

Operating instructions

Oil-free scroll compressors

Series

EO 6...EO 6 TR

EO 11...EO 16

EO 17...EO 22

EO 17 D...EO 22 D

Separate instructions:

Compressor control

Refrigerant compressed air dryer (DS)

Compressed air treatment

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Operating instructions for oil-free scroll compressors

- EO 6 / EO 6 D / EO 6 R / EO 6 DR / EO 6 TR (5.5 kW)
- EO 11 / EO 11 D (11 kW)
- EO 16 / EO 17 / EO 17 D (16.5 kW)
- EO 22 / EO 22 D (22 kW)

**IMPORTANT!**

READ CAREFULLY BEFORE USE

RETAIN FOR FUTURE REFERENCE

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1.1 Who are these operating instructions aimed at?

These instructions are aimed at end customers of BOGE who have purchased a scroll compressor and wish to operate it.

In addition to reading these instructions, the user must meet the following prerequisites in order to ensure professional operation of the compressor. S / he must:

- have an understanding of the control and of the accompanying operating instructions.
- have an understanding of the accompanying operating instructions for the additional components.
- be classified as skilled personnel or trained personnel with technical background knowledge in the field of compressed air technology.

1.2 Content of these instructions

These operating instructions deal exclusively with the functionality and operation of a BOGE type EO scroll compressor.

The prerequisite for safe operation of the scroll compressor is adherence to all the stipulated safety information and directions for use. Personnel must therefore have carefully read and understood these operating instructions before carrying out any work. In addition, the accident prevention regulations applicable in the location where the compressor is used as well as the general safety regulations must be observed. The illustrations in these instructions are provided for basic understanding and may differ from the actual version of the product. No claims can be made on this basis.

The following content and work descriptions do not (or only to a limited extent) form part of these instructions:

- Work on the electrical installations, e.g. the electrical commissioning or repairs to the control.
- Work on the DS refrigerant dryer, on the compressed air treatment components or on accessories.

Work on the electrical installations may only be carried out by an authorised and qualified electrician or BOGE Service personnel.


BOGE recommends having the control, compressor(s) and accessories set up and commissioned by BOGE Service personnel. Repair and maintenance work on the compressor should also be carried out by BOGE Service personnel.

1.3 Other important documents

- Lubricant and refrigerant safety data sheets (EO...D)
- Data sheets / documentation on the control and accessories
- Documentation for compressed air receiver (EO 6 R, EO 6 DR, EO 6 TR)
- Documentation for DS refrigerant dryer (EO 6 DR, EO 17 D, EO 22 D)
- Documentation for condensate drains and cyclone separator

1.4 Guide for reading

Symbols and typographic aids

Symbol	Meaning
	<p>Tips and additional information on optimum operation</p> <p>Tips and information that help you to use the compressor in an optimum manner are indicated by the symbol shown.</p>
<ul style="list-style-type: none"> – Information 1 – Information 2 – Information 3 	<p>List</p> <p>Important information is listed clearly.</p>
<p>Action</p> <p>or</p> <ul style="list-style-type: none"> • Action 	<p>Directions for use I</p> <p>Especially important directions for use with one action are indicated by the symbol shown.</p>
<ol style="list-style-type: none"> 1. Action 1 2. Action 2 3. Action 3 	<p>Directions for use II</p> <p>Directions for use with several actions are numbered and must be carried out in the specified sequence.</p>
<p>→ Result of action</p>	<p>Result</p> <p>The outcome that will follow an action is indicated by the arrow shown.</p>
<ol style="list-style-type: none"> (1) (2) (3) 	<p>Figures</p> <p>Figures may be divided into areas. The individual areas are numbered.</p>


Structure of warning notices

Signal words

Signal word	Meaning
DANGER	Warns of a danger to persons that will imminently lead to serious injury or death.
WARNING	Warns of dangers to persons that could lead to serious injury or death.
CAUTION	Warns of dangers to persons that could lead to moderate or minor injuries.
ATTENTION	Warns of property damage.


Warning sign

The following general warning sign is used in this document:

Warning sign	Meaning
	Warns of a hazardous area.

Warning notice design

Warning notices are a combination of signal words, warning signs and information. They are structured as follows:

	<p>SIGNAL WORD</p> <p>Type of danger</p> <p>Source of the danger and consequences if the warning notice is not observed.</p> <p>→ How to avoid the danger.</p>
---	---

1.5 Warranty and service

Limitation of liability

The manufacturer accepts no liability for direct or consequential damages due to improper operation or servicing on the basis of the information contained in these instructions. The product must only be operated by persons who are familiar with the operating instructions, the product, and national laws, ordinances and regulations on work, safety and accident prevention.

We do not accept any liability for personal injury or property damage caused by untrained persons, or by non-compliance with the regulations on work, safety and accident prevention.

No claims for the modification of products that have already been supplied may be made on the basis of the information, illustrations and descriptions in this manual.

For your own safety, only use original spare parts and accessories. We do not assume any liability for the use of other products and any consequential damage.

- Check the delivery for transport damage and completeness.
- Document defects and damage in writing immediately.
- Take photographs of damaged components.

Submit the written damage report.

Transport damage

BOGE accepts no liability for breakage or damage during transport. Please check the item immediately after delivery and make a complaint to the last carrier about any damage – even if the packaging is not damaged. In order to secure your claim for damages against the shipping company, we would advise you to temporarily leave the delivery items and packaging materials in the condition in which you found them when you identified the damage.

Please submit all other complaints to us within six days of receiving the delivery.

Service

To avoid delays, always provide the following data for your compressor when submitting enquiries:

- Type
- Year of manufacture
- Number



Should you have any questions about this product, please contact Technical Support on:

Telephone: +49 5206 601-140

If you require Service assistance, please contact BOGE Service on:

Telephone: +49 5206 601-100

Data on the rating plate

Enter the technical data for your compressor from the rating plate or enclosed data sheet into the figure below. If you have any queries this ensures that you always have the most important information to hand.

	
Type	_____
Year of manufacture	_____
Maschine number	_____
Volume flow	max. _____ m ³ /min
Final compression pressure	_____ bar
Motor speed	_____ rpm
Motor output	_____ kW
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Fon +49 (0)5206/601-0 Fax +49 (0)5206/601-200 info@boge.com Made in Germany	

Fig. 1.1: Data on the rating plate

1.6 System subject to monitoring

A compressor is often part of a pressure vessel system, which is subject to monitoring according to § 14 of the BetrSichV (Ordinance on Industrial Safety and Health). A system subject to monitoring shall only be put into service for the first time or after significant modifications if an approved body or a competent person has inspected the system to ensure it is in proper working order with regards to its assembly, installation, the conditions of erection and safety, taking into consideration its intended mode of operation.

According to the BetrSichV, the compressed air system shall be subjected to recurrent inspections by an approved body or competent person.

The operator must determine the inspection intervals within six months of commissioning and come to an agreement with the approved inspection body. The recurrent inspections must be arranged within the specified time frame and documented by the operator.

Operators located outside the Federal Republic of Germany must observe the national regulations for the country in which the device is used.

2.1 General safety information

Intended use

- BOGE compressors, including their additional equipment, are exclusively intended for the compression and treatment of air for industrial purposes. The air taken in must not contain any explosive or chemically unstable gases or vapours.
- The specified operating limits of the compressor may not be exceeded.
- Only operate the compressor in line with the permissible ambient conditions.
- BOGE compressors are designed for stationary operation. Ensure that they are only installed and operated in clean, dry rooms.
- Operating elements and the control are designed for operation by trained or qualified personnel.

Type DRL and DS compressed air dryers

- These dryers are only suitable for dehumidifying compressed air.

Reasonably foreseeable misuse

The compressor must be operated within the technical limits of use. Observe section "Technical data" on page 22. Non-observance of this data is deemed improper and poses a risk for the operational safety of the compressor and a danger to the operating personnel. Severe personal injury and / or property damage may result.

- Never direct the compressed air produced towards persons. Danger of death!
- Only use the compressed air produced as breathing air or allow it to come into contact with food if it has been treated beforehand.
- This BOGE compressor is not explosion-proof. Do not operate in explosive areas or potentially explosive atmospheres.
- Do not operate the compressor in rooms in which extreme dust, toxic or flammable vapours and gases may be produced.

The following is not permitted:

- Compressing fluids other than those mentioned under intended use or compressing fluids loaded with contaminants.
- Exceeding the final compression pressure indicated on the rating plate.
- Altering the safety devices and cladding or putting them out of operation.
- Removing or painting over signs and symbols on the compressor.
- Operation of the compressor by untrained or unauthorised persons.

Responsibility of the operator

Obligations of the operator

The operator is obliged to

- operate the compressor only in a technically perfect, safe-to-operate condition
- provide a device that automatically switches off the power supply in the event of a fault, to avoid injury from electric current
- check the completeness and function of the emergency stop device(s) at regular intervals
- carry out a workplace risk assessment in his area of responsibility and issue the ensuing operating instructions
- name a person responsible for the safe operation of the machine and the coordination of all work performed on the machine
- avoid stressful situations when operating the compressor by means of technological and organisational operations scheduling
- ensure proper workplace lighting is provided at the control section of the compressor according to the local health and safety regulations
- observe the safety data sheets for the hazardous substances used and make all information accessible to personnel in accordance with the safety data sheet
- provide the compulsory personal protective equipment, instruct others on its use and check that it is being worn at regular intervals
- determine the personnel responsible for various tasks on the machine
- instruct the personnel on a regular basis regarding all obligations concerning the preservation of safety and order at the compressor site
- develop safe technology for the potential dismantling of the construction, define responsibilities (work safety, supervision, workmanship), supervise dismantling work and check compliance with the established protective measures and instructions.

Operation regulations

The compressor unit operator is responsible for ensuring that it is installed, operated and maintained properly. Operators of work equipment in the Federal Republic of Germany must adhere to the regulations and rules currently valid for the Industrial Employers' Liability Insurance and Accident Insurance associations and also the Ordinance on Industrial Safety and Health (BetrSichV).

When operating the compressor unit outside the Federal Republic of Germany, the accident prevention regulations of the country in which the compressor is being operated must be observed in addition to the information contained in these operating instructions. In the event that measures are required above and beyond the legal regulations specified in the Federal Republic of Germany or the information contained in these operating instructions, it is of utmost importance that these be carried out prior to commissioning the compressor unit.

Personnel requirements**General**

Only personnel authorised by the operator of the compressor may work with or on the compressor. The personnel working on the compressor must observe all industrial safety regulations and operating instructions, successfully carry out their responsibilities, and read and understand the operating instructions. Always wear compulsory personal protective equipment when working on the compressor.

Only persons who are able to carry out work correctly and reliably and who meet the following requirements may perform activities on the compressor:

- Only authorised specialists should be instructed to carry out assembly, installation, service and maintenance work on the compressor.
- Work on the electrical installations may only be carried out by an authorised and qualified electrician. The electrical equipment must be disconnected from the mains and precautions taken to prevent it from being switched back on again.
- The compressor must be operated by trained personnel.

Trained personnel

Trained personnel are persons whom the operator has given detailed information about the tasks assigned to them and the possible dangers.

Qualified personnel / specialist

Skilled personnel are persons who are able to successfully carry out work assigned to them, recognise possible dangers independently and avoid injury to persons or damage to property due to their professional training, knowledge and experience as well as knowledge of the relevant regulations.

Qualified electrician

All work on the electrical system may only be carried out by a qualified electrician. Qualified electricians are persons who are able to successfully carry out work assigned to them on electrical equipment, recognise possible dangers independently and avoid injury to persons or damage to property as a result of electrical current due to their specialist qualifications, knowledge and experience as well as knowledge of the relevant regulations.

Personal protective equipment (PPE)

In general for all work on the compressor

- protective clothing
 - slip-resistant safety shoes and
 - hearing protection, if applicable,
- must be worn.

For special duties

- a protective helmet (for transportation with lifting gear)
- protective goggles (for work on pressurised parts / components)
- chemical-resistant protective gloves (when handling lubricants)
- cut and puncture-resistant protective gloves

must be worn.

Before starting work with operating materials (e.g. lubricating greases) without wearing chemical-resistant protective gloves, a skin protection cream must be applied. After finishing the work a skin care product must be applied.

Special warning notices

To indicate particular dangers, the following warning symbols / pictograms are used alongside warning notices.

Danger due to electric current

...warns of life-threatening dangers due to electric current.
Non-observance of the warning notice can cause serious or fatal injuries.
Activities that follow this warning notice may only be carried out by authorised and qualified electricians.

Danger from hot surfaces and operating materials

...warns of dangers from hot surfaces and operating materials.
Non-observance of the warning notice can result in serious burns.
Activities that follow this warning notice may only be carried out by authorised and qualified personnel.

Danger from automatic restart

...warns of dangers due to an automatic restart.
Non-observance of the warning notice can cause serious injuries due to moving parts.
Activities that follow this warning notice may only be carried out by authorised and qualified personnel.

Danger from overpressure and sudden discharge of fluids

...warns of dangers from overpressure and sudden discharge of fluids.
Non-observance of the warning notice can cause serious injuries.
Activities that follow this warning notice may only be carried out by authorised and qualified personnel.

Dangers due to moving parts

...warns of dangers to body parts by being crushed, cut, sliced off or drawn in.
Non-observance of the warning notice can cause serious injuries due to moving parts.
Activities that follow this warning notice may only be carried out by authorised and qualified personnel.

Danger due to hazardous or irritant substances

...warns of dangers from hazardous or irritant substances.
Non-observance of the warning notice can cause injuries to the skin, eyes and respiratory tract.
Activities that follow this warning notice may only be carried out by authorised and qualified personnel.

2.2 Safety information for operating the compressor

**WARNING**

Danger of personal injury or property damage.

Non-observance of the following safety information may lead to injuries and damage to the compressor.

Also observe the generally valid safety and accident prevention regulations in addition to the information in these operating instructions.

1. Ensure that no commissioning and maintenance work is undertaken on the compressor until these operating instructions are understood.
2. Only use the compressor for its intended purpose, as described in these operating instructions.
3. The operator must ensure
 - that only appropriately trained and authorised personnel work on this compressor
 - that no persons work on this compressor whose ability to react is impaired due to the use of drugs, alcohol, medication, etc.
 - that the operating, maintenance and repair personnel are familiar with all safety information and that it is being observed
 - that the compressor is only operated in a safe operating condition.
4. Avoid any procedure which may compromise the safety of the compressor.
5. Always wear compulsory personal protective equipment for protection against injuries from sharp corners or edges when working on the compressor.
6. To avoid dangers from debris or parts lying around, the work area of the compressor must be kept clean and tidy at all times.
7. Always squat when working on components mounted at a low height, never stoop. When working on components mounted higher up, always stand up straight.
8. It is imperative that the limit values for the final compression pressure specified on the rating plate are not exceeded.
9. Do not operate the compressor without the required protective and safety devices. The built-in safety devices must not be removed or shut down.
10. Ensure that all safety cladding and doors are closed before commissioning the compressor and that they are not opened during operation.
11. When dismantling the safety cladding or safety devices for repair or maintenance work, the compressor must be shut down as described in these operating instructions. All cladding and safety devices must be reattached and closed immediately upon completion of the repair or maintenance work.
12. Only operate the compressor using the additional equipment (options) recommended or authorised by the manufacturer.
13. Only undertake modifications or conversions of the compressor in agreement with BOGE, taking all relevant safety regulations into consideration. The manufacturer accepts no liability for damages resulting from unauthorised modifications to the compressor.

14. Never operate the compressor when one or more parts (e.g cable, plug) are damaged, it is not in perfect working order, or damage is detected or suspected.
15. Observe all safety and danger signs on the compressor.

Integrated DRL 6-2 compressed air dryer (EO 6 D, EO 11 D) and attached DS compressed air dryer (EO 6 DR, EO 17 D, EO 22 D)

The integrated Type DRL refrigerant compressed air dryer is also referred to below as a DL dryer.

16. For all information and tips on the attached DS dryer, please read the separate operating instructions for the dryer.
17. BOGE accepts no liability for non-observance of the safety regulations during handling, operation, maintenance or repair work.
18. The operational capability and service life of the refrigerant compressed air dryer as well as the avoidance of premature repairs are dependent on the correct operation, maintenance and professional repair of the device according to the instructions given in these operating instructions.

Electrical equipment of the compressor



DANGER

Risk of electric shock!

Coming into contact with live parts inside the switch cabinet or where the electrical equipment is housed can be fatal.

- Never open the electrical equipment and switch cabinet during operation.
- Work on the electrical equipment may only be carried out by an authorised and qualified electrician.
- Prior to all work:
 1. Disconnect all power infeeds using a mains disconnecting device.
 2. Take precautions to prevent them being switched back on again.
 3. Check that all system components are de-energised.
 4. Earth and short circuit.
 5. Cover or enclose adjoining live parts.
- Check the electrical equipment of the compressor at regular intervals for defects such as loose connections or scorched cables. Have any defects rectified immediately.
- Make sure to have all electrical systems and fixed electrical installations checked by a qualified electrician at least every four years. Any modifications carried out after inspection must conform to EN 60204-1.
- Check that all safety devices on the machine are functioning properly at regular intervals.
- Only use original fuses.
- Never touch the relay outputs and the I/O terminals. Dangerous voltage may still be present even when the machine is disconnected from the mains.

**Scroll compressor,
drive, air system****WARNING****Danger from overpressure, e.g. due to sudden discharge of fluids or bursting of components!**

In the event of damage, malfunctioning or incorrect use, fluids under high pressure can escape from pipes or individual components and cause severe injuries.

- Work on the system and components may only be carried out by skilled personnel.
- Wear PPE.
- Depressurise pressurised system components before working on them.
- It is forbidden to operate the compressor unit without suitable safety devices.
- Safety devices must not be removed or shut down.
- The maximum permitted operating limits must not be exceeded.

**WARNING****Risk of burns from hot surfaces and fluids!**

High temperatures are produced during the compression process. There is a risk of injury from touching hot surfaces or from hot fluids escaping.


- The compressor unit must not be operated without suitable safety devices, e.g. isolating protective equipment.
- The work may only be carried out by skilled personnel.
- Wear PPE.
- Before carrying out any work ensure that all hot components have cooled down to 50°C.

**WARNING****Moving parts or sharp edges!**



Risk of injury due to moving parts or sharp edges that can cause body parts to become caught, jammed, cut off or crushed. Non-observance of the safety information can result in serious injuries.


- The compressor unit must not be operated without suitable safety devices, e.g. isolating protective equipment.
- The work may only be carried out by skilled personnel.
- Wear PPE.

Lubricant and refrigerant

	<p>CAUTION Risk of injury due to contact with hazardous substances, e.g. from inhalation!</p> <p>Lubricants pose a potential danger to health and the environment as a result of their content.</p> <ul style="list-style-type: none"> → Avoid contact with skin and eyes. → Wear PPE. → Do not inhale vapours or mists. → Fire, naked flames and smoking are strictly prohibited when handling hazardous substances. → Observe the information on the relevant safety data sheets.
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2.3 Servicing safety information

 	<p>CAUTION Risk of injury when using unsuitable materials and components, e.g. as a result of mechanical failure!</p> <ul style="list-style-type: none"> → Only use original spare parts, lubricants and operating materials approved by BOGE during repair or maintenance.
--	---

	<p>DANGER Risk of electric shock!</p> <p>Coming into contact with live parts inside the switch cabinet or where the electrical equipment is housed can be fatal.</p> <ul style="list-style-type: none"> → To avoid such dangers, the power supply of the compressor must be equipped with a mains disconnecting device. The mains disconnecting device must conform to EN 60204-1. The main switch installed as standard complies with this requirement.
---	--

- Maintenance work may only be carried out by appropriately trained persons.
- Ensure that adjustments, fault rectification and repairs are only carried out by specialists or appropriately trained persons.

Prior to maintenance or repair work:

- Ensure that work on the electrical equipment of the compressor is only carried out by qualified electricians.
- Work on live parts or devices is prohibited. Exceptions are governed by the appropriate regulations, e.g. DIN VDE 0105.
- Prior to starting work on the electrical system the power supply must be switched off and precautions taken to prevent it from being switched back on again. All dismantled covers and safety devices must be refitted immediately after work is finished.
 1. Switch off the compressor using the OFF button.
 2. Disconnect all power infeeds using a mains disconnecting device.
 3. Take precautions to prevent them being switched back on again.
 4. Check that all system components are de-energised.
 5. Earth and short circuit.
 6. Cover or enclose adjoining live parts.
 7. Fix a warning sign to the control and fill in the name of the person who is authorised to switch the machine back on.
 8. Disconnect the compressor from the compressed air network (depressurise or block pressurised pipes).
- Exercise extreme caution during repair or maintenance work that requires the compressor to be operational. Ensure that persons stay away from the danger area.
- The operator must check the compressor daily for externally visible damage and defects and report any changes (including operational behaviour) immediately.
- When the automatic restart (Auto-Restart) is activated, the compressor will start automatically following a power failure. Prerequisite: the net pressure is lower than the set switch-on pressure.

Safety information for maintenance and repair of the dryer (EO...D)

The refrigerant dryer is integrated in the compressor housing (EO 6 D, EO 11 D, 17 D, EO 22 D) or attached (EO 6 DR).

**CAUTION****Risk of injury due to moving parts, hot surfaces or sudden discharge of pressurised fluids!**

- The operator must observe current EU Regulation Nos. 517/2014 and 303/2008. Existing internal plant regulations must also be adhered to.
- Repair and maintenance work on the refrigerant compressed air dryer may only be carried out by trained BOGE Service personnel. Non-observance can lead to injuries and damage to the compressor unit.

- Never temporarily or permanently remove, modify or adjust protective or safety devices on the dryer.
- Only use original spare parts.
- All maintenance and repair work should only be carried out when the system is stationary and disconnected from the mains power supply. Ensure that the dryer cannot be accidentally switched on.

- Prior to the removal of a pressurised component, disconnect the dryer from all pressure sources and relieve the pressure load on the dryer.
- Do not use flammable solvents to clean the dryer.
- Ensure exceptional cleanliness during all maintenance and repair work. Keep parts and exposed openings clear of dirt by covering them with a clean cloth, paper or adhesive strips.
- Never weld on pressurised components or modify them in any way.
- Ensure that no tools, loose parts, etc. are left behind in the system.

Handling refrigerant



CAUTION

Contact with refrigerant can cause poisoning and irritation of the respiratory tract.

Refrigerant contains harmful substances that can lead to poisoning and irritation of the respiratory tract.

- ➔ Repair and maintenance work on the refrigerant compressed air dryer (EO...D, EO...DR) may only be carried out by trained BOGE Service personnel.
- ➔ Wear personal protective equipment.
- ➔ Observe the refrigerant safety data sheet.

- Wear protective goggles and protective gloves.
- Do not allow liquid refrigerant to come into contact with the skin (causes frostbite).
- Do not inhale refrigerant vapour.
- To avoid higher concentrations, ventilate the workrooms well. Opening windows and doors is insufficient – a ventilation system is required, preferably on the connection point or near the ground.
- Do not smoke – burning cigarettes can cause the refrigerant to decompose. The substances produced as a result are toxic and must not be inhaled.
- Do not allow refrigerant to escape when it is topped up or during repair work.
- If the concentration of refrigerant suddenly increases (e.g. due to burst pipelines), leave the room immediately and enter only when there is sufficient ventilation.
- Welding and soldering work should only be carried out on refrigerating systems in well-ventilated rooms. Refrigerant will decompose when exposed to flames and electric arcs. The resulting decomposition products are toxic.
- Before commencing welding or soldering work on refrigeration systems, the refrigerant must be removed.
- A strong odour indicates decomposition of the refrigerant:
 - Leave the room immediately. Ventilate the room well.

3.1 How the compressor works

Compression process

BOGE scroll compressors are oil-free, stationary, electrically powered air compressors. A scroll compressor functions according to the positive displacement principle. It consists of two spirals; the moving spiral continuously compresses the drawn-in air against the fixed spiral using an eccentric motion. The spirals thereby form several increasingly narrower chambers within the coils. The gas being pumped is sucked in from outside, compressed within the pump and emitted via a connection in the centre of the spiral. This provides a constant, oil-free flow of compressed air of up to 10 bar overpressure.

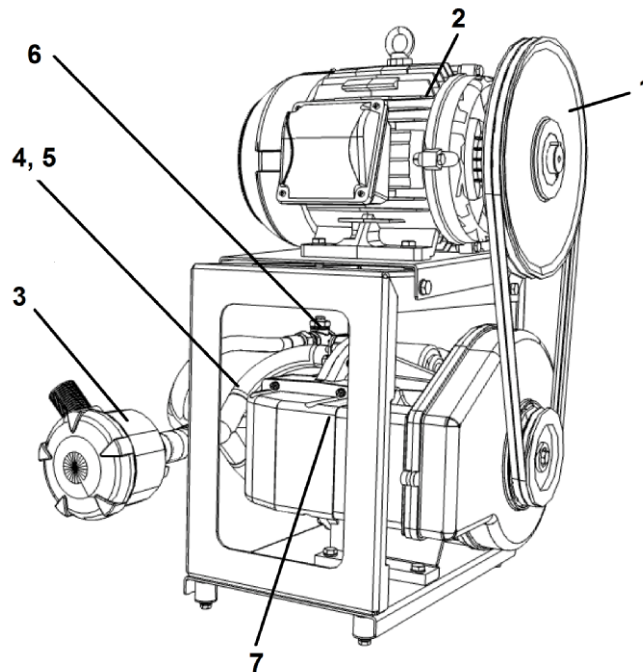


Fig. 3.1: Scroll unit EO 6

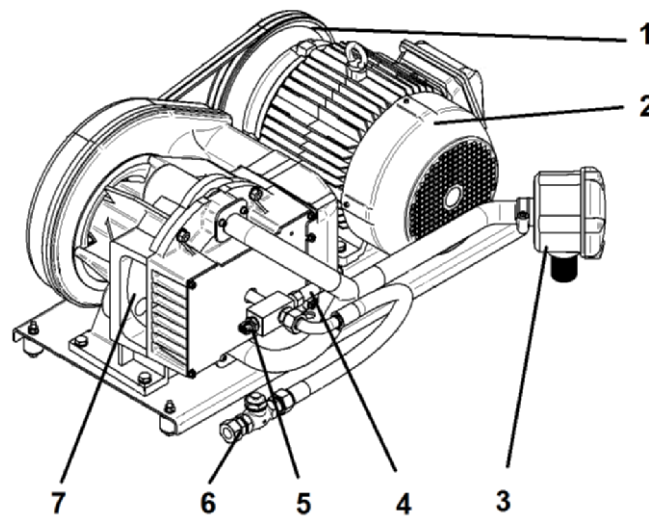


Fig. 3.2: Scroll unit EO 11...EO 22

1 Drive pulley

Power transmission from the electric motor to the compressor in the corresponding design using V-belt.

2 Drive motor

The electric motor drives the compressor with the corresponding transmission ratios and V-belt.

3 Suction filter

The suction filter cleans the air drawn in from the compressor stage.

4 Safety valve

The safety valve limits the maximum pressure in the system to a defined limit value. It blows off if the final pressure is exceeded due to a fault.

5 Temperature sensor

This sensor monitors the temperature of the compressed air.

6 Non-return valve

The non-return valve is located before the primary cooler and prevents compressed air from flowing back into the compressor from the compressed air network.

7 Airend / scroll compressor**Cooling air requirement**

Please refer to the following table for the cooling air requirement and the size of the supply air inlets for your compressor. Ensure that flaps and weather protection grids have the necessary free cross section. We generally recommend that you contact a specialist company to carry out the duct design and construction work.

Required cooling air quantity (see also Technical data)

Compressor		Air cooling ¹⁾		
Type	Drive rating	Required fan output for room ventilation	Required supply air inlet	Cooling air requirement
	[kW]	[m ³ /h]	[m ²]	[m ³ /h]
EO 6 / EO 6 R	5.5	1500	0.25	780 (8 bar) 660 (10 bar)
EO 6 D	5.5	1705	0,25	780 (8 bar) 660 (10 bar)
EO 6 DR	5.5	1705	0,25	780 (8 bar) 660 (10 bar)
EO 6 TR	2x 5.5	3000	0.50	780 (8 bar) 660 (10 bar)
EO 11 / EO 11 D	11	4900	0.65	2840
EO 16	16.5	6000	0.75	3500
EO 17 / EO 17 D	16.5	6000	0.75	3500
EO 22 / EO 22 D	22	7000	0.90	4300

¹⁾ For the cooling air requirement a temperature difference of + 4°C between the room and ambient temperature has been taken as a basis.

Table 3.1: Cooling air requirement, required supply air inlet and duct cross sections.

3.2 Control of the compressor

Net pressure

In the compressor, the pressure behind the secondary cooler is referred to as the net pressure. The control switches the compressor on and off during operation depending on the net pressure.

Operating states

All control systems for compressors are based on two principal operating states:

1. Load-run

- The compressor supplies the maximum amount of compressed air.
- To do so it consumes maximum power.

2. Standstill – ready for operation

- The compressor is stopped, but is ready for operation.
- If compressed air is required, it switches automatically to load-run.

Operating modes

By combining the two operating states **intermittent mode** is achieved:

In intermittent mode the energy balance is optimal.

- The compressor is operated in load-run.
- The compressor comes to a standstill once the switch-off pressure p_{\max} has been reached. It does not consume any power.
- Once the pressure has fallen to the switch-on pressure p_{\min} , it switches back to load-run.


3.3 Safety and monitoring devices

General

The safety devices and BOGE monitoring system ensure a high level of operating safety.

The control reacts as follows in response to a safety device:

- The compressor is switched off immediately.
- The fault is shown via a visual display.

	<p>CAUTION</p> <p>Risk of injury due to moving parts, overpressure or thermal hazards!</p> <p>→ It is forbidden to operate the compressor without the installed safety devices.</p> <p>→ The safety devices must not be removed or shut down.</p>
---	---

The following safety and monitoring devices are installed as standard:

Emergency stop function / main switch (mains disconnecting device)

The emergency stop function serves to avert or prevent a prevailing emergency situation, where such a situation is the result of conduct by individuals or an event posing an unexpected danger. The emergency stop function is provided by the main switch control element (mains disconnecting device). When the main switch is pressed, compressor operation is stopped immediately and the switch cabinet and control are no longer live. Dangerous voltage may still be present in the relay outputs and the I/O terminals even when the machine is disconnected from the mains.

The main switch is located in a prominent position on the front of the compressor housing.



NOTE

Only the off button of the control must be used to switch the compressor off during normal operation.

Temperature monitoring

The following temperatures are monitored:

- Final compression temperature per unit
- Intake air temperature
- Compressed air outlet temperature

A compressor switches off when the maximum permitted compressed air outlet temperature is reached. A scroll unit switches off when the maximum permitted final compression temperature of the unit is reached.

If the compressor needs to be switched off due to a fault:

1. Switch off the compressor (OFF button).
2. Acknowledge the fault.
3. Remedy the fault.
4. Switch on the compressor (ON button).

Decompression

A mechanical safety valve on each unit (see fig. 3.1 and 3.2) and on the compressed air receiver (see fig. 3.3) prevents the maximum permitted pressure from being exceeded.



WARNING

Risk of injury from flying parts caused by overpressure, e.g. pressurised components bursting or detonating!

- ➔ It is forbidden to operate the compressor without the installed safety devices.
- ➔ The safety devices must not be removed or shut down.
- ➔ The specified final compression pressure must not be exceeded.


	<p>CAUTION</p> <p>Risk of injury due to thermal danger caused by sudden discharge of extremely hot fluids at high flow velocity!</p> <p>Danger caused by noise due to the sudden escape of large quantities of gas!</p> <p>If the maximum permitted pressure is exceeded (e.g. in the event of a fault or an incorrect setting), the entire air delivery of an airend is blown off.</p> <p>➔ The compressor should only be operated with the housing closed.</p>
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Fig. 3.3: Safety valve (1) on receiver EO 6 R

3.4 Technical data

Technical data EO 6...EO 6 TR, part 1

Type		EO 6	EO 6 D	EO 6 R	EO 6 DR	EO 6 TR
Dimensions						
– Width	[mm]	670	670	1785	1760	1825
– Depth	[mm]	1000	1000	745	745	1000
– Height	[mm]	972	1385	1670	1670	1725
Standard receiver capacity	[l]	–	–	270	270	350
Weight	[kg]	250	336	368	405	647
Maximum emitted sound pressure level as per EN ISO 2151						
Super silenced 8 bar / 10 bar	[dB(A)]	62 / 59	62 / 59	62 / 59	62 / 59	62 / 59
Measuring surface	[dB(A)]	15	15	15	15	15
Sound power level 8 bar / 10 bar	[dB(A)]	77 / 74	77 / 74	77 / 74	77 / 74	77 / 74
Compressor						
Max. final compression temperature	[°C]	250	250	250	250	250
Compressed air outlet temperature over intake air temperature, approx.	[K]	15	15	15	15	15
Volume flow in accordance with ISO 1217 Annex C at:						
– p _{max} = 8 bar	[m ³ /min]	0.62	0.62	0.62	0.62	1.24
– p _{max} = 10 bar	[m ³ /min]	0.49	0.49	0.49	0.49	0.98
Drive motor						
Rated power	[kW]	5.5	5.5	5.5	5.5	2x 5.5
Nominal speed						
– with motors for 50 Hz	[rpm]	1465	1465	1465	1465	2x 1465
– with motors for 60 Hz	[rpm]	1765	1765	1765	1765	2x 1765
Protection class	IP	55	55	55	55	55
Design	IMB	3	3	3	3	3
ISO class	F	F	F	F	F	F
Electrical Connection						
Supply voltage / frequency ¹⁾	[V/Hz]	400 / 50	400 / 50	400 / 50	400 / 50	400 / 50
Recommended fuse protection at 400 V ^{2) 3)}	[A]	25	25	25	25	25*
Supply voltage / frequency of dryer ¹⁾	[V/Hz]	–	230 / 50	–	230 / 50	–
Deviating voltage / frequency						
Supply voltage / frequency	[V/Hz]	230 / 50	230 / 50	230 / 50	230 / 50	230 / 50
		220/440 / 60	220/440 / 60	220/440 / 60	220/440 / 60	220/440 / 60
		220 / 60	220 / 60	220 / 60	220 / 60	220 / 60
		380 / 60	380 / 60	380 / 60	380 / 60	380 / 60
		440 / 60	440 / 60	440 / 60	440 / 60	440 / 60
Recommended fuse protection at 220 V / 230 V ^{2) 3)}	[A]	32	32	32	32	32*
Recommended fuse protection at 380 V / 440 V ^{2) 3)}	[A]	25	25	25	25	25*

¹⁾ Standard equipment. Supply voltages and frequencies are detailed on a sign in the switch cabinet.

²⁾ Different supply voltages alter the values for the fuses.

³⁾ Use fuse cut-outs gG or miniature circuit-breakers with C characteristic.

* per compressor.

Technical data EO 11...EO 22 D, part 1

Type	EO 11 / EO 11 D	EO 16	EO 17 / EO 17 D	EO 22 / EO 22 D
Dimensions				
– Width [mm]	915	915	915	915
– Depth [mm]	1520	1520	1520	1520
– Height [mm]	1460	1460	1880	1880
Weight [kg]	585 / 620	710	774 / 808	896 / 934
Maximum emitted sound pressure level as per EN ISO 2151 [±3 dB(A)]				
Super silenced 8 bar / 10 bar [dB(A)]	62 / 59	66 / 63	62 / 59	64 / 61
Measuring surface [dB(A)]	20	20	20	20
Sound power level 8 bar / 10 bar [dB(A)]	82 / 79	86 / 83	82 / 79	86 / 81
Compressor				
Max. final compression temperature [°C]	250	250	250	250
Compressed air outlet temperature over intake air temperature, approx. [K]	10	10	8	8
Volume flow in accordance with ISO 1217 Annex C at:				
– p _{max} = 8 bar [m ³ /min]	1.24	1,86	1.86	2.48
– p _{max} = 10 bar [m ³ /min]	0.98	1.47	1.47	1.96
Drive motor				
Rated power [kW]	2 x 5.5	3x 5.5	3x 5.5	4x 5.5
Nominal speed				
– with motors for 50 Hz [rpm]	1465	1465	1465	1465
– with motors for 60 Hz [rpm]	1765	1765	1765	1765
Protection class	IP 55	55	55	55
Design	IMB 3	3	3	3
ISO class	F	F	F	F
Electrical Connection				
Supply voltage / frequency ¹⁾ [V/Hz]	400 / 50	400 / 50	400 / 50	400 / 50
Recommended fuse protection at 400 V ^{2) 3)} [A]	50	50	63	63
Supply voltage / frequency of dryer ¹⁾ [V/Hz]	230 / 50	–	230 / 50	230 / 50
Deviating voltage / frequency				
Supply voltage / frequency [V/Hz]	230 / 50	230 / 50	230 / 50	230 / 50
	220/440 / 60	220/440 / 60	220/440 / 60	220/440 / 60
	220 / 60	220 / 60	220 / 60	220 / 60
	380 / 60	380 / 60	380 / 60	380 / 60
	440 / 60	440 / 60	440 / 60	440 / 60
Recommended fuse protection at 220 V / 230 V ^{2) 3)} [A]	63	63	80	80
Recommended fuse protection at 380 V / 440 V ^{2) 3)} [A]	50	50	63	63

¹⁾ Standard equipment. Supply voltages and frequencies are detailed on a sign in the switch cabinet.

²⁾ Different supply voltages alter the values for the fuses.

³⁾ Use fuse cut-outs gG or miniature circuit-breakers with C characteristic.

Technical data EO 6...EO 6 TR, part 2

Type	EO 6	EO 6 D	EO 6 R	EO 6 DR	EO 6 TR
Intake air temperature					
– min. [°C]	+5	+5	+5	+5	+5
– max. [°C]	+40	+40	+40	+40	+40
Cooling air requirement					
– Required ventilator output for compressor room ventilation [m ³ /h]	1500	2000	1500	1705	3000
– Cooling air requirement 8 bar / 10 bar [m ³ /h]	780 / 660	1100 / 980	780 / 660	780 / 660	780 / 660
Operating pressure values ¹⁾ (factory settings)					
– p _{max} = 8 bar: Switch-off pressure p _{max} [bar]	8	8	8	8	8
Switch-on pressure p _{min} [bar]	7	7	7	7	7
– p _{max} = 10 bar: Switch-off pressure p _{max} [bar]	10	10	10	10	10
Switch-on pressure p _{min} [bar]	9	9	9	9	9
Safety valve on scroll unit					
Response pressure at:					
– p _{max} = 8 bar [bar]	12	12	12	12	12
– p _{max} = 10 bar [bar]	12	12	12	12	12
Dimensions / weights for optional compressed air receivers					
– Receiver capacity [l]	–	–	350	350	–
– Dimensions (width x depth x height) [mm]	–	–	1825 x 770 x 1725	1770 x 770 x 1725	–
– Weight [kg]	–	–	390	427	–
– Receiver capacity [l]	–	–	500	500	500
– Dimensions (width x depth x height) [mm]	–	–	1975 x 795 x 1785	1920 x 795 x 1785	1975 x 1000 x 1785
– Weight [kg]	–	–	420	457	677

¹⁾ For compressors for other operating pressures p_{min} = p_{max} – 1 bar.

Technical data EO 11...EO 22 D, part 2

Type	EO 11 / EO 11 D	EO 16	EO 17 / EO 17 D	EO 22 / EO 22 D
Intake air temperature				
– min. [°C]	+5	+5	+5	+5
– max. [°C]	+40	+40	+40	+40
Cooling air requirement				
– Required ventilator output for compressor room ventilation [m ³ /h]	4900	6000	6000	7000
– Cooling air requirement [m ³ /h]	2840	3500	3500	4300
– Free fan compression [Pa]	20	20	20	20
– Free fan compression [mm WS]	2	2	2	2
Operating pressure values ¹⁾ (factory settings)				
– p _{max} = 8 bar: Switch-off pressure p _{max} [bar]	8	8	8	8
Switch-on pressure p _{min} [bar]	7	7	7	7
– p _{max} = 10 bar: Switch-off pressure p _{max} [bar]	10	10	10	10
Switch-on pressure p _{min} [bar]	9	9	9	9
Safety valve on scroll unit				
Response pressure at:				
– p _{max} = 8 bar [bar]	12	12	12	12
– p _{max} = 10 bar [bar]	12	12	12	12

¹⁾ For compressors for other operating pressures p_{min} = p_{max} – 1 bar.

Technical data for DS dryer

Model of dryer	Compressor type	Weight approx.	Refrigerant volume R134a / CO ₂ equivalent approx.	Max. operating pressure	Max. compressed air inlet temperature	Cooling air requirement	Power consumption	Supply voltage
		[kg]	[kg / t]	[bar]	[°C]	[m ³ /h]	[kW]	[V]
DS 4-2	EO 6 DR 10 bar	24	0,16 / 0,23	16	65	90	0,15	230
DS 7-2	EO 6 DR 8 bar	24	0,16 / 0,23	16	65	90	0,14	230
DS 30	EO 17 D EO 22 D	35	0,36 / 0,51	16	65	550	0,78	230

Technical data for dryer DRL 6-2

Model of dryer	Compressor type	Weight approx.	Refrigerant volume R134a / CO ₂ equivalent approx.	Max. operating pressure	Max. compressed air inlet temperature	Cooling air requirement	Power consumption	Supply voltage
		[kg]	[kg / t]	[bar]	[°C]	[m ³ /h]	[kW]	[V]
DRL 6-2	EO 6 D EO 11 D	35	0,34 / 0,49	16	60	550	0,22	230

3.5 How the DS dryer works

The Type DS dryer is only used with Type EO 6 DR, EO 17 D and EO 22 D compressors.

DS refrigerant dryer

Read the user documentation supplied with the integrated or attached Type DS dryer as well as the information provided here.

The dryer contains a refrigerating system that cools the compressed air. The steam saturation limit is reduced in the process causing condensate to form, which is discharged by an automatic condensate drain. The greater the cooling temperature difference of the compressed air, the larger the quantity of condensed water. The lower the cooling temperature of the compressed air, the lower the moisture content. The lower limit of compressed air cooling is deduced from the dryer's operating principle, i.e. that moisture separation in liquid form can only take place above the freezing point of water.

Automatic condensate drain on the dryer

When the capacitive level sensor signals that the condensate container is full, the internal solenoid valve is opened and the condensate is forced through the drain pipe by the operating pressure. The condensate drain electronics ensure that the outlet opening is closed before the compressed air can escape. If the condensate outlet is faulty, the valve opens in cycles (approx. every 2 seconds) to remedy the fault automatically. For more information, please refer to the separate operating instructions for the condensate drain.

3.6 How the DRL 6-2 dryer works

The DRL 6-2 dryer is only installed in Type E 6 D and EO 11 D compressors.

Device overview

The following components are accessible on the integrated dryer after removing the housing walls:

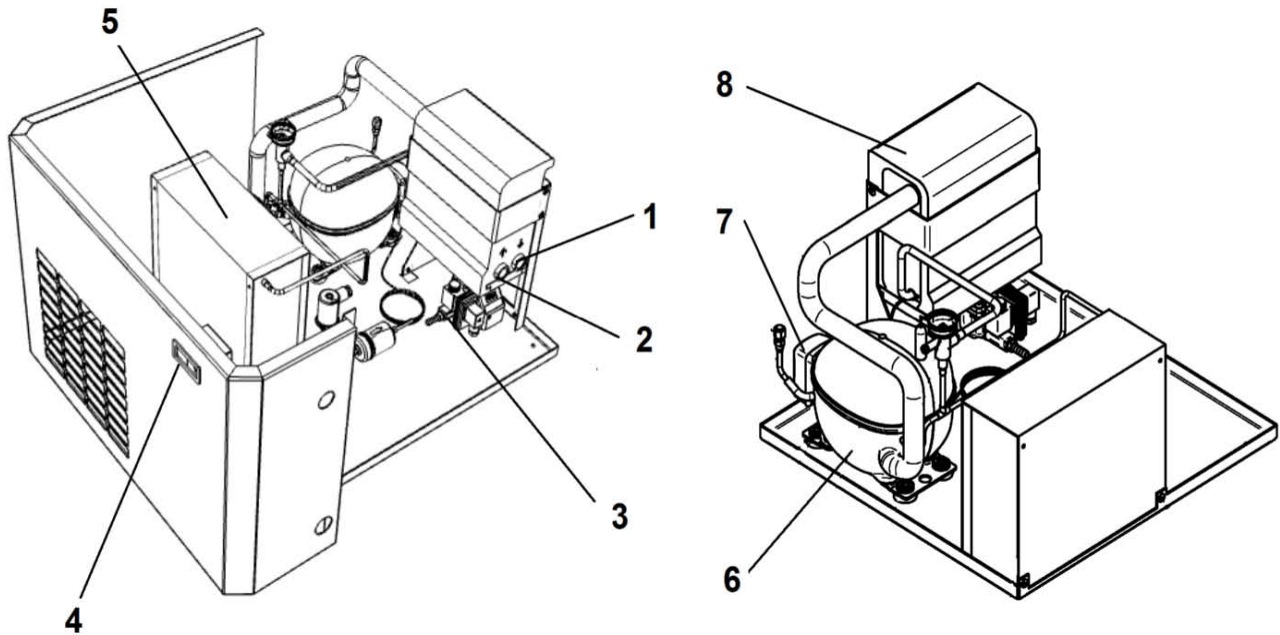


Fig. 3.4: DRL 6-2 dryer overview with pressure dew point display

- 1 Compressed air inlet
- 2 Compressed air outlet
- 3 Condensate drain
- 4 Pressure dew point display
 - Blue field: pressure dew point too low
 - Green field: pressure dew point OK
 - Red field: pressure dew point too high
- 5 Condenser
- 6 Compressor
- 7 Electrical connection
- 8 Air / air or air / refrigerant heat exchanger incl. insulation

Functional principle of the DRL 6-2

The dryer contains a refrigerating system that cools the compressed air. The steam saturation limit is reduced in the process causing condensate to form, which is discharged by a condensate drain.

The greater the cooling temperature difference of the compressed air, the larger the quantity of condensed water.

The lower the cooling temperature of the compressed air, the lower the moisture content. The lower limit of compressed air cooling is deduced from the dryer's operating principle, i.e. that moisture separation in liquid form can only take place above the freezing point of water.

3.7 Regulating the DRL 6-2 integrated dryer

The DRL 6-2 dryer is installed in Type EO 6 D and EO 11 D compressors.

Compressed air side

The compressed air that is pre-cooled and moisture-saturated in the after-cooler enters the refrigerant dryer and is pre-cooled in the first cooling stage in the air / air heat exchanger ((8), see fig. 3.4), without any additional external energy. This is performed against the flow of the already cooled compressed air, which heats up as a result. In the second cooling stage in the refrigerant / air heat exchanger that is cooled by the built-in refrigeration system, cooling to the desired pressure dew point takes place. The cooled compressed air is then heated again in the air / air heat exchanger as already described. The pressure dew point is shown on the pressure dew point display.

Refrigerant side



CAUTION

Risk of injury due to contact with hazardous substances, e.g. from inhalation!

- Wear PPE.
- Avoid contact with skin and eyes.
- Do not inhale vapours or mists.
- Observe the information on the relevant safety data sheets.

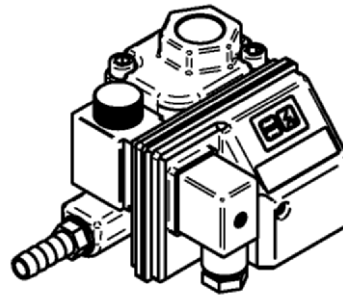
The refrigerant is injected into the refrigerant / air heat exchanger and vaporised. This removes heat from the compressed air flow.

An output control system on the refrigerant side controls the required compressed air output, in order to ensure that the pressure dew point remains constant in all output ranges.

The refrigerant compressed in the refrigerant compressor is condensed in the condenser and becomes available again for vaporisation.

Pressure dew point regulation

The DL dryer can be operated permanently under partial load, caused by reduced compressed air flow or a lower compressed air inlet temperature, with an output in the range 0 – 100%.

Condensate drainage

The level-controlled condensate drain automatically drains condensate from the DL dryer.

Fig. 3.5: Condensate drain

When the level sensor signals that the condensate container is full, a valve is opened and the condensate is forced through the drain pipe by the operating pressure.

The condensate drain electronics ensure that the outlet opening is closed before the compressed air can escape.

If the condensate outlet is faulty, the condensate drain switches to Timer mode and the valve opens in cycles (approx. every five seconds per minute) to remedy the fault automatically. For more information, please refer to the separate operating instructions for the condensate drain.

4.1 Transporting the compressor

General

Please observe the generally accepted safety and accident prevention regulations when transporting the compressor. BOGE accepts no liability for damage caused by incorrect transportation.



ATTENTION

Danger of property damage!

- The transport of the compressor should only be carried out by properly instructed and authorised personnel.
- The capacity of the lifting gear (lift truck or stacker) must correspond at least to the weight of the compressor / system.
- Note the location of the compressor's centre of gravity before lifting it. The location of the centre of gravity is specified both in the supplied dimensioned drawing and on the compressor packaging.
- All loose and rotatable parts must be removed before lifting the system.
- Lifting lugs on certain component parts (e.g. electric motor) are exclusively intended for lifting the individual part, not for lifting the entire compressor.

Intermediate storage of the compressor before installation

If the compressor is not being installed immediately after delivery, it must be stored in a sheltered location. During intermediate storage, ensure that the compressor is protected from dust and humidity.



NOTE

Observe the specifications and notes regarding the admissible environmental influences for intermediate storage (see chapter „Specifications for the compressor room“).

BOGE will not assume any liability for consequential damage as the result of improper storage.

Contact BOGE Service after an extended period of intermediate storage.

In the case of intermediate storage for more than two months also ensure to observe the information on commissioning after a prolonged period of inactivity (see chapter "5.1 Commissioning the compressor").

Transporting the compressor using a forklift truck

Move the compressor to the installation site as described in the following sections.

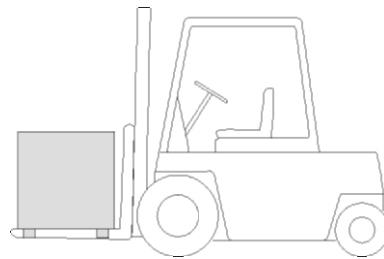


ATTENTION

Danger of property damage!

Inappropriate transportation may damage the compressor.

→ Do not subject the safety cladding to force during transportation.



Ensure that the forks are underneath the base frame or transport pallet of the compressor (see figure).

Fig. 4.1: Transport using a forklift truck

Transporting the compressor with a crane



ATTENTION

Danger of property damage!

Inappropriate transportation may damage the compressor.

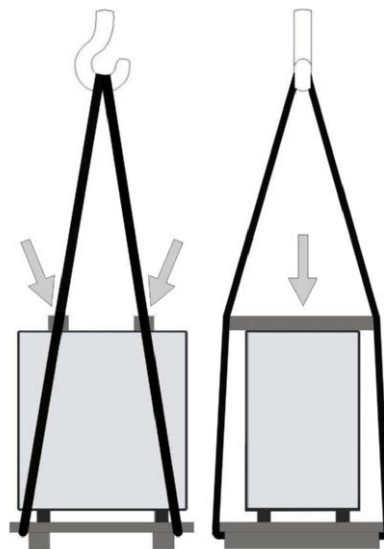
→ Do not subject the safety cladding to force during transportation.

→ Only lift the compressor using the supplied transport pallet.

→ Protect the compressor using wooden shoring (see arrows in the next figure).

→ Remove transport bracing.

→ Only use suitable slings of a sufficient minimum length.



Attach the lifting tackle slings under the ends of the compressor base frame or supplied transport pallet.

See the supplied dimensioned drawing for details regarding the centre of gravity.

Fig. 4.2: Transport with crane

4.2 Installing the compressor

Specifications for the compressor room

Installation surface

The compressor can be installed on a level industrial floor with no foundations. No special fastening elements are required.



ATTENTION

Danger of property damage!

→ There should be no external vibrations affecting the compressor site.

Sound protection

Only install compressors in workrooms if the sound pressure level of their measuring surfaces does not exceed 85 dB (A).



CAUTION

Danger due to noise!

A sound pressure level exceeding 80 dB (A) can cause permanent hearing defects in persons who always work in the vicinity of the compressor.

→ These persons must wear hearing protection while working near the compressor.



Admissible ambient conditions

- Installation altitude 0 to 1000 MSL
- Closed room, frost-free, dry
- Ambient condition +5°C to +40°C
- Relative humidity 0% to 60%



ATTENTION

Danger of property damage!

Non-observance of the admissible ambient temperatures may lead to the following problems:

- The compressor switches off when the maximum permitted compressed air outlet temperature is exceeded.
- Pipes and valves may freeze up at lower temperatures.

Measures to be taken to ensure that admissible ambient temperatures are maintained:

- Avoid having any heat-radiating pipelines or units in the vicinity of the compressor or insulate them well.
- Never install the compressor in the cooling air flow of other machinery.
- Provide the supply air inlets with adjustable louvres to ensure that the temperature does not fall below the minimum temperature in winter.

Ventilation of the compressor room

Non-observance of the following instructions can cause the maximum permitted final compression temperature to be exceeded. The compressor will switch itself off if this happens.

**CAUTION****Hazardous materials and substances!****Risk of poisoning or fire when compressing hazardous fluids.**

→ Arrange the compressor intake openings or ducts in such a way that dangerous admixtures cannot be drawn in. Dangerous admixtures include solvent vapours, dusts and other harmful substances. Avoid creating flying sparks in the vicinity of the compressor.

Ventilation openings (free-standing installation)

- Position supply air intakes close to the floor.
- Position exhaust air outlets in the ceiling or at the top of the wall.
- The required cross sections for the supply air inlets (as well as for the flaps and weather protection grids) are indicated in the table.

Supply air and exhaust air ducts

- The flow velocity in the ducts should not exceed 4 m/s.
- Never attach cooling air ducts to the compressor directly. Always use a compensator to prevent distortion and the transmission of vibrations.

Fans

The heated exhaust air must not be drawn in again. If necessary, the heated air must be drawn off by fans.

To ensure sufficient cooling even at high ambient temperatures, the fans must be designed as follows:

- The fan output must be approx. 10 – 15% greater than the sum of the required cooling air quantity for all the machinery operating in the room.
- For a free-standing installation, the cooling air requirement specified in the table corresponds to the required fan capacity.

Ventilation options

including diagram of the different ventilation options:

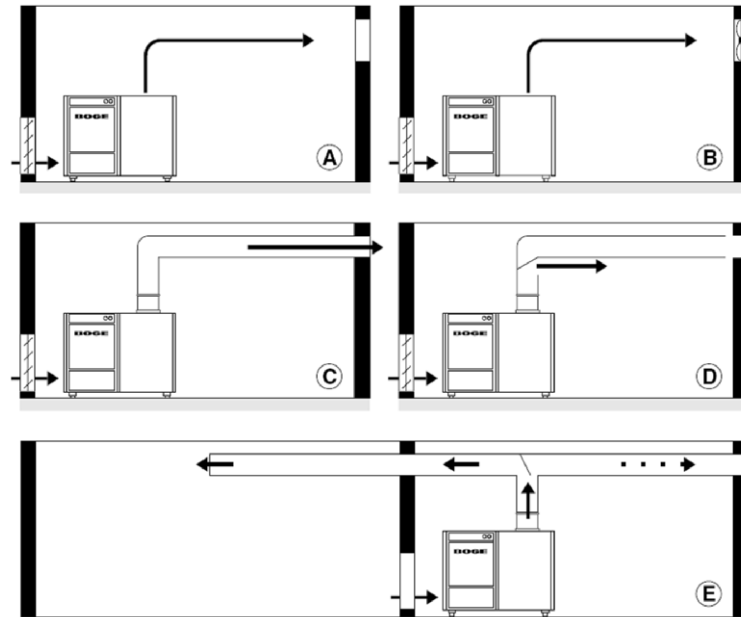


Fig. 4.3: Schematic diagram of the ventilation options

A Supply air inlets and exhaust air outlets in the external walls (free-standing installation)

B Support from exhaust air fan

C Exhaust air duct to outside

D Exhaust air duct with air admission flap

Warm exhaust air is added to the cold ambient air if required.

This prevents the system from freezing up if temperatures are below freezing.

E Use of warm exhaust air for heating

In winter the warm exhaust air is used to heat rooms.

In summer it is diverted outside.

**NOTE**

When using an exhaust air duct, an auxiliary fan must always be installed to ensure the exhaust air coming from the compressor can be completely removed.

Checking the scope of the delivery

The scope of the delivery depends on your order. Prior to commissioning, please check that all the required parts are available. Please check the order confirmation for any possible additional equipment. In addition to the compressor, the scope of the delivery includes at least the following:

- Operating instructions
- Keys
- Electric circuit diagram (in switch cabinet compartment)
- List of the electrical equipment (in switch cabinet compartment)
- Spare parts list

Positioning the compressor

1. Remove all packaging materials in and around the compressor.



ATTENTION

Danger of property damage!

The compressor should only be commissioned with the rubber feet attached. If the feet have been removed for transport, they must be reattached before commissioning.

2. Position the compressor and align it horizontally. The compressor must stand firmly on the ground on all feet.

Removing the transport locks

Each scroll unit is screwed to the housing frame during transportation. To remove the transport locks:

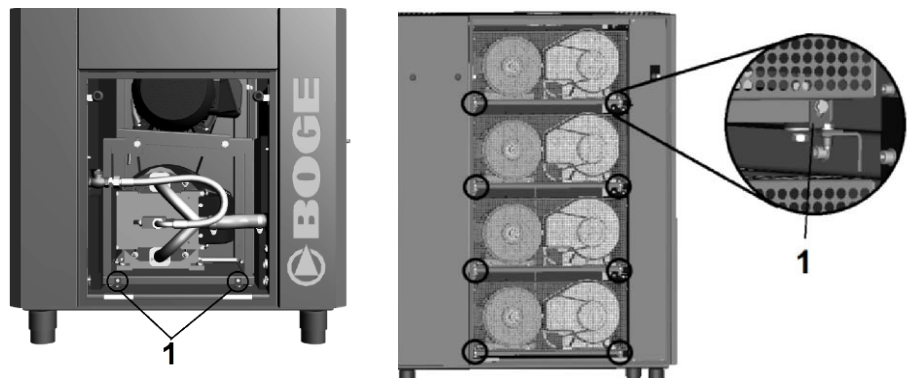


Fig. 4.4: Removing the EO 6 (left) and EO 11...EO 22 (right) transport locks

1. Open the respective side panel.
2. Remove the marked bracket (1) (two for each unit).

Belt tension

Check the V-belts for damage, correct tension and alignment. When doing so, observe the information on belt tensioning on page 67 in the "Servicing" section.

Installation conditions for compressed air receivers

The following information applies to supplied compressed air receivers and compressed air receivers with modular compressors (EO 6 R, EO 6 DR, EO 6 TR).



WARNING

Risk of injury due to overpressure!

In the event of damage, malfunctioning or incorrect use, air under high pressure can escape from pipelines or individual components and cause severe injuries.

- Protect the compressed air receiver against mechanical damage (e.g. from falling objects).
- Exposure of the compressed air receiver to additional static and dynamic loads, voltages or vibration stress is not permitted.
- Operate the compressed air receiver and its equipment from a safe location.
- Observe safety areas and safety clearances. Ensure that the compressed air receiver is easily accessible from all sides (e.g. for recurrent inspections). The required operating and maintenance areas should be taken from the attached dimensioned drawing.
- Ensure that the compressed air receiver is positioned securely. It must not shift or tilt when subjected to external forces. This also includes the additional weight imposed during a pressure test!
- The compressed air receiver must **not** be bolted to the ground.
- Ensure that the name plate is clearly visible.
- Ensure that the compressed air receiver is adequately protected against corrosion (galvanised receiver).
- In accordance with EN 286-1, compressed air receivers must only be used for compressors operating in cut-in and cut-out mode where the pressure fluctuation range amounts to $\Delta p \leq 10\%$ of the maximum operating pressure.
- In accordance with AD 2000, compressed air receivers must only be used for compressors operating in cut-in and cut-out mode where the pressure fluctuation range amounts to $\Delta p \leq 20\%$ of the maximum operating pressure.

Read and observe the documentation provided with the receiver!

Installation conditions for DRL 6-2 and DS dryers

These dryers are designed for operation at an ambient temperature of +25°C. However, the room temperature must not fall below +5°C, otherwise the condensate may freeze.



NOTE

The design conditions must be observed for operation at other ambient temperatures.

4.3 Assembly work

General

BOGE compressors are delivered as complete units ready for connection. The only work to be carried out during assembly is described in the following sections.



CAUTION

Risk of injury due to mechanical hazards, e.g. moving parts or sharp edges!

All assembly work must only be carried out by duly authorised and experienced skilled personnel (BOGE Service personnel).

→ Lay all power supply lines in a trip-proof and barrier-free manner so that potential accidents can be avoided.

Prior to delivery, each compressor undergoes a test run at the factory. It is carefully tested and set. However, damage during transit cannot be excluded.

- Please check the compressor immediately after delivery and make a complaint to the last carrier about any damage – even if the packaging is not damaged. In order to secure your claim for damages against the shipping company, we would advise you to temporarily leave the machines, equipment and packaging materials in the condition in which you found them when you identified the damage.
- Inspect the compressor for external transport damage before commissioning.
- Observe the compressor very closely during commissioning and the subsequent test run.
- Switch the compressor off immediately if malfunctions or faults occur. Inform BOGE Service.

4.4 Establishing the connections



WARNING

Risk of injury due to mechanical hazards, e.g. moving parts or sharp edges!

Danger of property damage or malfunctions due to incorrect connections!

The compressor should only be connected by duly authorised and experienced skilled personnel.

→ Wear PPE.

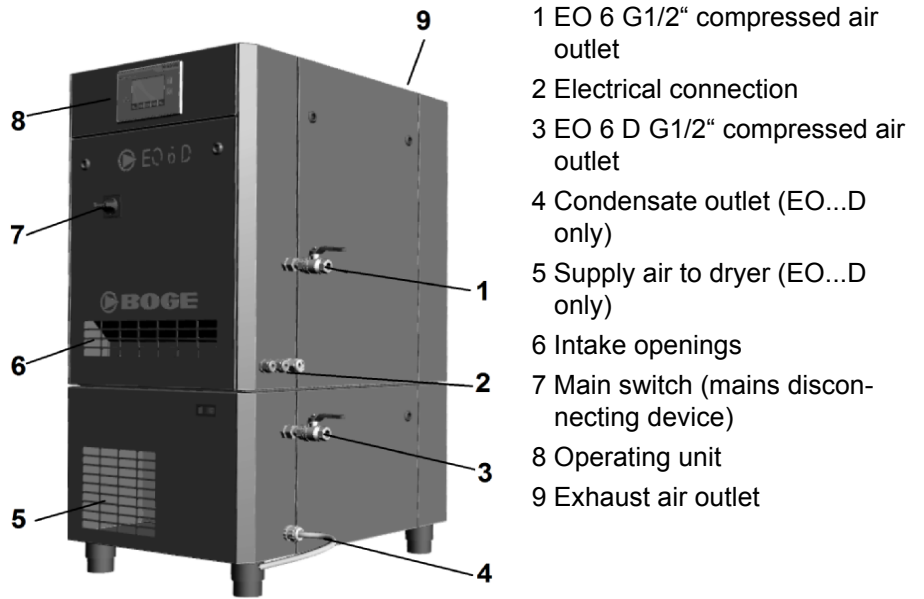


Fig. 4.5: EO 6 D overall view

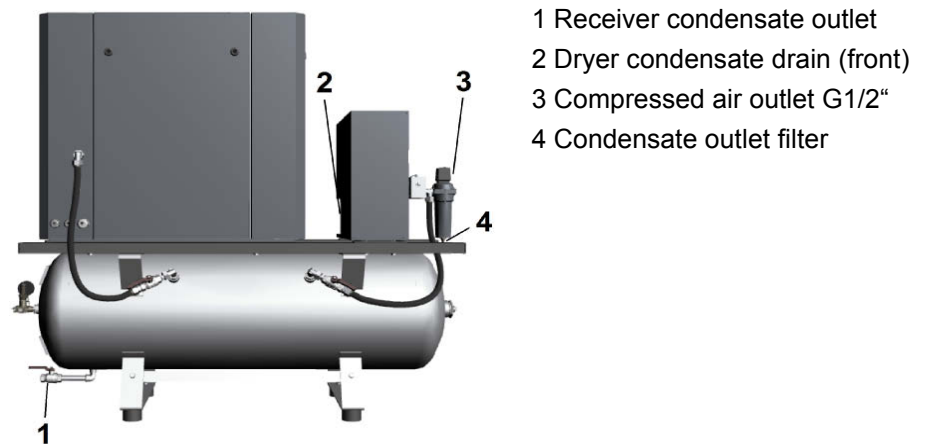


Fig. 4.6: EO 6 DR-270 rear view

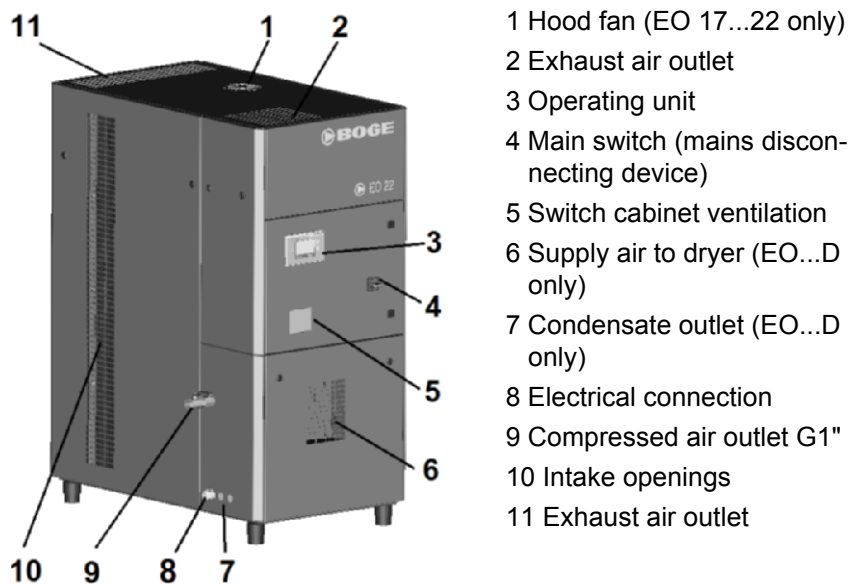


Fig. 4.7: EO 11...EO 22 D external overall view

Connecting the compressor to the compressed air network

Connect the compressed air outlet on the compressor to the compressed air network or a compressed air receiver. Use a BOGE high-pressure hose for this.

**NOTE**

Do not install a non-return valve in the pressure line.
The compressor is already equipped with a non-return valve.

1 Establishing the electrical connection

**DANGER****Danger of death due to electric current!**

Coming into contact with live parts, defective insulation or components can be fatal.

Ensure that all work on the electrical equipment of the compressor is only carried out by skilled electricians.

When connecting to the mains, observe the national and international regulations in force (e.g. VDE regulations, DIN / EN standards) and the local safety regulations.

Also observe the regulations of your local electricity utility company regarding the loading capacity of the mains.

Prior to all work:

1. Disconnect all power infeeds using the mains disconnecting device.
2. Take precautions to prevent them being switched back on again.
3. Check that all system components are de-energised.
4. Earth and short circuit.
5. Cover or enclose adjoining live parts.

Mains disconnecting device

Every compressor unit must be fitted with a mains disconnecting device in accordance with EN 60204-1. The main switch installed as standard complies with this requirement.

Rated voltage

The data of your mains (operating voltage, control voltage, current type, frequency, etc.) must be identical to the data on the rating plate on the switch cabinet. In the event of deviations, please contact BOGE service or your supplier.

Refer to the "Technical data" section regarding the design of the fuse protection.

Connecting the supply lines

- Check all terminals in the switch cabinet are firmly secured. If necessary, retighten the screw connections.
- Guide the power supply cable through the threaded cable connection.
- Connect leads L1, L2, L3, N, PE (PEN) firmly to the supply terminal. A clockwise rotating field must be created.

Retighten the electrical connections after the first 50 operating hours.

Condensate outlet connection (EO...D, EO...DR)

Scroll compressors with dryers are equipped ex works with automatic condensate drains.

**NOTE**

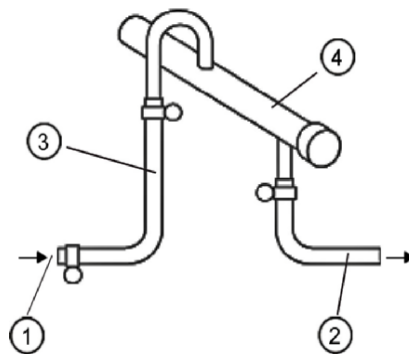
The refrigerant dryer separates water from the compressed air. Contaminants from the environment may be found in the condensate.

- Ensure the condensate is disposed of correctly.
- When disposing of the collected condensate, the wastewater regulations of the local water authority must be observed. Observe water protection regulations.

EO 6 DR, EO 17 D, EO 22 D: A minimum pressure of 2 bar is required to ensure that the automatic condensate drain functions correctly.

**ATTENTION****Risk of injury due to condensate discharge at operating pressure!**

- Install the condensate outlet in such a way that no persons or objects can be affected by the emerging condensate.



1 from condensate drain

2 to waster water drain

The condensate drain pipe (3) should be laid on the wall with an upward rise of max. 5 m. This increases the minimum operating pressure by 0.1 bar per meter. Lay the manifold (4) min. ½" with 1% downward gradient. Guide the drain pipe (3) into the manifold from above.

5.1 Commissioning the compressor

Checking the installation conditions

Installation location:		Date of installation location inspection:	
Product name: EO 6...EO 22 D			
Category		Inspection parts	Result (Y)
Installation location	Installation area	Is there sufficient space to operate the machine?	<input type="checkbox"/>
	Installation location	Does the installation location meet all the criteria specified in these instructions?	<input type="checkbox"/>
		Are the machine's intake air and exhaust air outlets free?	<input type="checkbox"/>
	Servicing	Is there sufficient space for maintenance and repair work?	
Electricity	Miscellaneous	Is there a stable power supply?	<input type="checkbox"/>
	Distribution system	Are the capacity of the circuit breaker and power cable sufficient?	<input type="checkbox"/>
		Distance of the circuit breaker to the installation location	<input type="checkbox"/>
Compressed air	Compressed air outlet	Are the connecting leads suitable (operating conditions observed, compensation considered if necessary)?	<input type="checkbox"/>
		Is there a shut-off device?	<input type="checkbox"/>
Condensate (EO...D only)	Outlet	Is the condensate drain pipe intact?	<input type="checkbox"/>
Environment	Installation surface	There are no external vibrations	<input type="checkbox"/>
		Is the installation surface secure, level and even enough for the load?	<input type="checkbox"/>
	Intake / cooling air	Is the ambient air free from dust?	<input type="checkbox"/>
		Is the ambient air dry?	<input type="checkbox"/>
		Does the intake air meet the required conditions (temperature, quality, contaminant content)?	<input type="checkbox"/>

Table 5.1: Checking installations

**WARNING**

Risk of injury due to mechanical hazards, e.g. moving parts or sharp edges!

The compressor should only be connected by duly authorised and experience skilled personnel.

→ Wear PPE.

Checking the pressure settings

Read the supplied operating instructions for the compressor control.

Checking the rotation direction of the drive and fan motors

Always check the respective motor's rotation direction is correct prior to initial commissioning or after replacing the motor.

**ATTENTION**

Danger of property damage!

Even brief operation in the wrong rotation direction (for more than 5 seconds) can cause significant property damage.

→ Always check the drive and fan motors' rotation direction prior to initial commissioning.

→ Record the test result on the commissioning report.

Ensure that the rotation direction matches the arrow on the compressor stage and the fan.

1. Close the mains disconnecting device.
2. Switch the compressor on and immediately off again to check the rotation direction.

Changing the rotation direction

**DANGER**

Danger of death due to electric current!

Coming into contact with live parts, defective insulation or components can be fatal.

→ Ensure that all work on the electrical equipment of the compressor is only carried out by skilled electricians.

→ Open the mains disconnecting device and secure against accidental switching on again using a padlock.

- Swap two phases (L1, L2 or L3) in the power cable.

Checking the leak tightness of the compressed air pipes



WARNING

Risk of injury due to overpressure!

In the event of damage, malfunctioning or incorrect use, fluids under high pressure can escape from pipes or individual components and cause severe injuries.

- Any work on the compressed air system must only be carried out by duly authorised and experienced personnel.
- Wear personal protective equipment, such as protective clothing and protective goggles.
- The leak tightness of the compressed air outlet connection must be checked immediately after switching on the machine.
- Make sure to maintain a safe distance during the inspection.

1. Close the mains disconnecting device.
2. Switch the compressor on and check the leak tightness of the compressed air outlet.
3. Switch off the compressor.



CAUTION

Risk of injury due to moving parts or sharp edges!

- Open the mains disconnecting device and secure against accidental switching on again using a padlock.

4. If required: have leaks repaired by experienced skilled personnel.
Record the test results.

Opening the shut-off valves


Open the ball valve on the compressor outlet.

Conducting a test run

1. Close the mains disconnecting device.
2. Switch on the compressor using the ON button on the compressor control.
 - The compressor starts.
 - The compressor switches off automatically once the pre-set switch-off pressure has been reached.
3. Check the net pressure on the control display.
4. If required, adjust the operating pressure (pressure setpoint).
 - The compressor is ready for operation.
 - For the control function see the control display.
5. Switch off the compressor after a several-hour test run at maximum operating load.

Record the test results.

5.2 Shutting down / recommissioning the compressor

	<p>CAUTION Risk of injury due to moving parts, thermal or pressure-related hazards!</p> <ul style="list-style-type: none"> → Open the mains disconnecting device and secure against accidental switching on again using a padlock. → Depressurise or block pressurised pipelines. Check that all pressurised components are fully depressurised.
---	---

Shutting down the compressor for prolonged periods

1. Slacken off the V-belts.
2. Do not cover the system so that it is airtight, otherwise the corrosion of various parts will be increased.


Recommissioning the compressor after a prolonged period of inactivity

Compressor systems that have been switched off, inactive or in storage for longer than three months should not be recommissioned until the measures described below have been carried out.

To recommission the compressor after a prolonged period of inactivity proceed as follows:

1. Turn the scroll compressor manually in the rotation direction several times.
2. Tension the V-belt.
3. Connect the system: See "Commissioning the compressor" on page 43.
4. Commission the system.

Refrigerant compressed air dryer

	<p>NOTE When handling used refrigerant, pay particular attention to the general safety rules in these operating instructions.</p>
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5.3 Operating the DRL 6-2 DL dryer

The integrated DL dryer is switched on and off via the compressed air compressor.



ATTENTION

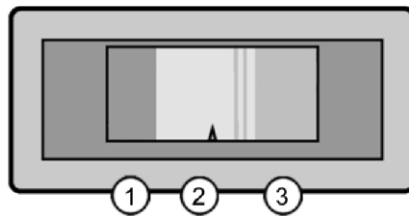
Danger of property damage!

→ Wait for approx. 5 minutes between switching the DL dryer off and on to allow the pressure in the refrigeration system to equalise.

Condensate

After a few hours of operation with compressed air flowing, it should be checked whether condensate is accumulating and being drained.

Pressure dew point display



The pressure dew point display shows the pressure dew point reached by the DL dryer.

- 1 Blue field: pressure dew point too low
- 2 Green field: pressure dew point OK
- 3 Red field: pressure dew point too high

Fig. 5.1: Pressure dew point display

6.1 Basic information on servicing





Your compressor has an integrated monitoring system in the form of the compressor control, which informs you in good time about the most important maintenance work via a maintenance warning.

The basic servicing intervals for the compressor are set by BOGE Service personnel via the control during commissioning depending on the ambient conditions.

This enables the most important maintenance work to be performed regularly and, over the long-term, to keep compressor wear to a minimum and to guarantee the machine has a long service life.

You should also observe the information in the supplied operating instructions for accessories and optional equipment.

Servicing safety information

	WARNING Risk of injury due to mechanical hazards, e.g. moving parts or sharp edges!
	WARNING Hot surfaces. Risk of burns from thermal hazards!
	WARNING Pressurised components. Risk of injury due to overpressure!
	CAUTION Risk of injury due to contact with hazardous substances, e.g. from inhalation!

In all circumstances:

Ensure that maintenance work is only carried out by duly authorised and qualified personnel or appropriately trained personnel.

- ➔ Wear personal protective equipment.
- ➔ Prior to starting any maintenance work, always stop the compressor as described in these operating instructions before removing any cladding or safety devices. Refit the cladding or safety devices immediately upon completion of the maintenance work.
- ➔ Heavy components may only be lifted by multiple persons in accordance with the local industrial safety regulations.
- ➔ Only use original spare parts and operating materials approved by BOGE for the maintenance and service work.
- ➔ When the automatic restart (Auto-Restart) is activated, the compressor will start automatically following a power failure. Prerequisite: the net pressure is lower than the set switch-on pressure.

**DANGER****Danger of death due to electric current!**

Coming into contact with live parts, defective insulation or components can be fatal.

Ensure that all work on the electrical equipment of the compressor is only carried out by authorised skilled electricians.

Always adhere to the procedure described below for all maintenance work. Never omit a single safety step. Otherwise, you will risk injuries due to re-starting, electric shock or self-releasing parts.

Prior to all maintenance work:

1. Switch off the compressor using the OFF button.
2. Open the mains disconnecting device and secure against accidental switching on again using a padlock.
3. After switching off the power supply, wait until the fan comes to a stop and all indicator lights go out.
4. Fix a warning sign to the control and fill in the name of the person who is authorised to switch the machine back on.
5. Check that all system components are definitely de-energised.
6. Allow all hot compressor components to cool to 50°C before starting any work.
7. Disconnect the compressor from the compressed air network. To do so, close the ball valve on the compressed air outlet.
8. Depressurise the compressor completely. One possible method is to vent the safety valves on the scroll units:
 - Turn the knurled nut anti-clockwise until you feel resistance from the spring.
 - Turn the knurled nut a little more. Any residual air escapes.
 - Once all the residual air has escaped from the system, retighten the knurled nut.
9. Remove all the safety claddings necessary for maintenance work.

After the maintenance work has been completed:

10. Refit all removed safety claddings.
11. Open the ball valve on the compressed air outlet.
12. Prior to switching on again, ensure that nobody else is still working on the compressor.
13. Only then may the warning sign be removed and the mains disconnecting device switched back on again.

Servicing by BOGE customer service recommended

Arrange for BOGE Service to fully check and service your compressor after every 3,000 operating hours or annually.



NOTE

Maintenance contract.

Enter into a maintenance contract with BOGE.

BOGE Service will carry out the proper maintenance on your compressor at regular intervals. As well as adhering to the warranty claim conditions, this guarantees maximum safety and reliability of your compressed air supply.

Servicing overviews

Overview with internal view of machine (EO 6 D)

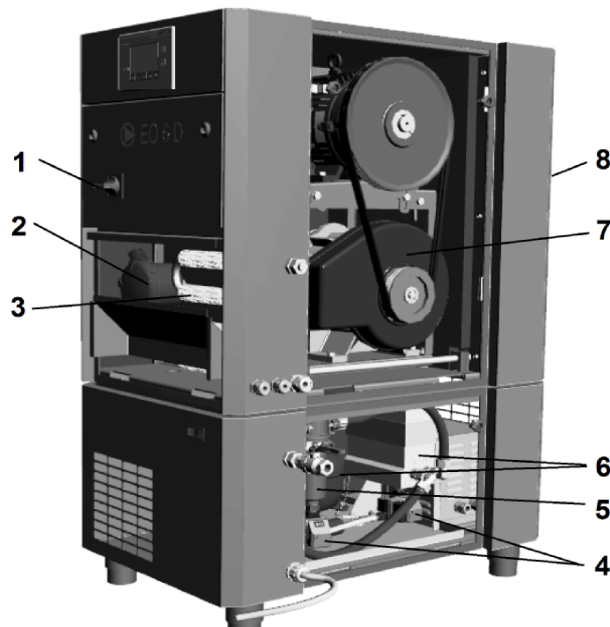


Fig. 6.1: Maintenance work on EO 6, EO 6 D

- 1 Check main switch (mains disconnecting device) / emergency stop function
- 2 Check / replace suction filter
- 3 Clean the secondary cooler
- 4 EO 6 D: check function of condensate drain
- 5 EO 6 D: cyclone separator servicing
- 6 EO 6 D: DRL 6-2 refrigerant dryer servicing
- 7 Cooling air fan on scroll unit
- 8 Clean primary cooler (rear of compressor)

Additional maintenance work for compressed air systems and compressor stations**Overview of machine (EO 6 DR)**

Fig. 6.2: Overview of additional maintenance work on the compressor unit or station

- 1 Check receiver safety valve for proper functioning
- 2 Drain condensate from receiver
- 3 EO 6 DR: DS dryer servicing incl. condensate drain and cyclone separator
- 4 EO 6 DR: filter servicing

Overview with internal view of machine (EO 11)

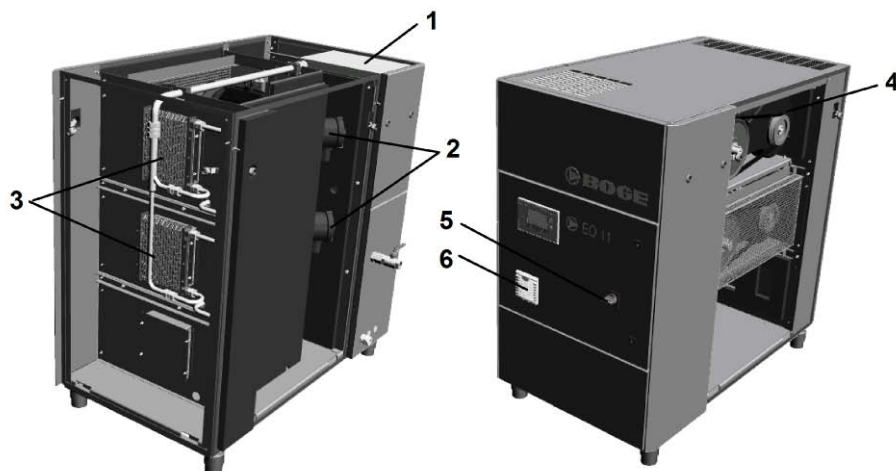


Fig. 6.3: Maintenance work on EO 11...16

- 1 Clean the secondary cooler
- 2 Check / replace suction filter
- 3 Clean the primary cooler
- 4 Cooling air fan on scroll unit
- 5 Check main switch (mains disconnecting device) / emergency stop function
- 6 Check / replace supply air filter for switch cabinet ventilation

Overview with internal view of machine (EO 22 D)

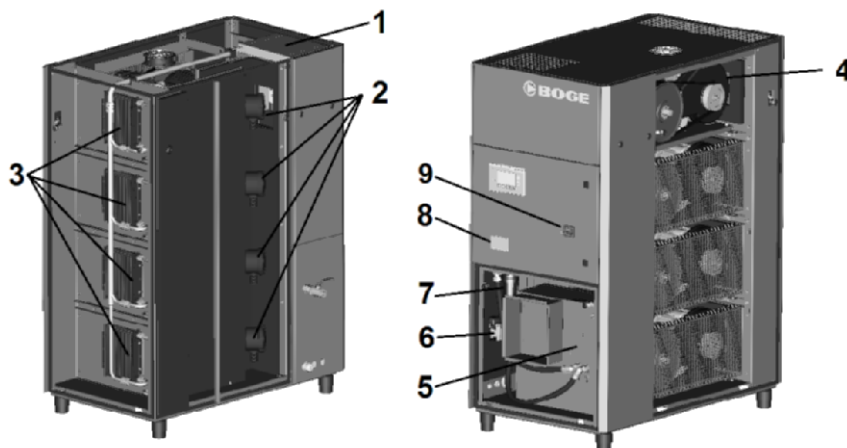


Fig. 6.4: Maintenance work on EO 17...22 D

- 1 Clean the secondary cooler
- 2 Check / replace suction filter
- 3 Clean the primary cooler
- 4 Cooling air fan on scroll unit
- 5 EO...D: DS refrigerant dryer servicing
- 6 EO...D: check function of condensate drain
- 7 EO...D: cyclone separator servicing
- 8 Check / replace supply air filter for switch cabinet ventilation
- 9 Check main switch (mains disconnecting device) / emergency stop function

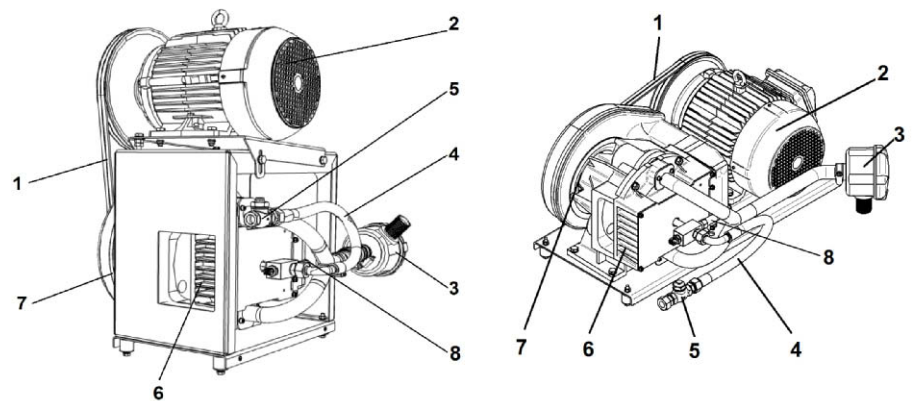
Overview of scroll unit

Fig. 6.5: Maintenance work on scroll unit EO 6 (left) and EO 11...22

- 1 Tension / replace the V-belt
- 2 Drive motor: bearing with permanent lubrication
- 3 Check / replace suction filter
- 4 Check / replace pressure hose
- 5 Check / replace non-return valve
- 6 Clean cooling air outlet
- 7 Clean cooling air fan on scroll unit
- 8 Check safety valve for proper functioning

Maintenance Intervals

The servicing intervals specified in the following tables are based on average operating and ambient conditions.

Extreme conditions may require shorter servicing intervals.

The first table contains servicing and maintenance work to be carried out by the customer at regular intervals in between the annual BOGE Service maintenance work.

BOGE recommends having the servicing and maintenance work listed in the second table performed by BOGE Service to ensure the warranty claim conditions are adhered to.



NOTE

Note down all maintenance work in the table on the final pages. This will facilitate troubleshooting for BOGE Service.

Maintenance work between fixed servicing intervals

The following servicing and maintenance work must be carried out by authorised and qualified personnel and will ensure your compressor functions flawlessly between fixed servicing intervals.


Maintenance work	Page
Weekly:	
Check compressor / air system for leaks	–
Check final compression temperature (max. 250°C)	Control
Monthly:	
Check / clean suction filter on scroll compressor	60
Check main switch (mains disconnecting device) / emergency stop function	Control panel / control
Check operating pressure, adjust if necessary	Control
For EO 11...22 D only: Check supply air filter for switch cabinet, replace if necessary	60
Check screw connections on the compressor are tightened properly	–
Every 1,500 operating hours ¹⁾ (or six-monthly):	
Check that electrical connections have been tightened properly	–
Clean the coolers (primary and secondary coolers)	61
Every 3,000 operating hours ¹⁾ (or annually):	
Replace suction filter	60
Every 5,000 operating hours ¹⁾ (or every 2 years):	
Clean cooling air fan on scroll compressor (10 bar)	63
Every 10,000 operating hours ¹⁾ (or every 4 years):	
Clean cooling air fan on scroll compressor (8 bar)	63

¹⁾ If the compressor is not used frequently, servicing must be carried out after the specified interval regardless of the number of operating hours.

Table 6.1: Maintenance work between servicing intervals

Maintenance work at fixed servicing intervals

To ensure the warranty claim conditions are adhered to, BOGE recommends having the following servicing and maintenance work carried out by certified BOGE Service personnel using original spare parts.

	<p>ATTENTION</p> <p>Compressor damage caused by improper servicing!</p> <p>The compressor may be damaged or destroyed if maintenance work is omitted or carried out incorrectly.</p> <ul style="list-style-type: none"> ➔ Have the following maintenance work carried out by authorised BOGE Service personnel only. ➔ Only use original spare parts.
---	---

Maintenance work (BOGE Service personnel)	Page
Every 3,000 operating hours ¹⁾ (or annually):	
Check safety valve(s) for proper functioning	65
Check compressor for leaks	–
Check V-belts	66
Check non-return valves	66
Every 5,000 operating hours ¹⁾ (or every 2 years):	
Replace "Tip Seal" sealant on scroll compressor (10 bar)	66
Service / lubricate scroll compressor bearing (10 bar)	66
Clean cooling fins on scroll compressor (10 bar)	66
Every 10,000 operating hours ¹⁾ (or every 4 years):	
Replace "Tip Seal" sealant on scroll compressor (8 bar)	66
Service / lubricate scroll compressor bearing (8 bar)	66
Clean cooling fins on scroll compressor (8 bar)	66
Replacing the V-belt	66
Replace non-return valves	–
Every 15,000 operating hours ¹⁾ (or every 6 years):	
Replace scroll compressor (10 bar)	68
Every 20,000 operating hours ¹⁾ (or every 8 years):	
Replace scroll compressor (8 bar)	68
Special servicing intervals:	
Lubricate drive motor bearing	68

¹⁾ If the compressor is not used frequently, servicing must be carried out after the specified interval regardless of the number of operating hours.

Table 6.2: Maintenance work at fixed servicing intervals carried out by BOGE Service personnel

Maintenance work on the dryer (EO...D)

EO 6 DR, EO 17 D, EO 22 D: Also observe the instructions supplied with the DS refrigerant dryer.

EO 6 D, EO 11 D: See "Maintenance work on the DRL DL dryer 6-2" on page 68.

Maintenance work
Daily:
For DRL 6-2 only: check pressure dew point
Weekly:
Check condensate outlet
Every 4 months:
For DS only: clean condenser fins
Check power consumption
Annually:
Condensate drain servicing*
Cyclone separator servicing*
For DS filter servicing only*: replace filter elements, check float drain

* Follow the supplied operating instructions.

Table 6.3: Maintenance work on the dryer

General information on lubricants and refrigerants



CAUTION


Risk of injury due to contact with hazardous substances!

Lubricants and refrigerants can pose a potential danger to health and the environment.


- ➔ Avoid contact with skin and eyes. Always wear protective gloves made of resistant plastic.
- ➔ Observe the information on the relevant safety data sheets.

Disposing of used operating materials and condensates


EO...D only: the air taken in contains water in the form of vapour, which turns into condensate during compression.

	<p>ATTENTION</p> <p>Danger of environmental damage!</p> <p>Hazardous substances, e.g. lubricants and cleaning agents, must be handled and disposed of in accordance with legal provisions.</p> <ul style="list-style-type: none"> → Ensure these substances are disposed of correctly. → When disposing of the collected condensate, the wastewater regulations of the local water authority must be adhered to. Observe the water protection law.
---	--

Pressure hoses

	<p>WARNING</p> <p>Possible sudden discharge of fluid.</p> <p>Risk of injury from material failure if unsuitable pressure hoses are used!</p> <p>Unsuitable, e.g. old pressure hoses, cannot withstand the operating loads and may burst, causing serious injuries.</p> <ul style="list-style-type: none"> → Do not re-use pressure hoses. → Defective or leaking pressure hoses must never be repaired; they must always be replaced immediately. → Do not use pressure hoses beyond their permissible service life. The manufacturing date is printed on the hose. BOGE recommends replacing pressure hoses after a usage period of max. five years (including storage time). → Replace pressure hoses with original spare parts approved by BOGE only.
---	---

Spare and wearing parts

	<p>CAUTION</p> <p>Risk of injury when using unsuitable materials and components, e.g. as a result of mechanical failure!</p> <p>Danger of property damage!</p> <p>Only use original spare parts and operating materials approved by BOGE during repair or maintenance work.</p> <ul style="list-style-type: none"> → BOGE accepts no liability for damage caused by the use of other spare parts and operating materials.
---	---

6.2 Performing maintenance work between fixed servicing intervals

Monthly: Check / replace supply air filter for switch cabinet ventilation

Type EO 11...EO 22 D only.

Check the function of the supply air filter mats in the switch cabinet:

- Once per month, however at least every 500 operating hours.
- Reduce interval if the air taken in is heavily polluted.

Replace the supply air filter mats:

- When dirt becomes encrusted on the filter mats, or at least once a year.



NOTE

Always keep a sufficient stock filter mats as replacements.

Replacing the supply air filter mat on the switch cabinet

1. Switch off the compressor using the OFF button.



DANGER

Danger of death due to electric current!

Coming into contact with live parts, defective insulation or components can be fatal.

Prior to all work on the switch cabinet:

- ➔ Open the mains disconnecting device and secure against accidental switching on again using a padlock.

2. Remove the cladding, see Figure 6.1.
3. Take the filter out of the cartridge.
4. Fit the new filter.
5. Re-fit the cladding.

Monthly: checking / cleaning the suction filter

Clean:

- Once per month, however at least every 500 operating hours.
- Reduce interval if the air taken in is heavily polluted.

Change:

- If damaged.
- After it has been cleaned twice.

1. Switch off the compressor using the OFF button.

**CAUTION****Risk of injury due to sharp edges and exposure to dust!**

This maintenance work should only be carried out by authorised and qualified personnel.

→ Wear PPE.

Prior to the maintenance work:

2. Open the mains disconnecting device and secure against accidental switching on again using a padlock.

Removing the filter cartridge

3. Open the compressor housing at the front.
4. Remove the filter housing lid (1).
5. Take out the filter cartridge (2).

Cleaning the filter cartridge**ATTENTION****Danger of property damage!**

Do not clean the filter cartridge in liquids.

→ Do not use hard objects for cleaning as doing so will damage the filter paper.

Replace the filter cartridge if it is damaged or has been cleaned twice.

6. Tap the filter cartridge with your hand to knock out coarse dust.
7. Blow out fine dust using dry compressed air (maximum pressure 5 bar) from the inside to the outside.
8. Clean the sealing surfaces of the filter cartridge.

Fitting the filter cartridge

9. Insert the filter cartridge into the filter case.
10. Attach the lid of the filter case.

Every 1,500 operating hours: Cleaning the cooler

Clean:

- After 1,500 operating hours but no less than every six months.

**NOTE**

The service life of the primary and secondary coolers depends on the degree of soiling in the intake cooling air. Heavy external soiling of the coolers leads to an excessively high temperature in the air system.

1. Switch off the compressor using the OFF button..



WARNING

Risk of injury due to sharp edges, hot surfaces and exposure to dust!

This maintenance work should only be carried out by authorised and qualified personnel.

→ Wear PPE.

Prior to the maintenance work:

2. Open the mains disconnecting device and secure it to prevent it being switched on again.
3. Allow all hot compressor components to cool to 50°C.

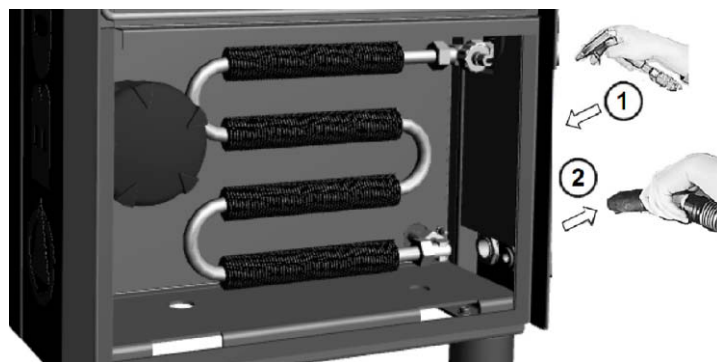


Fig. 6.6: Clean Type EO 6...EO 6 TR secondary cooler

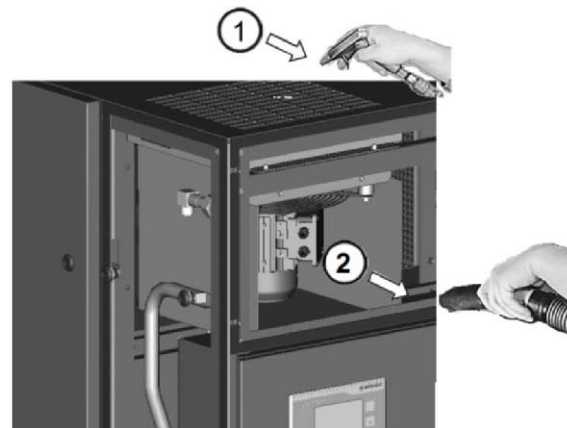



Fig. 6.7: Clean Type EO 11...EO 22 secondary cooler


4. Remove all the safety claddings necessary for maintenance work.
5. Open the respective housing panel. Secondary cooler: remove the housing panel above the operating elements / control.

	<p>ATTENTION Danger of property damage! → Do not use sharp objects to clean the cooler. They may damage the cooler.</p>
---	---

6. Clean off the accumulated soiling with a fibre brush.
7. **Primary cooler:** suck out any dirt from the system in the same direction as the normal flow of cooling air. Do not under any circumstances blow the dirt into the system using compressed air.
Secondary cooler: blow out any dirt with compressed air (1) in the opposite direction to the normal flow of cooling air (see fig. 6.6 and 6.7).
8. Suck up the blown out dirt using an industrial vacuum cleaner (2) (see fig. 6.6 and 6.7).

After the maintenance work has been completed:

9. Secondary cooler: screw the side panels back onto the airflow box.
10. Refit all removed safety claddings and housing panels.
11. Prior to switching on again, ensure that nobody else is still working on the compressor.
12. Only then may the warning sign be removed and the mains disconnecting device switched back on again.

	<p>NOTE If a cooler is very heavily soiled (cleaning with compressed air is no longer possible), it must be dismantled and cleaned by BOGE customer service.</p>
---	--

**Every 5,000 or 10,000 operating hours:
 Cleaning the fan**

Clean the cooling air fan on the scroll unit:

- After 5,000 operating hours (or 2 years) for a 10-bar machine or 10,000 operating hours (or 4 years) for an 8-bar machine.


	<p>NOTE The service life of the fans depends on the degree of soiling in the intake cooling air.</p>
---	--



Fig. 6.8: View of the right side of the EO 6 (left) and EO 11...22 scroll unit housing

- 1 Fan cover
- 2 V-belt
- 3 Protective equipment

1. Switch off the compressor using the OFF button.

	<p>WARNING</p> <p>Risk of injury due to sharp edges, hot surfaces, overpressure and exposure to dust!</p> <p>This maintenance work should only be carried out by authorised and qualified personnel.</p> <p>→ Wear PPE.</p> <p>Prior to the maintenance work:</p> <ul style="list-style-type: none"> 2. Open the mains disconnecting device and secure it to prevent it being switched on again. 3. Allow all hot compressor components to cool to 50°C. 4. Depressurise the system.
--	--

- 5. Remove the right side panel of the housing and the isolating protective equipment (3).
- 6. Remove the V-belts (2).
- 7. Loosen the screws on the scroll compressor fan covers (1) and remove the covers.
- 8. Check the fans and clean if necessary.

After the maintenance work has been completed:

- 9. Refit all removed safety claddings, covers and housing panels.
- 10. Prior to switching on again, ensure that nobody else is still working on the compressor.
- 11. Only then may the warning sign be removed and the mains disconnecting device switched back on again.

6.3 Having maintenance work performed at fixed servicing intervals


Every 3,000 operating hours: Changing the suction filter cartridge

Change the suction filter cartridge:

- If damaged.
- After it has been cleaned twice.
- Depending on soiling, also after 3,000 operating hours or annually at servicing intervals.


Changing the filter cartridge

1. Switch off the compressor using the OFF button.

	<p>WARNING</p> <p>Risk of injury due to sharp edges, hot surfaces, overpressure and exposure to dust!</p> <p>This maintenance work should only be carried out by authorised and qualified personnel.</p> <p>→ Wear PPE.</p> <p>Prior to the maintenance work:</p> <ol style="list-style-type: none"> 2. Open the mains disconnecting device and secure it to prevent it being switched on again. 3. Allow all hot compressor components to cool to 50°C. 4. Depressurise the system.
--	--

5. Remove the old filter cartridge (see “Removing the filter cartridge” on page 61).
6. Insert the new filter cartridge (see “Fitting the filter cartridge” on page 61).

Every 3,000 operating hours / annually: Function check of the safety valves

	<p>WARNING</p> <p>Risk of injury from flying parts caused by overpressure, e.g. pressurised components bursting or detonating!</p> <p>Risk of injury due to sudden discharge of hot compressed air!</p> <p>It is forbidden to operate the compressor without the installed safety devices. A safety valve prevents inadmissible overpressure.</p> <p>→ The specified final compression pressure must not be exceeded.</p> <p>→ Observe the statutory regulations applicable in the installation location for operating safety devices against overpressure.</p>
---	--

Have the function of the safety valve checked exclusively by BOGE Service personnel.

Interval: After approx. 3,000 operating hours but at least once a year.

**Every 3,000 operating hours / annually:
Checking the V-belts**

Check the V-belts:

- After approx. 3,000 operating hours but at least once a year for damage, correct tension and alignment.

**Every 3,000 operating hours / annually:
Checking the non-return valves**

Check the function of the non-return valves on the scroll units:

- After 3,000 operating hours but at least once a year.

**Every 5,000 / 10,000 operating hours:
Scroll compressor servicing**

10 bar compressor: After 5,000 operating hours but after two years at the latest. **8 bar compressor:** After 10,000 operating hours but after four years at the latest.

Have the following maintenance work on the scroll compressors carried out exclusively by BOGE Service personnel.

The following work must be carried out:

- Replace "Tip Seal" sealant on scroll compressor
- Service / lubricate scroll compressor bearing
- Clean cooling fins on scroll compressor

Every 10,000 operating hours: Replacing the V-belts

Replace the V-belts:

- If visibly damaged.
- After 10,000 operating hours.

Replacing the V-belts:

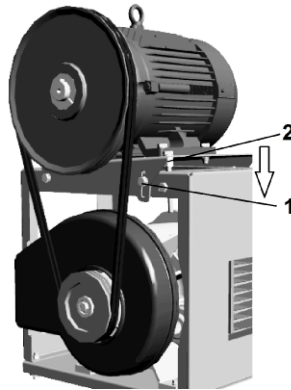
1. Switch off the compressor using the OFF button.

	<p>WARNING</p> <p>Risk of injury due to sharp edges, hot surfaces, overpressure and exposure to dust!</p> <p>This maintenance work should only be carried out by authorised and qualified personnel.</p> <p>→ Wear PPE.</p> <p>Prior to the maintenance work:</p> <ol style="list-style-type: none"> 2. Open the mains disconnecting device and secure it to prevent it being switched on again. 3. Allow all hot compressor components to cool to 50°C. 4. Depressurise the system.
--	--

5. Remove the service side cladding.

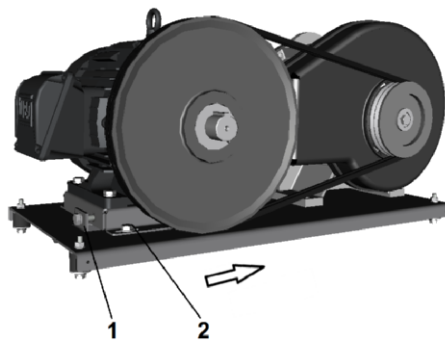
6. Remove the belt protection.

To slacken off the V-belts:



7. Loosen all four motor fastening screws (2).
8. Turn the belt tensioning screw (1) anti-clockwise.
9. Move the motor in the direction of the arrow until the V-belts are fully slackened.

Fig. 6.9: Replacing the EO 6...EO 6 TR V-belts



7. Loosen all four motor fastening screws (2).
8. Turn the belt tensioning screw (1) anti-clockwise.
9. Move the motor in the direction of the arrow until the V-belts are fully slackened.

Fig. 6.10: Replacing the EO 11...EO 22 D

10. Remove the relieved V-belt from the pulley.

11. Position the new V-belt on the pulley on the motor and compressor.

To tension the new V-belts:

12. Turn the belt tensioning screw (1) clockwise until the belt is correctly tensioned.



NOTE

The new V-belts must be exactly the same length. Always replace the V-belts as an entire set.

The belt tension is correct when the belts can be pressed in approx. 8 – 9 mm in the middle between the two pulleys with a weight of 2.5 kg.

13. Reattach the motor fastening screws.

14. Fit the belt protection.

15. Refit the service side cladding.

Every 15,000 / 20,000 operating hours: Replacing the scroll compressor

Heavily loaded scroll compressors should be replaced once a specific service life has expired.

Intervals:

10 bar compressor: after 15,000 operating hours but after six years at the latest.

8 bar compressor: After 20,000 operating hours but after eight years at the latest.

Have the scroll compressor replaced exclusively by BOGE Service personnel.

6.4 Special maintenance work

Drive motors with permanent lubrication

The bearings of the drive motors used have maintenance-free permanent lubrication.

Under normal operating conditions (ambient temperature max. 40°C, continuous operation) the bearings are maintenance-free within their service lives.

Higher or lower thermal loads (due to a higher or lower ambient temperature) can change the service life of the bearings.

6.5 Maintenance work on the DRL DL dryer 6-2



ATTENTION

Risk of injury from incorrectly performed work!

→ Observe all the safety rules for electrical systems and equipment before commencing any maintenance work (see chapter “General safety information” on page 7).



NOTE

As the servicing intervals depend heavily on the respective operating and installation conditions, only approximate values can be given here.

Daily checks

Monitor the pressure dew point.


Weekly maintenance

Check and if necessary clean the condensate drainage system.


Annual maintenance


Condensate drain: replace the set of wearing parts.


For more information, please refer to the separate operating instructions for the condensate drain.

	<p>ATTENTION Danger from overpressure! Risk of injury due to the sudden discharge of fluids. → Maintenance work may only be carried out on the condensate drain when it is in a depressurised state.</p>
---	---

6.6 Disposal after dismantling or replacement of parts

	<p>DANGER Danger of death due to electric current! Coming into contact with live parts, defective insulation or components can be fatal. Work on the electrical equipment of the compressor may only be carried out by an authorised and qualified electrician. Prior to all work on the switch cabinet: → Open the mains disconnecting device and secure against accidental switching on again using a padlock.</p>
---	---

	<p>WARNING Risk of injury due to sharp edges, hot surfaces, overpressure and hazardous substances! → Dismantling of the compressor should only be carried out by duly authorised and qualified personnel. → Also note all information on safe dismantling of the refrigerant dryer and safe disposal of the refrigerant in the supplied operating instructions for the Type DS dryer and in the safety data sheet for the refrigerant.</p>
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	<p>NOTE Dispose of all system parts in such a way that health and environmental damage is avoided. Should you have any questions about this product, please contact Technical Support on: Telephone: +49 5206 601-140</p>
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The following electronic components must always be disposed of separately:

- Displays, display devices
- Electrical power supply
- Controls
- Circuit boards with electronic components

Hazardous substances such as refrigerant and lubricants, as well as contaminated components if applicable, must be disposed of separately.

6.7 Spare parts and additional equipment

List of spare and wearing parts (for maintenance)

Name
Suction filter cartridge
Supply air filter mat on the switch cabinet
Compressor service kit incl. grease
V-belts

Spare parts for the DRL 6-2 DL dryer


	<p>NOTE!</p> <p>The spare parts inventory is continuously updated by BOGE. Should you require spare parts for the integrated DRL 6-2 compressed air dryer, please contact BOGE Technical Support:</p> <p style="text-align: center;">Telephone: +49 5206 601-140</p>
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Spare parts for the DS dryer

A list of available spare parts can be found in the separate operating instructions for the DS dryer.





List of available additional equipment

Name
Additional equipment for treating compressed air
Automatic condensate drain

	<p>Attention!</p> <p>Please always specify the following information on the type plate when ordering:</p> <ul style="list-style-type: none"> - Type - Year of manufacture - Machine number
---	--

7.1 Basic information on remedying faults

The tables on the following pages give information on the possible causes of operating faults and measures for their rectification (please also refer to the operating instructions for the compressor control).

	<p>DANGER Danger of death due to electric current! Coming into contact with live parts, defective insulation or components can be fatal. Prior to any work required to remedy faults: → Open the mains disconnecting device and secure against accidental switching on again using a padlock.</p>
	<p>WARNING Risk of injury due to mechanical hazards, e.g. moving parts, hot surfaces or overpressure! → Ensure that any work required to remedy faults is only carried out by trained personnel or specialists. → Ensure that components which have a safety function are only set, repaired or exchanged by BOGE Service personnel.</p>
	<p>CAUTION Risk of compressor damage! If fault and problem rectification (incl. maintenance and repair work) is carried out by unauthorised or unqualified personnel, this can damage or destroy the compressor. → Faults and problems may only be rectified by authorised and skilled personnel or BOGE Service personnel. → If in doubt, contact BOGE Service.</p>
	<p>Should you have any questions about this product, please contact Technical Support on: Telephone: +49 5206 601-140</p> <p>If you require Service assistance, please contact BOGE Service on: Telephone: +49 5206 601-100</p>

Compressor faults

The information provided in the following table refers to the compressor system or an individual scroll unit. Depending on the machine type, several scroll units may be installed.

Fault	Possible cause	Rectification
No or low free air delivery, no pressure build-up	System components in the compressor are leaking	Check the compressed air pipes inside the compressor; retighten or reseal the screw connections if necessary
	Scroll compressor seals are worn out	Replace seals
	Suction filter soiled	Clean suction filter
	Torn V-belt	Install new V-belt(s)
Compressor system does not start	No power to compressor	Check electrical connection
	Fuses are faulty	Check mains and control fuses and replace if necessary
	Power fluctuations in the electrical supply network	Ensure there is constant voltage in accordance with IEC 38
Safety valve blows off	Operating pressure setpoint has changed	Set the operating pressure to the maximum permitted pressure of the scroll compressor
	Safety valve is faulty	Replace safety valve
Control switches off as temperature too high	Critical ambient conditions	Check installation conditions
	Incorrect operating parameters set	Change settings on the control
	Cooler / fan operation faulty	Check cooler and fan functions, clean or replace components if necessary
	Sensor system faulty	Check sensor system, replace if necessary
Running unsteady	V-belt tension incorrect	Check belt tension
	V-belts are not the same length	Replace with an identical belt set
	Loose screw connections on drive side	Check screw connections

Table 7.1: List of possible faults

Refrigerant dryer and treatment faults (EO...D)

Observe the information in the supplied operating instructions for the Type DS dryer, condensate drain and cyclone separator.

fault	Possible cause	Rectification
Function	Power supply is faulty	<ul style="list-style-type: none"> – Check the power supply. – If the power supply is OK, contact BOGE Service or send the DL dryer to the manufacturer.
Water in compressed air network	Faulty condensate drain (blocked drain pipe, minimum operating pressure not reached)	Clean condensate drain with a neutral cleaning agent
DRL 6-2 DL dryer switches off during operation	DL dryer is being switched off by the installed electrical start-up and protective equipment due to overload	<ul style="list-style-type: none"> – Rectify the cause of the fault. – The DL dryer will switch back on automatically once the protective equipment has cooled down. <p>Note: the device may not switch back on immediately, as the protective equipment needs a certain amount of time to cool down to an acceptable operating temperature.</p>
	Condenser is dirty	Clean the condenser.
High pressure difference on the compressed air side Features: <ul style="list-style-type: none"> – Pressure difference on the compressed air side is increasing. – Volume flow is decreasing. 	DL dryer is freezing	Switch off the device and continue to allow compressed air to flow. After approx. 1/2 h, the pressure difference will return to the normal value. Switch the device back on. If the device freezes again, contact BOGE Service.

Table 7.2: List of possible faults on the dryer

8.1 Guidelines and standards

The compressor conforms to the following guidelines and standards:

Guidelines and directives

- Machinery Directive 2006/42/EC
- EMC Directive 2014/30/EU

In addition, the compressor complies with the protection objectives in the following directives:

- Pressure Equipment Directive 2014/68/EU
- Simple Pressure Vessels Directive 2014/29/EU
- Low Voltage Directive 2014/35/EU

Applied harmonised standards

- EN 1012-1
- EN ISO 12100
- EN 60204-1
- EN 61000-6-2
- EN 61000-6-4

8.2 Application of the Pressure Equipment Directive

This section covers the application of the Pressure Equipment Directive (PED) to the specified compressor series and their pressurised components.

Scope

List of machines (8 and 10 bar max. operating pressure for each type):

- EO 6
- EO 6 D
- EO 6 R
- EO 6 DR
- EO 6 TR
- EO 11
- EO 11 D
- EO 16
- EO 17
- EO 17 D
- EO 22
- EO 22 D

Classification and assessment of pressurised components

Compressor / compressed air systems and compressor stations are assemblies according to the PED. The classification of an assembly according to the PED is based on the highest category of the individual components.

Compressor components	Pressure volume product $P_s \cdot V$ Pressure nominal width product $P_s \cdot DN$	Classification / assessment according to PED	Conformity assessment procedure to be applied according to directive...
Pipelines (compressed air pipe system, cooler, hoses)	$P_s \cdot DN < 1000$	Art. 4, 3	PED
Safety equipment * (safety valves)	n.a.	Category IV according to Art. 2,4 (not taken into consideration for assembly assessment according to Art. 14)	PED
Compressed air receiver	$P_s \cdot V > 3000$	Excluded from scope according to Art. 1, 2.c	Simple Pressure Vessels Directive
Compressor / compressor block	n.a.	Excluded from scope according to Art. 1, 2.j	Machinery Directive
Optional equipment (e.g. filter, dryer, condensate drain, cyclone separator)	misc.	Art. 4, 3	PED

Outcome of the assessment

Every aspect of the assembly of the pressurised compressor components mentioned above is excluded from the scope of the Pressure Equipment Directive (PED).

Justification: According to Art. 1, 2.f of the PED, assemblies which in their entirety would fall into Category 1 at the highest are excluded from the scope of the PED if they are covered by the Machinery Directive.

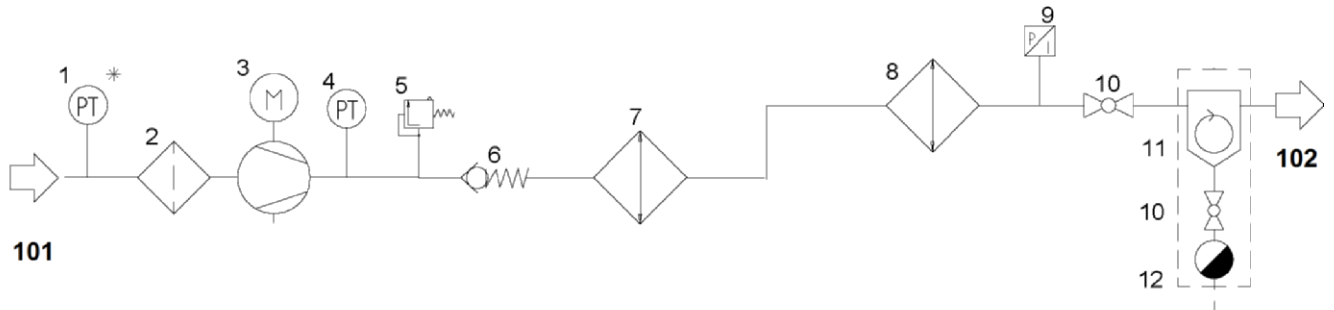
Installation in compressed air systems

The installation of the assemblies mentioned above in a compressed air system does not constitute a new assembly in the sense of the PED, provided that the integrated components are excluded from the scope of the PED.

8.3 Pneumatic circuit diagrams

The following pages contain the individual pneumatic circuit diagrams for the different machine types.

Pneumatic circuit diagram for EO 6, air-cooled

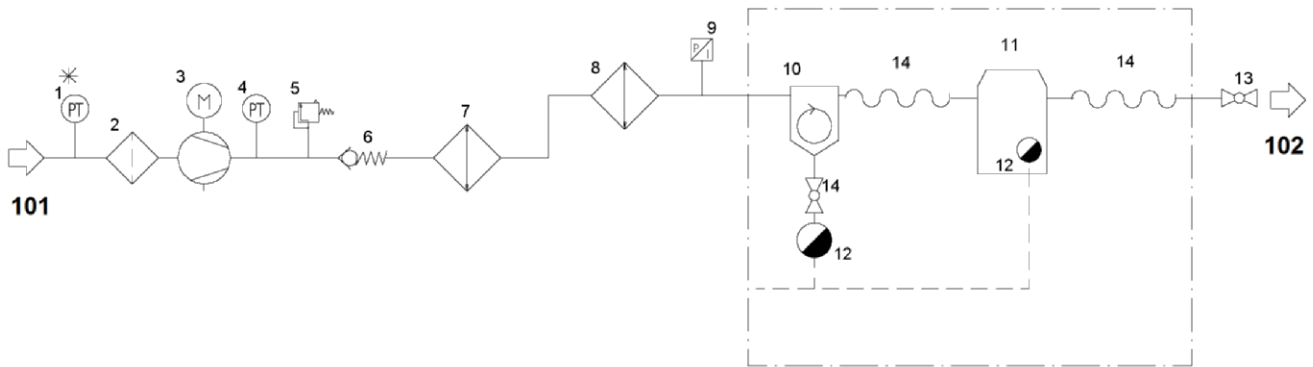


101 Intake air INLET
102 Compressed air OUTLET

- 1 Intake air temperature *
- 2 Suction filter
- 3 Unit
- 4 Final compression temperature
- 5 Safety valve
- 6 Non-return valve
- 7 Primary cooler
- 8 Secondary cooler
- 9 Net pressure
- 10 Ball valve (option)
- 11 Cyclone separator (option)
- 12 Condensate drain (option)

* with focus control 2.0

Pneumatic circuit diagram for EO 6 D, air-cooled

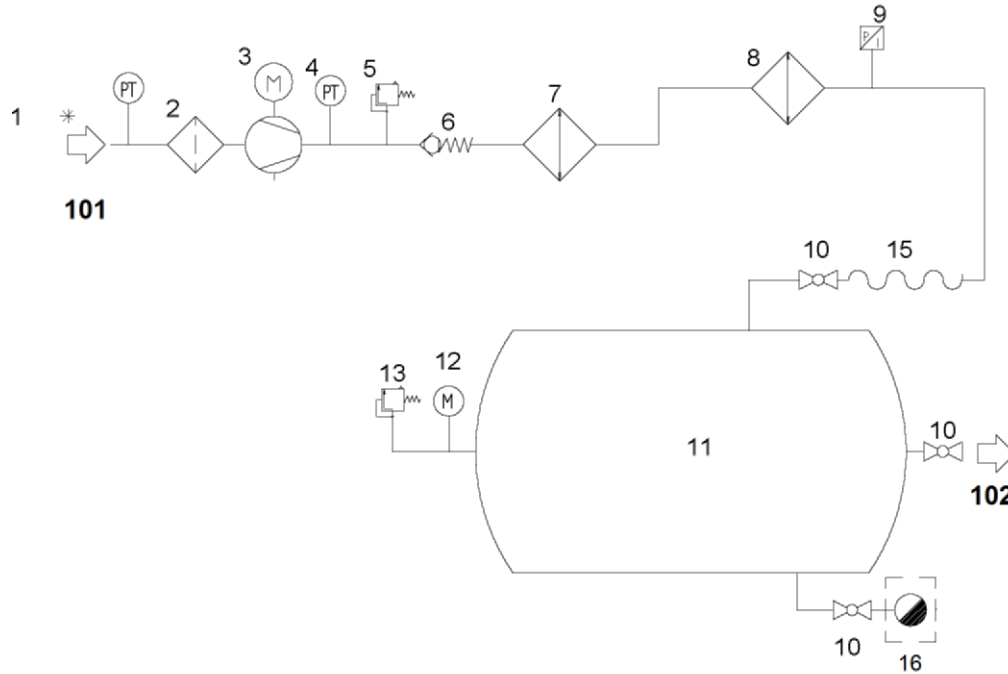


101 Intake air INLET
102 Compressed air OUTLET

- 1 Intake air temperature *
- 2 Suction filter
- 3 Unit
- 4 Final compression temperature
- 5 Safety valve
- 6 Non-return valve
- 7 Primary cooler
- 8 Secondary cooler
- 9 Net pressure
- 10 Cyclone separator
- 11 Refrigerant dryer
- 12 Condensate drain
- 13 Ball valve
- 14 Hose

* with focus control 2.0

Pneumatic circuit diagram for EO 6 R, air-cooled

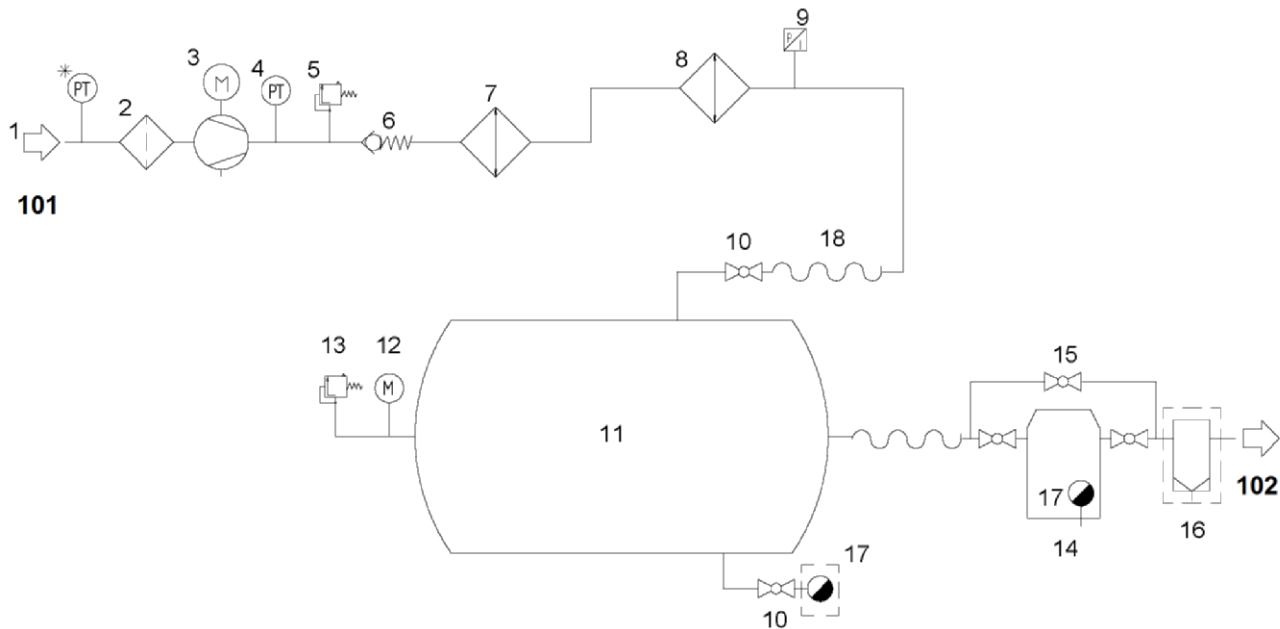


101 Intake air INLET
102 Compressed air OUTLET

- 1 Intake air temperature *
- 2 Suction filter
- 3 Unit
- 4 Final compression temperature
- 5 Safety valve
- 6 Non-return valve
- 7 Primary cooler
- 8 Secondary cooler
- 9 Net pressure
- 10 Ball valve
- 11 Receiver
- 12 Pressure indicator
- 13 Receiver safety valve
- 14 Condensate drain
- 15 Hose
- 16 Receiver condensate drain (option)

* with focus control 2.0

Pneumatic circuit diagram for EO 6 DR, air-cooled

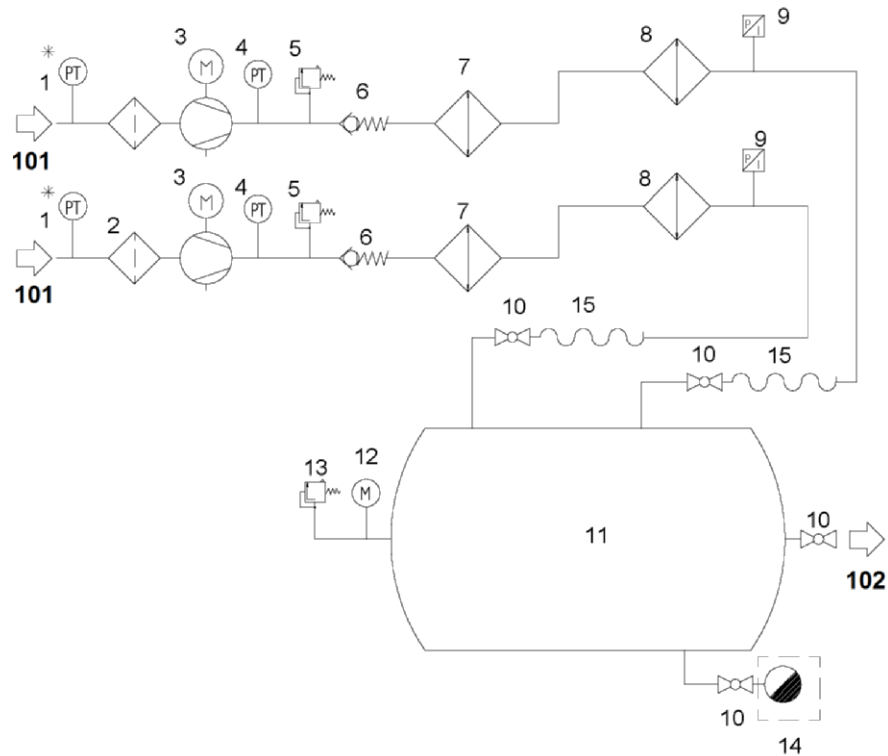


101 Intake air INLET
102 Compressed air OUTLET

- 1 Intake air temperature *
- 2 Suction filter
- 3 Unit
- 4 Final compression temperature
- 5 Safety valve
- 6 Non-return valve
- 7 Primary cooler
- 8 Secondary cooler
- 9 Net pressure
- 10 Ball valve
- 11 Receiver
- 12 Pressure indicator
- 13 Receiver safety valve
- 14 Dryer
- 15 Bypass line
- 16 Filter (option)
- 17 Receiver condensate drain (option)
- 18 Hose

* with focus control 2.0

Pneumatic circuit diagram for EO 6 TR, air-cooled

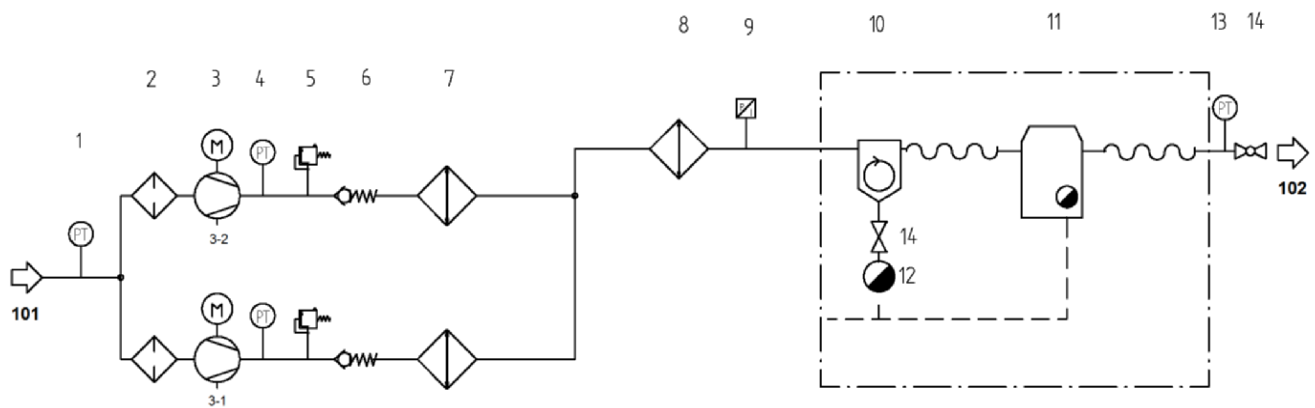


101 Intake air INLET
102 Compressed air OUTLET

- 1 Intake air temperature *
- 2 Suction filter
- 3 Unit
- 4 Final compression temperature
- 5 Safety valve
- 6 Non-return valve
- 7 Primary cooler
- 8 Secondary cooler
- 9 Net pressure
- 10 Ball valve
- 11 Receiver
- 12 Pressure indicator
- 13 Receiver safety valve
- 14 Receiver condensate drain (option)
- 15 Hose

* with focus control 2.0

Pneumatic circuit diagram for EO 11 (D), air-cooled



101 Intake air INLET

102 Compressed air OUTLET

1 Intake air temperature

2 Suction filter

3 Scroll unit 1, 2

4 Final compression temperature

5 Safety valve

6 Non-return valve

7 Compressed air primary cooler

8 Compressed air secondary cooler

9 Net pressure

10 Cyclone separator (EO 17 D)

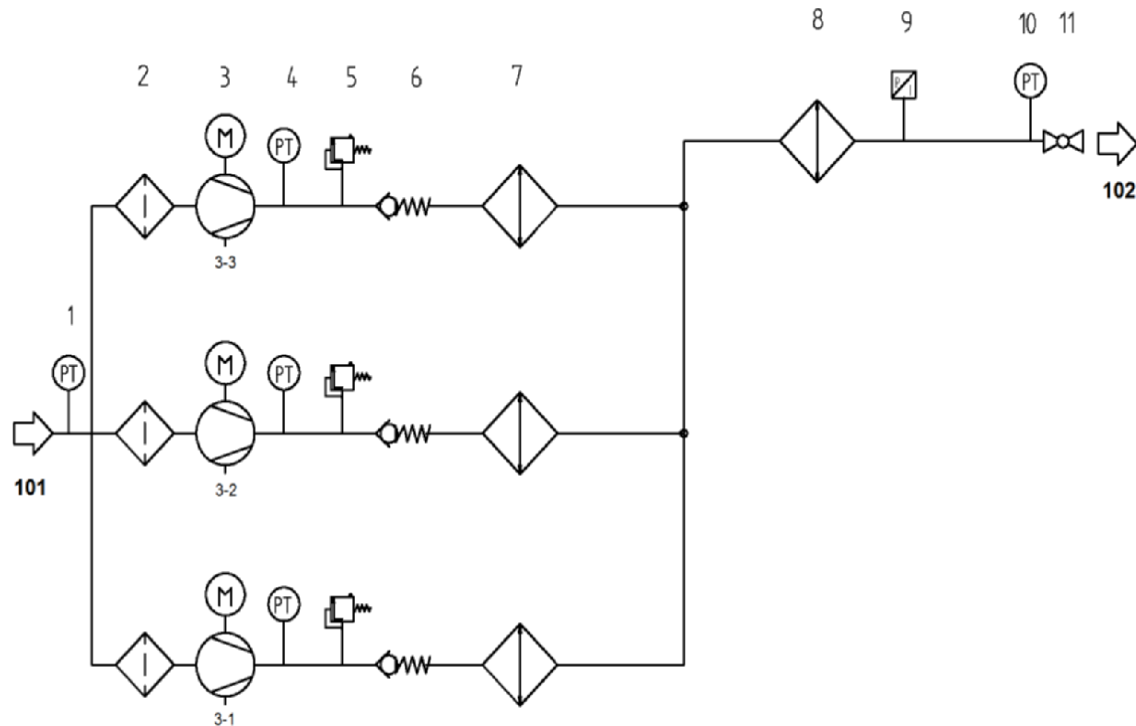
11 Refrigerant dryer (EO 17 D)

12 Condensate drain (EO 17 D)

13 Compressed air outlet temperature

14 Shut-off valve compressed air outlet

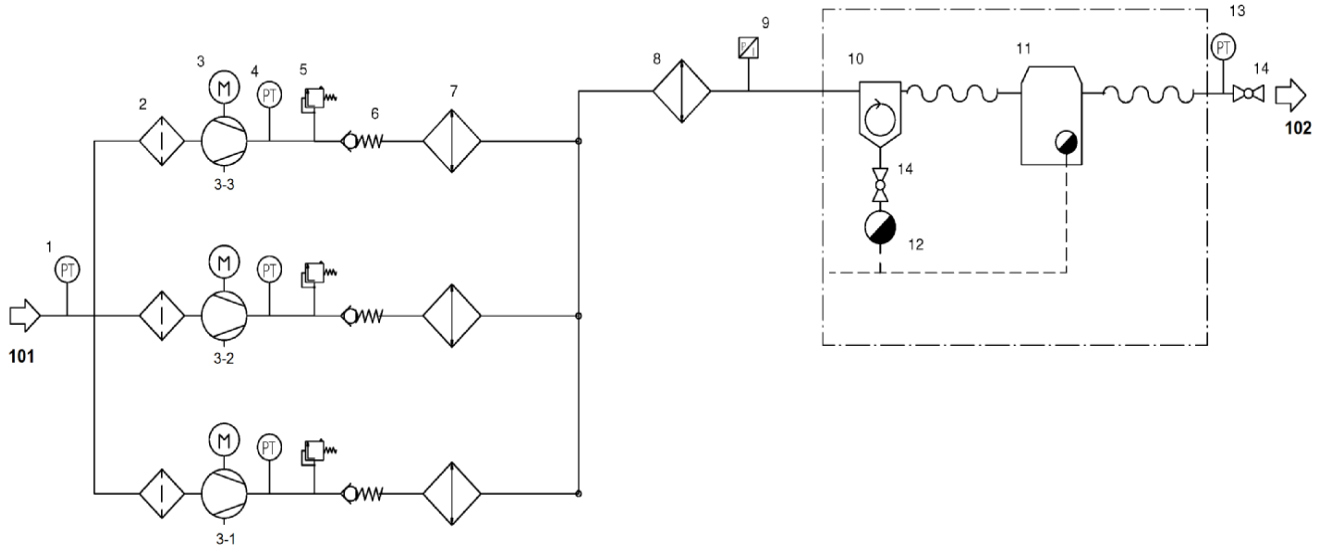
Pneumatic circuit diagram for EO 16, air-cooled



101 Intake air INLET
102 Compressed air OUTLET

- 1 Intake air temperature
- 2 Suction filter
- 3 Scroll unit 1,2,3
- 4 Final compression temperature
- 5 Safety valve
- 6 Non-return valve
- 7 Compressed air primary cooler
- 8 Compressed air secondary cooler
- 9 Net pressure
- 10 Compressed air outlet temperature
- 11 Shut-off valve compressed air outlet

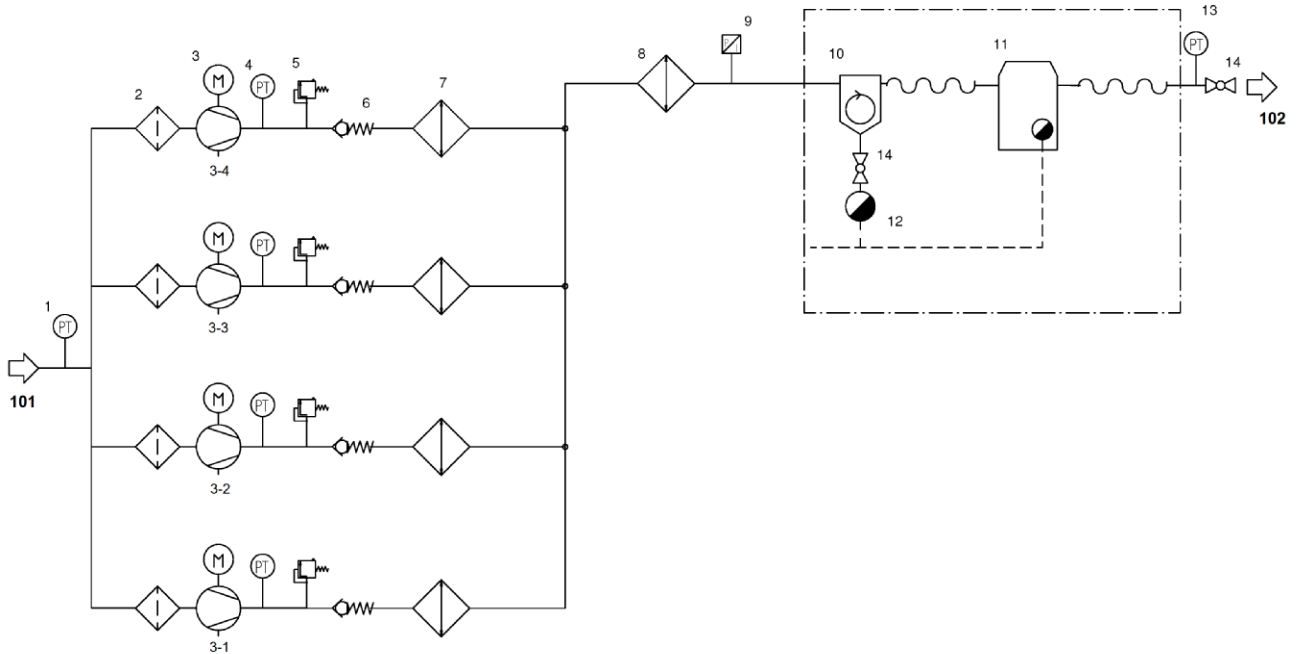
Pneumatic circuit diagram for EO 17 (D), air-cooled



101 Intake air INLET
102 Compressed air OUTLET

- 1 Intake air temperature
- 2 Suction filter
- 3 Scroll unit 1,2,3
- 4 Final compression temperature
- 5 Safety valve
- 6 Non-return valve
- 7 Compressed air primary cooler
- 8 Compressed air secondary cooler
- 9 Net pressure
- 10 Cyclone separator (EO 17 D)
- 11 Refrigerant dryer (EO 17 D)
- 12 Condensate drain (EO 17 D)
- 13 Compressed air outlet temperature
- 14 Shut-off valve compressed air outlet

Pneumatic circuit diagram for EO 22 (D), air-cooled



101 Intake air INLET
102 Compressed air OUTLET

- 1 Intake air temperature
- 2 Suction filter
- 3 Scroll unit 1,2,3,4
- 4 Final compression temperature
- 5 Safety valve
- 6 Non-return valve
- 7 Compressed air primary cooler
- 8 Compressed air secondary cooler
- 9 Net pressure
- 10 Cyclone separator (EO 17 D)
- 11 Refrigerant dryer (EO 17 D)
- 12 Condensate drain (EO 17 D)
- 13 Compressed air outlet temperature
- 14 Shut-off valve compressed air outlet

8.4 List of maintenance work performed

Please record the maintenance work you have completed in the relevant column															
Date															
Operating hours															
Check / replace supply air filter for switch cabinet ventilation															
Check final compression temperature															
Check / clean / replace suction filter															
Check / set net / operating pressure															
Check / clean cooler															
Function check of safety valves															
Servicing of the scroll unit															
Servicing of the refrigerant dryer, condensate drain, cyclone separator															

