ECO**TROC®** ATW-S

Heat-regenerated Adsorption Dryer

Rev 01_1225

Heat-regeneration by heated blower air in countercurrent direction to the adsorption process. Cooling by blower air

no purge air
Zero Purge
compressed air loss-free

Adsorption drying at it‘s best

The heat-regenerating adsorption dryers of the series **ECOTROC® ATW-S** are uniquely innovative, unbeatably efficient and remarkably reliable. Moreover, they can be individually adapted to all requirements and conditions. Premium quality, made in Germany.

The composition and continuous further development of existing, proven drying technologies are the basis of the new **ECOTROC® ATW-S** adsorption dryers. The use of state-of-the-art controls and continuously optimised drying processes guarantee the technical lead for these novel system solutions, which redefine the market for adsorption dryers.

The ECOTROC®ATW-S Plus-Effects +++

+ High-end plant engineering ▸ High performance reserves & safety
+ linear dew points ▸ constant compressed air quality
+ intelligent process solution ▸ favourable energy costs
+ efficient, long-lasting desiccant ▸ constant, high compressed air quality
+ very low energy consumption
+ **Zero Purge:** no purge air needed
+ brand-name components ▸ Simplified maintenance & high operational reliability
+ modular system concepts ▸ price-efficient
+ dew point control optional ▸ safety plus and energy-saving
+ special versions possible, e.g. stainless steel version
+ also safely suitable for critical environments
+ intelligent control ▸ process safety & linear pressure dew point
+ energy cost reduction, e.g. through dew point control or loop cooler
+ optionally also with superheated steam heat exchanger

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Functional principle

After the compressed air has been cooled and the condensate removed, it leaves the compressor in a moisture-saturated state. As the compressed air cools down further in the downstream piping, additional condensate usually forms. This leads to negative side effects such as corrosion, icing and consequently to high maintenance costs for the compressed air system. Drying the compressed air is therefore a mandatory requirement for any compressed air treatment system. If lower pressure dew points are required, adsorption dryers are used.

In an adsorption dryer, the compressed air to be dried flows through a desiccant bed, which removes the moisture from it by adsorption. The adsorption capacity of the desiccant is limited. Therefore, before the critical load limit is reached, the system switches to the second, alternating adsorption vessel. The adsorption vessel, which is fully loaded with moisture, enters the regeneration process after the switchover. The regeneration time is always shorter than the adsorption time of the vessel in operation, so that the continuous supply of dried compressed air to the point of use is guaranteed at all times.

Adsorption — Regeneration — Cooling —Switching

In the adsorption phase, the compressed air saturated with moisture is passed through the desiccant bed from bottom to top. As the compressed air flows through the container, the moisture is adsorbed by the desiccant so that dried compressed air is available at the outlet. A large part of the moisture is adsorbed in the lower third of the container – the „wet zone“.

Parallel to the adsorption phase, the regeneration phase runs on the second container in order to remove the moisture that has already been adsorbed here and to return the desiccant bed to a state ready for adsorption.

During the regeneration phase, ambient air is drawn in by a fan and heated in the downstream heater. This hot air is fed into the desiccant container from above - in counterflow to the adsorption direction. A significant advantage of the ATW-S: In this way, especially the upper third of the desiccant bed is heated extremely effectively. This area is particularly important for reliably low pressure dew points.

The desiccant bed is continuously heated, the moisture bound in the bed evaporates and is blown off to the atmosphere via the regeneration suction step. To monitor the regeneration phase, the temperature of the regeneration air blown off to the atmosphere is monitored. When a defined temperature threshold is reached, the heater can be switched off.

The moisture bound in the desiccant bed is now completely desorbed. As a result of the regeneration, the desiccant bed has heated up to well over 100 °C. Before the desiccant is able to absorb moisture again in the adsorption phase, it must therefore be cooled down.

For this reason, the direction of rotation of the fan is reversed in the cooling phase following the regeneration phase. Now the fan „sucks“ ambient air from the bottom to the top (in the same direction as the adsorption direction) through the desiccant bed. The reversal of the direction of rotation is of elementary importance for process reliability: In this way, the moisture inevitably contained in the ambient air first comes into contact with the desiccant at the bottom of the container during the cooling phase. The upper part of the desiccant bed is thus not already occupied by ambient moisture in the cooling phase and is available in the adsorption phase with maximum performance right from the start.

After cooling – again monitored by the temperature of the cooling air – the dryer switches to the pressure build-up phase. Now the pressure of the previously regenerated side is adjusted to the operating pressure. Once this is complete, the dryer can switch over to the freshly regenerated container. The container previously loaded with moisture is relieved and the regeneration phase begins here.

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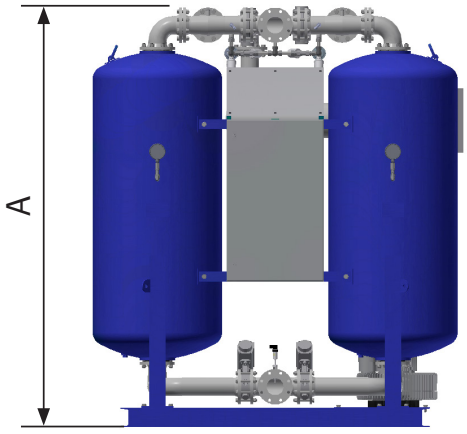
Performance data and dimensions

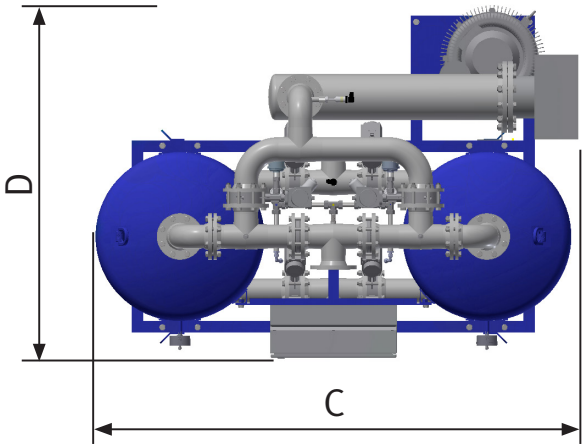
Type	Capacity*		Dimensions (mm)			Connection	Weight
	m³/h	cfm	A	C	D		kg
ATW-S0040	400	236	2260	1750	1030	DN 50	1.200
ATW-S0070	700	412	2310	1860	1180	DN 50	1.400
ATW-S0100	1000	589	2390	1920	1280	DN 80	1.500
ATW-S0140	1400	825	2420	1920	1320	DN 80	1.900
ATW-S0170	1700	1001	2480	2120	1450	DN 80	2.300
ATW-S0200	2000	1178	2550	2180	1480	DN 80	2.800
ATW-S0250	2500	1473	2640	2400	1520	DN 100	3.400
ATW-S0300	3000	1767	2630	2500	1580	DN 100	3.600
ATW-S0350	3500	2062	2790	2750	1900	DN 100	4.000
ATW-S0400	4000	2356	2890	2800	1990	DN 150	4.800
ATW-S0500	5000	2945	2870	2910	2040	DN 150	5.600
ATW-S0600	6000	3534	3000	3400	2350	DN 150	6.300
ATW-S0700	7000	4123	3000	3500	2280	DN 150	7.200
ATW-S0820	8200	4830	3100	3600	2500	DN 150	8.000
ATW-S0950	9500	5596	3300	3800	2600	DN 200	9.000

* calculated at 1 bar (abs.) and 20°C at 7 bar g working pressure, 35°C inlet temperature
** Insulation including vessel head and heater.

Flange connection acc. to ANSI B16.5 upon request

Dimensional drawings





Specifications	
Pressure dew point (PDP)	-40 °C
Media	Compressed air
min. Operating pressure	4 bar g
max. Operating pressure	11 bar g (ATW-S 0040 ... 0300) | 10 bar g (ATW-S0350 ... 0950)
Colour	blue RAL 5010
Connection	DIN EN 1092-1 Typ 11 (DIN 2633)

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Correction factors ATW-S

Inlet temperature °C	Operation pressure bar g						
	4	5	6	7	8	9	10
30	0,71	0,86	1,00	1,15	1,18	1,25	1,37
35	0,62	0,75	0,87	1,00	1,12	1,25	1,37
40	0,38	0,53	0,67	0,82	0,92	1,07	1,21
43	---	0,33***	0,45**	0,54**	0,61*	0,72	0,80

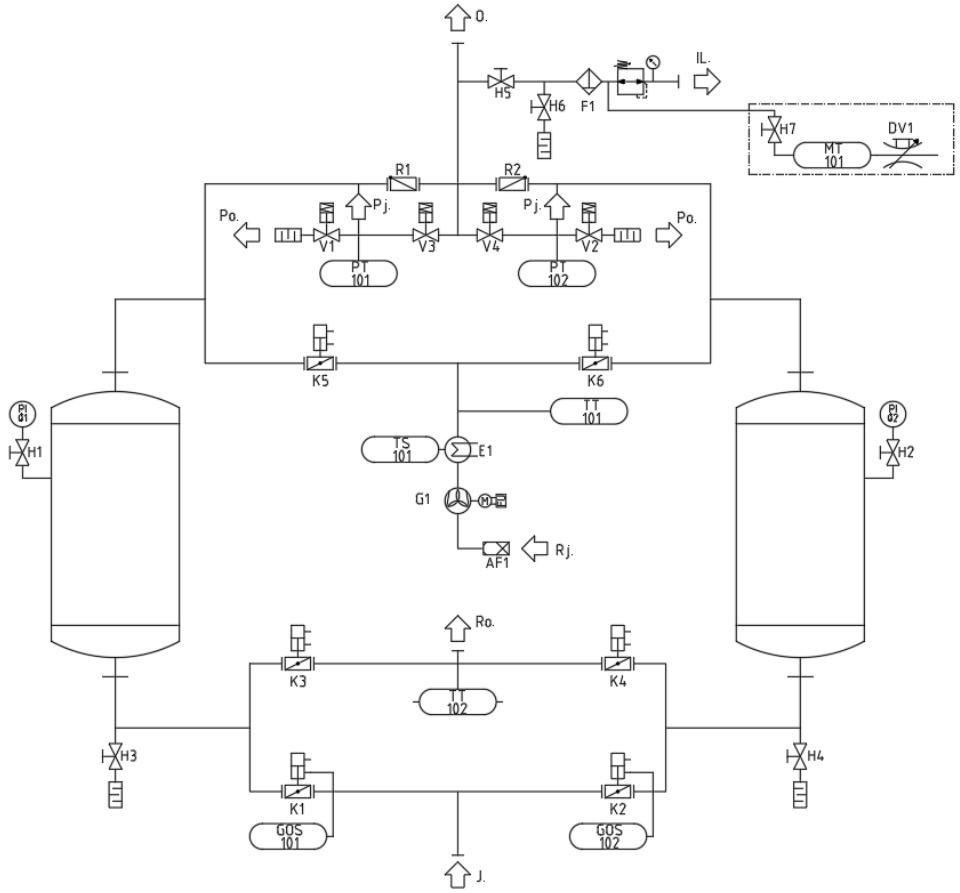
* PDP -30 °C, ** PDP -25 °C, *** PDP -20 °C

Please multiply the capacity of the filter with the correction factor in the above table to get the corrected capacity.

Guidance for determinating the dryer size:

Inlet volume flow V_{eff}:	2.000 m³/h	
Operating pressure:	7 bar g	$V_{corr} = V_{eff} / K1 = (2.000\ m^3/h) / 0,82$
Inlet temperature:	40 °C	$V_{corr} = 2.439\ m^3/h$
Required PDP:	-40 °C	
Correction factor K1:	0,82	chosen dryer size: ATW-S 250

R&I diagram



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Field of application					
Installation site	Indoor installation in non-aggressive atmosphere				
Ambient humidity max.	25% r.h at 40°C	37% r.h at 35°C	50% r.h at 30°C	70% r.h at 25°C	90% r.h at 20°C
Ambient temperature max.	35°C for intake air for regeneration; otherwise 50°C				
Ambient temperature min.	1,5°C; at temperatures ‹ 15°C or in the case of draughts, insulation of the dryer is necessary.				
Operating pressure	4 to 11 bar g				
Flow medium	Compressed air and nitrogen				
Pressure dew point	-20°C to -40°C (loop version -70°C)				

* calculated at 1 bar (abs.) and 20°C at 7 bar g working pressure

Further data	
Power supply	400V / 50Hz (other options on request)
Protection class	IP 54
Motors	Motors of the side channel blowers are built according to DIN EN 60034 / DIN IEC34-1, IE3, thermal class F, voltage tolerance 10%
Pressure sensors	2-wire technology, measuring range 0-16 bar, output signal 4-20 mA
Temperature sensors	PT 1000 class A: Measuring range -50°C +250°C
Pressure dew point sensors (opt.)	2-wire technology, measuring range -100 - +20°C, output signal 4-20 mA

Technische Merkmale

- Regeneration by means of heated ambient air in counterflow for adsorption
- Cooling by means of sucked ambient air in co-current for adsorption
- No purge air requirement - Zero Purge
- Complies with Directive 2014/68/EU on pressure equipment.
- The ECOTROC® ATW-S series dryers are subject to conformity assessment according to the PED 2014/68/EU.
- The following standards and manufacturing processes were used as a basis for production:
  DIN EN ISO 12100, DIN EN 1050, DIN EN 50081, DIN EN 50082, DIN EN 60204, DIN EN ISO 9001:2015 (comprehensive quality management), 2014/68/EU (Pressure Equipment Directive), TRB (Technical Guidelines for Pressure Vessels), GSG (Equipment Safety Act), 9th GSGV (9th Ordinance on Equipment Safety), 2006/42/EG

Approvals for pressure equipment

EU — **Approval for fluid group 2 according to Pressure Equipment Directive 2014/68/EU, Module H1 (Category IV)**

Quality assurance

Development/manufacture — **DIN EN ISO 9001**

Air purity class acc. to ISO 8573-1:2010

Solid particles — **-**

Humidity (gaseous) — **Class 3 (PDP -25°C), class 2 (PDP -40°C), opt. class 1 (PDP -70°C)**

Residual oil — **-**

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The control

The heat regenerated adsorption dryers of the **ECOTROC® ATW-S** series are equipped with a Siemens SIMATIC S7 1200 PLC with 7“ touch panel, which allows easy access to status, settings, alarm messages and diagnostic information of the drying system.

Access to the touch panel is characterised by advanced, user-friendly menu navigation. The panel displays the current operating status with all relevant operating parameters, such as operating pressure in each vessel, operating temperatures in the regeneration process and pressure dew point at the outlet of the plant. The operating parameters can be adjusted by authorised personnel after entering a key to access the service menu.

Various additional functions can be activated without the need to change the PLC programme. For diagnostic purposes, all alarm and warning messages that have occurred are listed and stored, accessible in the menu. Trend curves of temperatures and dew point are also available for the past period up to 24 hours.

An optional higher-level control system for the rolling operation of multiple dryers is also available.