

# 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).



# Product Data Sheet

## Adsorption Dryer DPS 120-630

### 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 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 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 a 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.

But 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 in order to increase the service life of the desiccant. An afterfilter (general purpose filter) should be installed downstream of the dryer in order to prevent possible desiccant dust ( $< 1 \mu\text{m}$ ) from entering.

The dryers comply with the requirements of the Pressure Equipment Directive 97/23/EC, and have the CE marking of this European directive.



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## Adsorption Dryer DPS 120-630

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### Basic data

Model	Nominal volume flow <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>	(Class 2)
Water content <sup>*2</sup>	Class 1-3 <sup>*3</sup>
Total oil content <sup>*2</sup>	Class 1 <sup>*4</sup>

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

\*3 - depending on the design

\*4 - the oil vapour content is not taken into account, it may reduce the purity class

### Volume flow conversion factors (cf)

#### 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

#### 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:**  $\text{max. actual volume flow} = \text{nominal volume flow} * \text{cf pressure} * \text{cf inlet temperature}$

$\text{Nominal needed volume flow} = \text{actual volume flow} / \text{cf pressure} / \text{cf inlet temperature}$

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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 *8</sup></li> </ul> </li> <li>■ Every 5 /10 years               <ul style="list-style-type: none"> <li>- Pressure vessel inspection acc. to Ordinance on Industrial Safety and Health of September 27th, 2002 (BGBl. I p. 3777) §15,</li> <li>- Inside check every 5 years (or 250.000 load changes)</li> <li>- Strength test (hydrostatic) every 10 years,</li> <li>both carried out by an authorised inspection agency, see page 5</li> </ul> </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. In order 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	2020 mm	1370 mm	570 mm	650 kg
DPS 150	DN 65 - PN16	2070 mm	1470 mm	650 mm	840 kg
DPS 210	DN 65 - PN16	2100 mm	1620 mm	745 mm	960 kg
DPS 240	DN 80 - PN16	2200 mm	1750 mm	800 mm	1080 kg
DPS 290	DN 80 - PN16	2200 mm	1900 mm	855 mm	1520 kg
DPS 370	DN 100 - PN16	2340 mm	2070 mm	950 mm	2000 kg
DPS 510	DN 100 - PN16	2600 mm	2220 mm	1030 mm	2450 kg
DPS 630	DN 125 - PN16	2820 mm	2420 mm	1100 mm	2900 kg

### Classification according to Pressure Equipment Directive 97/23/EC for group 2 fluids

Model	Volume	Category	Marking	Commissioning inspection <sup>*9</sup>	Routine inspection <sup>*9</sup>
DPS 120	225 litres	III	CE 0525	NP <sup>*10</sup>	NP <sup>*10</sup>
DPS 150	280 litres	IV	CE 0525	NP <sup>*10</sup>	NP <sup>*10</sup>
DPS 210	395 litres	IV	CE 0525	NP <sup>*10</sup>	NP <sup>*10</sup>
DPS 240	470 litres	IV	CE 0525	NP <sup>*10</sup>	NP <sup>*10</sup>
DPS 290	570 litres	IV	CE 0525	NP <sup>*10</sup>	NP <sup>*10</sup>
DPS 370	660 litres	IV	CE 0525	NP <sup>*10</sup>	NP <sup>*10</sup>
DPS 510	980 litres	IV	CE 0525	NP <sup>*10</sup>	NP <sup>*10</sup>
DPS 630	1121 litres	IV	CE 0525	NP <sup>*10</sup>	NP <sup>*10</sup>

\*9 - In Germany defined by the Ordinance on Industrial Safety and Health of September 27th, 2002 (BGBl. I p. 3777) §14 and §15

\*10 - Inspection by authorised person (AP) or Notified Body (NP)

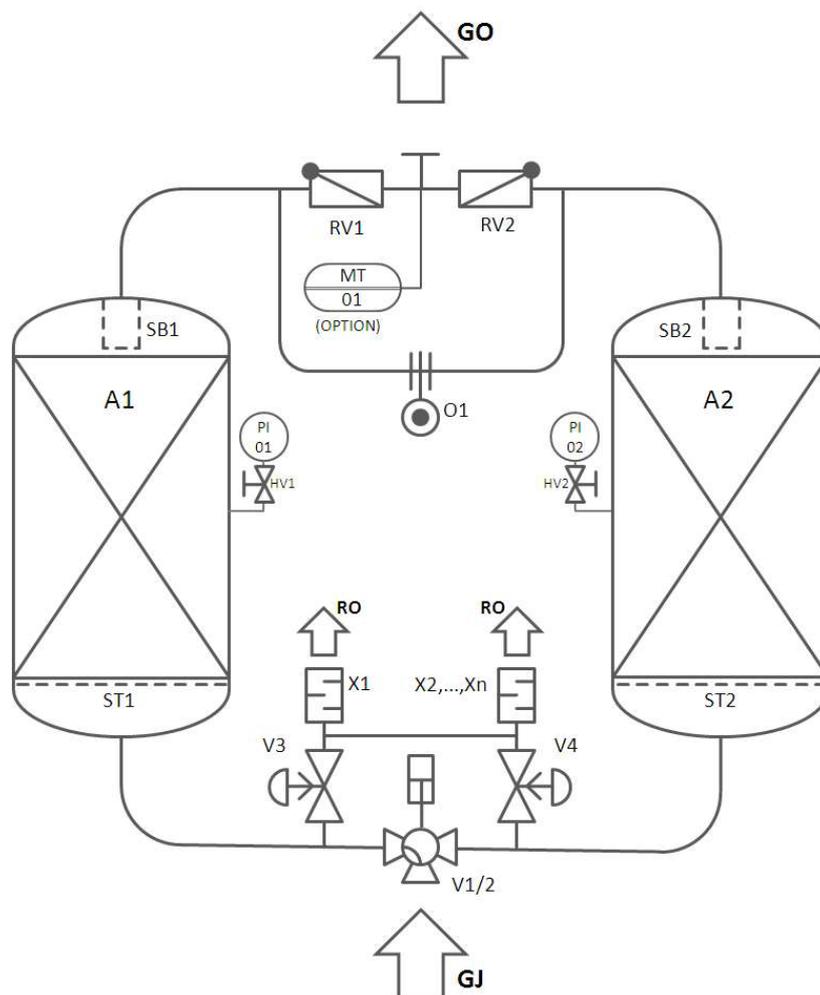
### Other Directives

Model	
All Models	<p>EMC-Standard (inspection scope for control system, solenoid valves and dew point measurement):  <i>Emitted interference acc. : EN 55011:1998 + A1:1999 + A2:2002 (limit value class: B)</i>  <i>EN 61000-3-2:2006-04, EN61000-3-3:2008</i>  <i>Interference resistance acc. : EN 61000-6-2:2005</i></p> <p>Machinery Directive 2006/42/EC is not applicable.</p>

# Product Data Sheet

## Adsorption Dryer DPS 120-630

### Flow diagram (PID)

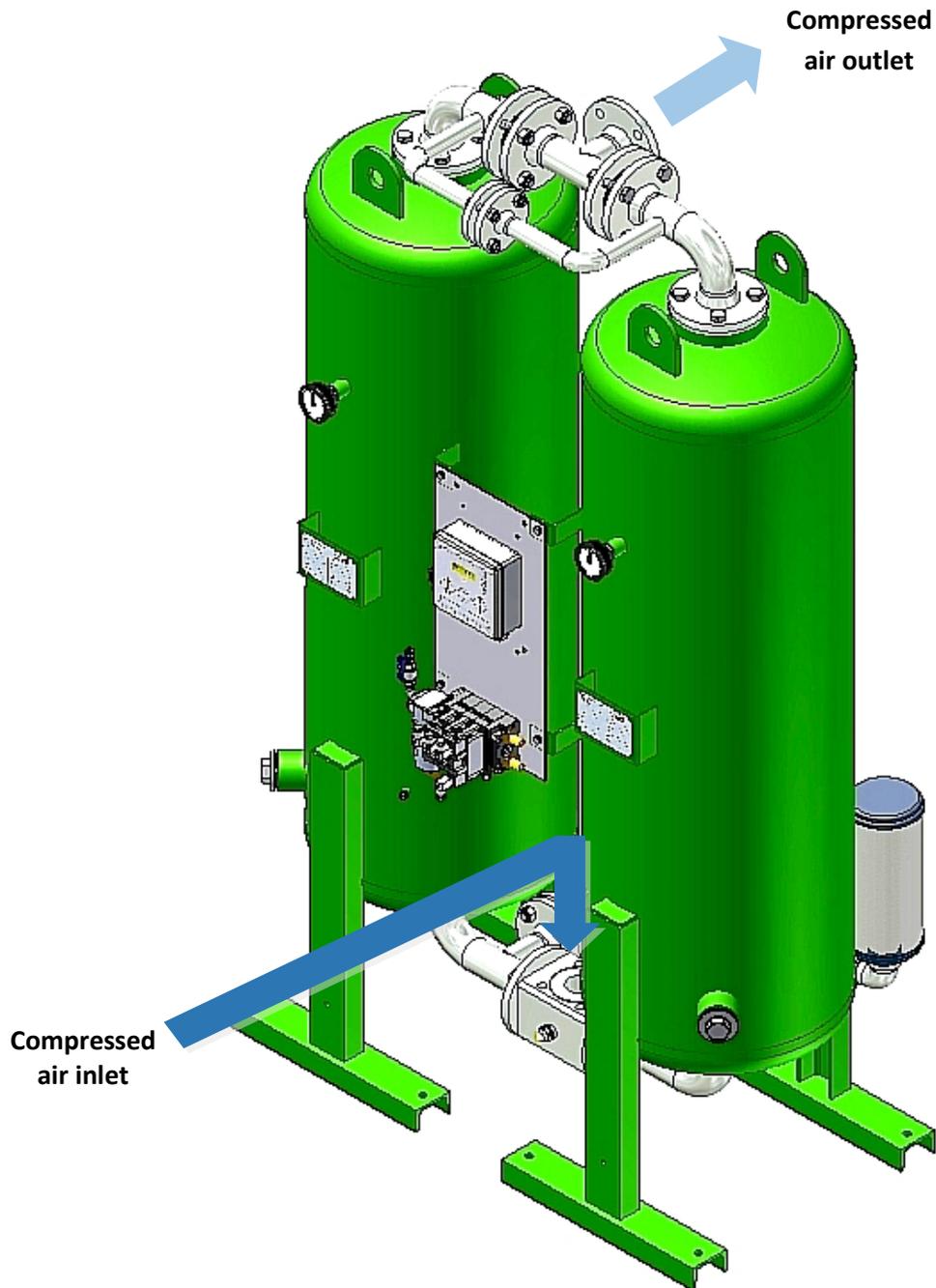


<b>A</b>	Dryer vessel
<b>V</b>	Valve
<b>HV</b>	Manual valve
<b>RV</b>	Non return valve
<b>SB</b>	Sleeve cylinder
<b>ST</b>	Desiccant support screen
<b>X</b>	Silencer for expansion
<b>O</b>	Orifice for regeneration air flow
<b>PI</b>	Pressure gauge
<b>MT</b>	Pressure dew point transmitter
<b>GJ</b>	Gas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



# Product Data Sheet

## Adsorption Dryer DPS 120-630



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### Accessories

Apart from the pressure dew point measurement (and dew point dependent control), as well as electronic condensate drains, for pre filters there is still further useful accessories available.



**The DA-CM1-230 switch-over control system** is used to control two redundant compressed air dryers in a compressed air system. These dryers can then be automatically operated alternately. All the dryers provided with a "remote start/stop contact" or a "compressor synchronisation contact" can directly be connected to and controlled by the switch-over control system without the need for modifications.

In addition, the required shut-off valves for stopping the air flow of each dryer (e.g. solenoid valves or valves with actuating drive, 230 VAC design each), provided by the customer, are supplied with supply voltage and controlled by the switch-over control system. Furthermore, additional input signals can be integrated in the group error message of the relevant dryer. Power supply and alarm inputs for condensate drains and differential pressure gauges are prepared for.



**The GSM Module DA-ETR-107** is a very simple extension to send in case of a dryer alarm a SMS message to one or up to 6 receivers on their mobile, or if a provider were selected also to an email address. With the message the dryer type, and the serial no. will be transmitted. The programming of the equipment can be done with a standard mobile phone, a condition is of course that the pin code of the SIM card is known. The equipment can be installed directly to the C1 control, and supplied with voltage 24VDC. Further the module has a 120 hours buffer battery, and an integrated antenna. For areas with low signal reception an external antenna could be added to the module. (SIM card is not scope of supply)



#### **Start up device (minimum pressure valve) DA-VPM-...**

To protect a dryer against high velocity during start up of the system, while the operating pressure is not yet reached in the net.

For sizes G ½" – G2 ½" (DA-VPM-B../16) a spring loaded angle valve, which opens at 3 - 5 bar(g) (Standard-setting is 3,5 bar (ü)).

For sizes DN80 – DN250 (DA-VPM-F../11) a not sealing butterfly valve, with pneumatic actuator. The actuator opens directly by the system pressure. Opening starts at 3 bar(g) and will be full open at 4 bar(g). Special version with adjustable opening pressure between 3 and 10 bar(g) is also available.



#### **Differential pressure gauge FAD01C with voltage free alarm contact.**

The dryer control C1 is already prepared to connect two volt free alarm contacts, and to show the alarms on the display (if desired) and to consider them in the common alarm output. Further an alarm delay could be programmed in the C1-control, so that an alarm will only display if the differential pressure drop is longer present than the programmed time delay.

**...and much more, please contact us.**