air
HANDLERS

AIR PRO

Range of rooftop air conditioning units

www.airhandlersnorthern.co.uk

Air Handlers started trading in May 1989. The company operates from its 60,000 sq. ft. factory in Salford Quays, which was purpose-built in the year 2000.

David Pinchbeck
Managing Director

Air Handlers Northern was founded by David Pinchbeck, who has over 50 years of experience working in the ventilation and air handling industry.

He is a true professional with considerable acoustics, building services, and manufacturing knowledge.
David has developed the company and its workforce into a leading UK manufacturer of air handling plant, leading the team with enthusiasm and integrity.

air HANDLERS
Celebrating over 30 years of success
1989-2023

What we do...

For over three decades, our business has manufactured a diverse range of air handling unit plant for most commercial and industrial sectors of the air conditioning market.
Over the three decades we have been in business, many changes in energy efficiency, construction standards and sustainability have driven continual research and development of the air handling products we manufacture.

Why us?

As one of the few remaining wholly British-owned air Handling plant manufacturers, we pride ourselves on innovation and developing new quality Air Handling products. Creating the Air Pro range of rooftop air conditioning units is another chapter in our product development; it offers compliance with building regulations and provides higher specification options for reduced environmental noise emissions and coastal environment protection.

Our Commitment

We aim to partner with the design team on all building services projects and ensure we can provide technical support for building regulations such as ERP, HTM (2021), BB101, and BB93 compliance.

From concept to completion and beyond is our promise.

Our contractor support at the quotation stage is tailored to suit every project.

After the order stage, we provide quality drawings, including dimensions, technical performance data, the number of sections, and handling and access.

Once the drawings are approved, our manufacturing team will guide the contractor through the various stages of manufacture and agree on a delivery date.

At an early stage, any site involvement would be discussed, and support would be given for things such as HYAB offloading, section bolting, flat pack installation, and onsite leakage tests.

If factory testing, such as a factory leakage test, volumetric simulation, or acoustic testing, is required this will be agreed upon at an early stage. Should a client/visitor witness test be required, this can be arranged by our site support team.

Both in-house and outsourced performances testing is available on all our air handling products. Our facilities have the capability to perform the following tests.

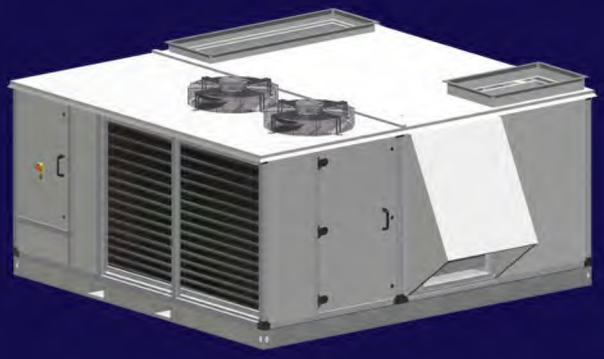
- **Air Leakage**
- **Volumetric performance**
- **Control function test**
- **Component function test**
- **Acoustic tests – including breakout, inlet and outlet sound power utilising a sound intensity probe analyser system.**

Outsourced testing is available and used when required, the following specialised consultants/authorities are used which can offer independent certification of results.

- **Specialist commissioning companies such as D.O.P filter tests both factory and site based.**
- **Acoustic testing laboratories such as Salford university acoustic labs which is UKAS certified.**
- **Acoustic consultants who have specific testing abilities.**

Air Handlers | Air Pro

(write up introducing air pro) eg ffbdfbd fb dflbk dlf fdbk dkfb dlfnv dkfvn kfjnv vvdjhbfv,ksz e gdl`uisgdfvlzisgdfliszguefdl`eld`gieufgli`ef f hj fbh hd dbdhfbhdbhdf df dsfhzs hsv dgxdfgfgdfgdfh dfsvfdufd bgdhgghdhgdfgbhv dbf dhv jh. hs ehyed. vbdhchbj bsjbjhg f sjsdhdfbjsdhcb sdbsdhsjdvjd dvnksdvjsl dbvskjfbdvsloxf sf sfs ljdv. sdlvskdj bkdsjbfvksdj vksdb vksdnks.



- Minimal environmental footprint-
  - Co2 reduced by up to 80%
  - Low GWP R- 454B (466) for reduced carbon footprint
- Superior efficiency at both full and partial loads
- Streamlined and easy installation
- Reduced refringent usage
- Quieter operational performance
- Energy recovery capability
- E.C fans for better control
- Zero ozone depletion potential ODP

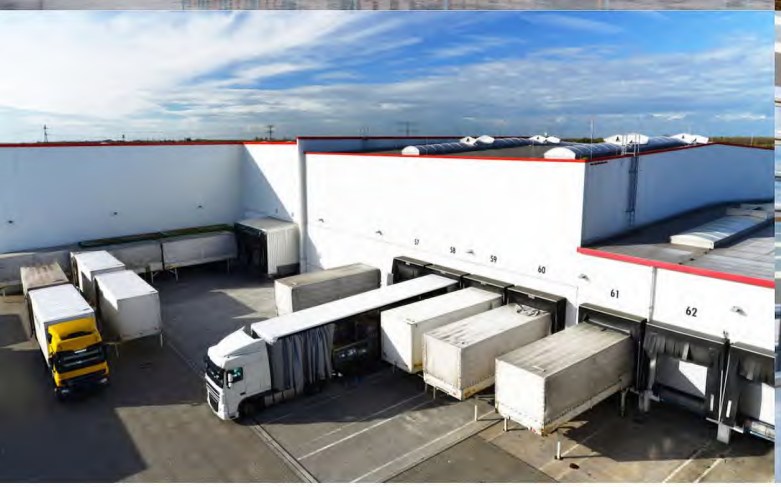
Most rooftop packaged air units are not based on energy-related products (ERP) or global warming potential (GWP). Ozone depletion potential (ODP) is a current benchmark; however, the Air Pro range has been introduced to focus on net zero emissions along with added features for environmental long-life compliance.

Air pro units are specifically engineered to facilitate installation and maintenance, including cutting-edge technology which can be achieved with the use of multi-scroll compressors. Electronic expansion valves (EEV) and variable speed electronically communicated (EC) fans are controlled by the main programable logic controller (PLC).

Air Handlers | Air Pro

The Air Pro series of units offers a diverse range of capacities suitable for air conditioning medium to large spaces commonly found in:

- **Shopping Malls**
- **Food Retail**
- **Logistics Warehouses**
- **Commercial Buildings**
- **Industrial Buildings**



Air Handlers | Air Pro

Air pro units are specifically engineered to facilitate installation and maintenance, including cutting-edge technology which can be achieved with the use of multi-scroll compressors. Electronic expansion valves (EEV) and variable speed electronically communicated (EC) fans are controlled by the main programable logic controller (PLC).

Systems Equipment:

- Variable speed compressor
- EC indoor/outdoor fan
- Electronic expansion valves
- Liquid line solenoid valves
- Suction and discharge pressure transducers
- Refrigerant leakage sensor
- CO2 sensor
- Discharge temperature sensor
- Up to 2 room temperatures
- Outdoor air temperature / Supply air temperature / Return air temperature
- Dampers' actuators
- Supply & return fan differential pressure sensor
- Air filter pressure switches

Air Pro Structures:

The ability to adjust cooling and heating capacity according to the actual building needs:

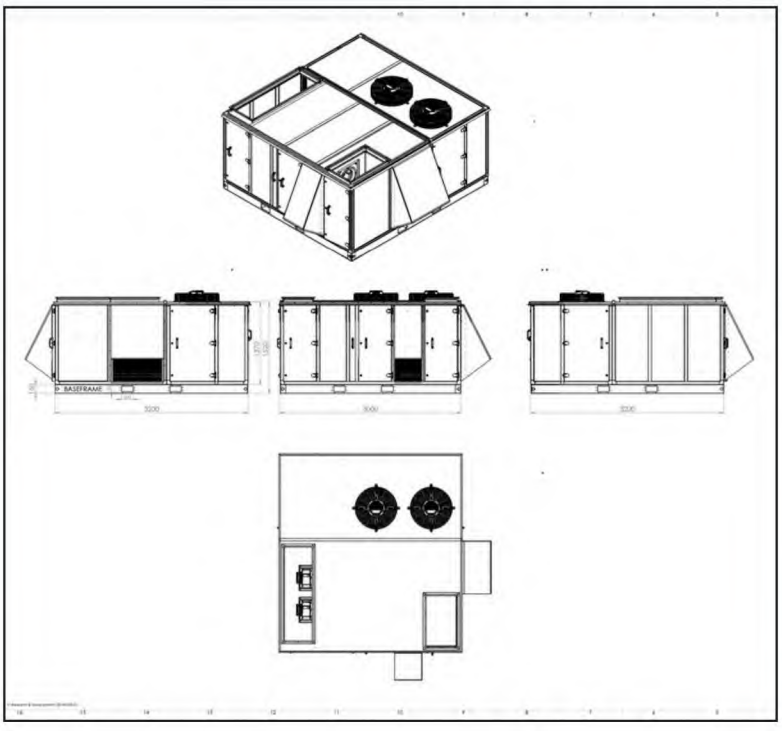
Our cutting-edge rooftop units boast a control capacity feature that responds dynamically to the real-time heating or cooling demands of a building. This adaptive capability ensures optimal energy usage, as the system automatically adjusts its capacity to match the specific needs, resulting in reduced energy consumption during periods when it is not essential. This not only enhances efficiency but also contributes to substantial energy savings, making our rooftop units an environmentally conscious and cost-effective choice for any building.

Air pro units are specifically engineered to facilitate installation and maintenance, also including cutting-edge technology; this can be achieved with the use of multi-scroll compressors. Electronic expansion valves (EEV) and variable speed electronically communicated (EC) fans are controlled by the main programable logic controller (PLC).

Specific optional features -

A range of options are available to cater for specific operational needs.

- Economiser functionality
- Management of indoor air quality
- Auxiliary heating modules
- Extended operational limits



Airpro units offer effortless and shift installation and are characterised by their mono-block lightweight design, incorporating a self-supporting frame, streamlining the installation and maintenance process.

They require only a direct connection to the air distribution ductwork and power cables as these units will not need elements like pipework, control cables, etc., to optimise space usage. This will offer the contract a reduced installation cost and fact install period.

Project Consideration-

- The Air Pro also offers a versatile airflow configuration with vertical and horizontal supply/return configurations. This universal design provides a well-suited configuration for projects from new build construction to retrofit.
- The Air Pro unit is designed to emit low sound levels; this is achieved by selecting low noise-producing components in the design; with up to 65% of the operation time occurring below half-load, there will be a significant reduction in sound levels during partial load operation.
- Night-time operation is always an additional issue with planning, and local authorities have problems with planning and restricting night-time environmental noise limits much lower than daytime.
- The Air-pro unit offers a night operation mode featuring free-cooling and compressor disabling, contributing to much-reduced noise emission.
- When the building services designer works on noise-sensitive projects, we have further noise-reducing optional features.
- Additional attenuation and soundproofing are available from the following options.

1. System and atmospheric attenuation
2. Slower running condenser fans
3. Acoustic compressor jackets and flexible refrigerant pipe connections reduce vibration transmission.
4. Compressor inertia bases to minimise vibration transmission.
5. Enhanced soundproofed, reduced sound transmission index (SRI) casework.

Photo of Salford uni panel testing.

All soundproof casework panels offered for reduced sound reduction breakout are tested in conjunction with Salford University acoustic test labs, which are UKAS certified

Seasonal efficiency:

Introducing novel metrics to underscore the significance of seasonal efficiency, as the trajectory of new buildings aligns with achieving nearly zero energy consumption. Accurate assessment of energy efficiency in these structures necessitates indicators that authentically reflect equipment performance across all seasons. Departing from the obsolete EER & COP metrics, the contemporary and future emphasis lies on seasonal efficiency.

Adherence to Eco-design regulations now requires the adoption of innovative seasonal efficiency metrics that offer more meaningful insights. The Seasonal Energy Efficiency Ratio (SEER) has superseded its predecessors by providing a meticulous evaluation of actual energy consumption in rooftop units, incorporating seasonal variations into their measurements. In contrast, the previous metrics, EER, focused solely on a single point—full thermal load—making them less representative of overall consumption during heating and cooling seasons.

Air Pro higher SEER due to:

High energy performance: R-454B refrigerant is designed for outstanding energy efficiency.

Optimised scroll compressors: Variable speed scroll compressors, tailored for R-454B, operates with variable speeds to achieve high performance, particularly in partial loads.

Electronic expansion valves: The system incorporates electronic expansion valves for precise control and efficiency.

Advanced control system to setup maximises performance while optimising energy consumption.

Efficient outdoor EC fans, ensuring both high efficiency and low noise levels.

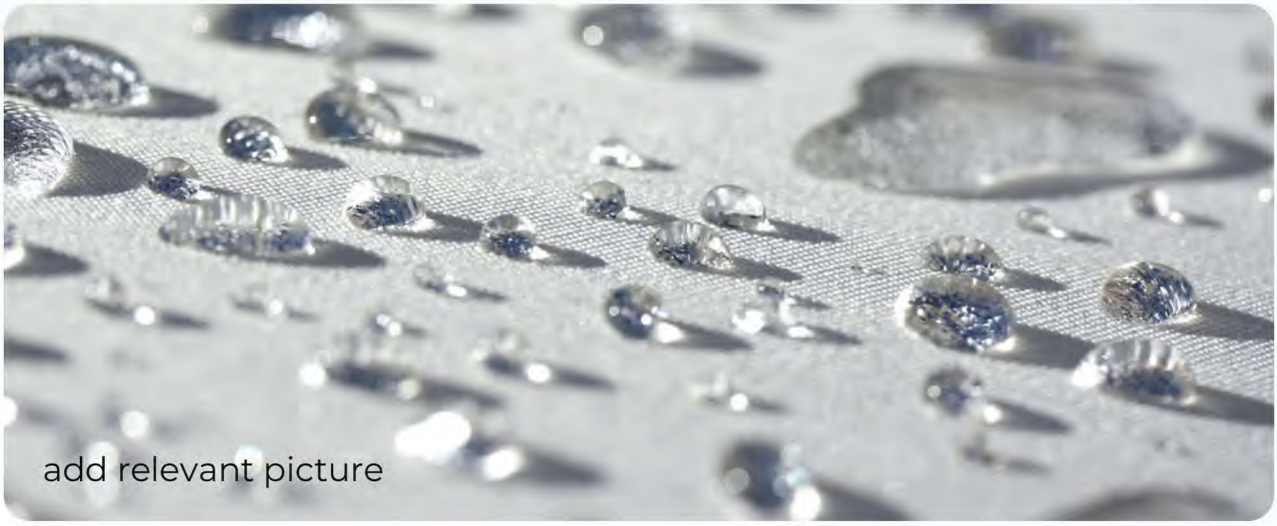
Indoor components include EC plug-fans equipped with pressure transducers, enhancing overall system effectiveness.

Casework Construction:

- The casework for Air Pro units is built with an acoustic-insulated aluminium penta- post frame.
- Utilises 50mm double skin panels with plastisol plastic-coated steel for the outer layer and pre-galvanised sheet steel for the inner layer.
- Features acoustic/thermal insulation composite within the panel.

Weatherproof Units:

- Air Pro units include fresh air and exhaust air louvre cowls on air inlets and outlets.
- Air Pro Incorporates a pent-style roof to provide protection against rain ingress.



Outdoor Circuit Characteristics:

- Coil is composed of copper pipes and aluminium fins.
- EC axial fan(s) with adaptive variable speed based on requirements.
- Benefits include reduced electricity consumption, lower sound levels at partial charge, and enhanced average seasonal efficiency.
- Easy access to the interior of the outdoor circuit.
- Pan for condensate drainage.

Indoor Circuit Characteristics:

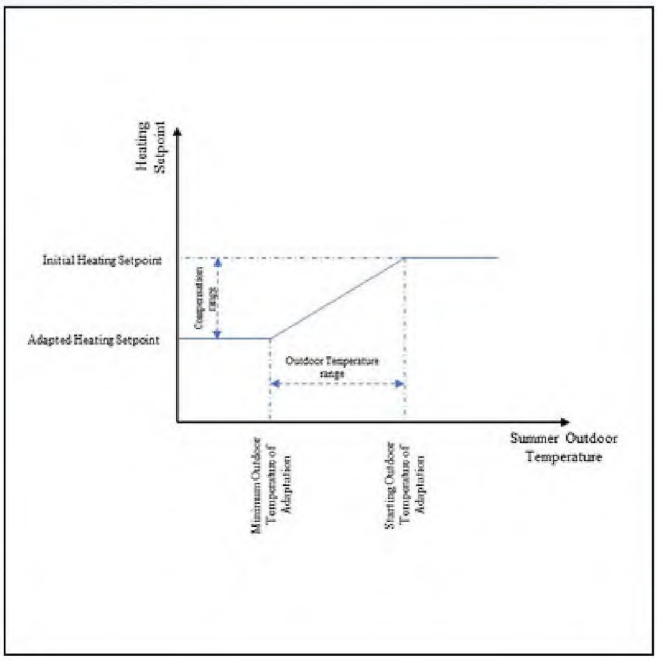
- The coil is made up of copper pipes and aluminium fins.
- EC electronic supply plug-fans equipped with variable control speed and flow rate controller.
- G4 and/or F7 air filter
- Pan for condensate drainage.

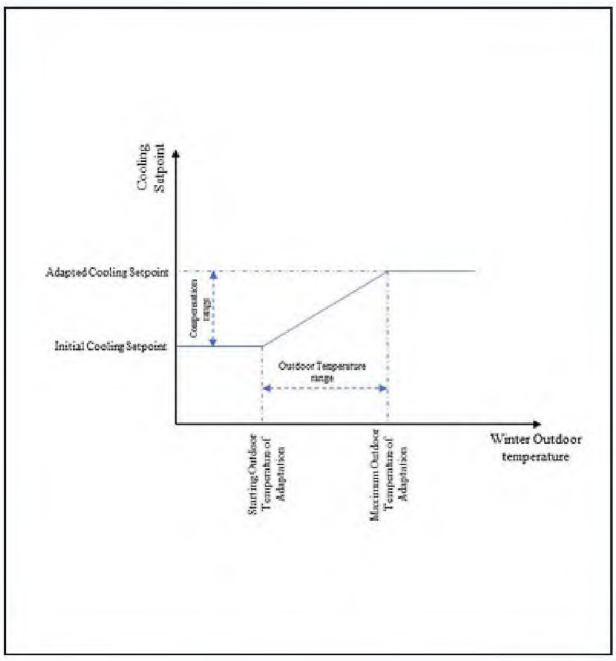
Cooling/heating circuit:

- Variable scroll compressor(s) to apply the most precise and efficient control capacity.
- Electronic expansion valve(s)
- Four-way cycle reversing valve(s)
- Filter dryer(s)
- Variable air volume

Setpoint compensation:

Based on the very hot or cold outside temperature the system compensates its indoor set point to prevent capacity shock into the system.





Protections:

- High - and low-pressure switch
- Refrigerant leakage sensor
- Compressor discharge temperature control
- Electrical protections
- Clogged filters alarm

Control System Overview:

Acts as a user-friendly interface for rooftop units, providing exceptional performance and value.

Utilises sensors to oversee and optimise all unit components, resulting in the following benefits:

- Higher part-load efficiency.
- Improved temperature control.
- Enhanced reliability.

Key Functions:

- Different operating modes: Automatically heating and cooling operation/ ventilation.
- Continuous monitoring of operating parameters.
- Display of values measured by sensors.
- Defrosting control.
- All-season optimal operation through condensation and evaporation pressure control.

Additional Features:

- Set point compensation linked to outdoor temperature.
- Hourly and weekly scheduling.
- Fire protection.
- Fault diagnosis and general alarm.
- Management of optional components like economizer, back-up heating, CO2 air quality sensor, energy recovery, etc.

Air-pro Physical Data:

AIRPRO	Indoor Air Condition								
	27ºC / 50%			29ºC / 50%			31ºC / 50%		
	TL	SL	CP	TL	SL	CP	TL	SL	CP
60 4(m3/s)	55.1	46.7	9.4	58	48.7	11.4	61	51	12.17
120 8(m3/s)	110.2	93.4	18.8	116	97.4	22.8	122	102	24.3
240 16(m3/s)	220.4	187	37.5	232	195	45.4	244	204	48.5

- TL, Total Cooling Load
- SL, Sensible Cooling Load
- Compressor Power

Air-pro Physical Data:

Air Pro	60	120	240
Cooling capacity	61.1	119.6	241.2
Power Input	19.6	38.95	78.2
EER performance	3.117347	3.070603	3.084399
SEER	4.94817	4.797818	5.056392
Heating Capacity	35.3	69.8	140.9
Power Input	16.6	33.1	66.15
COP Performance	2.126506	2.108761	2.130008
Outdoor Unit Fan (m3/s)	4	8	16
Indoor Supply (m3/s)	7.5	15.2	31
No. compressor/circuits	1/1	2/	4/2

Main Voltage	400 V/ 3ph/ 50 HZ
Power Supply	3 Wires + Ground + Neutral
Refrigerant	R-454B

Air-pro Cooling Capacity -

Fire alarm input:

In the event of fire, after fire alarm signals, the indoor fan and all other components are stopped and closed.

Fire man has the authority to open supply and return dampers, and to turn supply and return fan on or off.

Schedule programming:

the system can be programmed to activate during specific days and hours of the week, such as Monday through Friday from 8 AM to 5 PM, and to deactivate outside of those hours.

Air renewal:

When the outdoor conditions do not permit free cooling, but air renewal is required, control of the outdoor air damper can be carried out according to 2 parameters:

Desired renewal percentage: This value is set at 20% by default.

Mixing air temperature: Then, the air renewal will manage by following formula:

$$\%\ renewal: \frac{Retrun\ T - Mixing\ air\ T}{Return\ T - Outdoor\ T}$$

Air Pro Specification:

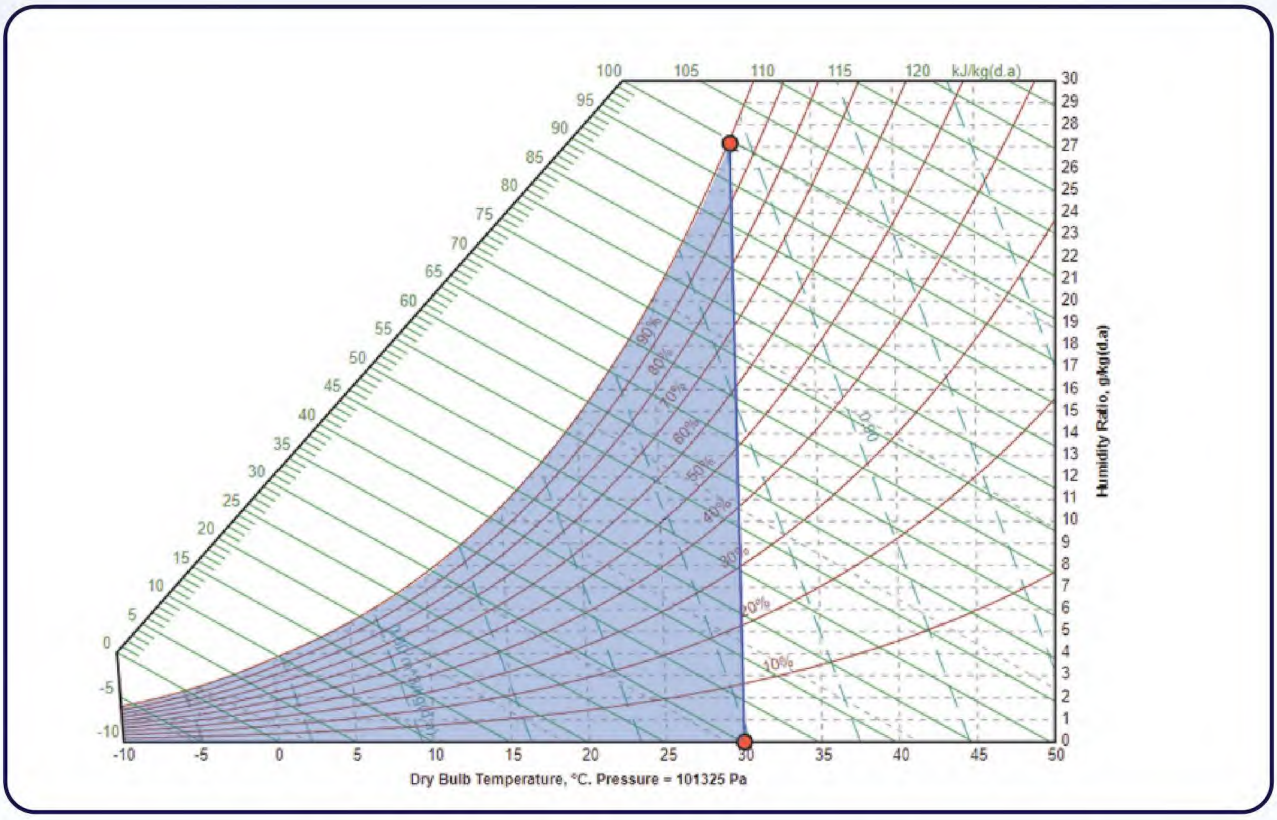
1. Free cooling
2. Air renewal
3. Refrigerant leak detector
4. Setpoint compensation
5. Defrost mode.
6. Fire alarm input
7. Schedule programming

Economiser Management:

The economiser enables optimal utilisation of outdoor air conditions when they are more advantageous than the conditions of the return air. This results in the ability to decrease the power consumption. The proportion of outdoor air can fluctuate between 0% and 100%. The control of the economiser is based on comparing inside and outside temperatures.

Free Cooling:

- Based on the outdoor temperature, the system can work in the ventilation mode and try to maintain the inside temperature by using the outside temperature as it can be seen in the following figure:



Note: *in this mode, System works in full-fresh air mode, and all return air will be exhausted.*

Defrost Mode:

During winter, the outdoor coil functions as the evaporator in the system. In low outdoor temperatures, there is a significant risk of ice formation on the outdoor coil. When ice accumulates, the system's pressure drops, triggering the control system to halt the heating mode. Subsequently, the system transitions into the cooling process, causing the outdoor coil to switch its function back to a condenser. This reversal is essential for melting the ice that has formed on the coil, ensuring the system operates effectively and efficiently despite the challenging winter conditions.

Auxiliary Heating Modules:

These systems are equipped to support auxiliary heating, allowing for additional capacity or higher supply temperatures when needed. This feature enhances the flexibility and adaptability of the system, ensuring it can effectively meet varying heating demands. By integrating an auxiliary heating option, the system can seamlessly adjust to higher temperature requirements or provide extra heating capacity during exceptionally cold periods. This not only improves the overall performance of the HVAC system but also ensures that it can efficiently respond to diverse heating needs, maintaining comfort and efficiency across different operating conditions.

Oil Boost Mode:

When the system operates at low capacity for an extended period, the circulation of oil within the cycle may slow down. To address this, the control system initiates an oil boost process. This process involves increasing the speed of the refrigerant flowing through the pipelines. By doing so, the system effectively manages to propel and return the oil to the compressor. The oil boost process is a crucial mechanism in maintaining the proper lubrication and functionality of the compressor, especially during prolonged periods of low-capacity operation. This proactive control strategy helps ensure the longevity and efficiency of the HVAC system.

System Benefits:

- Low environmental impact by using R454b.
- Capacity control.
- High energy efficiency throughout the year.
- Low sound level
- Up to three dampers (fresh/extraction/return air)

Systems equipment:

- Variable speed compressor.
- EC indoor/outdoor fan.
- Electronic expansion valves.
- Liquid line solenoid valves for avoiding liquid immigration to compressor.
- Suction and discharge pressure transducers
- Refrigerant leakage sensor
- CO2 sensor
- Discharge temperature sensor.
- Up to 2 room temperatures.
- Outdoor air temperature.
- Supply air temperature.
- Return air temperature.
- Dampers' actuators.
- Supply & return fan differential pressure sensor.
- Air filter pressure switches.

System characteristics:

The ability to adjust cooling and heating capacity according to the actual building needs:

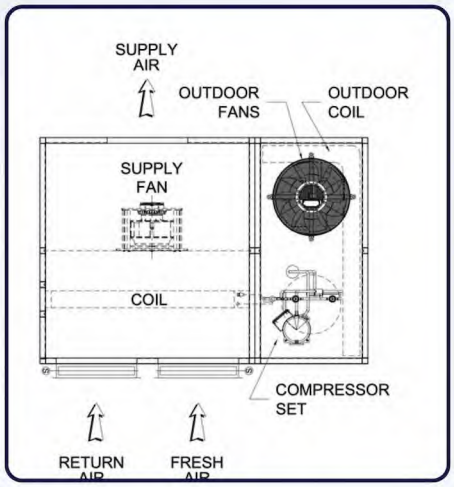
Our cutting-edge rooftop units boast a control capacity feature that responds dynamically to the real-time heating or cooling demands of a building. This adaptive capability ensures optimal energy usage, as the system automatically adjusts its capacity to match the specific needs, resulting in reduced energy consumption during periods when it is not essential. This not only enhances efficiency but also contributes to substantial energy savings, making our rooftop units an environmentally conscious and cost-effective choice for any building.

Precision control of superheat using electronic expansion valve:

In the Direct Expansion (DX) cycle, the expansion valve plays a pivotal role, and when upgraded to an Electronic Expansion Valve (EEV), the system's performance is significantly enhanced. The utilisation of an EEV leads to a reduction in power consumption, making it a crucial component for optimising energy efficiency in the overall system. Upgrading to an electronic expansion valve not only ensures precise control over the refrigerant flow but also contributes to increased operational efficiency, resulting in a more sustainable and cost-effective HVAC solution.

Different Assemblies

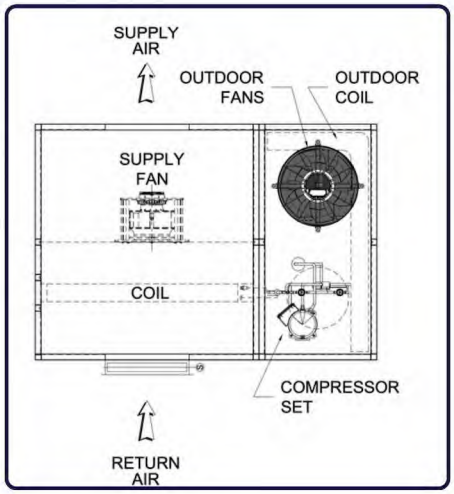
Full-fresh air: In this assembly, the system operates with fresh air. In such a configuration, it is essential to implement conservative measures to prevent positive pressure from building up inside the building.



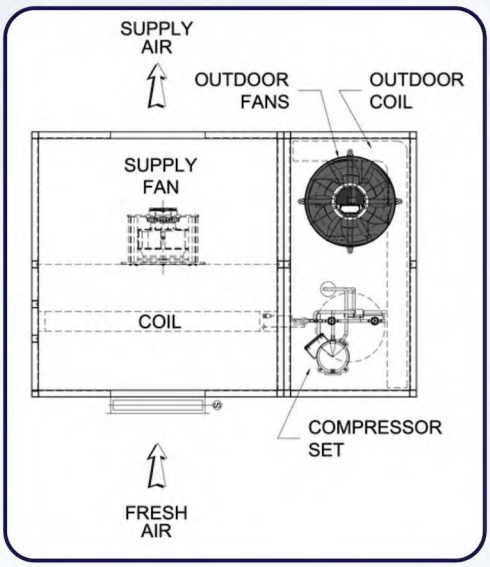
Fresh And Return Air

In this assembly, the system initiates the introduction of fresh air based on calculations performed by the control system, considering various parameters. The fresh air is added to the building's air, and the air quality is monitored to ensure a healthy indoor environment. This approach is energy efficient as it leverages the conditioned air within the building rather than exhausting it directly.

By dynamically adjusting the amount of fresh air based on real-time needs, the system optimises ventilation while minimising energy consumption. Additionally, the incorporation of indoor air quality monitoring ensures that occupants enjoy a comfortable and healthy environment. This balanced approach to ventilation, utilising a mix of conditioned and fresh air, reflects a sustainable and efficient strategy for maintaining indoor air quality in the building.



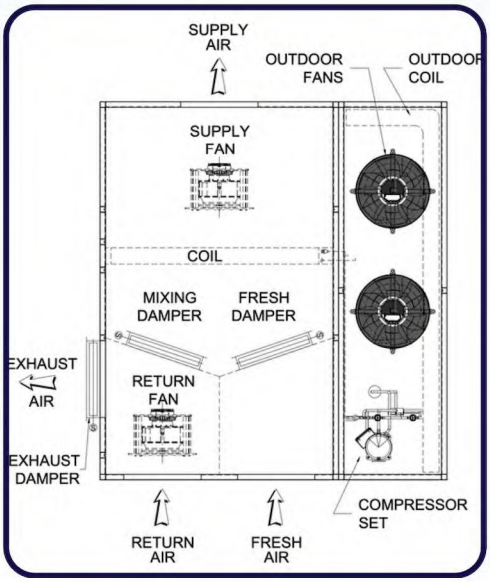
Full-return air:
In this assembly, the indoor air circulates continuously, and there is no introduction of fresh air for ventilation.



Other optional characteristics of the system

- Droplet eliminators (if necessary).
- Coil with copper pipes and aluminium fines.
- F7 Air filters
- Compressor discharge temperature protection.

Positive pressure/pressure balance inside the building:



Positive Pressure:

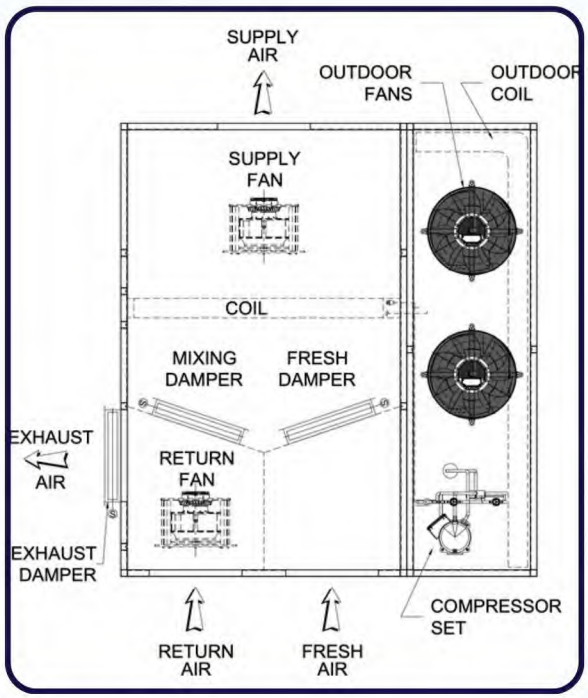
In this system, positive pressure within the building is maintained by returning a reduced volume of air from inside the building and introducing fresh air into the indoor space. This positive pressure strategy helps to control the flow of air, preventing contaminants from entering the building and promoting a cleaner and healthier indoor environment.

By returning a lesser amount of indoor air compared to the fresh air introduced, the system ensures a net gain in air supply. This positive pressure prevents infiltration of unfiltered outdoor air and contaminants, reducing the likelihood of indoor air quality issues. This approach not only supports a healthier indoor environment but also contributes to energy efficiency by minimising the need for excessive ventilation and conditioning of outdoor air.

Pressure balance:

In this system, the pressure balance within the building is maintained by returning the same amount of air that is supplied to the building. This approach, known as balanced ventilation, helps ensure that the overall air pressure inside the building remains constant.

The system avoids creating positive or negative pressure differentials by returning an equal volume of air to what is being supplied. This balanced ventilation approach is designed to prevent potential issues such as drafts, infiltration of outdoor pollutants, or difficulty in opening and closing doors due to pressure imbalances.



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