

## Extended Air Dryer Maintenance Intervals



### **AVENTICS™ RDD Air Dryer For The Railway Industry**

Fit and forget, high performance solution for main air supply on trains and auxiliary air preparation applications.



## Dry air is fundamental for reliable, low maintenance pneumatic systems

Safe, trouble free and low maintenance pneumatic applications depend on a reliable, dry air supply. There are many issues in rail applications that can lead to an increased water loading in the air dryer, such as excessive volumetric flow. These issues increase the water loading into the air dryer resulting in a reduction in pressure dew point suppression and therefore condensation. Condensation downstream will cause malfunctions on components and sub-systems. Life of components is reduced due to the washing out of greases and oil caused by the high amount of water in the air. In addition, low temperatures may cause the freezing of components, leading to malfunction.

A stable and high dew point suppression assures a reliable function of all downstream components on a train since condensation does not occur. In cases of increased water loadings due to loss of power supply and open inlet valves, a quick recovery is necessary after power is resumed. This ensures a consistent and effective dew point is maintained.

Not only in such scenarios, but also under the typical railway shock and vibration loads, traditional adsorption beads would, most likely, fail and need to be replaced.

High air consumption and therefore energy loss to regenerate dryer adsorption bed (>20%)



Saturated desiccant adsorption beads will break down and need to be replaced



Susceptible to poor performance due to shock, vibration and orientation resulting in maintenance and replacements after 6 to 48 months



Vertical installation of desiccant beads technology required which does not allow customers to be flexible on design and integration



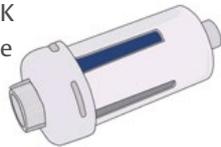


We offer an extensive range of products that not only set standards for quality and functionality in railway technology, but also extend maintenance intervals. We know the special requirements and standards. We have industry expertise and speak our customers' language. We offer established application support.

## The problem with current air drying solutions

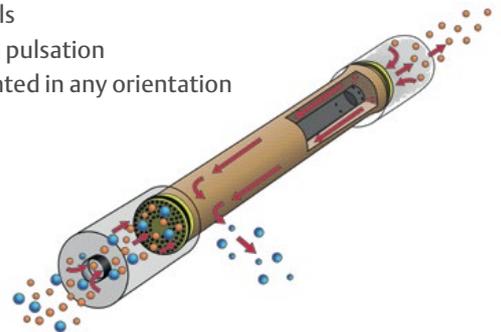
### Disposable Desiccant Dryers

- Uses adsorbent crystals (typically silica gel)
- Regular replacement of disposable desiccant unit
- Typical dew point suppression 20 to 30K
- Once saturated gives poor performance and will not recover
- Susceptible to poor performance due to shock, vibration and orientation
- Vertical orientation for full performance



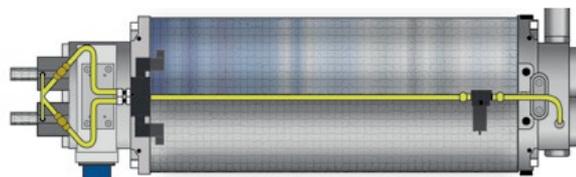
### Membrane Dryers

- Uses semi permeable membranes
- Water passes through membrane walls plasmolysis
- Continuous purge losses typically >20% of inlet flow
- Typical dew point suppression 20 to 30K
- Susceptible to failure
  - through shock, vibration and pressure fluctuations
  - by chemicals
  - by pressure pulsation
- Can be mounted in any orientation



### Regenerative Desiccant Dryers

- Uses adsorbent crystals (typically alumina silicates)
- Regenerated by heat or dried purge air (>20%)
- Typical dew point suppression 30 to 40K
- Once saturated gives poor performance and will not recover
- Susceptible to poor performance due to shock, vibration and orientation
- Vertical orientation for full performance



## Unique to the market – high performance and low maintenance with patented adsorption medium

The AVENTICS RDD dryer uses a completely new technology. A revolutionary and patented adsorption medium, consisting of adsorbent crystals is immobilized in a durable polymer support structure and produced in the form of a continuous embossed sheet. The unique manufacturing process results in a highly open porous structure that is consistent throughout the media. It creates flow channels between each layer, engineered to optimize application performance and resulting in fast kinetics and effective regeneration superior to conventional adsorption medium.

RDD dryer maintenance servicing is an easy task: The drying medium is integrated into an easy-to-replace cartridge. Thanks to a quick coupler fitting between filter bowl and drain valve the drain valve assembly and the filter element can be replaced easily. This also allows for flexible orientation. Service conditions and lifetime can be checked remotely for condition based maintenance.



### **Saving energy due to superior moisture uptake.**

High moisture uptake allows for much smaller purge loss (<15%) compared to conventional desiccant beads technology. Better performance results in saving energy and costs.



### **Fit and forget for at least 8 years.**

Longer maintenance intervals (> 8 years) lead to increased vehicle uptime saving time and costs.



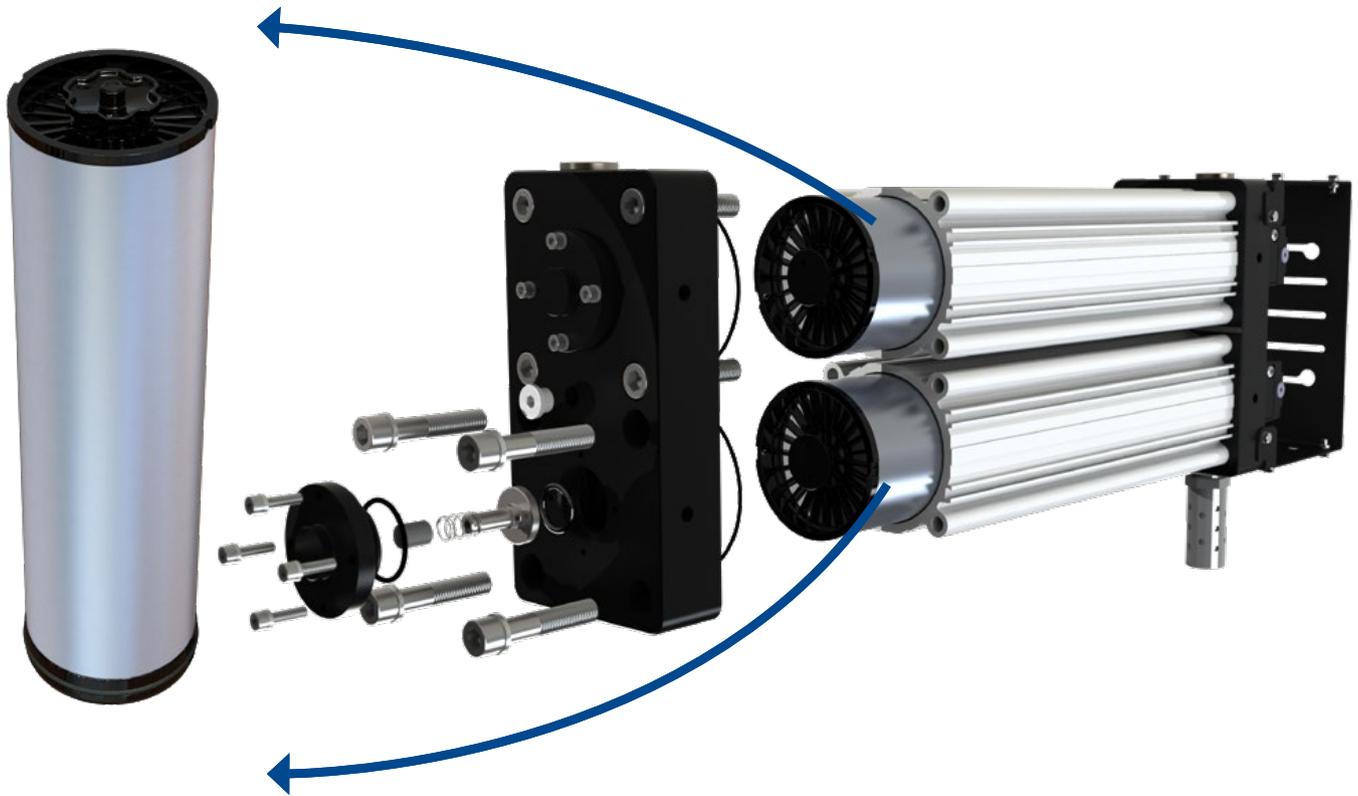
### **Stable and consistent performance under challenging conditions.**

Overcomes the disadvantages of granular materials such as degradation due to channeling, by-pass, orientation, dust generation as well as short service life and breakdown due to high water loading. Longer service life and stable performance.



### **Flexible design, easier integration and smaller envelope size.**

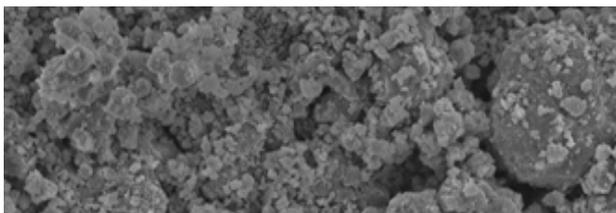
Can be installed in any orientation overcoming the many disadvantages of conventional desiccant beads technology, especially in environments susceptible to shock and vibration and where mounting horizontally is necessary or desirable. Provides a much smaller envelope size compared to conventional desiccant beads dryers. More flexible integration.



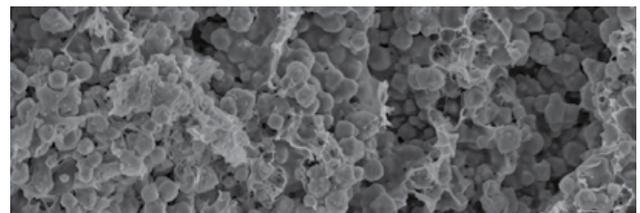
RDD drying medium cartridges

The RDD drying medium is integrated into an easy to replace cartridge: only remove one end cover from the dryer and pull out the cartridge using the provided baffle fitted to the cartridge, push a new cartridge in an assemble end cover again.

## AVENTICS Roll up Desiccant Drying Technology (RDD)...



Conventional dryers in the market: Surface of bead adsorbent crystals blocked with clay binder preventing water uptake, making the media inefficient.



AVENTICS RDD air dryer: Surface of adsorbent crystals embedded in RDD polymer structure, large and open drying surface, no clay blockage. This improves water uptake, increases efficiency and allows for a reduction in bed size.

## RDD: the air dryer for main air supply on trains

The AVENTICS RDD dryer has been developed for demanding mobile applications like Railway. With three sizes, barrel diameter 80, 100 and 125 mm, RDD covers a flow range from 500 up to 3500 l/min. Like conventional adsorption dryers, the RDD is a continuous flow design working with 2 columns containing the drying medium where 1 column is always drying the air and the second one is being regenerated by purge air. Control valves are constantly switching the air supply between the two columns once one column is saturated and has to be regenerated.

### Further offered options are:

#### Sub-base mounted inlet valve for sub-zero ambient temperatures

- optional heater
- easy-to-service

#### Integrated temperature and pressure sensors for heater control and advanced diagnosis

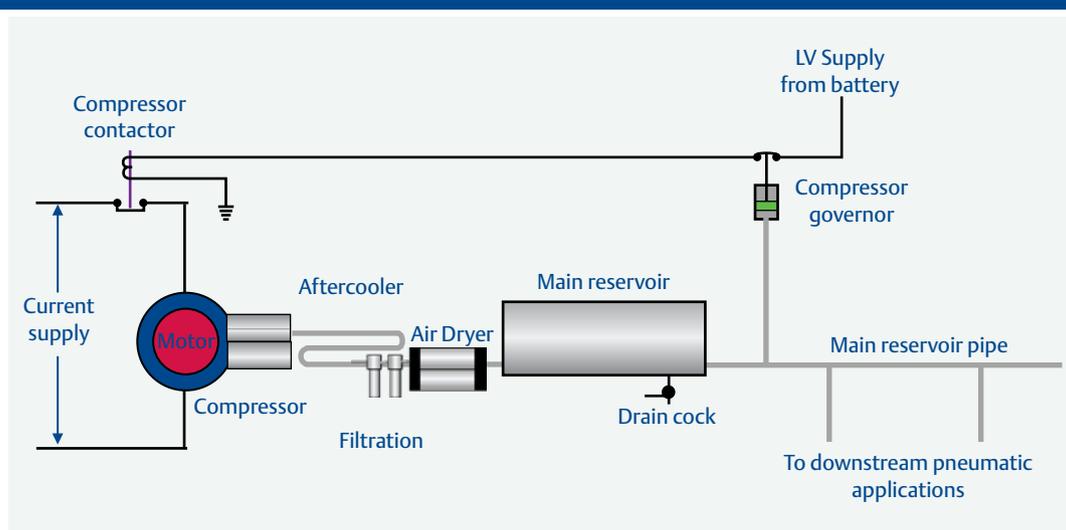
#### Advanced 1 or 2 stage pre-filtration including optional heaters and drain valves

- Stage 1 filter: maintenance-free particle and bulk water removal
- Stage 2 filter: oil removal (coalescing filter)

#### Control units in 2 different versions and including optional wiring harness:

- “Basic”: basic functionality and heater control, analog error signal
- “Advanced”: basic functionality and advanced for fault identification and condition monitoring, optional bus interface

### Schematic of compressed air supply on electric locomotive



## Advanced air filtration assures dryer performance



To assure superior performance of the RDD dryer the air from the compressor into the dryer needs to be free of bulk water, particles and oil. Too much bulk water will lead to an increased water loading and therefore a reduction in pressure dew point suppression.

In addition, like with all adsorption dryers, oil in the dryer will lead to a degrading of drying performance over time. This is a common issue which AVENTICS addresses with advanced oil removal filters.

The following filtration will be offered for the RDD Dryer:

- Maintenance-free bulk water and particle removal filter
- Advanced oil removal filter (coalescing filter)

For oil-free compressor setups the oil removal filter is not required and a maintenance-free filtration solution can be offered. allowing a service of at least 8 years before maintenance for the complete dryer system.

The filtration always meets at least the class 2 filtration quality for oil and particles according to ISO 8573-1.

The filters will be offered in 3 sizes addressing the specified flow ranges, ½“, ¾“ and 1“, and with optional solenoid drain valves and heaters for sub-zero ambient temperatures.

## RDD specification

Temperature range: -40 to +70°C

Dew point Suppression: >40K (<5% RH) @ 40°C inlet temperature & 100% RH

Purge: < 15%

Working pressure: 4 to 12 bar

Pressure drop across Dryer: < 0.2 bar

Operating voltage: 24 - 110VDC +25/-30%

Ingress protection Class: IP65

Heaters: optional, 1x for each solenoid and filter drain valve

Maintenance interval dryer: at least 8 years or 25,000 operating hours

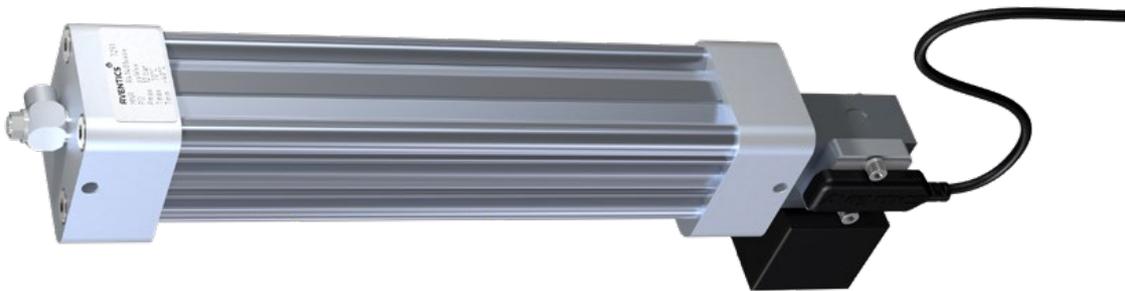


## RDDmini – covering smaller drying applications for auxiliary systems

The compact RDDmini dryer is used on auxiliary applications on trains like sanding, wheel flange lubrication, driver seat and pantograph lifting. It covers a flow range of 20 – 500 l/min.

### RDDmini

- Single column dryer for compressor loads up to 60%
- Regenerates using dry air from downstream reservoir while compressor is off
- Integrated and maintenance-free bulk water and particle removal filtration, optional separate oil removal filter
- Only timer or compressor signal needed for control
- Optional heaters for sub-zero ambient temperatures

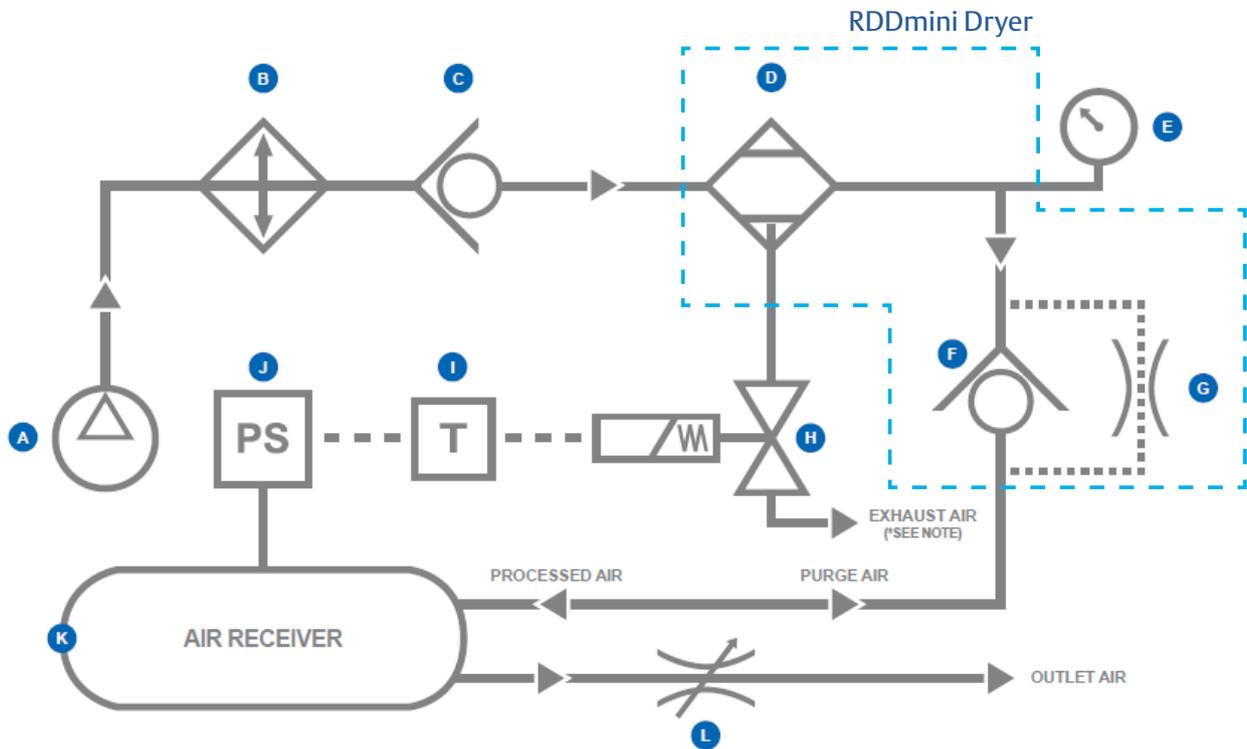


### RDDmini twin

- Double column dryer for continuous flow applications
- One column always provides dried inlet air to assure continuous flow while the second column is being regenerated
- Integrated and maintenance-free bulk water and particle removal filtration, optional separate oil removal filter
- Optional control unit to operate inlet and outlet valves



### RDDmini – single column control setup



SCHEMATIC KEY:	A	COMPRESSOR	E	PRESSURE GAUGE	I	TIMER RELAY
		B	AFTERCOOLER	F	NON RETURN VALVE	J
	C	NON-RETURN VALVE	G	FLOW CONTROL ORIFICE	K	AIR RECEIVER (DRY)
	D	RDDmini DRYER	H	SOLENOID CONTROLLED VALVE	L	FLOW CONTROL VALVE

### RDDmini specification

#### RDDmini

Temperature range: -40 to +70°C

Dew point suppression: > 40K (< 5% RH) @ 40°C inlet temperature & 100% RH

Purge: < 18%

Working pressure: 4 to 10 bar

Pressure drop across dryer: < 0.1 bar

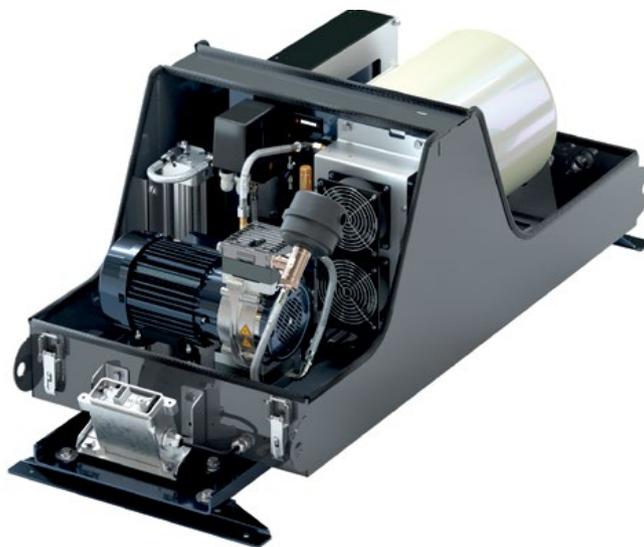
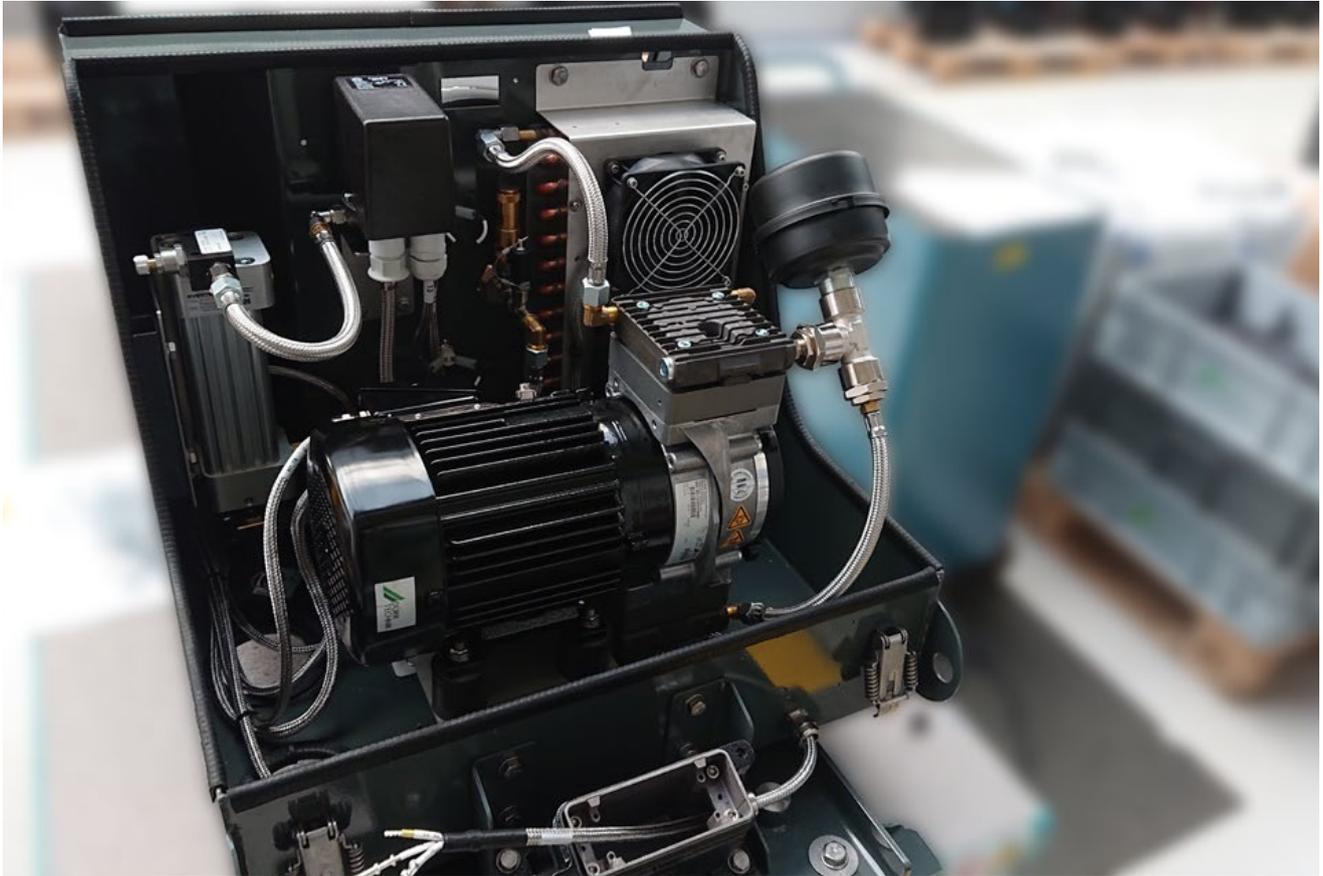
Operating voltage: 24 - 110 VDC +25/-30%

Ingress protection Class: IP65

Heaters: optional, 1x for each solenoid

Maintenance interval dryer: at least 8 years or 25,000 operating hours

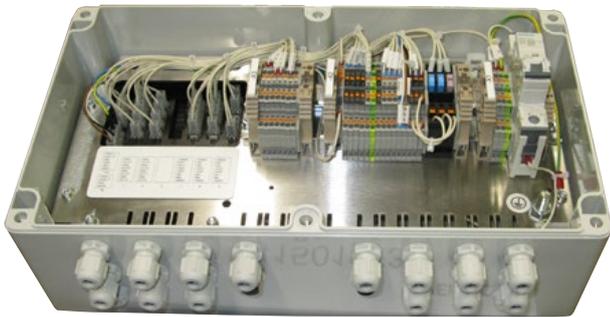
**Nordic country station – by Dürr Technik – used for auxiliary applications like wheel flange lubrication, sanding and driver seats.**



All RDD dryers were tested to the relevant railway norms and standards and therefore assure a trouble-free performance over lifetime.

- EN 45545-2 (HL3)
- EN 50155
- EN 60068-2-1 / -2 / -30
- EN 50121-3-2
- EN 61373 (category 1, class B)
- MIL-STD-810H (method 514.8, category 11)
- EN 60529
- EN 50306
- ISO 8573-1
- NF F11-100
- ISO 9227: 1000h
- EN 60721-3-5

### Advanced Control Unit



### Basic Control Unit



### Heaters



### Pressure and Temperature Sensors



# Optimize Your Total Cost of Ownership by Improving Efficiencies and Extending Maintenance Intervals.



**AVENTICS™**

With its unique adsorption media, the AVENTICS RDD Air Dryer offers high performance and extends maintenance intervals of your railway air preparation applications. This enables you to improve energy efficiency and significantly reduce lifecycle costs.

Visit us: [Emerson.com/aventics](https://emerson.com/aventics)

Your local contact: [Emerson.com/contactus](https://emerson.com/contactus)



[Emerson.com](https://emerson.com)



[Facebook.com/EmersonAutomationSolutions](https://facebook.com/EmersonAutomationSolutions)



[LinkedIn.com/company/Emerson-Automation-Solutions](https://linkedin.com/company/Emerson-Automation-Solutions)



[Twitter.com/EMR\\_Automation](https://twitter.com/EMR_Automation)

The Emerson logo is a trademark and service mark of Emerson Electric Co. AVENTICS is a registered trademarks of one of the Emerson family of companies. All other marks are the property of their respective owners. © 2021 Emerson Electric Co. All rights reserved. BR000052ENUS-01\_01-21



**CONSIDER IT SOLVED™**