



Drying | EVERDRY® eco

EVERDRY® eco with new options

Even more customised, even more efficient, even more sustainable

With our heat-regenerating adsorption dryers EVERDRY® we can offer you a tailor-made solution to match the respective location of use and applications to be served. This includes an optimum design and suitable structure well as the options to match the specific requirement.

The heat-generating adsorption dryer EVERDRY® can also be delivered as a complete system with particle and oil vapour

removal, with suitable storage tanks and alternative heat exchangers and further components for compressed air treatment. In this document we give you an overview of the different options available using the example of an EVERDRY® FRA-Vplus and prove how you can lower costs long-term using the additional options and increase both reliability and process safety.

Safety valves

Heater

Heat exchanger

Heat storage tank

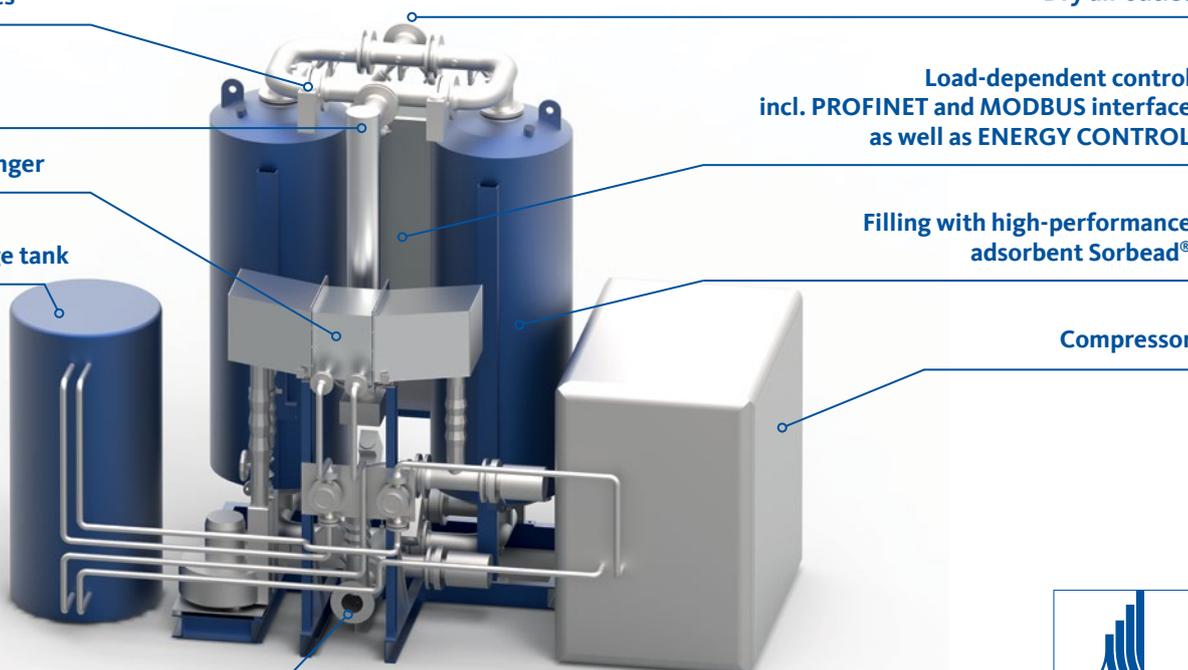
Regeneration air outlet
(desorption stage & cooling)

Dry air outlet

Load-dependent control
incl. PROFINET and MODBUS interface
as well as ENERGY CONTROL

Filling with high-performance
adsorbent Sorbead®

Compressor



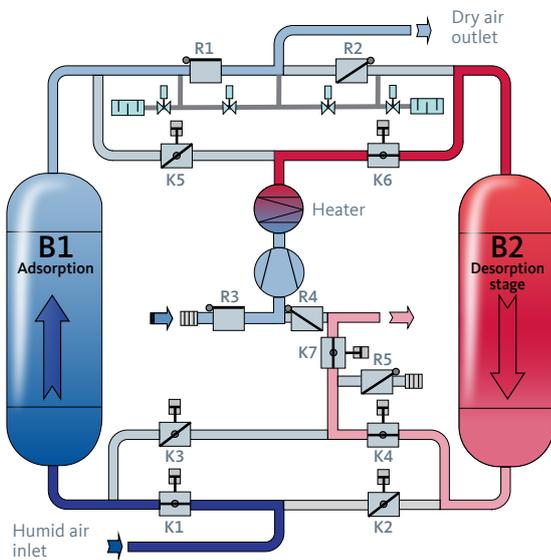
Better through Responsibility



EVERDRY® FRA-V_{plus} in the standard version

With the standard version of the heat-regenerating adsorption dryer EVERDRY® FRA-V_{plus}, the desorption stage takes place in a counter-flow to the direction of adsorption with heated fan-blown air in the pressure mode and subsequent cooling is by fan-blown air in the same flow in the vacuum mode. This makes it possible to carry out regeneration without compressed air losses (ZERO purge). However, the use of this adsorption dryer is influenced by the ambient parameters. Thus high outdoor temperatures and high

air humidity can have a negative effect on cooling. To compensate these parameters being exceeded occasionally, the plant constantly monitors the ambient temperature and relative humidity. Thanks to this smart environment monitor, the dryer switches to purge mode and uses part of the dry air flow for cooling if necessary. This means compressed air quality is guaranteed at all times! As soon as the ambient parameters permit, the plant switches back to normal cooling mode as quickly as possible.

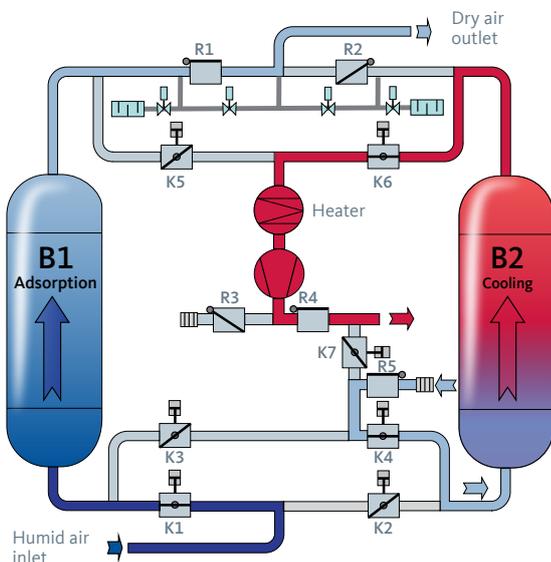


Desorption stage by means of blower in pressure mode

Whilst the compressed air is being dried in the adsorption container **B1**, the adsorption container **B2** that has just been saturated with moisture is regenerated.

Before the start of regeneration, the pressure in the adsorption container **B2** is gently relieved to atmospheric pressure. The desorption stage takes place with aspirated ambient air. For this, the regeneration blower pumps the ambient air to the downstream heater, where it is heated to the necessary desorption temperature.

The increase in temperature through the regeneration blower reduces the power requirements of the heater and has a positive effect on the energy requirement.



Cooling phase by means of fan in vacuum mode

To prevent temperature and dew point peaks after the switch over, the heat stored in the adsorbent after the desorption stage will be routed off to the outside by the cold fan-blown air flow.

The cool ambient air flows through the fittings **R5** and **K4** into the cooling adsorption container **B2**. Cooling takes place in the fan suction mode from the bottom to the top. This procedure prevents a pre-charging of the adsorbent through ambient moisture in the outlet area of the adsorption vessel, which would have a decisive influence over the quality of drying.

When the required process temperature is reached, the cooling phase is ended and the regeneration flaps (**K4**, **K6**) close.

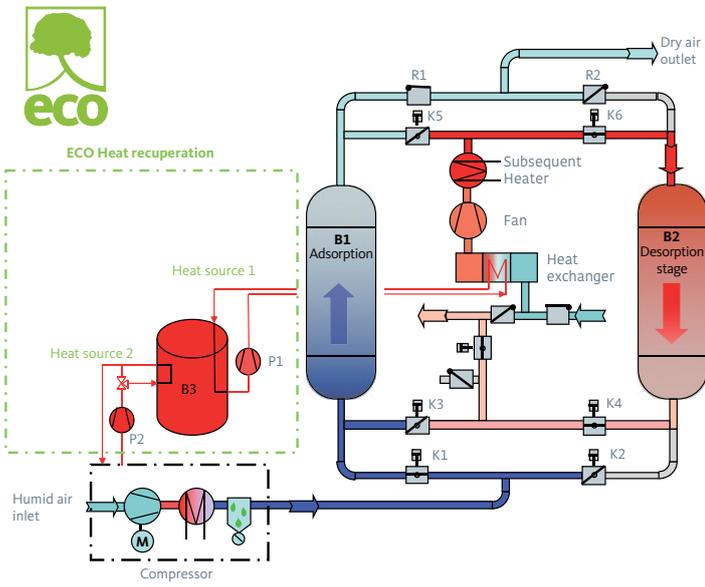
EVERDRY® FRA-V_{plus} in the eco version

With this model, the desorption stage also takes place in a counter-flow to the direction of adsorption with heated fan-blown air in the pressure mode and cooling is by fan-blown air in the same flow in the vacuum mode.

As long as the ambient parameters permit, this dryer also works in ZERO purge mode. As soon as the smart ambient monitor establishes that the aspirated air is too humid, it switches to purge mode and uses a part air flow of the dried air for cooling.

This means the use of this adsorption dryer is **independent of the ambient parameters**.

The deciding ecological advantage is the significantly reduced heat requirement thanks to **intelligent use of waste heat**, which translates to significantly lower electricity costs for the operator. Unlike with the standard version, the entire heat does not have to be generated through the heater, rather the energy in the heat storage tank is used. This originates e.g. from heat recuperation from the compressor or previous regeneration processes.

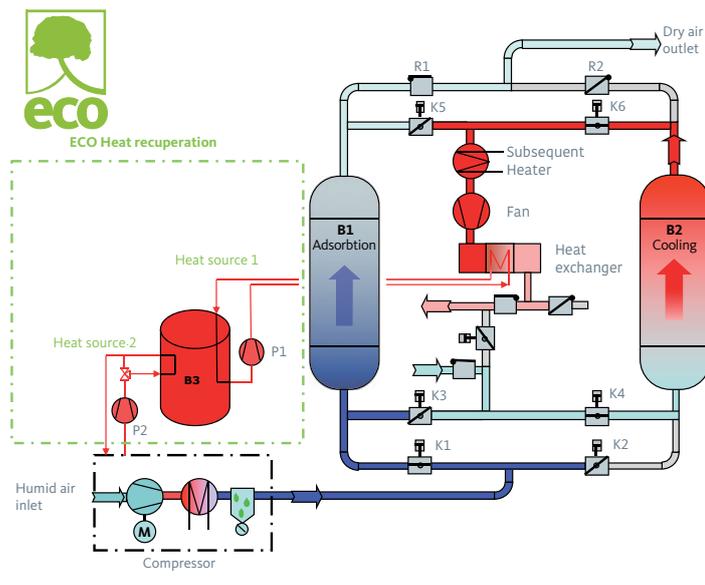


Desorption stage by means of blower in pressure mode

Whilst the compressed air is being dried in the adsorption container **B1**, the adsorption container **B2** that has just been saturated with moisture is regenerated.

The desorption stage takes place with aspirated and heated ambient air provided the ambient parameters allow this.

In contrast to the standard version, the heat from the heat storage tank **B3** is available in addition to the heat from the blower and the heater. This heat is produced on the one hand from the previous cooling phase (see below) and optionally from heat recuperation from the compressor.



Cooling phase by means of fan in vacuum mode

To prevent temperature and dew point peaks after the switch over, the heat stored in the adsorbent after the desorption stage is routed off by the cold fan-blown air flow.

Unlike with the standard version, the heat is not simply discharged to the environment, it is routed to the heat storage tank **B3** via a heat exchanger. During the subsequent regeneration, this heat replaces part of the heat that would otherwise have to be generated expensively by the heater.

Energy saving through heat recuperation

Thanks to the **intelligent use of waste heat** much less energy is required for the desorption stage. This significantly reduces electricity costs and provides a sustainable ecological advantage at the same time.

Unlike with the standard version, the entire heat does not have to be generated through the heater (9-160 kW installed power),

rather the energy in the heat storage tank is used. This originates e.g. from heat recuperation from the compressor or previous regeneration processes. To what extent this plays a role in the TCO (= total cost of ownership) cost balance and the point from which the additional costs pay off are shown in the following practical example:



Energy saving that can be achieved with the FRA-V 3400

Use of heat source 1 (desorption air heated by waste heat)

Energy difference based on connected load 48 kW > 2.2 kWh

- » Energy saving at full load 3,212 kW/year
- » Reduction in energy costs at 0.25 euros/kWh = 803 euros/year

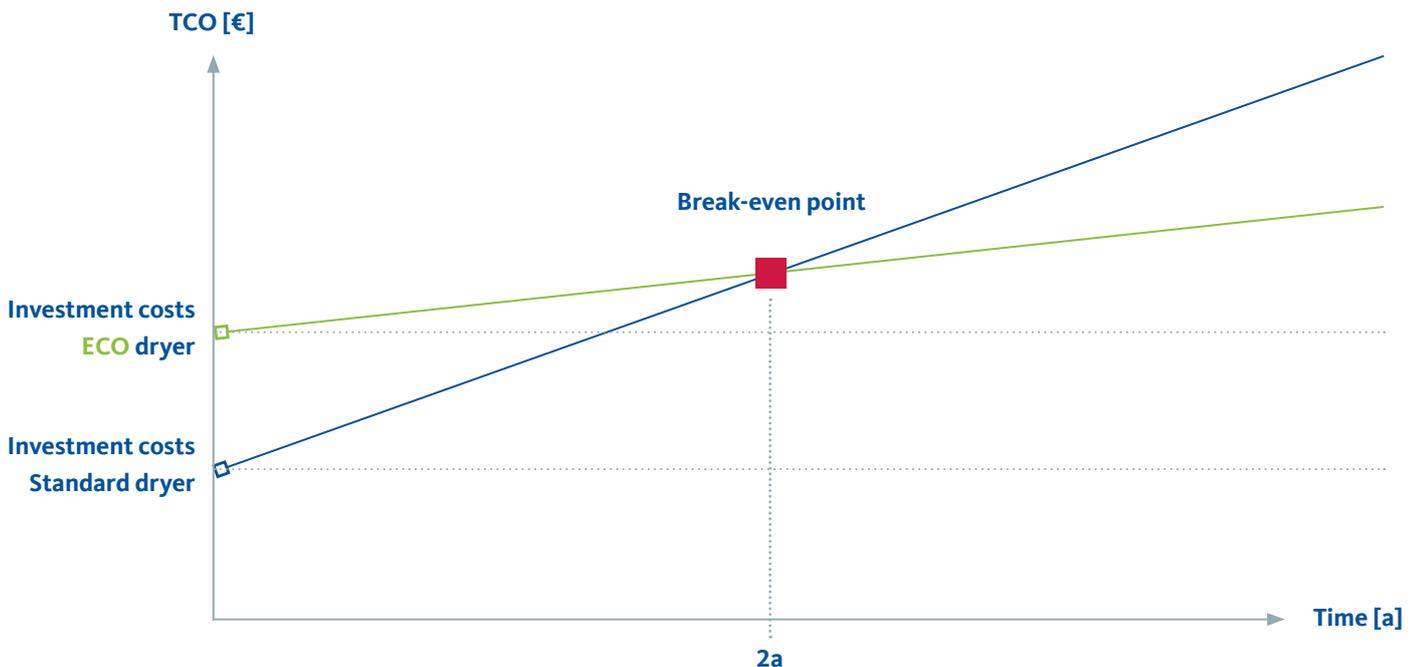
Investment: 4,800 euros > amortisation time: 6 years

Use of heat source 1 & 2 (desorption air heated by waste heat & waste heat compressor)

Energy difference based on connected load 48 kW > 7.2 kWh

- » Energy saving at full load 10,512 kW/year
- » Reduction in energy costs at 0.25 euros/kWh = 2,628 euros/year

Investment: 5,400 euros > amortisation time: 2 years



Energy saving through high-performance adsorbent Sorbead®

High-performance adsorbent Sorbead® eco

The required desorption temperature can be lowered significantly by using a specific adsorbent.

This reduces the energy consumption by more than 15%.

This adsorbent is manufactured exclusively by BASF in Germany and sold under the name **Sorbead®**. The relevant adsorbent filling is available from **BEKO TECHNOLOGIES** under the option **Sorbead® eco**.

The advantages at a glance:

- » Higher inlet temperature possible > absorption capacity even at inlet temperatures higher than 43°C
- » Desorption temperature up to 20% lower compared with conventional adsorbents > 15% less energy consumption
- » Higher absorption capacity > lower quantities of adsorbents, longer cycle times, thus reduced wear
- » Longer service life > longer life of the adsorbent thus extending the replacement intervals

All EVERDRY® adsorption dryers of the series FRA-V / FRA-Vplus / FRA / FRP / FRL-V / FRL (up to -40°C pressure dew point) can be equipped with this high-performance adsorbent.

The additional costs for this adsorbent are amortised at different rates depending on plant type and size as well as energy price and annual operating hours. In the following example calculation, the amortisation time is approx. 5 months.

Price for Sorbead eco option 3,600 euros

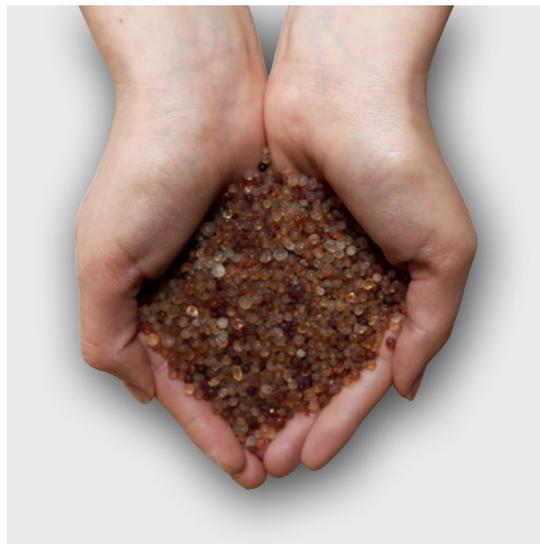
Energy consumption depending on the adsorbent filling

Activated aluminium	25.3 kWh/h
Sorbead® eco	21.5 kWh/h

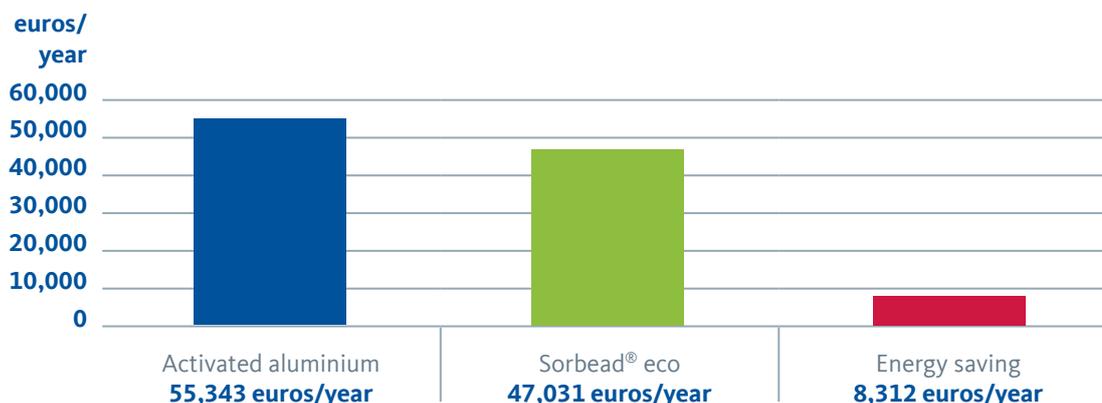
Energy costs per annum

Activated aluminium	55,343 euros
Sorbead® eco	47,031 euros
Energy saving	28,312 euros

Amortisation time 5.2 months



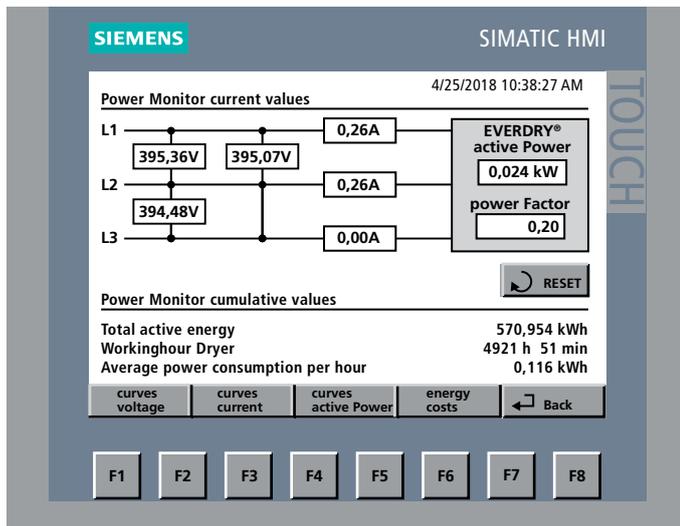
Energy costs for your EVERDRY® FRA-V 3400 plant



All values are based on: Operating hours 8,750 h/a | Energy price 0.25 euros/kWh

Recognise operating states from a long way away

There is a bright, multicoloured LED indicator light mounted on the switching cabinet. Thus it can be seen from quite a distance whether the plant is running in normal mode or whether an alarm state has occurred. The white display of the lamp corresponds to the normal system state.



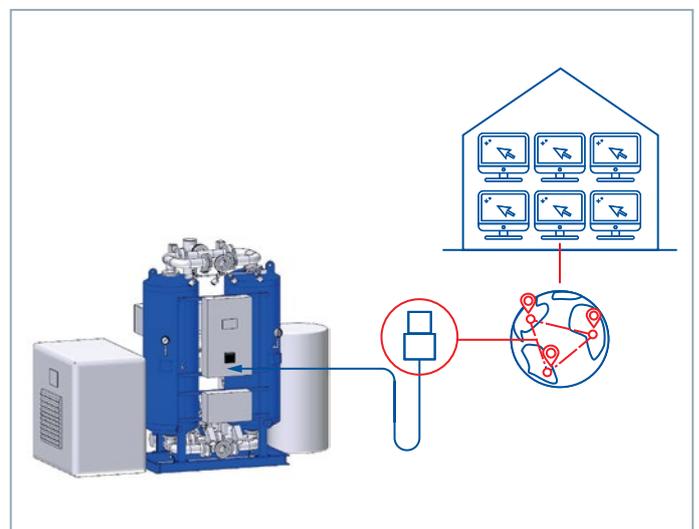
Transparent energy consumption

You can see the currently measured and average energy consumption of the plant at all times via the touchscreen, and have the specific costs shown.

This way, you can identify optimisation potentials quickly and easily.

Universally connectable through MODBUS RTU RS485 and PROFINET interface

Transmit all measured values and plant states conveniently via standardised MODBUS / PROFINET interface. This allows all measured values to be monitored and controlled directly from the control centre. Service messages are also displayed through this and can be acknowledged directly.



The EVERDRY[®] standard equipment features

Containers & pipes

- Adsorber tank, sandblasted, primed and painted in RAL 5002
- Base frame, sandblasted, primed and painted in RAL 5002
- Pipes inside and out HT-galvanised for maximum corrosion protection
- Flow distributor made of stainless steel for the even distribution of the compressed air flow

Fittings & pneumatics

- Streamlined individual fittings to minimise the differential pressure
- Two-part flap housing for simple maintenance / repair
- Reliable, pneumatically driven pneumatic valves for pressure relief / pressure build-up
- Manual fittings for manual pressure relief
- Pneumatic pipes in sturdy, corrosion-protected pneumatic tube
- Valve block, control air unit, pressure transducer mounted in a sturdy pneumatic cabinet
- Cables routed in galvanised steel reinforced tubes or cable ducts
- All sensors connected with M12 push-on connection
- Cable numbering

Process engineering & insulation

- Counter-flow desorption
- Parallel phase to avoid fluctuations in temperature and dew point
- Insulation of the heater housing

Measuring technology & control

- Monitoring of operating pressure by means of analogue sensing elements
- Alarm value can be set for inlet temperature
- 1x 24V voltage supply for BEKOMAT
- 1x BEKOMAT alarm contact
- Control S7-1200 with touch panel KTP700 (colour, multi-lingual, 7")
- Ambient control (FRA-V / FRA only)
- Monitoring of regeneration temperatures (heating/cooling) by analogue sensing elements
- Volume flow measurement at the outlet "ready to connect" (alarm value can be set for volume flow)
- Maintenance package (registration of flap actuations / "flexible maintenance")
- Calculation and coloured visualisation of the dryer work load
- Measurement of operating time dew point sensor / heating system / blower with adjustable maintenance intervals
- Stainless steel manometer with shut-off valve on every adsorber tank

Communication

- Profinet interface for MODBUS TCP or S7 communication (only for control S7-1200)
- Remote ON/OFF via potential-free contact or bus
- Analogue output for dew point signal
- 3 free analogue inputs (2 x pre-programmed, 1 x free to be assigned)
- 1 x potential-free alarm contact (collective fault message)
- 1 x potential-free contact for operating message



Customer-specific equipment options

Containers & pipes

- Adsorber tank painted in desired colour (RAL)
- Base frame painted in desired colour (RAL)
- Outdoor set-up

Fittings & pneumatics

- Safety valves (2 pcs, G1/2)
- Preparation for mounting to safety valves

Process engineering & insulation

- Thermal insulation of the adsorber sheathing and heads
- Sorbead high-performance adsorbent
- Heat recuperation
- Insulation for outdoor set-up
- Insulation in special materials (stainless steel, aluminium, ...)

Communication

- Profibus module Slave (only with control S7-1200)
- MODBUS-RTU RS485 (only with control S7-1200)
- Additional potential-free contacts

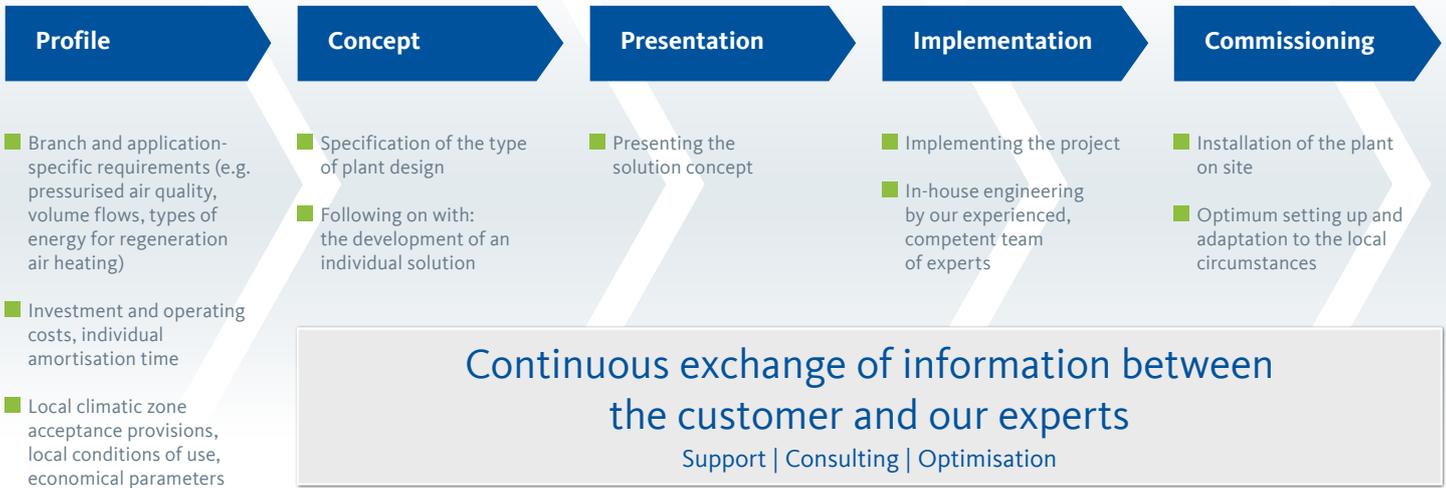
Measuring technology & control

- Switch-over monitoring for humid air inlet flaps through inductive sensors incl. LED display (green/red)
- End position monitoring for every further flap by inductive sensors incl. LED display (green/red)
- Dew point measuring and control unit
- Additional temperature transmitter at the inlet "ready to connect"
- Additional voltage supply 24V incl. alarm contact (potential-free)
- Individual wire marking
- Special voltage, different control S7-1200 with touch panel KTP1200 (colour, multi-lingual, 12")
- Energy control (measurement of the energy consumption current / average)
- Volume flow sensor at the outlet
- Shiny package (signalisation of plant state through coloured LED)
- Control-PLUS package (measurement of flap runtimes / "flexible maintenance")

* ■ Energy-saving options

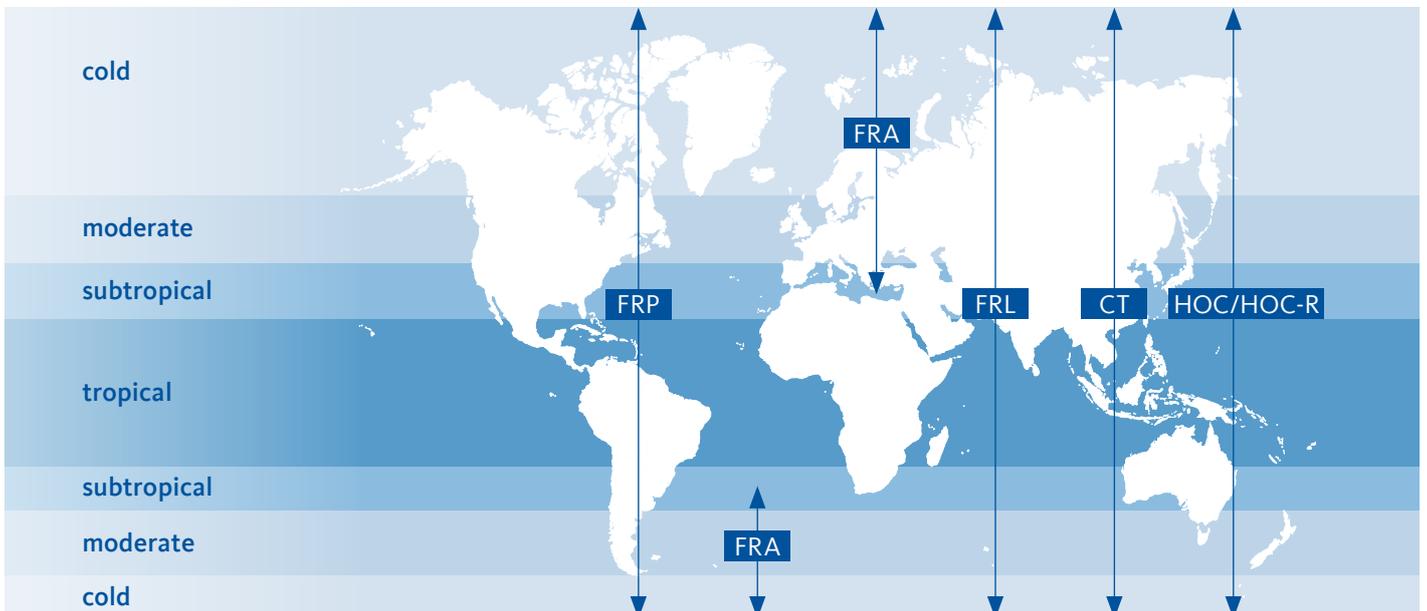


From the idea to the tailor-made solution – on the basis of standardised plant concepts



Added value in detail

The high quality of our solutions is partly the result of our material selection: We rely consistently on high-grade, maintenance-friendly components. HT-galvanised pipes guarantee high corrosion resistance. The sturdy control-air pipe in galvanised lines is a further guarantee of a long service life. Just as important: the user friendliness thanks to the large touch display and the innovative control concept.



EVERDRY® product range

Alongside our Eco version we also have...



FRA-V	FRA-Vplus	FRA	FRP
FRL-V	FRL	COMBITROC	Standard design data FR-x
HOC-F/1	HOC-F/1 with heating system	HOC-F/2	HOC-F/2 with heating system
HOC-P	HOC-P with heating system	HOC-R	Standard design data HOC-x

At home in every application – worldwide!

For over three decades we have represented products, systems and solutions which ensure the desired compressed air quality in our customer's production processes and make them more efficient. Reliable, high-performing and tried and tested worldwide!

 Condensate technology



 Filtration



 Drying



 Oil-free



 Measuring technology



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 all your queries. We would be delighted to tell you more about our condensate

treatment, filtration, drying, measuring and process technology, and our comprehensive services.

Visit us at



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