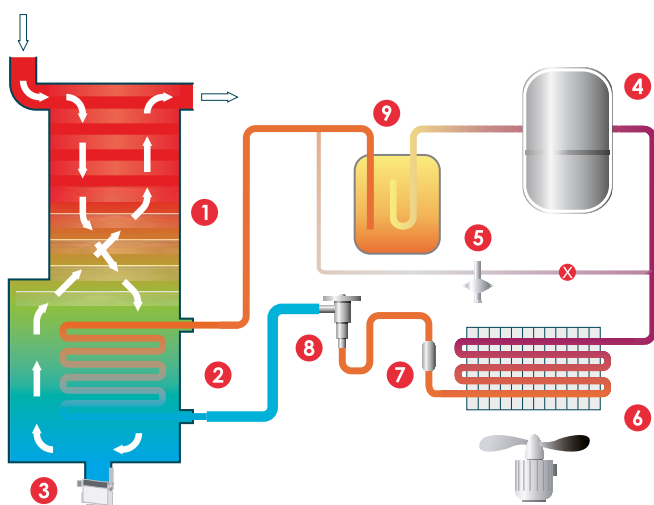


Refrigerant drying means that the compressed air is cooled, which allows a large amount of the water to condense and be separated.

After cooling and condensing, the compressed air is reheated to around room temperature. This heat exchange between ingoing and outgoing compressed air also reduces the temperature of the incoming compressed air, and as such reduces the required cooling capacity of the refrigerant circuit.

Cooling the compressed air takes place via a closed refrigerant system. Refrigerant dryers are used for dew points between +3°C to +10°C and have a lower limit, which is the freezing point of the condensed water.



| | |
|-----------|-------------------------------|
| Flow | 0.3 ~ 170 m ³ /min |
| Dew Point | up to +3°C |

– Air circuit

- 1. Air-to-air heat exchanger:** Incoming air is cooled down by the outgoing dry cold air
- 2. Air-to-refrigerant heat exchangers:** The air is cooled to the required dew point by the refrigerant circuit. The water vapor condenses into water droplets
- 3. Integrated water separators:** The moisture is collected and evacuated by the electronic drain

– Refrigerant circuit

The refrigerant removes the heat from the compressed air and cools down to the desired dew point.

- 4. Refrigerant compressor:** Compresses the gaseous refrigerant to a higher pressure
- 5. Regulation device:** The hot gas bypass valve regulates the dryer to prevent freezing at lower load conditions
- 6. Refrigerant condenser:** Cools the refrigerant so that it changes from a gas to a liquid
- 7. Refrigerant filter:** Protects the expansion device from harmful particles
- 8. Thermostatic expansion valve:** The expansion process reduces the pressure and cools the refrigerant further
- 9. Liquid separator:** Ensures that only refrigerant gas enters the compressor



Refrigerant dryer



Adsorption Drying

| | |
|------------------|-------------------------------|
| Flow | 0.3 ~ 170 m ³ /min |
| Dew Point | up to -70°C |

The general working principle of adsorption dryers is simple: moist air flows over hygroscopic material (typical materials used are silica gel, molecular sieves, activated alumina) and is thereby dried.

The exchange of water vapor from the moist compressed air into the hygroscopic material or “desiccant”, causes the desiccant to gradually be saturated with adsorbed water.

There are 3 different ways to regenerate the desiccant, which determines the type of adsorption dryer:

1. Heatless Dryers (HDT)
2. Heated Dryers (HHD)
3. Heated Blower Dryer (HBD)

Heatless Regenerated Dryers

– The drying process

Wet compressed air flows upward through the desiccant which adsorbs the moisture, from bottom to top.

– The regeneration process

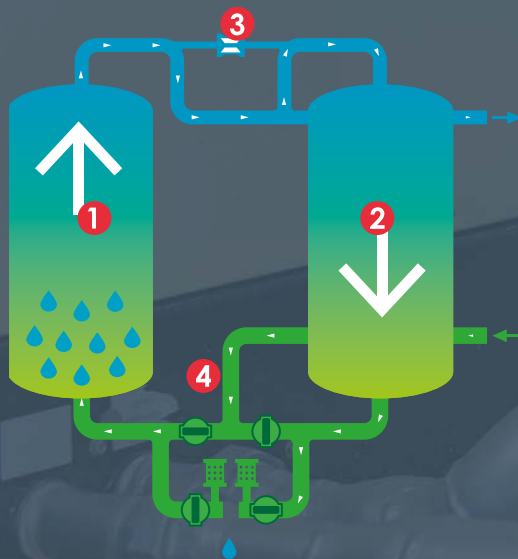
Dry air from the outlet of the drying tower is expanded to atmospheric pressure and sent through the saturated desiccant, forcing the adsorbed moisture out.

After desorption, the blow-off valve is closed and the vessel is re-pressurized.

– Switching

After regeneration, the functions of both towers are switched.

The regeneration process takes place with the help of expanded compressed air (“purged”) and requires approx. 15% of the dryer’s nominal capacity at working pressure.



Heated regenerated dryers

– The drying process

Wet compressed air flows upward through the desiccant which adsorbs the moisture, from bottom to top.

– The regeneration process

Dry air from the outlet of the drying tower is expanded to atmospheric pressure and sent over the heater.

The heated air is then sent through the saturated desiccant forcing the adsorbed moisture out, from top to bottom.

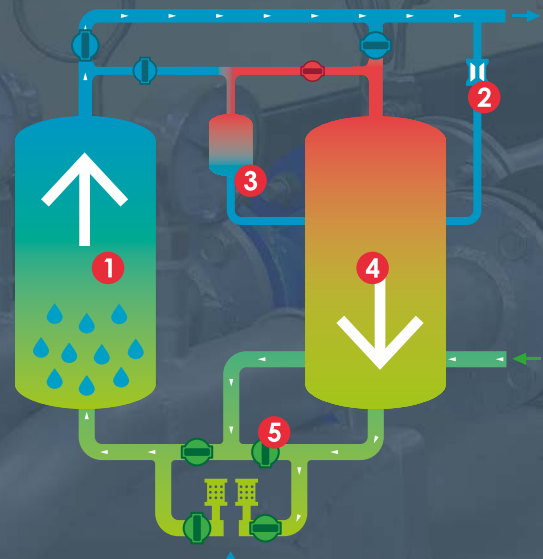
– Cooling

After the heating process, the hot tower desiccant is cooled. Cooling is done by expanding dry compressed air from the outlet over the hot reactivated tower, from top to bottom.

– Switching

After regeneration, the functions of both towers are switched.

These dryers heat up the expanded purge air by means of an electric air heater and hence limit the required purge flow to around 8%.



Blower regenerated dryers

– The drying process

Wet compressed air flows upward through the desiccant which adsorbs the moisture, from bottom to top.

– The regeneration process

The blower takes ambient air and blows it over the external heater.

The heated air is then sent through the saturated desiccant, forcing the adsorbed moisture out, from top to bottom.

– Cooling

Purge: After the heating, the hot tower desiccant is cooled. Cooling is done by expanding dry compressed air from the outlet of the adsorbing vessel over the hot reactivated tower, from top to bottom.

– Switching

After regeneration, the functions of both towers are switched.

