THERMAL SYSTEMS

Innovative drying technology

System for tempering power modules in magazines

RDS Magazine Dryer

Drying | Hardening

Drying | Hardening

New techniques for electronic components in the high-performance area

Optimal for power modules and high-temperature applications

The deciding competitive factor of the German energy supply system is no longer just the cost. Innovative performance, reliability and likelihood of being accepted on the global market are now much more important factors. Therefore, electronic components and the suitable outlet technology and connection technology have a key function.

The rapid grid expansion for renewable energy, which followed the energy transition, presents manufacturers of power electronic systems with the task of supplying the market with reliable systems. The increasing demands of the energy suppliers and the demand for reliability and sustainability present many challenges to system development. To achieve these performance levels we must now enter into and extend offshore applications.

Rehm offers the new RDS magazine dryer for this area. The energy efficient and sustainable system was developed as part of the HotAL research project (high temperature-optimised AL-bonding technology for offshore applications). The goal is to optimise performance electronics modules through the use of innovative materials and process management for high-temperature applications. Along with Rehm, Fraunhofer IZM Berlin and the industry partners Heraeus, SEMIKRON and F & K Delvotec Bondtechnik took part in this project that was supported by BMBF.

A new world of drying methods
with the RDS magazine dryer from Rehm

The new RDS magazine dryer from Rehm is the perfect system with inert gas operation for tempering power modules. The system can reach temperatures of up to 300 °C and residual oxygen values of less than 5,000 ppm O_2. It impresses with its innovative lock system as well as thermal insulation that enables a stable elevation profile when in process. The RDS magazine dryer is particularly suitable for the thermal treatment of semiconductor applications, hybrid constructions and electronic components that are transported in magazines. Examples of these would include electronic components in wind turbines, electric cars or inverters in the solar energy sector.

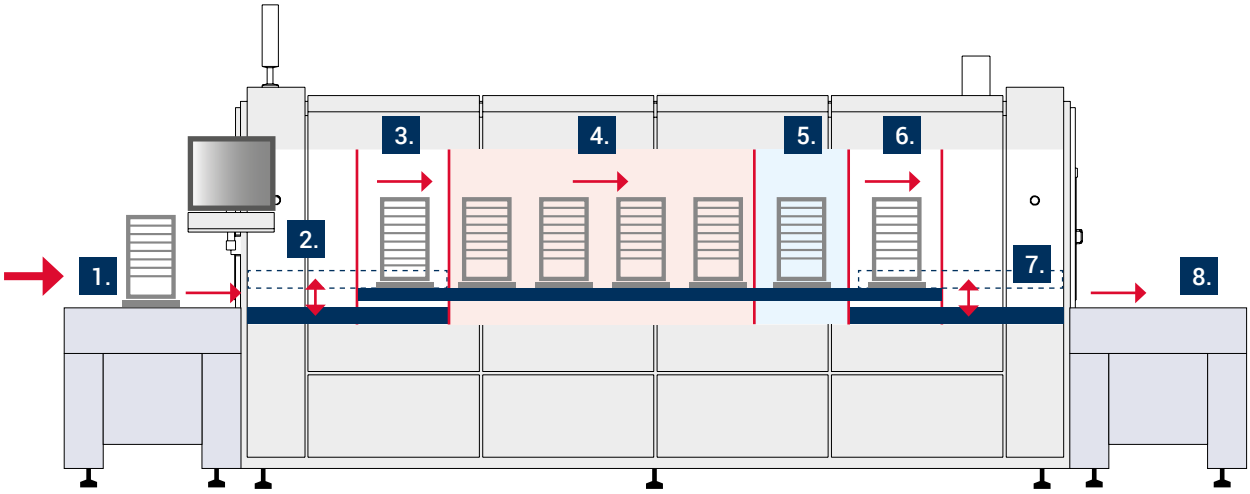
- **Temperatures up to 300 °C possible**
- **Residual oxygen values <5000 ppm O_2 possible**
- **Stable elevation profile through lock system and good thermal insulation**
- **Steady heating of components at the lowest Δ T**
- **High-performance cooling zones with temperatures of 20 °C**

Technical details
An overview of the RDS magazine dryer

The system consists of a lock system at the inlet and the outlet, four heat zones, and a cooling zone. In order to achieve an atmosphere with low levels of oxygen, locks on the magazine are necessary where possible. A three-part handling process at the inlet and outlet guarantees that the compartments can open and close independently of each other. In this way, an inert process chamber is guaranteed in every loading situation. The magazines are transferred to the lock zones with a so-called lifting transport. During the loading process, the lifting transport unit with the hoist is lowered below the level of the transport chamber and simultaneously unloads the magazine onto this. The magazine is unloaded using the opposite principle.

The magazine dryer prototype can be loaded and unloaded manually. The system is designed so that it can be fed using a handling system if necessary. Due to the flexible transport options, a small throughput during prototype production as well as a high throughput during future regular service is possible. Magazines with the maximum dimensions of 460 mm high, 240 mm wide and 240 mm deep can be transported using a three-part handling process with a base carrier plate. The cycle time can be a minimum of 3 minutes up to a maximum of 24 hours.

There is good thermal separation from the process chamber due to the compartments and the 80 mm thick insulation. The exchange of hot and cold gas flows can be effectively prevented which results in lower electrical power consumption.



1. Loading

Loading of the magazines by hand or using a handling system in the goods carriers with exact positioning.

2. Lifting transport/Inlet

A lifting mechanism feeds the magazines to the process chamber transporter.

3. N_2 tunnel

A low level of residual oxygen in the N_2 tunnel is guaranteed due to the lock system. Compartments eliminate air leakage.

4. Pre-heating/Heating

The four heat zones guarantee steady heating of all the components in the magazine at the lowest Δ T.

5. Cooling

Optimal thermal separation is achieved through a compartment between the heat and cooling zone. Cooling zone temperatures of 20 °C are possible.

6. N_2 tunnel

The locks in the outlet area ensure a lower ppm value in the process chamber and a stable elevation profile.

7. Lifting transport/Outlet

The locks in the outlet area ensure a lower ppm value in the process chamber and a stable elevation profile.

8. Unloading

Manual or automated unloading of the magazine.

Facts and figures
Detail information on the RDS magazine dryer

Dimensions

Length without handling systems:	3625 mm
Width:	1355 mm
Height:	1795 mm

Conveyor

Conveyor height:	950 mm ± 50 mm
Maximum magazine size:	H x L x D = 460 x 240 x 240 mm
Cycle time:	3 min up to 24 hours

Exhaust air

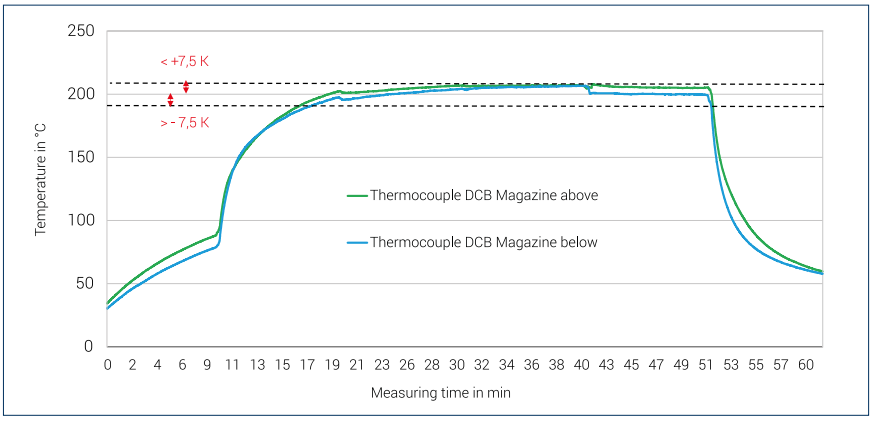
Exhaust volume flow rate:	400 m³/h
Pressure:	5 mbar

Process parameters

T_{max} = 300 °C

Residual oxygen values <5000 ppm O_2

Stable temperature profile



Open process chamber

Special characteristics

Magazine on carrier plates

Inlet transport in a lowered position

Efficient EC fan motors

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Rehm Worldwide

As a leading manufacturer of innovative thermal system solutions we have customers on every continent. With our own locations in Europe, America and Asia as well as 27 agencies in 24 countries we are able to serve the international markets quickly and to offer outstanding on-site service – worldwide and round the clock!

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