



ECO Series

Oil – Free Scroll Compressor

Operator Manual

4 kW (5 HP)

8 kW (10 HP)

11 kW (15 HP)

15 kW (20 HP)

LOT#: 003



WARNING

Personal injury and/or equipment damage will be result by failing to pay attention to the vital safety information and instructions in this manual. Carefully read, understand, and retain all safety information and instructions before operating this compressor.

Information on these operating instructions

These instructions enable you to use the machine safely and efficiently. The instructions are a component part of the machine and must be kept in the direct vicinity of the device and be accessible for staff at all times.

Staff must have carefully read and understood these instructions before starting all work. The basic prerequisite for safe working is compliance with all the safety instructions and instruction for actions included in these operating instructions.

The local occupational health and safety regulations and general safety rules for operational area of the machine also apply.

The instructions for the machine do not cover operation of the controller. Therefore, the instructions and content of the instructions for the controller in question must also be taken into account.

Furthermore, the instructions for the installed components found in the appendices also apply.

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All information and instructions in this manual have been compiled taking account of the applicable standards and regulations, state-of-the-art technology and our years of knowledge and experience.

The manufacturer assumes no liability for damages caused by:

- failure to adhere to these instructions
- improper use
- use of unqualified staff
- unauthorised conversions
- technical modifications
- use of non-approved spare parts

The actual scope of supply may differ from the descriptions and illustrations in these instructions in the case of special designs, the inclusion of additional ordering options or as a result of the latest technical modifications.

The obligations agreed in the contract of supply, the manufacturer's general terms and conditions of business and delivery and the legal regulations valid at the time of completion of the contract apply.

Customer service

Our Customer Service department is available to provide technical information.

24 hour hot line:

In addition, our employees are always interested in receiving new information and hearing of your experiences from usage which could be valuable for the improvement of our products.

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1 Overview

1.1 Design

Oil-free scroll compressor

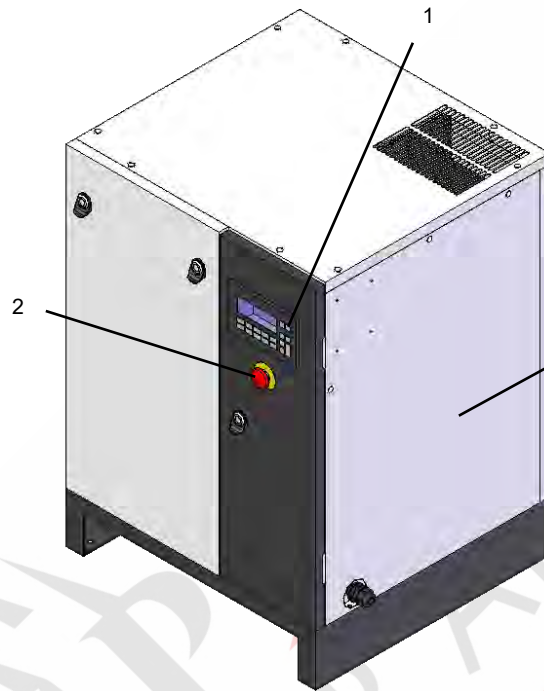


Fig. 1 : Oil-free scroll compressor 4 kW

- 1 Controller
- 2 Emergency Stop

3 Enclosure

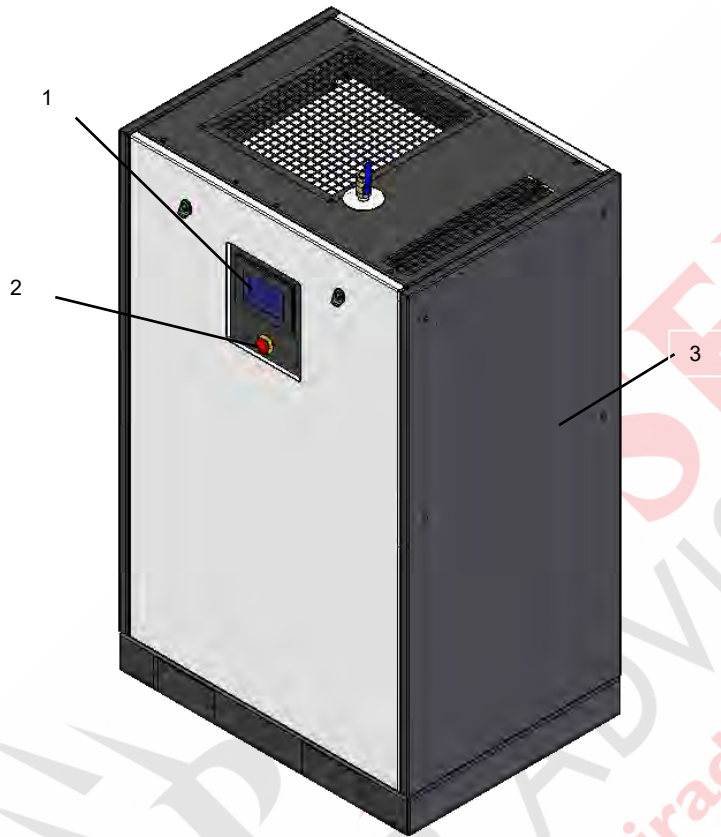


Fig. 2 : Oil-free scroll compressor 8 kW

- 1 Controller
- 2 Emergency Stop

- 3 Enclosure

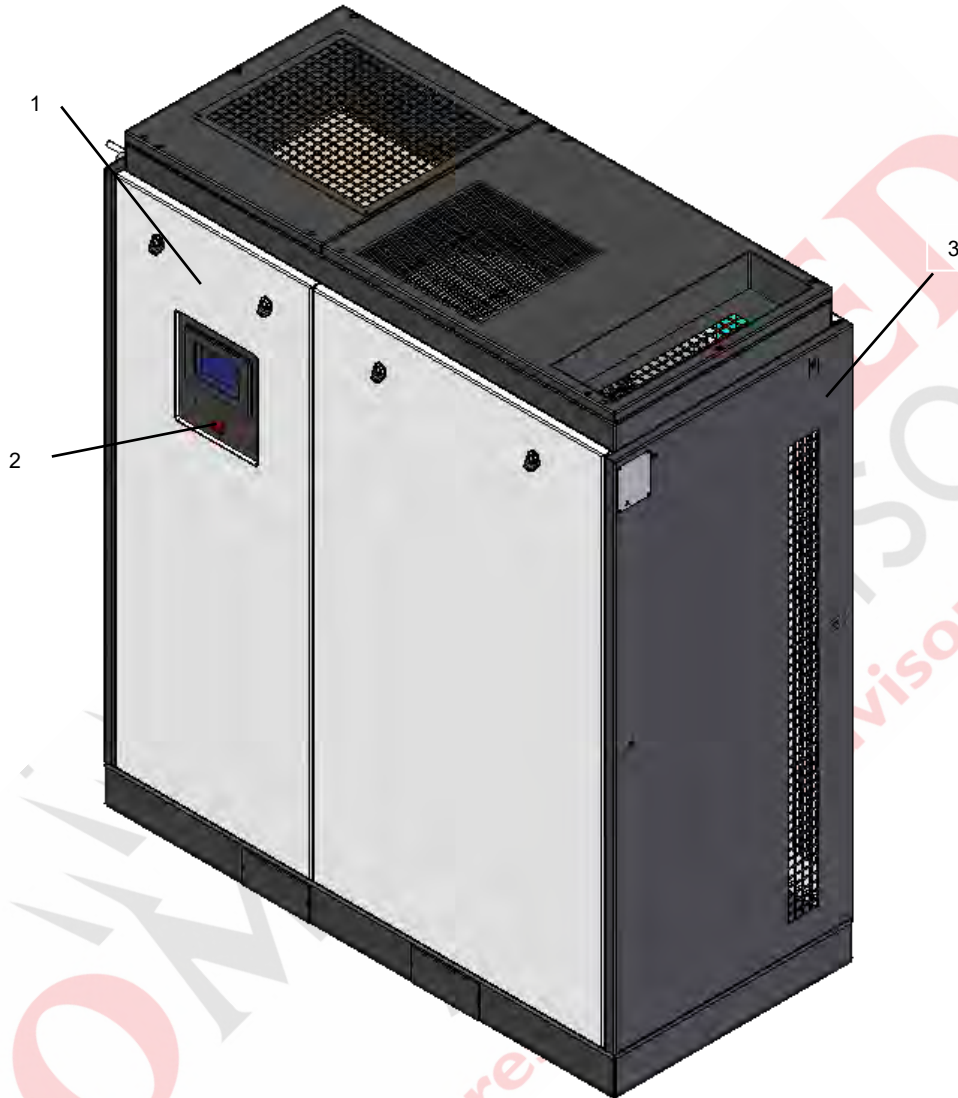


Fig. 3 : Oil-free scroll compressor 11-15 kW

- 1 Controller
- 2 Emergency Stop

- 3 Enclosure

Assemblies

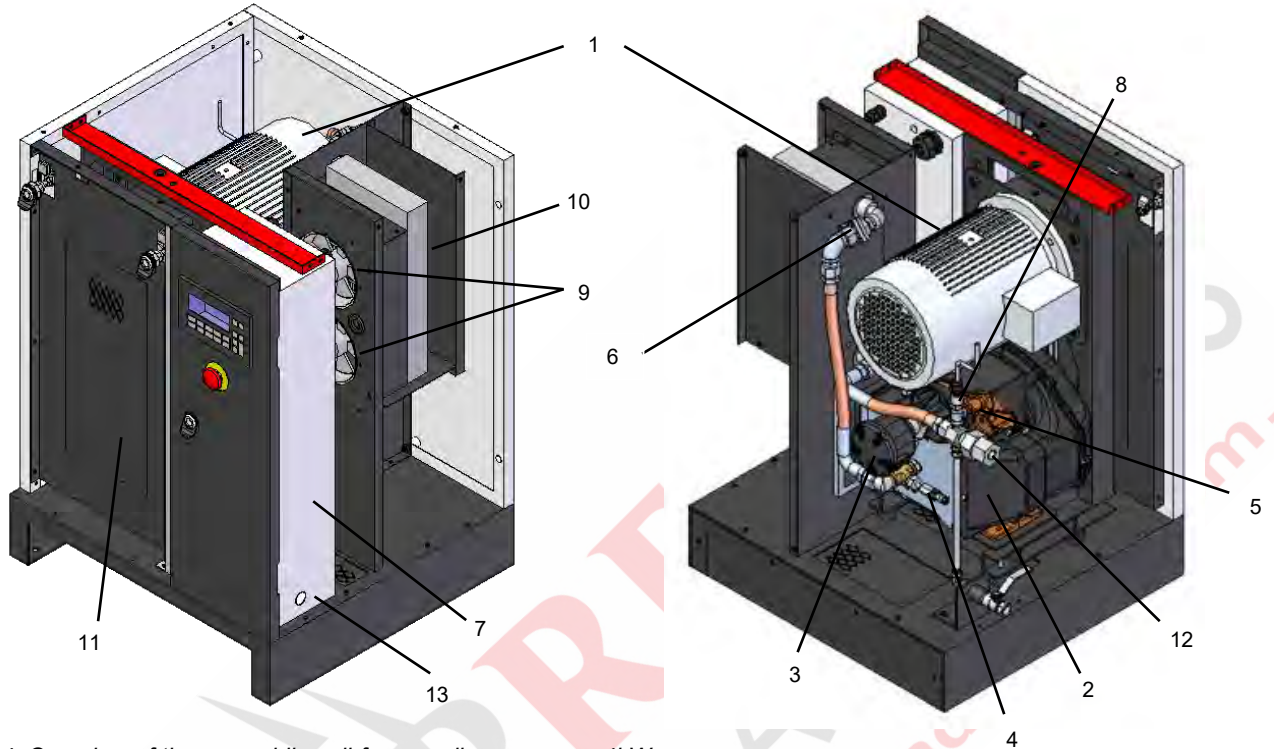


Fig. 4: Overview of the assemblies:oil-free scroll compressor 4kW

- | | | | |
|---|--------------------|----|-----------------------|
| 1 | Motor | 8 | Pressure Sensor |
| 2 | Compressor airend | 9 | Cooling-air fan |
| 3 | Air filter | 10 | After cooler |
| 4 | Tempreature sensor | 11 | Belt cover |
| 5 | Safety valve | 12 | Compressed air outlet |
| 6 | Non-return valve | 13 | Cable port |
| 7 | Switch cabinet | | |

Assemblies

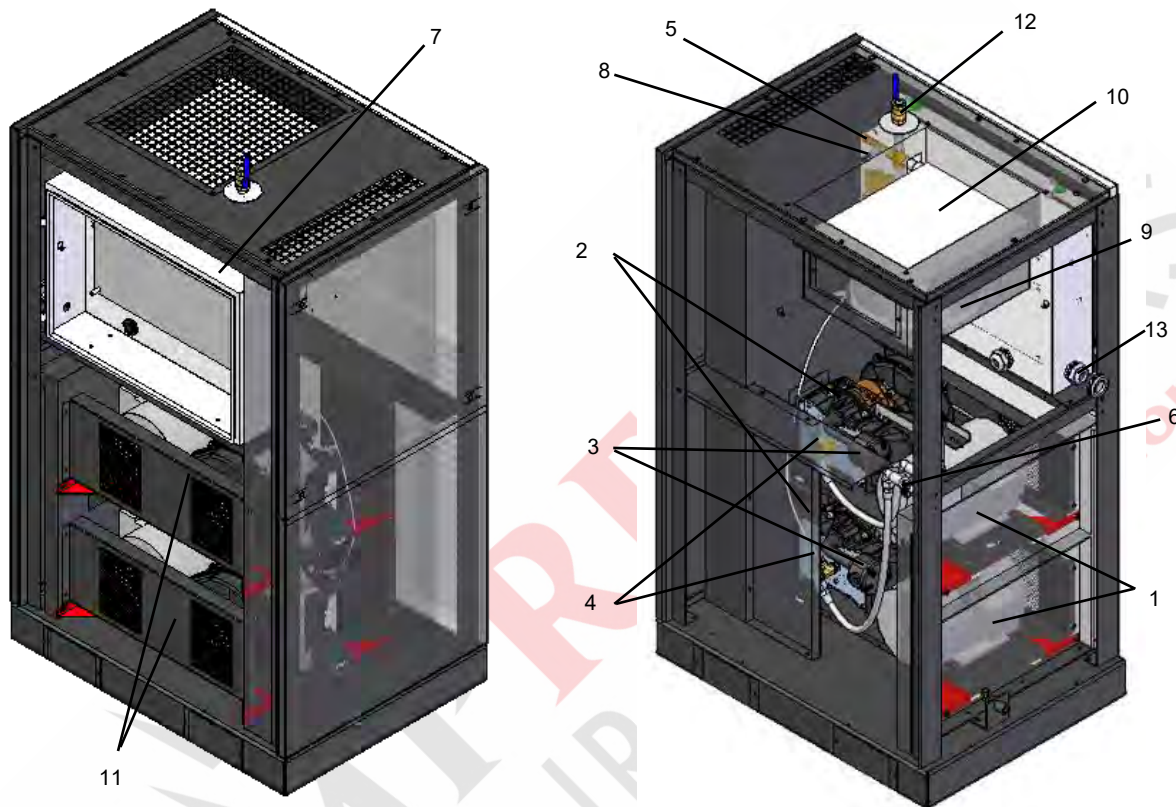


Fig. 5 : Overview of the assemblies:oil-free scroll compressor 8kW

- | | |
|----------------------|--------------------------|
| 1 Motor | 8 Pressure sensor |
| 2 Compressor air end | 9 Cooling-air fan |
| 3 Air filter | 10 After cooler |
| 4 Temperature sensor | 11 Belt cover |
| 5 Safety valve | 12 Compressed air outlet |
| 6 Non-return valve | 13 Cable port |
| 7 Switch cabinet | |

Assemblies

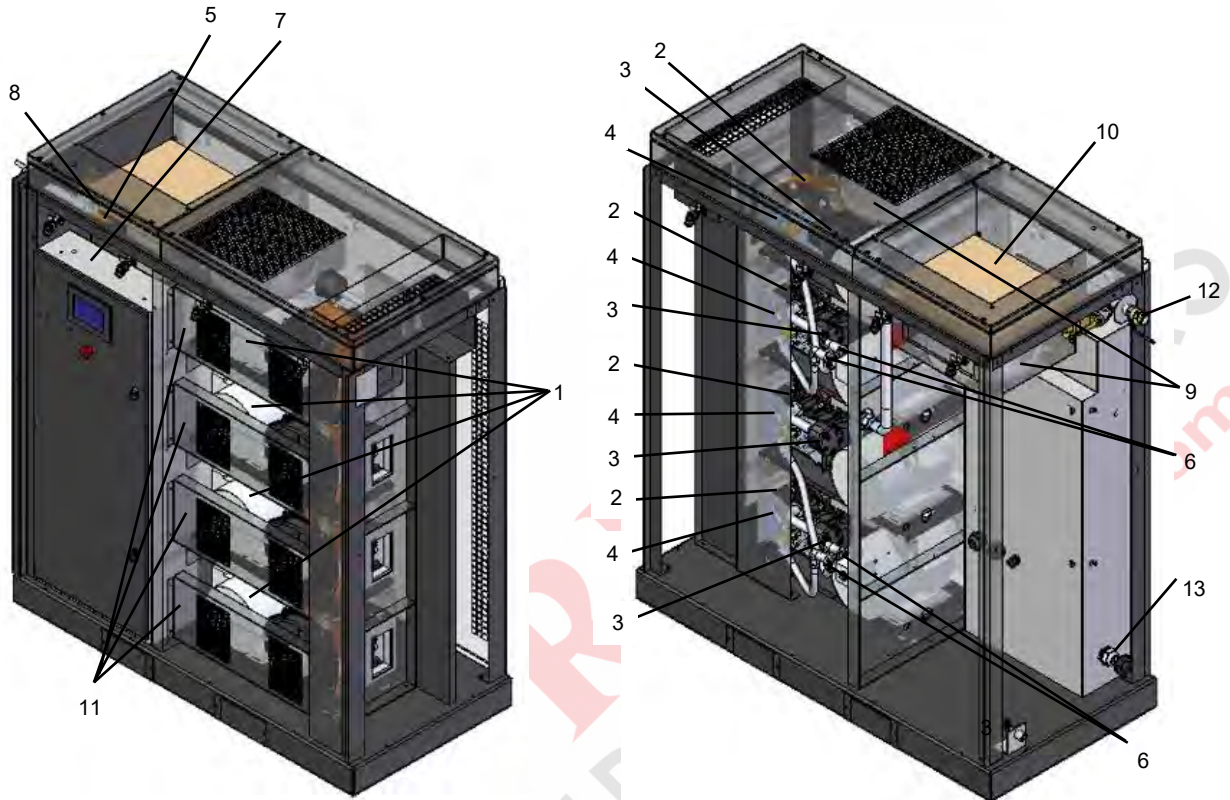


Fig. 6 : Overview of the assemblies:oil-free scroll compressor 11-15kW

- | | | | |
|---|--------------------|----|-----------------------|
| 1 | Motor | 8 | Pressure sensor |
| 2 | Compressor airend | 9 | Cooling-air fan |
| 3 | Air filter | 10 | After cooler |
| 4 | Temperature sensor | 11 | Belt cover |
| 5 | Safety valve | 12 | Compressed air outlet |
| 6 | Non-return valve | 13 | Cable port |
| 7 | Switch cabinet | | |


1.2 Brief description

Fresh air flows through the underside of the enclosure, is filtered by air filter and enters into the airend for compression process. The compressed air is released via outlet of airend and enters into the aftercooler for cooling.

1.3 Assembly description

1.3.1 Controller



For detailed information about the controller installed, consult the separate  Controller documentation.

1.3.2 Enclosure



ES04



ES08



ES11~15

Fig. 7 : Enclosure of every models

Allen wrench is used to disassemble the enclosure

1.3.3 Drive unit

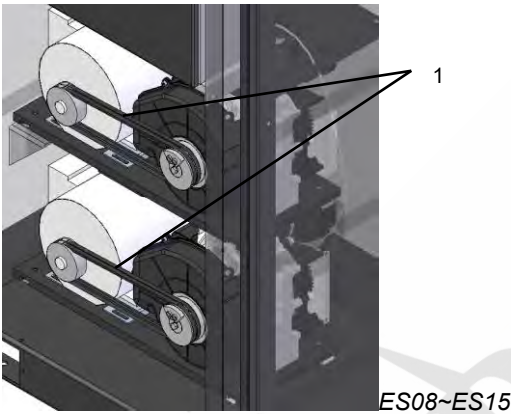
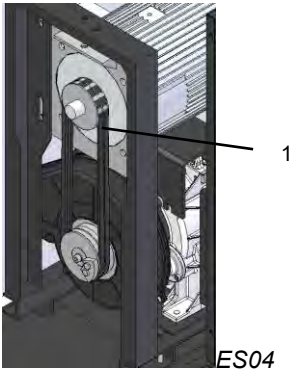


Fig. 8: Belt and belt pulley

The airend of compressor is driven by main engine via belt pulley (Fig 8). The rotating speed of airend of compressor is constant. There was no Inverter type.

Note: There is different of belt pulley of motor side between 50/60Hz.

1.3.4 Air filter

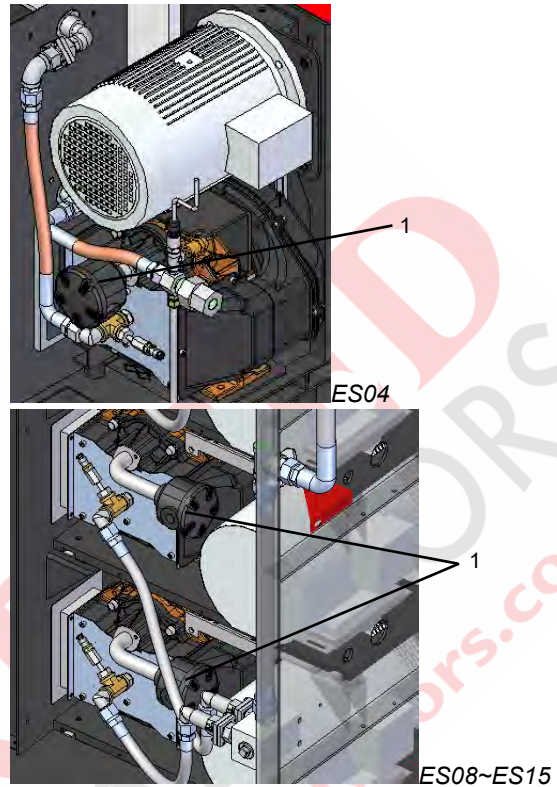


Fig. 9: Air filter

Air filter of scroll compressor (Fig 9) is located at the inlet of the airend. The sucked-in air flows directly into the airend for the purposes of compression.

1.3.5 Airend

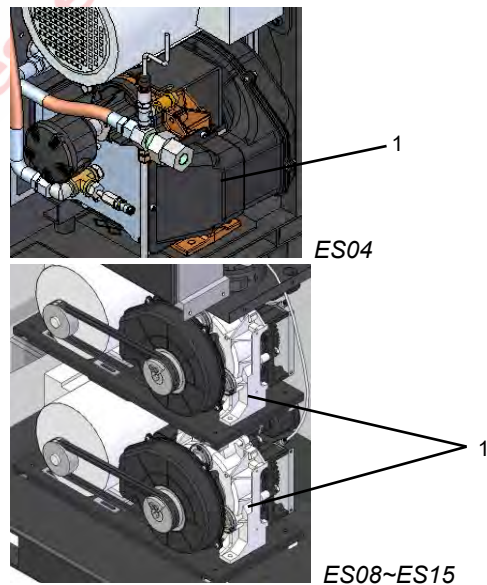
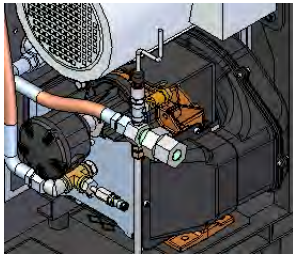
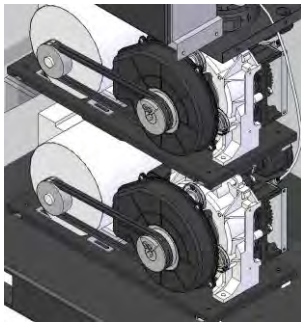


Fig. 10: Airend

The airend (



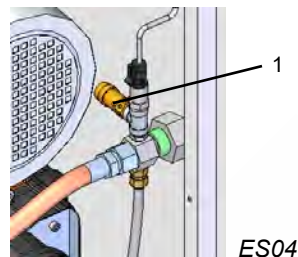
ES04



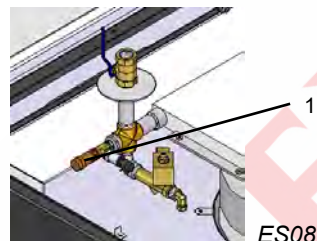
ES08~ES15

Fig. 10) inhales air and discharge it from the rear outlet after the air being compressed. Both inlet and outlet are at the back of the airend.

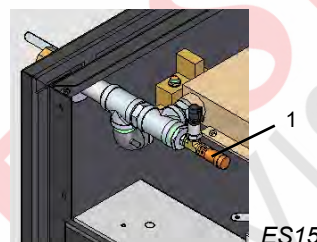
1.3.6 Safety valve



ES04



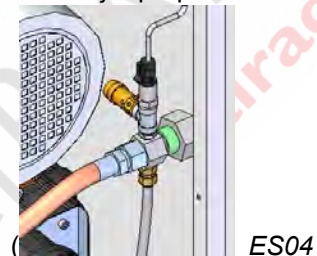
ES08



ES15

Fig. 11: safety valve

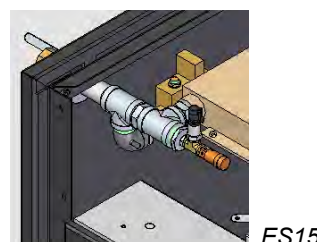
The major purpose of the safety valve



ES04



ES08



ES15

Fig. 11) installed on cooling piping is protecting the system from excessive pressure.

1.3.7 Non-return valve

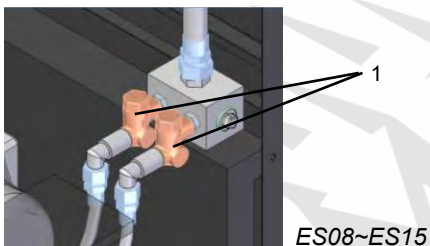
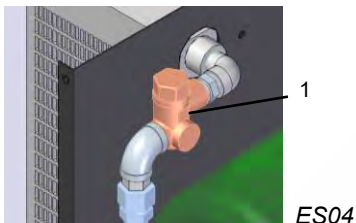


Fig. 12: Non-return valve



The non-return valve (ES04)



Fig. 12) prevents a return flow of pressure from the network to the compressor air end in the event of machine stoppage, which could otherwise cause reverse operation and/or leaks.

1.3.8 Cooler

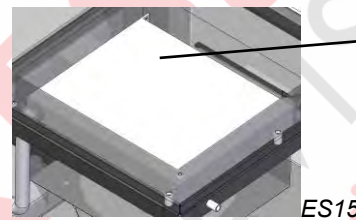
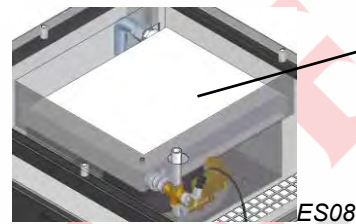
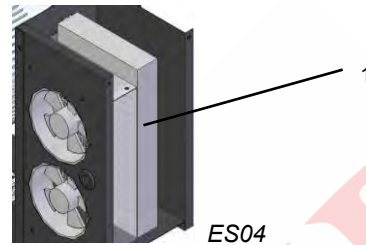


Fig. 13: Cooler

After the cooling process performed by the cooler

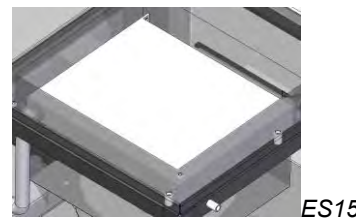
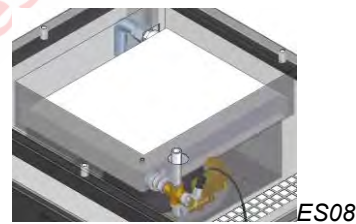
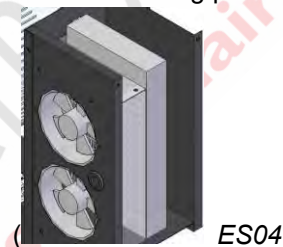


Fig. 13), the compressed air enters the customer's network via the compressed air outlet.

1.3.9 Cooling-air fan

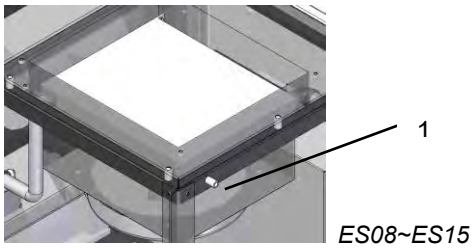
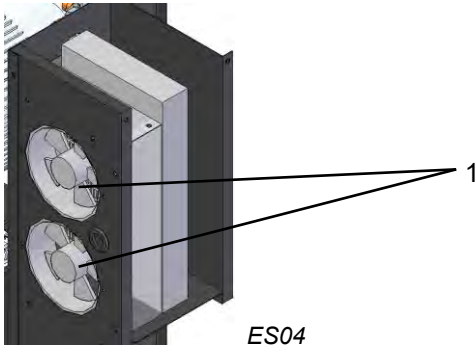


Fig. 14: Cooling-air fan

The compressed air that flows through the cooler is cooled by the cooling-air

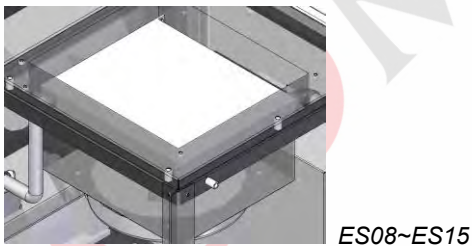
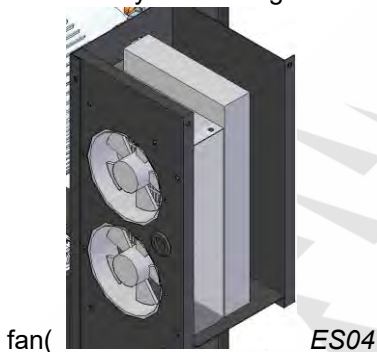


Fig. 14). The inner air of enclosure is sucked out by the cooling-air fan to keep the inner air temperature to be constant.

You can find information on cooling air volumes in the "Technical Data" chapter.



Ventilation in the air compressor room shall consider providing sufficient space for discharging compressed air and hot air .The discharged air can be used for heat recovery system.

1.4 Interface

Airflow



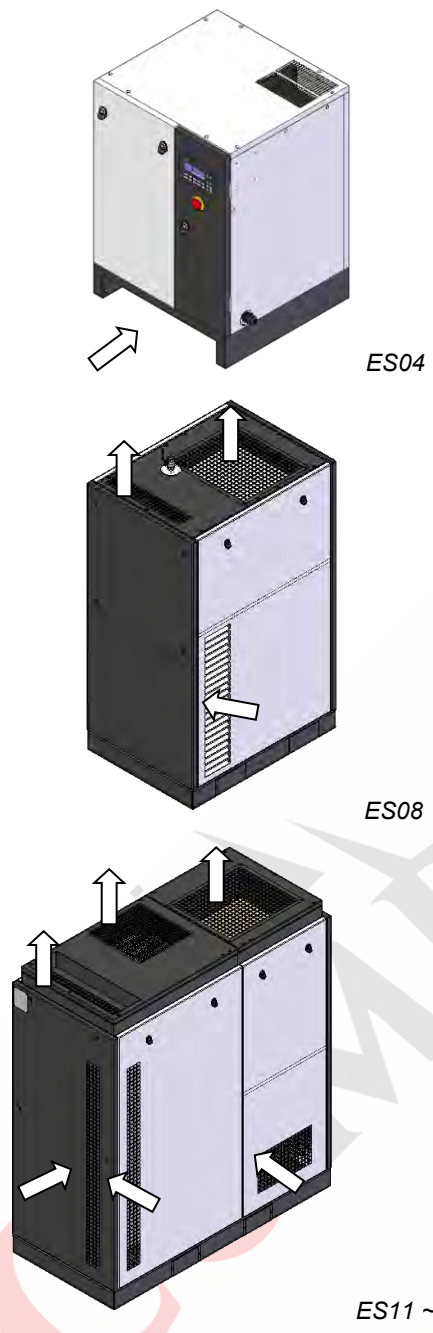


Fig. 15: Path of airflows

The cooling-air fan sucks air through the enclosure. A portion is sucked through the air filter and compressed by the aircend. The remaining air flows through the enclosure and cooler to take away the heat from the compressed air and motor.

Compressed air outlet



Fig. 16: Compressed air outlet

After cooling, the compressed air is released into the compressed air network via the compressed air outlet(Fig. 16).

2 Safety

This section is a summary of all the important safety aspects to ensure optimum protection of the personnel and safe and trouble-free operation.

The owner, lessor or operator of this compressor is hereby notified and forewarned that failure to observe these safety precautions may result in injury and/or property damage.

FSCURTIS does not mean to imply that the following safety precautions are all inclusive or that the observance of these precautions will prevent all injury or property damage.

FSCURTIS expressly disclaims responsibility or liability for any injury or property damage caused by failure to follow these specified precautions or by failure to exercise ordinary caution and due care required in operating or handling this equipment even though not expressly specified.

2.1 Symbols in these instructions

Safety instructions

The safety instructions and information in these instructions are illustrated using symbols. The safety instructions are prefaced by signal words which express the extent of the risk.



DANGER!

This combination of symbol and signal word indicates an immediate, hazardous situation which will lead to serious or even fatal injuries if not avoided.



WARNING!

This combination of symbol and signal word indicates a potentially hazardous situation which may lead serious or even fatal injuries if not avoided.



CAUTION!

This combination of symbol and signal word indicates a potential hazardous situation which may cause minor or slight injuries if not avoided.



NOTICE!

This combination of symbol and signal word indicates a potential hazardous situation which may cause material or environmental damage if not avoided.

Safety instructions contained in operation instruction

Safety instructions may relate to certain individual instructions. These safety instructions are embedded in the operating instruction so that they do not interrupt the flow of reading when performing the relevant action. The signal words described above are used.

Example:

1. Unfasten the screw.

2.



CAUTION!




Risk of entrapment on the cover!

Close the cover carefully.

3. Tighten the screw.

Special safety instructions

The following symbols are used in conjunction with the safety instructions in order to draw attention to particular hazards:

	Warning of electrical voltage.
	Warning of potentially explosive materials.
	General warning sign.





Tips and recommendations



This symbol indicates tips, recommendations and information for efficient and trouble-free operation.

Further markings

The following markings are used in these instructions for emphasising operating instructions, results, lists, references and other elements:

Marking	Explanation
	Step-by-step operating instructions
	Results of operating steps.
	References to sections of these instructions and other applicable documents
	Lists without a set order
[Button]	Operating controls (e.g. buttons, switches), display elements (e.g. indicator lamps)
"Display"	Screen elements (e.g. buttons, assignment of function keys)

2.2 Proper use

The machine is designed and constructed exclusively for the proper use described here.

The scroll compressor is only intended to generate compressed air in a non-explosive environment and must be supplied with cool, dry and dust-free cooling air. It is designed for 2,500 operating hours per year and wouldn't be the continued running machine.

Do not operate the compressor in excess of its rated pressures and speeds indicated on the compressor nameplate.

The proper use also includes compliance with all details in this manual.

Any use above and beyond the proper use, or any other type of use, is considered misuse.



WARNING! **Danger due to misuse!**

- The compressed air may not be used for respiration purposes without prior after-treatment.
- The compressed air may not be used directly for pharmaceutical or health treatment purposes, or for direct treatment of food without appropriate after-treatment.
- The scroll compressor may not be operated outdoors.
- The scroll compressor or its individual components may not be converted, modified or retooled.
- The scroll compressor may not be used in an potentially explosive atmosphere.
- The intake of any media other than cool, dry and dust-free cooling air is forbidden.

No Claims of any kind can be asserted for damage resulting from misuse.

2.3 General safety

1. Read and understand all the instructions found in this manual before operating your compressor.
2. **Disconnect the main power source before working on or performing any maintenance procedures on this unit. Use a lock out and tag out process.**
3. Do not attempt to remove any parts, break any connection, loosen oil fill plug or drain plug until the unit has been shut down and air pressure has been relieved.
4. Do not operate the compressor in excess of its rated pressures and speeds indicated on the compressor nameplate.
5. Do not remove guards, shields, or screens while the compressor is in operation. If removed for maintenance replace before resuming operation.
6. Observe the delivery pressure gauge daily to be sure the automatic control system is operating within proper limits.
7. Periodically check all safety and relief devices for proper operation.
8. Use compressed air properly. Pressurized air can cause serious injury to personnel.
9. Be sure that no tools, rags or loose parts are left in or on the compressor or drive parts.
10. Do not use flammable solvents for cleaning parts.
11. Exercise cleanliness during maintenance and when making repairs. Keep dirt away from parts and exposed openings by covering with clean cloth or Kraft paper.
12. Do not install a shut-off valve in the discharge line without installing a pressure relief valve between the shut-off and the compressor package.
13. Do not operate the compressor in areas where there is a possibility of flammable or toxic substances entering the system.
14. Never disconnect (or jump) the air discharge temperature switch or any other safety device and attempt to operate the compressor.
15. Know what mode of operation the compressor is in before working around the unit. The power

may be on but the machine not running if it is in the auto restart mode. Adhere to note #2 above.

2.4 Safety devices



WARNING!

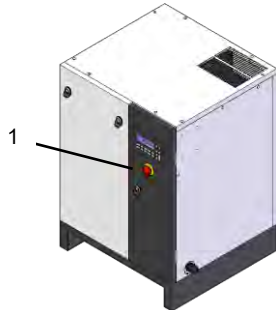
Risk of fatal injury from non-functional safety devices!

Risk of serious or fatal injury from non-functional or deactivated safety devices.

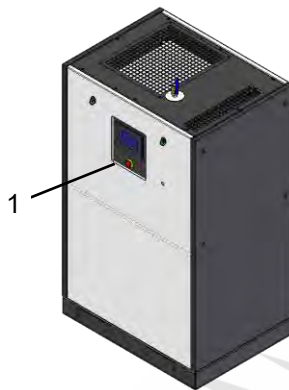
- Before starting any work, check whether all the safety devices are fully functional and correctly installed
- Never disable or bypass safety devices.
- Ensure that all safety devices are accessible at all time.

2.4.1 Position of the safety devices

The following illustrations show the position of the safety devices.



ES04



ES08



ES11 ~ ES15

Fig. 17: Emergency stop button (1) on the oil-free scroll compressor

2.4.2 Description of the installed safety devices

Emergency stop button

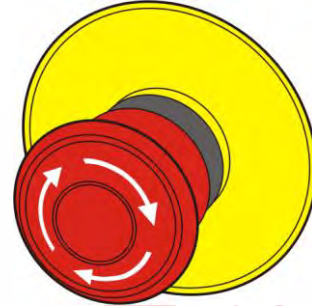


Fig. 18: Emergency stop button

Pressing the emergency stop button stops the machine by switching off the power supply with an immediate effect. After an emergency stop button has been pressed, it must be turned and unlocked to allow a restart.



WARNING!

Risk of fatal injury due to unauthorized restart!

Restarting the machine in an uncontrolled manner can cause serious or fatal injuries.

- Before restarting, ensure that the reason for the emergency stop has been rectified and that all safety devices are installed and in perfect working order.
- Do not unlock the EMERGENCY-STOP button until there is no more danger.

Relief valves

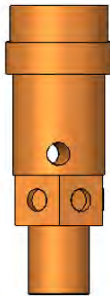


Fig. 19: Relief valve

Relief valves are relief devices for pressurized areas such as boilers, pressure tanks and pressure lines. In the event of an impermissible pressure increase, relief valves discharge gases, vapours or liquids into the atmosphere.

Do not change the pressure setting of the pressure relief valve, restrict the function of the relief valve or replace the relief valve with a plug.

2.5 Environmental protection



NOTICE!

Danger to the environment from incorrect handling of environmentally hazardous substances!

Incorrect handling of environmentally hazardous substances, particularly incorrect waste disposal, may cause serious damage to the environment.

- Always observe the instructions below regarding handling and disposal of environmentally hazardous substances.
- If environmentally hazardous substances are accidentally released into the environment. If in doubt, inform the responsible local authorities about the damage and enquire about suitable measure.

The following environmentally hazardous substances are used:

Lubricants

Lubricants such as grease and oil contain toxic substances. They must not be released into the

environment. Disposal must be carried out by a specialist disposal company.

2.5.1 Instructions on the machine

Direction of rotation



There is a direction of rotation sticker on the drive unit and on the cooling-air fan. This sticker shows the respective direction of rotation.

3 Technical data

3.1 Name plate

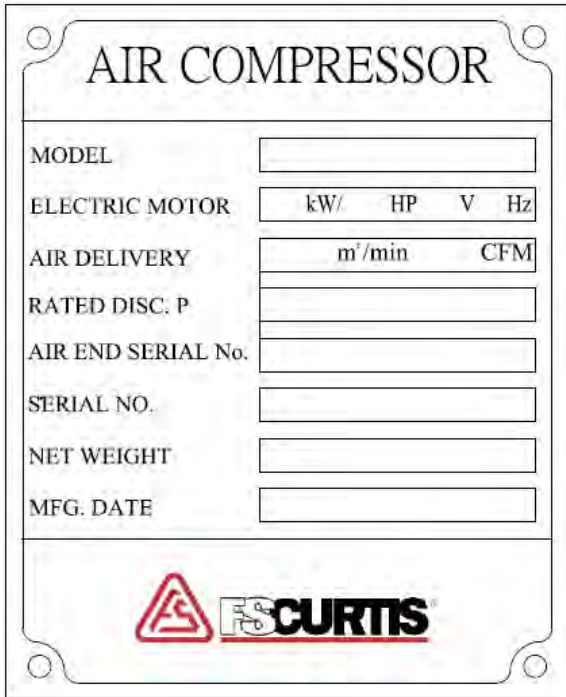


Fig. 20 Name plate

The name plate is located on the lower frame on the maintenance side and on the rear side of enclosure. It includes the following details:

- Model
- Air delivery
- Max. disc. pressure
- Electric motor
- Air end serial No.
- Serial No.
- Net Weight
- Manufacturing Date

3.2 Emissions

Noise emissions



Oil-free scroll compressor has comparatively lower noise. For details of noise of each machine type, please see technical data.

Oil-free scroll compressor has pretty low noise. For noise of each machine type, please see the following table. The actually-measured noise from client terminals will be different because of environment or other reflectors. Data in the following table are measured in the standard anechoic chamber provided by third party justice unit and based on ISO-2151.

Type	Noise level (ISO-2151)
	(dBA)
ES04	61
ES08	63
ES11	64
ES15	65

3.3 General specifications

3.3.1 Operating condition

Environment

Data	Value	Unit
Temperature range	+2 ~ +40 (+35.6 ~ +104)	°C (°F)
Relative humidity, maximum	80%	%
Maximum installation altitude above sea level	1000 (3281)	m (ft)

3.3.2 Discharge port

Type	Discharge Port
	inch
ES04	1/2
ES08	3/4
ES11	1
ES15	1

3.4 Oil-free scroll compressor

3.4.1 Plant data ES04-ES15

Type	Main motor power	Oil-free scroll compressor	
	kW	L x W x H [mm]	Weight [kg]
04	3.7	640 x 600 x 895	170
08	3.7x 2	1020 x 750 x 1645	440
11	3.7x 3	1600 x 750 x 1830	650
15	3.7x 4	1600 x 750 x 1830	720

4 Transportation, packaging and storage

4.1 Safety instructions for transportation

Improper transport



NOTICE!
Material damage due to improper transport!

Improper transport poses the risk of falling or toppling transport units. This could cause considerable material damage.

- Proceed with caution when unloading packages upon delivery and when transporting them on the premises, and observe the symbols and instructions on the packaging.
- Only use the fastening points provided.
- Do not remove packaging until shortly before installation.

4.2 Transport inspection

Upon receipt of the delivery, check for completeness and transport damage immediately.

In the event of visible external transport damage, proceed as follows:

- Do not accept the delivery, or only conditionally.
- Note the extent of the damage in the transport document or in the delivery note of the freight carrier.
- Initiate a complaints procedure.



Once detected, register complaints for defects and damage immediately. Claims for damages are only recognized within the applicable claim periods.

4.3 Packaging

About the packaging

The scroll compressors are packaged in cartons or sometimes on wooden frames in accordance with the anticipated transport conditions. Only environmentally-friendly materials are used for the packaging.

The packaging is designed to protect the individual components from transport damage, corrosion and other damage until they are installed. Therefore, do not destroy the packaging and only remove it shortly before installation.

Handling packaging materials

Packageing material comply with the applicable legal requirements and local regulations.



NOTICE!
Risk of environment damage from improper disposal!

Packaging materials are valuable raw materials that, in many cases, can be re-used or properly processed and recycled. Environmental risks from improper disposal of packaging materials.

- Dispose of packaging materials in accordance with the applicable environmental regulations.
- Comply with the regulations for waste disposal that apply at the location. If necessary, have specialist company dispose of waste.

4.4 Symbols on the packaging

The following symbols are affixed to the packaging. Always observe these symbols during transport.

Top



The tips of the arrows indicate the top of the packaging. They must always point upwards; otherwise there is a risk of damage to the contents.

Fragile



This symbol indicates packages with fragile or delicate contents.

Handle the package carefully so that it cannot fall or be subjected to impacts.

Protect against moisture



Protect packages from moisture and keep it dry.

4.5 Transport

Transport with a forklift vehicle

Packages can be transported with a forklift under the following conditions:

- The forklift must be designed for the weight of the packages.
- Existing guide rails on the frame must be used.
- The length of the forks must be at least 1000 mm.

Transporting

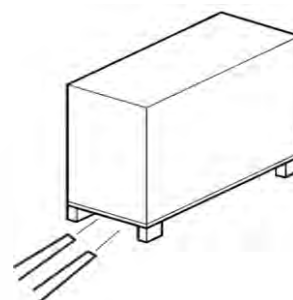


Fig. 21: Transportation with a forklift vehicle

1. Move the forklift so that its forks are inserted, as shown in Fig. 21.
2. Insert the forks so that they protrude on the other side.
3. Ensure that the package cannot topple if the centre of gravity is off-centre.
4. Lift the package and begin transport.

4.6 Storage

Storage of packages

Store the packages in the following conditions:

- Do not store outdoors.
- Store in a dry and dust-free environment.
- Do not expose to any aggressive media.
- Protect from exposure to sunlight.
- Avoid mechanical jolts.
- Storage temperature: 0 to 40 °C.
- Relative humidity: max. 80 %.
- In the event of storage for more than 3 months, check the general condition of all parts and the packaging regularly. If necessary, refresh or replace the rust-proofing.



In some cases, there may be notes about storage on the packages which extend beyond the requirements specified here. Adhere to these accordingly.

5 Installation and commissioning

5.1 Safety instructions for installation and initial commissioning

Electrical system



DANGER!
Risk of fatal injury due to electric current!

Risk of fatal injury in the event of contact with live components. There is a risk of electrical components moving uncontrollably and causing serious or fatal injuries after they have been switched on.

- Before beginning work, switch off the power supply and ensure that it cannot be switched on again. Cordon off this area in accordance with the applicable instructions and label it accordingly.

Improper initial commissioning



WARNING!
Risk of injury due to improperly performed initial commissioning!

In the event of improperly performed initial commissioning there is a risk of serious injury and material damage.

- Before initial commissioning, ensure that all installation work has been performed and completed according to the information and notes in these instructions and the locally applicable regulations.

Securing to prevent restart



WARNING!
Risk of fatal injury due to unauthorised restart!

In the event of an unauthorised restart

of the power supply during installation, there is a risk of serious or fatal injury in the hazard zone.

- Before beginning work, switch off the power supply and secure it against restarting.

Improper installation and initial commissioning



WARNING!
Risk of injury due to improperly performed initial commissioning!

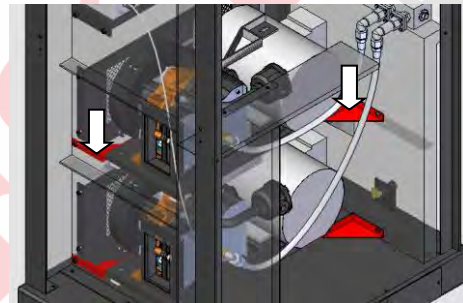
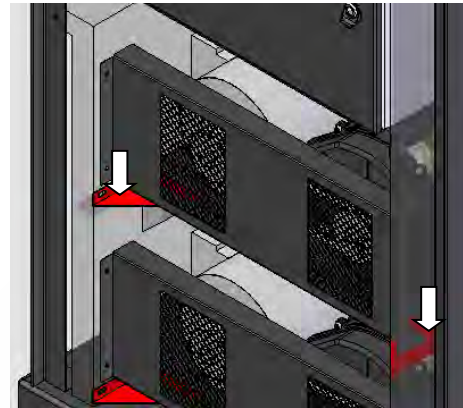
Improperly performed initial commissioning may result in serious injuries and considerable material damage.

- Before starting to work, ensure there is sufficient clearance for installation.
- Use caution when handling exposed sharp-edged components.
- Keep the machine's surroundings tidy and clean! Loosely stocked components, or components and tools lying around, are a potential source of accidents.
- Assemble all components properly. Tighten all screws with the specified torque.
- Ensure components cannot be dropped and cannot fall over.
- Prior to commissioning, observe the following:
 - Ensure that all installation work has been performed and completed according to instructions and information included in these instructions.
 - Ensure that there is nobody in the hazard zone.

5.2 Requirements at the installation site

Set up the scroll compressor so that the following conditions are fulfilled:

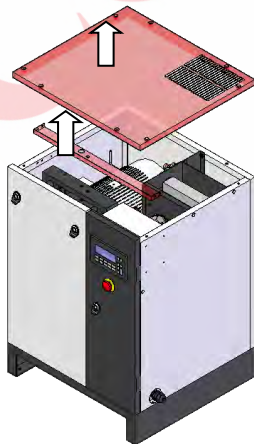
- The installation site is level.
- The machine is easily accessible and can be accessed from all sides.
- There is sufficient lighting.
- There is sufficient ventilation.
- There is a power supply available.
- Escape paths and rescue equipment are freely accessible.
- The machine is not exposed to a potential explosive atmosphere.
- The machine is not exposed to a corrosive atmosphere.
- The machine is not exposed to direct sunlight.
- There is no external heat from surrounding heat sources
- There is no accumulation of dust.
- Fire protection measures have been taken.
- The machine is not exposed to vibrations.
- The floor surface is resistant to solvents, impermeable to liquids, anti-static and easy to clean.
- There are no machines in the vicinity which could cause electrical or electromagnetic interference.
- Before removing the transport securing devices, remove the upper cover first.



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Related installation location diagram

Please see [Annex E](#) [installation space requirements]



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5.3 Installation

5.3.1 Ventilation



DANGER!
Risk of fatal injury from the use of explosive gas mixtures, vapours, dust or aggressive hazardous substances!

The use of explosive gas mixtures, vapours, dust or aggressive hazardous substances to ventilate the screw compressor can cause severe or even fatal injuries as well as significant material damage.

- Never use explosive gas mixtures, vapours, dust or aggressive hazardous substances to ventilate the screw compressor.
- Ensure that no potentially explosive gas mixtures, vapours, dust or aggressive hazardous substances enter into the ventilation for the screw compressor.

The air supplied via the intake openings is used for compression purposes and for cooling the unit.

Personnel: ■ Qualified personnel

Protective ■ Safety shoes

equipment: ■ Protective work clothing



NOTICE!
Risk of material damage due to condensation!

Cooling air that is too humid can create condensation.

- Only supply cool, dry and dust-free cooling air.
- For the intake of outside air, use a recirculating air flap.

1. Provide the required rate of cooling air according to the technical data for the scroll compressor (↪ *Chapter 3 'Technical data'*).
2. Extract the exhaust air according to the technical data for the scroll compressor (↪ *Chapter 3 'Technical data'*).
 - ⇒ This can prevent overheating of the air compressor room and oil-free scroll air compressor.

5.3.2 Connection to the compressed air network

- Personnel: ■ Qualified personnel
- Protective equipment: ■ Protective work clothing
 ■ Safety shoes
- Materials: ■ Flexible compressed air hose



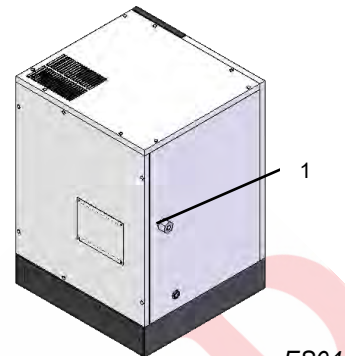
WARNING!
Risk of injury due to unpredictable movement of the compressed air hose!

Load changes in the compressed air network cause the compressed air hose to move suddenly, and with high force.

- Fasten the compressed air hose sufficiently.



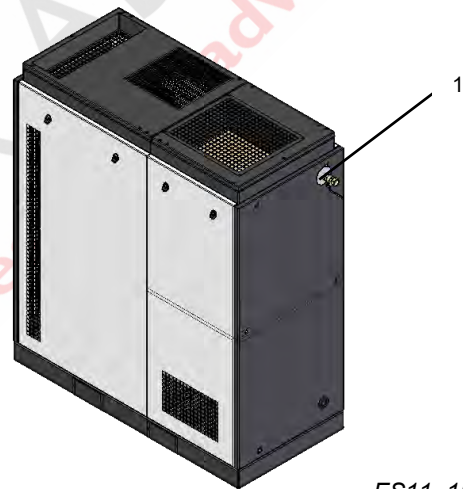
A properly planned, installed and serviced compressed air network and an additional stop valve installed at the input to the compressed air network are prerequisites for correct installation. Relief valves must be positioned in front of potential blockage points (e.g. shut-off valves, heat exchangers and outlet silencers). Always guide air released by the relief valve away from areas in which people are located.



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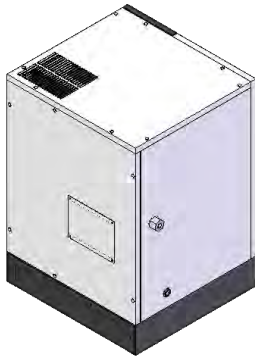
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Fig. 22: Compressor air outlet

1. Connect the compressed air according to the technical data (↪ Chapter 3 'Technical data')



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Fig. 22-1.

2. Ensure that the compressed air hose does not represent a tripping hazard.
3. Fasten the flexible compressed air hose sufficiently.

5.3.3 Connecting to the power supply

- Personnel: ■ Qualified electrician
- Protective equipment: ■ Protective work clothing
■ Safety shoes



NOTICE!

Risk of material damage to the compressor stage due to incorrect connection of the power supply!

In case of incorrect connection of the power supply, the compressor stage could be damaged irreparably due to an incorrectly rotating drive.

- Connect the power according to the wiring diagram and check the rotating field before starting the scroll compressor.



Properly dimensioned safety devices (for personal/system protection) in the mains supply line and a suitable master switch (for switching the power supply on/off) are prerequisites for correct installation prerequisite for the correct installation .

1. Using the data in the circuit diagram (in the switch cabinet), check whether the existing mains network is suitable. Voltage deviations of more than 5 % are not permitted.
2. Connect the power according to the provided circuit diagram (in the switch cabinet) and the technical data (↪ Chapter 3 'Technical data').
3. Check the direction of rotation is clockwise by using a rotating field measurement device.
4. Ensure that the power cable does not represent a tripping hazard.
5. Select the correct wire diameter according to the rated power of the air compressor. Do not use wire diameter that is too small, or power cord will be easily burnt out and generate danger.
6. Air compressor should have an independent power system, especially not connected with


other different power consumption systems. Because, it is possible to trip the overload protection device due to large voltage reduction or imbalance of three-phase current. This is especially important for air compressors with large power.

7. Install adequate NFB according to the power of the air compressor for the safety of power system and maintenance.
8. It is necessary to confirm the correct voltage while performing power distribution of air compressor.
9. The grounding wire of motor or system must be reliably installed and grounding wire cannot be connected to air delivery pipe or cooling water pipe, to prevent danger from electrocution.
10. Before performing any electrical maintenance work, be sure to cut off the power supply.

5.4 Switching on after installation

- Personnel: Qualified personnel
- Protective equipment: Protective work clothing
 Safety shoes
 Hearing protection

1. Check all connections for proper installation and firm seating of screw.
2. Ensure that there are no tools or loose objects lying in or on the machine.
3. Install the enclosure doors and ensure that they are sealed.
4. Carefully open the shut-off valve downstream of the outlet port between the scroll compressor and the compressed air network.

⇒ The scroll compressor is now connected to the compressed air network.
5. Switch on the main switch.
6. Start the scroll compressor  *controller* documentation.

⇒ The compressor is ready and may start up automatically at any time.

5.5 Work after the initial commissioning

Personnel:	■ Qualified Electrician
Protective equipment:	■ Safety shoes
	■ Protective work clothing
	■ Protective gloves
	■ Light respiratory protection
	■ Safety goggles



WARNING!

Danger of injury due to hot surfaces!

Surfaces of components can heat up a lot during operation. Skin contact with hot surfaces will cause severe skin burns.

- When performing any work near hot surfaces, heat-resistant protective clothing and protective gloves must be worn.
- Before any work, ensure that all surfaces have cooled to the ambient temperature; wait at least 30 minutes.

3. Wait until the components have cooled.
4. Check all coolant and compressed air lines for leaks.
5. Check the connectors of the components and tighten the screws.
6. Install the enclosure panels and ensure that they are sealed.



NOTICE!

Risk of material damage due to the compressor temperature that is too low or too high!


If the compressor temperature is too low or too high, the scroll compressor may become damaged.

- For more detailed information, contact the manufacturer.

7. Check the compressor temperature. □

5.6 Setting parameters



Refer to the  controller documentation.

1. Switch off the oil-free scroll compressor and secure it against restarting.
2. Open and remove the enclosure panels with the special spanner.

6 Operation

6.1 Safety instructions for operation

Improper operation



WARNING!
Danger of injury due to improper operation!


Improper operation can cause serious injury and significant material damage.

- Perform all operating steps in accordance with the information and notices in this manual.
- Before starting work, observe the following points:
 - Ensure that all covers and safety devices are installed and functioning properly.
 - Ensure that there is nobody in the hazard area.
- Never bypass safety devices during operation.

6.2 Controller



Controller documentation

Refer to the  controller documentation for information on how the scroll compressor is controlled.

6.3 Shutdown in an emergency

In dangerous situations, the movements of component must be stopped as quickly as possible and the power supply must be switched off.

Shutdown in emergency situations

In emergency situation, proceed as follows:

1. Immediately trigger an emergency stop through the emergency stop device.
2. If there is no danger to your own health, get

people out of the hazard area.

3. Initiate first-aid measures as necessary.
4. Alert the fire department and/or rescue service.
5. Inform the responsible parties at the implementation site.
6. Switch the machine off and secure to prevent a restart.
7. Keep access routes free for emergency vehicles.
8. Give directions to rescue vehicles.

After the rescue measures

9. Depending on the seriousness of the emergency situation, inform the local authorities.
10. Assign specialized personnel to resolve the malfunction.



WARNING!
Risk of fatal injury if the machine is restarted without authorization or in an uncontrolled manner!

An uncontrolled or unauthorized restarted of the power supply can cause severe or fatal injuries.

- Before restarting, ensure that all safety devices are mounted and functional, and that there are no danger for personnel.

11. Before restarting the machine, ensure that all safety devices are installed and functional.

7 Maintenance

7.1 Safety instructions for maintenance

Electrical system



DANGER!
Risk of fatal injury due to electric power!

Risk of fatal injury in the event of contact with live components. There is a risk of electrical components moving uncontrollably and causing serious injuries after they have been switched on.

- Before starting work, switch off the main power supply and make sure that it cannot be switched on again. Use a lock out and tag out process.

Moving parts



WARNING!
Danger of injury from moving parts!

Rotating parts and/or parts that make linear movements can cause serious injuries.

- Before beginning any maintenance work on moving parts, shut down the machine and take preventive measures to prevent restarting. Wait until all parts have stopped moving.
- Wear close-fitting protective work clothing with low tensile strength in the danger zone.

Securing to prevent restart



WARNING!
Risk of fatal injury due to unauthorised restart!

In the event of an unauthorised restart

of the power supply during maintenance, there is a risk of serious injuries or death for persons in the danger zone.

- Before beginning work, switch off all power supply and ensure they that it cannot be switched on again.

Hot surfaces



WARNING!
Danger of injury from hot surfaces!

The surfaces of components could heat up a lot during operation. Skin contact with hot surfaces will cause severe skin burns.

- During all work near hot surfaces, wear heat-resistant protective clothing and protective gloves.
- Before all work, make sure that all surfaces have cooled off to the ambient temperature, wait at least 30 minutes.

Improperly performed maintenance work



WARNING!
Danger of injury due to improperly performed maintenance work!

Improperly performed maintenance work may lead to serious injuries and significant material damage.

- Before beginning work, there is sufficient clearance assembly.
- Keep the machine's surroundings tidy and clean. Loosely stacked components, or components and tools left lying around, are a potential source of accidents. Protect components and exposed openings from dirt by covering them with a clean cloth or kraft paper.
- Do not use flammable solvents for

- cleaning parts
- For re-installation, ensure all components are installed properly and, in doing so, ensure that all fastening elements are re-installed and all screws are tightened using the correct torque.
 - Before re-commissioning of the machine:
 - Ensure that all maintenance work has been performed and completed according to the instructions and information included in this manual.
 - Ensure that nobody in the hazard area.
 - Ensure that all covers and safety devices are installed and functional.
 - Ensure that no tools, rags or loose parts are left in or on the compressor or drive parts.

compressor is not under pressure; wait at least 5 minutes.

7.2 Spare parts



WARNING! **Risk of injury due to using wrong spare parts!**

Using incorrect or faulty spare parts brings dangers to the personnel and can cause damages, malfunctions or complete failure.

- Only use genuine spare parts supplied by the manufacturer or manufacturer-approved spare parts.
- If in doubt, always contact the manufacturer.



Loss of warranty

The use of non-approved spare/replacement parts will invalidate the warranty.

Compressed air



WARNING! **Danger of injury from compressed air!**

Compressed air can escape from compressed air hoses or components under pressure in case of improper handling or in the event of a fault. This can result in eye injuries, dust being raised, or hoses making uncontrolled movements.

Pressurised components can move in an uncontrolled manner and can cause injuries if handled incorrectly.

- Before removing hoses or components under pressure, make sure the pressure is relieved.
- Have faulty components that are under pressure during operation replaced by appropriate specialist personnel immediately.
- Before all work, make sure that the

Procure replacement parts from authorized dealers or directly from the manufacturer.

Please refer to the Parts list for accurate part number information.

7.3 Maintenance schedule

The next section describes the maintenance work that is required for optimal and fault-free operation of the machine.

Insofar as increased wear can be detected during regular checks, the required maintenance intervals must be shortened according to the actual signs of wear. For questions about maintenance work or intervals contact the manufacturer.

intervals	Maintenance Work	Personnel
Everyday	Check to see if there is any abnormal alarm, sound or vibration	Trained staff
	Check to see if there is any abnormal alarm	Trained staff
Each operation of 500 hours	Check all electrical connection <i>Please see Chapter 7.4.2 (Check Electrical connection)</i>	Qualified electrician
	Check tension of belt	Qualified electrician
Each operation of 2500h or each year	Change air filter * <i>Please refer to Chapter 7.4.7 (Change air filter)</i>	Manufacturer
	Tensioning of belt	Manufacturer
Each operation of 10000h or each 4 years	Change belt <i>Please see Chapter 7.4.8 (Check and change belt)</i>	Manufacturer
	Change check valve	Manufacturer
	Change machine body sealing strip <i>Please see Chapter 7.4.9 (Change sealing strip)</i>	Manufacturer
	Change high pressure hose	Manufacturer
	Check and clean fan of the machine body	Manufacturer
	Check and clean cooling fan	Manufacturer
	Check and clean cooler	Manufacturer
	Check main motor <i>Please see Chapter 7.4.5 (Check main motor)</i>	Manufacturer
Each operation of 20000 or each 8 years	Change bearing of main motor	Manufacturer
	Change ES4 airend	Manufacturer
Everyday	Water leakage of air barrel	Trained staff
	Check to see if there is any abnormal sound	Trained staff

* The change intervals refer to:

- Ambient temperature +2 ~ +40 °C
- Max. humidity of 80%

7.4 Maintenance work



Necessary maintenance work

Necessary maintenance work appears on the display of the controller as a warning ↪ Controller documentation.

7.4.1 Checking for leaks

- Personnel: ■ Qualified personnel
- Protective equipment: ■ Safety boots
 ■ Protective work clothing
 ■ Light respiratory protection
 ■ Safety goggles
 ■ Protective gloves

1. Switch the oil-free scroll compressor off and secure to prevent restarting.
2. Close compressed air network-side gate valve and secure against re-opening.
3. Open and remove the sound insulation covers with the special spanner.
4. Check all lines and the base for leaks.
5. Check the connectors of the components and tighten the screws.

7.4.2 Checking the electrical connections

- Personnel: ■ Qualified Electrician
- Protective equipment: ■ Safety boots
 ■ Protective work clothing
 ■ Light respiratory protection
 ■ Safety goggles
 ■ Protective gloves



DANGER!

Danger to life from stored charges!

Electric charges may be stored in electrical components; these charges may be maintained even after the system has been switched off and disconnected from the power supply. Contact with these components may result in serious or fatal injury.

- Before working on the specified components, ensure that they have been completely disconnected from the power supply. Allow 10 minutes to elapse in order to ensure that the internal capacitors have been fully discharged.

1. Switch the screw compressor off and secure to prevent restarting.
2. Open and remove the sound insulation covers with the special spanner.
3. Open and remove the sound insulation covers with the special spanner.

7.4.3 Checking the compressor temperature

- Personnel: ■ Qualified personnel
- Protective equipment: ■ Safety boots
 ■ Protective work clothing



NOTICE!

Property damage due to compressor temperature that is too low or too high!

A compressor temperature that is too low or too high can cause damage to the screw compressor.

- For detailed information, contact the manufacturer.



- Standard air compressor exhaust temperature is ambient temperature + 180 °C.
- Standard exhaust temperature shall not be higher than 220 degrees C, if more than this temperature, the operating panel will appear warning messages and air compressor will stop.

1. Check compressor temperature.

7.4.4 Checking soiling of th cooler

- Personnel: ■ Qualified personnel
- Protective equipment: ■ Safety boots
■ Protective work clothing
■ Light respiratory protection
■ Safety goggles
■ Protective gloves

1. Switch the oil-free scroll compressor off and secure to prevent restarting.
2. Open and remove the upper covers of sound insulation with the special spanner.
3. Check compressed air and coolant liquid cooler from inside and outside for soiling.
4. Remove soiling.



Soiling can be removed by blowing it out, e.g. While doing this, make sure that the soiling from the device is blown out of rather than into the machine. In case of severe soiling, consult the manufacturer.

7.4.5 Checking main motor

- Personnel: ■ Qualified personnel
- Protective equipment: ■ Safety boots
■ Protective work clothing
■ Light respiratory

protection

- Safety goggles
- Protective gloves

1. Switch the oil-free scroll compressor off and secure to prevent restarting.
2. Open and remove the sound insulation covers with the special spanner.
3. Visually check of main motor.
 - ⇒ In case of visible defects, contact the manufacturer.

7.4.6 Add lubricating grease for main motor bearing

- Personnel: ■ Qualified personnel
- Protective equipment: ■ Safety boots
■ Protective work clothing
■ Light respiratory protection
■ Safety goggles
■ Protective gloves
- Materials: ■ Lubricating grease



If there is no lubricating grease inlet in the main motor, the main motor is filled with permanent lubricating grease.

1. Switch the oil-free scroll compressor off.
2. Open and remove the sound insulation covers with the special spanner.
3. For quantity of lubricating oil required for motor bearing, please see information on the motor label.



Lubricating grease inlets all locate at rear sides of main motor.



Fig. 23: Lubricating grease inlet

4. Open lubricating grease inlet (Fig. 23) and add lubricating grease to main motor bearing.

7.4.7 Replacing the air filter

Air filter

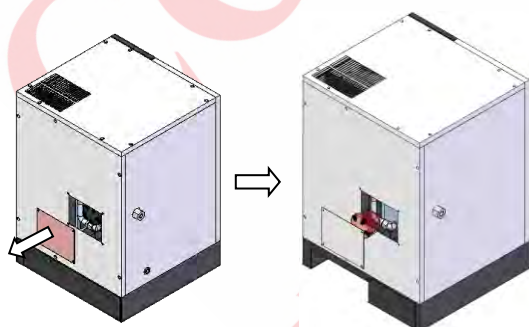
Personnel:

- Manufacturer

Protective equipment:

- Safety boots
- Protective work clothing
- Light respiratory protection
- Safety goggles
- Protective gloves

1. Switch the oil-free scroll compressor off and secure to prevent restarting.
2. Close the shut-off valve on the pressure network side and secure it to prevent it from being opened again.
3. Use cross screwdriver to open air filter maintenance cover.

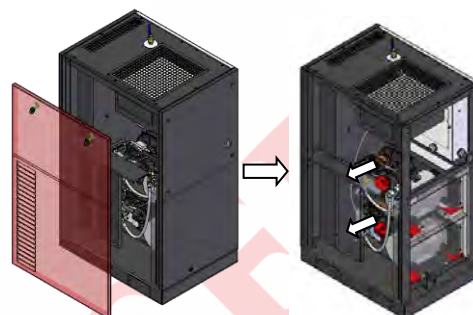


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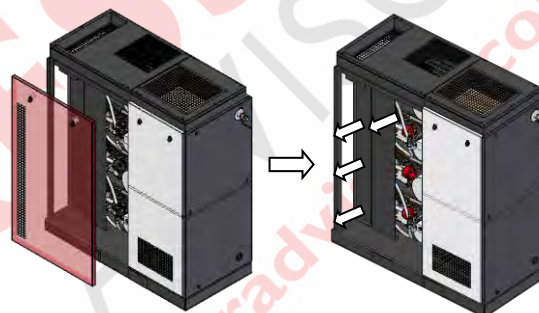
Fig. 24: Remove the intake filter

4. Unfasten and remove the intake filter.

5. Remove the old filter element.
6. Replace the new filter element.
7. Install air filter and screw tight.



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1. Switch the oil-free scroll compressor off and secure to prevent restarting.
2. Close the shut-off valve on the pressure network side and secure it to prevent it from being opened again.
3. Use keys to open shutter and remove the sound insulation covers with the special spanner.
4. Unfasten and remove the intake filter.
5. Remove the old filter element
6. Replace the new filter element.
7. Install air filter and screw tight.

7.4.8 Checking or replace belt

Belt

Personnel:	■ Manufacturer
Protective equipment:	■ Safety boots
	■ Protective work clothing
	■ Light respiratory protection
	■ Safety goggles
	■ Protective gloves

1. Switch the oil-free scroll compressor off and secure to prevent restarting.
2. Close the shut-off valve on the pressure network side and secure it to prevent it from being opened again.
3. Open front shutter.
4. Disassemble belt protecting cover with hexagon wrench.

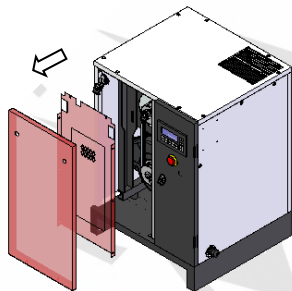


Fig. 25: Open front shutter and belt protecting cover ES04

5. Check belt tightness. If the value of belt tightness is within the allowable range, re-assemble front shutter and belt protecting cover. If the value of belt tightness shall be adjusted, do as follows.

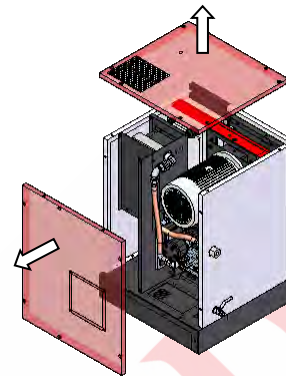


Fig. 26: Disassemble upper cover and rear cover ES04

6. Use allen wrench to disassemble upper cover
7. Use allen wrench to disassemble rear cover

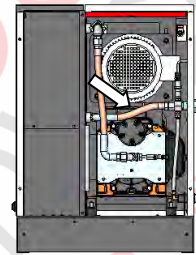


Fig. 27: Loosen supporting frame ES04

8. Loosen screws on the motor support frame
9. Loosen screws on the motor flange rotating plate
10. Use screw at motor flange rotating plate to adjust the location of motor upward and downward, and adjust the tightness of belt and change belt.

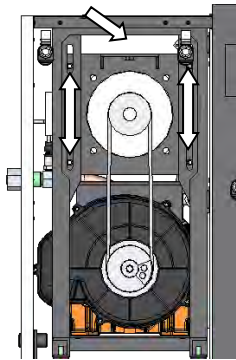
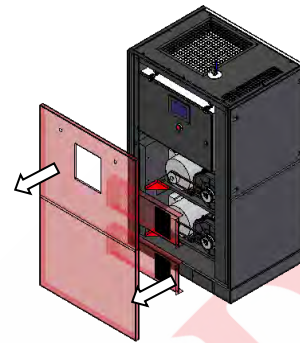


Fig. 28: Use flange screw to adjust location of motor upward and downward, and adjust the tightness of belt and change belt ES04



ES08



ES11~ES15

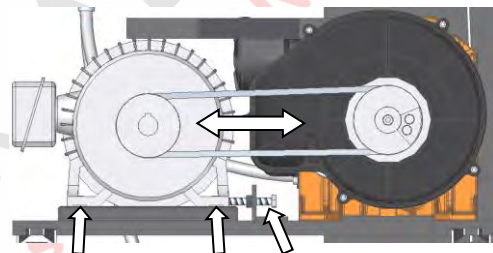


Fig. 29: Loosen motor footstands anchor screw, adjust tightness of motor or change belt ES08 & ES11~ES15. And then, loosen the adjusting screw when finished the adjustment.



Note: there are stripe numbers for dynamic and static scroll when inserting sealing stripes. The assembly is directional. The cut shall face toward central exit of scroll.

7.5 Measures after maintenance has been performed

After completion of the maintenance work and before switching the machine on, carry out the following steps:

1. Check whether all previously-removed protective equipment and covers have been replaced properly.
2. Ensure that all tools, materials and other equipment used have been removed from the work area.
3. Carefully open the compressed air network-side shut-off valve.
4. Clean the work area and remove any substances such as liquids, processing material or similar that may have escaped.
5. Ensure that all safety equipment on the machine functions perfectly.
6. Check whether all previously-removed protective equipment and covers have been replaced properly.
7. Document work on the machine in the maintenance log (please see Appendix C ☞ 'Service and maintenance log').

8 Faults

The following section describes possible causes of faults and the work to remedy them.

In case of faults that occur more than once, shorten the maintenance intervals according to the actual utilization.

In case of faults that cannot be remedied using the following instructions, contact the manufacturer.

8.1 Safety instructions for fault clearance

Electrical system



DANGER!
Danger to life from electric power!

Contact with live parts may prove fatal. When switched on, electric components may be subject to uncontrolled movements and may cause grave injury.

- Switch off the power supply before starting work and make sure that it cannot be switched on again.

Securing to prevent restart



WARNING!
Danger to life from an unauthorised restart!

In the event of an unauthorized restart of the power supply while tracking down and rectifying a fault, there is a danger of serious injuries or death for persons in the danger zone.

- Switch off all power supplies before starting work and make sure they cannot be switched on again.

Improperly executed troubleshooting work



WARNING!
Danger of injury from improper troubleshooting!

Improperly executed troubleshooting work may result in serious injury and significant damage to property.

- Ensure sufficient assembly space before starting work.
- Pay attention to orderliness and cleanliness in the assembly location! Loosely stacked or scattered components and tools could cause accidents.
- If components have been removed, pay attention to correct assembly, refit all fixing elements and comply with bolt tightening torques.
- Before the restart, ensure that
 - all troubleshooting work has been carried out and completed in accordance with the information and instructions in this manual.
 - no persons are in the danger zone.
 - all covers and safety devices are installed and functioning properly.

Hot surfaces



WARNING!
Danger of injury from hot surfaces!

Surfaces of components can heat up a lot during operation. Skin contact with hot surfaces will cause severe skin burns.

- During all work near hot surfaces, wear heat-resistant protective clothing and protective gloves.
- Before all work, make sure that all

surfaces have cooled off to the ambient temperature, wait at least 30 minutes.

wait at least 5 minutes.

Compressed air



WARNING! **Danger of injury from compressed air!**

Compressed air can escape from compressed air hoses or components under pressure in case of improper handling or in case of a fault. It can injure eyes, whip up dust or cause uncontrolled movements of hoses.

Components under pressure can move in uncontrolled fashion with improper handling and cause injuries.


- Before removing hoses or components under pressure, make sure the pressure is relieved.
- Have faulty components that are under pressure during operation replaced by appropriate specialist personnel immediately.
- Before all work, make sure that the compressor is not under pressure;

Behaviour in the event of faults

The following applies in principle:

1. Immediately initiate an emergency stop in the event of faults posing an immediate danger to people or property.
2. Ascertain the cause of the fault.
3. If fault rectification requires work in the danger zone, shut down the machine and secure to prevent restarting.
Immediately notify those responsible at the place of use about the fault.
4. Depending on the nature of the fault, have it rectified by authorized specialized personnel or rectify it yourself.

8.2 Fault displays

Refer to the  *controller documentation* for information on fault displays.

8.3 Fault table

Fault description	Causes	Remedy	Personnel
No picture in controller operation panel	Blocked pipeline	Check or change pipeline	Qualified electrician
	Check valve malfunction	Check or change check valve	Qualified electrician
	Abnormal pressure sensor line	Check or change pressure sensor line	Manufacturer
No action after pressing down start	Abnormal control cabinet line	Check or change control cabinet line	Qualified electrician
	Excessively high air inflow or ambient temperature	Improve ventilation of air compressor room	Qualified electrician
	Abnormal machine body	Check or change machine body	Qualified electrician
	Voltage below level	Adjust main power	Manufacturer
	Pipeline leakage	Check air compressor and system pipeline for leakage	Manufacturer
Excessively high air discharge	Abnormal check valve	Check or change check valve	Trained staff
	Abnormal pressure value set	Check pressure value set for security valve	Manufacturer
	Change spare parts	Replace after maintenance	Manufacturer
	Abnormal machine body	Check or change machine body	Manufacturer
Abnormal air compressor discharge signa	Air compressor reversion	Check or change line	Manufacturer
	Pipeline blockage	Check or change pipeline	Manufacturer
Excessively high air compressor pressure	Abnormal check valve	Check or change check valve	Manufacturer
	Blocked air filter	Check or change air filter	Manufacturer
Abnormal air compressor pressure signal	Abnormal pressure value set	Check controller pressure value set	Manufacturer
	Air compressor reversion	Check or change line	Manufacturer
Motor overload	Abnormal machine body	Check or change machine body	Trained staff
	Abnormal belt	Check or change belt	Manufacturer
	Abnormal motor	Check or change motor	Qualified electrician

Fault description	Causes	Remedy	Personnel
	Blocked pipeline	Check or change pipeline	Trained staff
safety valve open	Check valve malfunction	Check or change check valve	Manufacturer
	Abnormal pressure sensor line	Check or change pressure sensor line	Trained staff
Time for spare time	Abnormal control cabinet line	Check or change control cabinet line	Manufacturer
Unable to build pressure	Excessively high air inflow or ambient temperature	Improve ventilation of air compressor room	Manufacturer
	Abnormal machine body	Check or change machine body	Qualified electrician
	Voltage below level	Adjust main power	Manufacturer
	Pipeline leakage	Check air compressor and system pipeline for leakage	Manufacturer
	Abnormal check valve	Check or change check valve	Manufacturer
	Abnormal pressure value set	Check pressure value set for security valve	Trained staff
Abnormal sound	Air compressor reverse rotating	Check or place piping	Qualified electrician
	Abnormal airend	Check or change airend	Manufacturer
	Abnormal belt	Check or change line	Trained staff
	Abnormal motor	Check or change pipeline	Manufacturer

8.4 Trial run after troubleshooting

Please do as follows to carry out trial run after troubleshooting:

1. Reset emergency button.
2. Confirm malfunction record, refer to *Controller Instruction Manual*.
3. All staffs are evacuated from the danger area.
4. Startup the oil-free scroll compressor refer to *Controller Instruction Manual*.

9 Dismantling and disposal

Following the end of its useful life, the machine must be dismantled and disposed of in accordance with the environmental regulations.

9.1 Safety instructions for dismantling and disposal

Electrical system



DANGER!
Danger to life from electric power!

Contact with live parts may prove fatal. When switched on, electric components may be subject to uncontrolled movements and may cause grave injury.

- Before starting the dismantling, switch off the electric power supply and disconnect completely.

Improper dismantling



WARNING!
Danger of injury due to improper dismantling!

Stored residual energy, angular components, points and edges on or in the machine or on the tools needed can cause injuries.

- Ensure sufficient space before starting work.
- Handle exposed, sharp-edged components with care.
- Pay attention to orderliness and cleanliness in the workplace! Loosely stacked or scattered components and tools could cause accidents.
- Dismantle the components properly. Note that some components may have a high intrinsic weight. Use hoists if necessary.
- Secure components so that they cannot fall down or topple over.

- Consult the manufacturer if in doubt.

9.2 Dismantling

Before starting dismantling:

- Shut down the machine and secure to prevent restarting.
- Physically disconnect the power supply from the machine; discharge stored residual energy.
- Remove consumables, auxiliary materials and other processing materials and dispose of in accordance with the environmental regulations.

Then clean assemblies and parts properly and dismantle in compliance with applicable local occupational safety and environmental protection regulations.

9.3 Disposal

If no return or disposal agreement has been made, send the dismantled components for recycling.

- Scrap metals.
- Send plastic elements for recycling.
- Sort and dispose of other components in accordance with their material composition.



NOTICE!
Danger to the environment due to incorrect disposal!

Improper waste disposal will damage the environment

- Electrical scrap, electronic components, lubricants and other auxiliary materials must be disposed of by authorised specialist companies.
- If there is any question, please contact local competent authority or professional waste disposal company for waste disposal data.

Appendix

A Training log

Date	Name	Type of training	Training conducted by	Signature

B Service log

Compressor type:	
Plant number: Please specify for all enquiries, orders and correspondence.	
Motor number:	
Pressure tank number:	

Date of commissioning:

Customer Service department:

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Daily checks		Change of spare parts					
Abnormal sound	Water leakage of air barrel	Air filter	Belt	Check valve	Sealing strip	Date	Signature of inspector

Maintenance and repair operation			
Running hours	Date	Spare parts	Signature of maintenance crew

- C Maintenance Schedule**
- D Installation space requirements diagram**
- E Dimension drawing**
- F Electrical Schematic**

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