

# Product Data Sheet

## Adsorption Dryer DPS 120-630

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### Field of application

Adsorption dryers of the DPS series are designed for drying compressed air and nitrogen to pressure dew points of  $-25^{\circ}\text{C}$  to  $-70^{\circ}\text{C}$  (depending on the design) at operating pressures of 4 bar to 11 bar. Pressures up to 25 bar on request.

### Function

For drying the compressed air, i.e. "adsorption", the compressed air flow is led through a vessel filled with desiccant. The desiccant extracts moisture from the compressed air and stores it in its structure until the desiccant is saturated with moisture. The saturated desiccant then has to be regenerated, i.e. the moisture stored in the structure has to be "removed" before the desiccant can be used for drying again.

Continuous operation of an adsorption dryer therefore requires two vessels that are operated alternately. One vessel is used for drying the compressed air (adsorption) and the other vessel for regenerating the desiccant. For the DPS series, the change interval between adsorption and regeneration is 5 minutes at nominal conditions.

For the DPS series, a certain quantity of dried compressed air is drawn off at the dryer outlet (*approx. 15% of the nominal volume flow rate at nominal conditions*).

This amount of compressed air is expanded to atmospheric pressure and is led through the vessel to regenerate the desiccant. The dried, decompressed air is extremely moisture-subsaturated and thus extracts the moisture stored in the desiccant and discharges it to the atmosphere via a silencer (heatless regeneration).



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### Features

The desiccant has a high drying capacity for moisture and a long service life of several years. This ensures permanently low and stable pressure dew points.

For vessel switch-over a 3/2-way valve with a double-acting pneumatic actuator is provided on the inlet side. On the outlet side, the flow paths are secured using non-return valves. Expansion and regeneration are carried out via separately controlled pneumatic actuated seat angle valves.

A silencer is used for the effective reduction of the expansion noise.

The valves of the DPS series are controlled by means of a type "C1" processor control system with a 2-line clear text display and 3 operating keys. The control system is installed in a plastic housing with IP65 protection. The clear text display is used for direct and easy-to-understand indication of the operating state, errors, runtimes, service messages etc. If a pressure dew point sensor (option H) is connected, the current pressure dew point of the compressed air is also directly shown on the display and provided as a 4-20 mA signal. The pressure dew point measurement (option H) allows for dew-point-dependent operation of the dryer. Depending on the load of the dryer, the adsorption cycle may be extended, i.e. the switch-over frequency is adapted to the operating situation. This minimises the regeneration air consumption and thus the energy costs are minimised.

In addition, the control system provides a compressor synchronising contact. It is used for the synchronous operation of the dryer and a compressor which additionally reduces the regeneration air consumption. This function can also be used in conjunction with dew point-dependent operation.

If prefilter and afterfilter with differential pressure monitoring systems and alarm contacts are fitted (option), the alarm contacts can be connected to the control system, displayed and processed.

For this dryer size, the filters are not included in the scope of supply of the dryer.

However prefilters (fine filters) that prevent solid particles ( $< 0.01 \mu\text{m}$ ) and liquid contaminants ( $< 0.01 \text{ mg/m}^3$ ) from entering should be installed upstream of the dryers to increase the service life of the desiccant. An after-filter (general purpose filter) should be installed downstream of the dryer to prevent possible desiccant dust ( $< 1 \mu\text{m}$ ) from entering.

The dryers comply with the requirements of the Pressure Equipment Directive 2014/68/EU, and have the CE marking of this European directive.



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### Basic data

Model	Nominal volume flow (VN) <sup>*1</sup>	Min./Max. allowable operating pressure	Min./Max. allowable operating temperature
DPS 120	1,200 m <sup>3</sup> /h	4 - 11 bar (higher design pressures up to 25 bar on request)	+2°C - +60°C
DPS 150	1,480 m <sup>3</sup> /h		
DPS 210	2,080 m <sup>3</sup> /h		
DPS 240	2,430 m <sup>3</sup> /h		
DPS 290	2,930 m <sup>3</sup> /h		
DPS 370	3,700 m <sup>3</sup> /h		
DPS 510	5,080 m <sup>3</sup> /h		
DPS 630	6,290 m <sup>3</sup> /h		

\*1 - referred to 1 bar(a) and 20°C at 7 bar operating pressure, inlet temperature 35°C and pressure dew point at outlet -40°C

### Purity classes according to ISO 8573-1

Contamination	
Solid particles <sup>*2</sup>	---
Water content <sup>*2</sup>	Class 1-3 <sup>*3</sup>
Total oil content <sup>*2</sup>	---

\*2 - typical result, on the assumption that the suitable inlet concentrations and operating and marginal conditions are given

\*3 - depending on the design

### Volume flow conversion factors

#### «F1» - Pressure in bar (g)

4 <sup>*5</sup>	5	6	7	8	9	10	11	12 <sup>*6</sup>	13 <sup>*6</sup>	14 <sup>*6</sup>	15 <sup>*6</sup>	16 <sup>*6</sup>
0.63	0.75	0.88	1.00	1.13	1.25	1.38	1.50	1.63	1.75	1.88	2.00	2.13

\*5 - in the event of operating pressures below 4 bar(g), an external instrument air supply must be provided

\*6 - Dryer with design pressure >11 bar(g) on request

#### «F2» - Inlet temperature in °C

25	30	35	40	45	50	55	60
1.00	1.00	1.00	0.97	0.87	0.80	0.64	0.51

### Calculation of the converted volume flow

Converted volume flow VK	Nominal required volume flow VN <sub>min</sub>
$VK = VN \times F1 \times F2$	$VN_{min} = VK / F1 / F2$

VK : Converted volume flow calculated for the operating conditions

VN<sub>min</sub>: Nominal required volume flow calculated for the operating conditions, based on the volume flow at operating conditions

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### Maintenance rules

	Maintenance interval and maintenance activities
All Models	<ul style="list-style-type: none"> <li>■ Once a week :                             <ul style="list-style-type: none"> <li>- Check differential pressure of prefilter if installed</li> <li>- Check function of the condensate drains at prefilter if installed</li> </ul> </li> <li>■ yearly :                             <ul style="list-style-type: none"> <li>- Replace filter elements on prefilter and afterfilter if installed</li> <li>- Check expansion silencer, clean or replace, if required</li> <li>- Calibrate dew point sensor (option H) (interchange principle possible)</li> </ul> </li> <li>■ Every 2 years:                             <ul style="list-style-type: none"> <li>- Replace non-return valves and solenoid valves</li> </ul> </li> <li>■ Every 4 years:                             <ul style="list-style-type: none"> <li>- Replace desiccant, sleeve cylinder and seals every 4 years <sup>*7</sup>*8</li> </ul> </li> <li>■ Pressure equipment recurrent inspection: The intervals and responsibilities for the recurrent inspections can be obtained from the valid national regulations of the respective country. It may be necessary to involve a notified body in carrying out the inspection.</li> </ul>

\*7 – The regular service life of the desiccant is 3 - 5 years, however, it is very much depending on the contamination level of the incoming compressed air and the operating temperature. To achieve the specified service life of the desiccant, it is vital to exchange the filter elements as described above.

\*8 – The desiccant and the activated carbon must be disposed of according to the European waste code. A possible oil contamination must be taken into account.

### Product specific data

Specification	
Pressure dew points	-25°C / -40°C / -70°C
Electrical connection	230V 50/60 Hz, alternative 115V 50/60Hz or 24V DC
Power consumption	< 50 Watt
Protection Class	IP 65 (Nema 4)
Valve switching power (for each valve)	< 35 VA

### Materials

Component	
Vessel and supports	Steel (P265GH, ST37.0, St35.8)
Coating	<p><u>Inside</u> : 1/3 lower part of the vessels painted with "Brantho KorruX"</p> <p><u>Outside</u> : sand blasted SA2,5 (ISO8501) ;</p> <p>1-component primer on alkyd resin base ; dry thickness approx 40 µm (e.g. DuPont PercoTop 021, or similar product)</p> <p>2-component acrylic resin paint ; dry thickness approx 40 µm (e.g. DuPont PercoTop 9600, or similar product)</p>
Desiccant support screen	Stainless steel 304
Pipe connections	Steel, galvanized
3/2-way valve body	Steel 1.4060 ( Steel ASTM A105 ) yellow anodised
3/2-way valve bal and	Stainless steel 1.4301 ( ASTM A 182 F304)
Sealing materials	PTFE, Viton, Klingersil C4400
Screws	5.6 and 8.8 steel, zinc-plated
Desiccant filling	80% Molecular sieve 4A und 20% Silica gel

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### Connections, dimensions and weight

Model	Connection	Height	Width	Depth	Weight
DPS 120	DN 50 - PN16	1975 mm	1110 mm	780 mm	670 kg
DPS 150	DN 65 - PN16	2070 mm	1250 mm	870 mm	850 kg
DPS 210	DN 65 - PN16	2090 mm	1340 mm	920 mm	1080 kg
DPS 240	DN 80 - PN16	2185 mm	1520 mm	970 mm	1300 kg
DPS 290	DN 80 - PN16	2200 mm	1585 mm	1000 mm	1490 kg
DPS 370	DN 100 - PN16	2340 mm	1850 mm	1130 mm	1930 kg
DPS 510	DN 100 - PN16	2600 mm	1870 mm	1160 mm	2400 kg
DPS 630	DN 125 - PN16	2780 mm	2370 mm	1350 mm	3100 kg

### Classification according to Pressure Equipment Directive 2014/68/EU for group 2 fluids

Model	Volume	Category
DPS 120	225 litres	III
DPS 150	280 litres	IV
DPS 210	395 litres	IV
DPS 240	470 litres	IV
DPS 290	570 litres	IV
DPS 370	660 litres	IV
DPS 510	980 litres	IV
DPS 630	1121 litres	IV

### Other Directives

Model	ECM Directive 2014/30/EU	Low-voltage Directive 2014/34/EU	Machinery Directive 2006/42/EC
All Models	<p>Inspection scope for control system, solenoid valves and dew point measurement</p> <p>Emitted interference acc. :</p> <ul style="list-style-type: none"> <li>■ EN 55011:2009 / A1:2010 (limit value class: B)</li> <li>■ EN 61000-3-2:2014</li> <li>■ EN 61000-3-3:2013</li> </ul> <p>Interference resistance acc.:</p> <ul style="list-style-type: none"> <li>■ EN 61000-6-2:2005 / AC:2005</li> </ul>	<ul style="list-style-type: none"> <li>■ EN 60204-1:2006 / A1:2009</li> <li>■ EN60730-1:2011</li> </ul>	is not applicable

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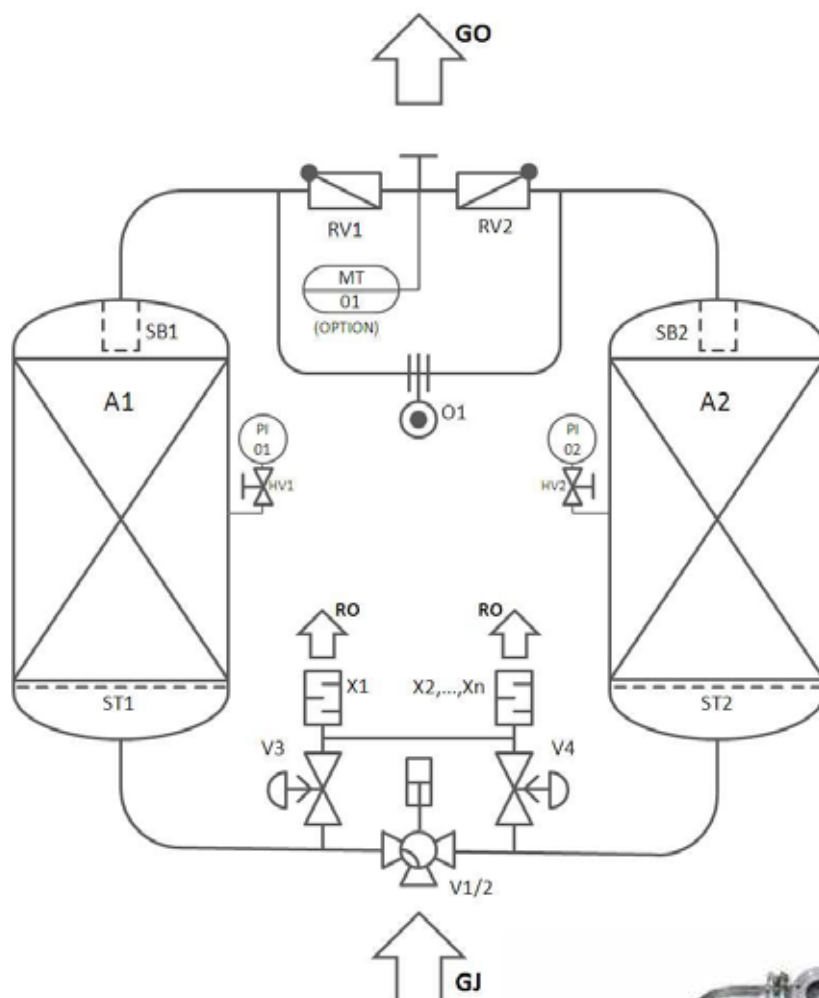
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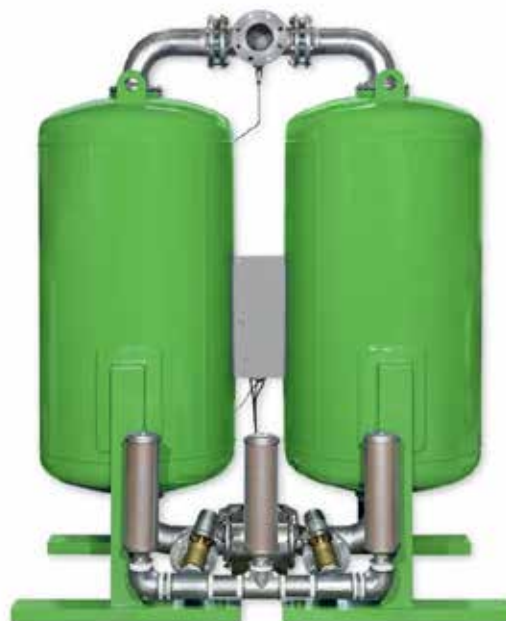
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### Flow diagram (PID)

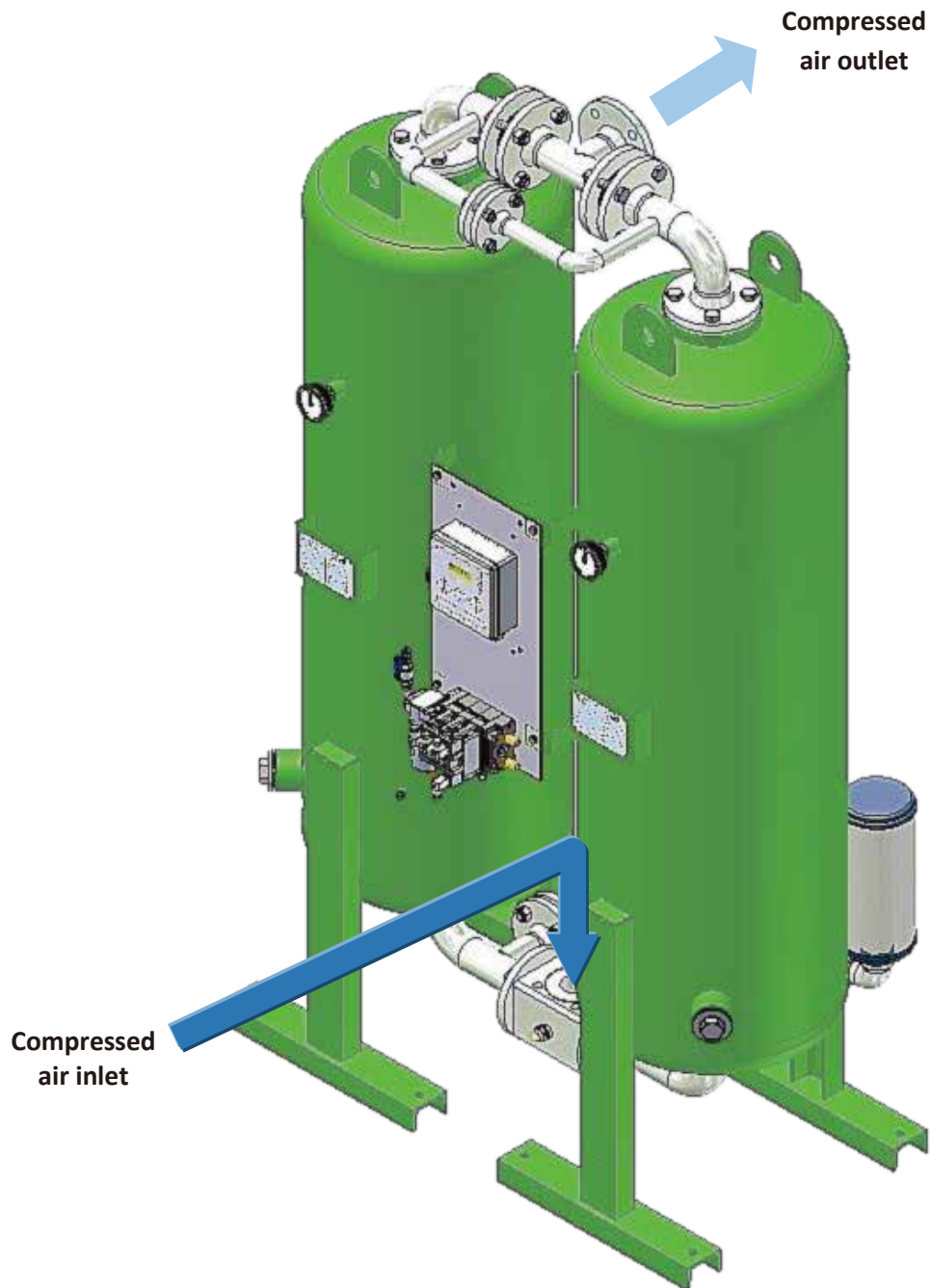


- A** Dryer vessel
- V** Valve
- HV** Manual valve
- RV** Non return valve
- SB** Sleeve cylinder
- ST** Desiccant support screen
- X** Silencer for expansion
- O** Orifice for regeneration air flow
- PI** Pressure gauge
- MT** Pressure dew point transmitter
  
- GJ** Gas inlet
- GO** Gas outlet
- RO** Regeneration air outlet



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### Accessories



**The DA-CM1-230 switch-over control system** enables the control of two redundant compressed air dryers in a compressed air system. The two dryers can be operated alternately while switching over automatically. All dryers, provided with a «remote start/stop contact» or a «compressor synchronisation contact», can be directly connected to the switch-over control system without the need for any further modifications. The DA-CM1-230 also controls all required shut-off valves (no scope of supply) to open or close the compressed air line to a dryer (e.g. solenoid valves or valves with actuating drive for 230V AC supply voltage). Furthermore, additional input signals can be hooked up to the common alarm message of each dryer. Beside the power supply the DA-CM1-230 provides alarm inputs for condensate drains, differential pressure gauges, etc. for each dryer.

**The GSM Module DA-ETR-107** is an easy-to-install extension for all dryers with alarm contact. In case of an alarm, a SMS message is sent to up to 6 different recipients or, if supported by the provider, an email message. Within the message, the dryer type and serial number is transferred, if required.

The programming can be done with a usual mobile phone, protected by the PIN code of the SIM card (no scope of supply) applied to the GSM module. The DA-ETR-107 is operated with 5-32V DC supply voltage. An internal battery ensures operation of up to 120 hours in case of loss of the supply voltage. The GSM module has an integrated antenna while an external antenna can be connected in the case of low signal levels.



**The Start-up device (minimum pressure valve) DA-VPM-...** protects the dryer from overload due to high flow velocities during pressure build-up of the compressed air system. For connection size G ½ to G 2½ spring loaded angle valves are offered (DA-VPM-B../16), providing an opening pressure of 3-5 bar (standard 3.5 bar). For connection size DN80 to DN250 butterfly valves with pneumatic actuator are offered (DA-VPM-F../11), directly operated by the working pressure while opening at 3 bar (full cross-section at 4 bar). Special versions with adjustable opening pressure or working pressures of up to 450 bar are available on request.



**Differential pressure gauges FAD01C with potential free alarm contact** allow to hook up the differential pressure control of the pre- and after-filter to the common alarm message of each dryer. To avoid a false error report due to start-up conditions or short-time peaks, an alarm delay can be set in the dryer control unit. The alarm message then will just be generated, if a too high differential pressure was indicated during the entire delay time interval.

... and many more. Please contact us.