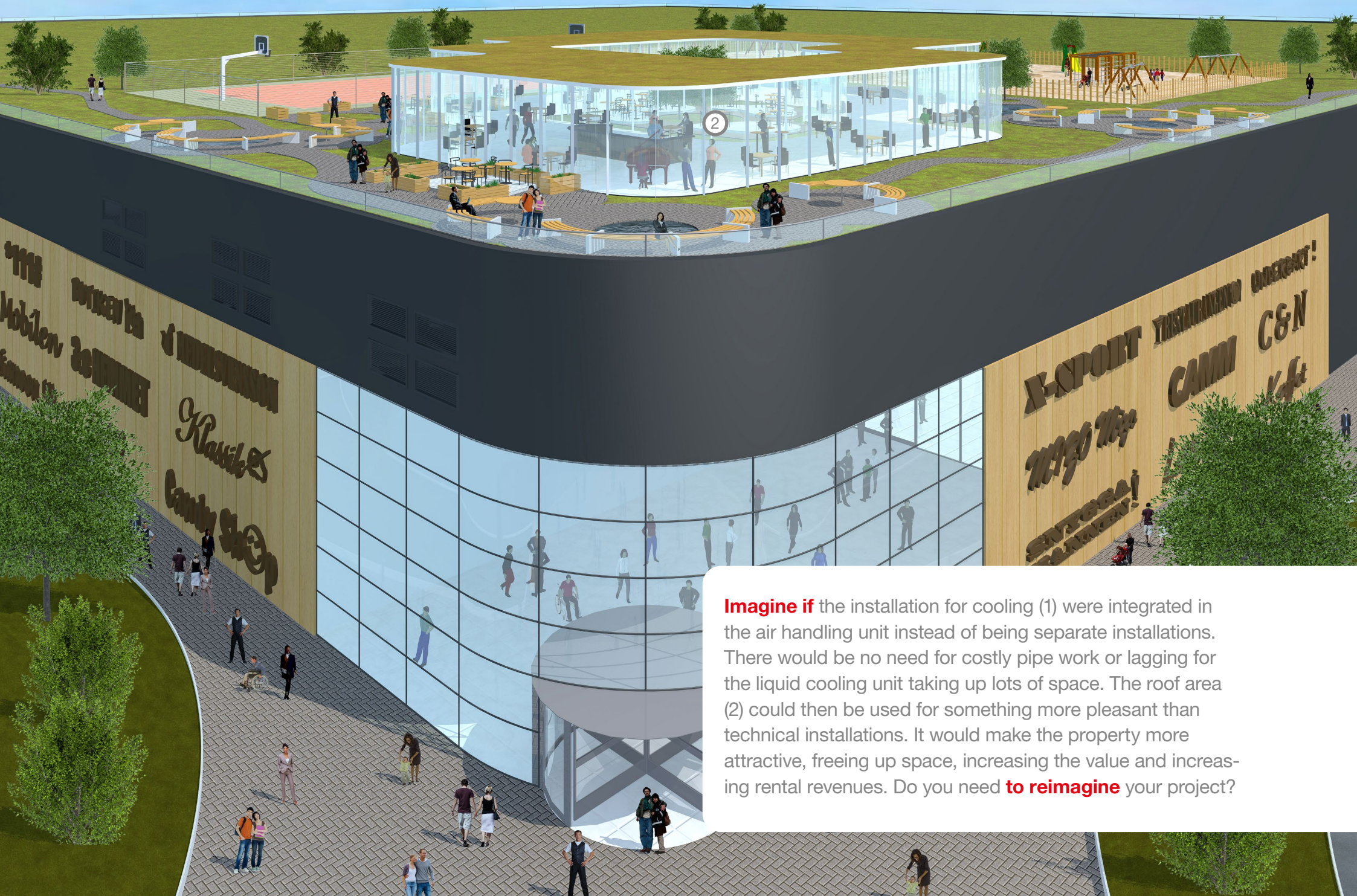




Imagine ...







**Imagine if** the installation for cooling (1) were integrated in the air handling unit instead of being separate installations. There would be no need for costly pipe work or lagging for the liquid cooling unit taking up lots of space. The roof area (2) could then be used for something more pleasant than technical installations. It would make the property more attractive, freeing up space, increasing the value and increasing rental revenues. Do you need **to reimagine** your project?



# Pleasant indoor climate

The EcoCooler integrated cooling unit is available for the Envistar Top, Envistar Flex and Flexomix units.

Units with EcoCooler are always tested at our test facility before delivery. Considerably less energy is required when EcoCooler is integrated in an air handling unit, rather than when the cooling unit is external.

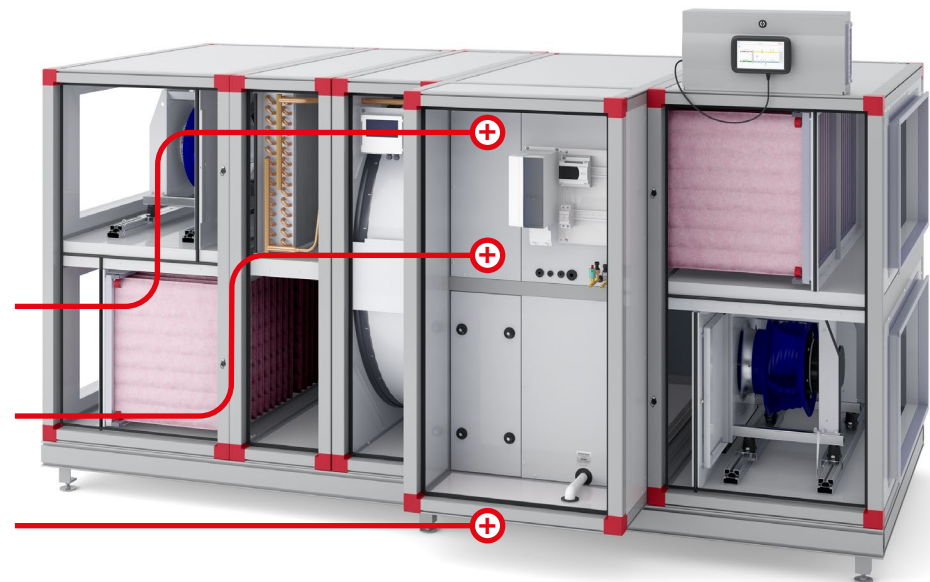
Some buildings encounter major variations in air flow, while requirements are strict for accurate control/regulation of the supply air temperature. EcoCooler meets the requirements through stepless control of the cooling power via a frequency inverter.

- Complete CE-marked cooling installation
- 8 sizes for the Envistar Top series, air flow 0.12–2.8 m<sup>3</sup>/s with cooling power 1.6–75 kW
- 14 sizes for the Envistar Flex and Flexomix series, air flow 0.22–10.4 m<sup>3</sup>/s with cooling power 3–260 kW
- Ideal for large variable air flows, VAV
- Available with cooling recovery

Highly efficient PM scroll compressors

Electronic expansion valves

Separate module to simplify transport into the building





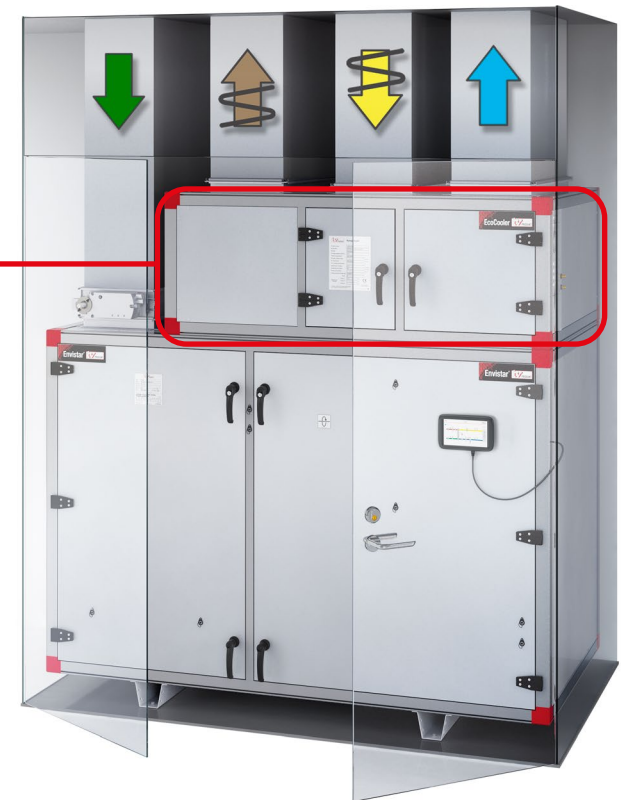
# For all sizes

Envistar Top saves up to 75 per cent of floor space compared to a traditional end-connected installation. This makes Envistar Top the most economic and energy-efficient solution for the available floor space.

The Envistar Top series, like many of our other units, has been specially adapted to allow transport in through narrow door openings and tight passages.

- Simple installation as the EcoCooler is integrated into the air handling unit
- Short build lengths for simple transport and smaller installation spaces
- Smaller refrigerant volumes than for split cooling systems offer a number of advantages as regards costs, environmental aspects and maintenance

## EcoCooler



No outdoor element, such as those commonly found in split systems, is required as the cooling installation is integrated in the air handling unit.



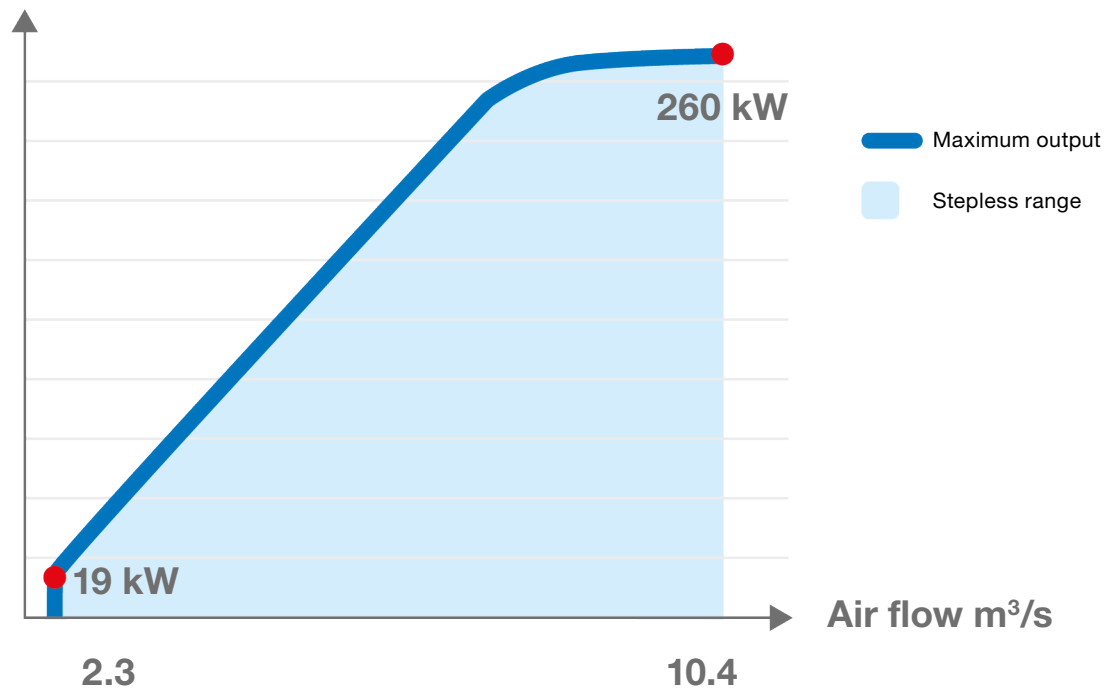
# Stepless control

Some buildings encounter major variations in air flow, while requirements are strict for accurate control/regulation of the supply air temperature. EcoCooler meets the requirements through stepless control of the cooling power via a frequency inverter.

**The benefits** of stepless control are:

- low minimum air flow
- optimal variable performance

Cooling power kW



The diagram shows the working range for the new EcoCooler in its largest size, 1280. The cooling power can be adjusted steplessly from 19–260 kW. The air flow varies from 2.3–10.4 m³/s. The EcoCooler in our smallest size 04, for Envistar Top, has a cooling power from 1.6–7.0 kW at air flows from 0.12–0.35 m³/s.



# Ideal for when the temperature rises

Cooling recovery can be used when the return air temperature is lower than the outdoor temperature. A unit with cooling recovery is the best solution in the case of high outdoor temperatures when there is a great need for cooling. The differences in various operating cases are shown below.

## 1 Without cooling recovery

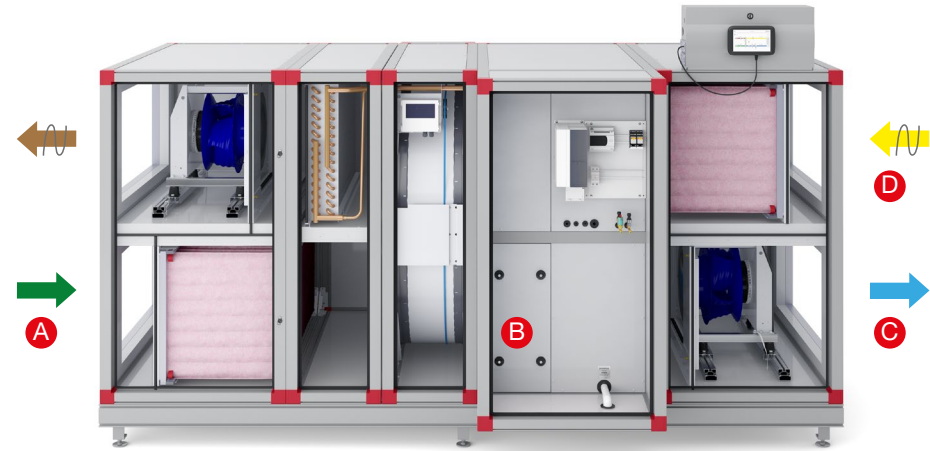
In the first case, the rotor is not operational and so air enters the cooling coil at a temperature of 26°C. Cooling compressor power for the full temperature reduction is needed in order to blow air into the room at a temperature of 16°C.

## 2 With cooling recovery

With 80% cooling recovery, the temperature after the rotor is 22.8°C instead of 26°C. This allows us to save energy and reduce the compressor's power requirement as well, resulting in a better EER.

## 3 Cooling recovery at high outdoor temperature

There is even greater benefit to cooling recovery at higher outdoor temperatures. At 30°C, the temperature after the rotor is 24.4°C, which means that we recover no less than 5.6°C with the rotor. EER together with the rotor increases to 7.8.



Envistar Flex with EcoCooler and cooling recovery

Operating case		1	2	3
Outdoor temperature °C	A	26	26	30
Outdoor humidity % RH	A	50	50	40
Rotor in operation		No	Yes	Yes
Temperature after rotor °C	B	26	22.8	24.4
Supply air temperature °C	C	16	16	16
Return air temperature °C	D	22	22	23
Electrical power, compressors kW/m <sup>3</sup> air		2.6	1.5	2.4
EcoCooler EER		5.3	9.1	7.8

**EER** stands for Energy Efficiency Ratio. This is a measure of how energy-efficient a cooling process is. The higher the number, the better. This figure is the ratio of the amount of energy obtained to the amount of energy required to create it. EER 6 means that you get 6 times as much cooling power in relation to the electrical power used by the compressor.



# EcoCooler **reduces** installation and operating **costs**

All the cooling unit's components are built into the air handling unit. You get a complete CE-marked installation, which is always tested at our test facility.

The integrated solution gives you a turnkey solution for ventilation and comfort cooling which does not require any outdoor installations. A unit with integrated cooling also requires significantly less energy than one with an external cooling unit.

We will notice a significant difference if we compare the cost of traditional installations with several different installers with an integrated solution from IV Product. The cost of installing EcoCooler is 15–40 % lower. The traditional, more complicated installations are frequently split over different physical locations, resulting in more piping being laid

The example below shows calculations for a shopping centre with 15 air handling units.

## Traditional installation

AHU	870 000 €
Cooling installation	953 000 €
<b>Total:</b>	<b><u>1 823 000 €</u></b>

## Installation with EcoCooler

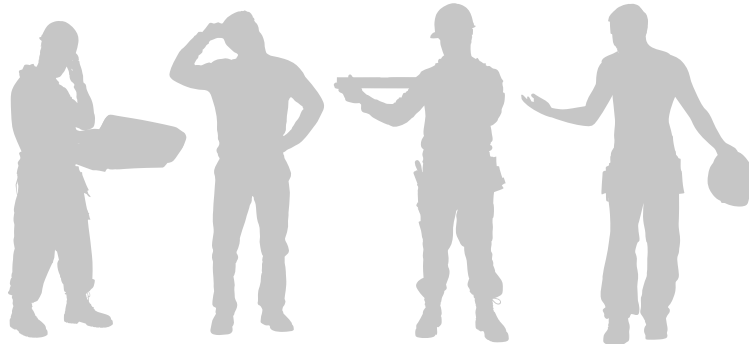
<b>Total:</b>	<b><u>1 368 000 €</u></b>
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**Saving: 455 000 €**



## Traditional installation



A traditional installation with an external liquid cooling unit requires resources for ventilation, construction, cooling and electricity, and for the most part these all have different suppliers.

The project design, tendering and installation process often takes a long time and requires coordination.

## Did you know that...

The operating cost of cooling a building with EcoCooler is very low? For an area of 300 m<sup>2</sup> with 1 m<sup>3</sup>/s air, you will use just approx. 1,000–2,000 kWh per year, depending on the operating time and cooling requirement.

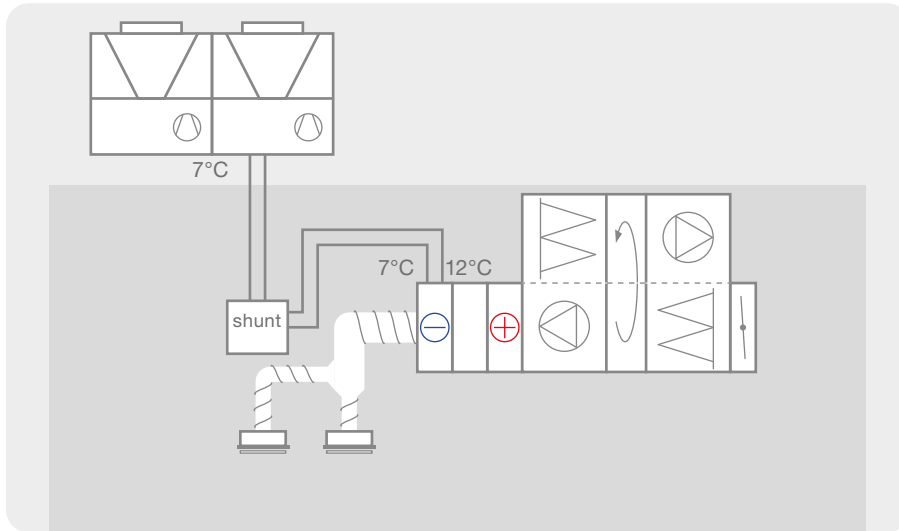
## Installation with EcoCooler



Only **one supplier** is required for installation of air handling units with the integrated EcoCooler cooling unit. This is a major benefit, as it is possible to save a lot of time and coordination resources throughout the entire process, from design to tendering and complete installation.

EcoCooler gives you a complete and tested unit that is ready to be commissioned.

# Comfort ventilation with cooled supply air



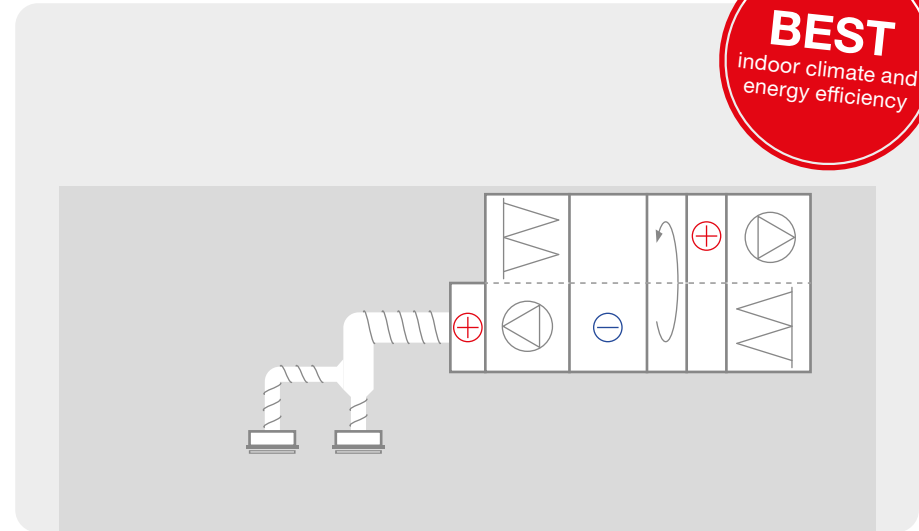
## Traditional installation

In a traditional installation, the ventilation unit cools the supply air using cold water from the liquid cooling unit on the roof.

Installations with liquid cooling units require more demanding maintenance than installations with integrated cooling units. External liquid cooling units frequently cause disruptive noise problems.

Traditional installations take up a lot of roof space that could be used instead to create interesting commercial areas. Roof terraces, gardens, pools – the possibilities are endless when the cooling unit is integrated into the air handling units instead of being placed on the roofs.

As regards energy efficiency, the traditional installation is less effective than an installation with EcoCooler.



## Unit with integrated EcoCooler 🍀🍀

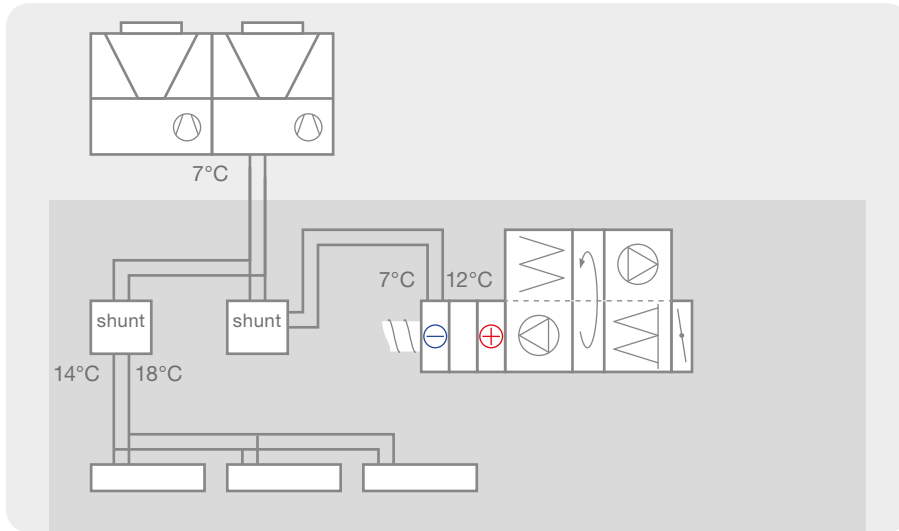
We recommend comfort ventilation with EcoCooler integrated in the air handling unit. The premises can be free-cooled by means of the outdoor air for much of the year. When this is insufficient, EcoCooler starts and cooled supply air is obtained in the most energy-efficient way. The unit has an EER of up to 7.

In many buildings, the air flow varies considerably and a highly accurate supply air temperature is required. EcoCooler can be used in combination with VAV systems, as the cooling power can be adjusted steplessly. EcoCooler is used in combination with active devices if individual control is required in every room.

A simplified installation approach means no more coolant coolers on the roof, and less complex cooling systems.



# Comfort ventilation with cooling baffles or fan convectors/fan coils



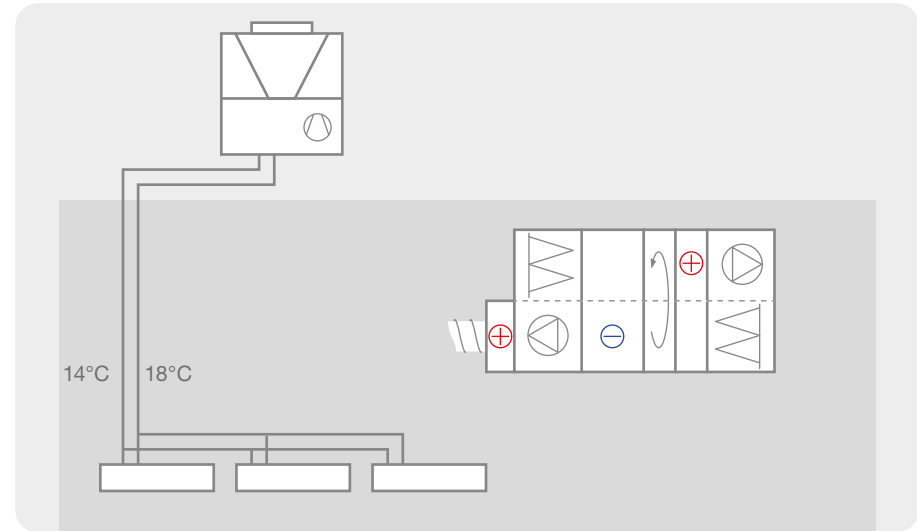
## Traditional installation with cooling baffles

In a traditional installation, the ventilation unit cools the supply air using cold water from the liquid cooling unit on the roof. The internal loads in the rooms are cooled using baffles or fan convectors/fan coils.

The water for the cooling coil in the ventilation unit usually needs to be at 7°C in order to dehumidify the outdoor air.

For cooling baffles and fan convectors/fan coils, the supply water needs to be warmer to prevent condensation. The liquid cooling unit on the roof produces water at 7°C that then has to be shunted to 14°C.

Producing water at 7°C and then shunting it to 14°C is not energy-efficient, and the EER for the liquid cooling unit drops.



## Unit with integrated EcoCooler

To create the most energy-efficient solution, we recommend cooling the supply air with EcoCooler, which is integrated in the air handling unit. The new EcoCooler can give an EER of up to 7.

If cooling the space with baffles or fan convectors/fan coils is desirable, a separate liquid cooling unit can be used to achieve this. In this case, the water for the baffles then only needs to be cooled to 14°C by the liquid cooling unit, which promotes energy efficiency.

This makes the entire system solution more energy-efficient than the traditional installation with cooling baffles and fan convectors/fan coils.

This installation is also simpler and more cost-effective. The liquid cooling unit on the roof may also be considerably smaller.

# Less **energy** for trim heating

A trim heater is available as an optional extra for EcoCooler. You can see below how little additional heating is needed with a highly efficient heat recovery unit. The air volume in most units with VAV systems is usually not 100 per cent of the design flow. Above all, a lower air flow is used when outdoor

temperatures are low. Therefore, the table shows the more realistic reduced flows of 70 and 50 per cent of the design flow. Trim heaters may be a good option for use in systems with high internal loads, such as gyms and shops, resulting in low installation costs.







The trim heater gets its power supply via EcoCooler and can be retrofitted if necessary.

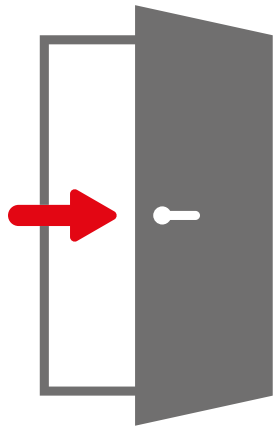
To increase the temperature by 2.5 degrees with the trim heater requires just **789 kWh/year**, according to the operating case in the table

	Design flow			Winter 70% of flow			Winter 50% of flow		
Temperature efficiency %	81			84			85		
Annual mean temperature, °C	6	9	10	6	9	10	6	9	10
DUT °C <b>A</b>	-20	-12	-5	-20	-12	-5	-20	-12	-5
Temperature after rotor °C <b>B</b>	14.0	15.5	16.9	15.3	16.6	17.7	15.7	16,9	18.0
Temperature increase, trim heating <b>C</b>	4.3	3.9	2.5	4.1	2.8	1.7	3.7	2,5	1.4
Temperature increase, fan <b>D</b>	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0,6	0.6
Supply air temperature °C	18.9	20	20	20	20	20	20	20	20
Energy, trim heating kWh/year	3,955	2,698	2,362	2,004	1,320	1,155	1,225	789	691

Calculated with a design air flow of 1 m³/s and an operating time of 3,000 h/year.

# Makes the installers' everyday life **easier**

When we develop AHUs, a lot of effort is invested to make it easy to transport the units into the property. Thanks to our extensive experience, we have developed many smart solutions that make it easy and cost-effective to position the air handling units on the installation site, without impacting on the building. With the concept **Easy Access** many installers' everyday life will be easier.



**easy**  
access  
developed with doors in mind

- Customised modules with minimal dimensions to simplify site transportation
- Significant cost savings



The aim of Easy Access has been to transport as large units as possible through a normal door with a width of 90 cm. Thanks to this, units with an air flow of approximately 4.5 m<sup>3</sup>/s can now be transported through a door with standard dimensions.

Easy Access gives great savings in time and costs compared to delivering the units in flat packs and assembling on site. Installation is faster, and hole making or other impacts on the building can be avoided.



## Complete CE-marked units

Our integrated cooling units EcoCooler and reversible heat pumps ThermoCooler HP can, with the new concept Easy Access, be supplied in split versions. The assembled unit is tested in our production facility in Växjö, to ensure optimal performance and CE marking before delivery. Service personnel, certified by us, join and fill the cooling circuit and perform installation leakage testing on the installation site.



An air handling unit with the measurements W 2220 × H 2465 × L 3760 mm can be transported into the plant room through a door with standard dimensions with our new concept Easy Access.



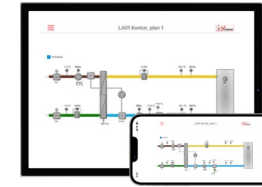
## Quick and easy with smart electrical connections

Through smart design, the fitter can quickly and easily handle the units' electrical connections on site in the plant room.



Scan the code to visit  
[www.ivprodukt.com/easy-access](http://www.ivprodukt.com/easy-access)  
and experience the concept.

# Control and adjust with our app IV Produkt AHU Controls



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.

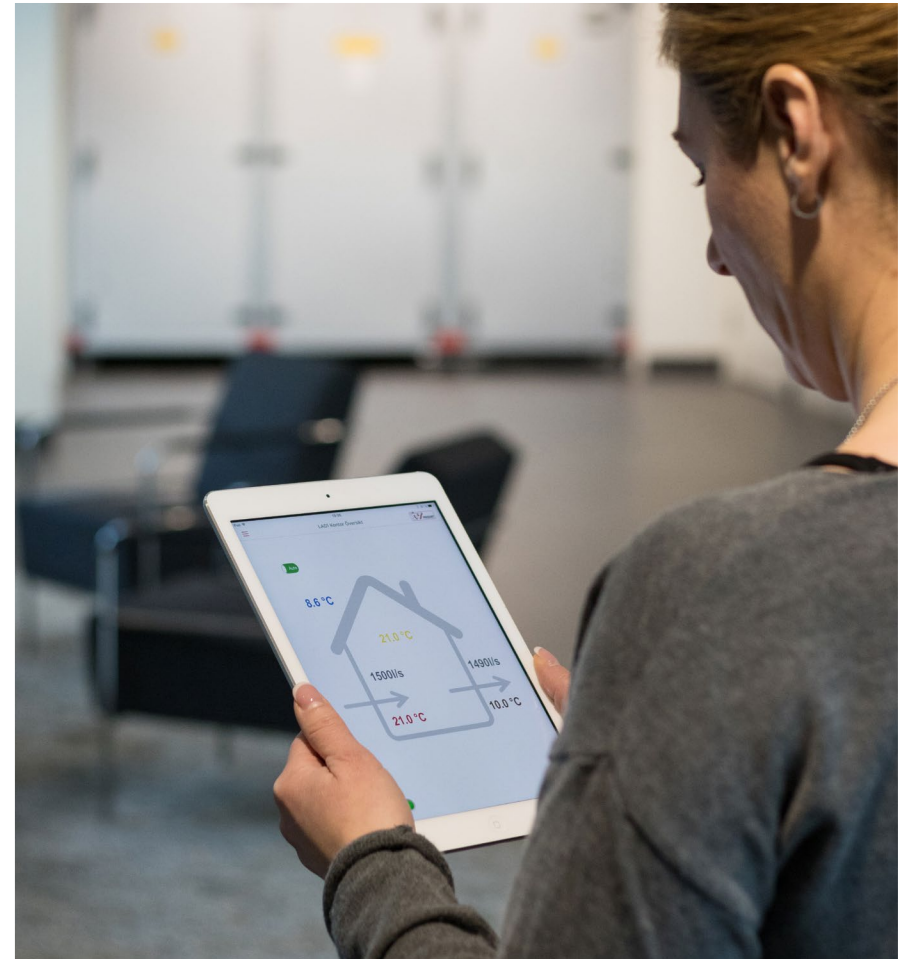
If you cannot connect the unit to the internal network, we can provide a Wi-Fi router for the unit.

## 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



The app is available to download for free for iOS and Android™. You can adjust setpoints and settings, see any alarms and much more without needing to be in the plant room.





# Full control – no matter where you are



## IV Produkt Cloud service

IV Produkt Cloud is a cloud service for our air handling units with integrated control, in which you and your colleagues will be able to keep track of your systems no matter where you are. The cloud service is always accessible wherever there is internet access. In other cases, there is an optional 4G router.



IV Produkt Cloud is available as a free subscription called Free, and a paid subscription called Service+. The new administrative service Digital Wallet helps you manage your subscriptions.



- Completely free subscription
- See status and flow chart and reset alarms
- Service+ included the first month



- Full access to change control functions and adjust values
- Alarm notifications, history and upgrades
- Good for balancing and commissioning
- Remote support capability from us at IV Produkt

## Lower your costs with Digital Wallet

For you who have multiple air handling units and wish to manage your own account. Switch between Free and Service+ subscriptions as the requirements of the system change.



# Adapted energy efficiency

Erikslund Shopping Center in Västerås welcomes around 6.3 million visitors each year – both locals from Mälardalen and visitors from further away. More than 70 shops are distributed over two levels, depending on their specialisations. The total shop-floor area, including IKEA, is 80,000 sq m.

Although this shopping centre was built relatively recently, the air handling – provided by a previous supplier – was not working as required. So in 2017, they decided to replace many of the units. We supplied 15 units from our Envistar Flex series with the EcoCooler integrated cooling unit. The units were

supplied with cooling recovery in order to achieve the best possible energy efficiency. This involves an integrated rotary heat exchanger for cooling recovery in sequence with the cooling unit. This maximises energy utilisation and ensures a low connected power load. Our units come with stepless adjustment of the cooling power.

The air flow inside the property varies widely, and a high level of accuracy is required when controlling the supply air temperature in order to maintain the best possible indoor climate – and EcoCooler copes admirably.



## Results

- The best indoor climate all year round
- Cooling recovery for the greatest possible energy efficiency

**Property owner:** IKEA Centres **Contractor:** Assemblin Västerås



# Green roof surfaces **place demands** on ventilation and cooling installation

Hans Christian Andersen's House in central Odense is a spectacular museum. Visitors are able to experience the author's universe through architecture, sound, light, and images.

The museum has an area of 5,600 m<sup>2</sup>, and is expected to receive 200,000-300,000 visitors per year. Six Air Handling Units from our Envistar Flex and Flexomix series have been installed with the integrated EcoCooler cooling unit. This ensures the museum has a good indoor climate with a comfortable temperature – even when there are many visitors. The ventilation solution is also adapted to protect the objects in the museum.

In central Odense, major excavation was carried out to build the museum. Parts of the building are below ground level. Small gardens and beautiful roofs can be seen from street level. It was important to install the ventilation units indoors so as not to adversely affect the outdoor architecture.

IV Produkt was chosen as the preferred supplier due to the company's extensive experience in integrated cooling in air handling units and the many sizes in the range.



## The results

- A good indoor climate for the high number of visitors
- A ventilation solution that creates a suitable climate for museum objects
- Units installed indoors so as not to adversely affect the architecture outdoors

**Property owner:** Odense Municipality

# Creating an **excellent** work environment

Not far from MalmöMässan is the eXlent office building – an extraordinary property offering smart solutions and with ambitious environmental goals. This building is certified as “Excellent” according to BREEAM, the world’s most stringent environmental certification system.

The office space, covering just over 7,000 sq m, was ready to move into in 2016 and all offices have now been let. NCC themselves have offices in one part of the building.

NCC’s concept when building this office property was that “Carefully planned premises result in healthier employees who perform better. Operating out of a property that holds environmental certification lends credibility both internally and externally. This results in stronger customer relations, proud staff and is an advantage when recruiting new colleagues.”

We supplied EcoCooler with cooling recovery for the project. The energy efficiency of the units was a contributory factor in the awarding of the environmental certification.

EcoCooler is used in combination with a VAV system here, creating demand-based ventilation.



Picture from NCC. Photo: Martin Palvén

## Results

- Certification in accordance with BREEAM was made possible
- An attractive property as there are no outdoor installations
- A single supplier for units, cooling, control and regulation

**Property developer:** NCC Property Development AB

**Property owner:** Castellum **Contractor:** VEAB

# With the indoor climate **in mind**

Gekås Ullared is the most popular destination for visitors in Sweden, welcoming almost 5 million visitors each year. Shopping, accommodation, food and events all help to create an extraordinary experience.

This place is incredibly popular and attracts visitors from both far and wide. The department store building is now being extended, from 90,000 to 120,000 sq m.

We have supplied the air handling units for a number of phases of this ever-expanding location. The latest phase of the expansion required the supply of units with a total air flow of 50 m<sup>3</sup>/s.

The renovated department store covers an area of around 45,000 sq m and will be able to welcome up to 9,000 simultaneous visitors, no matter what the time of year. This is why stringent demands are being made of the indoor climate.

The air handling units have long operating times, which makes energy efficiency a crucial factor in operating costs.



## Results

- The best indoor climate possible
- Minimal operating and installation costs
- Short installation time

**Property owner:** GeKås **Contractor:** Falkenbergs Rör



# EcoCooler

## Envistar Top with rotary heat exchanger

Size		04	06	09	10	12	17	22	28		
Power variant		2V	2V	2V	2V	1V	2V	2V	2V	1V	2V
Air flow, min.	m³/s	0.12	0.15	0.20	0.20	0.25	0.25	0.41	0.61	0.8	0.8
Air flow, max.	m³/s	0.35	0.60	0.94	0.95	1.15	1.15	1.60	2.10	3.0	3.0
Max. cooling power with cooling recovery <sup>a</sup>	kW	6.5	12.2	19.2	18.3	18.3	20.3	41.4	60	69	77
Power requirement compressor with cooling recovery <sup>a</sup>	kW	1.1	2.6	2.7	3.6	2.7	3.6	6.5	10.6	10.0	13.0
No. of compressors	units	1	1	1	1	1	1	1	1	1	1
Max. operating current	A	6.5	18.0	23.0	23.0	18.0	23.0	13.5	23.0	23.0	28.2
Recommended fuse protection 230V+N 50 Hz	A	10	20	25	25	20	25	-	-	-	-
Recommended fuse protection 3 × 400V+N 50 Hz	A	10	20	25	25	20	25	25	32	50	50
Refrigerant volume, circuit 1 <sup>b</sup>	kg	1.0	1.4	1.7	1.7	2.1	2.1	3.7	5.1	7.0	7.0

## Envistar Top with counter-flow heat exchanger

Size		04	06	09	10	12	17	22	28
Power variant		2V	2V	2V	2V	2V	2V	2V	1V/2V
Air flow, min.	m³/s	0.12	0.15	0.25	0.25	0.30	0.50	0.68	0.92
Air flow, max.	m³/s	0.35	0.60	0.95	0.95	1.15	1.65	2.00	3.00
Max. cooling power <sup>a</sup>	kW	6.3	11.2	14.1	17.5	20.6	27.4	40	45 / 51
Power requirement compressor <sup>a</sup>	kW	0.9	2.4	3.2	3.6	7.2	9.6	10.6	10.0 / 12.7
No. of compressors	st	1	1	1	1	1	1	1	1
Max. operating current	A	6.5	18.0	7.2	23.0	10.7	13.5	23.0	23.0 / 28.2
Recommended fuse protection 230V+N 50 Hz	A	10	20	-	25	-	-	-	-
Recommended fuse protection 3 × 400V+N 50 Hz	A	10	20	16	25	20	25	40	50
Refrigerant volume, circuit 1 <sup>b</sup>	kg	1.0	1.4	1.8	1.7	2.7	3.7	5.1	7.0

For object-specific and the most up-to-date data, see the product selection program IV Produkt Designer

a - Applicable at outdoor air temperature +28°C, RH 50%, return air temperature +22°C and rotor in hygroscopic configuration.

b - The refrigerant can be selected between R454B or R410A. Technical data shows that R454B and R410A have similar performances. For more detailed data download the IV Produkt Designer.

# EcoCooler

## Envistar Flex and Flexomix

Size		100	150	190	240	300	360	400	480	600	740	850	980	1080	1280											
Power variant		2 V	2 V	2 V	2 V	2 V	2 V	2 V	1 V 2 V	1 V 2 V 3 V	2 V 3 V	1 V 2 V 3 V	1 V 2 V	1 V 2 V 3 V	1 V 2 V 3 V											
Air flow, min.	m <sup>3</sup> /s	0.22	0.33	0.42	0.49	0.57	0.74	0.8	0.93	0.93	1.16	1.16	1.16	1.42	1.42	1.61	1.61	1.61	1.95	1.95	2.02	2.02	2.02	2.28	2.28	2.28
Air flow, max.	m <sup>3</sup> /s	1.01	1.63	2.09	2.44	2.87	3.71	4.00	4.66	4.66	5.78	5.78	5.78	7.08	7.08	8.06	8.06	8.06	9.77	9.77	10.14	10.14	10.14	11.46	11.46	11.46
Max. cooling power with cooling recovery <sup>a</sup>	kW	17.8	26.3	35.6	36.6	47.2	59.5	66.3	51.4	84.6	64.7	89.0	104.6	95.6	129.8	101.0	121.5	151.4	105.5	162.0	149.6	154.3	194.3	167.4	190.6	225.0
Max. cooling power without cooling recovery <sup>b</sup>	kW	13.5	20.4	27.0	28.1	39.2	46.1	50.6	54.6	65.2	56.2	68.1	80.6	73.1	100.2	77.2	92.9	116.3	79.7	124.9	103.6	126.1	151.5	115.0	139.7	177.3
No. of compressors	st	1	1	1	1	1	1	1	1	1	1	2	1	2	1	2	2	1	2	2	2	3	2	2	3	
Max operating current	A	7.2	10.7	13.5	13.5	21.4	26.1	28.2	28.2	36.7	28.2	36.7	45.9	36.7	56.3	36.7	45.9	60.5	36.7	63.6	45.9	57.9	75.9	48.5	63.6	90.6
Recommended fuse protection 3x400V+N 50 Hz	A	10	16	20	20	25	32	32	32	40	32	40	50	40	63	40 <sup>c</sup>	50	63	40 <sup>c</sup>	80	50	63	80	50	80	100
Refrigerant volume, circuit 1 <sup>d</sup>	kg	1.7	2.9	3.7	4.1	5.1	6.0	6.8	8.1	8.1	7.6	7.6	6.2	10.1	9.3	11.5	9.3	9.3	14.6	10.4	11.3	11.3	7.1	12.9	12.9	9.5
Refrigerant volume, circuit 2 <sup>d</sup>	kg	-	-	-	-	-	-	-	-	-	-	-	3.6	-	4.14	-	5.9	5.9	-	7.4	7.1	7.1	5.8	9.0	9.0	6.7
Refrigerant volume, circuit 3 <sup>d</sup>	kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.8	-	-	6.7	

a - Applicable at outdoor air temperature +28°C, RH 50%, return air temperature +22°C and rotor in hygroscopic implementation.

b - Applicable at outdoor air temperature +28°C, RH 50% and return air temperature +22°C.

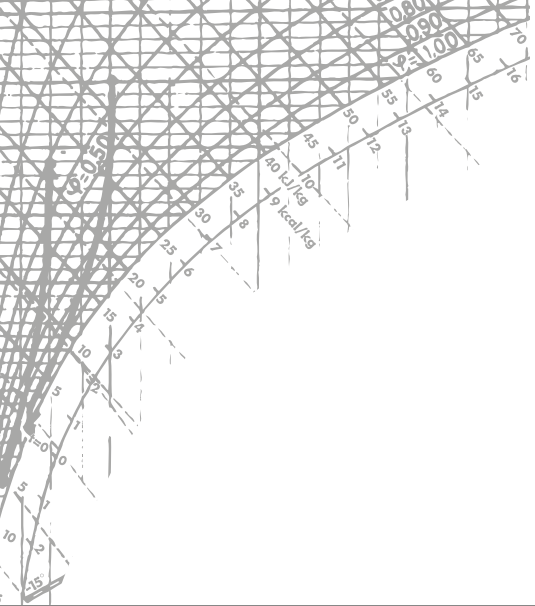
c - 50A for units equipped with trim heaters.

d - The refrigerant can be selected between R454B or R410A. Technical data shows that R454B and R410A have similar performances. For more detailed data download the IV Produkt Designer.

For object-specific and the most up-to-date data, see the product selection program IV Produkt Designer

The **IV Produkt Designer** product selection program will give you everything you need to select a unit for your project. Download it for free at [ivprodukt.com](http://ivprodukt.com) or contact us for assistance.





# Air handling with LCC in focus

**You are welcome** to visit us at [www.ivprodukt.com](http://www.ivprodukt.com), or contact us to find out more.

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