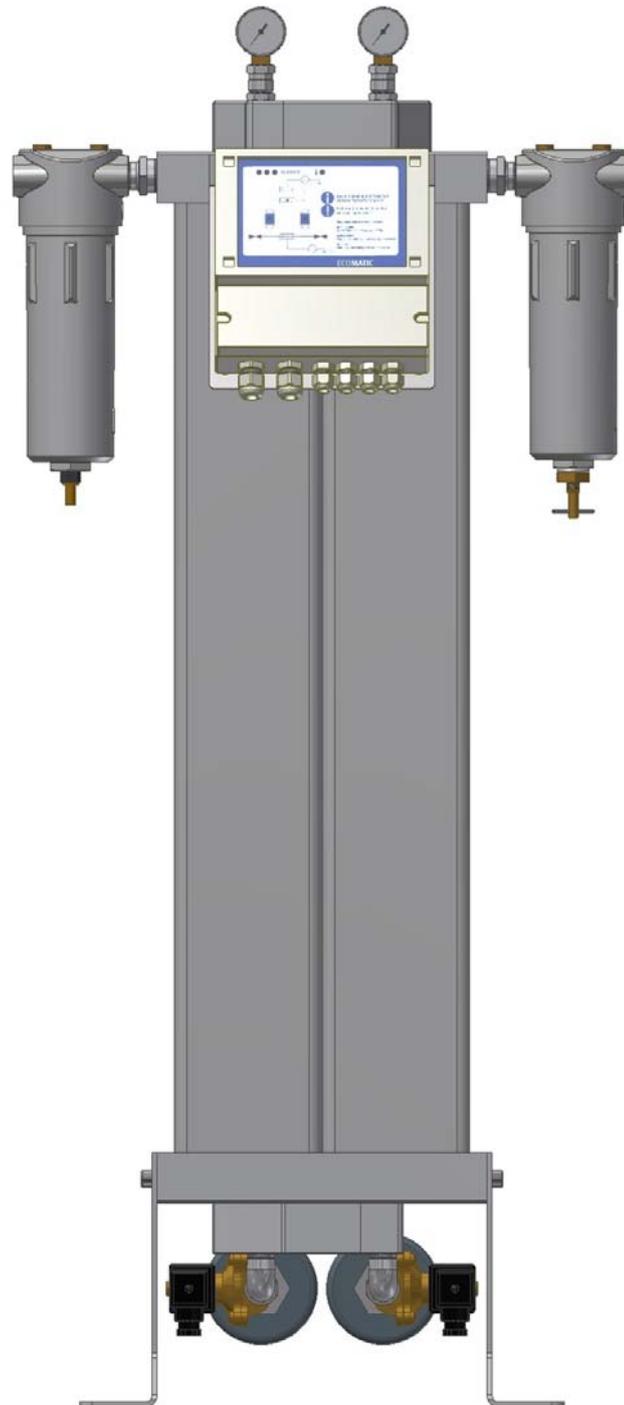


ECOTROC® ATK-APN 1 - 10/16

Operating manual

Adsorption Dryers

Rev. 0317-03



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1. General information

Please complete the following information according to the type plate, vessel plate and contract documents. This enables the manufacturer to clearly identify the dryer and makes it easier to give advice if there are queries. It also simplifies the provision of spare parts and support. This may correspond to separate pieces of equipment for the individual devices.

1.1 System data

Model: _____

Order No.: _____

Vessel No.: _____

Serial No.: _____

Year of manufacture: _____

Date of commissioning: _____

1.2 Contact data

Company: _____

Address: _____

Phone: _____

E-mail: _____

1.3 Accompanying documents

Applicable documents which are not included with this documentation:

- Installation drawing
- Documentation for additional equipment parts
- Controller documentation
- Calibration certificate (if dewpoint controller is installed)

1.4 Warranty notes

For the conditions necessary for compliance with the warranty, please refer to our "General Terms of Sale and Delivery"

The warranty shall be void if:

- The adsorption dryer is used for anything other than its intended use.
- The instructions in this operating manual are not observed.
- External influences (e.g. aggressive substances) cause damage to the adsorption dryer.
- Maintenance intervals are not adhered to.
- Damage is caused due to incorrect or defective maintenance.
- The adsorption dryer is operated although defects are evident.
- An unfavourable or incorrect installation is selected.
- The necessary process conditions are not stipulated by the system concept (e.g. highly undersaturated compressed air at the inlet).

1.5 Operating manual

This operating manual will help clarify any outstanding questions concerning the setup, installation, operation, maintenance, repair and disposal of the dryer. It contains useful tips and advice.

It is not only written for the operator who is responsible for monitoring the daily operation of the device, but also for the service personnel who performs the installation and service. Maintenance and repair work may only be carried out by qualified personnel!

This operating manual must be read before any installation and maintenance work is started. All safety instructions must be observed!

The operating manual must be kept in the vicinity of the adsorption dryer.

As already mentioned in the warranty notes, the manufacturer accepts no liability for damages resulting from disregard of the operating manual.

1.6 Signs and symbols used

The following symbols are listed in this manual and /or are affixed to the adsorption dryer:



Tip

This symbol indicates tips for the efficient use of the adsorption dryer!



Note

This symbol indicates instructions for the safe handling of the adsorption dryer.



Caution / Warning

This symbol indicates general hazards or dangerous situations.



Danger! Compressed air

This symbol warns of dangers due to compressed air.



Danger! High voltage

This symbol warns of dangers due to electric voltage.



Slip hazard

This symbol warns of the risk of slipping.



Wear ear protectors



Wear respiratory protection



Wear goggles

These three symbols point out the necessity to wear personal protective equipment.

2. Intended purpose / use

The adsorption dryer is designed for removing humidity from compressed air by adsorption in industrial compressed air systems. It requires the supply of saturated compressed air from a supply source.

The main task is to reduce vaporous water components in the compressed air. Upstream filters and dryers ensure that only particles and drop shapes are separated. The desiccant which is specifically designed for this purpose is used to store the water vapour molecules from the compressed air in the open pores of the adsorbent, thereby reducing the moisture content of the compressed air.

2.1 Intended use

The adsorption dryer is exclusively designed for drying compressed air! If the adsorption dryer is to be used with other gases, this must be agreed with the manufacturer. Other safety guidelines may apply here!

The adsorption dryer must be set up at a site indoors:



- which is suitable for the weight,
- weatherproof (exposure to sun should be avoided),
- dry,
- frost-free,
- vibration-free,
- not in potentially explosive atmospheres,
- which can be accessed for maintenance and servicing,
- which at best has little dust exposure,
- which is free from dangers due to the expansion factor or airflow sounds,
- which is free from aggressive or corrosion-promoting substances.



The adsorption dryer must only be operated within the allowable operating conditions. These are defined on the type plate and vessel plate. Any other use is considered improper and the manufacturer accepts no liability.

The adsorption dryer must not be converted in any way and its components must not be modified. The use of components other than the original ones from the manufacturer is not permitted, unless this has been agreed with the manufacturer.

The values shown on the vessel plate are the maximum permissible values as per the pressure equipment directive. These values are not meant for the operating conditions. The maximum operating conditions can be found on the type plate of the adsorption dryer.

For the nominal performance data of the adsorption dryer, please refer to the Section "Performance data".

Exceeding or even significantly undercutting the design data can lead to bad pressure dewpoints!

The compressed air supplied to the adsorption dryer must be of the following quality:

- Free from aggressive and corrosive substances
- Free from particles and solids
- Moisture-saturated
- Must be within the temperature conditions for the design.



In principle, the adsorption dryer can also be operated without any pre-treatment, but this may be detrimental to the service life of the adsorbent. Droplets of oil and particles are stored in the open pores and reduce the adsorption capacity of the adsorbent.



Where temperatures are above 55°C, previously collected moisture can be released again or can no longer be absorbed!

2.2 Performance data

The performance data of the individual types of devices is shown in the table below. The data are based on the operating conditions of the compressed air temperature + 35°C and 7 bar operating pressure, and a moisture content of the compressed air of 100 %.

| Type | Nominal volumetric flow rate m ³ /h | Connection | Height mm | Width mm | Depth mm | Weight Kg |
|---------------|--|------------|-----------|----------|----------|-----------|
| ATK-APN 1/16 | 5 | 3/8" | 625 | 409 | 300 | 16 |
| ATK- APN 2/16 | 10 | 3/8" | 725 | 409 | 300 | 18 |
| ATK-APN 3/16 | 20 | 3/8" | 825 | 409 | 310 | 19 |
| ATK-APN 4/16 | 35 | 3/8" | 880 | 481 | 440 | 35 |
| ATK-APN 6/16 | 50 | 3/8" | 980 | 481 | 440 | 37 |
| ATK-APN 7/16 | 60 | 1/2" | 1080 | 481 | 440 | 40 |
| ATK-APN 8/16 | 70 | 1/2" | 980 | 567 | 478 | 56 |
| ATK-APN 9/16 | 90 | 1/2" | 1120 | 567 | 478 | 64 |
| ATK-APN 10/16 | 110 | 1/2" | 1300 | 567 | 478 | 72 |

Refers to 1 bar(a) and 20°C

| | |
|--|------------------------------|
| Classification acc. DGRL 2014/68/EG | ATK-APN 1 to 3 Abs. 3 Art. 4 |
| Classification acc. DGRL 2014/68/EG | ATK-APN 1 to 10 category I |
| Fluid group | 2 |
| Supply voltage | 230 V, 50-60 Hz |
| Protection class | IP 54 |
| Min. / Max. allowable pressure | 4 / 16 bar |
| Sound pressure level (free-field measurement at a distance of 1,5 m) | up to 80 dB (A) |
| Min. / Max. temperature | +2 to 50 °C |



According to the definition in the pressure equipment directive, pressure vessels are not subject to repeated tests. If necessary, regional or national specifications can be applied in addition or as supplementary. The adsorption dryers are inspection-free, according to the definition of the pressure equipment directive.

3. Safety notes

The ATK-APN adsorption dryers have been built according to state-of-the-art technology and the latest safety regulations. However, there is still a risk of danger during operation, maintenance, installation and servicing, and during transport and setup. In particular, the disregard of safety regulations when handling compressed air may result in serious injury or death. Expertly trained personnel and those trained in safety should therefore only use the system.



- Observe the safety notes in this manual and on the adsorption dryer.
- Observe all safety notes, even those in the individual chapters.
- Observe all legal guidelines and safety regulations (the latter may vary from region to region!)
- Observe all local site regulations which are stipulated for the field of application.

3.1 Signs and symbols

The following sign can be found on the adsorption dryer:

- **Type plate** (on the right side of the vessel)
It shows details of the type, year of manufacture, serial number of the device, performance data, weight and filters installed.

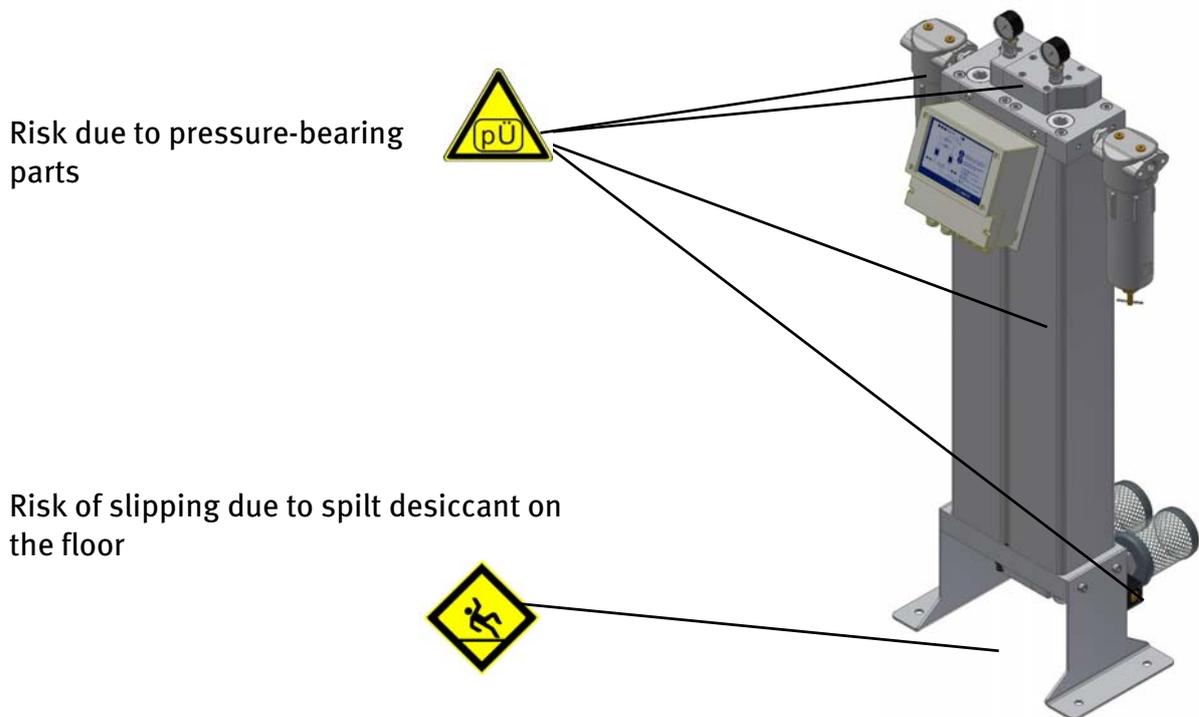
Only once on the adsorption dryer:

Type plate:

| | | | |
|--|----------------------------|---|--|
| ECOTROC Adsorptionstrockner Adsorption Dryer KSI Filtertechnik GmbH Wetzlar www.ksi.de | | | |
| Typ / Type | max. Druck / max. Pressure | | |
| S-Nr. / S-No. | Spannung / Voltage | | |
| Leistung / Capacity | Vorfilter / Prefilter | | |
| Baujahr / Built | Nachfilter / Final filter | | |
| Gewicht / Weight (kg) | | | |
| <small>Vor Inbetriebnahme und Service das Handbuch lesen. Read the manual before operation and service.</small> | | <small>Made in Germany Gefahr durch Druckluft! Danger Compressed Air!</small> | |

The type plates on the device show important information. Please make sure that they are always legible and that they can be accessed.

3.2 Danger zones



- Never operate the adsorption dryer outside of the load limits shown on the vessel plate.



- Never carry out work as long as the adsorption dryer is under pressure.

- Do not modify the structure of the adsorption dryer or change its function.

- Only use the adsorption dryer for its intended purpose.

- Do not climb onto the adsorption dryer.

- Do not carry out welding work on pressure-bearing parts.



- Wear respiratory protection and eye protection when changing the desiccant.

- Risk of slipping due to spilt desiccant.

- Always check that the silencers are secure and wear eye protection.



- Never operate the adsorption dryer if there is apparent damage.

- Avoid sparks and open flame in the vicinity of the desiccant.



- Never hold on to pieces of the equipment to lift up the adsorption dryer, but always exclusively use its base sections, profiles and plates.

- Only carry out work on the adsorption dryer if it has been disconnected from the power supply.

Desiccants

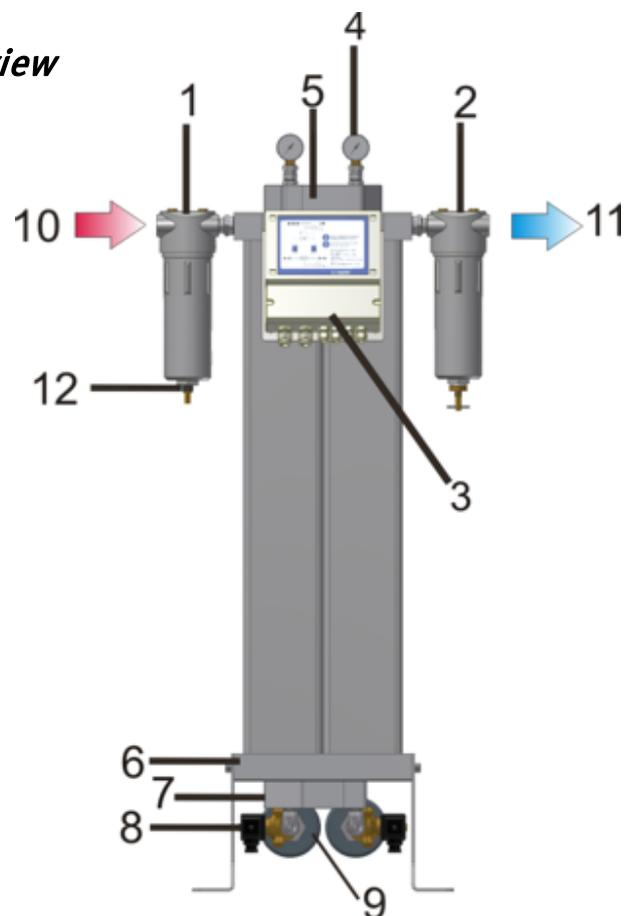
The desiccants used do not fall into the hazardous substances group and are therefore not subject to labelling requirements. Nevertheless, please observe all common safety measures with regard to using chemicals. Please also wear your personal protective equipment (goggles and respiratory protection). Please also note that the material accumulates contaminants, including oil vapour parts. This can cause additional dangers.

If you require further information, contact the manufacturer to receive a copy of the safety datasheet of the desiccant.

4. Technical product data

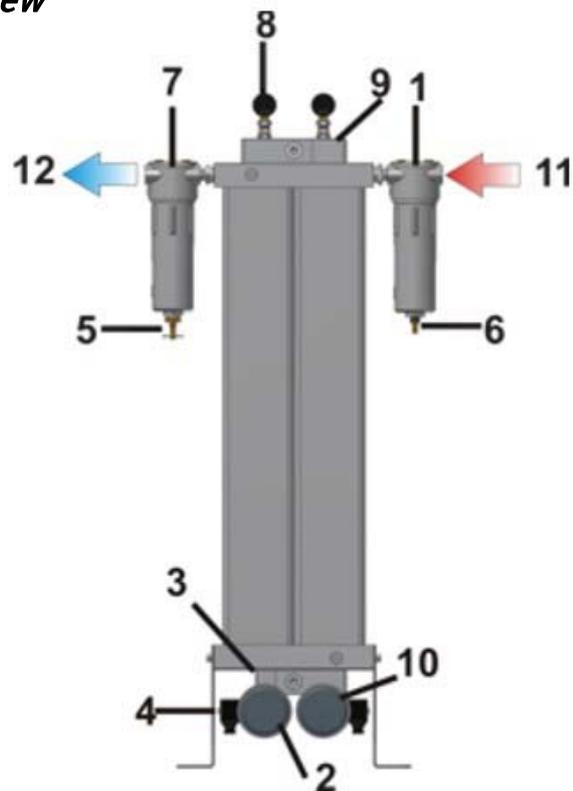
4.1 Equipment overview, front view

- 1 - Pre filter
- 2 - Final filter
- 3 - Control unit
- 4 - Manometer
- 5 - Piston block top
- 6 - Bottom plate
- 7 - Piston block bottom
- 8 - Solenoid valve expansion
- 9 - Silencer
- 10- Inlet
- 11- Outlet
- 12- Condensate drain pre filter



4.2 Equipment overview, rear view

1. Pre filter
2. Silencer
3. Piston block bottom
4. Solenoid valve
5. Manual drain final filter
6. Condensate drain
7. Final filter
8. Manometer
9. Piston block top
10. Silencer
11. Inlet
12. Outlet



4.3 Function description



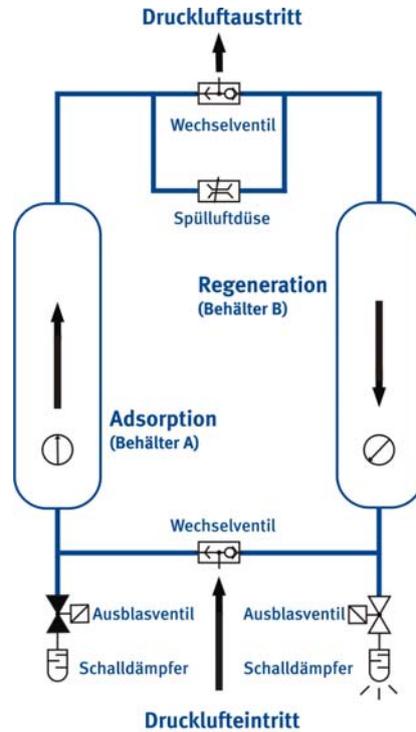
From the filled adsorbent material, (desiccant in this case), moisture is stored in the large, open pores of the adsorbent material, thus reducing the moisture content in the compressed air.

Through the joining pipe and possible pre-treatment, the compressed air is fed via the inlet into the diffuser (flow distributor and sieve). The compressed air is hereby distributed over the whole vessel cross-section for optimum efficiency. Based on the laws of physics and a calculated and required contact time, the abovementioned moisture content is stored in the open pores of the desiccant. The cleaned compressed air then exits the vessel again through a sieve on the outlet.

As the temperatures rise, the performance of the desiccant is reduced since the so-called adsorption heat builds up in the desiccant as the amount of moisture increases and as temperatures exceed 55 °C, the stored moisture is then released again from the agent, i.e. no more moisture is stored.

The moisture stored in the desiccant gradually saturates the material. During the course of the defined adsorption phase, the desiccant bed is optimally used. After a predetermined time, the desiccant is then desiccated again following the counter-flow principle using the dried compressed air, which is removed from the dry output flow through a nozzle. This process constantly switches between the two vessels. With the appropriate compressed air quality at the inlet, it is possible for the service life of the desiccant to exceed well over 10,000 hours.

Operating principle:

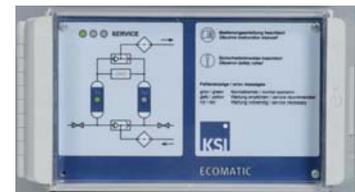


5. Monitoring the operation

The following components are provided for regular monitoring:

The pressure gauges display the operating pressure. They provide information about the regular switch-over of the adsorption dryer.

The Ecomatic control display (shown on the right here), uses LEDs to inform you of the status or phase which the adsorption dryer is currently in.



If a dewpoint controller is used, then the operating status is also shown. To do so, press the arrow keys to display all information about the current status. The screens shown on the right are then displayed.

| | |
|-----------------------|---------------------|
| Taupunktreg. 11:02:53 | |
| -68,8 °Ctp | Anzahl Zyklen 00218 |
| 13,7 °C | |
| Taupunktreg. 18:16:04 | |
| Restzeit: -000:00:33 | |
| 1-Regeneration | |
| Lastwechsel 000000-1x | |
| 2-Säule aktiv | |
| Lastwechsel 000000-1x | |

When daily checks are carried out, be mindful of any noises which are caused by the regeneration process. The pressure gauges should also be taken into consideration here. The expansion and noises of the purging air should always be regular. Brief

interruptions in the flow noises for example indicate a defective solenoid valve or control fault.

6. Transport, storage and setup

6.1 Transport

i Although great care is taken, please check immediately whether the adsorption dryer has been damaged in any way. Any kind of transportation damage must be pointed out immediately to the deliverer and manufacturer.

- Suitable hoisting equipment must be provided for the transportation, loading and unloading process.
- The device must only be lifted at the designated points: crane hook or transport pallet.
- Take the weight of the adsorption dryer into account and provide suitable assistive equipment.
- Do not remove the packaging material until the device is moved to its place of installation.
- Only appropriately qualified personnel may carry out the abovementioned tasks.
- Observe all regulations on accident prevention.

6.2 Storage

i If the adsorption dryer needs to be stored before being commissioned, ensure that the storage site fulfils the following requirements:

- Indoors only
- Dry
- Frost-free
- Protected against weather impact.

i If the device is stored after having been commissioned, please proceed as follows:

- Depressurise the adsorption dryer.
- Disconnect the adsorption dryer from the compressed air system.
- Close the compressed air inlet and outlet.

6.3 Setup



Please refer to the setup conditions described in Section 2.1. The basic data required for the setup can be found in the Performance data in Section 2.2.

When setting up, make sure

- that the ground is level and capable of bearing the weight.
- Make sure there is enough space around the adsorption dryer to carry out the servicing and maintenance work. We recommend at least 0.8 m.
- Make sure that the adsorption dryer can be reached and accessed by the lifting gear.
- The adsorption dryer must not be accessible to non-experts, or warning signs should be affixed for inexperienced persons.
- The adsorption dryer cannot be rammed by haulage vehicles.
- The signage is clearly visible at all times.

There are mounting holes in the base section of the adsorption dryer. These should be used to anchor the device into the ground, as long as the ground allows it.

7. Installation

7.1 Recommendations for installation



Proper installation is the basic prerequisite for the safe and problem-free operation of the ATK-APN series.

We recommend the installation of shut-off devices both upstream and downstream of the adsorption dryer. The adsorption dryer can thereby be disconnected from the compressed air system during maintenance.

If operation cannot be interrupted during maintenance, a by-pass line must be provided. It should at least include a filter combination MFO and SMA to prevent a contamination of moisture in liquid form downstream of the adsorption dryer.



We recommend installation after a corresponding pre-treatment. Filters and separators should already be installed prior to this to prevent rapid saturation of the prefilter, which is part of the delivery. The adsorption dryer is usually installed behind an air cauldron.

A filter with a separation degree of 0.01 μ must be installed immediately in front of the adsorption dryer (included in the delivery) to collect any possible additional liquid drops and solids, which would otherwise close up the open pores of the adsorbent material for the drying process.

Installing the device behind an air cauldron also has the advantage in that pulsating compressed air is buffered and the temperature at the inlet of the adsorption dryer is lower, because it cools down in the air cauldron.

Choose a place of installation with the lowest possible compressed air temperature and with the highest level of saturated compressed air. This then increases the service life of the desiccant and the adsorption dryer works most efficiently.

When installing an air cauldron, make sure that:

- There is no reverse flow (e.g. install a non-return valve)
- The compressed air inlet temperature does not exceed the maximum permissible value
- Pressure shocks or pulsating compressed air are buffered by the corresponding filters
- The condensate separation of the prefiltration works properly

7.2 Demands on the installation

Prior to installation, check the following points:



- The compressed air system and the adsorption dryer must be free from pressure.
- For compressed air systems which need to remain under pressure, shut-off devices have to be protected against unintentional opening.
- The operating pressure in the system cannot be higher than the maximum permissible operating overpressure of the adsorption dryer.
- There must be no pressure surges in the system in the desiccant (e.g. from valves which open abruptly).
- The pipelines are designed for the operating pressure, nominal width and volume.
- No possible vibration transmission or vibration.
- No residue left in the pipeline from mechanical processing.

7.3 Elimination of hazards

Bitte beachten Sie die mit der Installation in Zusammenhang stehenden Gefahren:



- Do not work on parts which are under pressure.
- The pipelines must be held in place with brackets; the adsorption dryer is not designed to act as a support for the pipes.
- The adsorption dryer must only be used in the predetermined operating conditions (see vessel plate), it is the operator's duty to observe these values.

8. Commissioning



All work on ATK-APN adsorption dryers and on the feeder and drainage systems must only be carried out by expertly trained persons and by those with experience in the field of compressed air!

8.1 Commissioning prerequisites

The following points must be checked immediately prior to commissioning:



- The maximum operating values must not be exceeded.
- Upstream and downstream shut-off devices are closed.
- All connections and screw connections are secure. Check this and tighten if necessary using a suitable tool.
- Visually check again for any signs of damage. Do not use the adsorption dryer if it is damaged in any way.

8.2 Pressurisation



Nur wenn Sie alle in Punkt 8.1 genannten Überprüfungen erfolgreich absolviert haben, führen Sie die nachfolgenden Schritte in der angegebenen Reihenfolge durch.



Wear ear protection for this, as the flow noise can get very loud.

1. Make sure that the compressed air system is under pressure upstream of the adsorber.
2. Slowly open the cut-off valve upstream of the adsorption dryer until you hear the flow noise.
3. Keep an eye on the pressure gauge on the vessel. Pressurisation must rise slowly.
4. At 4 bar, close the shut-off device again at the inlet. Check all connections for leaks. If leaks are found, the adsorption dryer must be rendered pressureless again and the leaks must be repaired.
5. If no further flow noises can be heard and if the pressure gauge does not indicate any further increase in pressure, you can open the cut-off valve completely.
6. Only then switch on the adsorption dryer controller.

8.3 System operation

Pressurisation has been successful. Check whether the compressed air system downstream of the adsorption dryer can be opened safely. Then proceed as follows:



1. Slowly open the cut-off valves at the outlet of the adsorption dryer until you hear the flow noise.
2. Keep an eye on the pressure gauge. Should the pressure suddenly drop, check whether any tapping points are still open.
3. If the pressure remains stable and you no longer hear any flow noise, the cut-off valve downstream of the adsorption dryer can be opened completely.
4. Start the controller. Once switched on, it can take 1 minute until the first valve is opened.
5. Keep an eye on the pressure gauges. The operating pressure must be virtually "0" on the expanding side. The expansion noise is loud, only quiet flow noises should be perceived after this.

6. Once regeneration has been completed, pressurisation starts. During this time, the previously opened valve must be closed and pressurisation must start again.
7. Once the pressurisation time has passed, the pressure on both vessels must be virtually the same.
8. Now also take into account the expansion (regeneration) on the other side. If this also works as described above, the adsorption dryer is ready for operation.

8.4 Disconnecting from the system

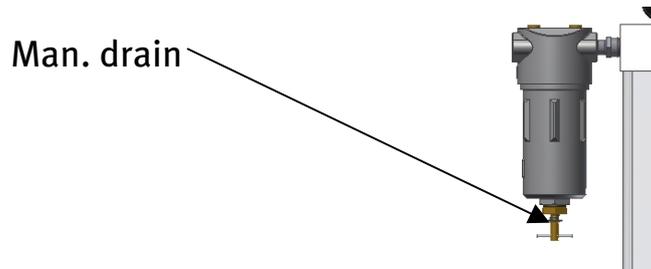


Should you have to disconnect the adsorption dryer from the system, e.g. for a maintenance operation, make sure that this work is only carried out when the device is free from pressure.



Wear your personal protective equipment. Proceed as follows:

1. Close the cut-off valves at the inlet and outlet of the adsorption dryer.
2. Open the manual drain on the after-filter housing.



3. Keep an eye on the pressure gauge and wait until it displays "0" bar before starting work.
4. Then close the manual cock again.

Instead of using the manual drain cock, you can also depressurise the adsorber dryers by allowing the controller to continue to run upstream and downstream of the dryer if the shut-off devices are closed, until both sides are depressurised.

The adsorption dryer is now disconnected from the mains.

9. Maintenance



Maintenance work may only be carried out by suitably qualified personnel! Make sure that the device is free from pressure before starting work and observe the applicable accident prevention regulations for the place of installation!

9.1 Regular maintenance work

The following table gives an overview of the intervals and scope of the maintenance work:

| Maintenance of | Activity | Daily | Every month | 12 months | 24 months | 48 months | Page |
|--|--|-------|-------------|-----------|-----------|-----------|------|
| Pressure gauge and control device | Visual check, functional check | X | | | | | 12 |
| Control box | Check that the cables and terminals are securely fixed | | | X | | | - |
| Silencer | Clean | | | X | | | 26 |
| | Replace | | | | X | | 26 |
| Pre and final filter element | Replace the filter element | | | X | | | 23 |
| Desiccant | Replace | | | | | X | 23 |
| O-rings of filter housings | Replace | | | | X | | 23 |
| Pistons | Replace | | | | X | | 25 |
| Solenoid valves | Replace | | | | X | | 27 |
| Pressure dew point sensor (if installed) | Recalibrate | | | | X | | 28 |

9.2 Daily checks

The following points should be checked every day:

- The difference in the operating pressure upstream and downstream of the adsorption dryer is not more than 0.5 bar.
- Open the manual drain slightly on the after-filter. It must not drip.
- Check if you can hear any unusual or loud noises.
- Check for leaks.
- If prefilters are installed, check that the condensate drains work properly.

9.3 Checking the pressure dew point

If a pressure dewpoint controller is installed, the pressure dewpoint is displayed. You can then set the pressure dewpoint according to your requirements.

With the standard package, the ECOMATIC (time control only) is already installed. Since this controller can't measure the pressure dewpoint, you should measure it externally from time to time.

Determine a measuring point behind the dryer and connect an external measuring device. Make sure that this measurement is used in accordance with the manufacturer specifications and that it is suitable for the pressure dewpoint range of the adsorption dryer which is to be measured. Record these values in order to be able to track the course of the pressure dewpoint.

9.4 Overview of maintenance parts

9.4.1 Annual maintenance

The following maintenance parts should be replaced every 12 months:

| Type | Component | Description | Quantity | Interval | Activity |
|-------------|------------------|--------------------|-----------------|-----------------|-----------------|
| ATK-APN 1 | GTE-ATK-APN 1 | Filter element | 1 | 12 months | Replace |
| ATK-APN 2 | GTE-ATK-APN 2 | Filter element | 1 | 12 months | Replace |
| ATK-APN 3 | GTE-ATK-APN 3 | Filter element | 1 | 12 months | Replace |
| ATK-APN 4 | GTE-ATK-APN 4 | Filter element | 1 | 12 months | Replace |
| ATK-APN 6 | GTE-ATK-APN 6 | Filter element | 1 | 12 months | Replace |
| ATK-APN 7 | GTE-ATK-APN 7 | Filter element | 1 | 12 months | Replace |
| ATK-APN 8 | GTE-ATK-APN 8 | Filter element | 1 | 12 months | Replace |
| ATK-APN 9 | GTE-ATK-APN 9 | Filter element | 1 | 12 months | Replace |
| ATK-APN 10 | GTE-ATK-APN 10 | Filter element | 1 | 12 months | Replace |

9.4.2 Two- and four-year maintenance

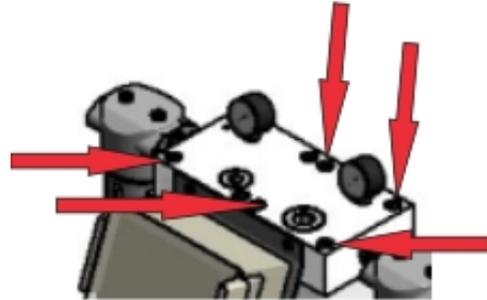
The following maintenance parts should be replaced every 24 / 48 months:

| Type | Component | Description | Quantity | Interval | Activity |
|------------|---------------|---------------------------|----------|---------------------------|----------|
| ATK-APN 1 | FT-ATK-APN 1 | Functional components set | 1 | 24 months | Replace |
| | F-ATK-APN 1 | Desiccant filling | 1 | 48 months / when required | Replace |
| ATK-APN 2 | FT-ATK-APN 2 | Functional components set | 1 | 24 months | Replace |
| | F-ATK-APN 2 | Desiccant filling | 1 | 48 months / when required | Replace |
| ATK-APN 3 | FT-ATK-APN 3 | Functional components set | 1 | 24 months | Replace |
| | F-ATK-APN 3 | Desiccant filling | 1 | 48 months / when required | Replace |
| ATK-APN 4 | FT-ATK-APN 4 | Functional components set | 1 | 24 months | Replace |
| | F-ATK-APN 4 | Desiccant filling | 1 | 48 months / when required | Replace |
| ATK-APN 6 | FT-ATK-APN 6 | Functional components set | 1 | 24 months | Replace |
| | F-ATK-APN 6 | Desiccant filling | 1 | 48 months / when required | Replace |
| ATK-APN 7 | FT-ATK-APN 7 | Functional components set | 1 | 24 months | Replace |
| | F-ATK-APN 7 | Desiccant filling | 1 | 48 months / when required | Replace |
| ATK-APN 8 | FT-ATK-APN 8 | Functional components set | 1 | 24 months | Replace |
| | F-ATK-APN 8 | Desiccant filling | 1 | 48 months / when required | Replace |
| ATK-APN 9 | FT-ATK-APN 9 | Functional components set | 1 | 24 months | Replace |
| | F-ATK-APN 9 | Desiccant filling | 1 | 48 months / when required | Replace |
| ATK-APN 10 | FT-ATK-APN 10 | Functional components set | 1 | 24 months | Replace |
| | F-ATK-APN 10 | Desiccant filling | 1 | 48 months / when required | Replace |

9.4.3 Two-year maintenance / Tighten the screws

Due to the fact that ATK-APN dryers use the pressure swing process at least every 2 years the screws should be controlled. Please tighten the screws exclusively with a torwue wrench. Check all screws on the top and bottom plate!

| | |
|--------------|---------|
| ATK-APN 1-3 | 22,5 NM |
| ATK-APN 4-7 | 44,0 NM |
| ATK-APN 8-10 | 74,0 NM |



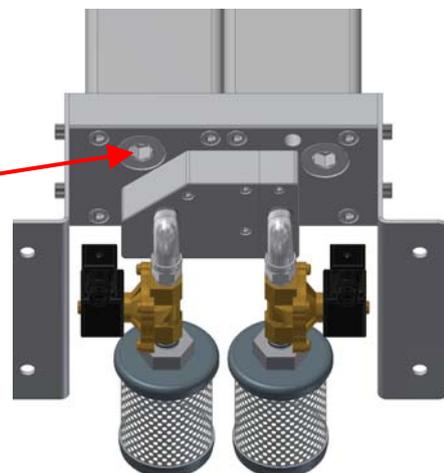
9.5 Replacing the filter elements

The prefilter of the adsorption dryer retains particles and liquid forms of oil and water, thereby protecting the desiccant against contamination. The job of the after-filter is to stop any abrasion dust that has built up from the desiccant. Proceed as follows to replace these filter elements:

1. Close the cut-off valves upstream and downstream of the adsorption dryer.
2. Open the manual drain cock on the filter and wait until the pressure gauge on the adsorption dryer shows "0" bar.
3. Turn the bottom part of the filter in a clockwise direction to open it. Unscrew it completely and carefully put it down.
4. Now you can remove the filter element out of the filter.
5. Use a damp cloth to clean inside the filter housing.
6. Check whether the O-ring in the filter head is OK. Replace if necessary.
7. Please fit the new filter element into the three pockets, on the inside of the filter bowl.
8. Screw the bottom part of the filter back in again and close the manual drain cock.
9. Slowly open the shut-off device at the outlet and check for leaks.
10. Once the pressure is back to normal again, slowly open the shut-off device at the outlet.

9.6 Replacing the desiccant

Draining nozzle bottom



Filling nozzle top



When replacing the desiccant, make sure to wear your personal protective equipment, namely the respiratory protection and goggles.



Risk of slipping if material is spilt!



The service life of the desiccant is heavily dependent on the quality of the compressed air at the inlet of the adsorption dryer. Strain from oil vapour significantly reduces the service life. In favourable conditions, the service life can exceed well over 10,000 hours. Proceed as follows to replace the desiccant:



1. Depressurise the adsorption dryer.
2. First, open the sealing plug on the top.
3. Place a collecting vessel underneath the bottom sealing plug and remove it.
4. Collect the desiccant as it runs out.
5. Empty the vessel completely. (you can also empty the vessel using a vacuum cleaner).
6. Blow through the sieves inside the vessel.
7. Close up the bottom sealing plug again and pour the new adsorption material through the top opening. Depending on its use, the desiccant can consist of several layers. Make sure that you add the materials in the correct order. WS and alumina materials generally form the water protective layer and must be added first.
8. Once you've reached the filler plug, condense the material through slight vibration of the sheath of the adsorption dryer and then top up again until the desiccant no longer condenses, even with vibration.
9. Screw the top sealing plug back in again.



We recommend that you only change the filter element after the desiccant has been changed. Likewise, only change, or at least clean the solenoid valves after the trial run. To do so, allow the adsorption dryer to run for half an hour. The dust particles that accumulate are hereby captured in the after-filter element which is to be replaced. Only then replace the filter element.

As a rule, the adsorption dryer needs several cycles before it reaches the desired pressure dewpoint. Take into account that the piping system behind the adsorption dryer may become contaminated with moisture during this phase. You may need to provide a blow-off line during the installation operation.



Contaminated desiccant must be disposed of in accordance with the local regulations! As a rule, the disposal code is:

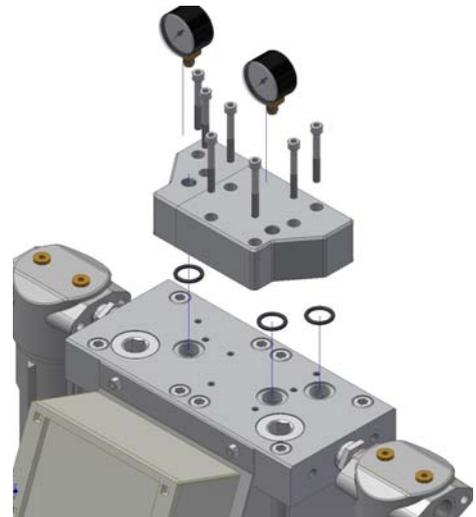
"Used, non-contaminated desiccant" with the disposal code number: 06 08 99

If other toxic or hazardous substances have been stored, this must be determined by the operator and the desiccant must be disposed of taking the type of contamination into consideration!

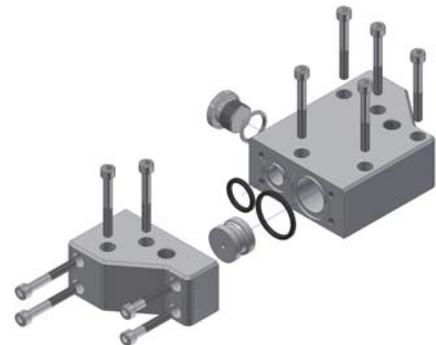
9.7 Piston replacement

The shuttle valve pistons in ATK-APN dryers are integrated in the top and bottom plate. The pistons suffer from mechanical stress so they need to be replaced every 2 years. To exchange them, mind the following procedure:

1. Depressurise the adsorption dryer.
2. Make sure that the pressure gauges show "0" and that the adsorption dryer is fully depressurised.
3. Switch off the control device.
4. Loosen the top screws first.
Make sure that nothing can get into the opening.

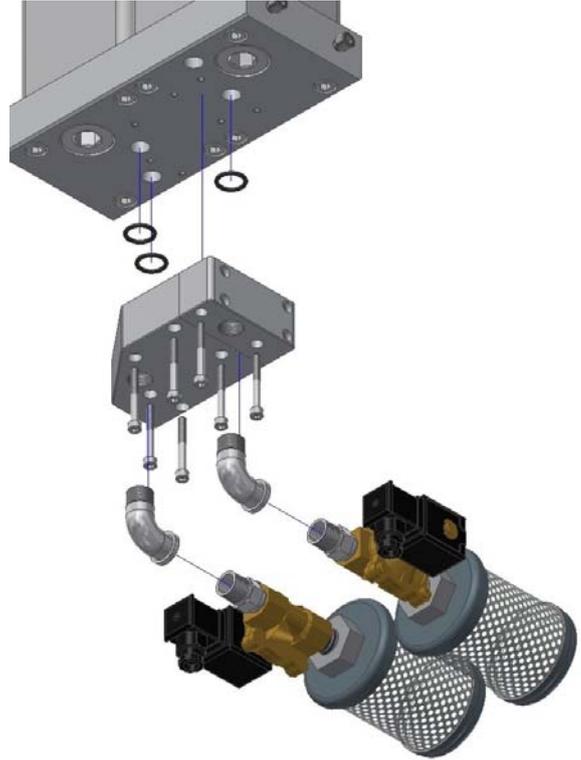


5. Remove the screws on the side and exchange the piston. (ATTENTION! The piston with a nozzle needs to be on top)



6. The socket on the back side of the piston block can stay closed. Replace the o-rings, too, and remount the block onto the plate. Lube the screws.

7. Remove the solenoids from the valves. Afterwards you can disassemble the block completely or demount the silencers and solenoid valves first.



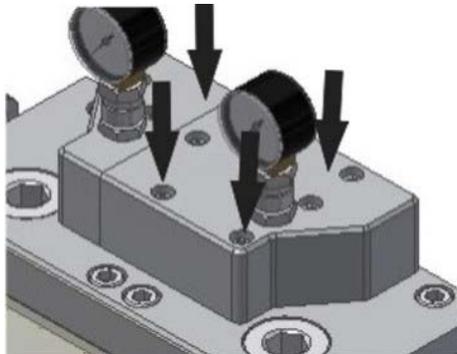
8. Then, remove the screws on the side of the block, too. Exchange the piston and the o-rings. Reassemble the block and fix it below the plate.
9. Remount the solenoid valves and the silencers and attach the solenoids to the valves.

Slowly open the shut-down valves in front of the dryer and check for leakages by rising the pressure up to 4 bar. Only open the valves completely if there are no more leakages.



ATTENTION!

At assemble the block again please take care that the tightening torque of the screws is not higher than ATK-APN 1-3 max. 7 Nm; ATK-APN 4-7 max. 12 Nm; ATK-APN 8-10 max. 23 Nm

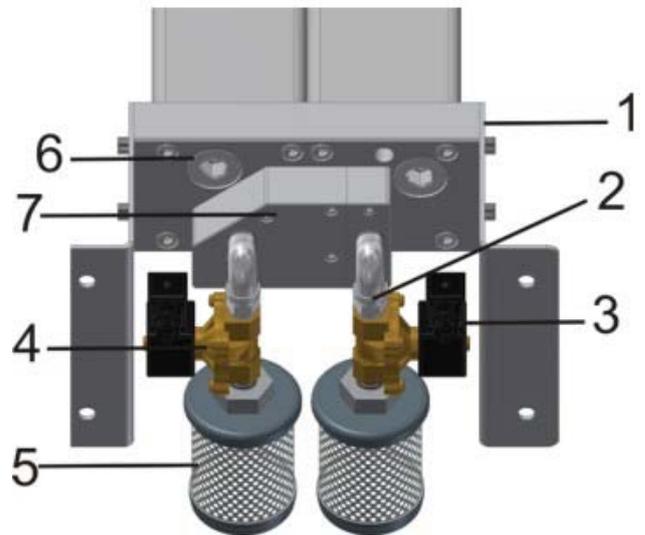


9. 8 Replacing the solenoid valves

The solenoid valves are supplied fully assembled and should also be replaced as such. These valves are also subject to a mechanical load and must be replaced after two years. Proceed as follows to replace them:

1. Depressurise the adsorption dryer.
2. Make sure that the pressure gauges show "0" and that the adsorption dryer is fully depressurised.
3. Switch off the controller by disconnecting the mains power plug.
4. Loosen the solenoid valve plug.
5. Loosen the removable screw connections.
6. Remove the exhaust bridge.
7. Dismantle and replace the solenoid valves.
8. Fit the exhaust bridge back in place. Tighten all screw connections again.

1. bottom plate
2. removable connection
3. solenoid valve plug
4. solenoid valve
5. silencer
6. desiccant nozzle bottom
7. piston block bottom

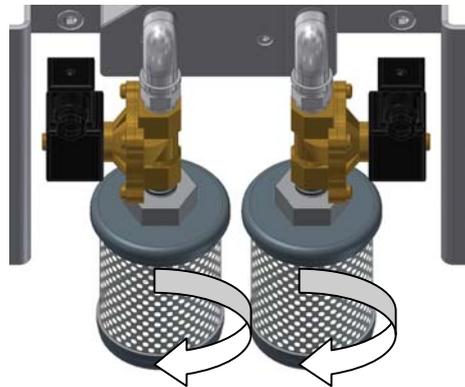


9.9 Replacing the silencers

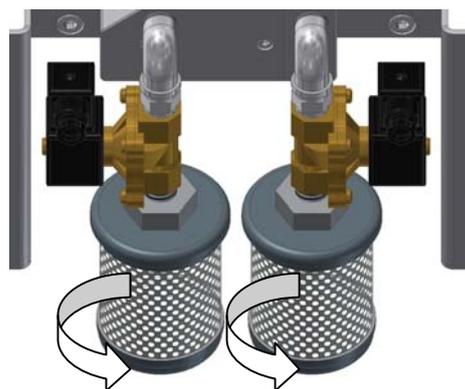
The silencers lessen the noise generation of the regeneration process. In these silencers, proportionate desiccant abrasion in the form of dust is retained. Combined with the outgoing moist air, the silencers become clogged with dust over time and must be replaced. Proceed as follows to replace them:

1. This work must only be carried out after the device has been depressurised.
2. To do so, close the inlet and outlet shut-off devices.
3. Switch off the controller by disconnecting the mains power plug.
4. Unscrew the silencers from the threads in anticlockwise direction.
5. Wrap a few layers of Teflon around the thread of the new silencer to make it easier to dismantle it later on. Then screw the new silencer back in again in a clockwise direction until hand-tight.
6. If the desiccant also has to be replaced, replace this first, then the silencers, then perform a trial run.

Disassembly



Assembly

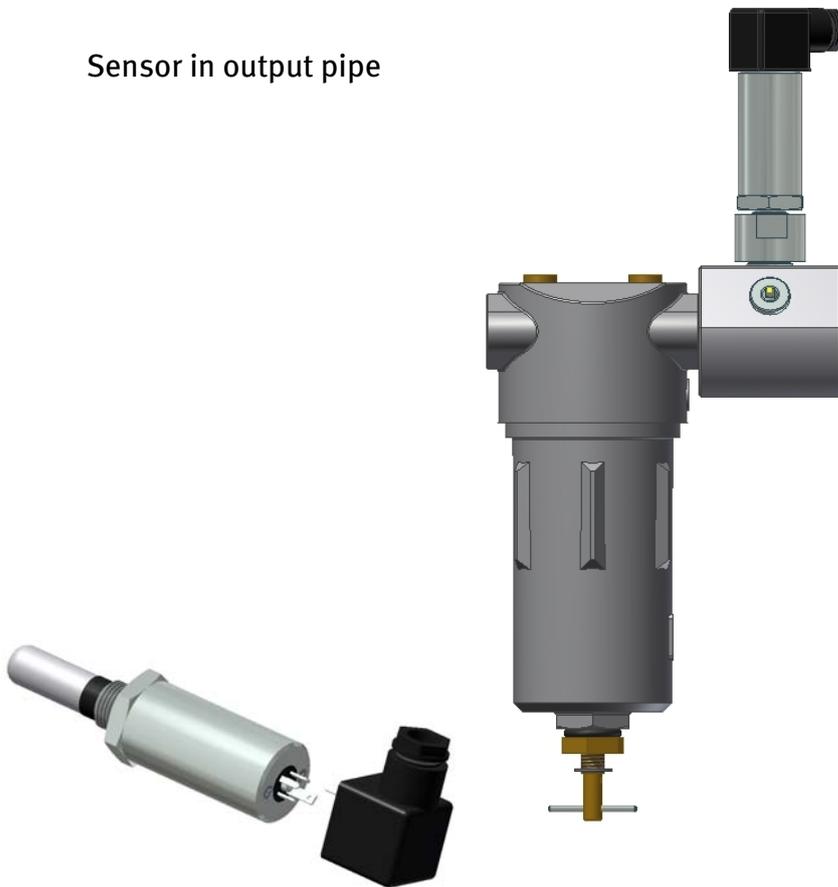


10. Replacing the pressure dewpoint sensor

If you've chosen the "ECOTROConomy" option, you must replace the sensor element every two years. Desiccant abrasion and oil vapours can cause the accuracy of the sensors to drift. This sensor element must therefore be replaced as follows:

1. This work must only be carried out after the device has been depressurised.
2. To do so, close the inlet and outlet shut-off devices.
3. Switch off the controller by disconnecting the mains power plug.
4. Loosen the cubic plug of the sensor element.
5. Unscrew the sensor element in the counter-clockwise direction.
6. Fit the new sensor element by screwing it in the clockwise direction.
7. Screw the cubic plug back onto the sensor.
8. Slowly open the inlet shut-off device until both vessels are pressurised again.
9. Check for leaks on the screw connection. If there is a leak, seal it.
10. Then start up the controller and open the shut-off device on the outlet.

Sensor in output pipe



Sensor element with cubic plug

11. Faults

The following faults may occur:

| Error | Possible cause | Corrective action |
|--|---|--|
| Device does not switch on | No power supply | Check supply voltage |
| | Microfuse defective | Replace fuse |
| Dryer does not regenerate | Controller does not work | Call Maintenance |
| | No power supply | Check supply voltage |
| | Compressor synchronisation circuit is active | Set DIL switch No. 8 to "1" (for ECOMATIC) |
| | Solenoid valve does not open | Check cable connection / terminals |
| Replace magnetic coil if necessary | | |
| Dryer does not reach the pressure dewpoint | Desiccant not sufficiently regenerated yet | Allow it to keep running (after 48 hours at the latest, the pressure dewpoint should be reached) |
| | Water breakdown / oil breakthrough | Call Maintenance, replace desiccant if necessary |
| | Defect condensate drain | Check prefilter for build-up of condensate |
| | Inlet conditions incorrect (pressure, temperature) | Call Maintenance |
| | Compressed air extremely undersaturated | Apply moisture |
| | Check input parameters, possible by-pass build-up in the desiccant due to flow rate being too low | Call Maintenance |
| | Silencer blocked | Replacement |
| No pressure according to pressure gauge on dryer | Inlet to dryer closed | Open the supply line |
| Differential pressure indicator is in red zone | Filter element is clogged | Call Maintenance |
| Dryer keeps returning to alarm status | Reverse flow through by-pass, reverse flow via oil vapour adsorber | Change by-pass, install non-return valve, call Maintenance |
| Compressors start up too frequently | Leaks | Call Maintenance |
| No pressurisation | Piston in undefined position | Switch off controller, allow pressurisation to take place, then switch controller back on again |

12. Manufacturer's declaration

12.1 Manufacturer's declaration

Manufacturer's declaration

We, the manufacturer,

KSI Filtertechnik GmbH
Siemensring 54-56
D-47877 Willich

hereby declare that for the assemblies listed below:

Adsorption dryer ECOTROC ATK-APN Type 1 to 3

the harmonised standards:

DIN EN ISO 12100-1-2; DIN EN ISO 14121-1; DIN EN 55011; DIN EN 61000-6-2, 61000-3-2,
61000-3-3 have been adhered to.

The pressure vessels which are part of these assemblies have been manufactured in construction and design conforming to the European Guideline 2014/68/EU Appendix I for pressure equipment as per the technical rules and also according to guide line 2014/29/EU for simple pressure vessel and construction based on the AD2000 instruction sheets.

Any modifications made to the equipment which has not been approved by the manufacturer will annul this declaration.

Willich, 01.06.2016

Signed:



Holger Krebs,
Managing Director

13. EC Declaration of conformity

EU Declaration of conformity

We, the manufacturer,

KSI Filtertechnik GmbH
Siemensring 54-56
D-47877 Willich

hereby declare that for the assemblies listed below:

Adsorption dryer ECOTROC ATK-APN Type 4 to 10

the harmonised standards:

DIN EN ISO 12100-1-2; DIN EN ISO 14121-1; DIN EN 55011; DIN EN 61000-6-2, 61000-3-2,
61000-3-3 have been adhered to.

The conformity assessment procedure was completed in accordance with Module A.

The pressure vessels which are part of these assemblies have been manufactured in construction and design conforming to the European Guideline 2014/68/EU Appendix I for pressure equipment as per the technical rules of the AD2000 instruction sheets.

Any modifications made to the equipment which has not been approved by the manufacturer will annul this declaration.

Willich, 01.11.2016

Signed:



Holger Krebs,
Managing Director