PRODUCT**DATASHEET**

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ECO**TROC**® ATK-APN

Heatless-regenerated Adsorption Dryer

Solutions for compressed air and gases – reliable and safe treatment

Adsorption dryers **ECOTROC® ATK-APN** are specially designed for use in systems where a required pressure dew point of -20°c to -70°c has to be ensured.

Rev 01_0418
2018
EN

All KSI products are manufactured in conformity with DIN EN ISO 9001 · Technical modifications and errors excepted

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Permanent high compressed air quality

KSI compressed air treatment systems provide customized solutions for specific purposes. **ECOTROC® ATK-APN** dryers are available in two options. The compact aluminium line (APN) for volume flows up to 110 m³/h and the standard line with welded vessels for volume flows up to 3050 m³/h. For further information about the **ATK** standard welded line please consult the respective information material. A permanent high compressed air quality is a feature of both product lines.

Using first-class materials, KSI produces exceptional quality **ECOTROC® ATK-APN** industrial adsorption dryers. The use of quality desiccants in combination with intelligent controls assures consistent compressed air and compressed gas quality and stable dew points (from -20°c to -70°c). Non-electric change-over valves assure reliable and risk free operation. Standardized brand-name blow-down valves extend the operating life, minimise service times and simplify maintenance significantly. The cost effective operation and functionality supplements the exceptional price-performance ratio.

The intelligent 10 minute **ECOMATIC** cycle (control cycle for adsorption, regeneration and pressure build-up) requires less regeneration energy than dryers with shorter cycles and saves adsorbents due to the lower number of load changes. By configurating individual time intervals further potential energy saving is possible.

The compressor synchronising circuit that is integrated in the **ECOMATIC** control as standard saves additional regeneration energy because the **ECOTROC® ATK-APN** runs only when the compressor is working. Consequently no regeneration (purge) air is wasted during stand-by periods. Large cross sections at inlets and outlets, in internal and external pipe lines as well as valves and silencers ensure high flow capability. Integrated and coordinated solutions such as **ECOCLEAN®** compressed air filters and **KONDRAIN®** condensate drains enable further cost saving opportunities and improve operational reliability.

Function

Pre-filtration

The **ECOCLEAN® SMA** pre-filter simply seperates out any solid and liquid components from the saturated compressed air. Accumulated compressor condensate is ejected reliably and without pressure loss by the electronic level controlled **KONDRAIN® N** (optional).

Adsorption

The pre-cleaned compressed air is distributed across the so-called wet-zone via the flow divider from the lower end of the adsorption vessel across the desiccant bed. The actual adsorption through agglomeration of the water molecules to the large internal surface of desiccant now begins.

Final-filtration

After flowing through the whole desiccant bed the treated compressed air enters the final-filter **ECOCLEAN® DMF** through a flow optimizer and a shuttle valve for the final dust filtration. High purity compressed air is now available.

Regeneration / Desorption

Simultaneously to the adsorption process in the rst vessel the desiccant in the second vessel is regenerated. A part of the already treated compressed air from vessel one is channeled into vessel two through a purging air nozzle in counter ow. By using the physical effect of pressure release to atmospheric pressure the regeneration air dries the moist desiccant highly effectively. the moisture is exhausted via a blow-down valve and silencer.

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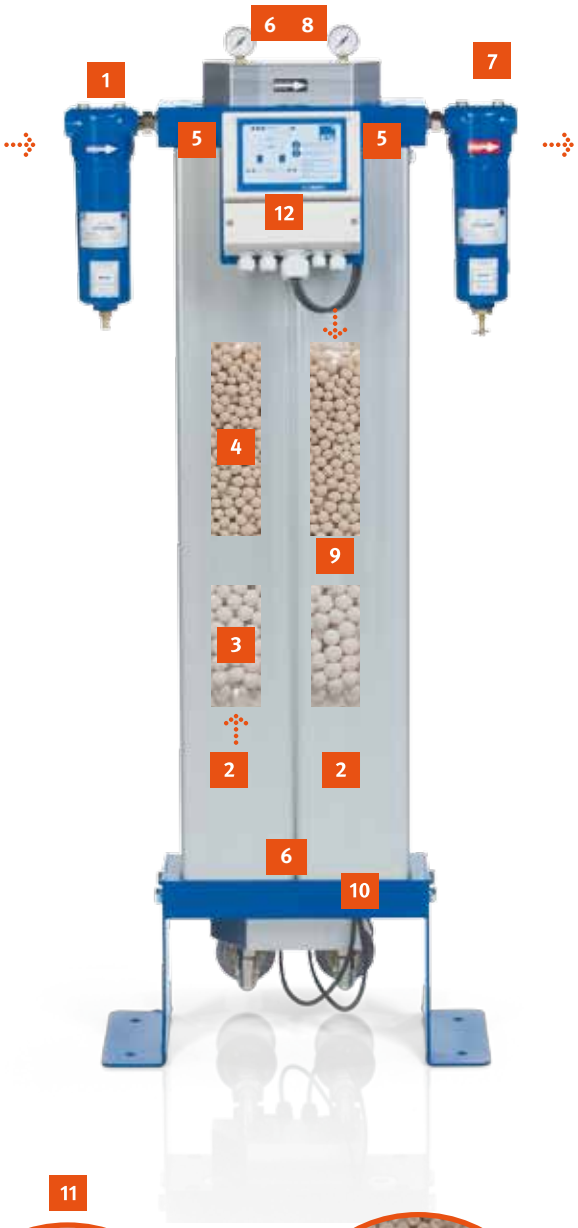
Switch-over

Once the regeneration process is done the pressure buildup in the vessel begins. After reaching the operating pressure the air flow is directed from the adsorbing vessel to the freshly regenerated vessel. Adsorption now commences in the freshly regenerated vessel, while the other vessel starts its regeneration cycle.



1	flow-optimised **ECOCLEAN® SMA** pre-filter
2	inlet diffusor
3	wet zone for pre-drying
4	adsorption phase desiccant vessel
5	outlet diffusor
6	change-over valve
7	flow-optimised **ECOCLEAN® DMF** final filter
8	purging air nozzle
9	desiccant vessel regeneration phase
10	blow-down valve
11	silencer(s)
12	electronic control device **ECOMATIC**

Desiccants

Silencers, Blow-down valves ATK-AP

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High-end aluminium profile line

Solid and robust construction offers long operating life, low failure rates and problem free installation. All of the design sizes can be fastened to the floor. An aluminium profile that was developed by KSI together with the globally active SABA group offers optimal flow conditions in the adsorber bed and maintains a stable pressure dew point as a result of an over dimensioned desiccant volume. The **ATK-APN** standard version reaches a secure pressure dew point of -40°c. The optional **ATK-APN -70** version is designed for a pressure dew point of -70°c and provides highest operation and process safety.
Two large dimensioned silencers provide more safety during the switch-over cycles than other devices on the market, which increase the risk of discharging desiccant dust with the use of just one silencer.

KSI is convinced that this system offers more safety by essentially eliminating the risk of any desiccant dust to atmosphere due to the large silencer surface area.
KSI **ECOCLEAN® SMA** and **DMF** pre and after filters are of course part of the delivery scope, and offer optimal pre-filtration of entering particles and water or oil droplets. This increases the operational reliability and service life of the **ATK-APN** devices significantly. A final filter assures safe filtration of the unavoidable desiccant dust on the discharge side.

Capacities and dimensions

Type	Capacity* -40°C pdp	Capacity* -70°C pdp	Dimensions (mm)				Connection
	m³/h	m³/h	A	B	C	D	
ATK-APN 1	5	4	625	535	409	300	3/8“
ATK-APN 2	10	7	725	635	409	300	3/8“
ATK-APN 3	20	13	825	735	409	310	3/8“
ATK-APN 4	35	21	880	767	481	440	3/8“
ATK-APN 6	50	32	980	867	481	440	3/8“
ATK-APN 7	60	40	1080	967	481	440	1/2“
ATK-APN 8	70	48	980	860	567	478	1/2“
ATK-APN 9	90	56	1120	1000	567	478	1/2“
ATK-APN 10	110	68	1300	1180	567	478	1/2“

* refer to 1 bar (abs.) 20°c at 7 bar g operating pressure, 35°c inlet temperature

Higher volume flows / higher operating pressures on demand

Fully-automatic heatless-regenerated high-end adsorption dryer

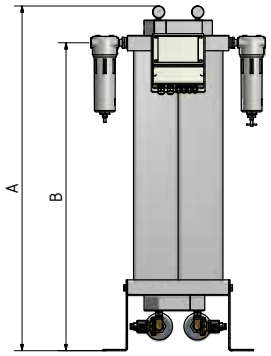
including:

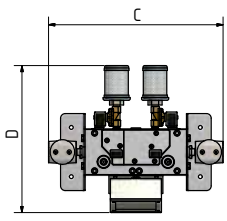
- pre-filter **ECOCLEAN® SMA**
- final-filter **ECOCLEAN® DMF**
- electronic control device **ECOMATIC**
  including compressor direct current switch

capacity volume flow: up to 110 m³/h*
capacity pressure dew point: -20°c to -70°c
max. operating pressure: 16 bar (ATK-APN 10: 13,5 bar g)
max. inlet temperature: 35°c

* refer to 1 bar (abs.) 20°c at 7 bar g operating pressure

Higher capacities and inlet temperatures on demand





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Correction factors

Correction factors operating pressure																									
bar g	4	4,5	5	5,5	6	6,5	7	7,5	8	8,5	9	9,5	10	10,5	11	11,5	12	12,5	13	13,5	14	14,5	15	15,5	16
F(p)	0,6	0,7	0,74	0,82	0,89	0,97	1	1,08	1,11	1,16	1,22	1,29	1,36	1,42	1,5	1,57	1,63	1,69	1,75	1,83	1,9	1,96	2,03	2,1	2,14

Correction factors inlet temperatures									
°C	<25	25	30	35	38	40	45	48	50
F(t)	1,2	1,1	1,09	1	0,84	0,78	0,72	0,65	0,58

please multiply the dryer's capactiry with the correction factors in the table above to get the correct capacity.

Higher inlet temperatures on demand

Electrical Data

Type	Installed power	Electrical voltage	Frequency
	W	V	Hz
ATK-APN 1	32	230	50/60
ATK-APN 2	32	230	50/60
ATK-APN 3	32	230	50/60
ATK-APN 4	32	230	50/60
ATK-APN 6	32	230	50/60
ATK-APN 7	32	230	50/60
ATK-APN 8	32	230	50/60
ATK-APN 9	32	230	50/60
ATK-APN 10	32	230	50/60

Quality components for best compressed air quality

Further Data	
Protection class	IP 54
Purging air (average)	14 %*

* at a pressure dew point of -40°C

Field of application

Installation site	Installation inside 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.	50°C				
Ambient temperature min.	+2°C				
Operating pressure	4 to 16 bar g				
Medium	Compressed air and gases				
Pressure dew point	-40°C*				

* refer to 1 bar (abs.) 20°c at 7 bar operating pressure

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Technical features

Regeneration by purging air in countercurrect to adsorption

Low purging air demand due to shorter cycles and optimized compressed air and gas pipings

According to council directives 2014/29/EU on simple pressure vessels and the directive 2014/68/EU on pressure equipment.
Dryers of KSI product line **ECOTROC® ATK-APN** undergo a conformity assessment while construction according to annex I.

Following norms and manufacturing processes are basis for the production:
DIN EN ISo 12100, DIN EN 1050, DIN EN 50081, DIN EN 50082, DIN EN 60204, DIN EN ISo 9001:2008 (Total Quality Management), 2014/29/EU (Simple Pressure Vessels), 2014/68/EU (Pressure Equipment Directive), TR B'en (Technical Directives Pressure Vessels), GSG (Equipment Safety Act), 9. GSGV (9th Regulation for Equipment Safety), 2006/42/EG

Approvals for Pressure Equipment

EU	**Approved for fluid group 2 according to Pressure Equipment Directive** 2014/68/EU
according to classification	**ATK-APN 1 to 3: Art. 4 (3)**
DGRL 2014/68/EU	**ATK-APN 4 to 10: category I**
Fluid group	**2**

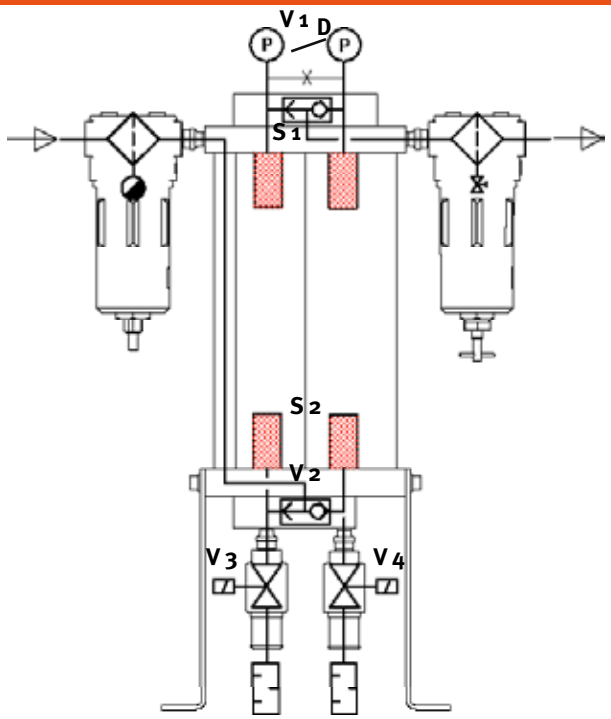
Quality Management

Development/Production	**DIN EN ISO 9001**

Air purity class according to ISO 8573-1:2010

Solid particles	**Class 2 (through final-filtration, standard)**
Humidity (gaseous)	**Class 3 (PdP -20°C), Class 2 (PdP -40°C), opt. Class 1 (PdP -70°C)**
Total oil	**-**

R&I Scheme



P 1	Manometer vessel 1
P 2	Manometer vessel 2
V 1	Shuttle valve top
V 2	Shuttle valve bottom
S 1	Flow optimizer top
S 2	Flow optimizer bottom
V 3	Blow-down valve vessel 1
V 4	Blow-down valve vessel 2
D	Nozzle

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Maintenance

Following regulations for maintenance guarantee a secure and trouble-free use and should be obeyed by the customer.		
daily	Manometer + Control:	Visual and function check
annual	Control box & Silencer(s):	Check wires and clips, clean
	Pre- & Final-filterelement:	Exchange
after 2 years	Silencer(s):	Exchange
	O-Rings of filter housing:	Exchange
	Pistons shuttle valves & associated O-Rings:	Exchange
	Solenoid valves:	Exchange
	Pressure dew point sensor (opt.):	Exchange
after 4 years	Desiccant:	Exchange
	Sieves/Diffusors:	Clean, exchange if necessary

Control devices

Dew point controls with intelligent functions

Control with set cycle times

ECO**MATIC**

Standard scope of supply in all **ECOTROC® ATK-APN** dryer units

- Display of adsorption/regeneration cycle
- Micro processor fully electronic
- Energy saving compressor direct current switch
- Cycle times configurable
- Status display and potential-free alarm signal for service
- 24 V optional on demand
- usable for adsorption dryers of other manufacturers as well (if configured by KSI staff)

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Control on demand

ECO**TROCONOMY-Comfort (ET-C)**

effortless upgrade for all **ECOTROC® ATK-APN** adsorbers (older versions too)

- dew point measurement and display from +20°c up to -100°c
- demand based control of regeneration by measuring the operational conditions
- integrated load change counter => vessel inspections could be done later
- storage of operation parameters with time data => safety for power failures
- password protection on all levels (configurable)
- connection for optical and acustical signals
- automatical service display
- display of service intervals (adjustable)
- potential-free alarm output
- external 2-20mA-signal to transfer the displayed dew point value, i.e. to a master display or control room

High-end control

ECO**TROCONOMY-Premium (ET-P)**

Upgrade of all **ECOTROC® ATK-APN** adsorbers possible (even older models)

- functions like ECO**TROCONOMY-Comfort**, in addition:
- pressure measurement at dryer inlet and display on control monitor
- temperature measurement at dryer inlet and display on control monitor
- security shutdown for variation from set values possible (refers to pressure)
- alarm when leaving defined data intervals (refers to pressure and temperature)

Dew point control saving potential (calculation based on **ECOTROC® ATK-APN 8**)

Compressed air volume flow	70 m³/h
Operating pressure in system	7 bar
Energy demand air compressor	6,61 kW
Operating hours per year	7500 h
Energy cost per kWh	0,15 €/kWh
Purge air share	14 %
Stand by operation	70 %

Purge air costs without control	0,14 €/h
Purge air costs with control	0,04 €/h
Costs for the dryer	
Purge air loss without control	1040,57 €
Purge air loss with control	312,17 €
Savings through dew point control per year	**728,40 €**

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Versions and options

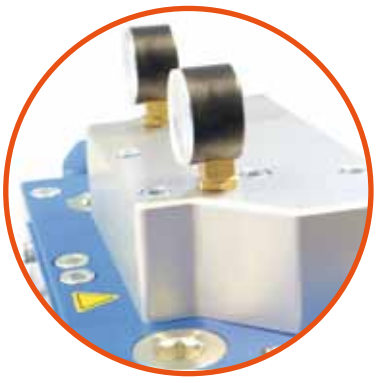
- **ECOTROC® ATK-APN** for volume flow from 5 m³/h to 110 m³/h
- **ECOTROC® ATK** for volume flows from 150 m³/h to 3050 m³/h (information material available separately)
- **ECOTROC® ATO-APN**, combines **ECOTROC® ATK-APN** and **ECOTROC® ATC-APN**, solution for oil-free compressed air
- **ECOTROC® ATK-HP** for operating pressures up to 500 bar und volume flows from 10 to 1000 m³/h
- customized dryers for special needs possible on demand
- **ECOTROC® ATK-APN -70** version with pressure dew point -70°c
- standard control included, other control devices available separately

The ECOTROC®ATK-APN Plus Effect +++

+ two large silencers => risk of clogging with desiccant dust virtually eliminated
+ use of quality desiccant => capacity is more reliable
+ standard pre- and final-filtration => safer operation
+ purging gas recirculation is standard scope of supply
+ design for special spaces possible due to symmetrical piping and components
+ delivery of ready-to-use units
+ robust and solid construction
+ fastening to floor is possible
+ **ATK-APN1** to **ATK-APN3** are available including wall mounting preparations
+ modular concept

Service advantages

- desiccant change is possible via filler and drain ports
- simple and clear service packages
- intelligent controller is easy to programme and operate
- The two service blocks on the upper and lower plate contain all parts required for maintenance. All service works can be performed in a comfortable position after demounting the block. No complicated labor necessary.
  Important: The dryer remains fixed within the installation.



Filling ports are standard on all ATK-APN dryers