

COMFORT

ROOFTOP UNITS

WTA

**PACKAGED FRESH AIR UNIT,
AIR FLOW FROM
2100 TO 12600 m³/h**

- ▶ Perfect air quality
- ▶ Zero energy waste
- ▶ Plug and play approach
- ▶ Continuous control system



**TODAY'S COMFORT,
GROWING ATTENTION TO
ENERGY EFFICIENCY AND
CHALLENGING
ARCHITECTURAL
DESIGNS REQUIRE
EXTREMELY EFFICIENT
COOLING SYSTEMS.**

AIR RENEWAL



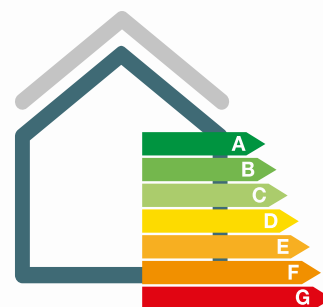
The time spent in closed rooms exposes us to various types of pollutants that degrade the air in the environment and worsen the level of comfort, generating physical and mental discomfort for the occupants. For this reason the regulations require the adoption of ventilation systems able to renew the air and ensure that people live in a safe and healthy place.

The solution is a primary air system that treats and purifies the outdoor air before it is delivered into the indoor environment through the fan section combined with a treatment section.

ENERGY EFFICIENCY

The primary air system usually is the most energy intensive system inside the building, accounting for the majority of total energy consumption. The fan section ensures a continuous supply of air and the treatment section takes and treats the outdoor air before delivering it into the indoor environment.

Aiming at generating sustainable systems with minimum environmental impact, this system is therefore essential to minimize energy waste and operating costs, while fulfilling regulatory constraints.



PLANT SIMPLIFICATION



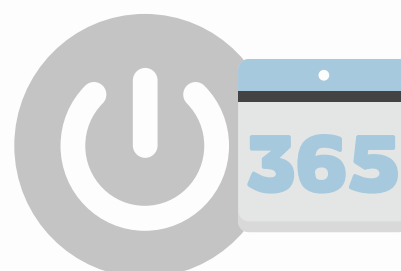
Traditionally, the primary air distribution involves expensive ducts work and fluid distribution in order to connect the air handling units with the central cooling/heating plant and the air distribution system.

Therefore, it is important to find innovative solutions to reduce the operations of installation and maintenance, to streamline the technical spaces and reduce the risk of failure and malfunction.

RELIABILITY AND OPERATIONAL AUTONOMY

The main function of a primary air unit is to ensure continuous air renewal within the environment. Therefore, the proper and continuous operation of the unit is at utmost importance.

The control system must allow for an easy and automatic resource management in every operating condition, in order to achieve high levels of efficiency and integration.



THE SOLUTIONS

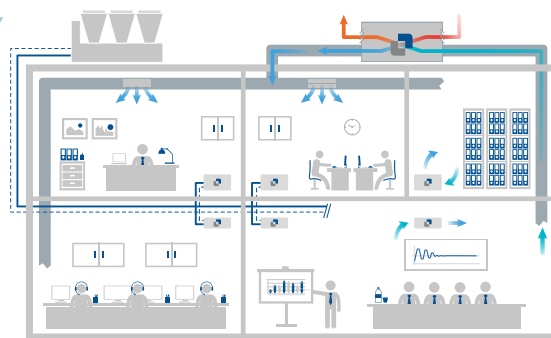
Perfect air quality, minimum annual consumption and easy integration with other systems: this is what air renewal means to Climaveneta.



PERFECT AIR QUALITY

The use of the latest technologies in a product specifically designed for air renewal, makes WTA the ideal solution for the primary air treatment in commercial and industrial buildings.

The outside air is filtered and treated by the autonomous WTA unit that can easily be integrated into air conditioning systems such as chillers with hydronic terminals or direct expansion systems.



ZERO ENERGY WASTE

The energy costs for the air renewal can be dropped. The combination of both an active and a static heat recovery system ensure the extraction of all the energy contained in the exhaust air in order to reuse it to condition the renewed air.

Moreover, the smart management of both the free cooling system and the by-pass of the static heat recovery eliminates all the unnecessary energy waste.



PLUG AND PLAY APPROACH

Everything needed for the air renewal is inside a single and compact structure, where all the spaces are specifically designed to ensure easy access to internal components.

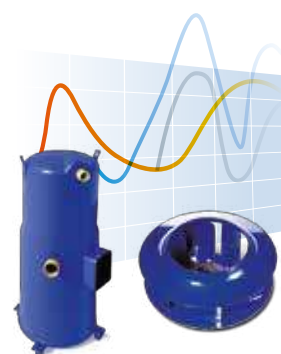
Transportation and installation is greatly simplified, operation times are halved and thanks to the electronically controlled fans the calibration phase is completely eliminated.



HIGHLY PRECISE CONTINUOUS REGULATION

Advanced control logics and technical components with high-capacity adjustment, such as EC plug fans and inverter driven compressors, perfectly answer the various thermal and renewal air requirements.

The continuous and precise modulation of all of the resources provide perfect ambient comfort and a drastic drop in the energy consumption.



TECHNOLOGICAL CHOICES

INVERTER DRIVEN COMPRESSOR



The use of variable speed scroll compressors allow the modulation of the thermal capacity of the unit in a continuous, automatic and precise way.

The unit can deliver exactly the required power, with zero energy waste and maintaining constant the air supply temperature.

This system, in particular under partial load working conditions, ensures the greatest comfort level for the occupants without generating annoying temperature fluctuations.

PLUG FANS WITH ELECTRONIC CONTROL

The air circulation comes from the plug fans with backward blades and electronically controlled brushless motors.

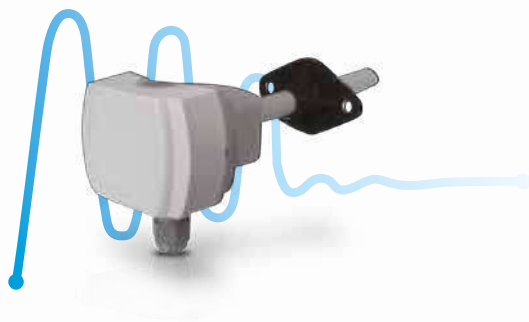
These fans achieve maximum reliability and high efficiency within a wide operating range.

The impellers are made of an innovative composite material, which is very light and resistant to corrosion. The result is a more efficient, lighter, and quieter performance than the previous steel fans.



Resulting from an accurate design, the new WTA boasts innovative technical and structural features that make this unit the ideal solution for modern buildings.

OPTIMIZED CONTROL OF AIR FLOW



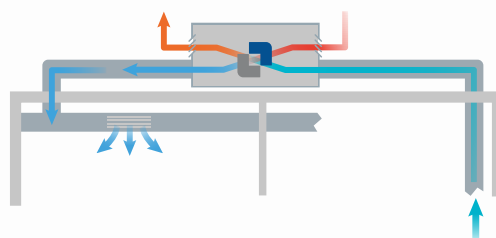
The electronic control of the rotary speed ensures perfect regulation of the supply and return air flow. The air flow can be set directly from the controller and then it is kept constant during the unit's operation in order to precisely respond to the requirements of the distribution system.

Alternatively, the air flow can be dynamically varied thanks to a regulation probe CO₂ or CO₂+VOC probes: according to the real requirements, the unit controls the fan speed in a way that controls the necessary air flow, ensuring large energy savings.

THERMODYNAMIC RECOVERY

The expulsion air is used as a precious energy source for the thermodynamic circuit. Instead of using the outside air as an exchange source, the coil makes use of the indoor air that has a more suitable temperature.

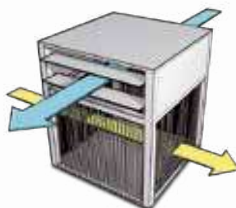
This allows the system to work with more favourable condensing and evaporating temperatures, strongly increasing the overall efficiency of the circuit.



HEAT RECOVERY SYSTEM WITH BY-PASS



Standard working mode



Free cooling working mode

WTA units feature a heat recuperator with crossed air flows that can convey the heat from the expulsion air to the renewal air. In this way the intake air directed to the coil has a more favourable temperature which can extend the working limits of the unit.

Moreover, to further increase the efficiency of the unit, the crossed air flow recuperator features a dedicated damper to exploit the by-pass system. When outdoor air temperatures get low and are very close to the expulsion air temperature, it is more convenient to by-pass the cross-flow recuperator in order to reduce the energy consumption of the unit.

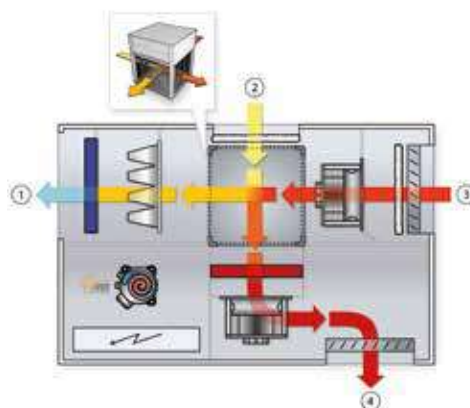
WORKING MODES

COOLING MODE

- 1- Supply air
- 2- Ambient air
- 3- Outdoor renewal air
- 4- Expulsion air

In the cooling mode, WTA treats the outdoor warm air and then delivers it into the environment in neutral conditions, with a controlled supply air temperature.

The by-pass damper remains closed in order to completely recover the energy of the expulsion air in the double recovery, transferring it to the renewal air and then to the cooling circuit.

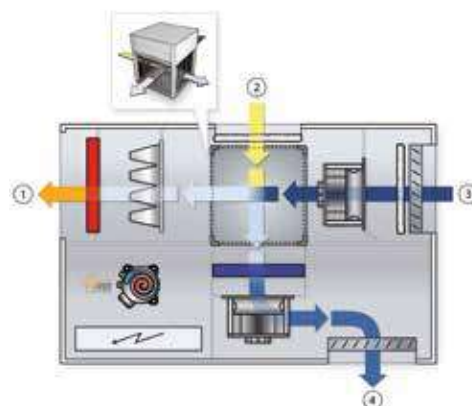


HEATING MODE

- 1- Supply air
- 2- Ambient air
- 3- Outdoor renewal air
- 4- Expulsion air

In the heating mode the WTA unit treats the outdoor fresh air in order to deliver it to the environment in neutral conditions, with a controlled supply air temperature.

The by-pass damper remains closed in order to fully recover the energy of the expulsion air in the double recovery, transferring it to the renewal air and then to the cooling circuit.

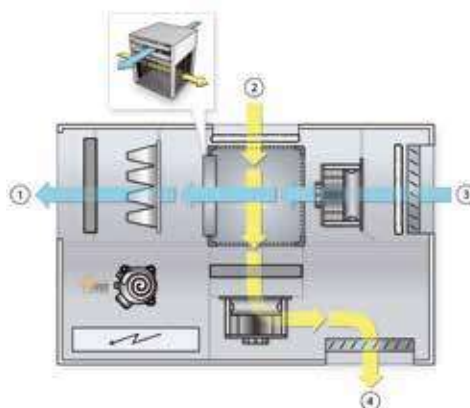


BY-PASS PLATE HEAT EXCHANGER. FREE COOLING

- 1- Supply air
- 2- Ambient air
- 3- Outdoor renewal air
- 4- Expulsion air

In the recuperator by-pass operation, the WTA unit treats the outside air, which is at favourable conditions, in order to deliver it to the environment in neutral conditions and without the contribution of the cross-flow recovery system.

The by-pass damper is opened in order to optimize the unit's operation and the air treatment is ensured by the inverter compressor that controls the power until it is switched off and the free cooling system can be adopted.





UNIT FOR PRIMARY AIR RENEWAL AND FILTRATION. AIR FLOW FROM 2100 TO 12600 m³/h

WTA		0021	0026	0033	0041	0051	0064	0080	0100	0126
Cooling										
Total cooling capacity	kW	13,2	16,2	20,9	27,2	32,4	39,7	51,1	64,6	76,3
Heat recovery cooling capacity	kW	3,0	3,7	4,7	6,2	7,7	9,7	12,0	15,0	18,9
Compressors power input	kW	3,7	5,4	7,0	8,6	10,8	13,9	16,7	20,5	20,4
EER compressors		2,74	2,29	2,31	2,43	2,29	2,16	2,34	2,43	2,82
EER compressors + recovery		3,54	2,98	2,98	3,15	3,00	2,85	3,06	3,16	3,74
Heating										
Total heating capacity	kW	12,7	14,0	19,7	23,2	27,9	32,3	41,0	51,9	66,2
Heat recovery heating capacity	kW	4,3	5,3	6,8	9,0	11,1	13,9	17,2	21,5	27,1
Compressors power input	kW	1,4	1,4	1,9	2,2	2,7	2,6	3,8	5,1	6,6
COP compressors		5,85	6,18	6,79	6,46	6,19	7,07	6,26	5,95	5,96
COP compressors + recovery		8,86	9,96	10,37	10,55	10,27	12,42	10,79	10,16	10,08
Supply fans										
Supply air flow rate	m³/h	2100	2600	3300	4100	5100	6400	8000	10000	12600
Available external static pressure	Pa	250	250	250	250	250	250	250	250	250
Total power input	kW	0,57	0,69	0,92	1,11	1,56	1,86	2,21	2,85	3,51
Return/expulsion fans										
Return air flow rate	m³/h	2100	2600	3300	4100	5100	6400	8000	10000	12600
Available external static pressure	Pa	200	200	200	200	200	200	200	200	200
Total power input	kW	0,56	0,68	0,91	1,16	1,62	1,98	2,34	3,06	3,74
Compressors										
No. compressors / No. Circuits	N°	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
Size										
Length	mm	3220	3220	3220	3520	3520	3520	3520	3520	3520
Width	mm	1700	1700	1700	2250	2250	2250	2250	2250	2250
Height	mm	1260	1260	1260	1500	1500	1500	2300	2300	2300

Cooling: Outdoor +35°C 45% U.R. / Indoor 26°C 50% U.R. / Supply 21°C

Heating: Outdoor 7°C 87 % U.R. / Indoor 20°C 50% U.R. / Supply 22°C

The units highlighted in this publication contain HFC R410A [GWP₁₀₀ 2088] fluorinated greenhouse gases.

ACCESSORIES



Air flow regulation with CO2 or CO2+VOC

The CO2 or CO2+VOC probes controls the air quality in the environment, regulating and optimizing the quantity of the renewal air.



High quality filters

Highly efficient filtration (bag filters or electronic filters) for those applications where the renewal air can never be contaminated. To be used in addition to the standard G4 sp 98mm filtration.



Pre-treatment water coil with 3-way valve

Pre-treatment water coil to extend the working limits of the unit. It is possible to manage the coil through the adoption of a 3-way valve.



Precise temperature control

Advanced air supply temperature management, even in the most critical compressor operating conditions to avoid temperature fluctuations.



Silencers

The compressor box is insulated with a special pad to reduce noise emissions.



Supervision systems

Connections with BMS systems through the most widespread communication protocols.



Protection coil treatment

Protection coil treatment in case of installation in aggressive environments.



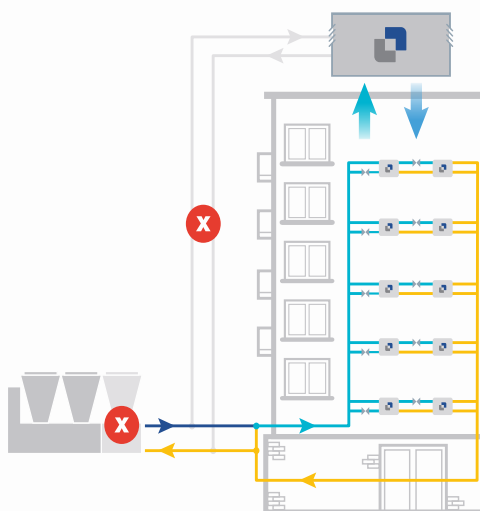
Comparison between technologies

THE PLANT DESIGN WITH WTA

The autonomous WTA unit strongly simplifies the plant layout avoiding the secondary air conditioning system to treat the primary air.

In general the plant design including the WTA unit allows to:

- ✓ Eliminate the system's connections (pipes, pumps and regulation of the fluid distribution) between the heating/cooling plant and the air handling units responsible for treating the primary air.
- ✓ Reduce the size of the heating/cooling units because they are not required anymore to produce the necessary power for treating the outdoor air.
- ✓ Ensure higher design flexibility and a better plant layout, so that the units can be positioned more accurately reducing the footprint and installation timing.



COMPARISON BETWEEN TECHNOLOGIES: WTA versus Traditional plant for the air renewal treatment

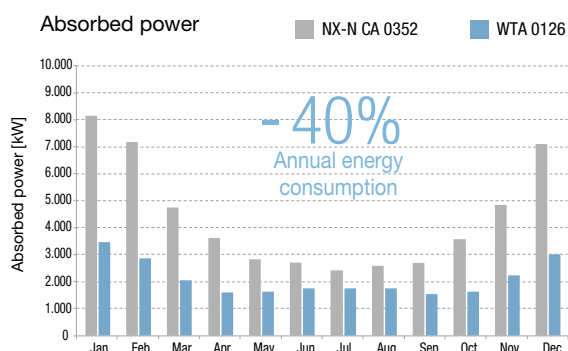
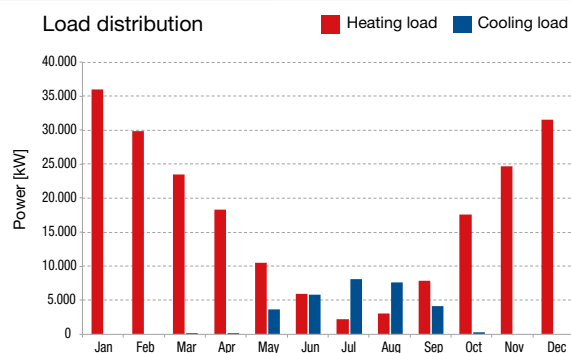
We have considered a typical installation of the tertiary sector located in Milan: an office building requiring constant renewal air 12 months a year, 6 days a week, from 8 a.m. to 10 p.m.

The two solutions taken into consideration are:

- Heat pump with scroll compressor (NX-N CA 0352+UTA)
- WTA 126.

According to the thermal profile of the city, the chart shows that the thermal load is much higher compared to the the cooling load. The adoption of the heat recovery system is therefore necessary.

Load distribution



THE RESULTS

In both the plant layouts, we have supposed to make use of equivalent fan sections. The values illustrated on the chart refers to the energy consumption of the refrigerant circuit alone.

The results reveal that the autonomous fresh air unit ensures annual energy savings around 40% compared to a traditional plant system using a hydronic unit for the production of hot and cold water and a air handling unit.

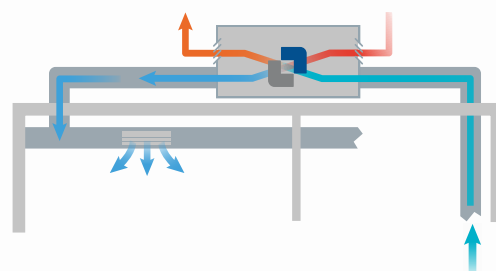
Minimum energy consumption, widest operating range and highest reliability.
Everything needed for the air renewal is inside a single compact unit.

THE DOUBLE RECOVERY

The heat recovery allows to extract the expulsion air energy in order to transfer it to the renewal air on the by-pass plate exchanger and to the cooling circuit on the thermodynamic recovery system. The perfect combination among the double recovery, the thermodynamic-and the static recovery, ensures not only premium levels of efficiency but also highest reliability over a wide operating range.

With extreme outdoor temperatures, both in cooling and heating modes, the static recovery allows to:

- ✓ Treat freely the renewal air before it goes to the treatment coil.
- ✓ Remain within the working limits of the cooling circuit
- ✓ Ensure a controlled temperature of the supply air



COMPARISON BETWEEN TECHNOLOGIES:

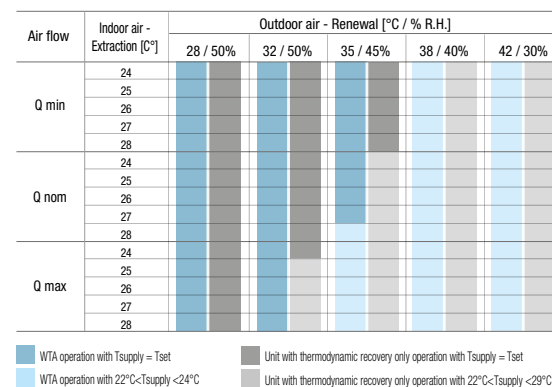
WTA with double heat recovery versus unit with thermodynamic recovery only

For the analysis, we have considered the performance level of two WTA units adopting different technologies: a WTA unit using the plate heat exchanger and a WTA without this component.

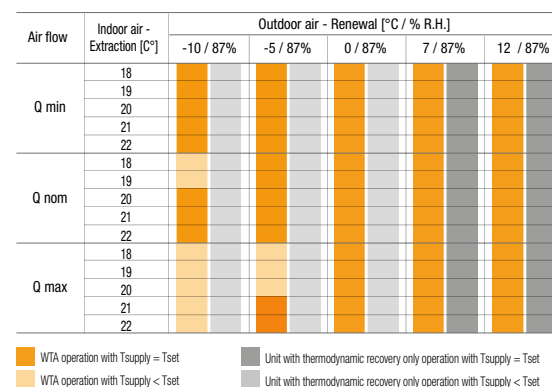
The selected units featured the same size and presented the same working conditions. The chart shows the operating range of the two solutions in which the supply air temperature is ensured as per design conditions.

Supply air temperature in cooling mode: 21°C
Supply air temperature in heating mode: 20°C

Summer mode



Winter mode



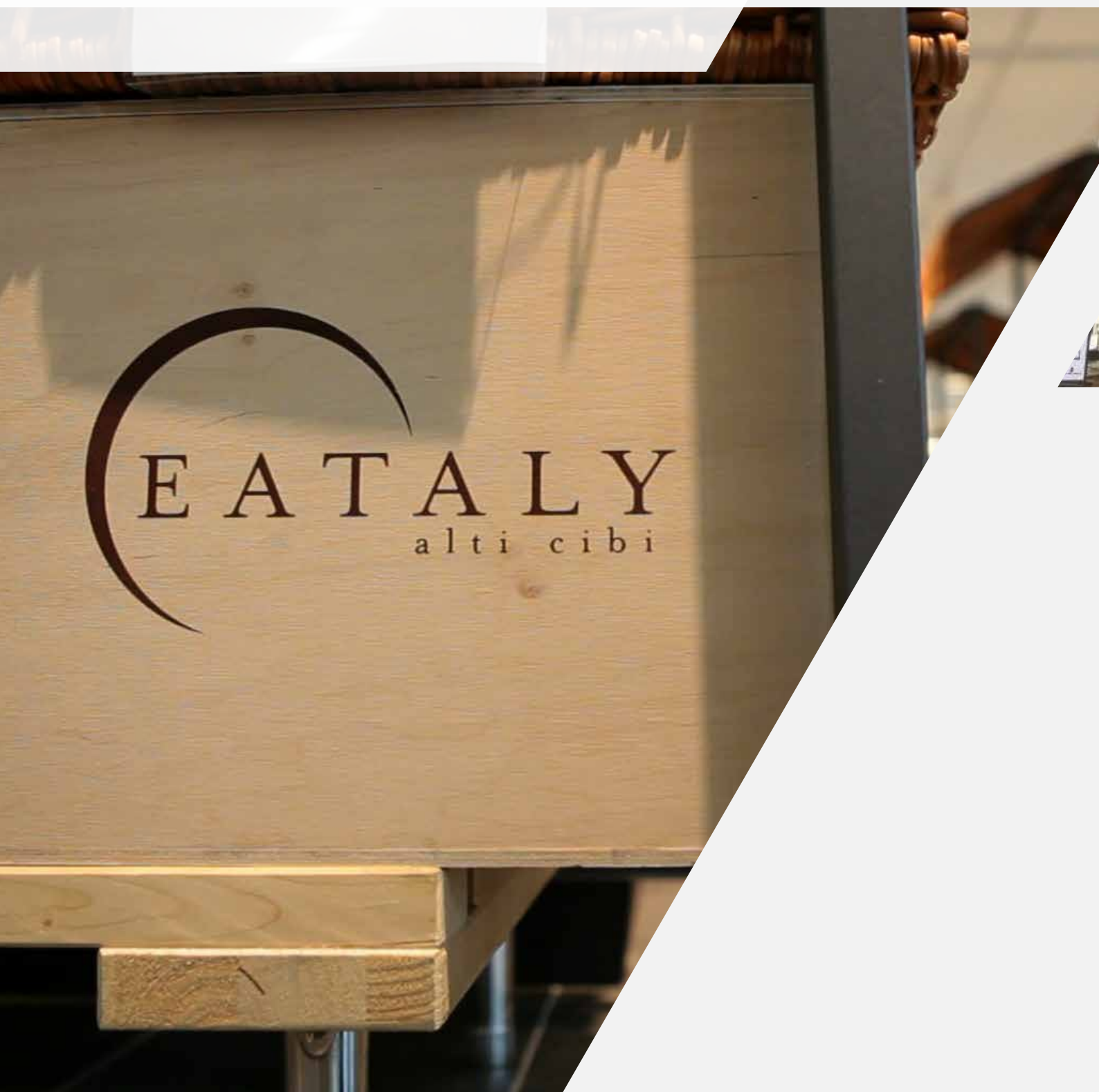
THE RESULTS

Comparing the two solutions, it has been shown that the operating range where the unit is able to ensure supply temperature as per design condition, is much wider in the system adopting the plate heat recuperator, especially in heating mode.

To achieve the same values using a unit without plate heat exchanger, it would be necessary for the system to add further power capacity or additional resources in order to balance the gap of power.

“BY FAR THE BEST PROOF IS EXPERIENCE”

Sir Francis Bacon
British Philosopher (1561-1626)



Shopping Centres Eataly

2013 - Bari (Italy)

Plant type:

Air to air system

Cooling capacity:

1500 kW

Installed machines:

5x i-WHISPER ENTHALPY,
1x NECS-N



PROJECT

The new Eataly store is the chain's most recent hit that offers high quality Italian food products, combining tasting and sales in the same comfortable and stylish space.

The new store is spread over an area of 8,000 square meters in the monumental part of the Fiera del Levante, and gives the utmost attention to local products in order to promote local businesses.

SOLUTION

In order to always provide ideal comfort in the store, both in summer and winter, an air to air HVAC system based on 5 Climaveneta rooftop units has been designed. In particular, the designer has selected 3 i-WHISPER ENTHALPY 0553 and 2 i-WHISPER ENTHALPY 0653 units, for a total of 1500 kW installed.

CHALLENGE

Eataly Bari has a generous size space with a strong load variability according to the time of day and the day of the week and variable loads due to the high number of operating kitchens and the amount of customers.



MORE THAN 1000 PROJECTS ALL OVER THE WORLD

AUCHAN - Italy

Bari - Italy
2013



Cooling capacity:
3200 kW

Heating capacity:
2700 kW

Air flow:
330000 m³/h

Installed machines:
8x WHISPER ENTHALPY,
2x WHISPER HALL,
2x WISDOM-R,
1x i-FOCS,
1x i-FX-Q

EON ENERGY RESEARCH CENTRE - Germany

Aachen - Germany
2008



Total cooling capacity:
275 kW

Installed machines:
3x WHISPER,
2x AC 34 Close Control
Units

LE FAIRWAY - France

Montrouge - France
2013



Cooling capacity:
941 kW

Installed machines:
6x i-WHISPER-E,
2x NECS-Q

KONZUM D.D. - Zagreb

Oporovecka - Zagreb
2009



Total cooling capacity:
980 kW

Installed machines:
1x NECS-FC/SL,
1x WIZARD,
4x WHISPER ENTHALPY
GAS

ROME FAIR - Italy

Rome - Italy
2005



Total cooling capacity:
26000 kW

Total heating capacity:
16000 kW

Air flow:
670000 m³/h
Installed

Installed machines:
168x rooftop units,
34x air cooled chillers,
WIZARD

STAPLES - Portugal

Palmela - Portugal
2009



Installed machines:
2x WHISPER/B

Climaveneta rooftop units, with their unbeatable advantages in terms of efficiency, precision and high quality are already the preferred choice in the most challenging and prestigious projects, all around the world.

**LA CARTIERA
SHOPPING CENTRE - Italy**
Pompei - Italy
2012



Total cooling capacity:
3400 kW
Total heating capacity:
3100 kW

Installed machines:
12x WHISPER,
8x WORK,
6x WISDOM-R

PALACE HOTEL HILTON - Guinea
Oyala - Guinea
2013



Cooling capacity:
4578 kW

Installed machines:
3x FOCS/SL,
8x WHISPER ENTHALPY,
20x AHU

E.LECLERC - Portugal
Santarem - Portugal
2009



Cooling capacity:
57,5 kW
Heating capacity:
64,5 kW

Installed machines:
1x NECS-N,
2x WHISPER

MEDIA MARKT - Poland
Przemysl - Poland
2009



Total Cooling capacity:
360 kW

Installed machines:
2x WISPHER-T/B



for a greener tomorrow

Eco Changes is the Mitsubishi Electric Group's environmental statement, and expresses the Group's stance on environmental management. Through a wide range of businesses, we are helping contribute to the realization of a sustainable society.



mitsubishi electric hydronics & it cooling systems S.p.A.

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