Air-Technology
QUALITY FOR LIFE

AL-KO

ENERGY EFFICIENCY made in Germany

SAVE ENERGY

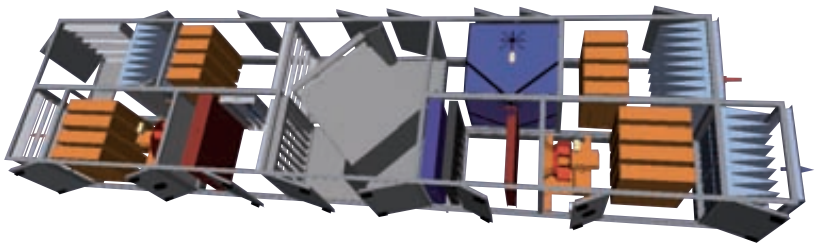
AIR-CONDITIONING-UNITS | PLUG-AND-PLAY

INTEGRATED COOLING AND HEAT-PUMP TECHNOLOGY IN AIR-CONDITIONING UNITS WITH CONTROL TECHNOLOGY

In many cases of application, cooling generation in the air-conditioning units presents a technically and economically interesting alternative to central cooling. Over 20 years experience, our own development centre and highly qualified staff make AL-KO a strong partner for your projects.

Many points speak for an integrated solution:

- Less space requirement, through the integration of a cooling unit in the air-conditioning unit.
- External heat exchange units or roof condensers for many air-conditioning applications are dispensed with, because the exhaust air can be used for the heat exchange.
- The complete solution from one source reduces your engineering effort and develops clear guaranteed limits.
- No costs for the hydraulic connection to a possible further detached central cooling unit.
- There are no distribution losses.
- Modern methods of performance control guarantee high partial load efficiency.
- By equipping the cooling system with heating pump control for the reversal of the cooling system, in many cases the residual heat portion of the exhaust air can be used very efficiently.
- The direct heat transfer through direct sublimation provides efficient dehumidifying of air.



3D-construction AL-KO Klim@Soft: air-handling- / air-conditioning-unit with integrated cooling generation and energy recovery

AL-KO stands for energy efficiency

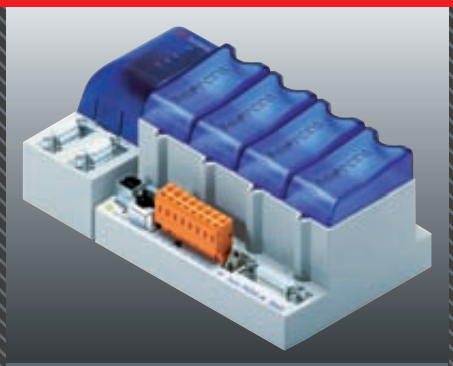
The application of modern, highly efficient scroll and reciprocating compressor from a notable manufacturer, as well as the selection of the applicable partial load control for your application, guarantees the best performance data and optimum control.

The AL-KO solution spectrum:

- Fully hermetic, in the application of the optimized scroll compressor used in the air-conditioning technology
- Multi-compressor cooling systems for performance adjustment with up to three compressors in the cooling circuit
- Hot-gas bypass control adjusted to the multi-compressor cooling systems
- Digital scroll compressor for pulse-width modulated performance control
- Speed controlled reciprocating compressor
- Refrigerant R407C, R410a, R134a, according to the requirement.

Measurement and Control Technology:
Fundamentally, all AL-KO cooling machines are supplied with their own measurement and control. AL-KO has developed their own controller for standard uses with predominantly cooling function. The "AL-KO cooling controller" provides the connection to the on-site measurement control and forms a clear guarantee limit. Many functions are implemented as standard:

- Compressor management and protection functions
- Performance control
- Automatic performance limitation at overload or not sufficient heat exchange guaranteed, ensures operation also when used outside of the design limits.
- Alarm management with history memory
- Linked to the on-site measurement and control through conventional signals (dry contacts or 0…10 Volt signal)
- Bus connection via MOD bus or LON (other systems on request)
- Operating point monitoring (optional)



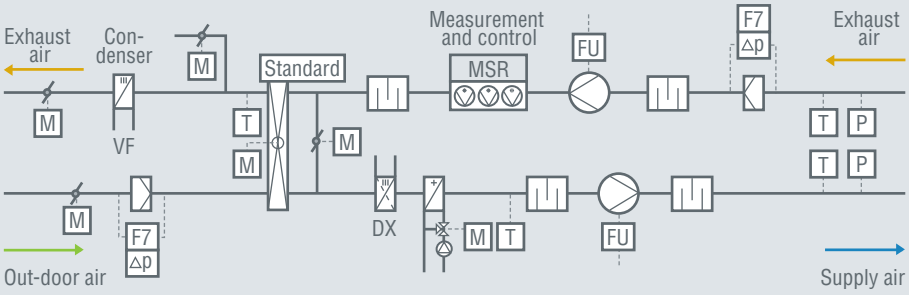
Carel Controller

Saia Controller

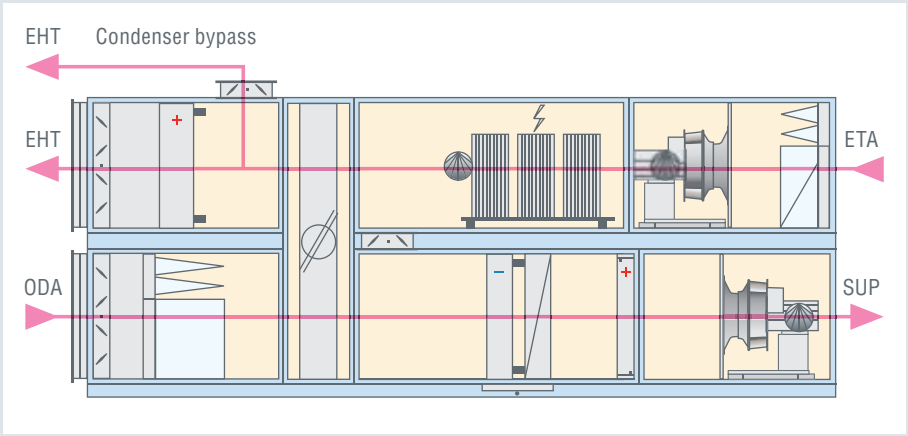
Example of application of air-conditioning-unit with rotary heat exchanger

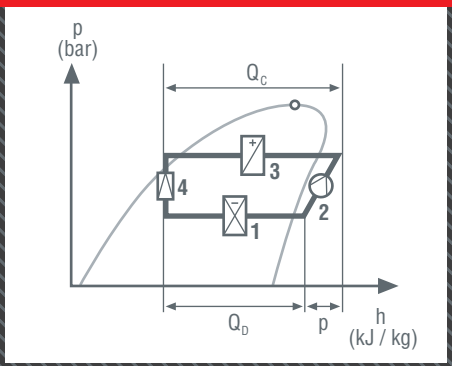
Integrated cooling unit for cooling out-door air

- Cooling performances from 8 to approx. 270 kW per cooling circuit* with scroll multi-compressor cooling systems
- Direct heat exchanger in the ambient air
- Internal condenser in the exhaust air
  - Uses the exhaust air, cooler in comparison to the ambient air, for heat exchange
  - Uses no mounting surface outside of the building or the unit
  - Optional downstream bypass to bypass the condenser outside of the cooling period.
- If no, or unusable, exhaust air the combination with external liquefaction possible.
- Optional switching on of heating pump give many more possibilities of more efficient use of the residual heat in the exhaust air.



* at climate conditions of t0 / tc 10° / 55°

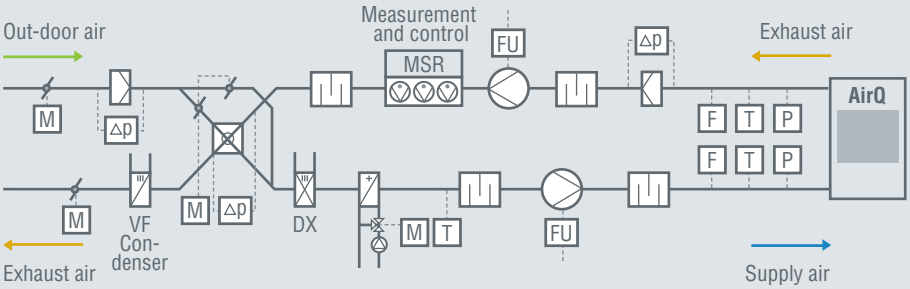


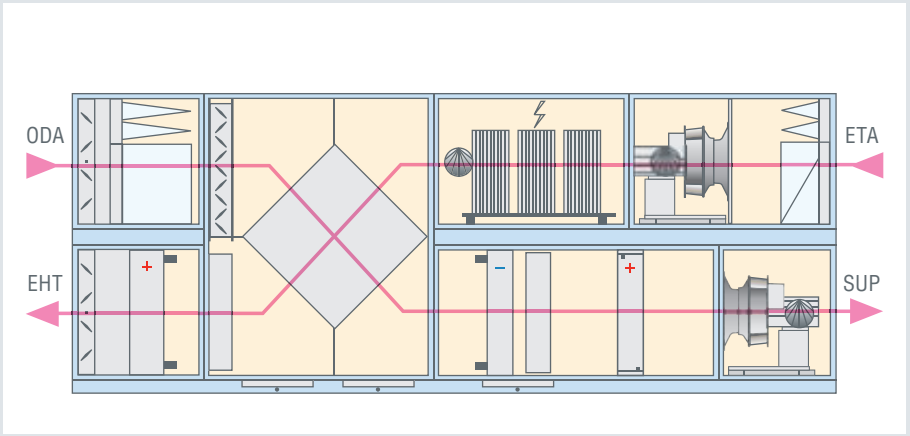


Example of Application of Air-Conditioning Unit (Roof Top) with Plate Heat Exchanger

Integrated cooling unit for cooling out-door air

- For complete delivery of the cooling assemblies, pre-commissioning of the cooling unit is possible at the factory. No soldering on site.
- Optional switching on of heating pump give many more possibilities of more efficient use of the residual heat in the exhaust air.

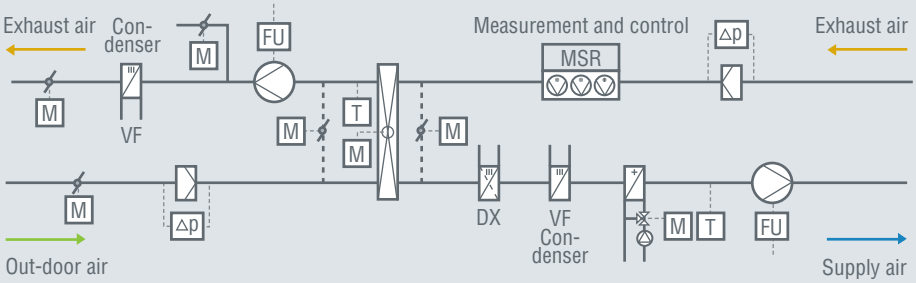


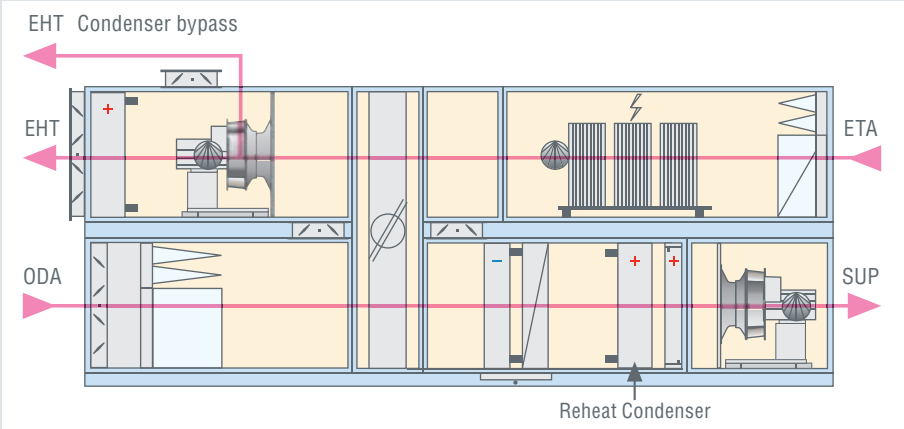


Example of application of air-conditioning-unit

For the external cooling and dehumidifying with heat recovery (reheat) from the cooling circuit

- Using the waste heat of the cooling plant for reheating in dehumidifying mode. No unnecessary operation of the boiler in summer necessary.
- High specific cooling performance feasible through additional use of ambient air for heat exchange.
- As necessary, also forced-air cooling by heat exchange using the ambient air.
- Heat extraction from the cooling circuit through hot-gas heat dissipation or partial-flow condensation.
- Application for greater cooling performances.
- Reheating using additional condenser.
- Performance control using condensate mixing or hot-gas distribution.

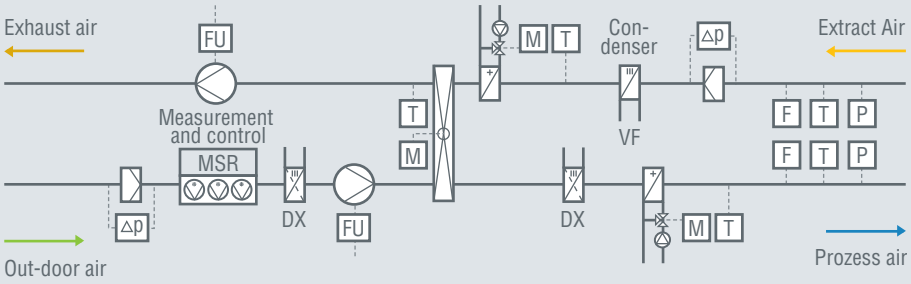


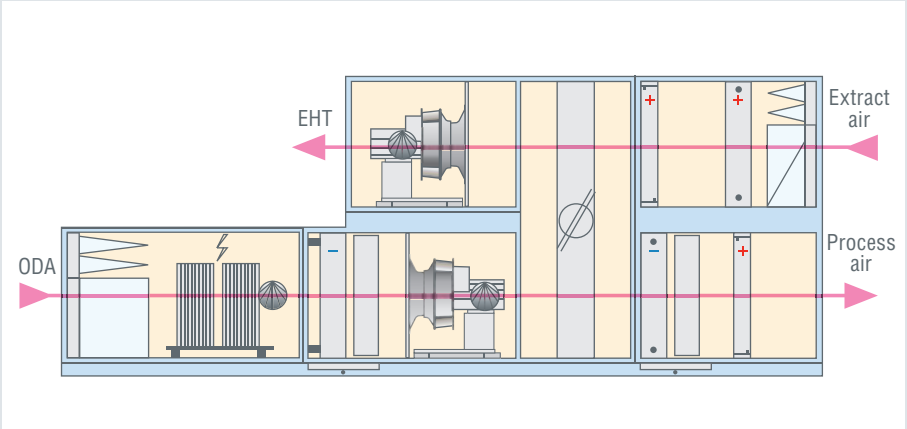


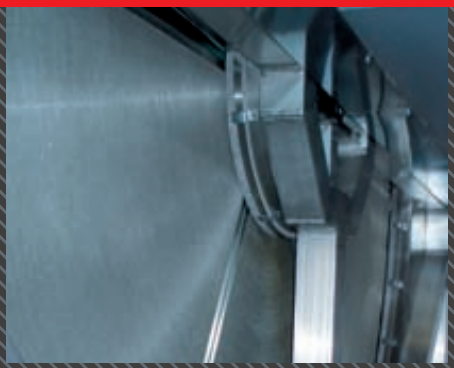
Example of application of process technology

Pre-dehumidification for a sorption dehumidifier using the condensation heat regeneration

- Direct heat exchanger, transfers the heat directly from the air to the evaporating of the cold media. No heat transfer from the cold media to a heat carrier (water or sole) required. The evaporating temperature can be applied approximately 4 to 7 K higher. The surface temperatures necessary for dehumidification are generated more efficiently.
- After the direct heat exchanger, an absolute humidity of 5 g / kg can be attained.
- An adjusted control of performance and exchange prevents icing and reduces the energy input in partial load mode.
- The waste heat of the cooling unit can be used, completely or in part, during the sorption process to preheat the regeneration airflow.







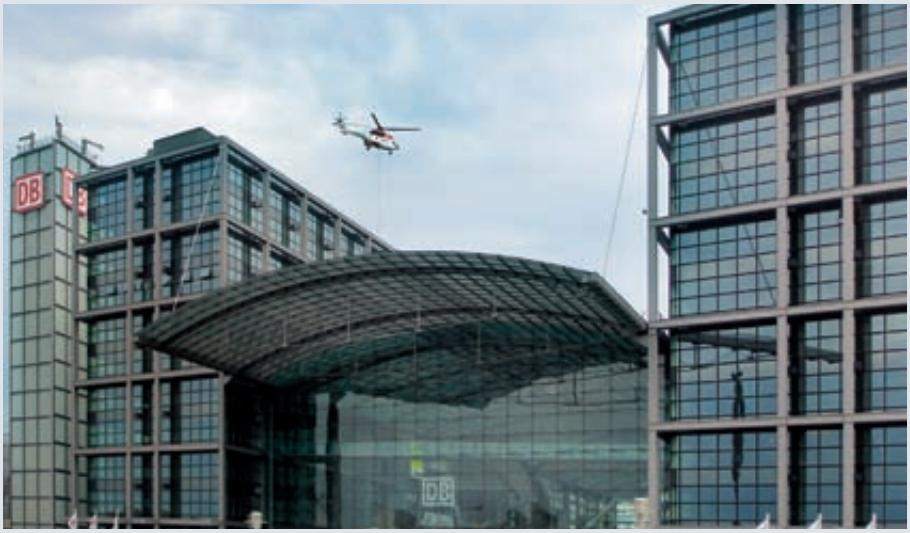
Main station Berlin – energy-efficient air-conditioning with integrated cooling

- 6 air-conditioning-units
- approx. 170 000 m^3/h air-volume
- 1051 KW cooling capacity

The reconstruction of the Berlin main railway station was spectacular, because, above all, two office towers were tilted from both sides over the actual station to form the roof of the station.

The building work for the two office towers represented the last section of completing the station. Both buildings are 46 metres high and, therefore, higher than the nearby Federal Chancellery, which is 36 metres height. Both construction frames overhang the East-West glass roof of the station like bridges, there-fore the designation “bow”.

Both bow constructions, totalling 12 floors, encompass approximately 50 000 square metres gross area. They are designed for office use. For the retention of occupant productivity in the large office area, the responsible parties decided on total air-conditioning. Naturally, it was assumed that this air-conditioning can be operated with the least primary energy consumption.



Main station Berlin – installation of the air-conditioning-units by helicopter.

Because of the high percentage of glass area as facade of the bow construction, in summer, much of the thermal load must be dissipated by the air-conditioning units. For the selective promotion of this procedure, there are still some surface cooling elements and window convectors existing in the rooms.

However, the air-conditioning accomplishes the majority of the remainder. A total of 6 AT4 air-conditioning-units were supplied, with integrated cooling, rotors for energy recovery and dehumidification units. All air-conditioning-units are tailored to the installation site because of the restricted space available.

On delivery of the central units, the foundations required and the retainer housing for the roof air-conditioning casings design were available.

The media pipelines for supplying the units in the roof casings were laid and the air connections and ducts in the building for connection of the units provided. Therefore, the missing air-conditioning units had to be transported by helicopter. Again a highlight for all parties involved in the construction and, not least, one of the great precedence‘s of a dismountable unit construction.

All units were accurately inscribed, so that they could be allocated easily at the installation site on the roof and helicopter for transportation. Installation was

Internal absorption in the unit rotary heat exchanger with humidity recovery

carried out immediately on the roof – 20 fitters were employed at this period on each of the two bow constructions.

In total, the new air-conditioning-units accomplish a volume flow of approx. 170000 m³/h. For the application of office air-conditioning, 6 AT4 central units were equipped with rotary heat exchangers. Because the supply air and exhaust air units are not separated spatially, rotors are, therefore, not very expedient, because humidity recovery can also be accomplished for. In the event of failure in summer, the heat recovery rate in the supply air is between 71.2 % and 72.4 % and also analog the re-humidification rate between 42.5 % and 46.6 %. On winter days, the heat recovery rate is an average of between 70.7 % and 72.0 %, as well as a re-humidification rate of 75.4 % to 78.8 %. Therefore, not only can the primary heating energy be saved, but also the required energy supply to the humidification units is reduced.

External absorption unit in the accessible roof casings

AL-KO Air-Technology – abstract of our references

Air-conditioning-units with cooling and integrated control units

- MTLA Lab Heidelberg
  12 500 m³/h | 57 kW | Okt. 2008
- Magnet Schulz Memmingerberg
  180 000 m³/h | 1212 kW | Sept. 2008
- Medtronic Meerbusch
  38 000 m³/h | 160 kW | Juni 2008
- Saartorius AG Göttingen
  8 000 m³/h | 30 kW (WP) | Juli 2008
- Main Station Berlin
  170 000 m³/h | 1051 kW | Juli 2008
- Galerie Andernach
  63 600 m³/h | 409 kW | Dez. 2008
- Generali Insurance München
  9 300 m³/h | 60 kW | März 2007
- TOHO Tenax Heinsberg
  50 000 m³/h | 255 kW | Juli 2008
- Carnissensingel Rotterdam NL
  29 700 m³/h | 182 kW (WP) | Feb. 2008
- Verpleghuis Delfshaven NL
  51 500 m³/h | 181 kW | Sept. 2008
- Linden Park Bussigny CH
  54 000 m³/h | 208 kW (WP) | Juli 2008
- Property market Rosenheim
  48 000 m³/h | 185 kW (WP) | Nov. 2008

and many more

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