

AIR HANDLING UNIT WITH INTEGRAL HEAT PUMP



MANDÍK®

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WITH INTEGRAL HEAT PUMP

Unit description:

The air handling unit with integral heat pump is a variant of the standard MANDÍK air handling units of M and P series. By appropriate combination of the used sections, their layout and addition of the heat pump circuit, the unit features new parameters and functions. The heat pump circuit with heating and cooling functions is designed from high-quality components to achieve high efficiency and reliability of operation.

Unit casing:

Original frameless self-supporting structure.
Casing thickness 50 mm (mineral insulation 50 kg/m³).

Unit casing parameters according to EN 1886.

Tests performed by TÜV SÜD Munich:



Casing strength: D1 (M)

Casing leakage class: L1 (M)

Leakage between the filter and the frame: < 0.5 % – F9 (M)

Thermal insulation: T3 (with standard insulation of specific density 50 kg/m³)

Thermal bridges: TB2

Casing attenuation in the range:

| | | | | | | | |
|-----|------|------|------|------|------|------|------|
| Hz: | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
| dB | 15.8 | 23.6 | 31.3 | 37.3 | 39.5 | 39.7 | 43.2 |

Air flow range:

From 2000 to 25 000 m³/h

Control:

Autonomous control system on the Carel or Siemens platform.

Versions:

Indoor version.

Outdoor version – the unit can be configured for the needs of outdoor installation.

Hygienic version – the configuration and overall arrangement of the unit can be selected so that it meets functional and hygienic requirements according to VDI 6022.

The whole unit can be designed with regard to energy efficiency according to the requirement of EN 13053.

Delivery:

The unit is delivered to the customer including completely connected circuit of the heat pump and installed control system.

Certificates:



ISO 9001



KTA 1401



10 CRF50



Product Certificate



Hygienic Assessment

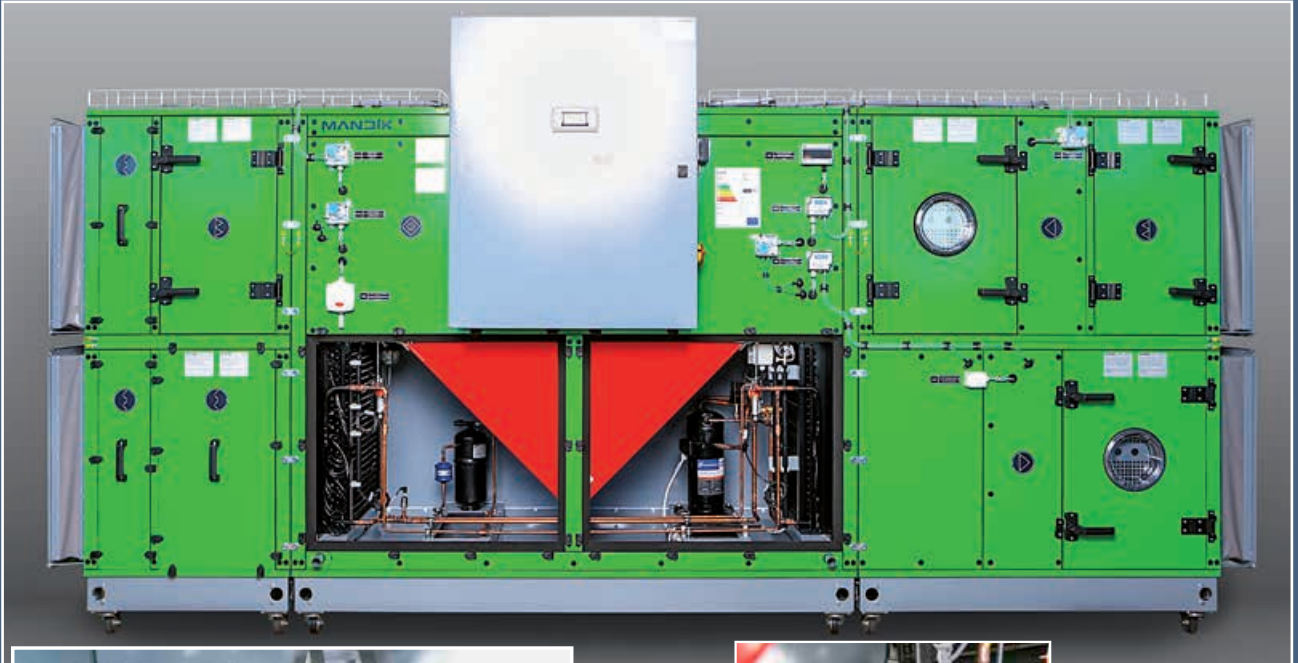


RLT Membership



TÜV SÜD Certificate

AIR HANDLING UNIT M5 WITH PLATE RECUPERATOR AND INTEGRAL HEAT PUMP



EXAMPLE OF AIR HANDLING UNIT WITH HEAT RECOVERY WITH INTEGRAL REVERSIBLE HEAT PUMP

Unit description:

Product line of MANDÍK air handling units – M5
 Indoor version
 Energy Class A+

Integral reversible heat pump as heating and cooling source
 Plate recuperator for heat recovery

Technical parameters:

| | | | |
|---------------------------------------|-------------|--------------------------------------|--------------------|
| Nominal air flow: | 3100 [m³/h] | Total electric power input – summer: | 4.6 [kW] |
| Air flow velocity: | 1.76 [m/s] | Total electric power input – winter: | 4.3 [kW] |
| Plate recuperator efficiency ϕ : | 79.8 [%] | Number of compressors: | 1 [piece] |
| Inlet fan power input: | 1.19 [kW] | Number of heat pump circuits: | 1 [piece] |
| Working frequency of the supply fan: | 50 [Hz] | Voltage: | 400/3/50 [V/Ph/Hz] |
| Outlet fan power input: | 1.27 [kW] | Max. operating current: | 6.5 [A] |
| Working frequency of the outlet fan: | 50 [Hz] | Coolant: | R410A |
| Intake air filtration class: | M5 | Coolant charge: | 4 [Kg] |
| Discharge air filtration class: | G4 | | |

Output parameters:

Summer operation mode

| | | | |
|---|----------|----------------------------|-----------|
| <i>ODA = 32 °C, rh 40 %, ETA = 25 °C, rh 50 %</i> | | Compressor power input: | 2.14 [kW] |
| Heat recovery cooling output: | 5.6 [kW] | Intake air temperature SUP | 20.5 [°C] |
| Heat pump cooling output: | 7.9 [kW] | EER: | 2.93 [-] |

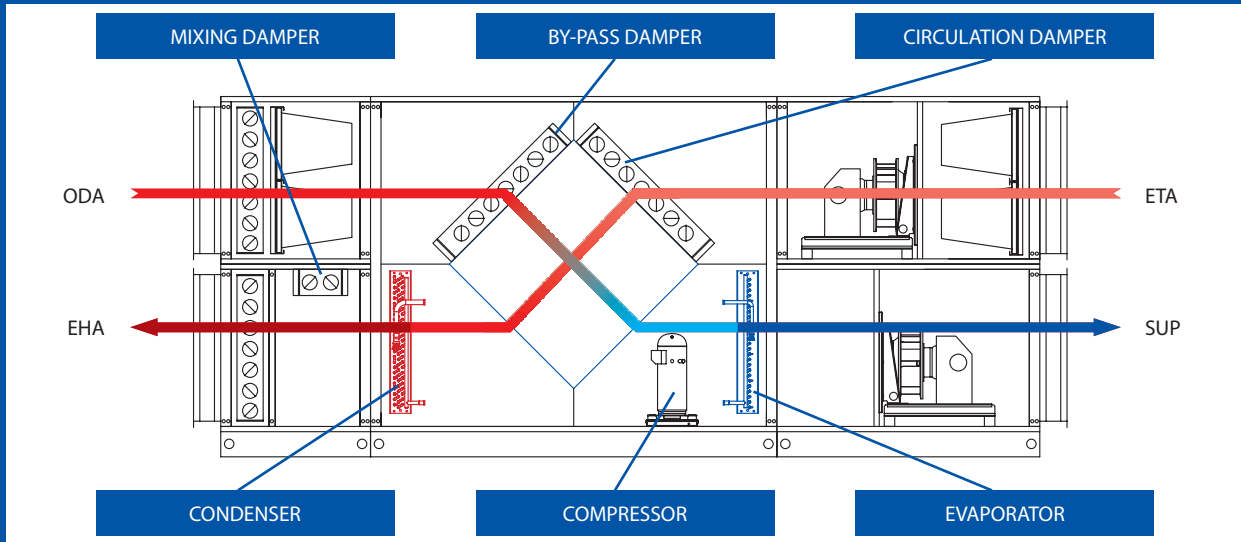
Winter operation mode

| | | | |
|--|-----------|----------------------------|-----------|
| <i>ODA = -15 °C, rh 90 %, ETA = 22 °C, rh 45 %</i> | | Compressor power input: | 1.86 [kW] |
| Heat recovery heat output: | 18.4 [kW] | Intake air temperature SUP | 24.5 [°C] |
| Heat pump heat output: | 7.8 [kW] | COP | 6 [-] |



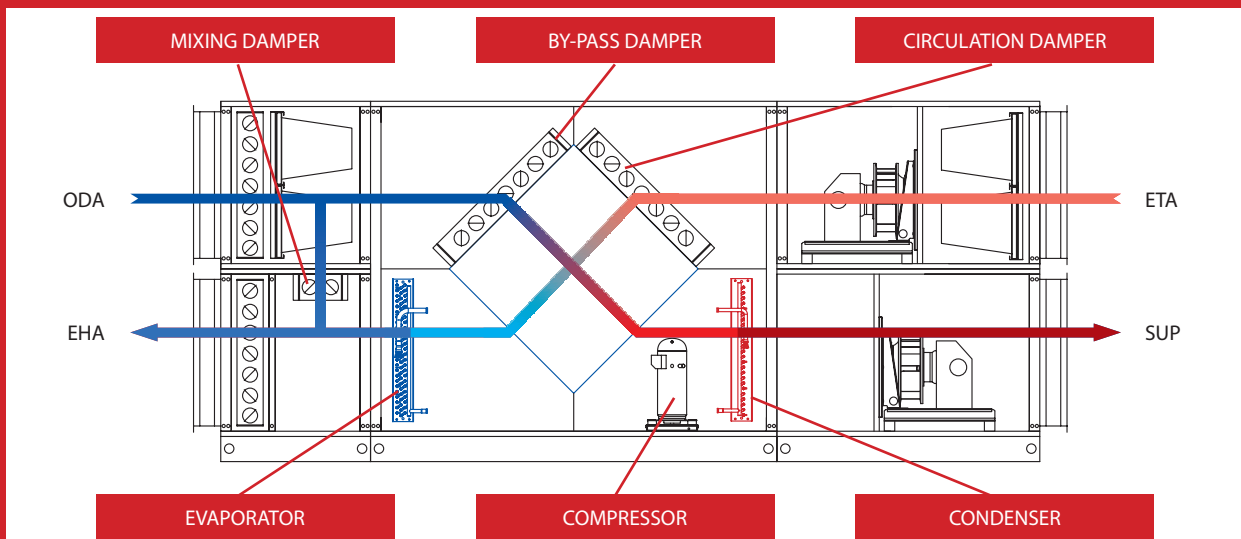
SUMMER OPERATION MODE OF THE UNIT

Fresh air is pre-cooled in the energy recovery heat exchanger by exhaust air of a lower temperature. After recuperation the intake air is after-cooled on the heat pump evaporator. On the condenser the heated exhaust air is discharged to atmosphere. The mixing damper is closed downstream of the condenser. In case of big heat gains in the room and in fresh air temperature decrease below the required temperature in the room the intake air goes through the by-pass of the recuperator, and the heat pump need not run. In case of need of internal air circulation, the dampers are closed on the fresh and exhaust air side, and the mixing damper is open upstream of the recuperator to provide nominal air flow. If the quality of the internal air decreases, the fresh air damper opens, and the by-pass damper is opened.



WINTER OPERATION MODE OF THE UNIT

Fresh air is pre-heated in the energy recovery heat exchanger by exhaust air of a higher temperature. After recuperation the intake air is after-heated on the heat pump condenser. If the fresh air temperature is equal to or less than 0°C and at the same time lower than the temperature downstream of the evaporator, the mixing damper is opened downstream of the evaporator, and the heat energy of the exhaust air of a higher temperature than that of the fresh air is used, and thus the mixed air is regulated to a temperature of min. 0°C due to the recuperator frost protection (due to its high efficiency). To ensure continuous operation of the heat pump circuit, the evaporator is equipped with electric heating rods to protect the heat exchanger against freezing.



ADVANTAGES OF THIS SOLUTION

High efficiency of the unit (Energy Class A+).

Very low operating costs.

The unit for summer and winter operation without the need of an external heat and cold source. The heat pump circuit can be used for air dehumidification and for winter heating of the ventilated room.

The only form of input energy – electric.

Small space necessary. It is not necessary to install external heat and cold sources.

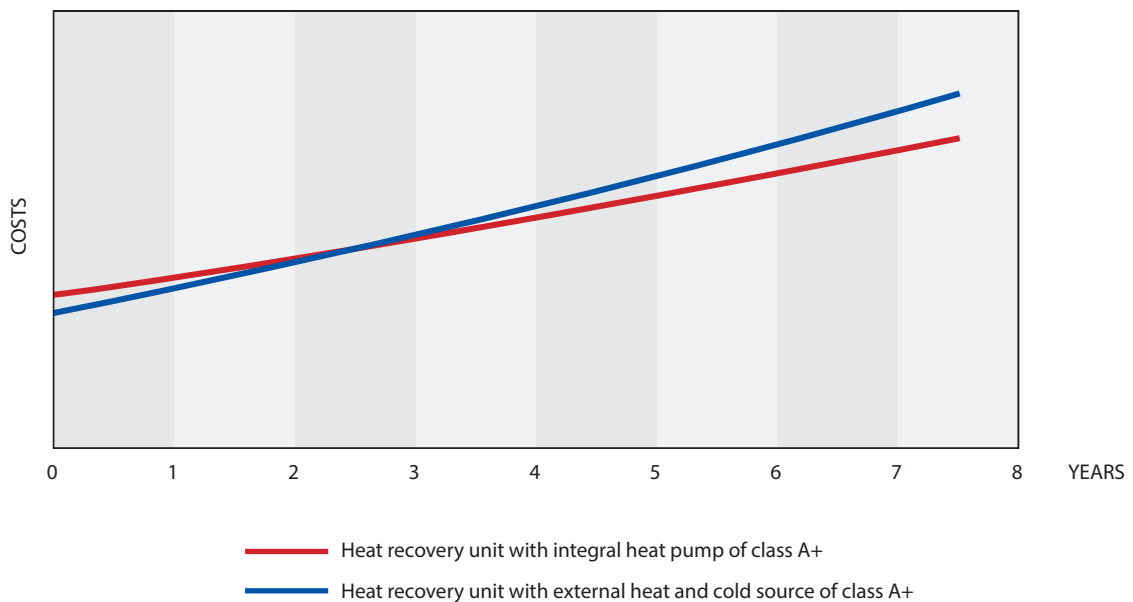
Ecological coolant R410A.

Minimum length of coolant piping – coolant and material savings.

The delivery with already installed and debugged control system – plug and play system.

Comparison of investment and operating costs:

Example for all-year operation – 12-hour shift (e.g. commercial centre)



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