Drying | EVERDRY® FRA-V

Regeneration with fan-blown air: the Heat Regenerating Adsorption Dryer EVERDRY® FRA-V

Standardised system concepts with a wide range of possible variations: To solve complex tasks in compressed air drying with large volume flow rates economically!
In-house engineering for individual system solutions!

The classic concept: Innovatively implemented via the latest system technology

Tried and tested process engineering, paired with the latest control technology, stand for the three variable basic concepts that work ideally worldwide in any climate zone. The standard series is broken down into 23 performance levels from 580 to 20,000 m^3/h.
Higher volume flow rates can also be achieved at the customer's request.

In the EVERDRY® FRA-V, desorption takes place in a counter-flow direction of adsorption with heated fan-blown air in the pressure mode and cooling is by fan-blown air in the vacuum mode.
There are no compressed air losses for regeneration (ZERO Purge).
The use of an adsorption dryer depends on the ambient conditions, which have to be checked before use.

Model:	FRP	FRA	FRL
Pressure dew point	-40 °C	-40 °C	-40 °C -70 °C option
Quality Class	-.2.-	-.2.-	-.2.- -.1.-

FR

› Application Oriented Solutions

- › Added value by utilising comprehensive competence
- › Total concept instead of just individual components
- › Informative and user-friendly touch panel control system
- › Easy to maintain

› Reliable Process Management

- › Safe function monitoring with sensor technology
- › High-quality high-temperature galvanising
- › Tried and tested, maintenance-friendly components

› Energy-optimised Concept

- › Beneficial individual valves
- › Energy-efficient dew point control system

Better through Responsibility

BEKO

Heat Regenerating Adsorption Dryer: In-house Engineering for Individual System Solutions

Profile

- Branch and application-specific requirements (e.g. pressurised air quality, volume flows, types of energy for regeneration air heating)
- Investment and operating costs, individual amortisation time
- Local acceptance provisions
- Climate zones, local assignment conditions, economical parameters

Concept

- Specifying the type of system design
- Following on with: Developing individual solutions

Presentation

- Presenting the solution concept

Implementation

- Implementing the project
- In-house engineering by our experienced, competent team of experts

Commissioning

- Installing the system on site
- Optimum setting up and adjustment for the local circumstances

Continuous exchange of information between the customer and our experts
Support / Consulting / Optimisation

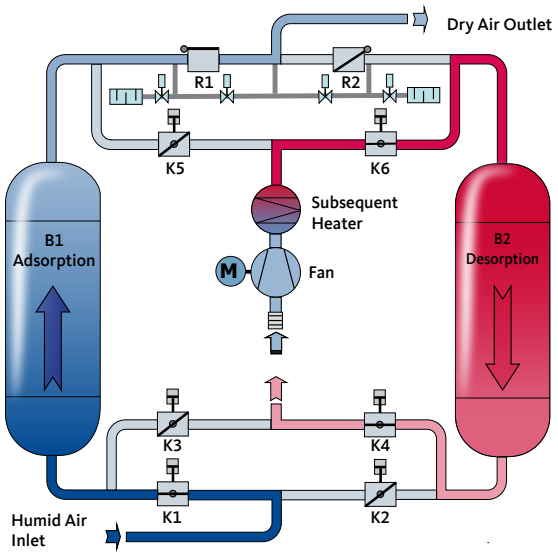
Function Process for EVERDRY® FRA-V

Adsorption stage

The moist compressed air flows enters the system through the valve **K1** and into the adsorption vessel **B1**. The flow distributor ensures an even distribution of the moist compressed air. The moisture will be absorbed by the drying agents during the through flow. The dried pressurised air is then routed via the outlet valve **R1** and the system outlet to the consumer positions. The adsorption process ends based on either the time or dew point (option). Adsorption takes place from the bottom to the top.

Desorption stage

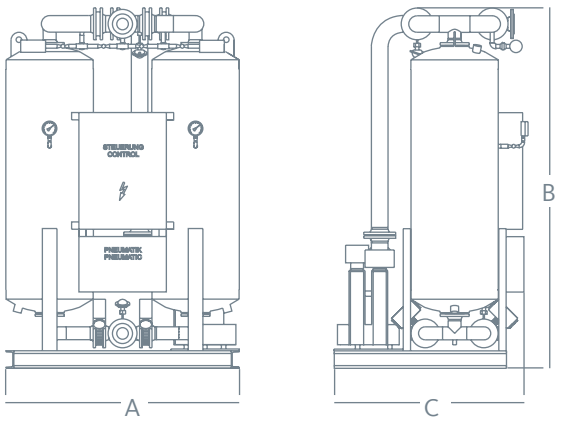
Whilst the compressed air is being dried in the adsorption vessel **B1**, the adsorption vessel **B2** that has just been saturated with moisture is regenerated. Before the start of regeneration, the pressure in the adsorption vessel **B2** is gently relieved to atmospheric pressure. Desorption takes place with aspirated ambient air. The regeneration fan conveys the ambient air to the subsequent heater. This is where the fan-blown air is heated up to the necessary desorption temperature. The regeneration fan creates an increase in temperature that has a positive effect on the heater's performance.



The air flow from the fan passes through the valve **K6** to the desorbing adsorption vessel **B2**. The moisture absorbed by the desiccant evaporates and routed by the air flow from the fan through the valve **K4** into the atmosphere. Energy-optimised desorption is executed via a counter-flow process. This means that the moisture from the adsorption vessel reaches the atmosphere by the shortest path. The heated fan-blown air cools down when it flows through the adsorption vessel **B2** since the water evaporates. The outlet temperature of the desorption air is therefore not much higher than the evaporation temperature (approx. 40 – 60°C). The moisture level in the desiccant bed reduces with the desorption process. Decreasing moisture levels result in an increase of the outlet temperature of the desorption air. The cooling stage ends when the necessary process temperature is reached. Desorption takes place in the opposite direction to adsorption from the top to the bottom.

EVERDRY® FRA-V: FRA-V 0600 – FRA-V 3400

- Designed for fully automated and continuous operation
- Desorption in a counter-flow to the adsorption direction by means of heated fan-blown air
- No pressure loss for regeneration
- Cooling with fan-blown air
- Designed for indoor installation
- Flow-optimised individual valves to minimise the pressure loss



ZERO PURGE

EVERDRY®	FRA-V 0600	FRA-V 0750	FRA-V 0900	FRA-V 1100	FRA-V 1400	FRA-V 1700
Volume flow rate (m³/h)	580	720	880	1100	1400	1700
Connection PN 16 DIN 2633	DN 50	DN 50	DN 50	DN 80	DN 80	DN 80
Connected load (kW)	10.1	10.1	14.2	14.2	18	25
Dimensions						
A (mm)	1510	1550	1600	1650	1700	1750
B (mm)	2315	2325	2390	2420	2650	2705
C (mm)	1165	1165	1190	1210	1325	1470
Weight (kg)	1150	1250	1350	1650	1900	2250

EVERDRY®	FRA-V 2000	FRA-V 2300	FRA-V 2600	FRA-V 2900	FRA-V 3400
Volume flow rate (m³/h)	2000	2300	2600	2900	3400
Connection PN 16 DIN 2633	DN 100	DN 100	DN 100	DN 100	DN 100
Connected load (kW)	28	31	38.5	41.5	48
Dimensions					
A (mm)	1800	1850	1940	1990	2200
B (mm)	2755	2800	2820	2840	3010
C (mm)	1520	1555	1785	1810	1945
Weight (kg)	2600	2800	3100	3350	3850

Operating conditions*	
Medium	Compressed air
Operating pressure	7 bar [g]
Inlet temperature	35 °C
Inlet humidity	saturated
Pressure dew point	-40 °C

Electrical connection*	
Power supply	3 Ph. | 400 V | 50 Hz
Protection class	IP 54, acc. to IEC 529 (no explosion protection)
Version	according to VDE / IEC
Permissible voltage deviation	+/– 10 %

* Different conditions on request

Limits of use*	
Operating pressure	4 ... 10 bar [g]
Inlet temperature	5 ... 43 °C
Ambient temperature	5 ... 40 °C
Maximum fan aspiration	35 °C / 40 % r. F. / 30 °C / 50 % r. F.

Reference conditions according to DIN / ISO 7183	
Medium	Compressed air
Volume flow rate in m³/h relative to	20 °C (1 bar [g])
Operating pressure	7 bar [g]
Compressed air inlet temperature	35 °C
Inlet humidity	saturated

Standby stage

In the standby stage, the freshly regenerated vessel with the closed inlet valve (**in this case K2**) is under operating pressure. During this stage, the standby vessel is kept pressurised via the open pressure build-up valve. If the adsorption stage is monitored via a dew point dependent control system (option) and is then completed, then the duration of the standby stage is dependent on the loading status of the adsorption vessel (**in this case B1**). The switch over process will be only be initiated when the drying agent break-down capacity has been reached (increase in the pressure condensation point). If the system is operated in the "time-dependent switch over" mode, then the initiation of the switching over process will be executed when the set cycle time has expired.

Parallel Stage

Before the switching over process is executed for the adsorption vessel (**in this case from B1 to B2**), this will be switched into parallel function by opening the inlet valve (in this case K2). The pressurised air flows over both adsorption vessels for approx. 5 – 15 minutes (can be set individually).

Switching Over Procedure

At the end of parallel stage, the system switches over to the regenerated adsorption vessel (**in this case B2**) in the following steps:

- **The inlet valve (in this case K1) on the saturated adsorption vessel (in this case B1) is closed**
- **The pressure build-up valve is closed**
- **Open the pressure relief valve for the adsorption vessel to be regenerated (in this case B1)**
- **Open the regeneration valves (in this case K3, K5)**
- **Switch on the fan and heater**

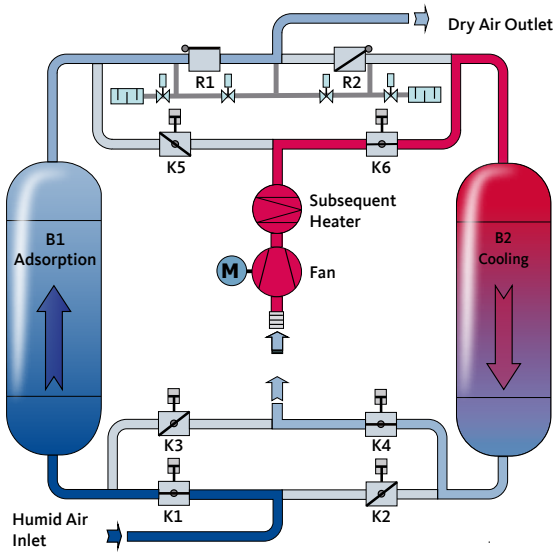
The vessel saturated with moisture **B1** is now in the desorption stage while the adsorption vessel **B2** is responsible for drying the compressed air.

Cooling stage

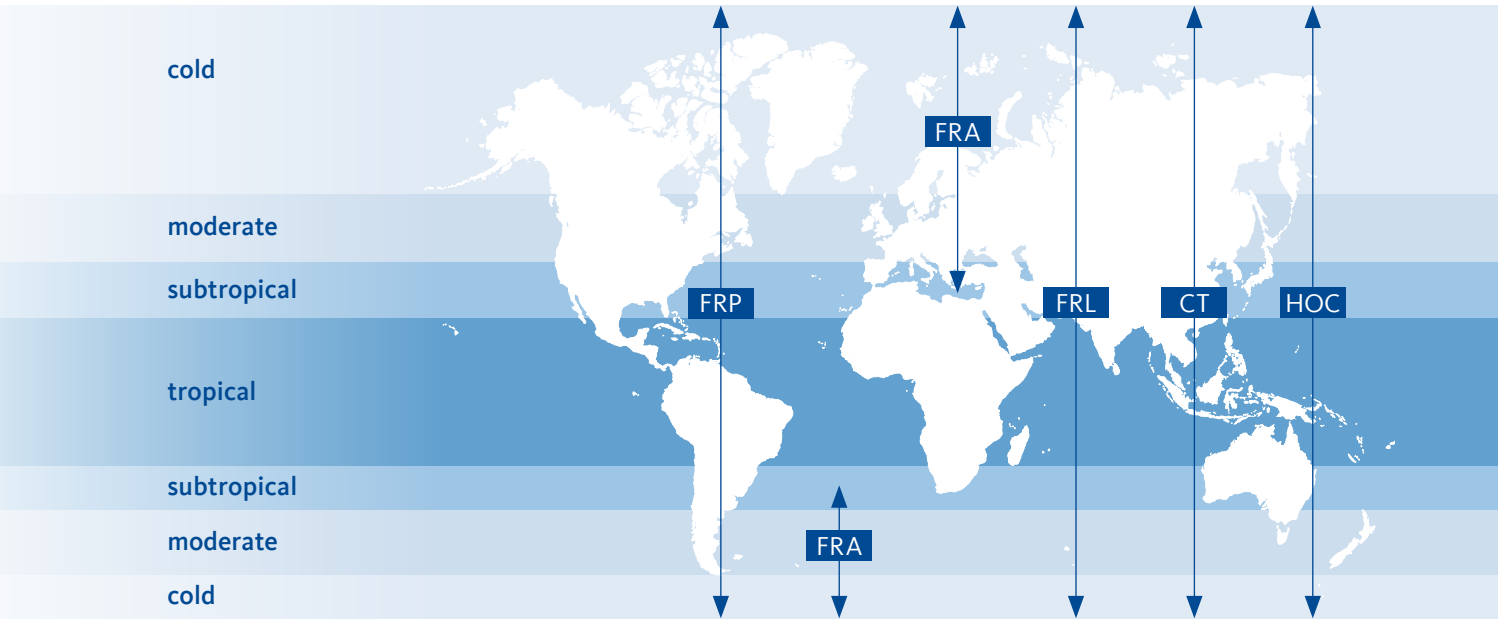
To prevent temperature and dew point peaks after the switch over, the heat stored in the desiccant after the desorption stage will be routed off by the cold fan-blown air flow. The cool ambient air flows through the valve **K4** into the cooling adsorption vessel **B2**. Cooling takes place in the fan suction mode from the bottom to the top. This procedure prevents a pre-loading of the desiccant through ambient moisture in the outlet area of the adsorption vessel, which has a decisive influence over the quality of drying. The cooling stage ends when the necessary process temperature is reached. At the end of the cooling stage, the regeneration valves (**K4, K6**) close.

This is followed by a gradual build up of pressure in the regenerated adsorption vessel **B2**. The integrated pressure transmitters monitor the correct build up of pressure. The next stage (standby) only begins when both vessels have reached the same operating pressure. Cooling takes place in the same direction as adsorption from the bottom to the top. The desiccant has to be be cooled efficiently to ensure a constantly high quality of the compressed air. In unfavourable climatic conditions (ambient temperature or humidity too high), adequate cooling is no longer possible with ambient air.

In order to also guarantee process reliability in such cases, your EVERDRY® adsorption dryer is fitted with a sensor that constantly measures the ambient temperature as well as the relative humidity of the ambient air. The resulting dew point for the ambient air is calculated from this. These values are displayed on the screen of the dryer's control panel. If pre-set limits are exceeded, then the cooling stage is executed with a small share of the dried compressed air instead of with the ambient air (compressed air cooling). As soon as the values fall below the pre-set limits again, the system switches back to ambient air cooling for the next cooling stage. This function increases the operational reliability of your EVERDRY® and ensures a constantly high quality of the compressed air independent of the ambient conditions.



The Heat Regenerating Adsorption Dryer: At home throughout the world.



Do you have questions about the best way of processing your compressed air?

We have the answers! We offer efficient solutions for any type of processing chain. Please contact us with your queries. We would be delighted to tell you more about our condensate treatment, filtration, drying, measuring and process technology, and our comprehensive services.

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