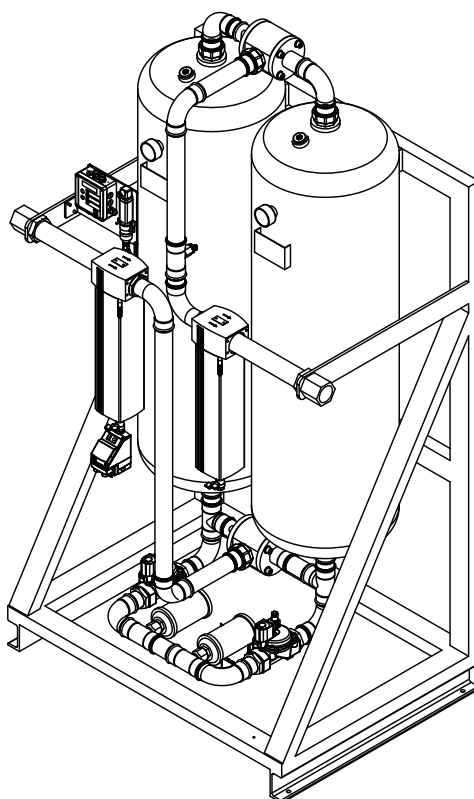


Installation and operating manual

Cold-regenerated adsorption dryer with dew point control

**DRYPOINT® AC 410 – 495**  
**DRYPOINT® AC 410 – 495 MS**





## Contents

<b>1. Safety warnings and instructions</b> .....	<b>5</b>
1.1. Pictograms and symbols .....	5
1.2. Signal words according to ISO 3864 and ANSI Z.535.....	5
1.3. General safety instructions.....	6
1.3.1. Safety precaution during plant operation .....	8
1.3.2. Risk of injury from electric energy .....	8
1.3.3. Risks from adsorbents .....	9
1.3.4. Safety instructions for maintenance work .....	10
1.4. Transport and storage .....	11
1.5. Intended use.....	13
1.5.1. Warranty and liability .....	14
1.5.2. Duties of the plant operator .....	14
1.5.2.1. Safety .....	14
1.5.2.2. Plant operation .....	14
1.5.3. Duties of personnel .....	14
<b>2. Product information</b> .....	<b>14</b>
2.1. Scope of delivery.....	14
2.2. Type plate .....	15
2.3. Product overview and description .....	15
2.3.1. Operating principle of adsorption dryer .....	15
2.3.1.1. Prefilter with condensate drain .....	15
2.3.1.2. Afterfilter .....	15
2.3.2. Function of DRYPOINT® AC 410 – 495 .....	16
2.3.2.1. Adsorption.....	16
2.3.2.2. Regeneration.....	16
2.3.2.3. Pressure build-up .....	17
2.3.2.4. Switching over of plant .....	17
2.3.2.5. Intermittent operation .....	17
2.3.3. Control and display elements.....	17
2.3.4. Display (standard version) .....	17
2.3.4.1. Service messages (standard version).....	17
2.3.4.2. Acknowledging service messages (standard version).....	19
2.3.5. Text display (dew point control version) .....	21
2.3.5.1. Button functions.....	21
2.3.5.2. Display layout.....	21
2.3.5.3. Second level (with SET button).....	23
2.4. Parts and components .....	24
2.5. Dimensions.....	25
2.6. Technical data .....	26
<b>3. Installation</b> .....	<b>27</b>
3.1. Warning .....	28
3.2. Installation area .....	28
3.3. Bypass line (optional).....	29
3.4. Connection to compressed air system .....	29
3.4.1. Compressed air quality .....	29
3.5. Intermittent operation .....	29
<b>4. Electrical installation</b> .....	<b>30</b>
4.1. Warning .....	30
4.2. Connection PCBs .....	31
4.2.1. Basic control PCB .....	31
4.3. Connection to power supply .....	32
4.4. Function of electrical control.....	32

- 4.4.1. Standard control ..... 32
- 4.4.2. Load-dependent control (dew point control)..... 32
- 4.4.3. Time control..... 33
- 4.4.4. Dew point control (optional) ..... 33
- 4.5. Alarm states..... 33
- 4.6. Alarm inputs..... 34
- 4.7. Software-generated alarms (with dew point control only) ..... 34
- 4.8. Intermittent operation ..... 34
- 4.9. Behaviour in the event of a power failure ..... 34
- 5. Start-up..... 34**
- 5.1. Commissioning ..... 34
- 6. Operation..... 35**
- 6.1. Operating mode..... 35
- 6.2. Service mode ..... 35
- 7. Maintenance and servicing..... 36**
- 7.1. Maintenance intervals ..... 36
  - 7.1.1. Filter elements..... 36
  - 7.1.2. Adsorbent ..... 36
  - 7.1.3. Service inspection tasks ..... 36
  - 7.1.4. Service intervals..... 36
  - 7.1.5. Service tasks..... 36
- 7.2. Maintenance schedule ..... 37
- 7.3. Replacing filter elements ..... 37
- 7.4. Maintenance of BEKOMAT® 20 FM condensate drain ..... 39
- 7.5. Maintenance of 2/2-way solenoid valve ..... 40
  - 7.5.1. Installation ..... 40
  - 7.5.2. Electrical connection ..... 40
  - 7.5.3. NC function ..... 41
  - 7.5.4. Troubleshooting..... 41
    - 7.5.4.1. Replacing solenoid ..... 41
    - 7.5.4.2. Replacing diaphragm ..... 41
    - 7.5.4.3. Replacing magnet armature (NC function)..... 42
    - 7.5.4.4. Replacing manual assisted actuation device ..... 42
    - 7.5.4.5. Figure: Spare parts ..... 42
- 7.6. Maintenance of shuttle valves ..... 43
- 7.7. Replacing adsorbent ..... 45
- 7.8. Spare parts..... 46
- 8. Troubleshooting and repair ..... 47**
- 8.1. Possible causes of faults..... 47
- 8.2. Troubleshooting of BEKOMAT® 20 FM ..... 49
- 9. Shutting down plant..... 49**
- 9.1. Depressurising plant..... 50
- 10. Dismantling and disposal..... 50**
- 11. Declaration of Conformity..... 51**

## 1. Safety warnings and instructions

### 1.1. Pictograms and symbols

#### In this documentation



General instructions



Observe installation and operating instructions



General hazard symbol (danger, warning, caution)



Warning: electric voltage



Wear respiratory protection mask



Wear hearing protection



Wear safety goggles

#### About the plant



Observe installation and operating instructions  
(on type plate)

### 1.2. Signal words according to ISO 3864 and ANSI Z.535

**DANGER**

**Imminent danger**

Consequences of non-compliance: serious or even fatal injury

**WARNING**

**Potential danger**

Consequences of non-compliance: possible serious or fatal injury

**CAUTION**

**Imminent danger**






Consequences of non-compliance: injury and/or damage to property

**NOTE**

**Additional notes, tips and hints**





Consequences of non-compliance: inefficient operation, extra maintenance work.  
No risk to persons.

**1.3. General safety instructions**

<p><b>NOTE</b></p>	<p><b>Installation and operating manual</b></p>
	<p>Before reading this manual, make sure that it refers to your plant model. This document contains important information and instructions for the safe operation of the plant. Before carrying out any work with or on the plant, all specialist technical personnel <sup>1</sup> must have read this manual.</p> <p>A copy of this operating manual must be kept near the plant where it is at all times accessible to staff.</p> <p>In addition to the instructions in this document, always comply with the statutory regulations for machine operation, accident prevention and safety. This also applies to the use of accessories and spare parts.</p>
<p><b>DANGER</b></p>	<p><b>Insufficient qualification</b></p>
	<p>Improper handling and operation of the plant might result in serious or even fatal injury, and/or damage to property.</p> <ul style="list-style-type: none"> <li>• All tasks described in this installation and operating manual must be performed by specialist technical personnel<sup>1</sup> who meet the following criteria:</li> <li>• Before carrying out any work with or on the plant, all specialist technical personnel<sup>1</sup> must have read and understood the contents of this installation and operating manual. It is the responsibility of the owner of the plant to ensure that the above requirement is complied with.</li> </ul>
<p><b>DANGER</b></p>	<p><b>Escaping compressed gas</b></p>
	<p>Risk of serious or even fatal injury from contact with escaping compressed gas or unsecured plant components.</p> <ul style="list-style-type: none"> <li>• Before carrying out any installation or maintenance work, depressurise the system.</li> <li>• Use only pressure-resistant installation material and suitable tool that are in proper working order.</li> <li>• Before pressurising the system, check all plant components and repair them, if necessary. Open valves slowly to prevent pressure blows during operation.</li> <li>• The feed pipes must be permanently installed. Drain pipe: short, properly secured pressure hose attached to pressure-resistant pipe.</li> <li>• Make sure that no persons can be injured or objects damaged by condensate or escaping compressed gas.</li> <li>• Prevent transmission of vibration and impacts on plant components.</li> <li>• Perform a leakage test.</li> </ul>
<p><b>DANGER</b></p>	<p><b>Use of unsuitable tools</b></p>
	<p>If unsuitable tools are used, there is a risk of plant malfunction, potentially resulting in injury and/or damage to property.</p> <ul style="list-style-type: none"> <li>• When serving and repairing the plant, use only tools that are in proper working order and have been approved for the respective task.</li> <li>• If you require special tools for certain tasks, contact the manufacturer.</li> </ul>
<p><b>DANGER</b></p>	<p><b>Modifications to the plant</b></p>
	<p>Structural modifications to the plant might result in serious injury and/or damage to property.</p> <ul style="list-style-type: none"> <li>• Any modifications to the plant must be made by the manufacturer, or after consultation with the manufacturer.</li> <li>• Work on pressure vessels and pipelines such as welding, structural modifications, assembly work, etc. is prohibited, unless you have obtained the prior consent of the manufacturer and, if required, of the notified body. Such modifications shall void the Declaration of Conformity.</li> </ul>

**<sup>1</sup> Specialist technical personnel**


Specialist technical personnel are persons who, due to their professional qualification and knowledge in the field of measuring, control and pneumatic technology, and their knowledge of the applicable statutory regulations, guidelines and standards are in a position to foresee potential dangers in relation to the use of the plant, and who are qualified to perform the tasks described in this manual. Special operating conditions (e.g. plant operation with aggressive media) require additional knowledge.



<b>DANGER</b>	<b>Disabling of safety devices</b>
	<p>If safety devices are disabled or not working properly, there is a risk of serious injury, plant malfunction and/or damage to property.</p>
	<ul style="list-style-type: none"> <li>• Never disable or bridge the safety devices of the plant.</li> <li>• Safety devices that prevent operation of the plant at inadmissible conditions (e.g. excessive pressure or temperature) are not included in the standard scope of delivery.</li> <li>• Should they be supplied as installed accessories, they must never be disabled or bridged.</li> </ul>
<b>DANGER</b>	<b>Excessive pressure / temperature</b>
	<p>Suitable measures must be taken to ensure that the pressure in the plant components does not exceed the permissible operating pressure.</p>
	<ul style="list-style-type: none"> <li>• It is the responsibility of the plant operator to protect the plant against excessive pressure build-up.</li> <li>• Take suitable measures to protect the compressor and the compressed air system downstream of the adsorption dryer.</li> <li>• Take suitable technical precautions to ensure that the temperature at operating pressure does not exceed the maximum permissible operating temperature of the individual components.</li> <li>• The plant operator must take suitable measures to ensure that the temperature of the incoming gas does not exceed the maximum permissible operating temperature of the plant.</li> <li>• If the plant is pressurised to operating pressure, the operator must ensure that the maximum permissible operating temperature is not inadvertently exceeded by ambient conditions at the site of installation.</li> </ul>
<b>DANGER</b>	<b>Fire safety</b>
	<p>A fire in the plant might result in serious injury or damage to materials.</p>
	<ul style="list-style-type: none"> <li>• Safety devices that prevent excessive pressure build-up as a consequence of a fire are not included in the standard scope of delivery.</li> <li>• If there are potential ignition sources at the place of installation of the plant, the operator must take suitable safety measures to ensure that the permissible operating parameters of the plant are not exceeded.</li> </ul>
<b>NOTE</b>	<b>Pressure vessel – stress from alternating loads</b>
	<p>The alternating load rate per year depends on the plant cycle times and the type of the plant. The plant design is based on a service life of 10 years.</p>
	<ul style="list-style-type: none"> <li>• In Germany, the pressurised walls must be tested at least every 5 years (internal test), and strength test (pressure test) must be completed at least every 10 years.</li> <li>• Observe the statutory regulations that apply at the place of installation of the plant and schedule all necessary tests with the respective notified body.</li> </ul>

**1.3.1. Safety precaution during plant operation**


Compliance with the statutory safety and operating regulations is a prerequisite for trouble-free and safe operation of the plant. Strictly adhere to all applicable internal work instructions.

- The plant must be regularly inspected for visible damage.
- Faults and defects that might impair its safety must be eliminated without delay. In the event of malfunction, follow the instructions in “8. Troubleshooting and repair”. Should you be unable to resolve the problem, contact the manufacturer.
- The plant, including its control system, must only be operated by suitably trained and instructed personnel.

<b>DANGER</b>	<b>Manual pressure relief during operation</b>
	Manual pressure relief during plant operation might result in serious injury and/or damage to property. <ul style="list-style-type: none"> <li>• Never open the manual pressure relief ball valves while the plant is in operation.</li> </ul>

<b>WARNING</b>	<b>Blow-off noises during pressure release</b>
  	When compressed gas is released, it expands, which can be result in a loud noise. <ul style="list-style-type: none"> <li>• Therefore always wear hearing protection!</li> </ul>

**1.3.2. Risk of injury from electric energy**

<b>DANGER</b>	<b>Electric power</b>
	Incorrect connection or damaged components can cause serious or even fatal injury. <ul style="list-style-type: none"> <li>• All work on electrical connections and devices must be performed by authorised specialist technicians and according to DIN VDE regulations (or equivalent national regulations) and the instructions of the utility company.</li> <li>• If work needs to be performed on powered parts, a second person must be deployed to shut down the main switch, should it be required.</li> <li>• Cordon off the working area and set up warning signs.</li> <li>• Use only insulated tools.</li> <li>• The electrical equipment of the plant must be tested regularly.</li> <li>• Use only original fuses of the correct rating.</li> </ul>







**1.3.3. Risks from adsorbents**

The adsorbents (desiccants) are contained in the adsorbers (see “2.4. Parts and components”).

The adsorbent has been chosen with reference to the processing system and drying task. Use only adsorbents supplied by the plant manufacturer.

Adsorbents are chemicals that need to be handled with the necessary care (DIN safety data sheet). The adsorbents used in your plant are not subject to the labelling requirements according to the German Hazardous Substances Ordinance. All adsorbents must be stored in a room that is only accessible to trained and instructed personnel.

<p><b>WARNING</b></p>	<p><b>Health risk from adsorbents</b></p>
  	<p>Risk of injury to eyes and injury from ingestion</p> <ul style="list-style-type: none"> <li>• In the case of contact with the eyes, rinse thoroughly with plenty of water. Always consult a doctor.</li> <li>• After ingestion, immediately consult a doctor.</li> <li>• Spilled adsorbent must be removed without causing airborne dust.</li> <li>• When removing or adding adsorbent to the absorption dryer, wear a dust mask (recommended protection class: P2 or FFP2) and safety goggles.</li> </ul>
<p><b>NOTE</b></p>	<p><b>Handling of adsorbents in the event of a fire</b></p>
	<p>There are no restrictions regarding extinguishing agents. The adsorbent might however react with water or foam.</p>

**1.3.4. Safety instructions for maintenance work**





All persons involved in the installation, start-up, operation or maintenance of the plant must have read and fully understood the installation and operating instructions, and in particular the safety instructions. If you have any queries, please contact the manufacturer.

The manufacturer shall not be liable for damage caused by incorrect installation, assembly or start-up of the plant. The plant operator shall be solely responsible for such damage.


The responsibilities for maintenance work must be clearly assigned. Before carrying out any maintenance work, inform the operating personnel.


All prescribed configuration, maintenance and inspection tasks must be carried out by customer service technicians of the manufacturer and according to the schedule.

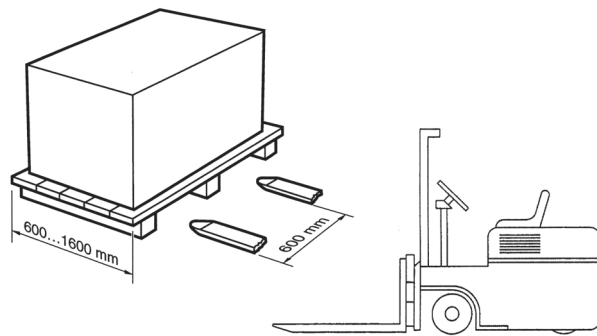
Strictly adhere to all instructions regarding the maintenance of the plant.


<p><b>DANGER</b></p>	<p><b>Maintenance work during plant operation</b></p>
	<p>Carrying out maintenance work while the plant is in operation poses an increased risk to persons.</p> <ul style="list-style-type: none"> <li>• For certain maintenance tasks, the plant must be completely shut down, de-energized and depressurised.</li> <li>• Shut down the plant, following the relevant instructions.</li> <li>• Depressurise the plant.</li> <li>• Disconnect it from the electric power supply, secure it against inadvertent switching on and attach a warning sign to the main switch.</li> <li>• If guards need to be removed, let the plant cool down before carrying out any further work. Before restarting the plant, mount and secure the guards and insulation.</li> </ul>
<p><b>DANGER</b></p>	<p><b>Improper replacement of components</b></p>
	<p>Incorrect replacement of components can cause serious or even fatal injury.</p> <ul style="list-style-type: none"> <li>• We strongly recommend having damaged or wearing parts replaced by a customer service technician of the manufacturer.</li> <li>• After completion of the maintenance work, perform a leakage test.</li> <li>• To replace large assemblies, use lifting gear and secure the parts properly before moving them! Use only lifting gear lashing equipment that is in proper working order and has the necessary load capacity!</li> </ul>
<p><b>DANGER</b></p>	<p><b>Assembly work above head height</b></p>
	<p>Assembly work above head height can cause serious or even fatal injury.</p> <ul style="list-style-type: none"> <li>• For all such work, use safety-approved ladders and work platforms!</li> <li>• Never use machine parts as climbing aids! Risk of injury from fall!</li> <li>• For all maintenance work above a height of 1.80 m, wear fall arrest equipment!</li> </ul>
<p><b>NOTE</b></p>	<p><b>Use of unsuitable or damaged components</b></p>
	<p>The use of unsuitable or damaged components can cause malfunction of the plant.</p> <ul style="list-style-type: none"> <li>• If you detect any serious damage to the pressure devices, shut them down and remove them immediately!</li> <li>• Replace damaged components with new ones.</li> <li>• Replace wearing parts according to the prescribed schedule in the devices and spare parts list or in chapter “7.2. Maintenance schedule”. This list is an integral part of these installation and operating instructions.</li> <li>• Use only original spare and accessory parts supplied by the manufacturer. Third-party components might not meet the necessary stress and safety standards.</li> </ul>


1.4. Transport and storage


<b>DANGER</b>	<b>External forces and torques</b>
	<p>The plant must be protected against external forces and torques, as these could cause damage, leading to leakage or even malfunction of the plant.</p> <ul style="list-style-type: none"> <li>• Ensure that no external forces and torques are transferred to the plant through the on-site piping system. Otherwise, the permissible load on the system might be exceeded. If necessary, the plant operator must carry out tests or make modifications to the on-site installations.</li> <li>• The adsorption dryer must be protected against vibration caused by other units. If necessary, the operator must take suitable measures to prevent the propagation of vibration.</li> </ul>

<b>WARNING</b>	<b>Uneven load distribution</b>
	<p>There is a high risk of serious injury when the plant is being transported with lifting gear.</p> <ul style="list-style-type: none"> <li>• The angle between the perpendicular and the ropes must at all times be greater than 45°. Otherwise, the piping system might be damaged so that it is no longer tight, and there is a risk of serious malfunction of the plant.</li> <li>• Never lift the plant by the pipes. Otherwise, the piping system might be damaged so that it is no longer tight, and there is a risk of serious malfunction of the plant.</li> </ul>



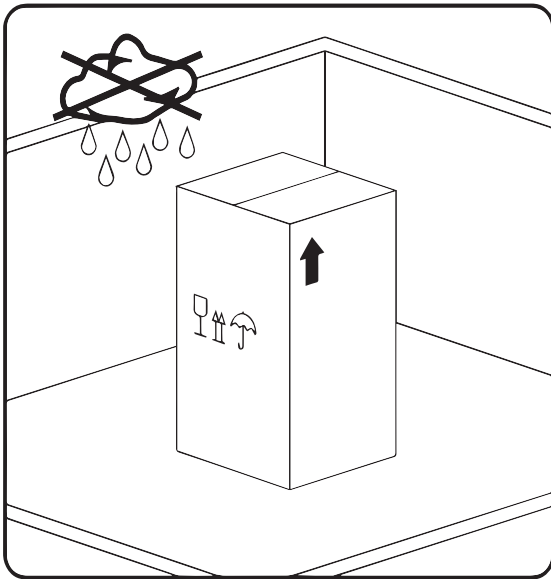
<b>NOTE</b>	<b>Labels on packaging</b>
	<p>Observe the labels on the packaging.</p>

NOTE	Damage caused during transport or storage
	<p>Incorrect transport or storage, or the use of unsuitable lifting equipment might cause damage to the plant.</p> <ul style="list-style-type: none"> <li>• The plant must only be transported and stored by authorised and suitably trained specialist technical personnel.</li> <li>• If you detect any damage, do not start the plant.</li> <li>• Always adhere to the specified transport and storage temperatures.</li> <li>• Special care is required during transport and when loading and unloading the plant! Never use force!</li> <li>• Ensure that the permissible maximum load of the lifting gear used at the operator's premises is not exceeded.</li> <li>• When transporting the plant with a lift truck, lift the plant by its support frame or the profiled timber frame.</li> </ul>

NOTE	Transport of plant by its pipes
	<p>Never lift the plant by the pipes, as this might result in leakage or serious malfunction of the plant.</p> <ul style="list-style-type: none"> <li>• Lift the plant only by the lashing points provided, using suitable lifting gear.</li> </ul>

The DRYPOINT® 410 – 495 adsorption dryers are shipped in a cardboard box and on a profiled timber frame.


Despite our best efforts regarding packaging, etc., the plant might be damaged during transport. Upon receipt, please remove all packaging material and inspect the plant for visible damage. If you detect any such damage, immediately notify the carrier company and **BEKO TECHNOLOGIES GMBH** or one of its agents.




To store the plant, place it in its original packaging and store it in an enclosed, dry and frost-free room. Ensure that the storage temperature does not exceed the limits specified on the type plate.


Even when packaged, take suitable measures to protect the plant against the elements.

While in storage, secure the plant so that it cannot topple over or fall, and protect it against vibration.

NOTE	Recycling of packaging material
	<ul style="list-style-type: none"> <li>• The packaging material is recyclable. Dispose of the packaging material according to the applicable statutory regulations.</li> </ul>

**1.5. Intended use**

<b>DANGER</b>	<b>Improper use</b>
	Improper use can result in serious injury and damage to property.
	<ul style="list-style-type: none"> <li>• Only use the plant for its intended purpose.</li> </ul>

<b>DANGER</b>	<b>Operation of plant outside limit range</b>
	If the specified limits are exceeded, there is a risk of plant malfunction, potentially resulting in injury and/or damage to property.
	<ul style="list-style-type: none"> <li>• The plant must only be operated for the intended use and within the permissible limits specified on the type plate and in the technical data.</li> </ul>

The plant must only be used for the intended purpose. The adsorption dryer has been specifically designed for the drying of compressed air or nitrogen and must not be used for any other purpose.

The manufacturer shall not be liable for damage caused by improper use of the plant.

The medium to be dried must not contain any corrosive substances that might cause damage to the materials in the adsorption dryer. To prevent unavoidable corrosion on carbon steel components during proper plant operation, a 1 mm corrosion allowance or suitable coating has been applied.

The manufacturer guarantees that only materials suitable for the purpose have been used for the production of the plant. If the plant operator requests the use of certain materials for specific plant components, it is the operator's responsibility to ensure that these materials are suitable for the intended use.

The pressure and the temperature of the medium must conform to the specifications on the type plate and in this installation and operating manual!

The plant is not designed to withstand loads from traffic, wind or earthquakes. In the event of such a load, take suitable measures to protect the plant against the impact.

The manufacturer shall not be liable for damage and/or injury caused by non-compliance with the instructions above or the general applicable safety rules and regulations. The manufacturer's liability shall also not apply, if the adsorption dryer is operated without the necessary care or if best practice is not followed.

In order to ensure safe and trouble-free operation of the plant, always observe the safety instructions and other information in this document.

Remember that the safety warnings and instructions always also refer to your personal safety!

For the operation of the adsorption dryer, strictly adhere to the relevant occupational safety and accident prevention regulations and the instructions in this installation and operating manual. The adsorption dryer has been designed and built according to best practice.

It conforms to the European Low Voltage Directive 73/23/EEC.

The design/development, production, assembly of this plant as well as all customer services are subject to the certified quality assurance system of the manufacturer according to DIN ISO 9001/EN 29001.

**1.5.1. Warranty and liability**

All warranty and liability for injury or damage to property shall be voided, if it is caused by:

- Improper use of the plant
- Incorrect installation, start-up, operation and maintenance of the plant
- Operation of the plant while it is obviously defective
- Non-compliance with the instructions in this document regarding transport, storage, installation, start-up and maintenance of the plant
- Unauthorised modifications to the plant
- Insufficient inspection or monitoring of plant components that are subject to wear
- Incorrectly performed repairs
- Use of third-party components

Please also observe the general warranty terms and conditions of the manufacturer.

**1.5.2. Duties of the plant operator**

The plant operator must ensure that the plant is commissioned by personnel who are familiar with the relevant safety instructions and trained in the operation of the plant. The instructions include in particular:

**1.5.2.1. Safety**

- Accident prevent regulations
- General and plant-specific safety instructions
- Safety devices of the plant
- Emergency procedures

**1.5.2.2. Plant operation**

- Proper procedures for plant commissioning and start-up
- Emergency procedures
- Plant shut-down

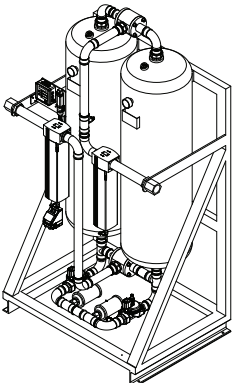
**1.5.3. Duties of personnel**

All persons who are involved in the operation of the plant must

- comply with the general occupational safety and accident prevention regulations and must have read the installation and operating manual.
- All instructions in this document must be strictly adhered to.



**2. Product information**


**2.1. Scope of delivery**

Figure	Description
	<p style="text-align: center;">DRYPOINT® AC, complete</p>

## 2.2. Type plate

The type plate is attached to the container of the DRYPOINT® AC.

Manufacturer:			
<b>BEKO TECHNOLOGIES GmbH</b> Im Taubental 7 D-41468 Neuss			
Art-Nr. Item number N° d'article			
<b>XXXXXXXXXX</b>		<b>XXXXXXXXXX</b>	
Anlage Plant Installation		Baujahr Year of manufacture Année de fabrication	
<b>DP AC xxxx</b>		<b>xx / 20xx</b>	
Betriebsdruck Operating pressure Pression de fonctionnement		Spannung / Leistungsaufnahme Voltage / Power consumption Voltage / Consommation électrique	
<b>min. 4 bar / max. 16 bar</b>		<b>230 V - 50-60 Hz / 40 W</b>	
Vorfilterelement Prefilter element Element du filter amont		Betriebstemperatur Operating temperature Température de service	
<b>1. xxx</b>		<b>min. 5 °C / max. 50 °C</b>	
<b>2. N/A</b>		Umgebungstemperatur Ambient temperature Température ambiante	
<b>3. N/A</b>		<b>min. 4 °C / max. 50 °C</b>	
Schutzklasse / Schutzart Protection class / Type of protection Classe de protection / Type de protection		Nachfilterelement Afterfilter element Element du filtre à poussières	
<b>I / IP54</b>		<b>xxx</b>	

<b>NOTE</b>	<b>Handling of type plate</b>
	Do not remove or cover the type plate, and protect it against damage.

## 2.3. Product overview and description

### 2.3.1. Operating principle of adsorption dryer

#### 2.3.1.1. Prefilter with condensate drain

The medium to be dried is pre-filtered by a high-performance submicro filter. Oil, water and dirt particles are held back by the micro-fibre fleece to a rate of 99.99998% for dirt particles larger than 0.01 µm.

The micro-fibre fleece is encased in a coalescing filter jacket and the medium flows from the inside outwards. In the coalescing filter, the liquid aerosols and mists form larger droplets, which then drop into the bottom part of the filter housing from where they are removed through the condensate drain from the system.

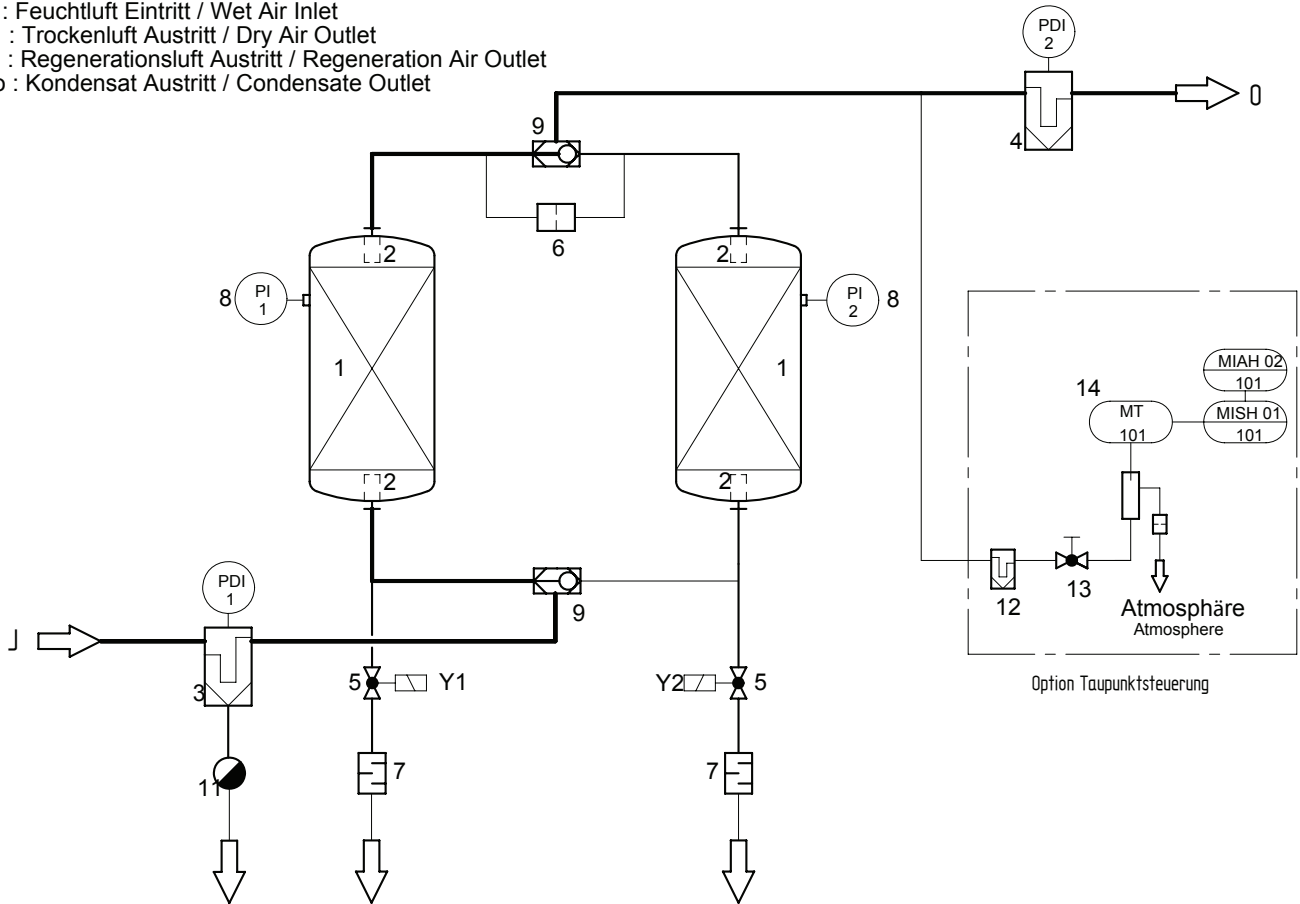
After the prefiltration stage, the residual oil content is smaller than 0.01 mg/m<sup>3</sup> (at a max. infeed concentration of 3 mg/m<sup>3</sup>).

#### 2.3.1.2. Afterfilter

The downstream dust filter removes fine dust with a particle size of < 25 µm from the compressed air.

### 2.3.2. Function of DRYPOINT® AC 410 – 495

J : Feuchtluft Eintritt / Wet Air Inlet  
 O : Trockenluft Austritt / Dry Air Outlet  
 R : Regenerationsluft Austritt / Regeneration Air Outlet  
 Ko : Kondensat Austritt / Condensate Outlet



#### 2.3.2.1. Adsorption

The plant is an adsorption dryer with alternating adsorption and regeneration phases.

The two adsorbers are operating alternately. While one adsorber dries the medium, the other one is regenerated. This process ensures uninterrupted operation of the adsorption dryer.

The medium to be dried enters the prefilter (3) through the wet gas inlet (J). In the prefilter, condensate, oil aerosols and dirt particles are removed by a high-performance microfilter.

The medium is then fed through the lower shuttle valve (9) and the lower flow distributor (2) into the vessel of one of the adsorbers (1) and then flows from the bottom to the top of one adsorber.

At the top of the adsorber, the dried medium flows through the upper flow distributor (2) and the upper shuttle valve (9) into the afterfilter (4).

In the afterfilter, fine dust particles and any abrasion residue of the adsorbent are removed by the dust filter and the dried and cleaned medium is fed to the dry gas outlet (O) where it enters the compressed air system.

#### 2.3.2.2. Regeneration

The adsorbent is regenerated by means of a partial flow of the dried medium.

To start the regeneration process, the 2/2-way solenoid valve (5) at the regeneration gas outlet is opened. As a result, the adsorber is depressurised to ambient pressure. The compressed air is released through the silencers (7) from the system.

A partial flow of the dry medium flows from the adsorber in adsorption mode through the bypass line into the upper piping, and from there down through the adsorber to the regenerated. At the bottom of the adsorber, the medium is released into the atmosphere through the silencers (7).

The regeneration gas volume is limited by the orifice (6).



**2.3.2.3. Pressure build-up**

At the end of the regeneration process, the 2/2-way solenoid valve (5) at the regeneration gas outlet is closed. The pressure in the regenerating adsorber is built up through the bypass line in the upper piping.

Until the switch-over is started, the regenerated adsorber remains at operating pressure in stand-by mode.

**2.3.2.4. Switching over of plant**

Depending on the operating mode selected at the text display of the electronic control unit, the switch-over is time-controlled or load-controlled (see “2.3.3. Control and display elements”).

**2.3.2.5. Intermittent operation**

If the compressor is operated in discontinuous (intermittent) mode, the plant control can be linked to the compressor control. This ensures that the plant regeneration is not interrupted. After completion of the pressure build-up and no compressed air is consumed, the plant remains in stand-by mode.

To couple the plant control to the compressor control, connect the floating NO contact of the compressor to the clamping strips X12 (digital input) of the control PCB. The contact must be closed when the compressor is not running.

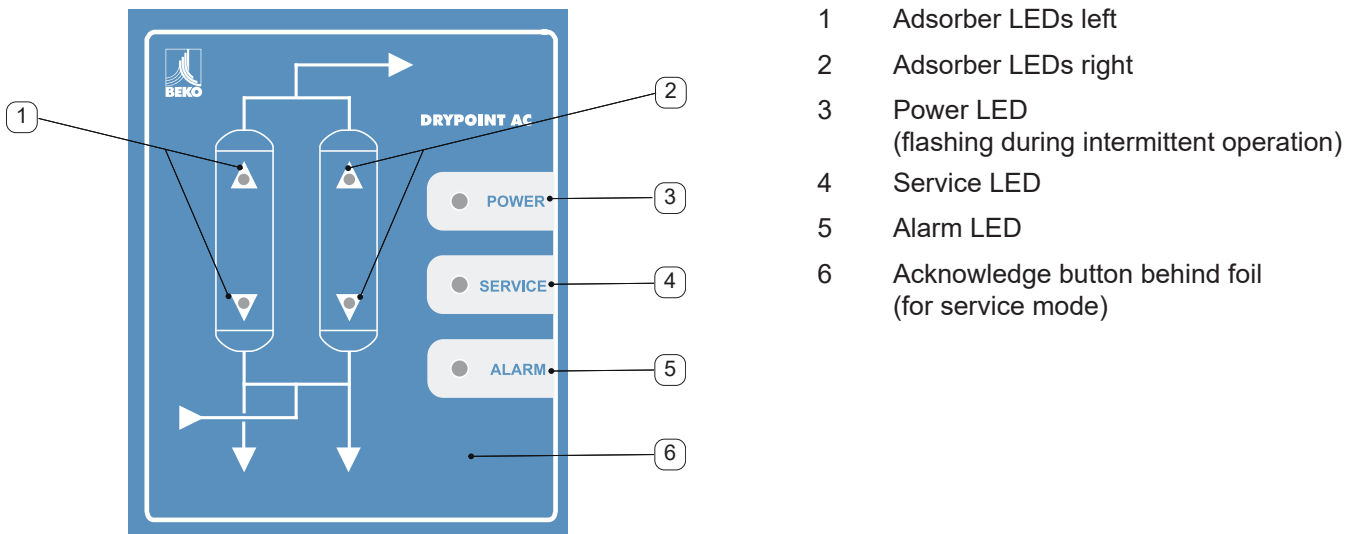
Stand-by state is indicated on the standard control unit by an LED. In the version with dew point control, it is indicated in plain text.

This operating mode is only available, if the plant is installed directly downstream of the compressor, and there is a storage tank downstream of the plant that is large enough to allow for the completion of the regeneration process in the adsorption dryer without a need to start the compressor.

**2.3.3. Control and display elements**

**2.3.4. Display (standard version)**

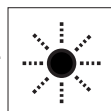
After successful start-up, the current operating state of the plant is indicated by LEDs on the display. The plant is controlled automatically and no further operator intervention is required.



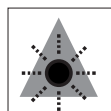
**2.3.4.1. Service messages (standard version)**

There are two sets of service indicators: the service LED in running mode and the adsorber LEDs. The various signals are indicated by 3 different symbols:

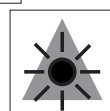
Indication by service LED in **running mode** (flashing):  
 Service A = short-long / service B = short-long-long-long.  
 Indication by service LED in **service mode**:  
 3 seconds on, or 3x flashing briefly



Indication by adsorber LED in **service mode** (flashing):  
 The service message is active, i.e. the time for a service has been reached.



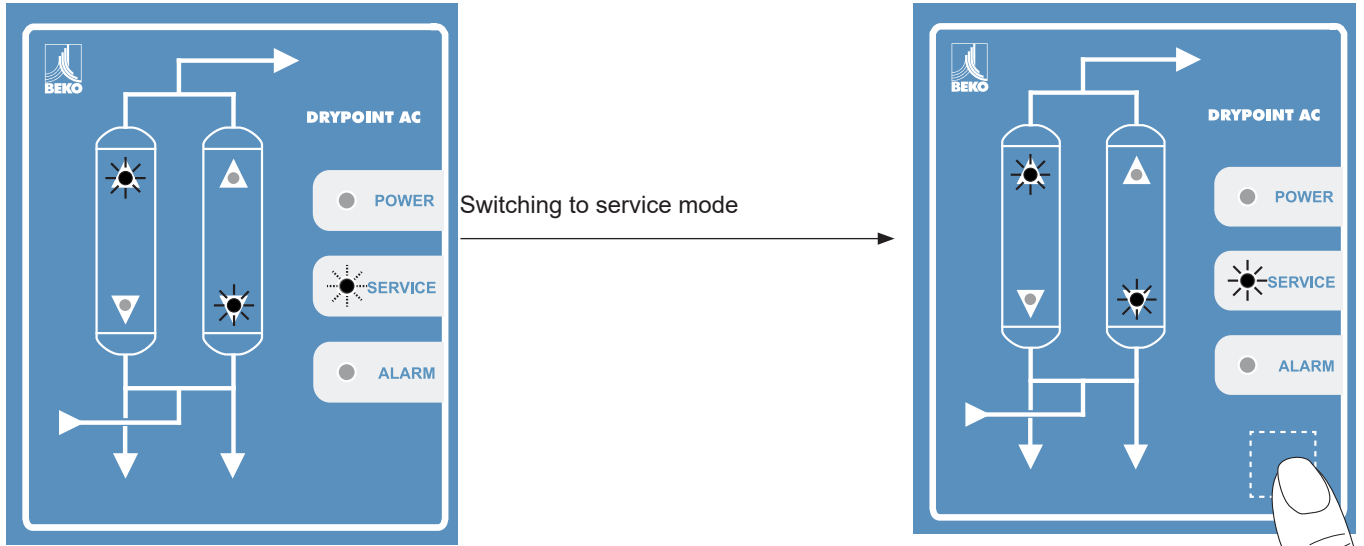
Indication by adsorber LED in **service mode** (continuously lit):



The service message is not active, i.e. the time for a service is not yet reached. In running mode, the LEDs indicate the current operating state.

**Service indication in running mode:**

The service LED flashes and the respective adsorber LEDs are continuously lit, indicating the current operating state.

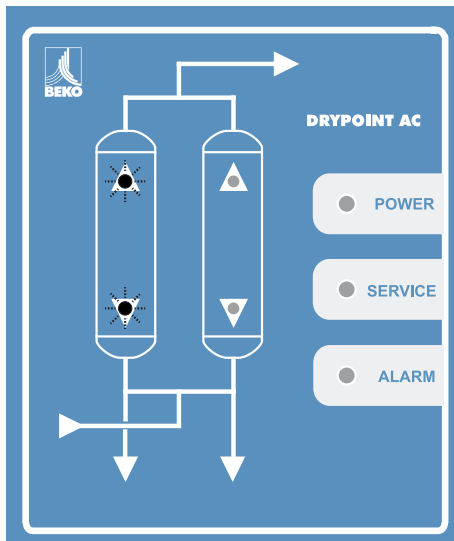


**Press and hold for 3 seconds;** the service LED is continuously lit for 3 seconds and then switched off

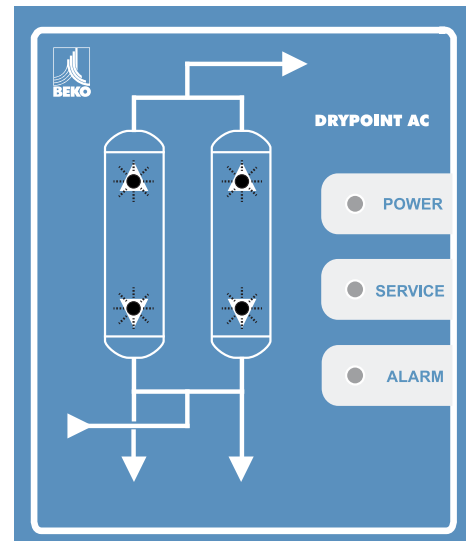
**Note:** In service mode, the adsorber LEDs **do not** indicate the operating state

**Service indication in service mode:**

Service A (active)

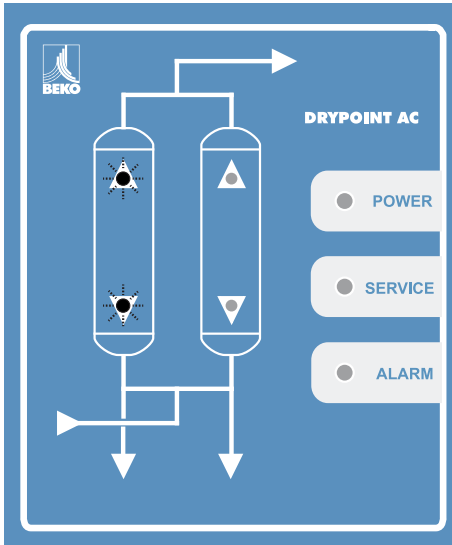


Service B (active)

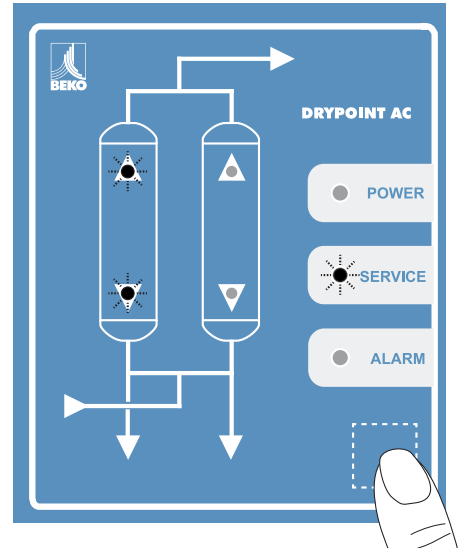


### 2.3.4.2. Acknowledging service messages (standard version)

Example: Service A (active)

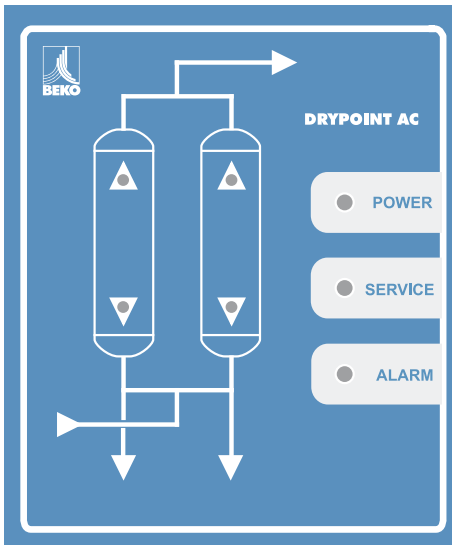


Acknowledgement



Press and hold the button for **3 seconds**; when the button is released the service LED flashes briefly 3x

Left adsorber LEDs are off

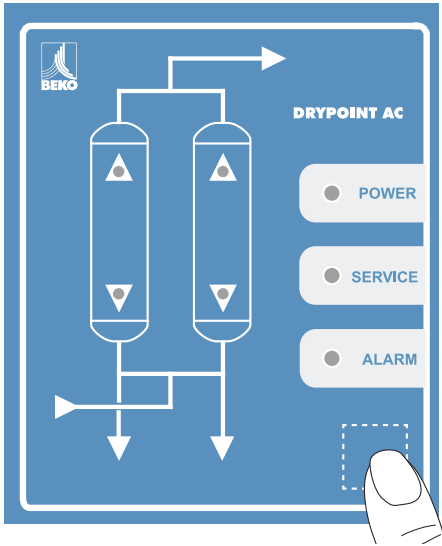


No button pressed

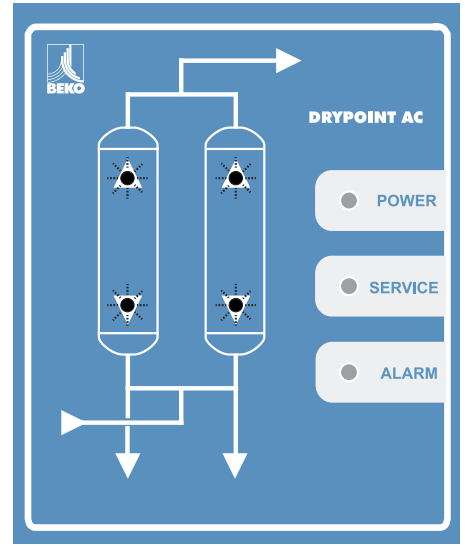
Service mode is terminated automatically after 5 seconds

Go to service messages

Service B (not active)

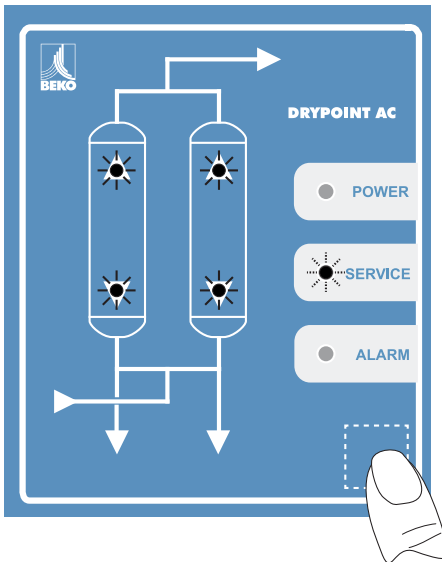


Service B is indicated; LEDs are continuously lit, as service B is not yet active (time to service has not yet elapsed).

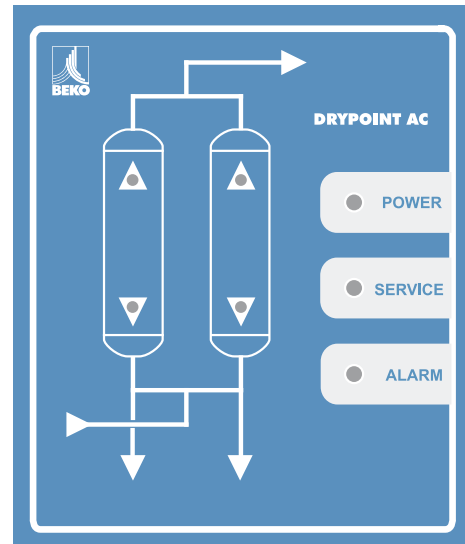


Press the button **1x**  
Press the button **1x**

It is possible to reset a not yet active service message\*



The adsorber LEDs are off. Indication only available again after 1 hour.



Press and hold the button for **3 seconds**; the service LED flashes briefly 3x

Go to next service message by pressing the button briefly **1x** or wait for **5 seconds** until service mode is terminated automatically

**\* Purpose of function:**

Service B might be carried out at the same time as service A, even if service B is not yet due. In this case, service messages that have not yet been activated must be acknowledged in order to set the operating hours counter to "0".

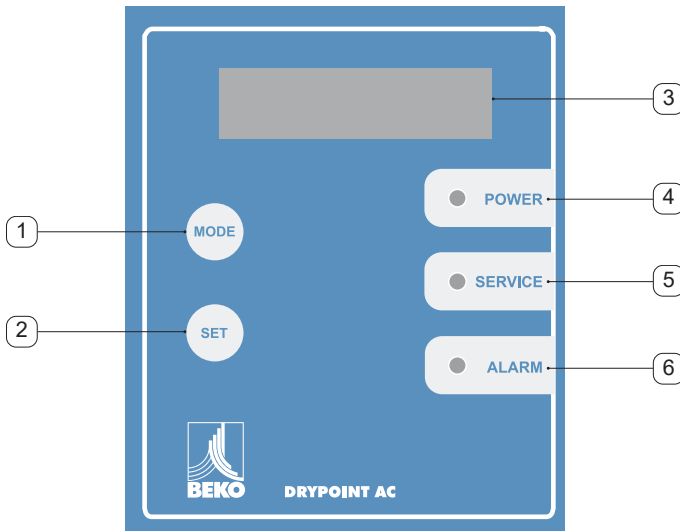
**\*\* Note:**

Upon a start-up and after acknowledging or resetting an active/not active service in service mode, the adsorber LEDs are only lit permanently after 1 hour has elapsed, which means that acknowledging is only possible by exiting the service mode and calling it up again.

<b>NOTE</b>	<b>Exceeding service intervals A and B</b>
	As the time intervals between service A and service B might overlap, acknowledging service A might result in an acknowledgement of service B.

### 2.3.5. Text display (dew point control version)

After successful start-up, the current operating state of the plant is indicated by LEDs on the display.



- 1 MODE button to select operating mode
- 2 SET button (to confirm entry)
- 3 Text display
- 4 Power LED
- 5 Service LED
- 6 Alarm LED

#### 2.3.5.1. Button functions

Press the MODE button to scroll down through the display texts. After the last display text, the first one is displayed again.

Press the SET button to return to the first display text.

The SET button is also used to access the "second level" of the control. This is the service level where you can acknowledge service messages, change text language and adjust a number of other parameters.

This example of changing the display language from German to English explains how the service level is accessed and works.

- Simultaneously press and hold the MODE button and the SET buttons for minimum 3 seconds.
- Message "Service Mode 1.0" is displayed (1.0 = software version).
- Press the MODE button until "Land" (country) is displayed.
- Press and hold the SET button for minimum 3 seconds (to access the memory).
- "Deutschland" (Germany) is displayed.
- Press the MODE button to change to "Great Britain".
- Press and hold the SET button for minimum 3 seconds (to close the memory).
- "Great Britain" is displayed.
- If no button is pressed for the next 10 seconds, the service mode times out and the new settings are not saved!

To leave the service level, press and hold the MODE and the SET buttons for minimum 3 seconds.

The system automatically exits the service level, if no changes are made (buttons are pressed) for 5 minutes.

#### 2.3.5.2. Display layout


The display shows the current status of the plant and any service or alarm messages.

Table 1 shows the various display texts. The menu consists of 2 levels

At the first level, you can scroll through the texts by pressing the MODE button. During plant operation, the display always shows the current plant state.

To access the second or service level, simultaneously press the MODE and SET buttons for minimum 3 seconds.

At the first level, you can scroll through the texts by pressing the MODE button. To make changes, proceed as described in "2.3.5.1. Button functions".

NOTE	Behaviour of control after restart and power failure
	<p>After a restart or power failure, pressure is built up again to the point at which the container operation was interrupted. The last state of the container is saved.</p>

2.3.5.2.1. Table 1: First level (without SET button)

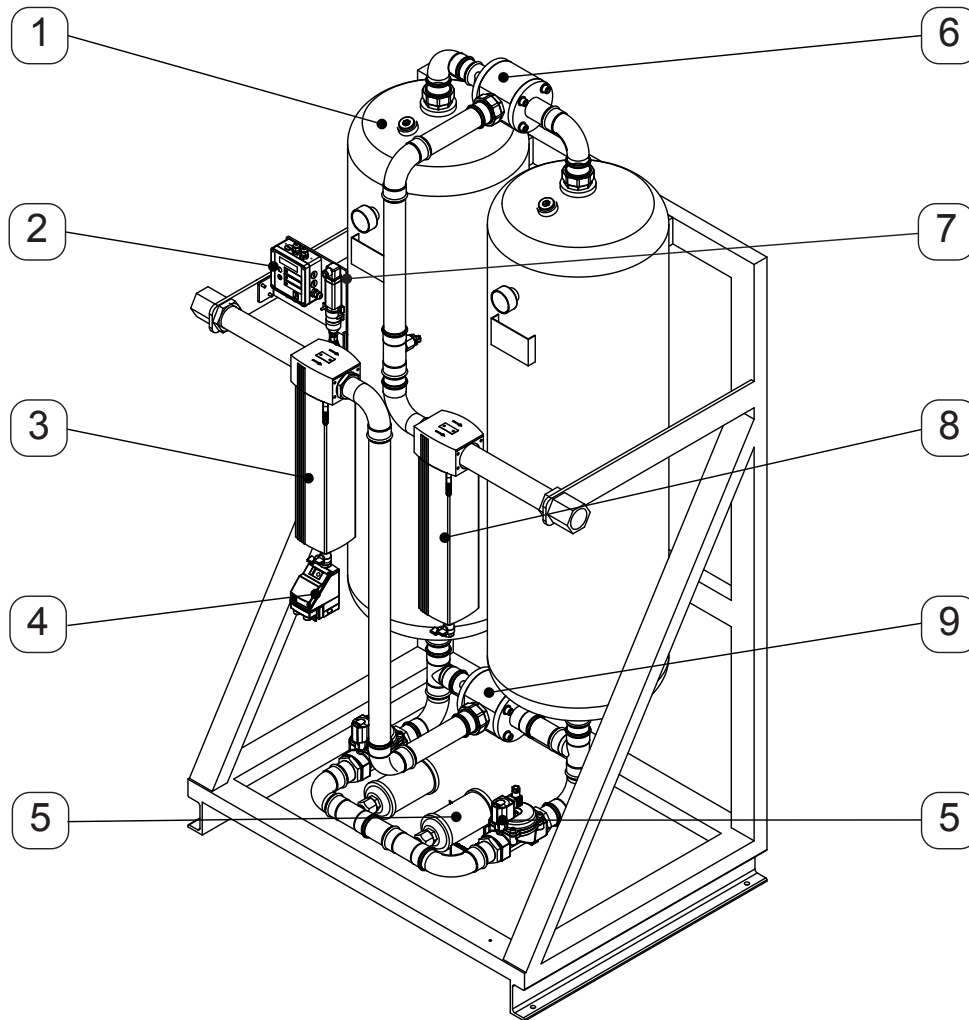
Display texts				
	Top line	Bottom line with dew point control	Bottom line with time control	Comment
<b>Current operation</b>	Dewp. Control ↑ (↓)	Dewpoint= xx °C	-----	Default display (after 10 min.)
	Adsorption Right	Dewpoint= xx °C	xx:xx/Rest xx:xx	Alternating right / left
	Adsorption Left	Dewpoint= xx °C	xx:xx/Rest xx:xx	Alternating right / left
	Regen. Right	xx:xx/Rest xx:xx	xx:xx/Rest xx:xx	Alternating right / left
	Regen. Left	xx:xx/Rest xx:xx	xx:xx/Rest xx:xx	Alternating right / left
<b>Statistics</b>	Operating time	xxxxxx hrs.	xxxxxx hrs.	
	Stand-By	xxx:xx:xx hrs.	xxx:xx:xx hrs.	
	Oper. Time Ads.	xxxxxx hrs.	xxxxxx hrs.	Adsorbent operating time
<b>Action</b>	Off-Line			Plant switches to "off-line" mode. Only displayed, if this function has been triggered (intermittent operation).
<b>Service messages</b>	Service A	replace !	replace !	Maximum service life of wearing parts reached (text switches between message and default display).
	Service B	replace !	replace !	Maximum service life of adsorbent reached (text switches between message and default display).
	Transmitter	calibrate !		Annual calibration of dew point transmitter due.
<b>Alarm messages</b>	Safety Mode			Safe mode operation ("fix mode"). Displayed, if alarm has been triggered.
	Dew point alarm			Dew point alarm triggered.
	Short	Transmitter		Short circuit at dew point transmitter
	Open	Transmitter		Transmitter circuit open
	Failure			Electrical failure

## 2.3.5.3. Second level (with SET button)

Display texts				
	Top line	Bottom line with dew point control	Bottom line with time control	Comment
<b>Service mode</b>				After pressing SET button (press and hold SET button for : 3 seconds).
	Service Mode x.x			Software version
	Country	Great Britain		Available countries: DE/GB/NL/FR/IT/ES/PT/PL/DK/FI/SE/NO/TR/CZ
	Pressure	xx bar		1-16 bar, adjustable
	Temperature	xx °C		25-55 °C, adjustable in steps of 5 °C
	Switchover Dewp.	-48 °C		Switchover temperature 0 to -100 °C, adjustable; factory-set to -48 °C
	Dewp. Alarm	0 °C		+20 to -80 °C and OFF, adjustable; factory-set to 0 °C
	Mode	Dewp. Control Dewpoint in Safe	Time Control	Select dew point or time control  Upon dew point alarm
	<b>Service A</b>	Change ?	Change ?	Acknowledgement of service A (confirmed with "Change successful!")
	Service A	done ?	done ?	
	<b>Service B</b>	Change ?	Change ?	Acknowledgement of service B (confirmed with "Change successful!")
	Service B	done ?	done ?	Acknowledgement of service B (confirmed with "Change successful!")

## 2.4. Parts and components

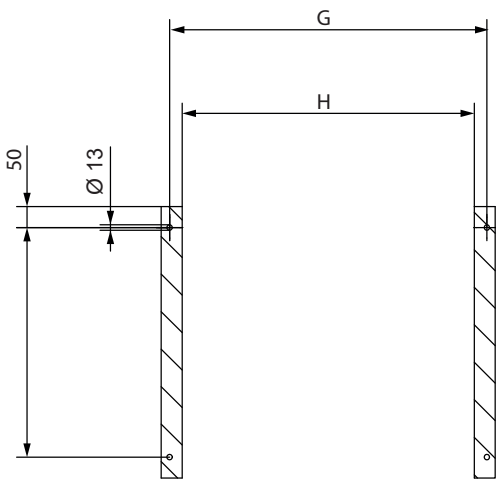
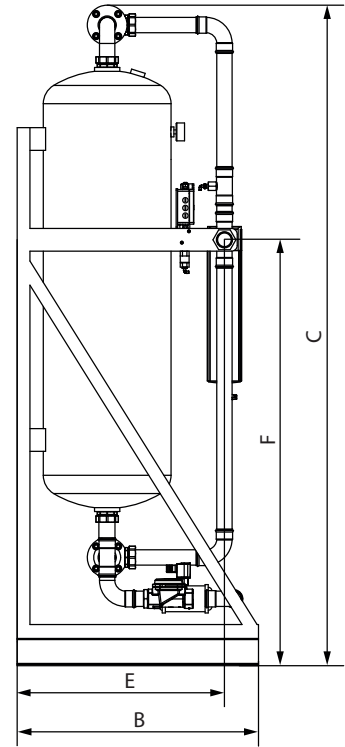
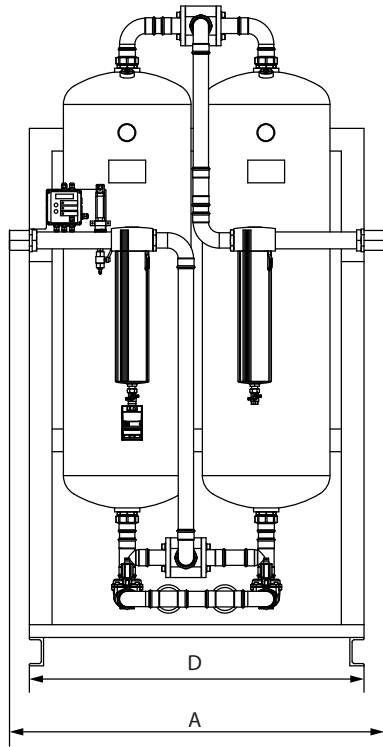
### Plant components of DRYPOINT® AC 410 – 495



- |   |                                |    |  |
|---|--------------------------------|----|--|
| 1 | Adsorber                       | 6  | Upper shuttle valve  |
| 2 | Control unit                   | 7  | Dew point transmitter<br>(with option "dew point control") |
| 3 | Prefilter (CLEARPOINT® type S) | 8  | Afterfilter (CLEARPOINT® type RF)                          |
| 4 | Condensate drain               | 9  | Lower shuttle valve  |
| 5 | Silencer                       | 10 | Solenoid valve   |



2.5. Dimensions



DRYPOINT® AC	410	415	418	423	430	438	455	465	485	495
A (mm)	700	700	850	870	920	920	1,190	1,190	1,320	1,320
B (mm)	450	450	600	600	650	650	750	750	850	850
C (mm)	1,600	2,025	1,905	1,905	1,890	2,220	2,180	2,200	2,315	2,330
D (mm)	600	600	750	750	800	800	1,050	1,050	1,180	1,180
E (mm)	365	365	400	465	530	520	635	625	730	730
F (mm)	900	1,100	1,100	1,170	1,185	1,320	1,350	1,350	1,480	1,500
G (mm)	560	560	710	710	760	760	1,010	1,010	1,140	1,140
H (mm)	500	500	650	650	700	700	950	950	1,080	1,080
I (mm)	350	350	500	500	550	550	650	650	750	750
Weight (kg)	155	185	245	245	290	365	400	475	565	645

## 2.6. Technical data




DRYPOINT® AC	410	415	418	423	430	438	455	465	485	495
Connection	½"	1"	1"	1"	1"	1 ½"	2"	2"	2"	2"
Medium	Compressed air/nitrogen									
Volumetric flow rate (m³/h)*	100	150	175	225	300	375	550	650	850	1000
Operating pressure min./max.	4 ... 16 bar									
Max. inlet temperature	50 °C									
Ambient temperature min./max.	+4 ... +50 °C									
Air humidity	Max. 100 % at 45 °C									
Ambient conditions	0 ... Altitude 0 - 2000 m (indoor installation)									
Pressure dew point	Min. -40 °C, optional -70 °C < PDP < -40 °C									
Working principle	Fully automated, cold-regenerating, continuous operation									
Electrical data										
Operating voltage (depending on model)	230 V / 50 ... 60 Hz (± 10 %), optional 115 V / 50 ... 60 Hz (± 10 %), 24 VDC (± 10 %)									
Mains cable wire cross-section	AC: 3 x 0.75 mm² DC: 2 x 0.75 mm²									
Power consumption and internal fusing	max. 40 W / 2 A slow-acting, 250 V, ceramic tube fuse									
Contact rated voltage relay solenoid valves	230 V / 115 VAC / 24 VDC									
Contact rated current relay solenoid valves	8 A (ohmic load)									
Contact rated voltage relay alarm	125 V									
Contact rated current relay alarm	1 A (ohmic load)									
Protection class	IP 54									
Overvoltage category	2									
Purity of compressed air at adsorption dryer outlet										
Residual water content	DRYPOINT® AC 410 – 495: 0.11 mg/m³ DRYPOINT® AC 410 – 495 MS: 0.0027 mg/m³									
Adsorbent in pressure vessels										
DRYPOINT® AC 410 – 495	Aluminium oxide									
DRYPOINT® AC 410 – 495 MS:	Molecular sieve									

\* Volume flow rates for PDP -40 C, in relation to 20 C ambient temperature, 1 bar (abs), an operating pressure of 7 bar (gauge) and a compressed air inlet temperature of 35 C (saturated)


Correction factor													
Inlet temperature	Operating overpressure (bar)												
	4	5	6	7	8	9	10	11	12	13	14	15	16
25 °C	0.75	0.90	1.05	1.20	1.35	1.50	1.65	1.80	1.95	2.10	2.25	2.40	2.55
30 °C	0.69	0.83	0.96	1.10	1.24	1.38	1.51	1.65	1.79	1.93	2.06	2.20	2.34
35 °C	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
40 °C	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20	1.30	1.40	1.50	1.60	1.70
45 °C	0.44	0.53	0.61	0.70	0.79	0.88	0.96	1.05	1.14	1.23	1.31	1.40	1.49
50 °C	0.31	0.38	0.44	0.50	0.56	0.63	0.69	0.75	0.81	0.88	0.94	1.00	1.06

DRYPOINT® AC	Regeneration air flow rate (m³/h) at 1 bar, 20 °C		Air exit flow rate (m³/h) at 1 bar, 20 °C	
	Standard	MS	Standard	MS
410	15.0	20	81.6	75.4
415	23.0	30	121.7	113.1
418	26.3	35	142.7	132.0
423	34.0	45	183.2	170.0
430	45.0	60	244.7	226.2
438	56.0	75	306.1	282.8
455	83.0	110	447.9	414.7
465	98.0	130	529.5	490.1
485	128.0	170	692.6	640.9
495	150.0	200	815.5	754.0


### 3. Installation

<b>DANGER</b>	<b>External forces and torques</b>
	<p>The plant must be protected against external forces and torques, as these could cause damage, leading to leakage or even malfunction of the plant.</p> <ul style="list-style-type: none"> <li>• Ensure that no external forces and torques are transferred to the plant through the on-site piping system. Otherwise, the permissible load on the system might be exceeded. If necessary, the plant operator must carry out tests or make modifications to the on-site installations.</li> <li>• The adsorption dryer must be protected against vibration caused by other units. If necessary, the operator must take suitable measures to prevent the propagation of vibration.</li> </ul>
<b>NOTE</b>	<b>Responsibility for proper installation</b>
	<ul style="list-style-type: none"> <li>• The operator is responsible for the proper installation of the adsorption dryer, and of the piping to and from the plant.</li> <li>• The manufacturer is <b>not</b> responsible for the planning or installation of safety devices that prevent overvoltage, short circuits or overloads.</li> </ul>
<b>NOTE</b>	<b>Integration into existing piping</b>
	<p>If the plant is to be installed into an existing pipeline, the operator must take into account that the pipes downstream of the place of installation of the dryer might be contaminated. It might therefore be necessary to clean or replace this piping sections and the components.</p>

### 3.1. Warning

NOTE	Modifications to the plant
	Removing the filter or the bulk materials from the system without replacing them immediately can result in a significant impairment of the plant performance and function.
	<ul style="list-style-type: none"> <li>• Never remove individual filters or bulk material from the system without replacing them before restarting the plant.</li> </ul>

- For installation work, you can remove the housing cover plates for servicing and installation access.
- The plant can be supplied with compressed air from any conventional compressor. You must however ensure that the compressed air at the plant inlet meets the feed conditions for compressed air. Make sure that the air intake duct of the compressor is not at a position where the ambient air is particularly contaminated (e.g. near machine exhaust pipes or other sources of contamination).

NOTE	Removing packaging
	Carefully remove all packaging from the plant.
	If the plant has been damaged during transport, or if parts are missing, notify the manufacturer and the transport company without delay. If necessary, document the damage and inform the manufacturer.

### 3.2. Installation area

- The adsorption dryer must be installed in an upright position. Observe the flow direction markings.
- Ensure that there is no risk that the air flows through the plant in the opposite direction to the design flow direction (exception: intermittent operation).
- Do not attempt to start the plant against a large volume of air that is under atmospheric or even lower pressure (see also “2.6. Technical data”).
- To prevent this, we recommend installing an automatic start-up system (optional equipment).
- Do not run several plants in parallel without providing separate volumetric flow limitation devices.
- If the compressor is operated in discontinuous mode, the plant control can be linked to the compressor control (option: intermittent operation, see “3.5. Intermittent operation”). Always ensure that a regeneration cycle that has been started is completed even after the compressor has been shut off.
- If the ambient temperature at the location of installation of the plant is likely to drop below +2 °C, install an auxiliary heater (optional equipment) to protect the plant against frost.
- Clean the surface on which you want to place the plant and make sure that the system is accessible from all sides. There must be sufficient room for the replacement and servicing of the plant.
- The floor must be level and able to carry the weight of the plant.
- The adsorption dryer must be protected against vibration caused by other units.
- Position the plant so that it can be connected to a power socket (with the supplied power cable) or to a mains disconnect device (with external power supply).

**3.3. Bypass line (optional)**

We recommend installing a bypass line around the plant, so that the downstream compressed air system is supplied with compressed air while maintenance work is carried out on the plant.

**3.4. Connection to compressed air system**

Connect the wet gas inlet and the dry gas outlet of the plant to the respective pipes. Check all screw fittings for proper fixture.

**3.4.1. Compressed air quality**

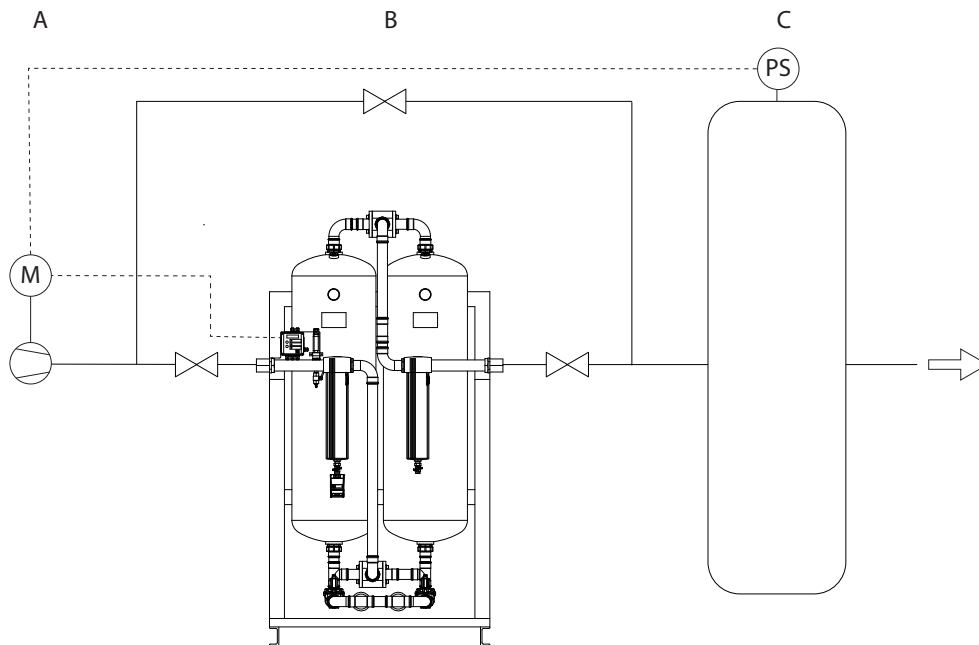
The maximum permissible residual oil content in the compressed air upstream of the plant is 3 mg/m<sup>3</sup>. If the residual oil content is higher than this value, install an additional prefilter.

If oil-free compressed air is required, install an oil vapour absorber downstream of the plant.

To achieve sterile compressed air, install a high-performance sterile filter downstream of the plant.

**3.5. Intermittent operation**


If the adsorption dryer is to be run in intermittent operating mode, install it as shown in figure "Intermittent operation" as follows: Compressor (A) – plant (B) – storage vessel (C).



Ensure that the plant is protected against air counterflow!

## 4. Electrical installation

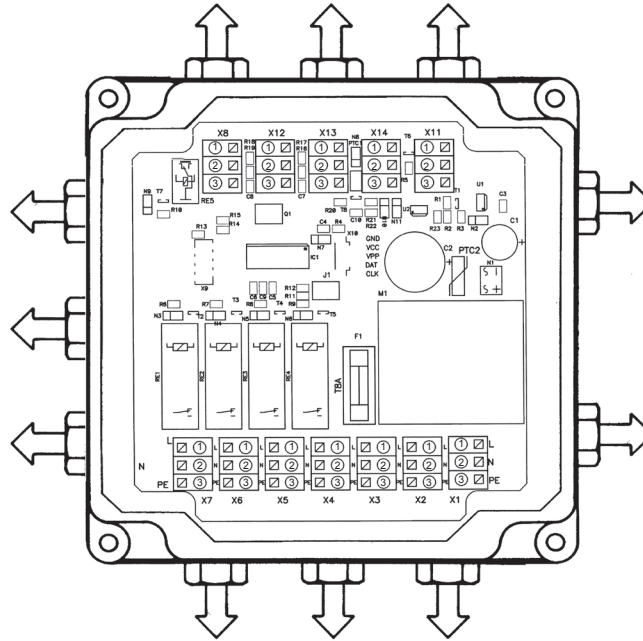
### 4.1. Warning

<b>DANGER</b>	<b>Electric power</b>
	<p>Incorrect connection or damaged components can cause serious or even fatal injury.</p> <ul style="list-style-type: none"> <li>• All work on electrical connections and devices must be performed by authorised specialist technicians and according to DIN VDE regulations (or equivalent national regulations) and the instructions of the utility company.</li> <li>• The electrical control is connected to the power mains with the supplied power cable with safety plug, or by means of an external power cable.</li> <li>• The plant must be supplied with 230/115 VAC, 50/ 60 Hz or with 24 VDC and protected by a 1.6 A fuse.</li> <li>• If the system is powered through an external cable, install a mains disconnect device (external switch) close to the plant.</li> <li>• A wire cross-section of 3x0.75mm<sup>2</sup> (AC) or 2x0.75mm<sup>2</sup> (DC) is required for connection to an external power supply.</li> <li>• <b>The wire ends to be connected to the control unit must be equipped with wire-end ferrules.</b></li> <li>• <b>All electrical connections must be tested prior to commissioning.</b></li> <li>• <b>All electrical connections must be established by a qualified electrician.</b></li> </ul>

## 4.2. Connection PCBs

### 4.2.1. Basic control PCB

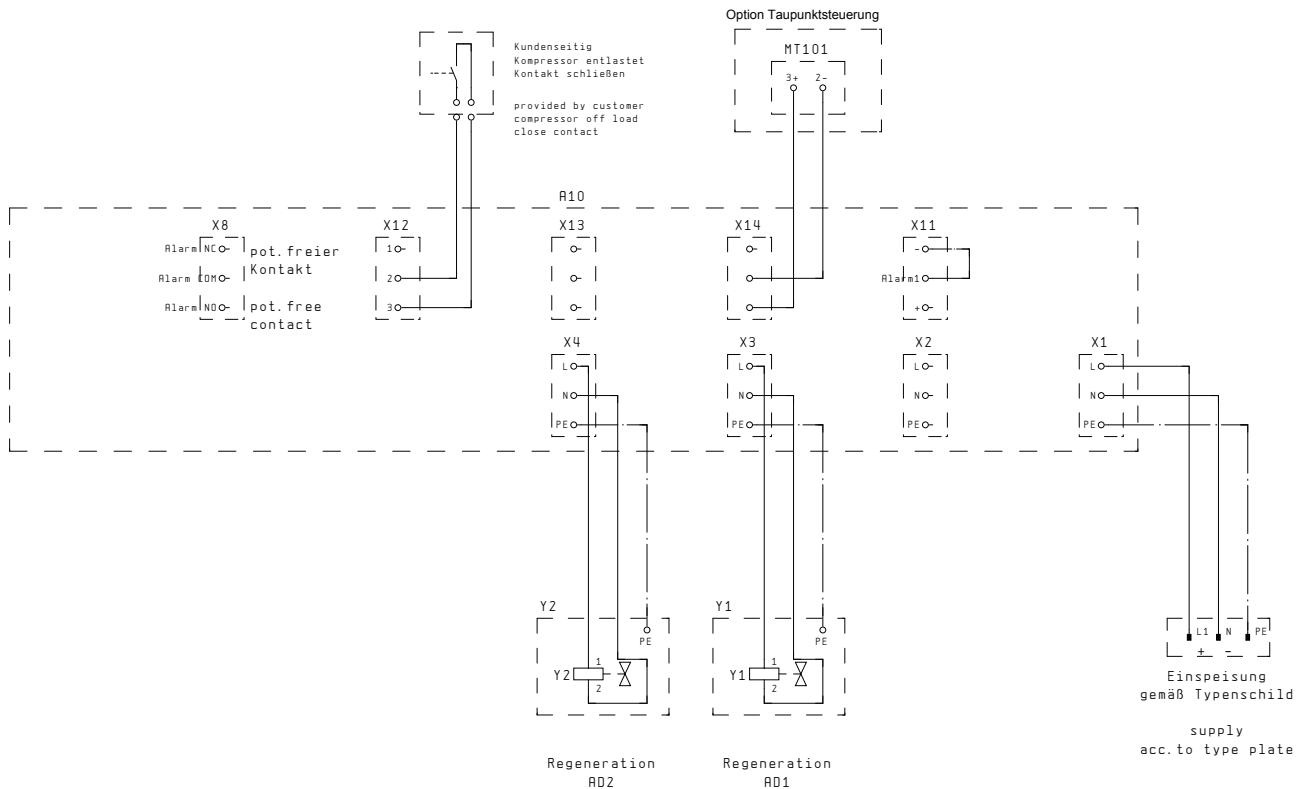
The connecting points consist of screwless spring terminals.



Connection	Terminal strip	Terminal		
		1	2	3
Mains, 115 VAC / 230 VAC / (24 VDC)	X1	L1 (+)	N (-)	PE
Output, 115 VAC / 230 VAC / (24 VDC)	X2	L1 (+)	N (-)	PE
Regeneration valve container 1	X3	L1 (+)	N (-)	PE
Regeneration valve container 2	X4	L1 (+)	N (-)	PE
Adsorption valve container 1	X5	L1 (+)	N (-)	PE
Adsorption valve container 2	X6	L1 (+)	N (-)	PE
Stand-by valve	X7	L1 (+)	N (-)	PE
Alarm output (changeover, floating)	X8	NC	Common	NO
Supply voltage 12 VDC/ Alarm 1 inlet / drain	X11	(-) GND	Alarm UFM-T	(-) 12 V
Intermittent operation	X12		(-) GND	Interm.
not in use	X13			
Dew point transmitter	X14		(-) Dew point	(-) 12 V

### 4.3. Connection to power supply

For the electrical installation, refer to the table and wiring diagrams below.



### 4.4. Function of electrical control

#### 4.4.1. Standard control

The standard version of the electrical control features a display where the current states of the plant are indicated by means of LEDs. The control is equipped with a floating general alarm contact that is available as an NO or as an NC contact. The control can be linked with the compressor control as described in “2.3.2.5. Intermittent operation”. This option is particularly energy-efficient for intermittent compressor operation, as the adsorption dryer is only in operation while the compressor is running.

#### 4.4.2. Load-dependent control (dew point control)

This electronic control option allows for a range of programming and configuration options. The plant can thus be programmed and configured to meet specific requirements, so that cycle times are optimised and regeneration air consumption is minimised while operational safety is maximised.

The relevant control parameters can be configured directly in the control. This ensures that the plant is optimised for the actual requirements and site conditions.

A general error signal can for example be sent through a floating contact to a process control system. In addition, the control is equipped with an input port as standard, so that signals can be exchanged with the compressor. This option is particularly energy-efficient for intermittent compressor operation, as the adsorption dryer is only in operation while the compressor is running.

The control system allows for dew-point controlled capacity control.

By installing a dew point sensor, dew point changes are detected quicker and more reliably. Energy costs are reduced, and the adsorbent capacity is fully utilised, as the drying time is adjusted, preventing undesirable dew point peaks.

The text display of the control unit indicates the current operating states as well as service and alarm messages in plain text.

The electronic control unit is a modular system.

As all models feature a basic PCB, the standard control unit can be upgraded with dew point control.

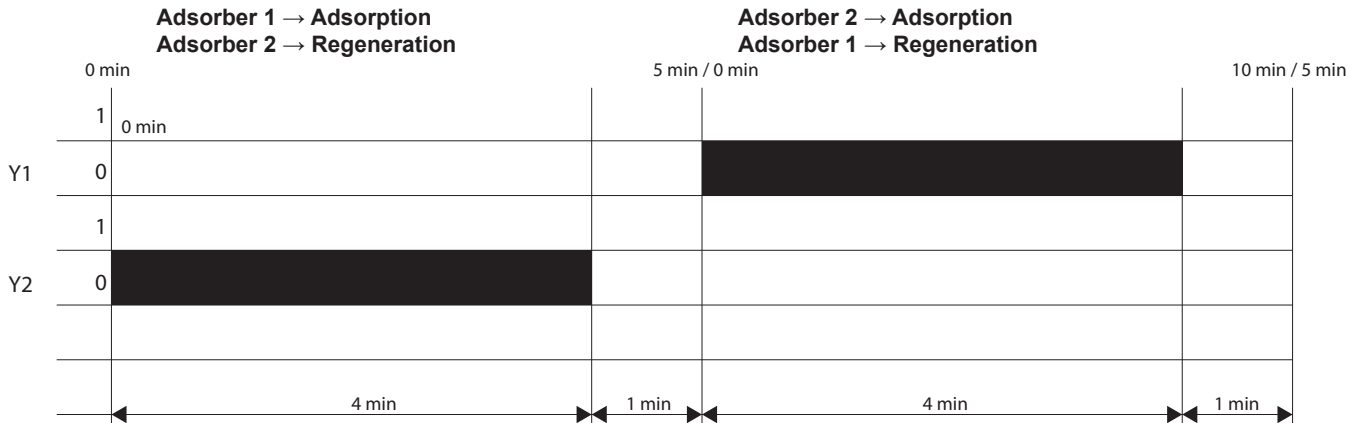
Plants featuring the previous control unit version can be upgraded with one of the latest generation, as all control units have the same dimensions.



**4.4.3. Time control**

In time control mode, the adsorption cycle for an adsorber is set to 5 minutes.

This adsorption time results from a regeneration time of 4 minutes and a pressure build-up time of 1 minute for the regenerating adsorber.



**4.4.4. Dew point control (optional)**

With dew point control, the adsorption cycles of cold-regenerated adsorption dryers can be adjusted on the basis of the actual operating conditions. This normally results in longer adsorption cycles, while the regeneration time remains the same, so that less regeneration air is used.

The user chooses the operating mode (time control or dew point control) at the text display.

The criterion for the extension of the adsorption cycle is the pressure dew point at the dry air outlet of the adsorption dryer. This pressure dew point is determined by a dew point sensor.

With dew point control, a processing window is defined in the control programme. The two switching points define the time during which dew point control is to be activated.

Standard settings for switching points: A = -48 °C; B = -43 °C. Switching point B is automatically set by the control system.

These settings are always applied, if there are no special customer requirements (e.g. pressure dew point must be < -60 °C).

In dew point control mode, the adsorption dryer continues adsorbing moisture in one of the two adsorber vessels, until the pressure dew point at the dry air outlet reaches the value set for switching point B.

When switching point B (= -43 °C) is reached, the system continues operation with time mode cycles (5 minutes adsorption, 4 minutes regeneration, 1 minute pressure build-up), until the set pressure dew point is reached at switching point A (= -48 °C). Subsequently, the control switches back to dew point-controlled cycles until the pressure dew point at the dry air outlet reaches again the value set for switching point B.

During the stand-by phase (with load-controlled extended cycle), the regenerated container remains under operating pressure, so that the adsorber can be switched over instantly from regeneration/stand-by to adsorption. The current stand-by time is shown on the display.

**4.5. Alarm states**

If an alarm occurs, the control switched to safety mode. This is indicated on the display ("safety mode", only in version with dew point control). Press the MODE button to call up the associated fault message, indicating the cause of the problem. If more than one fault occurred at the same time, repeatedly press the MODE button to view the individual fault messages.

## 4.6. Alarm inputs

The control unit features 2 alarm inputs. Terminal X11- 2 is connected to the condensate drain alarm device. Terminals X13- 2 and X13- 3 are connected to a differential pressure alarm device (optional). The differential pressure alarm is not configured in DRYPOINT® AC models. Both alarm inputs are NC contacts. This means that, if they are not wired for alarm input, they must be configured with a wire bridge. NC contacts are used to provide wire-break protection.

If an alarm is triggered, the alarm output (terminal X8) is switched. The alarm switches a floating contact (changeover). The user is warned by a red LED in the housing cover that an alarm has occurred (with standard and load-dependent control).

## 4.7. Software-generated alarms (with dew point control only)

The control system features a number of safety functions. If certain faults occur, an alarm signal is generated. This applies to the following functions:

- Dew point transmitter open
- Short circuit at dew point transmitter
- Dew point preliminary alarm
- Dew point alarm

## 4.8. Intermittent operation

If terminals **X12- 2 and X12- 3** are connected to a floating contact of the compressor (**open when compressor is running**), intermittent operation is active (see also “2.3.2.5. Intermittent operation”). The compressor runtime is determined as the total runtime from the start of the pressure build-up phase. At the end of the adsorption phase, the system determines whether the runtime was longer or shorter than the set factor (e.g. 1 minute). If the runtime is shorter, the control system automatically closes the regeneration valves and sets the system to **STAND-BY** mode.

When the compressor restarts the next pressure build-up cycle (i.e. air is extracted), the program continues and the system resumes operation.

## 4.9. Behaviour in the event of a power failure

The control system includes an intelligent data saving system. In the event of a mains voltage dip or failure, the control system saves all relevant data. When the power returns, the control system initiates a pressure build-up and then continues operation from the point at which the interruption occurred.

# 5. Start-up

## 5.1. Commissioning

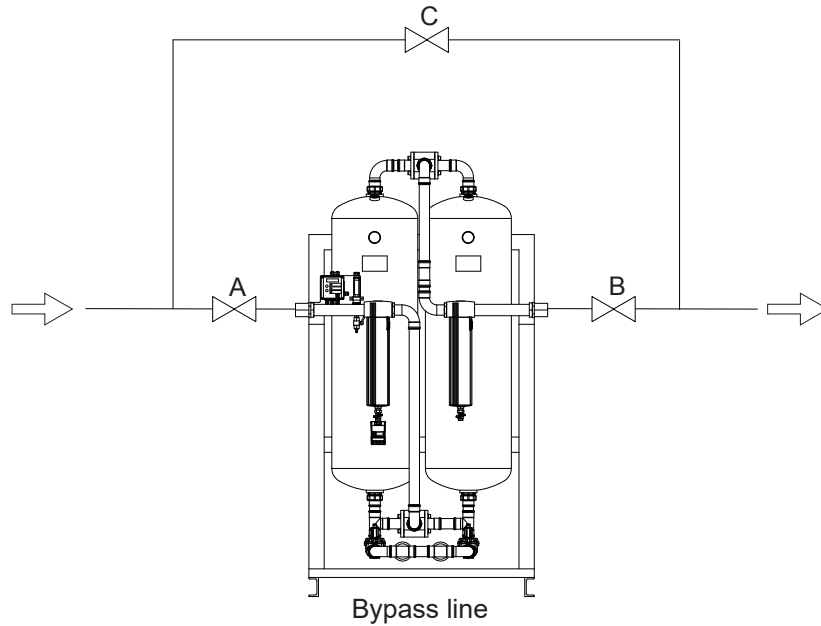
Before commissioning the plant, ensure that the pressure vessels are equipped with the necessary safety devices, e.g. devices to prevent excessive pressure, safety valve, etc.

These devices are not included in the scope of delivery of the plant.

To prevent any problems during commissioning, we recommend having the plant commissioned by BEKO service technicians.

To commission the plant, observe the instructions in “1.4. Transport and storage” and perform the tasks below in the prescribed sequence:



1. Make sure that valves A and B in the bypass line (optional) are closed and that the electronic control system is switched off.



2. Slowly pressurise the plant by opening valve A slowly.  
Constantly check the pressure at the pressure gauges. Both adsorbers must reach operating pressure.
3. Switch on the power supply to the electronic control.
4. The control system starts the pressure build-up phase in the two adsorbers. Subsequently, the regeneration phase is started in one adsorber, while the adsorption phase is started in the other.
5. Note that moisture from the ambient air might have entered the vessels and the adsorbent during transport and/or storage of the plant. Before commissioning the plant, it should therefore be regenerated for minimum 3 hours before shut-off valve B to the compressed air system is opened!
6. Slowly open valve B, thus connecting the plant to the compressed air system.
7. If valve C was open during commissioning, close it.

The plant is now fully commissioned and works automatically and continuously from now on.

## 6. Operation

<b>WARNING</b>	<b>Risk of personal injury during plant operation</b>
  	<p>During plant operation, the following mechanical risks exist: Sudden pressure relief in components such as the silencers; loud blow-out noise during pressure release.</p> <ul style="list-style-type: none"> <li>• When working with or on the plant, always wear hearing protection.</li> </ul>

### 6.1. Operating mode

When the plant is in operation, you can select the desired operating mode, i.e. "time control" (see "4.4.3. Time control", page 33) or "dew point control" (see "4.4.4. Dew point control (optional)", page 33) at the text display.

In standard operating mode, the plant is run continuously and automatically.

With intermittent operation (see "4.8. Intermittent operation", page 34), the plant remains in stand-by mode after completion of the pressure build-up, and if no compressed air is consumed.

Stand-by state is indicated on the standard control unit by an LED. In the version with dew point control, it is indicated in plain text.

### 6.2. Service mode

In service mode, service messages are displayed and can be acknowledged. These messages are displayed, if service A or B must be performed and when a service has been completed (see "2.3.4.1. Service messages (standard version)", page 17).

## 7. Maintenance and servicing

### 7.1. Maintenance intervals

#### 7.1.1. Filter elements

To ensure trouble-free operation of the plant and its components, the filter elements must be replaced when a message instructing you to do so is displayed, or latest after 8760 operating hours or 1 year.

#### 7.1.2. Adsorbent

Liquid oil can destroy the adsorbent, which results in significantly impaired plant performance. We therefore strongly recommend replacing the filters at regular and appropriate intervals.

Non-compliance with the operating conditions (i.e. excessively high inlet temperature or insufficient operating pressure) can result in an overload of the adsorbent, causing malfunction of the plant.

To ensure trouble-free operation of the plant and its components, the adsorbent must be changed when a message instructing you to do so is displayed, or latest after 26,250 operating hours or 3 years.

#### 7.1.3. Service inspection tasks

1. Visual inspection of the adsorption dryer and the filters
2. Inspection of the prefilter and afterfilter elements and replacement of the filter elements
3. Inspection and cleaning of the condensate discharge
4. Inspection and testing of all filters; clean and lubricate, if necessary
5. Inspection of the silencers; replace, if necessary
6. Inspection of all electrical components and indicators
7. Inspection of the adsorbent and replacement according to service interval
8. Pressure leakage test
9. Test run and final check
10. Testing of adsorption dryer switching
11. Restarting of plant
12. Compressed air quality check
13. Documentation of inspection tasks with date, etc. in service report


#### 7.1.4. Service intervals

Service A (annual service interval): after 52500 cycles or 8760 hours  
 Service B (3-yearly service interval): after 157,500 cycles or 28,000 hours

#### 7.1.5. Service tasks

The table below provides an overview of the service tasks and their purpose for services A and B.

Service	Scope	Cycle
Service A	Filters Wearing parts	52,500 cycles 8760 hours - max. 10,000 hours
Service B	Adsorbent and complete service A	157,500 cycles 26,250 hours - max. 28,000 hours

NOTE	Content of service kit
	The prefilter and afterfilter elements and the BEKOMAT® wearing parts are not included in the service kits and must be ordered separately.

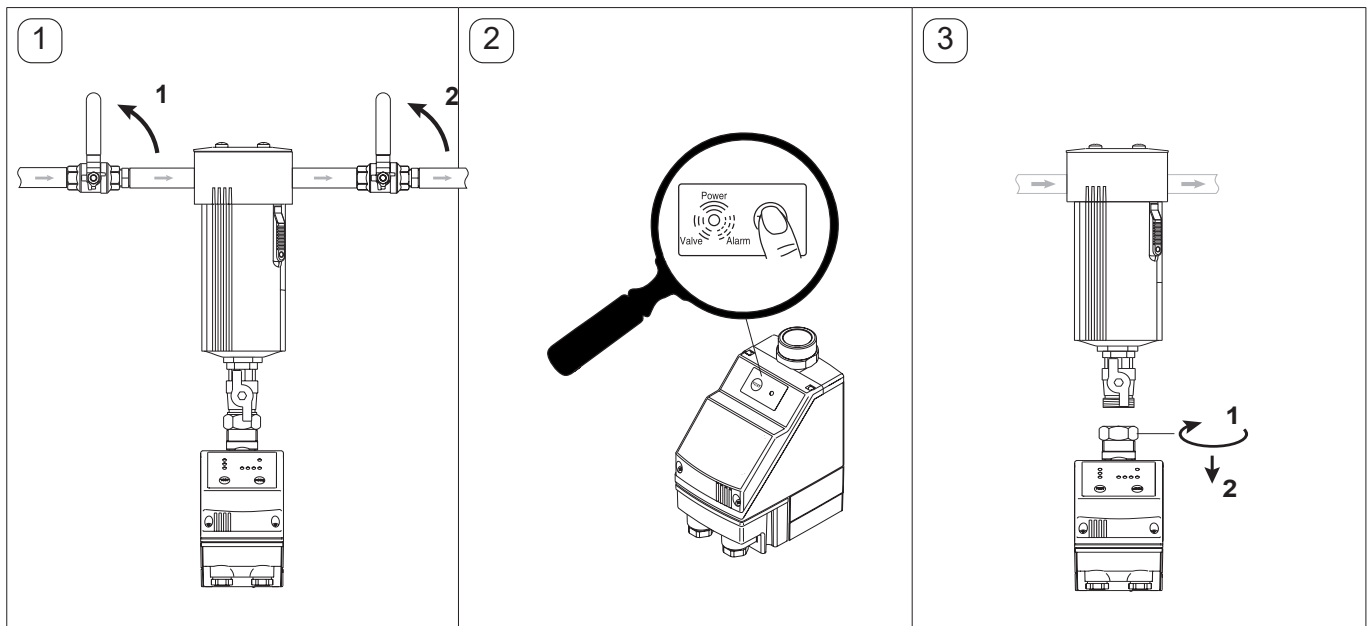
### 7.2. Maintenance schedule

The manufacturer recommends performing the following maintenance tasks within the prescribed maintenance intervals.

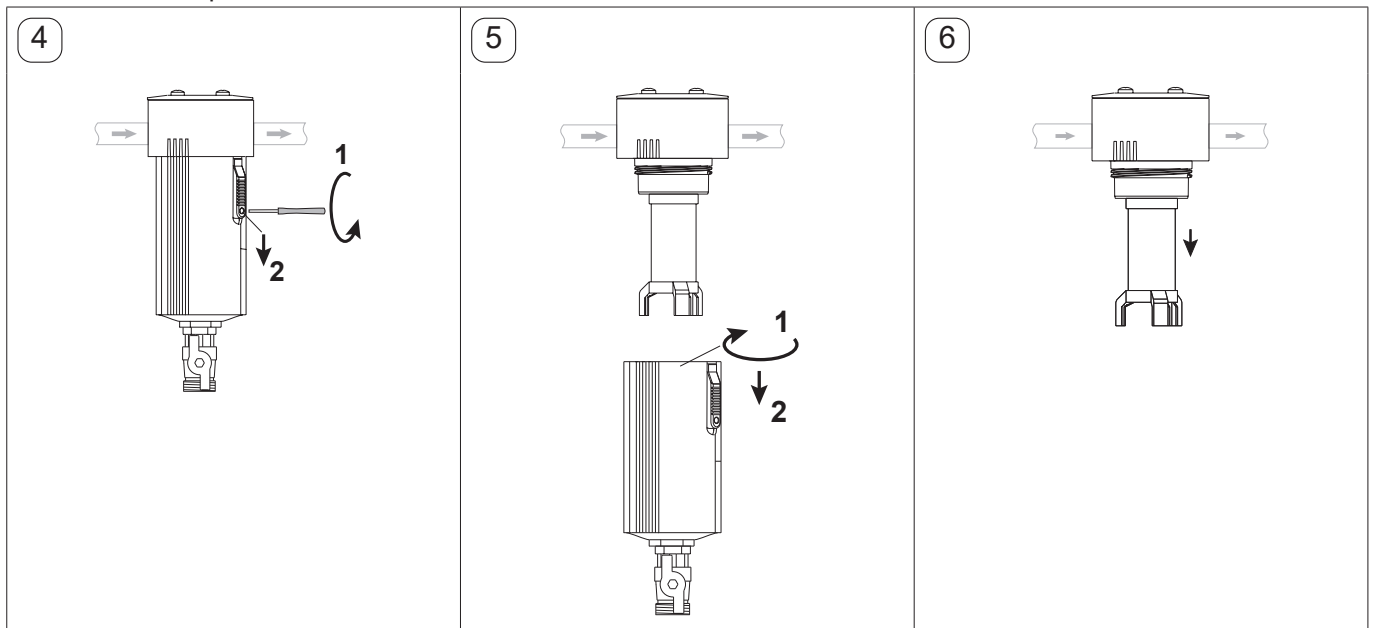
DRYPOINT® AC 410 – 495	Type Comment	3 months	6 months	12 months	24 months	3 years	5 years
Inspection	<b>Check/clean:</b> Condensate drain at prefilter Silencers Shuttle valves Solenoid valve  <b>Check:</b> Adsorbers, adsorbent			X			
Service kit for service A				X			
Service kit for service A						X	
Calibration of dew point transmitter	Dew point control			X			

### 7.3. Replacing filter elements

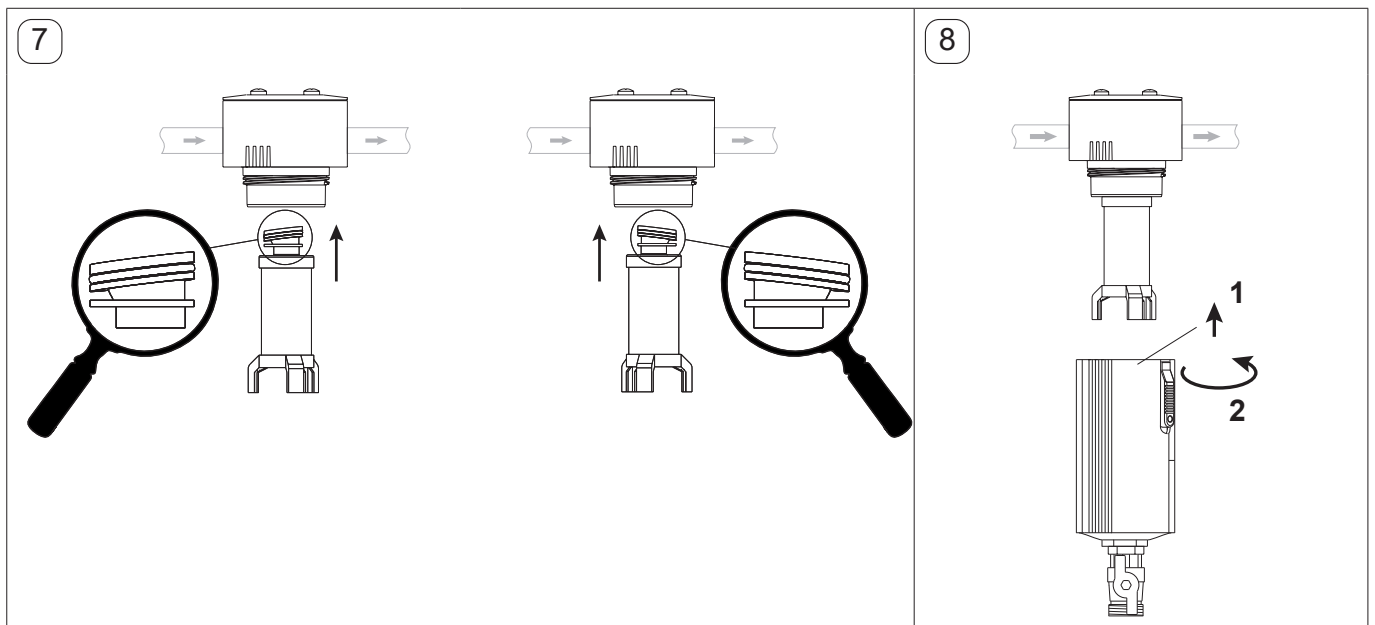
1. Close all shut-off valves in the gas inlet and outlet lines.
2. Depressurise the BEKOMAT® by pressing and holding the TEST button.
3. Disconnect the BEKOMAT®.



4. Loosen the screws of the slider. An audible signal indicates that the housing is fully depressurised! After all pressure has been released, open the slider.
5. Unscrew the bottom part of the housing.
6. Remove the spent filter element.



7. Insert the new filter element. Caution: The upper end cap must be installed according to the angle in the element seat.
8. Mount the bottom part of the housing.

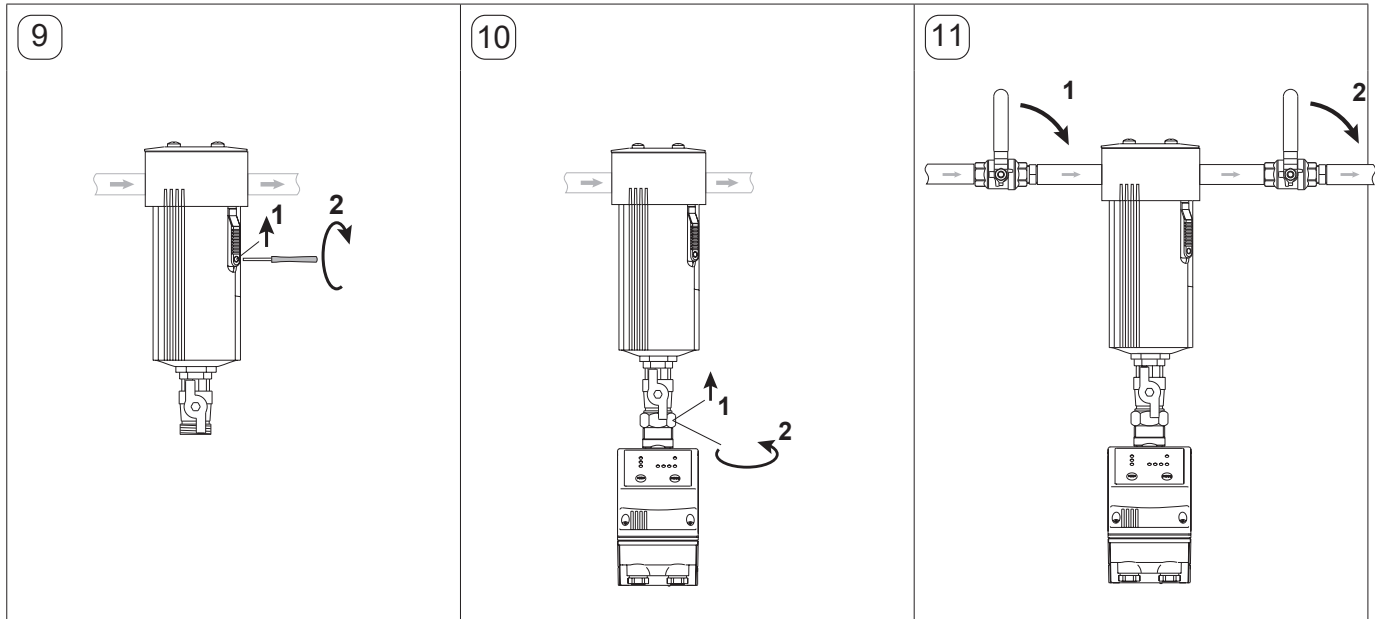


9. Lock the slider and tighten the screw.

10. Mount the BEKOMAT®.

11. Slowly pressurise the filter by carefully opening the shut-off valves.

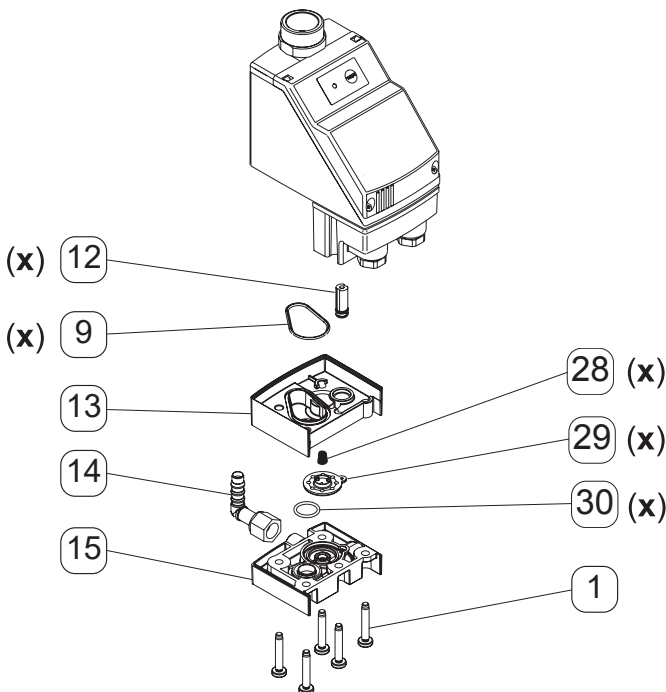
Note down the next filter element change date in the maintenance schedule and on the supplied adhesive label. Apply the label to the filter housing body in a position where it is clearly visible. Check your stock and order new elements, if necessary.



**7.4. Maintenance of BEKOMAT® 20 FM condensate drain**

**Preparation:**


- Depressurise the BEKOMAT®!
- De-energize the BEKOMAT®!




**Maintenance recommendation:**

- Unscrew the elbow connector (14).
- Open the inlet side fitting of the BEKOMAT®.
- Loosen the 5 TORX screws (1) and remove the parts (9, 12 - 15 and 28 - 30).
- Caution: Do not remove the core guide pipe.
- Clean the parts.
- Replace the wearing parts (x).
- Reassemble and install the BEKOMAT®.


**7.5. Maintenance of 2/2-way solenoid valve**

<b>DANGER</b>	<b>Incorrect performance of inspection and maintenance tasks</b>
	<p>Incorrectly performed inspection and maintenance tasks can cause serious or even fatal injury and/or damage to property. Deposits and dirt on components, and seals that are worn or have been damaged by ageing might result in plant malfunction.</p> <ul style="list-style-type: none"> <li>• All maintenance work must be performed by trained technical personnel and with suitable tools.</li> <li>• Before carrying out any maintenance work, depressurise the piping system and disconnect the solenoids from the power supply. It is not necessary to remove the valve from the piping system.</li> <li>• Spare parts are available in the form of wearing parts kits. For order numbers, see spare parts lists in the appendix.</li> </ul>

<b>NOTE</b>	<b>Responsibility for the proper performance of inspection and maintenance tasks</b>
	<p>It is the responsibility of the plant operator to devise appropriate inspection and maintenance intervals, with reference to the actual operating conditions of the valve.</p>


In addition to the prescribed services, we recommend servicing/cleaning based on the actual operating conditions, and also in the event of noticeable changes to the switching times or if there are audible switching noises. Depending on the ambient conditions, the solenoid should be inspected for cracks and deposits and proper electrical connection. Check the seal to make sure that there is no leakage.

**7.5.1. Installation**

<b>NOTE</b>	<b>Handling of solenoid</b>
	<ul style="list-style-type: none"> <li>• Do not use the solenoid as a lever!</li> <li>• The solenoid can be installed in any position.</li> <li>• We recommend however installing it vertically facing upwards, as this reduces the risk of wear and contamination.</li> </ul>

- Inspect the solenoid valve for visible damage.
- Before installing the valve, clean the piping system. Dirt can cause malfunctions.
- Do not remove the protective caps at the connections until just before installation into the piping system.
- To seal the fitting thread G according to DIN ISO 228-1, we recommend using PTFE sealing tape.
- Prevent stress on the valve housing that might be caused by improperly aligned pipes or the use of unsuitable tools and sealing materials.

**7.5.2. Electrical connection**

<b>DANGER</b>	<b>Electric power</b>
	<p>Incorrect connection or damaged components can cause serious or even fatal injury.</p> <ul style="list-style-type: none"> <li>• Connect the protective conductor to the terminal marked for this purpose!</li> <li>• Prior to pressurising the system, we recommend performing a function test. A clicking noise must be audible when the system switches over (magnet armature reaches stop).</li> <li>• Before connecting a plug to a device socket, ensure that the socket is not powered!</li> <li>• DC solenoids are destroyed when operated without magnet armature.</li> </ul>

Connect the solenoid according to the relevant electro-technical regulations and standards. After connection, seal the terminal chamber to achieve the necessary protection class. Ensure that the cable opening is properly sealed and that the gasket between the solenoid and the device socket is correctly positioned. Protection class IP 65 can only be achieved with proper installation and sealing. Tighten the central screw of the device sockets with max. 60 Ncm. Avoid deformation of the housing! For connections marked "+" and "-", ensure correct polarity! Connections that are not marked can be connected to any of the conductors.



### 7.5.3. NC function

#### Closed:

The pressure spring in the magnet armature closes the pilot seat.

The diaphragm is pushed by a closing spring onto the main valve seat.

The process fluid flows through the control bore in the diaphragm into the control chamber above the diaphragm, thus increasing the closing force.

#### Open:

After the electric power is switched on, the magnet armature is pulled by magnetic force against the pole surface of the magnet sleeves.

The pilot seat is now open and the fluid pressure in the control chamber is reduced, as fluid is released through the valve. The amount of fluid escaping from the control chamber through the pilot seat is greater than the amount that flows into the chamber through the control bore in the diaphragm. A pressure difference is established, lifting the diaphragm so that the main valve seat is opened.

### 7.5.4. Troubleshooting

Symptom	Possible cause	Remedy
Valve failure		Control voltage must be > 90 % of the rated voltage. If the operating voltage is low and the power cables are long, choose a large conductor cross-section to minimise the voltage drop. Measure the control voltage just in front of the solenoid.
	Fuse loose or tripped	Check fuse.
	Solenoid defective, no flow	Replace coil.
	Operating pressure too high	Check max. operating pressure and reduce, if necessary.
	Crack in diaphragm	Replace diaphragm.
	Valve dirty	Clean control bores.
	Magnet armature blocked	Clean magnet armature and sleeve.
Valve seat not tight		Clean valve; if the seat area is heavily contaminated: replace diaphragm.

#### 7.5.4.1. Replacing solenoid

Shut down the power supply. Loosen the central screw of the device socket and remove the socket.

Disengage the spring bracket and remove the solenoid. If the O-ring on the magnet sleeve has become brittle, replace it.

Place the new solenoid on the sleeve so that the spring bracket engages in the groove. Push in the spring bracket to engage it properly. Turn the solenoid into the desired position and mount the device socket with the seal.

Tighten the central screw of the device socket with max. 60 Ncm.

#### 7.5.4.2. Replacing diaphragm

Depressurise the valve and shut down the power supply.

Disengage the spring bracket and remove the solenoid.

Loosen the screws of the cover and remove the valve cover. Remove the pressure and the diaphragm.

Install the new diaphragm on the valve housing as shown in the drawing. Mount the valve cover and tighten the cover screws crosswise.

#### Tightening torques for screws

M4 = 2.0 Nm±10 %

M5 = 3.6 Nm±10 %

M6 = 6.0 Nm±10 %

M8 = 16.0 Nm±10 %

M10 = 31.0 Nm±10 %

**7.5.4.3. Replacing magnet armature (NC function)**

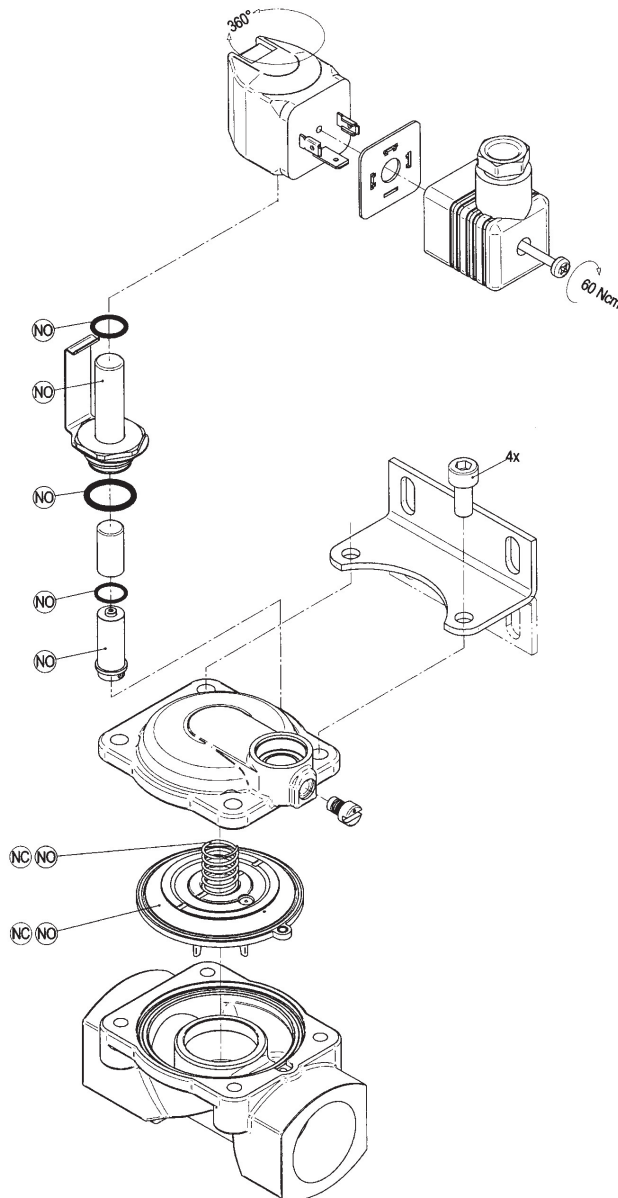
Depressurise the valve and shut down the power supply.  
 Disengage the spring bracket and remove the solenoid. If the O-ring on the magnet sleeve has become brittle, replace it. Remove the size 22 screw element. Remove the magnet sleeve together with the screw element and the spring bracket. Remove the O-ring from the groove.  
 Replace the pressure spring and the magnet armature. Slide a new O-ring onto the collar of the magnet sleeve and mount the magnet sleeve as shown in the drawing. When the screw element is screwed in, the O-ring is pushed into the correct position to seal the device properly. Tightening torque for screw element: 20 Nm ± 10 %.

**7.5.4.4. Replacing manual assisted actuation device**


Depressurise the valve and shut down the power supply.  
 Disengage the spring bracket and remove the solenoid. If the O-ring on the magnet sleeve has become brittle, replace it. Remove the size 22 screw element. Remove the magnet sleeve together with the screw element and the spring bracket. Remove the O-ring from the groove.  
 Replace the manual assisted actuation device. Slide a new O-ring onto the collar of the magnet sleeve and mount the magnet sleeve as shown in the drawing. The collar of the magnet sleeve must engage in the groove of the manual assisted actuation device. By screwing in the screw element, the O-ring is pushed onto the collar of the magnet sleeve to seal the device.  
 Tightening torque for screw element: 20 Nm ± 10 %.

**7.5.4.5. Figure: Spare parts**

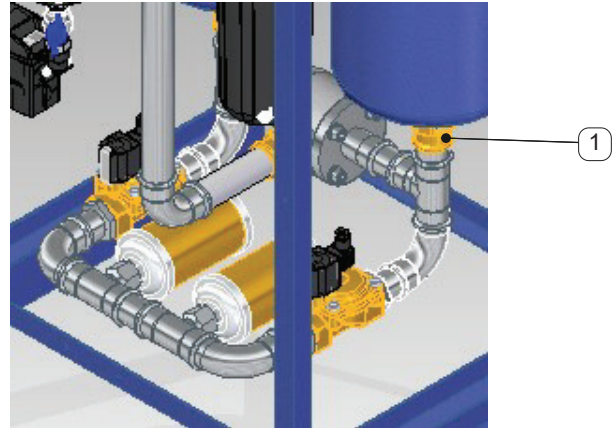
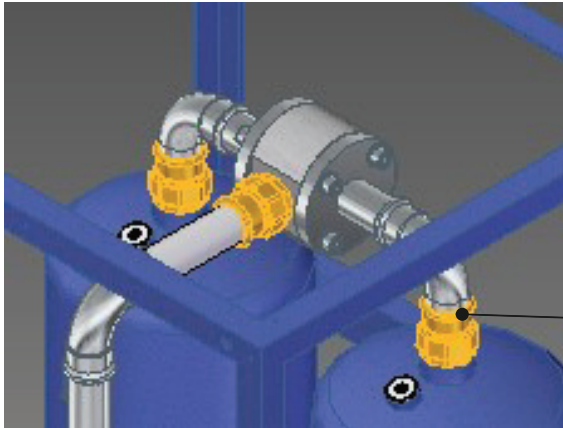
Parts marked with "NC" and "NO" are included in the wearing parts kit (see "7.8. Spare parts").




**7.6. Maintenance of shuttle valves**

<b>DANGER</b>	<b>Incorrect performance of maintenance work</b>
	Incorrectly performed maintenance tasks can cause serious or even fatal injury and/or damage to property.
	<ul style="list-style-type: none"> <li>All maintenance work on the shuttle valves must be performed by specialist technical personnel.</li> </ul>

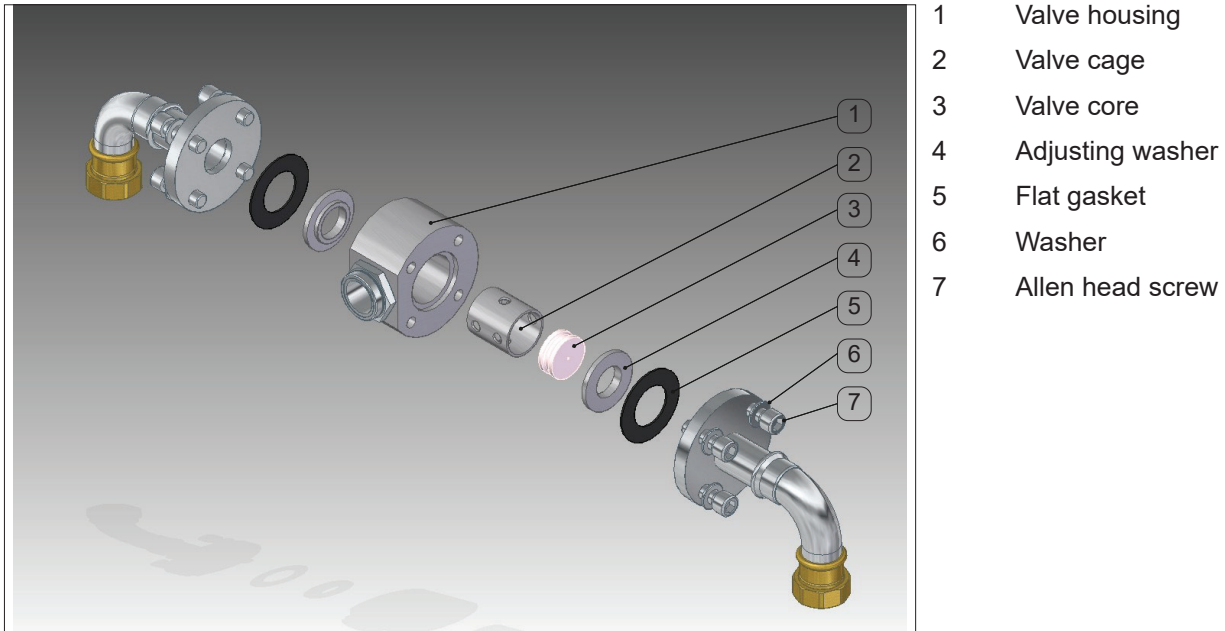
1. Shut down the plant.
2. Depressurise the plant.
3. Disconnect the entire upper or lower piping from the adsorption dryer. To do this, open the three union nuts of the fittings (1).



<b>CAUTION</b>	<b>Performance of maintenance work</b>
	Incorrectly performed maintenance tasks can cause damage to the equipment.
	<ul style="list-style-type: none"> <li>Please note that the valve core of the upper shuttle valve features a bore. If this bore is blocked, regeneration and pressure build-up are not possible.</li> <li>The valve core of the lower shuttle valve does not feature a bore.</li> <li>Observe the maximum permissible tightening torques for the Allen head screws (M12: 40 Nm / M16: 95 Nm).</li> </ul>




#### 4. Disassemble the shuttle valve as follows:


- Unscrew the Allen head screws (7) and the washers (6).
- Remove the shuttle valve housing (1).
- Remove the adjusting washers (4).
- Replace the valve cage (2) and the valve core (3).
- Reassemble the parts by performing the above steps in reverse order.
- Ensure that the valve cage (2) and the adjusting washer (4) are properly positioned.
- Use new flat gaskets (5) to seal the device.



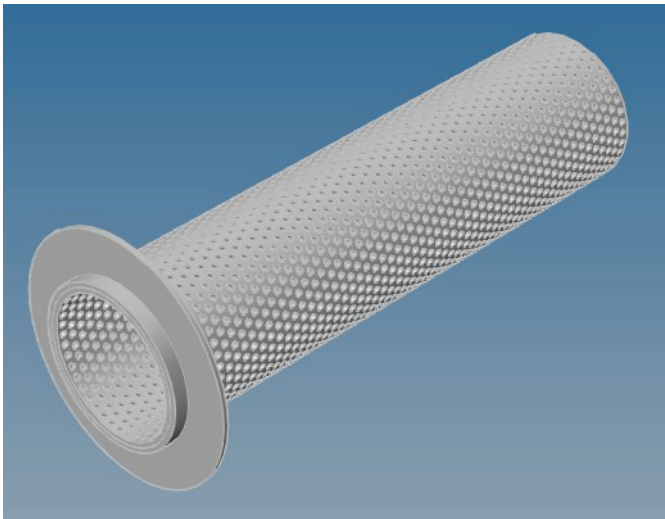
5. Connect the complete upper or lower piping to the adsorption dryer. To do this, tighten the union nuts of the fittings at the adsorber or the pipes respectively.
6. Insert new flat gaskets into the fittings.
7. Pressurise the plant.
8. Restart the plant.

7.7. Replacing adsorbent

<b>WARNING</b>	<b>Health risk from adsorbents</b>
  	<p>Risk of injury to eyes and injury from ingestion</p> <ul style="list-style-type: none"> <li>• <b>The adsorbent must be replaced by specialist technical personnel.</b></li> <li>• In the case of contact with the eyes, rinse thoroughly with plenty of water. Always consult a doctor.</li> <li>• After ingestion, immediately consult a doctor.</li> <li>• Spilled adsorbent must be removed without causing airborne dust.</li> <li>• When removing or adding adsorbent to the absorption dryer, wear a dust mask (recommended protection class: P2 or FFP2).</li> </ul>

<b>NOTE</b>	<b>Maintenance interval</b>
	<p>Interval: after 26,250 operating hours or maximum 3 years</p>

1. Shut down the plant.
2. Depressurise the plant.
3. Disconnect the complete upper or lower piping of the adsorption dryer. To do this, open the union nuts of the fittings at the containers and the shuttle valve housing.
4. Keep a suitable number of collecting containers (plastic bags or buckets) ready to collect the adsorbent.
5. The fittings of the containers contain flow distributors that are placed loosely in the fittings and keep the adsorbent in the containers. Carefully pull the lower flow distributor from the fitting. Collect the escaping adsorbent in the collecting containers.




## 7.8. Spare parts

DRYPOINT® AC	410	415	418	423	430	438	455	465	485	495
Service kit for service A: Repair kit for solenoid valve silencer shuttle valve wearing parts	4035391	4035393	4035394	4035395	4035396	4035397	4035398	4035399	4035400	4035401
Wearing parts kit for condensate drain	4003051									
Adsorbent container	on request									
Gas distributor	4035693		4035694				4035695			
Prefilter	4002851	4006097	4006097	4002853	4002854	4002855	4022589	4006450	4002858	4002858
Afterfilter	4004844	4006098	4006098	4004846	4004847	4004848	4032870	4006451	4006451	4006451
O-ring + filter element (PDP control)	4035705									
2/2-way solenoid valve	4035696		4035697				4035698			
Pressure gauge	4035699									
Shuttle valve	on request									
Wearing parts kit for upper + lower shuttle valve	4035700		4035701				4035702			
Replacement standard control	4035703									
Replacement PDP control	4035704									
BEKOMAT® 20 FM condensate drain	4003051									
SD21 pressure dew point transmitter*	4024282									
Inline filter*	on request									
Piping sealing kit	on request									

\* with dew point control

## 8. Troubleshooting and repair

<b>DANGER</b>	<b>Incorrect troubleshooting and repairs</b>
	Incorrectly performed troubleshooting and repair tasks can cause serious or even fatal injury and/or damage to property.
	<ul style="list-style-type: none"> <li>All troubleshooting and repair work must be performed by suitably instructed or trained specialist technical personnel!</li> </ul>

In this chapter, you learn about:

- Malfunctions and failures that might occur
- Causes of malfunctions and failures
- Action to be taken to eliminate the cause of a malfunction or failure (see tables below)

Always write down the operating state and parameter settings at the time at which the fault occurred.

To eliminate a fault, you must shut down the plant. Observe the instructions below:

- Shut down the plant.
- To shut down the plant, proceed as described in “9. Shutting down plant”. Attach a warning sign to the plant: "Do not switch on plant!".
- If necessary, depressurise the plant (see “9.1. Depressurising plant”).
- After completion of the work, restore the plant to its initial state.

### 8.1. Possible causes of faults

Before starting a systematic troubleshooting process, check the following:

- Is there any visible damage to the plant or are there plant parts missing?
- Is the plant correctly powered and does the supply voltage correspond to that specified on the type plate?
- Are all electrical components inside the plant powered?
- Are all pneumatically actuated components supplied with control air and does the control air pressure correspond to that specified on the type plate (minimum pressure)?
- Has the plant been correctly commissioned and started (see also “5. Start-up”)?
- Are all external shut-off fittings in the correct position (see also “5. Start-up”)?
- Do the feed parameters (max. throughput rate, min. operating pressure, max. inlet temperature) correspond to the design parameter values?

Troubleshooting The tables contain information regarding the symptoms, causes and remedies for efficient troubleshooting.

Symptom	Possible cause	Remedy
Control unit not working properly; LEDs on front foil not lit	Unit not powered	Ensure that the terminals of the control are powered with the voltage specified on the type plate.
Alarm signal at alarm output (terminal strip X11) (if installed)	Fuse F1 defective (see page 31)	Disconnect the control system from the power supply; check the control unit and replace fuse, if required
	Control system defective	Check control unit; replace, if necessary
		<b>Contact customer service department</b>
High differential pressure at adsorption dryer	Filter elements blocked	Check differential pressure; replace filter elements, if necessary
	Flow distributors in containers blocked	<b>Contact customer service department</b>

Symptom	Possible cause	Remedy
Shuttle valves (9) fail to switch (see P&ID diagrams on page 16)	Solenoid valve (5) failed to open	Check solenoid valve; replace valve, if necessary <b>Shut down the plant (see “9. Shutting down plant”) and depressurise it (see “9.1. Depressurising plant”).</b>
	Shuttle valve (9) is defective	Check shuttle valve; replace defective components <b>Shut down the plant (see “9. Shutting down plant”) and depressurise it (see “9.1. Depressurising plant”).</b>
	Control unit defective	Check control unit; replace, if necessary
Pressure gauge indicates backup pressure during regeneration	Silencer blocked	Disassemble silencer; clean and replace, if necessary <b>Shut down the plant (see “9. Shutting down plant”) and depressurise it (see “9.1. Depressurising plant”).</b>
	Flow distributor in adsorber blocked	<b>Contact customer service department</b>
During absorption, the pressure gauge indicates a pressure that is too low, and the plant releases air during the pressure build-up phase	Solenoid valve (5) is not tight or fails to close properly	Check solenoid valve; replace valve, if necessary
	Shuttle valve (9) is not tight or fails to switch properly	Check shuttle valve; replace defective components <b>Shut down the plant (see “9. Shutting down plant”) and depressurise it (see “9.1. Depressurising plant”).</b>
Dew point too high	Air does not meet inlet conditions	Check medium throughput rate, pressure and temperature; readjust, if necessary
	Regeneration gas volume too small	<b>Contact customer service department</b>
	Condensate enters the adsorption dryer	Check prefilter and condensate drain at prefilter; replace filter element or condensate drain, if necessary <b>Shut down the plant (see “9. Shutting down plant”) and depressurise it (see “9.1. Depressurising plant”).</b>




**8.2. Troubleshooting of BEKOMAT® 20 FM**

Symptom	Possible cause	Remedy
All LEDs off	Fault in power supply Power supply PCB defective Control PCB defective	Check voltage against that specified on the type plate Check external and internal wiring Check plug connections Inspect PCBs for damage
TEST button pressed, but no condensate discharge	Feed/drain line blocked or closed Wear (seals, valve core, diaphragm) Control PCB defective Solenoid valve defective Pressure below minimum pressure Pressure above maximum pressure	Check feed/drain lines Replace wearing parts Check whether the valve opens with an audible click sound (repeatedly press TEST button) Inspect PCBs for damage Check operating pressure; if necessary, install low-pressure or vacuum drain
Condensate is only discharged while TEST button is pressed	Insufficient feed line incline; cross-section too small Excessively high condensate volume Sensor tube very dirty	Install feed line at an incline Install venting line Clean sensor tube
Device constantly blows off air	Control air line blocked Wear (seals, valve core, diaphragm)	Clean entire valve unit Replace wearing parts Clean sensor tube



**9. Shutting down plant**

For plants that are run in continuous mode, perform the following steps to shut down the plant:

1. Close the shut-off fittings behind the plant (valve B, see figures "Bypass line" on page 35).
2. Do not shut down the control unit until both adsorbers are fully regenerated.
3. Shut down the control unit by disconnecting the control box from the power supply.

NOTE	Shutting down
	<ul style="list-style-type: none"> <li>• After shutting down, no compressed air must flow through the plant, as this would result in an overload of the adsorbent, so that it can no longer be regenerated by the dryer system.</li> <li>• For plants that are operated in systems with discontinuous compressed air consumption, you must install a control suitable for intermittent operation.</li> </ul>



### 9.1. Depressurising plant

<b>WARNING</b>	<b>Blow-off noises during pressure release</b>
 	When compressed gas is released, it expands, which might result in a loud noise. <ul style="list-style-type: none"> <li>• Therefore always wear hearing protection!</li> </ul>

1. Shut down the plant, following the relevant instructions (see also “9. Shutting down plant”).
2. Close the shut-off fittings A and B (see figures "Bypass line" on page 35).
3. Press and hold the TEST button of the BEKOMAT® until all condensate is discharged and the plant is completely depressurised.



### 10. Dismantling and disposal

<b>NOTE</b>	<b>Safe disposal of plant components</b>
 	<ul style="list-style-type: none"> <li>• All plant components, materials and substance must be disposed of safely and in accordance with the applicable statutory waste disposal regulations.</li> </ul>

Dismantle the components and dispose of the various materials through the appropriate recycling channels.

The adsorbent must be disposed of according to special safety regulations. For instructions, contact the manufacturer's customer service department, who will perform this task for you.



# 11. Declaration of Conformity

BEKO TECHNOLOGIES GMBH  
 Im Taubental 7  
 41468 Neuss

GERMANY

Tel: +49 2131 988-0  
 www.beko-technologies.com



## EU-Konformitätserklärung

Wir erklären hiermit, dass die nachfolgend bezeichneten Produkte den Anforderungen der einschlägigen Richtlinien und technischen Normen entsprechen. Diese Erklärung bezieht sich nur auf die Produkte in dem Zustand, in dem sie von uns in Verkehr gebracht wurden. Nicht vom Hersteller angebrachte Teile und/oder nachträglich vorgenommene Eingriffe bleiben unberücksichtigt.

Produktbezeichnung: DRYPOINT AC  
 Modelle: 410, 415, 418, 423, 430, 438, 455, 465, 485, 495  
 Spannungsvarianten: 115 VAC, 230 VAC, 24 VDC  
 Max. Betriebsdruck: 16 bar  
 Produktbeschreibung und Funktion: Adsorptionstrockner zur Aufbereitung und Trocknung von Druckluft

**Druckgeräte-Richtlinie 2014/68/EU**

Angewandtes Konformitätsbewertungsverfahren: Kategorie I / Modul A  
 Angewandtes Regelwerk und Normen: AD2000  
 DIN EN ISO12100:2010  
 Fluidgruppe gemäß Art. 13 Gruppe 2

Baugruppe, bestehend aus folgenden drucktragenden Komponenten:

Typ	Benennung	Zul. Betriebsdruck	Kategorie	Modul	CE-Kennzeichnung gemäß	Seriennummer
465	Filtergehäuse, Vorfilter M020	16 bar	I	A	2014/68/EU	s. Typenschild
485, 495	Filtergehäuse, Vorfilter M022	16 bar	I	A	2014/68/EU	s. Typenschild
465	Filtergehäuse, Nachfilter M020	16 bar	I	A	2014/68/EU	s. Typenschild
485, 495	Filtergehäuse, Nachfilter M022	16 bar	I	A	2014/68/EU	s. Typenschild
465, 485, 495	Rohrleitungssystem, geschraubte, gepresste Fittings	16 bar	Art. 4, Abs. 3		keine	keine
423, 430, 438, 455, 465, 485, 495	Diverse Armaturen	16 bar	Art. 4, Abs. 3		Keine	Keine
423, 430, 438, 455, 465, 485, 495	Adsorberbehälter 1	16 bar	Einfacher Druckbehälter nach 2014/29/EU		2014/29/EU	s. Typenschild
423, 430, 438, 455, 465, 485, 495	Adsorberbehälter 2	16 bar	Einfacher Druckbehälter nach 2014/29/EU		2014/29/EU	s. Typenschild

Die Modelle 410, 415, 418, fallen in keine Druckgerätekategorie und sind gemäß Artikel 4, Absatz 3 in Übereinstimmung mit der in den Mitgliedstaaten geltenden guten Ingenieurpraxis ausgelegt und werden dieser entsprechend hergestellt.

**Niederspannungs-Richtlinie 2014/35/EU**

Angewandte Normen: EN61010-1:2010

Die Geräte mit der Betriebsspannung 24 VDC fallen nicht in den Anwendungsbereich der Niederspannungs-Richtlinie.

**EMV-Richtlinie 2014/30/EU**

Angewandte Normen: EN61326-1:2013 Emission: Klasse B,  
Immunität: Industrieller Bereich

**ROHS II-Richtlinie 2011/65/EU**

Die Vorschriften der Richtlinie 2011/65/EU zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten werden erfüllt.

Der Hersteller trägt die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung.

Unterzeichnet für und im Namen von:

Neuss, 02.09.2019

**BEKO TECHNOLOGIES GMBH**

  
i.V. Christian Riedel

Leiter Qualitätsmanagement International

**BEKO TECHNOLOGIES GMBH**  
 Im Taubental 7  
 41468 Neuss

GERMANY

Phone: +49 2131 988-0  
 www.beko-technologies.com



## EU Declaration of Conformity

We hereby declare that the products named below comply with the stipulations of the relevant directives and technical standards. This declaration only refers to products in the condition in which they have been placed into circulation. Parts which have not been installed by the manufacturer and/or modifications which have been implemented subsequently remain unconsidered.

Product designation: DRYPOINT AC  
 Types: 410, 415, 418, 423, 430, 438, 455, 465, 485, 495  
 Supply voltage versions: 115 VAC, 230 VAC, 24 VDC  
 Max. operating pressure: 16 bar  
 Product description and function: Adsorption dryer for compressed air

**Pressure Equipment Directive 2014/68/EU**  
 Applied conformity assessment procedure: Category I / module A  
 Applied regulations and standards: AD2000  
 DIN EN ISO12100:2010  
 Fluid group accordance Art. 13 Group 2

Assembly consisting of the following pressure-bearing components:

Type	Designation	Perm. Operating pressure	Category:	Modul	CE marking	Serial number
465	Filter housing, Preliminary filter M020	16 bar	I	A	2014/68/EU	Type plate
485, 495	Filter housing, Preliminary filter M022	16 bar	I	A	2014/68/EU	Type plate
465	Filter housing, afterfilter M020	16 bar	I	A	2014/68/EU	Type plate
485, 495	Filter housing, afterfilter M022	16 bar	I	A	2014/68/EU	Type plate
465, 485, 495	Piping system, screwed, pressed fittings	16 bar	Art. 4, para. 3		None	None
423, 430, 438, 455, 465, 485, 495	Various fittings	16 bar	Art. 4, para. 3		None	None
423, 430, 438, 455, 465, 485, 495	Adsorber tank 1	16 bar	Simple pressure vessel 2014/29/EU		2014/29/EU	Type plate
423, 430, 438, 455, 465, 485, 495	Adsorber tank 2	16 bar	Simple pressure vessel 2014/29/EU		2014/29/EU	Type plate

The Types 410, 415, 418 are not classified in any pressure equipment category. In accordance to article 4, section 3, they have been designed and manufactured according to sound engineering practice as applicable in the member states.

**Low Voltage Directive 2014/35/EU**

Applied harmonised standards: EN61010-1:2010

The devices with working voltage 24 VDC are not in the scope of the Low-Voltage Directive.

**EMC Directive 2014/30/EU**

Applied harmonised standards: EN61326-1:2013 Emission: Class B,  
Immunity: Industrial area

**RoHS II Directive 2011/65/EU**

The products meet the requirements laid down in European Directive 2011/65/EU concerning the restriction of the use of certain hazardous substances in electrical and electronic devices.

The manufacturer shall have sole responsibility for issuing this declaration of conformity.

Signed for and on behalf of:

Neuss, 02/09/2019

**BEKO TECHNOLOGIES GMBH**

i.V. Christian Riedel  
Head of International Quality Management

**BEKO TECHNOLOGIES GmbH**

Im Taubental 7  
 D - 41468 Neuss  
 Tel. +49 2131 988 0  
 Fax +49 2131 988 900  
 info@beko-technologies.com  
 service-eu@beko-technologies.com

**DE****BEKO TECHNOLOGIES LTD.**

Unit 11-12 Moons Park  
 Burnt Meadow Road  
 North Moons Moat  
 Redditch, Worcs, B98 9PA  
 Tel. +44 1527 575 778  
 info@beko-technologies.co.uk

**GB****BEKO TECHNOLOGIES S.à.r.l.**

Zone Industrielle  
 1 Rue des Frères Rémy  
 F - 57200 Sarreguemines  
 Tél. +33 387 283 800  
 info@beko-technologies.fr  
 service@beko-technologies.fr

**FR****BEKO TECHNOLOGIES B.V.**

Veenen 12  
 NL - 4703 RB Roosendaal  
 Tel. +31 165 320 300  
 benelux@beko-technologies.com  
 service-bnl@beko-technologies.com

**NL****BEKO TECHNOLOGIES  
(Shanghai) Co. Ltd.**

Rm. 606 Tomson Commercial Building  
 710 Dongfang Rd.  
 Pudong Shanghai China  
 P.C. 200122  
 Tel. +86 21 508 158 85  
 info.cn@beko-technologies.cn  
 service1@beko.cn

**CN****BEKO TECHNOLOGIES s.r.o.**

Na Pankraci 58  
 CZ - 140 00 Praha 4  
 Tel. +420 24 14 14 717 /  
 +420 24 14 09 333  
 info@beko-technologies.cz

**CZ****BEKO Tecnológica España S.L.**

Torruella i Urpina 37-42, nave 6  
 E - 08758 Cervelló  
 Tel. +34 93 632 76 68  
 Mobil +34 610 780 639  
 info.es@beko-technologies.es

**ES****BEKO TECHNOLOGIES LIMITED**

Unit 1010 Miramar Tower  
 132 Nathan Rd.  
 Tsim Sha Tsui Kowloon Hong Kong  
 Tel. +852 5578 6681 (Hong Kong)  
 +86 147 1537 0081 (China)  
 tim.chan@beko-technologies.com

**HK****BEKO TECHNOLOGIES INDIA Pvt. Ltd.**

Plot No.43/1 CIEEP Gandhi Nagar  
 Balanagar Hyderabad  
 IN - 500 037  
 Tel. +91 40 23080275 /  
 +91 40 23081107  
 Madhusudan.Masur@bekoindia.com  
 service@bekoindia.com

**IN****BEKO TECHNOLOGIES S.r.l**

Via Peano 86/88  
 I - 10040 Leini (TO)  
 Tel. +39 011 4500 576  
 Fax +39 0114 500 578  
 info.it@beko-technologies.com  
 service.it@beko-technologies.com

**IT****BEKO TECHNOLOGIES K.K**

KEIHIN THINK Building 8 Floor  
 1-1 Minamiwatarida-machi  
 Kawasaki-ku, Kawasaki-shi  
 JP - 210-0855  
 Tel. +81 44 328 76 01  
 info@beko-technologies.jp

**JP****BEKO TECHNOLOGIES Sp. z o.o.**

ul. Pańska 73  
 PL - 00-834 Warszawa  
 Tel. +48 22 314 75 40  
 info.pl@beko-technologies.pl

**PL****BEKO TECHNOLOGIES S.E.Asia  
(Thailand) Ltd.**

75/323 Soi Romklao, Romklao Road  
 Sansab Minburi  
 Bangkok 10510  
 Tel. +66 2-918-2477  
 info.th@beko-technologies.com

**TH****BEKO TECHNOLOGIES CORP.**

900 Great Southwest Pkwy SW  
 US - Atlanta, GA 30336  
 Tel. +1 404 924-6900  
 Fax +1 (404) 629-6666  
 beko@bekousa.com

**US**

Original instructions are in German.

