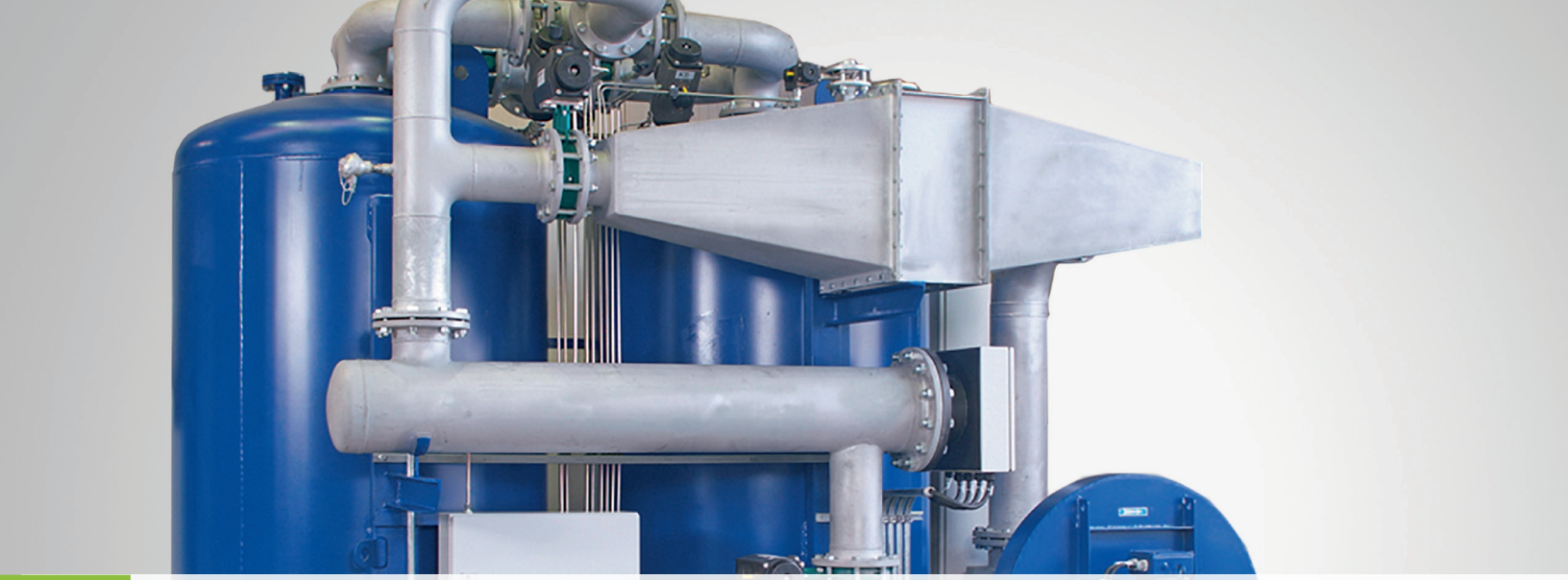


Drying | EVERDRY® FRL

Closed-loop cooling: the Heat Regenerating Adsorption Dryer EVERDRY® FRL

Standardized 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.

EVERDRY® FRL regenerates the desiccant bed in a counter-flow direction to drying via heated ambient supplied by a blower, and subsequently cools the desiccant bed in the drying direction (downward flow) via a closed-loop circuit in which the blower recirculates cooling air through a water-cooled heat exchanger. The cooling phase is independent of ambient conditions, thus FRL is suitable use in for all climate zones. Furthermore, since compressed air not required for cooling (true Zero Purge), this technology ensures reliable performance and ideal operating efficiency.

Model:	FRL
Pressure dew point	-40 °F -94 °F option
Quality Class	-.2.- -.1.-

FR

› Application-oriented Solutions

- › Added value by utilizing comprehensive competence
- › Optimized design via total system approach
- › Informative and user-friendly touch panel control system
- › Easy to maintain

› Reliable Process Management

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

› Energy-optimized Design

- › Low pressure drop across dryer (flow optimized piping and process valves)
- › Energy-efficient dew point control system

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

Profile

- Identify relevant industry and project-specific requirements
  - local code requirements
  - understand climate and operating conditions
- Optimize solution considering total cost - both initial investment and operating costs

Concept

- Determine the type technology for the application
- Develop standard or customized solutions

Presentation

- Propose the recommended technology and solution

Implementation

- Project execution (design/ procure/build)
- In-house engineering through our resident experts

Commissioning

- On-site start-up & commissioning support
- Post-commissioning support via our dedicated technical service team

Continuous exchange of information between the customer and our experts

Support / Consulting / Optimization

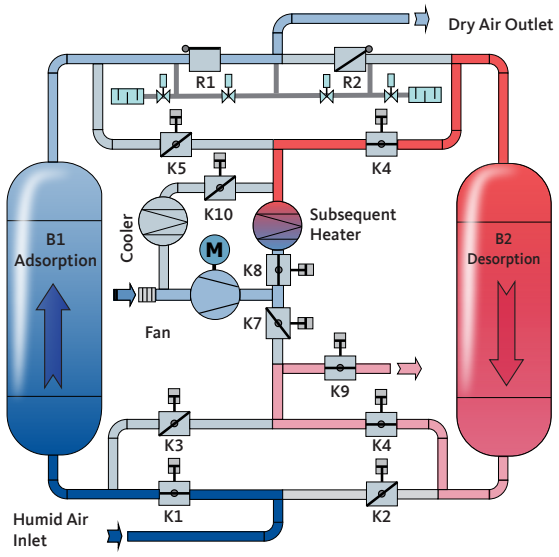
How it Works: EVERDRY® FRL

Adsorption phase

Saturated compressed air flow enters the system through open valve **K1** and into the adsorption tower **B1**. The flow distributor ensures an even distribution of the moist compressed air. The water vapor will be adsorbed by the desiccant as it flows upward through tower. Dried air passes through the outlet check valve **R1**, exiting to the air distribution system. The adsorption phase ends based on either the time or outlet pressure dew point (option).

Regeneration phase

While the compressed air is being dried in tower **B1**, offline tower **B2** is regenerated. Before the start of regeneration, the pressure in tower **B2** is gently relieved to atmospheric pressure. Regeneration is achieved when the blower forces ambient air through open valve **K8**, across the in-line process heater, through open valve **K6** and downward through the regenerating tower **B2**. The heated, dry regeneration air, extracts water that was adsorbed by the desiccant and the now moisture-laden air exits the bottom of the tower through open valves **K4** and **K9** and is vented to atmosphere.



The desiccant is most saturated at the bottom of the tower, so regeneration in counter-flow direction to drying (top-down) optimizes efficiency since the water to be removed follows the shortest path to reach the atmosphere.

Because evaporation has a net cooling effect, the hot regeneration air is cooled as it flows down through tower B2; therefore, the exhaust temperature of the regeneration air is typically in the range of 100-140°F. As the moisture level in the desiccant bed drops during regeneration, the exhaust outlet temperature will slowly increase (less evaporation = less cooling effect). The regeneration phase is complete once the target process temperature is reached.

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 pressurized 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**) accordingly. The pressurized air flows over both adsorption vessels for approx. 5 – 15 minutes (can be set individually).

Switching Over Procedure

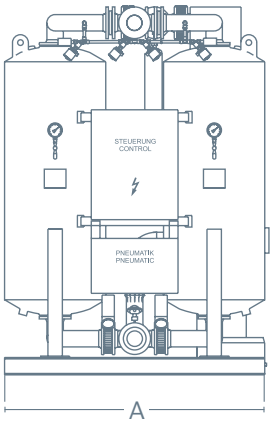
At the end of parallel stage, the system switches over to the regenerated adsorption vessel (**in this case B2**) in the following steps:

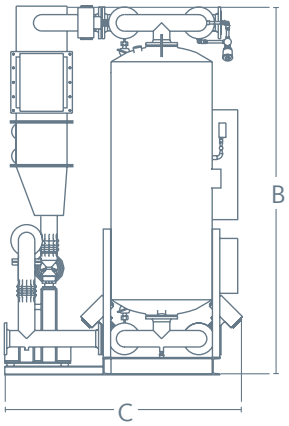
- **The inlet valve (in this case K1) on the saturated adsorption vessel (in this case B1) is closed**
- **The pressure build-up valve is closed**
- **Open the pressure relief valve for the adsorption vessel to be regenerated (in this case B1)**
- **Open the regeneration valves (in this case K3, K5, K8)**
- **Switch on the fan and heater**

The moisture-laden tower **B1** is now in the offline regeneration phase and tower **B2** takes over drying the compressed air.

EVERDRY® FRL: FRL 0600 – FRL 3400

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





LOOP

EVERDRY®	FRL 0600	FRL 0750	FRL 0900	FRL 1100	FRL 1400	FRL 1700
Volume flow rate (SCFM)	340	424	518	648	824	1000
Connection 150# Flange (in)	2	2	2	3	3	3
Connected load (kW)	10.1	10.1	14.2	14.2	18	25
Dimensions						
A (in)	62	64	65	67	67	71
B (in)	92	92	95	96	97	99
C (in)	51	51	52	55	56	58
Weight (lb)	2,750	2,970	3,190	3,740	4,400	4,950

EVERDRY®	FRL 2000	FRL 2300	FRL 2600	FRL 2900	FRL 3400
Volume flow rate (SCFM)	1,177	1,354	1,530	1,707	2,000
Connection 150# Flange (in)	4	4	4	4	4
Connected load (kW)	28	31	38.5	41.5	48
Dimensions					
A (in)	72	73	77	79	88
B (in)	101	103	103	104	111
C (in)	65	65	73	76	82
Weight (lb)	4,950	6,270	6,820	7,260	8,580

Operating conditions*	
Medium	Compressed air
Operating pressure	100 PSIG
Inlet temperature	100 °F
Inlet humidity	saturated
Pressure dew point	–40 °F

Electrical connection*	
Power supply	3 Ph. | 400 V | 50 Hz
Protection class	NEMA 4 (no explosion protection)
Version	UL
Permissible voltage deviation	+/– 10 %

* Different conditions on request

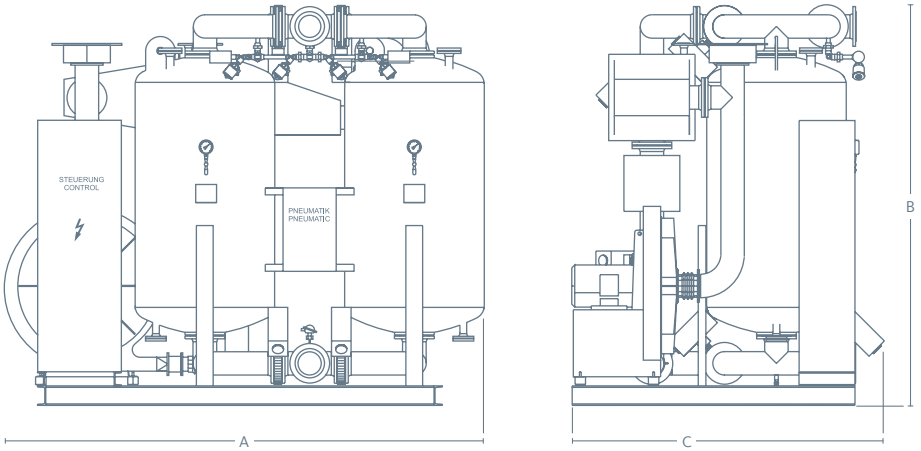
Limits of use*	
Operating pressure	70-150 PSIG
Inlet temperature	40-110 °F
Ambient temperature	40-104 °F
Max. fan aspiration	95 °F / 85 % RH 104°F / 70 % RH

Reference conditions according to DIN / ISO 7183	
Medium	Compressed air
Volume flow rate in m^3/h relative to	20 °C (1 bar [g])
Operating pressure	7 bar [g]
Compressed air inlet temperature	35 °C
Inlet humidity	saturated

EVERDRY® FRL: FRL 4200 – FRL 20000

LOOP

- Fully automated for continuous operation
- Heated blower regeneration in counter-flow to drying direction
- Closed-loop cooling via blower and water-cooled heat exchanger
- True zero-purge
- Designed for indoor installation
- Design optimized for minimal pressure loss



EVERDRY®	FRL 4200	FRL 5000	FRL 6000	FRL 7000	FRL 8200	FRL 9400
Volume flow rate (SCFM)	2470	2950	3530	4120	4830	5500
Connection 150# Flange (in)	6	6	6	6	6	8
Connected load (kW)	52.5	69.5	78.5	92	105.5	123
Dimensions						
A (in)	133	137	148	150	171	168
B (in)	114	116	118	120	126	129
C (in)	89	89	98	100	103	110
Weight (lb)	11,800	13,420	15,400	17,160	20,900	23,430

EVERDRY®	FRL 10600	FRL 12000	FRL 13500	FRL 15000	FRL 17000	FRL 20000
Volume flow rate (SCFM)	6240	7060	7950	8830	10000	11770
Connection 150# Flange (in)	8	8	8	8	10	10
Connected load (kW)	141	159	177	198.5	220	247
Dimensions						
A (in)	197	213	221	232	221	260
B (in)	134	134	138	138	144	146
C (in)	114	118	122	126	126	138
Weight (lb)	30,800	33,440	37,400	42,900	47,300	53,900

Operating conditions*	
Medium	Compressed air
Operating pressure	100 PSIG
Inlet temperature	100 °F
Inlet humidity	saturated
Pressure dew point	–40 °F

Electrical connection*	
Power supply	3 Ph. | 400 V | 50 Hz
Protection class	NEMA 4 (no explosion protection)
Version	UL
Permissible voltage deviation	+/– 10 %

* Different conditions on request

Limits of use*	
Operating pressure	70-150 PSIG
Inlet temperature	40-110 °F
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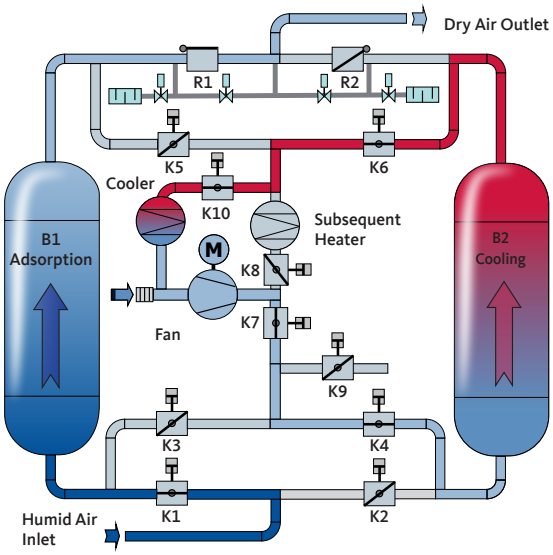
Operating pressure	7 bar [g]
Compressed air inlet temperature	35 °C
Inlet humidity	saturated

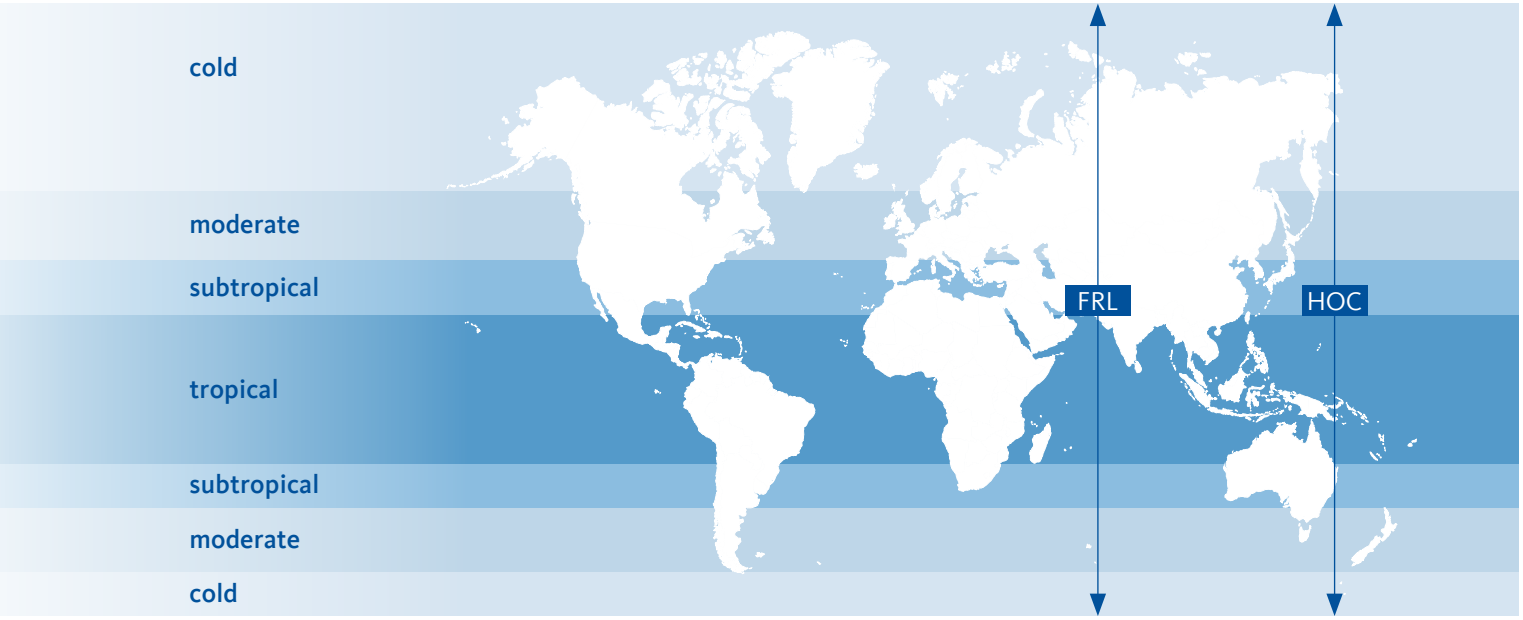
Cooling phase

To prevent temperature and dew point spikes after tower switch over, the desiccant bed must be adequately cooled to remove heat built up during regeneration phase. FRL uses a closed-loop cooling process in which the blower recirculates air across a water-cooled heat exchanger. Cooling takes place in the same direction as drying – from the bottom to the top. This is this ideal method of cooling the desiccant bed, as it prevents preloading of the freshly regenerated desiccant with moisture from the ambient air. Furthermore, the closed-loop cooling phase is independent of ambient conditions.

Prior to cooling phase, regeneration exhaust valve **K9** is closed. The cooling cycle begins when heater inlet valve **K8** is closed, while simultaneously opening valves **K7** and **K10**. The cooling phase ends when the target process temperature is reached. At the end of the cooling stage, regeneration valves **K4** and **K6** closed and the now fully regenerated and cooled tower **B2** gradually builds up to line pressure. The integrated pressure transmitters continuously monitor the tower pressure. The next phase (standby) only begins when both vessels have reached the same operating pressure.



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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