

Run Around Coils Heat Recovery Systems For High Efficient Heat Recovery.

Run around coils heat recovery systems combine a very high level of heat recovery with entirely separate air paths.

Run around coils heat recovery systems

There is an optimal heat recovery system for any air handling application.


Which system to choose depends on which specific benefits are more relevant in the case at hand.

Moreover, ordinances, standards, and rules and regulations stipulate minimum values for heat recovery, which also have an impact on system selection.

Run around coils heat recovery systems (RAC) are first choice wherever airflows are required to be entirely separate. In these systems, the sensible and latent heat carried by one airflow is transferred to the other airflow indirectly, via a liquid medium. As a rule, the heat transfer fluid is a water/glycol mixture (brine) in the pump circuit. Supply air and extract air heat exchangers can be arranged at entirely separate locations. They are merely connected by a hydraulic connection.

Thanks to absolute separation of the supply and extract airflows, any mass transfer of, e. g. bacteria, contaminants, humidity or odors, is reliably avoided. This makes run around coils heat recovery systems particularly suited for applications subject to strict hygiene requirements, such as medical applications.

Heat recovery systems compared

	Rotary heat exchanger	Cross-flow plate heat exchanger	Double cross-flow plate heat exchanger	Counterflow plate heat exchanger	Run around coils heat recovery system	High efficiency run around coils heat recovery system
Heat recovery coefficient (wet) up to approx.	0.90	0.70	0.80	0.85	0.60	0.75
Reduced overall length	■				■	
Separate arrangement					■	■
Separate airflows		■ ¹	■ ¹	■ ¹	■	■
Adiabatic extract-air humidification	□ ²	□	□	□	□	□
Transfer of air humidity	■ ³					
Supply of heat and cooling energy						□
Variable brine quantity					■	■
Outdoor-air bypass	□	■	■	■		
Variable speed control	■					

■ standard
□ optional

¹ Leakages of up to 0.5 % of the volume flow possible (depending on the pressure conditions between supply and extract airflows)

² only reasonable with non-hygroscopic rotors

³ with non-hygroscopic rotors only in case of condensation

Run around coils heat recovery systems by robatherm

Standard run around coils heat recovery system

Thanks to reduced space requirements and separate arrangement, RAC solutions by robatherm offer highest variability. Compliance of the systems with the standards DIN EN 308 and DIN EN 13053, and with the guidelines VDI 2071, VDI 3803, and VDI 6022 is ensured.

Typical performance data of standard RAC

Heat recovery coefficient up to	At an air velocity of	Pressure drop approx.	H class *)
0.60	1.5 m/s	220 Pa	H2
0.55	2.0 m/s	240 Pa	H3
0.50	2.5 m/s	250 Pa	H3

*) as per DIN EN 13053; referred to an air volume flow of 10,000 m³/h and a period of operation of 5,000 h/a

High efficiency run around coils heat recovery systems

Compared to a standard RAC, a high efficiency run around coils heat recovery system (HE-RAC) features

- an extended controller,
- special heat exchangers,
- a special hydraulic control assembly.

Typical performance data of HE-RAC

Heat recovery coefficient up to	At an air velocity of	Pressure drop approx.	H class *)
0.75	1.5 m/s	200 Pa	H1
0.70	2.0 m/s	250 Pa	H2
0.65	2.5 m/s	300 Pa	H3

*) as per DIN EN 13053; referred to an air volume flow of 10,000 m³/h and a period of operation of 5,000 h/a

HE-RAC controller

For run around coils heat recovery systems, robatherm offers optimized control system solutions tailored to the requirements. In the standard configuration, the RAC controller is integrated in Smart Control.

The HE-RAC controller is available for connection to either robatherm's Smart Control or the customer's DDC.

The control system specifically developed for HE-RAC controls the brine circuit on the basis of the ratio of air- and brine-side heat flow capacities. An optimal ratio of energy yield over drive energy input is thus ensured.

Exact actual values are obtained from an electronic flow meter system without any moving parts and calibrated fan inlet nozzles.

The periodically collected energy management data (heat recovery coefficient, heat recovery output current and annual, heat recovery utilization rate, annual energy demand, cost saving, etc.) can be represented graphically and analyzed.

The pump kick control prevents stuck circulation pumps even in case of prolonged standstills.

HE-RAC heat exchangers

The special heat exchangers feature a very high counterflow for maximum heat transfer.



Each vent and drain of the heat exchanger circuit is accessible via special inspection panels even with the control assembly connected.

The extract air heat exchanger is antifreeze-protected by means of the supply temperature lower limit.

Heat exchangers consisting of seamless copper pipes with aluminium fins afford protection against corrosion.

For applications subject to increased corrosion protection requirements, robatherm offers heat exchangers with coated aluminium fins and copper manifolds in a sendzimir-galvanized sheet steel, or in a stainless steel (1.4301) frame. The hydraulic pipes are anti-corrosive and suitable for water/glycol mixtures.

The air-side inflow and outflow paths of the heat exchangers with highly efficient counterflow have been optimized by robatherm in terms of the heat transfer rate.

Casing adapters are airtight and thermally insulated in order to minimize leakage rates and heat losses. Wall penetrations for the adapters have a thermal bridge factor of class TB1.

The overall fin width per heat exchanger complies with VDI 3803, VDI 6022, DIN 1946-4, and DIN EN 13053, ensuring cleanability down to the core. In case of larger overall widths, the heat exchangers are split into several fin packs.

The bottom of the casing has been designed as a tray sloped on all sides for reliable condensate drain and optimal cleanability.

Hydraulic control assembly

A flow meter, a power-controlled pump, and a three-way valve in the hydraulic module allow the brine quantities to be measured and adjusted as required.



The hydraulic control assembly with power adjustment has also been optimized with regard to the water-side pressure drop.

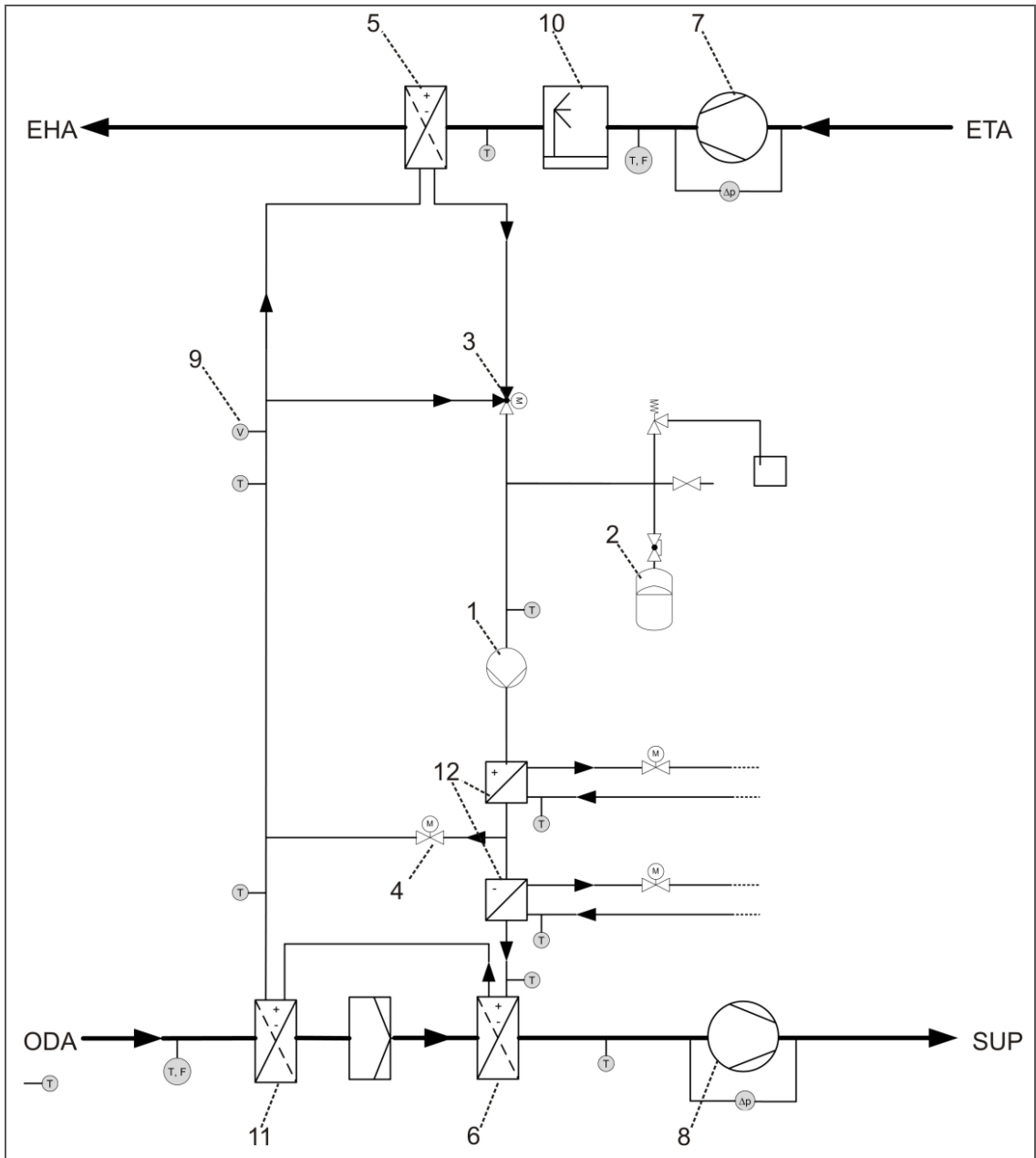
A power-controlled pump and a control valve ensure high control accuracy, even in part-load operation.

Extended functionality for multifunctional use

The robatherm HE-RAC can be additionally provided with the following functions for multifunctional use.

- Adiabatic extract air humidification (indirect evaporative cooling) for minimized mechanical chilling in summer as per VDI 3803.
- Supply of heat energy to the brine circuit of the HE-RAC by means of water/water plate heat exchanger if heat recovery alone fails to yield the desired supply air temperature due to low outdoor temperatures.
As a result, an air-side reheater is not required, and the overall length can be short.
- Supply of cooling energy, in the form of cold water, to the brine circuit of the HE-RAC by means of water/water plate heat exchanger if heat recovery alone (plus any adiabatic extract air humidification) fails to yield the desired supply air temperature due to high outdoor temperatures. As a result, an air-side reheater is not required, which saves space.

Functional diagram of the high efficiency run around coils heat recovery system



- | | | | |
|---|--|----|--|
| 1 | Brine pump | 7 | Extract air fan |
| 2 | Brine expansion tank | 8 | Supply air fan |
| 3 | Brine bypass valve for power limitation | 9 | Flow meter |
| 4 | Brine bypass valve for antifreeze protection | 10 | Optional: Adiabatic extract air humidification |
| 5 | Extract air heat exchanger | 11 | Optional: Outdoor air filter preheater |
| 6 | Supply air heat exchanger | 12 | Optional: Supply of heat or cooling energy |

Optimal choice among robatherm heat recovery systems

The robatherm range of highly efficient heat recovery systems

For highly efficient heat recovery, robatherm offers a wide range of systems: efficient rotary heat exchangers also transferring humidity; operationally reliable and cost-effective plate heat exchangers (cross- or counterflow), reversible heat pumps or leakage-free run around coils heat recovery systems with the optional supply of heat or cooling energy from external sources.

Among this wide range, customers will find the air handling unit (AHU) with the ideal heat recovery system for any installation.

As for which casing and components to choose, the response to customer requests will be optimal and customized, for unrivaled implementation versatility ensues from robatherm's modular AHU concept.

The efficiency of air handling units by robatherm, i. e. efficiency in planning, installation, commissioning, and operation, is owed to the factory integration of control and cooling technology.

The TrueBlue efficiency certificate – transparent and compliant with standards

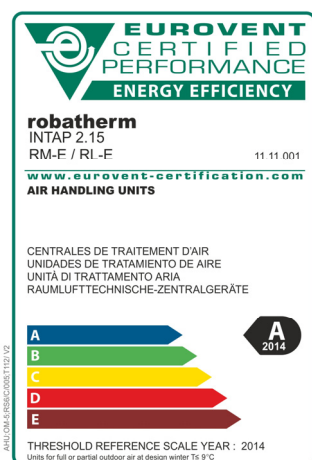
By means of the TrueBlue efficiency certificate, robatherm supports their customers in selecting the heat recovery system that is optimally suited to the respective application. Given that this certificate is based on a comprehensive examination, taking into account the entire useful life of the air handling unit, it is possible to implement a system that saves both costs and resources. The meteorological data at the installation site in question and the individual operating conditions are also included.

Based on current standards, the costs of investment, operation, maintenance, and disposal, as well as primary-energy demand and CO₂ emission are determined, and documented in a clear manner.

The TrueBlue efficiency certificate takes into account any losses associated with generation, storage, distribution, and delivery, as well as auxiliary-energy demands.

Conventional heat generation and chilling systems and the AHU-integrated systems by robatherm can thus be compared objectively in terms of energy efficiency and investment costs.

This is the only way to achieve a transparent and precise assessment of the overall system when planning new installations or modernization projects.



For air handling units with HE-RAC by robatherm, a Eurovent energy efficiency label or a similar label according to Herstellerverband Raumlufttechnische Geräte e.V. can be obtained upon request.



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