Operating instructions

CVS Compressor RPO 200/300/400/600/800

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The operating instructions must be read by the operator of the compressor and before start-up!

Translation of the original operating manual

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1 General

1.1 Information regarding the operating instructions

These operating instructions provide important information on how to deal with the compressor type RPO.
A precondition for safe operation is the observance of all safety and handling instructions specified in these operating instructions. Furthermore, all local accident prevention regulations and general safety regulations valid for the application area of the compressor must be observed.
Carefully read the operating instructions before starting any work! It is a product component and must be kept in direct proximity of the compressor, well accessible to the personnel at all times.
When passing the compressor on to third parties, the operating instructions must also be handed over.

1.2 Pictogram explanation

Warning notes

Warning notes are characterised by pictograms in these operating instructions. The warning notes are marked by signal words expressing the extent of the hazard.
It is absolutely essential to observe the notes and to proceed with caution in order to prevent accidents as well as bodily injuries and property damage.

DANGER!
points to an immediately dangerous situation, which can lead to death or serious injuries if it is not avoided.

WARNING!
... points to an immediately dangerous situation, which can lead to death or serious injuries if it is not avoided.

ATTENTION!
... points to a potentially dangerous situation, which can lead to minor or light injuries if it is not avoided.

CAUTION!
... points to a potentially dangerous situation, which may lead to property damage if it is not avoided.

Hints and recommendations

NOTE!
… highlights useful hints and recommendations as well as information for an efficient and trouble-free operation.

1.3 Limitation of Liability

All specifications and notes in these operating instructions were compiled with consideration to the valid standards and regulations, the state of the art as well as to our long-standing knowledge and experience.
The manufacturer is not liable for damages caused by:

- Failure to follow the operating instructions
- Improper use
- Deployment of non-trained personnel
- Arbitrary modifications
- Technical changes
- Use of non-approved spare and wear parts

The actual scope of supply may differ from the explanations and illustrations described in this manual in case of special designs, if additional order options are made use of, or due to latest technical changes.
Incidentally, the responsibilities agreed upon in the delivery contract, the general terms and conditions as well as the manufacturer's conditions of delivery and the statutory provisions valid at the time of contract conclusion shall apply.

Warranty

The manufacturer guarantees the correct functioning of the applied process technology and the performance parameters identified.
The warranty period commences on the date the compressor is delivered to the customer.
Components are exempted from the warranty and from claims for defects as far as wear and tear damage is concerned.
→ Also see page 92, Chapter 10.2.

1.4 Copyright protection

Surrendering the operating instructions to third parties without written permission of the manufacturer is not permitted.

NOTE!
Content details, texts, drawings, pictures and other illustrations are protected by copyright and are subject to industrial property rights. Any improper use shall be liable to prosecution.

Any type and form of duplication also of extracts as well as the exploitation and/or communication of the contents are not permitted without the manufacturer’s written declaration of consent.

1.5 Scope of delivery and goods receiving

Immediately check the delivery after receipt for completeness and transport damages. The scope of delivery is indicated on the delivery note.

Proceed as follows in the case of outwardly recognisable transport damage:

- Do not accept the delivery or only under reserve.
- Note the extent of damage on the transport documents or on the delivery note of the forwarder.
- Lodge complaint.

NOTE!

Lodge a complaint for each defect, as soon as it is recognised. Compensation claims can only be submitted within the valid complaint periods.

1.6 Spare parts

WARNING!

Risk of injury by incorrect spare parts!

Incorrect or defective spare parts can result in damage, malfunctions or total failure and also impair safety.

Therefore:

– Use only the manufacturer's original spare parts.

Procure spare parts directly from the manufacturer or from authorised dealers.

1.7 Warranty conditions

Warranty terms see "General Terms of Sale".

1.8 Customer Service

Our customer service can be contacted for any technical advice. Information about the responsible contact person can be retrieved by telephone, fax, E-mail or via the Internet at any time, refer to manufacturer's address on page 2.

1.9 Declaration of Incorporation
Declaration of Conformity

Declaration of Incorporation and Declaration of Conformity, refer to page 94ff.

2 Safety

2.1 Intended use

The compressor type RPO is intended exclusively for the compression of cleaned, atmospheric air.

Use the compressor only as intended.
All specifications in the operating instructions must be strictly adhered to (technical data, operating data, permissible working range), refer to the respective chapters in this regard.
All types of claims due to damage arising from improper use are excluded. The operator alone shall be responsible for any damage arising from improper use.

2.2 Operator's responsibility

The compressor is used for industrial purposes.
The operator of the compressor is therefore subject to the legal obligations concerning occupational safety.
The provisions valid at the place of installation as well as the safety and accident prevention regulations of the Institution for statutory accident insurance and prevention must be observed. The operator must in particular:

- inform himself on the valid industrial safety regulations.
- determine the additional hazards that arise from the special working conditions at the compressor's place of installation by means of a hazard assessment.
- implement the necessary rules of conduct for operation of the compressor at the place of installation by means of user instructions.
- check at regular intervals during the compressor's entire period of use whether the user instructions correspond to the current state of the body of rules and regulations.
- adapt the operation instructions, if necessary to the new regulations, standards, and operating conditions .
- clearly regulate the responsibilities for installing, operating, maintaining and cleaning the compressor.
- ensure that all employees working on or with the compressor have read and understood the operating instructions. In addition he must at regular intervals train the employees in how to deal with the compressor and inform them about potential hazards.

In addition, it is the operator's responsibility to ensure that:

- the machine is always in a technically perfect condition.
- the machine is maintained in accordance with specified maintenance intervals.
- all safety equipment is regularly checked for completeness and correct functioning.

2.3 Operating personnel

2.3.1 Requirements

WARNING!
Risk of injury in case of inadequate qualification!
Improper handling can lead to considerable bodily injuries and property damage.
Therefore:
– Have any activities only carried out by the individuals designated for that purpose.

The operating instructions specify the following qualification requirements for the different fields of activity:

- **Instructed persons**
  have been instructed during instructions provided by the operator with regard to the work assigned to them and possible hazards arising from improper conduct.
- **Specialised staff**
  is due to its technical training, knowledge and experience as well as due to its knowledge of the pertinent regulations able to carry out the work assigned to it and to independently recognise potential hazards.
- **Electrical specialised staff**
  is due to its technical training, knowledge and experience as well as due to its knowledge of the pertinent regulations able to evaluate, carry out the work assigned to it and to independently recognise potential hazards.

2.4 Personal protective equipment

When handling the compressor, it is necessary to wear personal protective equipment, in order to minimise health hazards.

- Before carrying out any work, properly don the necessary protective equipment such as gloves, safety goggles, etc. and wear during work.

2.5 Occupational safety and special risks

The remaining risks that result from the hazard analysis are specified in the following section.

Observe the safety notes listed here and the warning notes in the other chapters of these instructions to reduce health hazards and to avoid dangerous situations.

Danger pictograms of the compressor

The relevant dangerous spots on the compressor are identified by these pictograms:

DANGER!

Mortal danger due to electric current!

... identifies life threatening situations caused by electric current. Non-observance of the safety instructions can result in severe injuries or death. Necessary work may only be carried out by an electrical specialist.

DANGER!

General danger pictogram!

… denotes general dangerous situations for individuals. Non-observance of the safety instructions can result in severe injuries or death.

DANGER!

Danger of burns!

… denotes the presence of a hot surface.

DANGER!

Rotating parts!

… marks that there are rotating parts here. Non-observance of the safety instructions can result in severe injuries or death.

Hazard notes and occupational safety

For your own safety and that of the machine, the following information must be observed and complied with:

Improper operation

DANGER!

Danger due to improper operation!

- Only use compressor in a perfect technical condition. Malfunctions that are relevant for safety have to be promptly eliminated.
- Conversions of the compressor are not permissible and can impair safety.
- Before carrying out regular maintenance, cleaning and repair work, switch off power supply and secure compressor against restarting (switch off drives).
- Never bridge any safety equipment or put it out of operation.
- Any work on the compressor and/or on electrical equipment must be carried out by specialised staff.
- Repair and maintenance work may only be carried out when the compressor is stationary. For this, the compressor must be secured against restarting!
- The compressor may not be under pressure or negative pressure while work is being carried out on it.
  Close the shut-off valve on the plant side and vent the line between the compressor and the shut-off valve. Manually relieve the compressor overpressure at the safety valve. Observe pressure gauge!
- The drive's protective equipment may only be removed when the compressor is stationary and has to be correctly refitted after completion of work.
- Only dismantle accidental contact protection after compressor and pressure pipe have cooled down.
- It is an environmental protection requirement that any liquids arising during maintenance work (e.g. oil) must be collected and disposed of in an environmentally compatible manner.

Moving components

WARNING!

Risk of injury by moving components!

Powered rotating components can cause the most serious injuries!

Therefore during operation:

- It is absolutely forbidden for persons to stay in the hazard area or in the immediate vicinity!
- Do not put safety devices and/or functions out of operation and do not render them inoperative or bypass them.
- Never reach into open outlets and inlets or into running equipment.

Before entering the hazard area:

- Switch off power supply and secure against restarting.
- Wait for standstill of lagging components.
- Wait for automatic dissipation and/or discharge of residual energies (compressed air).

Compressed air

WARNING!

Risk of injury due to compressed air!

Pneumatic energies can cause the most serious injuries.

In the case of damage to individual components, air can be discharged under high pressure and injure e.g. the eyes. Therefore:

- Before starting any work, first depressurise pressurised components. Pay attention to accumulators. Accumulator pressure must also be completely relieved.

Signposting

WARNING!

Risk of injury by illegible pictograms!

Labels and signs can become dirty or unrecognisable in the course of time.

Therefore:

- Always keep safety, warning and operating instructions in a well legible condition.
- Immediately replace damaged or obliterated signs or labels.

Improper transport

DANGER!

Danger by falling down or tilting of the compressor!

The weight of the compressor may injure a person and cause serious bruising!

Therefore:

– Depending on the dead weight and size of the compressor, use a pallet on which the compressor can be moved by means of a fork lift.
– For lifting the compressor, use suitable lifting gear (slings, eye bolts etc.) that is designed for the weight of the compressor.
– When putting the slings in position, take care to avoid putting to much stress on individual components.
– Only use the intended transport borings.

Start-up, operation

WARNING!

Risk of injury due to improper start-up and operation

Improper start-up and operation can lead to serious bodily injuries or property damage. Therefore:

– Have all work during initial operation exclusively performed by the manufacturer's employees or by his authorised representatives or by trained personnel.
– Start-up and operation may only be performed by adequately qualified personnel that has been authorised and instructed by the operator.
– Before the start of any work, ensure that all covers and protective devices are correctly installed and function correctly.
– Never override any protective equipment during operation.
– Pay attention to tidiness and cleanliness in the working area! Loosely stacked or scattered components and tools are accident sources.

Maintenance and troubleshooting

WARNING!

Risk of injury due to improper maintenance and troubleshooting!

Improper maintenance and troubleshooting can lead to serious bodily injuries or property damage. Therefore:

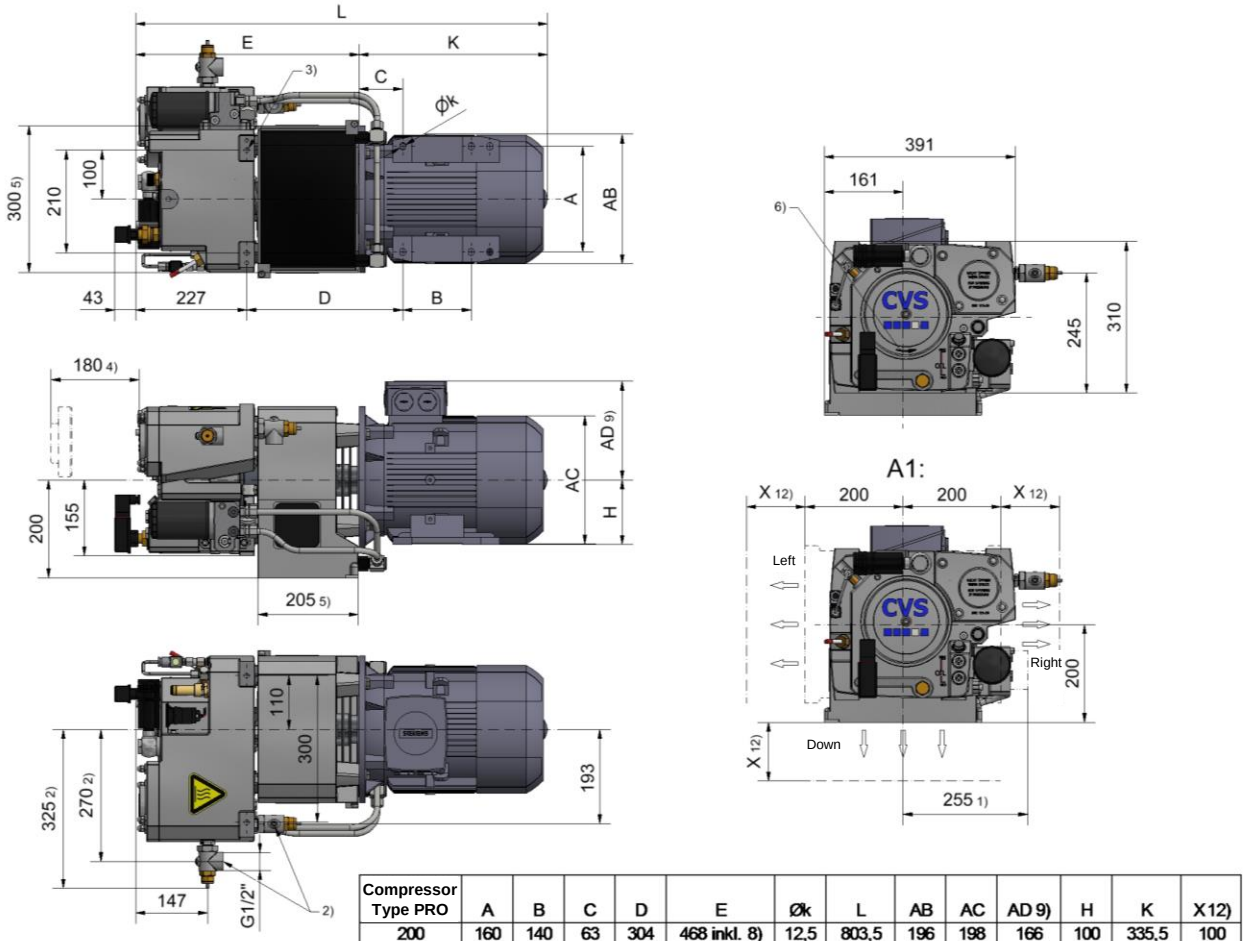
- Maintenance work and troubleshooting work may only be carried out by sufficiently qualified and instructed personnel.
- Secure compressor against restarting, switch off drives!
- Before starting any work, provide for sufficient space and freedom of movement during assembly.
- Pay attention to tidiness and cleanliness in the assembly area! Loosely stacked or scattered components and tools are accident sources.
- The compressor is getting hot during operation! Allow it to cool down before starting any work.

If components must be replaced:

- Pay attention to correct installation of spare parts.
- Properly reassemble all fastening elements.
- Observe screw tightening torques.
- Before restarting, ensure that all covers and protective devices are correctly installed and function correctly.
- After completion of maintenance work and troubleshooting, check correct functioning of safety equipment.

3 Technical data

3.1 Dimensions RPO 200/300/400/600[13)]



Compressor Type PRO	A	B	C	D	E	Øk	L	AB	AC	AD 9)	H	K	X12)
200	160	140	63	304	468 inkl. 8)	12,5	803,5	196	198	166	100	335,5	100
300	160	140	63	304	468 inkl. 8)	12,5	803,5	196	198	166	100	335,5	100
400	190	140	70	311	468 inkl. 8)	12,5	797	226	222	177	112	329	100
600	216	140	89	319	457	12,5	842	265	262	202	132	385	120

Fig. 1: Dimensions RPO 200/300/400/600

1 Line to the oil cooler with blow out direction "right"

2 Compressed air either "to the side" or "to the rear". With the blow out direction "to the right", only ""to the side" is possible.

3 Attachment borings M12 x 26. Required min. screw-in depth: 24 mm.

4 Clearance for filter change (deoiling element, air filter, oil filter)

5 Interior diameter for vent channel at the transition point. Expand the vent channel to keep the accumulated pressure as low as possible.

6 Sense of rotation viewing the "maintenance side of the compressor" or "the motor drive shaft": left.

7 Weight indication: compressor without fill

8 With RPO 300 and RPO 400: Reduction flange for electric motor

9 Terminal box for the motor is on top (standard). As agreed, right and left are also possible.

12 Minimum distance from the wall

13 RPO600 see also chapter 3.2

A1 Illustration of the possible blowout directions of the oil cooler

3.2 Dimensions RPO 600/800[13)]

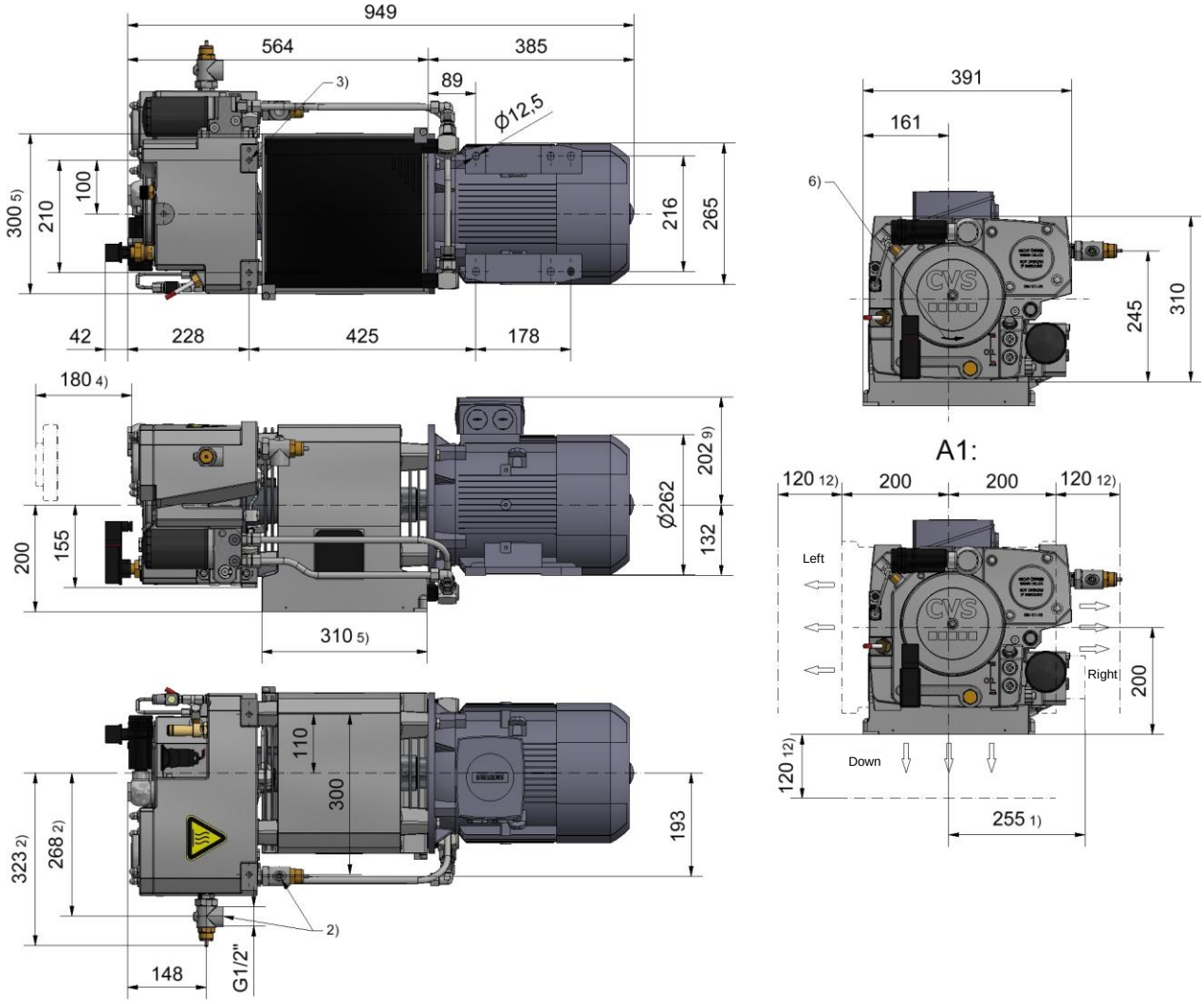


Fig. 2: Dimensions RPO 800

1 Line to the oil cooler with blow out direction "right"

2 Compressed air either "to the side" or "to the rear". With the blow out direction "to the right", only ""to the side" is possible.

3 Attachment borings M12 x 26. Required min. screw-in depth: 24 mm.

4 Clearance for filter change (deoiling element, air filter, oil filter)

5 Interior diameter for vent channel at the transition point. Expand the vent channel to keep the accumulated pressure as low as possible.

6 Sense of rotation viewing the "maintenance side of the compressor" or "the motor drive shaft": left.

7 Weight indication: compressor without fill

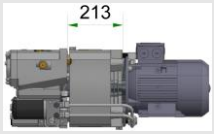
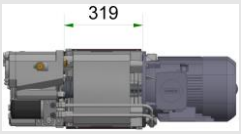
8 Terminal box for the motor is on top (standard). As agreed, right and left are also possible.

12 Minimum distance from the wall

13 RPO600 see also chapter 3.1

A1 Illustration of the possible blowout directions of the oil cooler

3.3 Technical data

Description	Unit	RPO 200	RPO 300	RPO 400	RPO 600		RPO 800
Size of oil cooler	–		 see chapter 3.1		 see chapter 3.2		
Suction volume flow [1), 2)]	[l/min]	180/175	260/256	380/375	550/540		770/758
Final overpressure [3)]	[bar_g]	10/12					
Suction pressure	[mbar]	1000					
Motor rated speed	[min^{-1}]	1420	1420	1440	1455		1455
Power requirement at the shaft [2)]	[kW]	2,2/2,4	2,8/3,2	3,8/4,2	5,2/5,7		7,2/8,0
Final overpressure range	[bar_g]	3…10/12					
Speed range	[min^{-1}]	1000…2200	1000…2200	1000…2200	1000…2200		1000…2000
Sound pressure level [4) 5)]	[dB(A)]	60	61	63	63	64	64
Oil content [6)]	[l]	1,8/2,4	1,8/2,4	1,8/2,4	2/2,6	2/3	2/3
Remaining oil content of the compressed air [7)]	[mg/m^3]	≤ 5					
Voltage of electric motor	[V AC]	3 x 400					
Frequency of electric motor	[Hz]	50					
Protection class of electric motor	–	IP 55 (shake proof)					
Design of electric motor	–	B35 or B85					
Weight without drive motor [8)]	[kg]	58	58	57	55	61	67
Weight with drive motor [8)]	[kg]	76	80	84	93	99	111
Cooling suction temperature [9)]	[°C]	-40…+40					
Activation duration [10)]	[%]	30…100					

Tab. 1: Technical data

1) *Suctioned volume flow referenced to 20 °C, acceptance as per DIN ISO 1945/ISO 1217*
2) *with final overpressure 10 bar_g / 12 bar $_g$*
3) *positive working pressure > 10 bar_g only in connection with idle control to avoid the generation of condensate*
4) *sound pressure level as per DIN 45635 with a compressor speed of 1500 min^{-1}, open air measurement: 7 m, driven via AC motor and a positive working pressure of 10 bar_g. When driven by a DC motor or converter driven AC motor, the sound pressure level can be above the indicated values.*
5) *The values indicated refer to the pure working sound of the compressor. Depending on the installation situation (e.g. muffler), the intake sound may deviate from this value.*
6) *higher value: oil volume during first fill. lower value: oil volume that can be drained and refilled during an oil filter change. The difference is the remaining residual oil in the compressor.*
7) *with static operation; With pulsations, such as caused by the compressed air dryer, a pulsation damping valve must be installed, see page 45.*
8) *compressor without fill*
9) *for higher temperatures, please consult with CVS*
10) *refers to the actual load operation and until the minimum temperature of the compressor is reached.*

Type key	RPO	200 300 400 600 800	LA LLA LLTA LLA-T
Rotation compressor with oil cooling			
Suction power of the compressor, approx. e.g. 400 ~ 400 l/min			
Load intermittent duty Load idle intermittent duty Load idle drying run intermittent duty Load idle intermittent duty (with externally controllable drying run)			

Lubricating oils

The following lubricating oils are permitted by default for operating the compressor type RPO:

Model	Brand	Designation
Mineral oil	MOBIL	Delvac MX Extra 10W-40
Synthetic oil	MOBIL	Delvac 1 ESP 5W-40

Tab. 2: Lubricating oils

Changes in the permitted lubricants are reserved.

For more lubricants validated by CVS, the lubrication specification 6000-00 SP must be requested from CVS.

Synthetic oil at low temperatures

CAUTION!
Use synthetic oil if the ambient temperature is –50…-25°C.

3.4 Rating plate

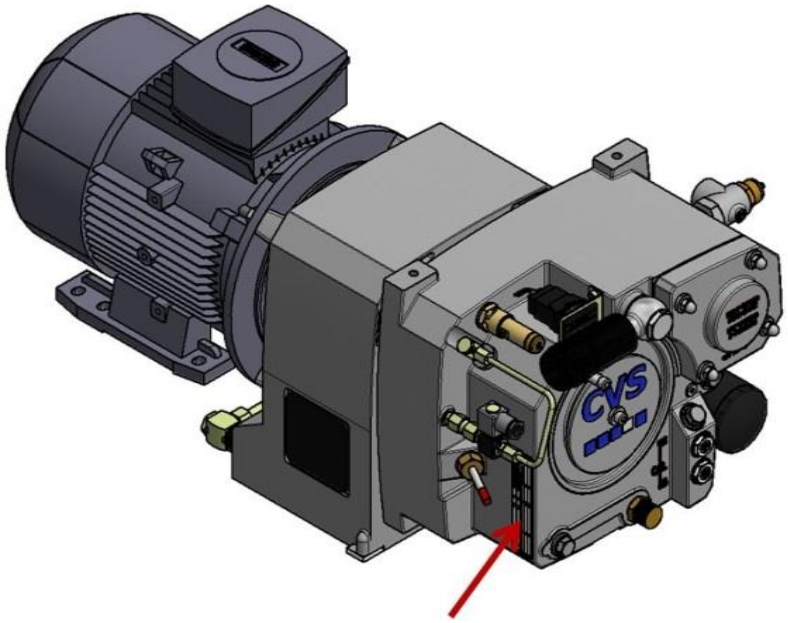


Fig. 3: Location of the rating plate

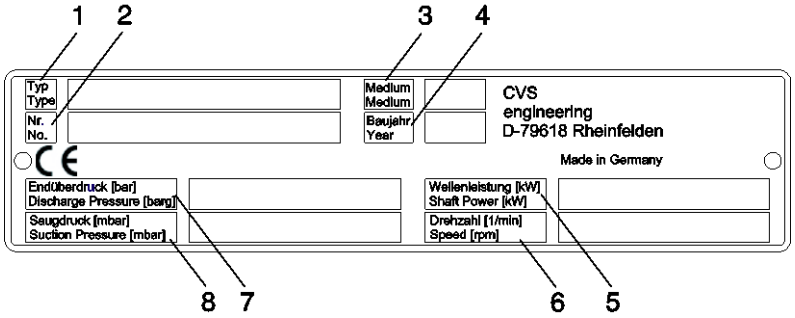


Fig. 4: Rating plate

1 Type
2 Serial number
3 Medium
4 Year built
5 Shaft power in kW
6 Speed in 1/min
7 Final overpressure in bar
8 Suction pressure in mbar

4 Design and function of the compressed air system

4.1 Design

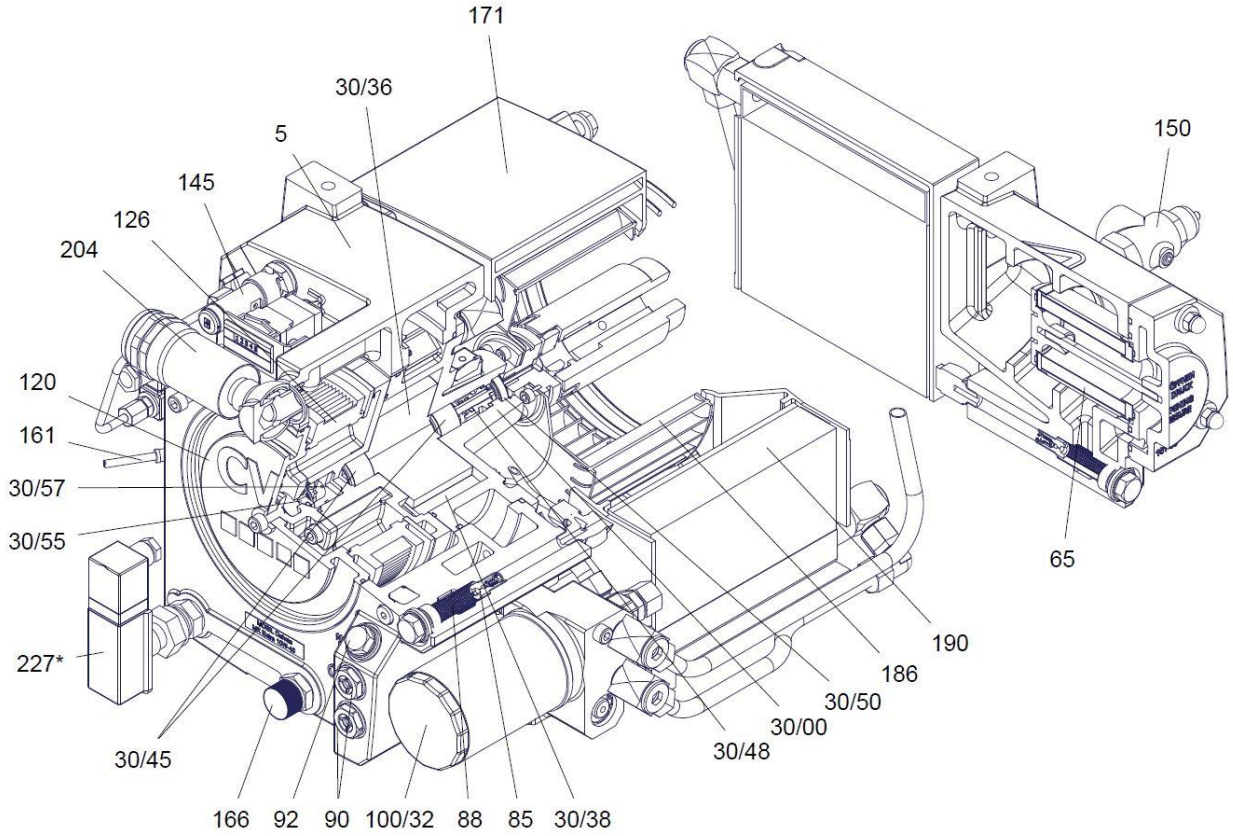


Fig. 5: Design of RPO compressor

5	Compressor casing	150	Minimum pressure valve	30/36	Rotor
65	Oil separator	161	Safety temperature switch	30/38	Rotor slider
85	Oil return nozzle	166	Oil drain	30/45	Needle bearing
88	Sieve	171	Intermediate flange	30/48	Slip ring seal
90	Oil-sight glasses	186	Fan with coupling	30/50	Radial shaft seal
92	Oil fill screw	190	Oil cooler	30/55	Piston for suction regulator
100	Thermostat, complete	204	Cyclone separator		
126	Air filter	227*	Oil level monitor	30/57	Non-return valve with suction regulator
120	Air filter lid	30/00	Compressor stage, complete	100/32	Oil filter
145	Safety valve 14 bar_g				

** Option*

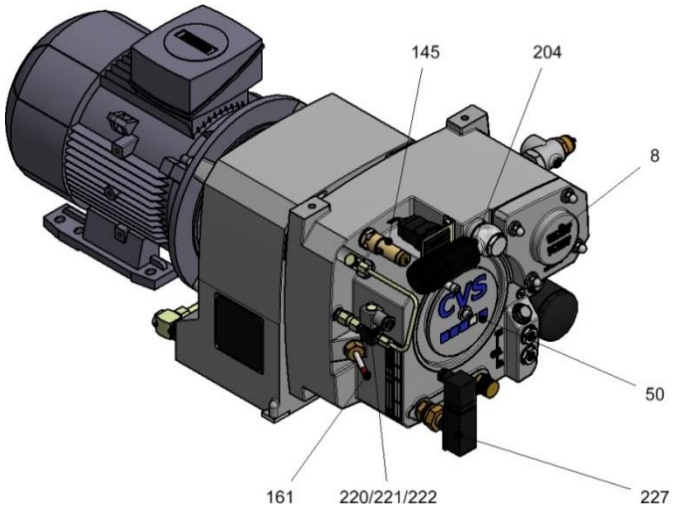


Fig. 6: Maintenance and safety equipment of the RPO compressor

8	Oil separator cover
50	Casing lid
145	Positive working pressure 14 bar_g
161	Safety temperature switch
204	Cyclone separator
220/221/222	Load idle valve with coil and plug
227	Oil level monitor

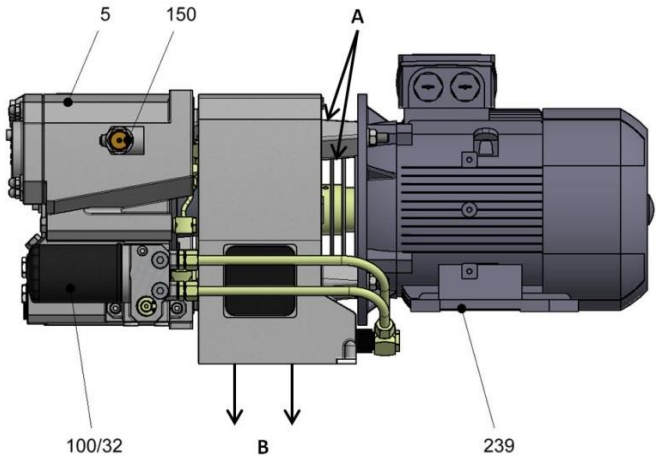


Fig. 7: Cooling air

5	Compressor casing
150	Minimum pressure valve
100/32	Oil filter
239	Electric motor
A	Cooling air suction
B	Cooling air exit

4.2 Function

General

CVS rotary vane compressors with oil cooling of the model series RPO are compact one-stage compressors, ready to install and constructed as per the European standard EN 1012-1 for the compression of atmospheric air, designed for positive overpressures of 10/12 bar_g.
The back cooling of the injected oil is performed by an air-cooled heat exchanger.
The compressor delivers low-pulsation compressed air with an exit temperature of approx. 70 °C.

The compressors are available in different operation modes:

- Load intermittent duty (LA)
- Load idle intermittent duty (LLA)
  (Positive working pressure > 10 bar_g
  only in connection with idle control)
- Load idle drying run intermittent duty (LLTA)
  (Running times < 30%, only in connection with compressed air dryer and drainage valve)
- Load idle intermittent duty with externally controllable drying run (LLA-T)

Air passage

The air is suctioned via the cyclone separator (Pos. 204) and reaches the suction regulator (Pos. 30/55), (Pos. 30/57) via the air filter (Pos. 126); from there, it travels axially into the compressor stage (Pos. 30/00).
In the compressor stage, the air is compressed. At the same time, oil is injected to cool and lubricate. The compressed air leaves the compressor stage and enters the pre-separation chamber, where the majority of the oil is separated from it. After that, it is transported on to the oil separator (Pos. 65). This reduces the residual oil content of the compressed air to less than 5 mg/m^3. The compressed air leaves the compressor via the minimum pressure valve (Pos. 150).
The safety valve 14 bar_g (Pos. 145) protects from overpressure.

Oil circuit

A thermostat (Pos. 100) is installed in the oil circuit to regulate the temperature.
From a defined oil temperature, the oil is routed via an oil cooler and returned to the compressor stage via the oil filter.
In the compressor stage, the oil is mixed with the air to be compressed, while it picks up the compression and the friction heat and prevents backflow losses.
The oil is separated from the compressed air in the pre-separator chamber and in the oil separator and returned to the process once again.

Functional principle of the rotary vane compressor

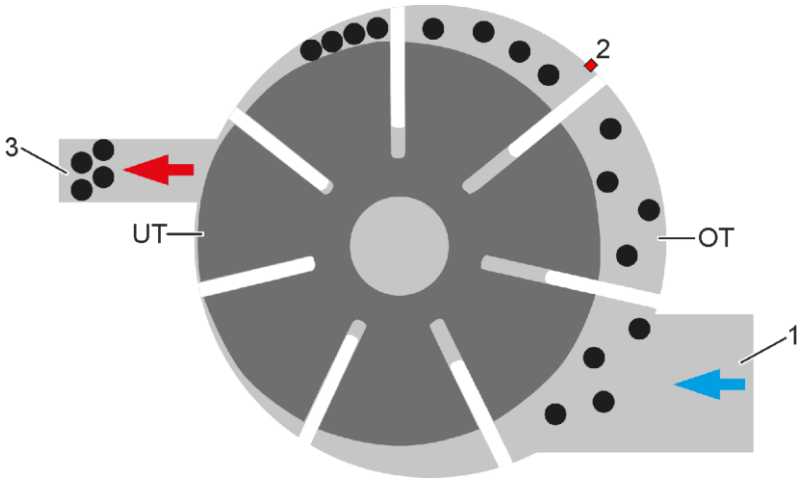


Fig. 8: Principle diagram of compressor stage

1 Inlet channel
2 Oil injection
3 Output
OT top dead centre
UT bottom dead centre

The air reaches the compressor stage via the inlet channel (1). The suctioning cell is closed by the subsequent vane approx. at top dead centre (TDC), once it has reached its maximum volume. When you continue to rotate the rotor, the cell's volume will be decreased and this will make the air denser. Shortly before reaching the bottom dead centre (BDC), the densified air will be expelled.
During the densifiying process, oil is sprayed into decreasing cells via nozzles (2), which pick up compression and friction heat and prevents return flow losses.

4.2.1 Functional principle of the construction of the compressor

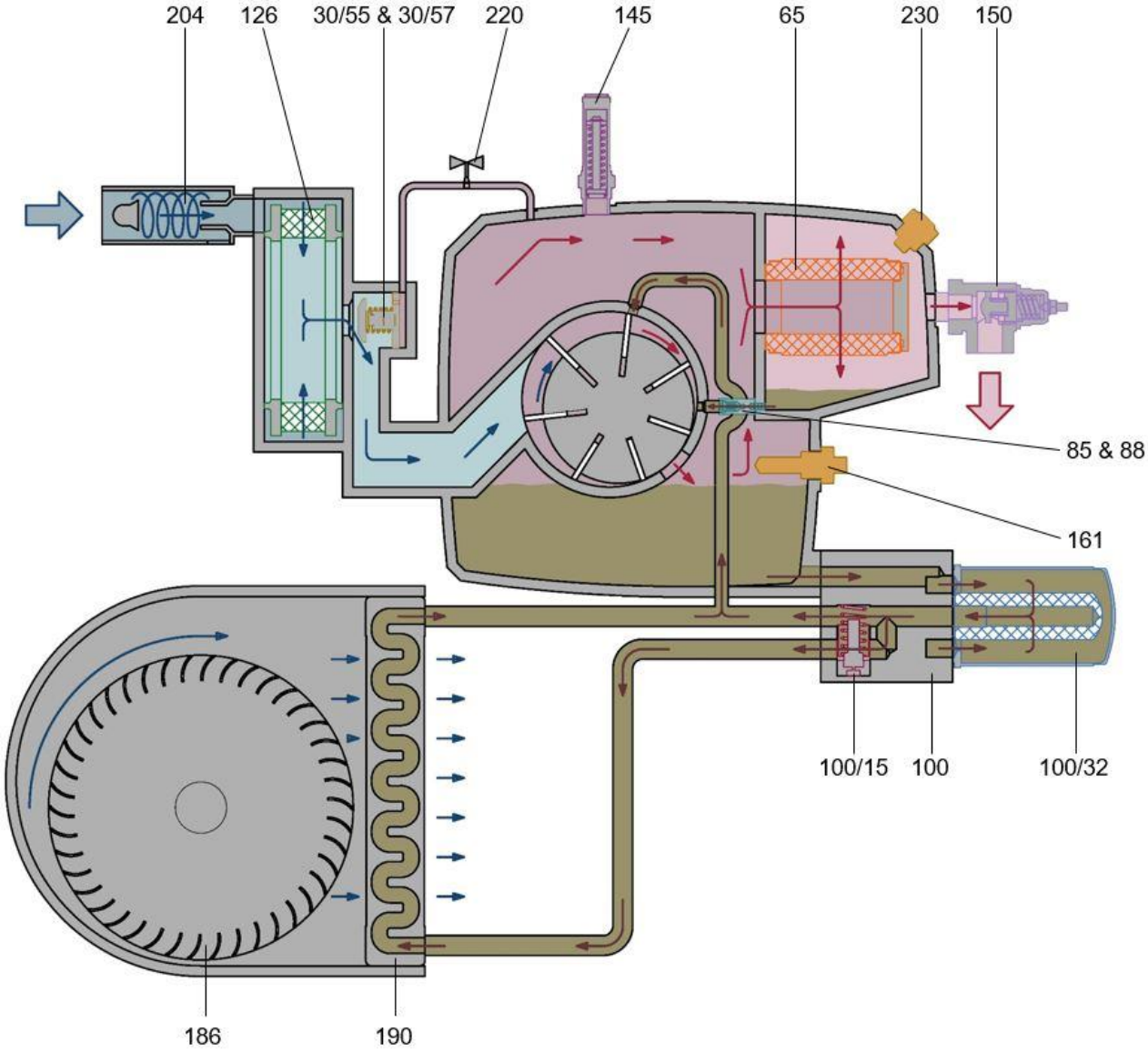


Fig. 9: Flow chart of the construction of the compressor

30/55 & 30/57	Air suction regulator	150	Minimum pressure valve
65	Air deoiler element	161	Safety temperature switch 115 °C
85 & 88	Sieve insert & oil return nozzle	186	Ventilation wheel
100	Thermostat, complete	190	Oil cooler
100/15	Thermostat	204	Cyclone separator
100/32	Oil filter	220	Regulator valve of the idle control
126	Air filter	230	Temperature switch LLTA
145	Safety valve 14 bar_g		

4.3 Components

4.3.1 Air filter (Fig. 5: Pos. 126)

The air filter cleans the air suctioned by the compressor.

4.3.2 Oil filter (Fig. 5: Pos. 100/32)

The oil filter cleans the circulating oil.

4.3.3 Minimum pressure valve (Fig. 7: Pos. 150)

The minimum pressure valve is a combined minimum pressure and check valve at the compressed air outlet. It is designed or adjusted so that air only can flow into the connected pressure line if there is an operation overpressure of approx. 2 bar_g. This will ensure the oil circulation in the compressor, even if the pressure in the consumer line is only built up very slowly or if it falls below approx. 2 bar_g in case of large volumes used.

4.3.4 Electric motor (Fig. 7: Pos. 239)

The electric motor must be connected to the compressor stage (Pos. 30/00) via a form-locking rotational elastic coupling. The drive can also be driven by a V-belt and the belt pulley.
Depending on the model, the electric motor is switched either directly, via star triangle switch or soft starter. The shut off or switch on of the motor depends on the respective use/consumption of the compressed air.

4.4 Oil cooler (Fig. 5: Pos. 190)

The oil cooler is an air-cooled heat exchanger, in which the circulating oil is cooled back by the compressor stage.

4.5 Thermostat (Fig. 5: Pos. 100)

In order to avoid condensate failure during operation in the compressor casing, the compressor's final temperature is regulated by a thermostat that is built into the oil circuit.
From a defined oil temperature, the oil is routed via the oil cooler.

4.6 Safety and shutoff functions

The compressor type RPO is equipped with the following safety and shutoff functions:

- Positive working pressure 14 bar_g
- Safety temperature switch
- Cold conductor sensor on electric motor
  (if an electric motor is attached)

4.6.1 Safety valve 14 bar_g (Pos. 145)

To safeguard against exceeding the max. permissible operation overpressure, a safety valve has been installed as per EN 1012-1.

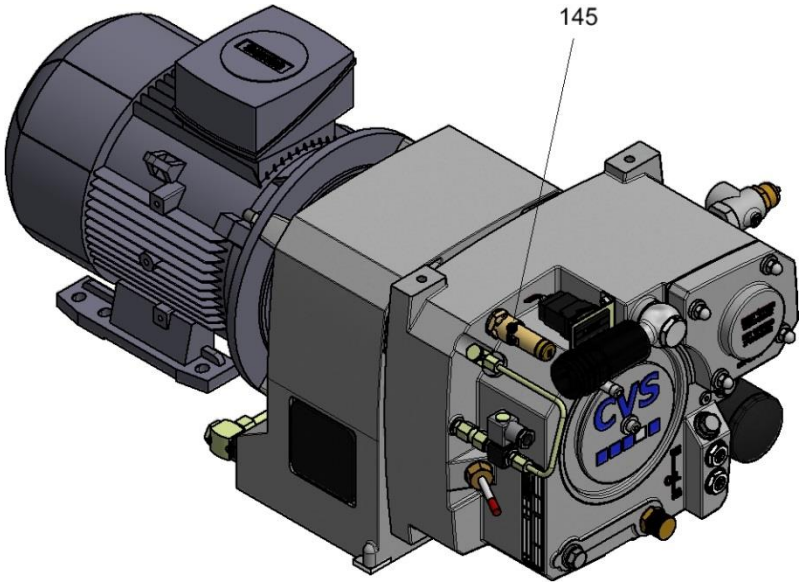


Fig. 10: Safety valve

4.6.2 Safety temperature switch (Pos. 161)

According to EN 1012-1:2010 § 5.8.2., air compressor systems with oil injection must have an automatic deactivation device that shuts off the compressor if the temperature of the compressor oil exceeds the safe threshold. The deactivation device must trigger at a temperature not exceeding 120 °C.
The compressors are equipped with a safety temperature switch that will switch off the compressor if the temperature exceeds 115°C. Additionally, the oil temperature can be put out via an integrated PT100 (resistance thermometer) as an analogue signal.

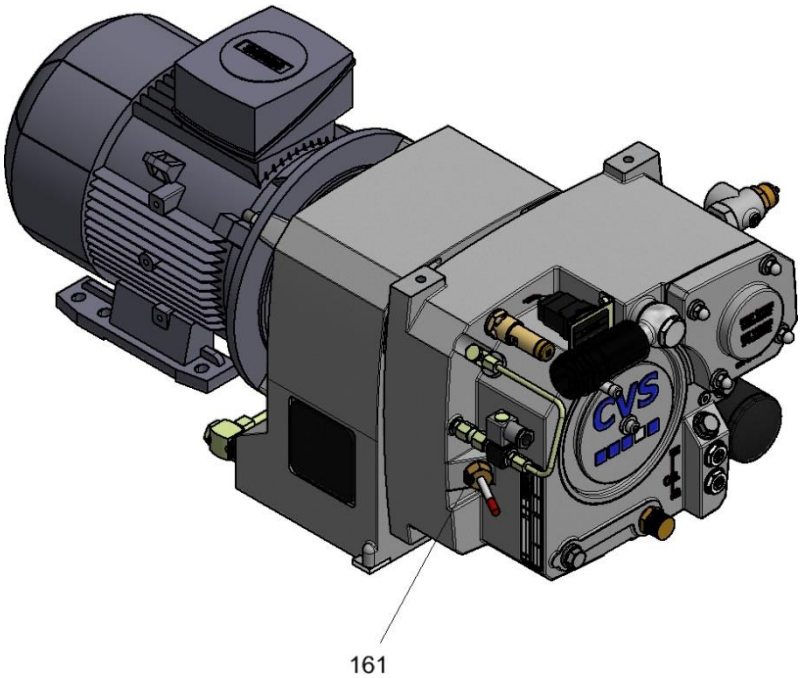


Fig. 11: Safety temperature switch

4.7 Options

4.7.1 Sound proof hood

To lower the sound pressure level, the compressor can be equipped with a sound proof hood.
You can also use a customer supplied sound proof hood.

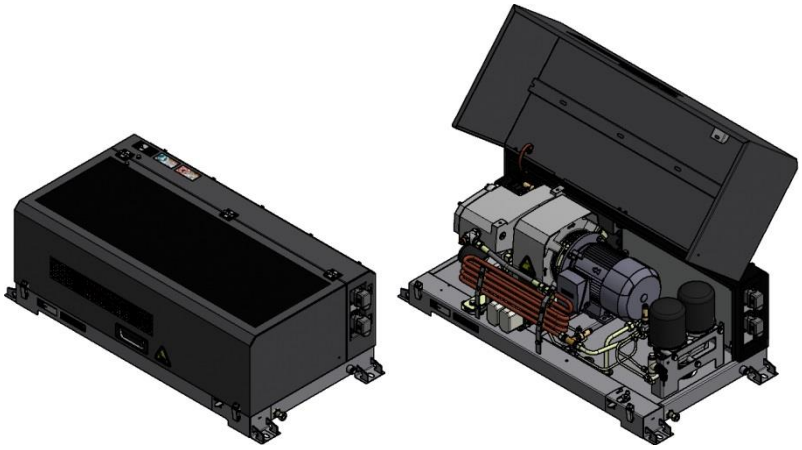


Fig. 12: Example CVS compressed air system with sound proof hood (closed and open)

4.7.2 Oil level monitor (Pos. 227)

The optional oil level monitor can be connected either to the closer or opener.
By connecting suitable warning devices (e.g. as alarm signal, warning lamp or automatic display in the driver display), the oil level monitoring becomes more comfortable with compressors installed inside vehicles.

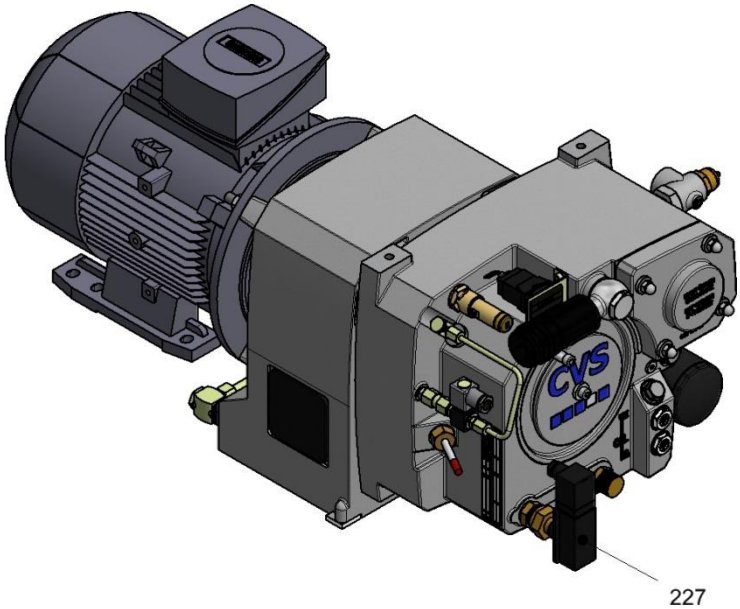


Fig. 13: Oil level monitor

4.7.3 Compressed air dryer

To dry the fed compressed air, you can connect a compressed air dryer.
The downstream compressed air dryer can cause system-related pulsations in the pressure line. In this case, a pulsation damping valve must be installed downstream from the compressor.
The dryer function can be monitored additionally (switching).

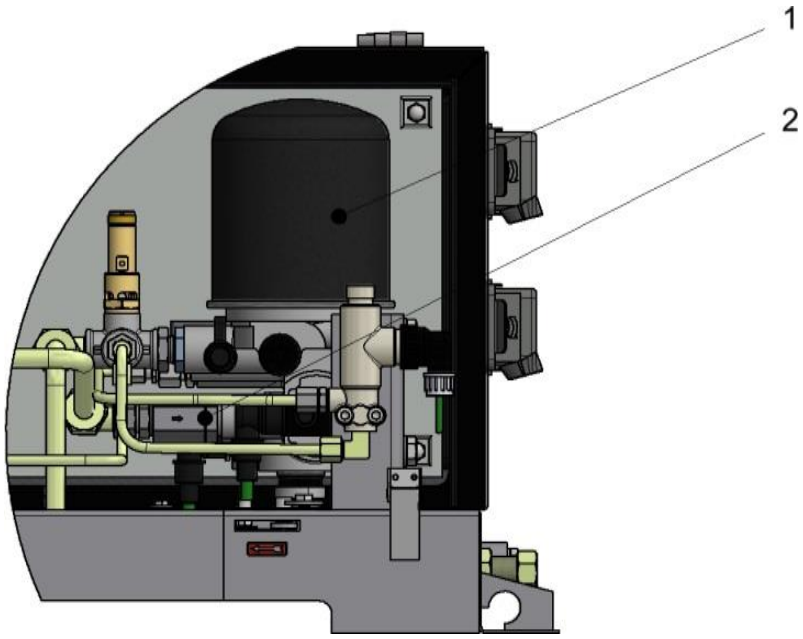


Fig. 14*: Example compressed air dryer and pulsation damping valve*

1 Compressed air dryer
2 Pulsation damping valve

5 Transport and storage

5.1 Safety notes for transport

See chapter 2.5 Safety!

Personal protective equipment

See chapter 2.4.

5.2 Transport

The compressor, which is fastened on a base plate, must be transported either by crane or a fork lift. The lifting gear must be designed for the weight of the compressor. → Weight see page 20, chapter 3.2.

For future transports:

- Seal all open connections
  (prevents penetration of dirt and water)
- Securely fasten the compressor prior to transport (e.g. screw it onto a pallet)
- Transport and put down the compressor with a fork lift or secure with straps and lift with suitable lifting gear.

Transport by crane

Attach the compressor to the appropriate transport borings.

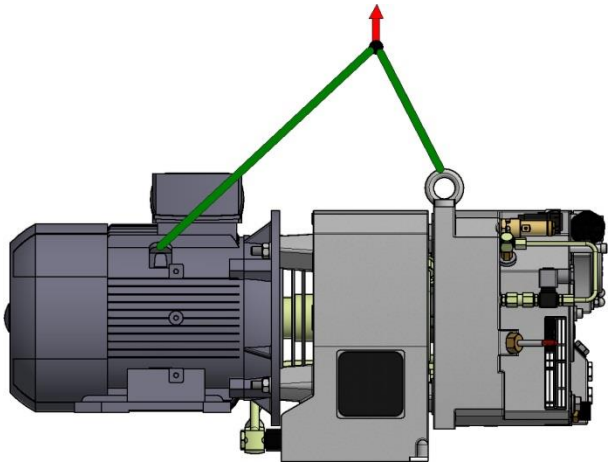


Fig. 15: Transport by crane

5.3 Storage

The compressor must be stored under the following conditions to avoid damage:

- Do not store outdoors
- Store dry and dust free
- Do not expose to aggressive media
- Protect against direct solar irradiation
- Avoid mechanical vibrations
- Storage temperature: -40 to +60°C
- Relative humidity: max. 95%, non-condensing

5.3.1 Storage for a period of more than 3 months

Storage of new compressors

- Close the intake socket and pneumatic interface to prevent moisture from entering
- Check the general condition of all parts and the packaging at regular intervals.
  (visible rust formation, water collection, damage to the packaging, etc.)

Storage of compressors that have already been used

- Perform oil change
- Operate the compressor in permanent operation at 10 bar_g for approx. 2 h.
- Close the intake socket and pneumatic interface to prevent moisture from entering
- Check the general condition of all parts and the packaging at regular intervals.
  (visible rust formation, water collection, damage to the packaging, etc.)

5.3.2 Recommissioning of stored compressors

Before commissioning after extended storage, the function tests of the compressor must be performed according to the corresponding chapter 7.3 of the operating instructions.

5.3.3 Storage or standstill of compressors installed in the vehicle

- Close the intake socket and pneumatic interface to prevent moisture from entering
- Check the general condition of all parts and the packaging at regular intervals.
  (visible rust formation, water collection, damage to the packaging, etc.)

NOTE!

Following a longer standstill of a compressor built into the vehicle, CVS recommends running the compressor in permanent operation for about 0.5 h every 6 weeks.

6 Installation and assembly

6.1 Safety at installation and assembly

See chapter 2.5 Safety!

Personal protective equipment See chapter 2.4.

6.2 Installation diagram

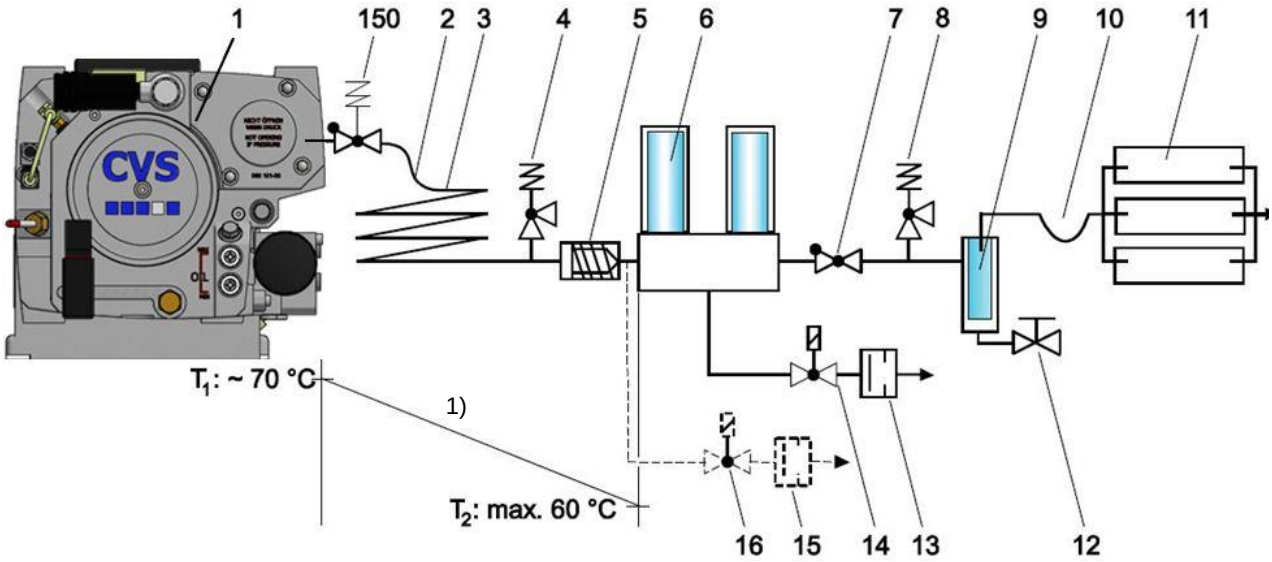


Fig. 16: Installation diagram

1	Compressor [2]	9*	Micro filter (only required with compressed air quality: < 5 mg/m³ residual oil content)	150	Minimum pressure valve
2	Compensator and hose line			15	Muffler
3	Compressed air after cooler (cooling coil/block type radiator) [3]			16	Relief valve
4	Safety valve	10	Compensator (hose line) [4]	Pos. 15 and Pos. 16 only required if Pos. 6 is not available with Pos. 14	
5	Pulsation damping valve	11	Compressed air tank)		
6	Compressed air dryer	12*	Manual emptying micro filter		
7	Non-return valve	13	Muffler	T1:	Output temperature compressed air
8	Safety valve (grid-side)	14	Drainage valve of dryer	T2:	Input temperature compressed air dryer

1) The compressed air line between the compressor and the input of the compressed air dryer must be connected downhill to the compressed air dryer.

2) The temperature in the installation room must not exceed 40 °C.

3) The length of the compressed air aftercooling is to be dimensioned so that the input temperature into the compressed air dryer does not exceed 60 °C.

4) Not contained in the scope of delivery of CVS.

* *optional*

6.3 Installing the compressor

CAUTION!
CVS recommends having the installation performed and checked by CVS or by instructed personnel.

Avoiding storage damage

CAUTION!
The compressor must be attached to the vehicle frame using rubber elastic bearings. A non-observance can lead to storage damage on the compressor and the electric motor.

NOTE!
CVS would gladly assist you with the selection of a suitable installation location in the vehicle.

The compressor type RPO is attached to the compressor and the electric motor via two attachment locations each.

Attachment requirements

- The attachment points on the vehicle must feature a sufficient load capacity and rigidness.
- The attachment points must be on the same level.
- The fastening screws must feature a sufficient clamping length.

Requirements upon the installation location

The installation location must fulfil the following requirements:

- protect from dirt, falling rocks and spray water.
- no exposure to direct drive wind.
- protect the drive motor of the compressor from direct sunlight, e.g. by attaching sheet metal panelling.
- offer sufficient space for accidental contact protection.
- offer sufficient space for the connections of the suction and pressure lines.
- ensure good legibility of the instruments.
- be accessible for maintenance and repair work, e.g. for air and oil filter changes or the control of the safety and non-return valve on the service side of the compressor. Also see page 18 ff, Fig. 1 and Fig. 2.
- Enough space/clearance for cooling air supply and discharge to avoid a cooler short-circuit.

Installation position

The installation position can be selected freely in reference to the driving direction if the compressor axle is horizontal.

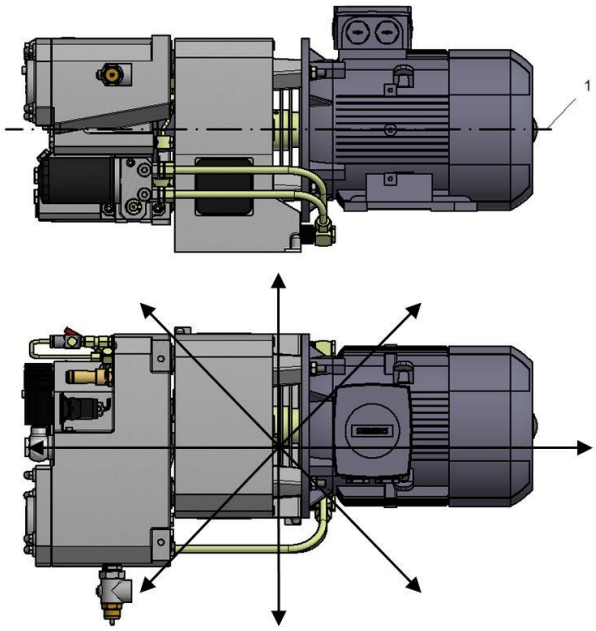


Fig. 17: freely selectable installation position with horizontal compressor axle

1 Horizontal compressor axle

In the longitudinal and the cross axle, the deviation from the horizontal machine axis may not exceed 12°or 21%.

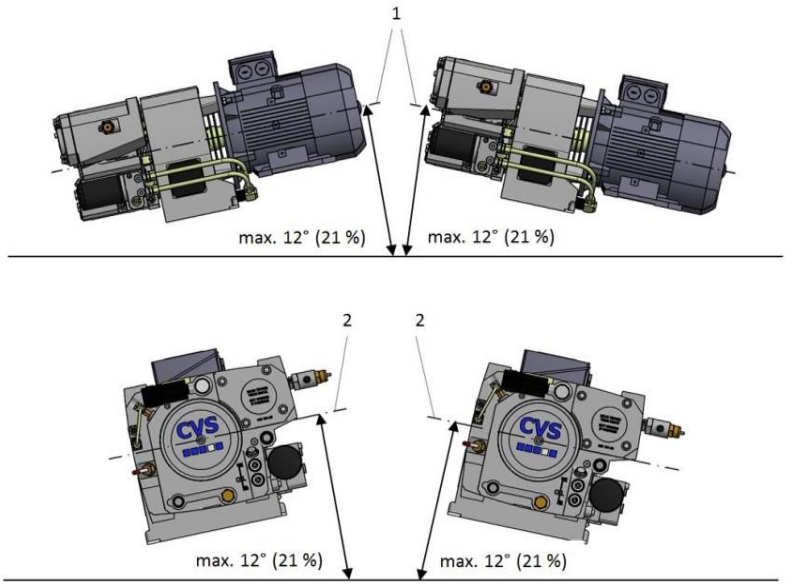


Fig. 18: top: max. deviation of longitudinal axle
bottom: max. deviation of cross axle

1 Longitudinal axle
2 Cross axle

Assembly

1. Use the suitable transport means to place the compressor into the intended installation position on the vehicle. Observe transport instructions in Chapter 5.
2. Attach the compressor with screws as per Tab. 3 without tension.

Use the following screws to attach the compressor:

Screw	Solidity	Torque	Screw-in depth in the compressor casing
M12	8.8	80 Nm	24 mm

Tab. 3: Fastening screws

The fastening screws for the electric motor must match the attachment borings.

6.4 Drive

CAUTION!

- If the drive motor is installed at a later time, the selection and layout lie in the responsibility of the system designer.
- Do not route axial forces into the compressor shaft when installing drive components.
- Do not tap couplings or other connection components onto the shaft, but slide them on.
- Check the torque and the sense of rotation.

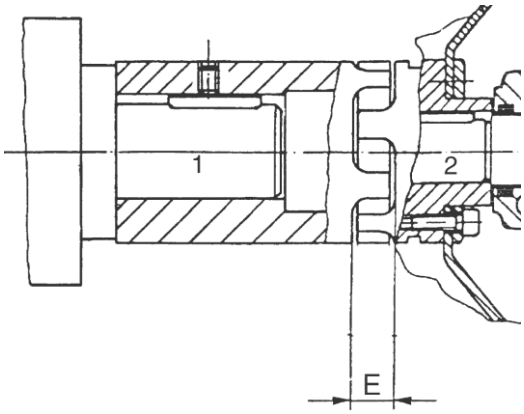


Fig. 19: Coupling play

1 Motor side
2 Compressor side
E 20 mm

6.4.1 V belt drive

CAUTION!

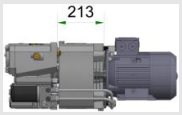
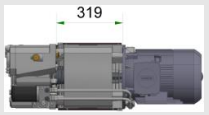
- Only install the V belt drive with additional exterior bearing of the drive shaft. The drive shaft is not designed for cross force by the belt pretension.
- Observe the design, installation and inspection instructions of the manufacturer.

Assembly

- Carefully and correctly align the axles of the driving and driven shaft on all levels.
- Align the V belt pulleys accurately to each other.
- Select the V belt by length for an even belt tension.
- Smallest permissible effective diameter of the pulleys = 140 mm.

6.5 Oil cooler

The oil routed to the compressor type RPO is back cooled via a heat exchanger. The following table lists the volume flow of the cooling air for the compressor:

Description		Unit	RPO 200	RPO 300	RPO 400	RPO 600	RPO 800
Positive working pressure [1]		[bar_g]	10/12	10/12	10/12	10/12	10/12
Size of oil cooler		–					
Oil cooler (Pos. 190)	Cooling air volume flow	[m^3/h]	400	500	600	800	1100
	max. cooling air entry temperature at cooling air blower [2]	[°C]	40				
External oil cooler	Cooling air volume flow	[m^3/h]	700	700	700	700	950
	max. cooling air entry temperature at cooling air blower	[°C]	55	55	52	50	50

Tab. 4: Oil cooler specifications

1) with a compressor speed of 1,500 min^{-1}

2) for higher temperatures, please consult with CVS

Installing the external oil cooler

Please observe the following when installing an external oil cooler:

- Max. line length between the cooler and the compressor: approx. 1 m.
  For longer line lengths, please consult CVS
- Do not exceed the max. cooling air suction temperature (temperature in the installation room of the external oil cooler) indicated in Tab. 4.
- The oil must flow through the cooler from the bottom up.
- If the oil cooler is installed below the compressor, an oil drain stopcock must be installed on the oil cooler or the connection line at the lowest point.

6.5.1 Cooling oil lines

Leaks

CAUTION!
When screwing the oil output and input lines into the cooler, support the torque on the edge of the bushing. If this is not observed, there can be leaks on the bushing soldering spot.

Cooling oil hoses

The cooling oil hoses must meet the following requirements:

- Core made of Teflon or Viton
- DIN 20024
- Interior pipe diameter as per the following table:

Compressor	Interior pipe diameter [mm]
RPO 200/300/400/600	9
RPO 800	12

Tab. 5: Interior pipe diameter of the cooling oil hoses

You can also purchase the cooling oil hoses from CVS.

6.6 Line connection (pressure line)

Condensate

CAUTION!
In order to prevent condensate from entering the compressor, route the pressure line from the compressor **in a declining** fashion. Condensate that leaks into the compressor can cause damage to it.

Pressure line

The pressure line must fulfil the following requirements:

- corrosion-proof
- Interior pipe diameter as per the following table:

Compressor	Interior pipe diameter [mm]
RPO 200/300/400/600	12
RPO 800	15

Tab. 6: Interior pipe diameter of the pressure line

Assembly

Install the line as follows:

- Route the pressure lines declining from the compressor.
- Install a compensator (such as a pressure hose) between the compressor and the site's compressed air supply.
  CVS recommendation: PTFE corrugated hose with stainless steel fixtures

6.7 Cyclone separator

By standard, the cyclone separator is screwed directly to the suction opening of the compressor.

Notes at offset cyclone separator

If the cyclone separator is installed offset and is connected to the compressor via a vacuum hose (i.e. if there is a risk of suctioning water), the following guidelines must be observed during installation:

- Horizontal placement of the cyclone separator
- Dirt disposal slot must always point down
- Min. interior diameter of the vacuum hose: 30 mm

6.8 Relief valve

If the devices that are installed downstream from the compressor are not equipped with a relief possibility, a relief valve must be installed on the vehicle between the compressor and the non-return valve on the compressed air reservoir input.
When the compressor is shut off, the relief valve opens and the pressure volume between the compressor and the compressed air reservoir is relieved slowly (approx. 5...10 seconds).
If there is a compressed air dryer installed downstream from the compressor, which relieves pressure after a shutoff, no external relief equipment is necessary. A pulsation valve is to be installed upstream of the compressed air dryer, which slowly relieves compressed air from the system. Also see page 36, Fig. 16.

When restarting the compressor against the relieved pressure line, the required start-up power of the electric motor is lower, which avoids an excessive heat-up of the electric motor winding with frequent start and stop cycles.
The pressure in the compressor in front of the minimum pressure valve is still at approx. 2 bar_g after the line network has been released.

6.9 Safety equipment and control elements

To protect from unauthorised excession of the permitted positive working pressure, safety valves must be installed at the site. Install the safety valves in the locations, where the line networks are separated (e.g. back flap).
The site must provide suitable control elements such as pressure monitors to switch the compressor on and off according to the pressure.

6.9.1 Safety valve (on site)

The safety valves prevent the excession of the permissible max. pressure.

Risk of explosions

DANGER!
Risk of injury by explosions!
Explosions can cause severe injuries!
Therefore:
- Install the safety valve as instructed. Observe the manufacturer's instructions.
- Only use the safety valve for its intended purpose.
- Never block the safety valve.

6.9.2 Pressure monitor (on site)

The pressure monitor is used to control the compressor. For this, the pressure provided by the network (pressure after dryer) is probed and compared to the minimum and maximum pressures set on the pressure monitor. The pressure monitor emits an electrical signal to the control, which shuts the compressor off or switches it on.
Further information is contained in the operating instructions of the pressure monitor.

6.10 Oil level monitor (optional)

The oil level monitor can be connected either to the closer or opener.
Further information is contained in the operating instructions of the level monitor.

6.11 Cyclone separator or micro filter

To further improve the quality of the compressed air, an additional cyclone separator or a micro filter can be installed downstream.

6.12 Pulsations (pulsation damping valve)

If there are devices installed downstream of the compressor, which cause sudden pulsations (pressure break-ins, such as a two-chamber adsorption dryer as compressed air dryer), a pulsation damping valve must be installed downstream of the compressor.

Pulsations of downstream devices

CAUTION!
Pulsations cause malfunctions in the compressor.

6.13 Sound proof hood

NOTE!
Please consult CVS if you decide to install a sound proof hood afterwards.

Notes

Observe the following during installation:

- A sufficient cooling air volume to reroute the heat volumes, also from the additional units, must be ensured.
- The separation of input and output air must be effective.
- Install an additional oil cooler if needed.

6.14 Electrical connection

Electrical mains connection

The compressor is prepared to be connected to the vehicle control at the factory.

When making the electric connection, observe the following:

- Check the supply voltage and the frequency.
- Route the cable without tension and friction points.
- Attach the cables every 300 mm.

After the installation, perform the sense of rotation check as per chapter 7.2.

Electric motor

The electric motor must be connected by the operator and regulated so that the permissible switch on frequency is not exceeded. See operating instructions for max. switch on frequency.

DANGER!

Mortal danger due to electric current!

The electrical motor must be earthed according to the manufacturer's information!

7 Start-up and operation

7.1 Safety during start-up

See chapter 2.5 Safety!

Personal protective equipment

See chapter 2.4.

7.2 Start-up

NOTE!
To support commissioning, the general commissioning check-list 6022-00 SP can be requested from CVS.

Inspections BEFORE activation

- Check correctness of data on the rating plate
- Oil level check
  → see chapter 8.4.1 "Oil level check"
- Add oil if necessary
  → see chapter 8.4.2 "Adding oil"

ATTENTION!
The compressor is delivered with or without oil filling, as agreed.

- Safety valve closed
  → see chapter 8.5 „Checking safety valve“
- Correct connection of the lines (pressure-side and suction-side if applicable)
- Connect grounding cable
- Connect electrical connections
- Check the tightening torque of the mechanical interface (screw connections).
  → see chapter 6.3 "Assembly"

Switch on

Switch on the air supply system as follows:

1. Open shut-off devices (if installed)
2. Start the compressor drive.

Functional testing

Perform the following functional testing while the air supply system is switched on:

- Check the sense of rotation of the compressor

NOTE!
Start the compressor; there will be a vacuum at the intake socket if the rotating direction is correct. To check the vacuum carefully feel the vacuum with your hand, see Fig. 29

- All connections and lines tight.

NOTE!
The tightness test can be performed on all pneumatic connections with leak search spray.

- Check the operating data.
  → see chapter 3.3 "Specifications"
- Correct adjustment of the pressure monitor
  → see chapter 6.9.2 "Pressure monitor (on site)"

NOTE!
The pressure monitor works properly if the air supply system starts to transport compressed air when the lower pressure point is reached, and switches to idle or turns off when the upper pressure point is reached.

- Final overpressure/mains pressure reached.

Switching off

Switch off the air supply system as follows:

1. Switch off the compressor drive.
2. Close the shut-off valves (if installed)

7.3 Operation after long standstill or after extended storage

NOTE!
After a long standstill or extended storage, CVS recommends an inspection of the compressor by an authorised workshop.

In case of a longer standstill or during extended storage (longer than 6 months)

- Perform an oil change prior to startup. The quality of the oil will decrease due to condensate buildup.
- Perform inspections as per Chapter 7.2.
- Perform functional testing as per Chapter 7.2.

7.4 Longer standstill

NOTE!
Following a longer standstill of a compressor already built into the vehicle, CVS recommends running the compressor every 6 weeks for about 30 minutes.

7.5 Operation

Positive working pressure
> 10 bar_g

CAUTION!
With positive working pressures of more than > 10 bar_g, the compressor should be operated in the load idle intermittent duty.

CAUTION!
The setting of the opening pressure on the minimum pressure and non-return valve must not be altered.

NOTE!
The optional oil cooler is equipped with a temperature-dependent cooling fan, which is switched on or off when a defined oil temperature is reached.
As the cooling fan switches dependent on the temperature, it can suddenly start while there is current applied, even if the compressor is not running.

7.6 Operation modes

NOTE!
The mains pressure is the pressure after the compressed air dryer.

7.6.1 Load intermittent duty (LA)

During load intermittent duty, the compressor is automatically switched off by a pressure monitor after the desired mains pressure has been reached. At the same time, the non-return valve in the suction regulator (Pos. 30/57) closes.
The line network is relieved by a site-supplied relief valve (see chapter 6.8).
As soon as the network pressure falls below the minimum pressure set up in the pressure monitor, the compressor is switched on once again.
In this operating mode, you must ensure that the permissible switch on frequency of the drive motor is not exceeded.

- Switch on frequency for RPO 200 / 300 / 400: < 50/hour
- Switch on frequency for RPO 600 / 800: < 40/hour

CAUTION!
The operating temperature of the compressor should be between 75 and 90°C. During load intermittent duty, you must ensure that the switch on intervals are long enough.
If the operating temperature is not reached, there is a risk of condensate interruption in the compressor, which will then lead to a failure of the compressor.

7.6.2 Load idle intermittent duty (LLA)

Compressors with load idle intermittent duty have an additional regulator valve (Pos. 220), which distinguishes them from compressors with load intermittent duty
With this operating mode, the suction regulator (Pos. 30/57) is closed once the desired network pressure is reached.
The compressor runs in idle mode, which will reduce the power consumption of the electric motor accordingly. If the pressure monitor does not signal another pressure loss after the time that was set on the time relay, the compressor is turned off completely electrically. But, if the demand is signalled by another pressure loss, the suction regulator will open and the compressor will enter the conveyor mode once again.
The pressure monitor and the time relay must be supplied by the customer.

7.6.3 Load idle drying run intermittent duty (LLTA)

When in load idle drying run intermittent duty, after the desired grid pressure is reached, the compressor will first switch into idle run for a short time and then into drying run.
This operating mode prevents the compressor's oil temperature from decreasing too far, thus preventing condensate precipitation in the compressor (emulsification).
When the compressor has reached the operating pressure in the transport cycle, the compressor will switch to idle for a defined runtime while at the same time opening the drainage valve (controller by the 3/2-directional solenoid valve) at the dryer. After the end of the idle time, the compressor is switched back to transport operation, but the drainage valve stays open and the compressed air transported by the compressor escapes (at minimum pressure) through the drainage valve.
If in the meantime the compressor has reached the minimum temperature, it switches off after a time controlled overrun time, provided no further pressure loss is signalled. If the minimum temperature has not yet been reached, the compressor continues to run until the minimum temperature has been reached, or for a maximum of 20 minutes in drying run. If the pressure monitor does not signal another pressure loss in the meantime, the compressor is turned off completely electrically. But, if the demand is signalled by another pressure loss, the compressor changes the conveyor mode once again.

7.6.4 Load idle intermittent duty with externally controllable drying run (LLA-T)

For compressors with operating mode load-idle intermittent duty and externally controlled drying run (LLA-T), the suction controller (Pos. 30/57) is activated after the desired grid pressure is reached and closed via an additional control valve (Pos. 220). The compressor runs in idle mode, which will reduce the power consumption of the electric motor accordingly. If the vehicle control does not signal another pressure loss after the set time, the compressor is turned off completely electrically. But, if the demand is signalled by another pressure loss, the suction regulator will open and the compressor will enter the conveyor mode once again.

Independently of the load-idle-intermittent duty, a drying run can be tripped by the vehicle-side control. For this, the compressor is switched to transport mode and the drainage valve at the compressed air dryer (controlled by the 3/2-directional solenoid valve) is opened. The compressed air produced by the compressor (at minimum pressure) escapes through the drainage valve and thus transports the collected liquid from the compressor.

8 Maintenance

8.1 Safety during maintenance work

See chapter 2.5 Safety!

Personal protective equipment

See chapter 2.4.

Environmental protection

Observe the following information with regard to environmental protection during maintenance:

- Remove emerging, used or excessive grease at all lubricating points that are manually supplied with lubricant and dispose of in accordance with valid local regulations.
- Collect exchanged oil in suitable containers and dispose of in accordance with valid local regulations.

8.2 Cleaning

CAUTION!

Risk of damage!

Aggressive cleaning agents and substances can damage or destroy electrical cables and adjacent components.

Therefore:

– Do not use cleaning agents with aggressive ingredients.
– Remove the cleaning agent residue, specifically in the oil circuit.

8.3 Maintenance schedule

Under normal operating conditions, an overall usage time of 30 years can be reached. Maintenance is required for optimal and interference-free operation during this time. Maintenance intervals must be observed.

If there are any deviations from the agreed framework conditions, it is possible that an increased wear on the individual parts or function grounds is found in the regular inspections. In this case, the operator must shorten the required maintenance intervals based on the actual wear found.

Changes compared to normal operation (increased power consumption, temperatures, vibrations, noises, etc. or response of monitoring systems) lead to the assumption that the functions are impaired. These then have to be subjected to an inspection by specialised staff.

In case of queries regarding the maintenance work and intervals: contact the manufacturer (service address → page 2).

Maintenance intervals [1]	Maintenance work	see	To be carried out by
Every 0.5 years operating hours: 1,100	Visually check the oil level [2]	Chap. 8.4.1	Specialised staff
	Visually inspect the unit for leakage [2]	–	
	Check the cyclone separator and clean if necessary [3]	Chap. 8.6	
Every 1 year operating hours: 2,200	Replace the air filter insert [3]	Chap. 8.8	
	Clean oil cooler (air side)	Chap. 8.10	
	Oil change when using mineral oil, incl. change of air deoiling element and oil filter	Chap. 8.4.3, chap. 8.9, chap. 8.11	
Every 2 years operating hours: 4,400	Oil change when using synthetic oil, incl. change of air deoiling element and oil filter	Chap. 8.4.3, chap. 8.9, chap. 8.11	
	Remove and clean the oil return nozzle and screen	Chap. 8.7	
	Function test and cleaning of the oil level monitor	Chap. 8.12	
	Servicing the minimum pressure valve (re-grease O-rings) with subsequent function test	Chap. 8.14	
	Functional inspection of the safety valve	Chap. 8.5	
Every 4 years operating hours: 8,800	Checking the air intake controller for leaks and replace the O-rings (2) if necessary	Chap. 8.13	
	Replacing the oil return nozzle and screen	Chap. 8.7	
	Replacing the O-rings (2) and flat seals (2) at the air deoiling element	Chap. 8.11	
	Replacing the O-ring in the air filter lid with a flat seal under the air filter	Chap. 8.8	
Every 6 years operating hours: 13,200	Changing the compensator hose	Chap. 8.17	
	Servicing the minimum pressure valve (incl. changing the 3 O-rings) with subsequent function test	Chap. 8.14	
Every 8 years operating hours: 17,600	General overhaul of the compressor	Overhaul instructions	CVS or an authorised workshop
Every 16 years operating hours: 35,200	Replacing the bearing at the compressor		
	Replacing the bearing at the electrical motor		Electrical specialist

Tab. 7: Maintenance schedule

1) Maintenance intervals "Nominal": depending on what event comes first

2) Can be omitted if an oil level monitor is used

3) When used in a heavily polluted environment (e.g. when installing underfloor), the change interval can be shortened. CVS therefore recommends that the air filter and cyclone separator be checked regularly (at least every 3 months) for the degree of contamination during the first year of use. If necessary, extract intake air from a dirt-protected area and / or additional pre-separator via a vacuum-proof hose line

8.4 Oil level check and oil change

CAUTION!

For a trouble-free operation, keep the oil change intervals and check the oil quality and the oil level.
Observe maximum fill level.
Overfilling will lead to damages to the compressor.

8.4.1 Oil level check

The oil level varies depending on the operating condition of the compressor (1. compressor running, 2. compressor stopped, but not overpressure relieved, 3. compressor stopped and overpressure relieved).
Oil level check always takes place in stopped condition without relieved safety valve (Pos. 145), so under minimum pressure.
The area between the top and bottom edges (see through) on the lower oil sight glass is the reserve area, sufficient for a running time of another approx. 1,000 hours.
The maximum fill level (in pressure relieved condition) is at the upper edge of the upper oil level sight glass.

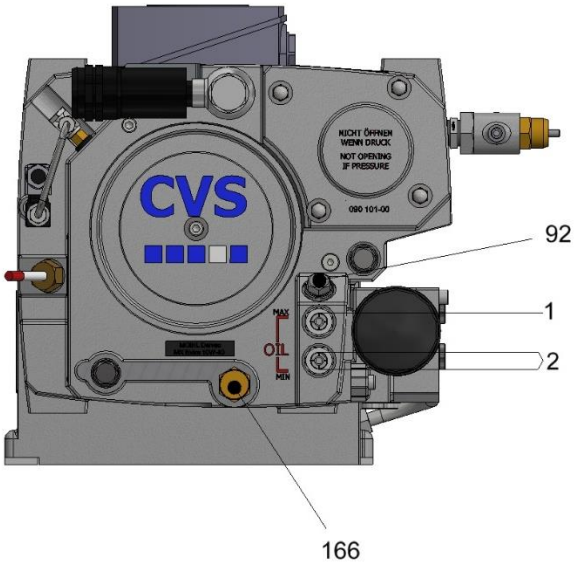


Fig. 20: Oil level check

1 max. fill height
2 reserve area
92 Oil fill screw
166 Oil drain

8.4.2 Fill oil

DANGER!
Danger due to improper operation!
– Only open the fill screw while the system is switched off and free of pressure.
– Protect the system from being restarted.

Tool

- Spanner width across flats SW 19

Torques

- Locking screw – hexagon screw G ½“: 50 Nm

Oil volume and specification see chapter 3.3, "Specifications".

1. Ventilate the compressor (via a safety valve, Pos. 145). Completely relieve the overpressure (see chapter 8.5) and electrically secure against reactivation.
2. Open the oil fill screw (Pos. 92) and add oil, e.g. through a funnel.

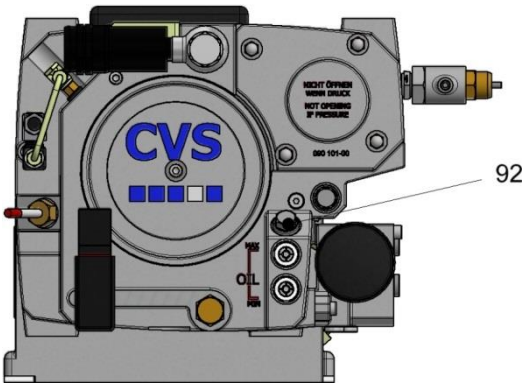


Fig. 21: Opening the oil filling screw (Pos. 92)

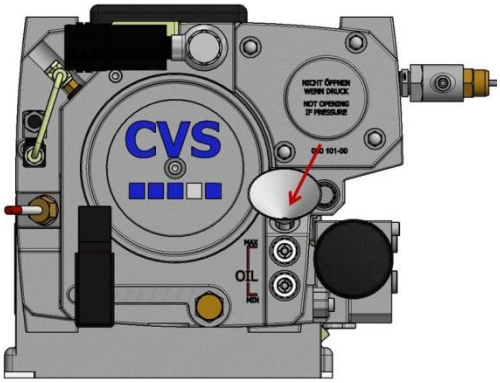


Fig. 22: Fill oil

3. The required oil volume can only be filled in in two steps when filling the compressor the first time.
   In the first step, only fill in oil to the lower edge of the filling bore (approx. 1.9 litres).
4. Close the fill screw.
5. Close the safety valve.
6. Run the compressor for about 5 minutes to warm it up. The oil cooler and the oil filter is filled.
7. Switch off the compressor.

8. Ventilate the compressor (via a safety valve, Pos. 145). Completely relieve the overpressure (see chapter 8.5), open oil filling screw and fill in the required remaining amount (higher value from Table 1 page 20). When refilling (after oil/oil filter exchange) take the lower value from Table 1 page 20.
9. Close the safety valve and the oil fill screw.

8.4.3 Oil change

ATTENTION!
Perform the oil change with warm, switched off and pressure-free air supply system. The oil temperature should be 30…40°C.

Oil level time

- The oil level time depends on the operating conditions and the compression final temperature. The oil level time is reduced after the compressor is not run within the limits indicated in the Chapter "Specifications".
- The oil level times can be significantly increased by contamination.
- For adjustment or re-definition of the oil change intervals, CVS recommends bringing in the oil manufacturer to check the oil.

Tool

- Drain hose
- Oily cloth

1. Ventilate the compressor (via a safety valve, Pos. 145). Completely relieve the overpressure (see chapter 8.5) and electrically secure against reactivation.

2. Screw the cover off the oil drain valve.

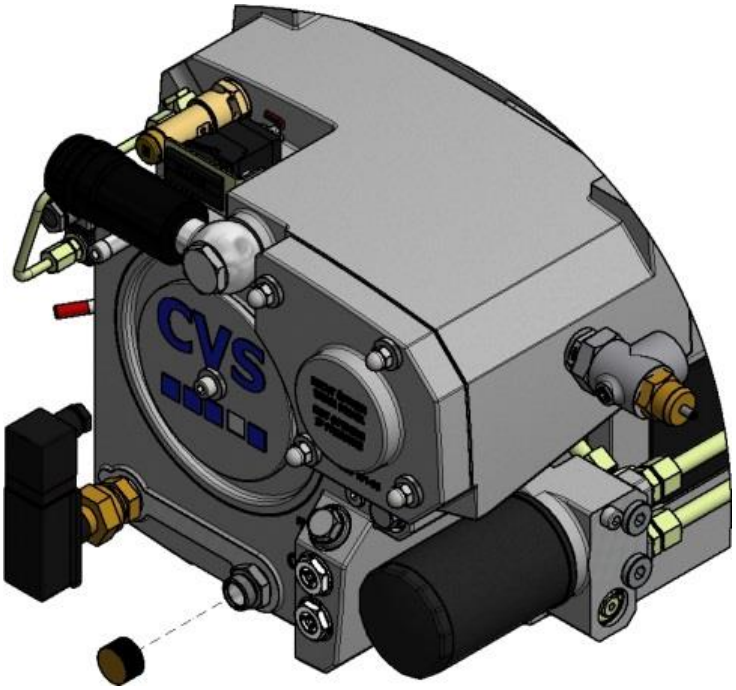


Fig. 23: Screwing the cover off

3. Remove the plastic caps from the two ends of the drain hose.

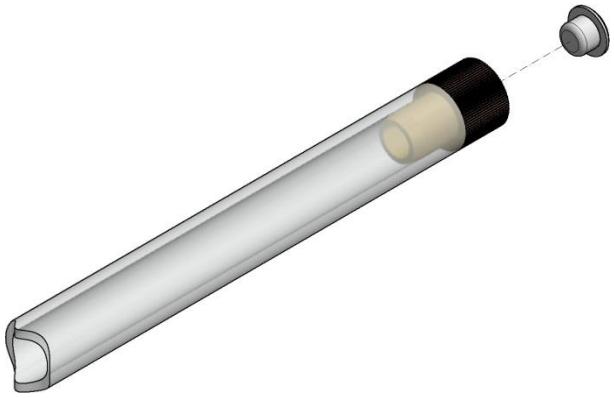


Fig. 24: Remove the plastic caps

4. Turn the drain hose onto the oil drain valve.

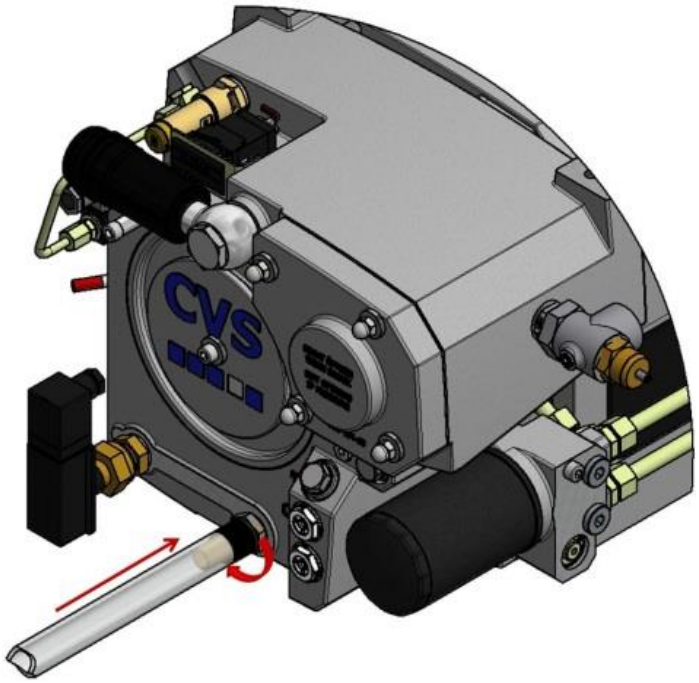


Fig. 25: Open the drain hose

5. Drain oil into suitable container. Empty compressor completely.
6. Remove the drain hose from the oil drain valve.
7. Push the plastic caps into the two ends of the drain hose.
8. Screw the cover onto the oil drain valve.
9. Dispose of waste oil in an environmentally safe manner.
10. Fill oil. See chapter 8.4.2.

8.5 Safety valve at the compressor (Pos. 145)

Risk of explosions

DANGER!
Risk of injury by explosions!
Explosions can cause severe injuries!
Therefore:
- Install the safety valve as instructed. Observe the manufacturer's instructions.
- Only use the safety valve for its intended purpose.
- Never block the safety valve.
- If the pressure exceeds the permissible value, immediately shut off the compressor.

WARNING!

Danger of burns!

The compressed air exiting from the safety valve contains oil and measures up to 80°C. It can cause most severe injuries.

Therefore:

– Only check the safety valve while wearing protective gloves and safety goggles.

Wear hearing protection!

Wear hearing protection during venting of the system / compressor and the function test of the venting device.

Wear safety goggles!

Wear safety goggles during venting of the air supply system / compressor and the function test of the venting device.

Wear protective gloves!

Wear protective gloves during venting of the system and the function test of the venting device.

Build in safety valve

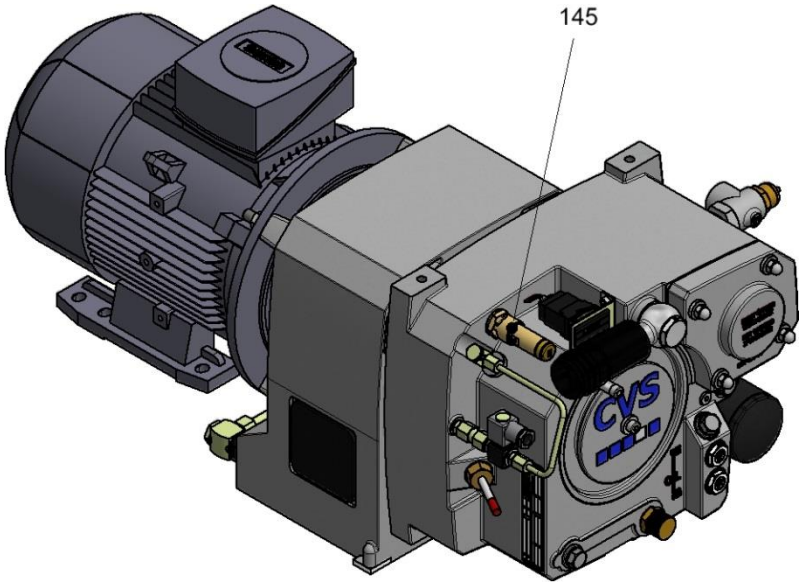


Fig. 26: Safety valve 14 bar_g (Pos. 145)

8.5.1 Functional testing

Perform a functional test in the following cases:

- during initial start-up
- after interruption of operations (e.g. maintenance, service, storage)
- according to the usage conditions and maintenance intervals to be stipulated by the operator (see TRB 600 and AD leaflet A 2).
- during the external or internal test of the associated pressure tank
- Additionally, the manufacturer recommends functional inspection of the safety valve once per month.

Perform function test according to AD bulletin A 2 para. 4.7 and as described below:

1. Turn venting button counter-clockwise until you can clearly hear operation medium being blown out.
2. Turn venting button clockwise to the stop.

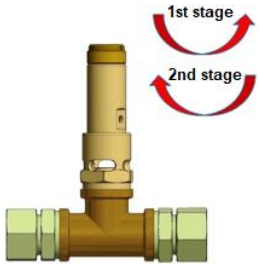


Fig. 27: Functional inspection of the safety valve

8.5.2 Ventilate the compressor

1. Turn the safety valve through the venting button counter-clockwise until you can clearly hear operation medium being blown out.

NOTE!
Do not screw the venting button too far from the spring screw.

2. Do not close the safety valve until no more compressed air is escaping.
3. Turn venting button clockwise to the stop.

8.6 Cyclone separator (Pos. 204)

If the compressor type RPO is equipped with a cyclone separator, this must be tested (open removal opening) and cleaned as per the maintenance plan if required.

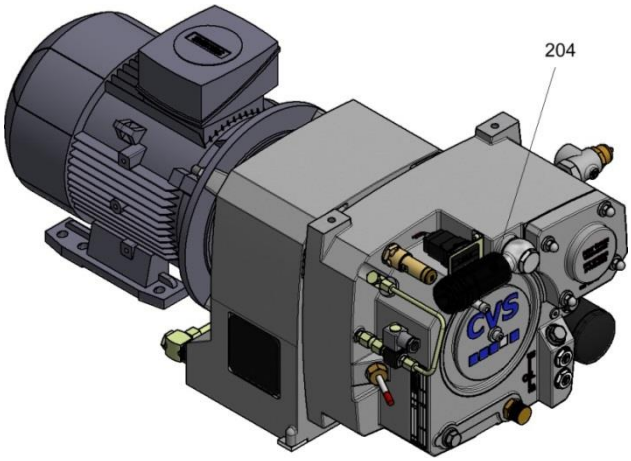


Fig. 28: Cyclone separator

8.6.1 Check the cyclone separator

Start the compressor; there will be a vacuum at the cyclone separator if the rotating direction is correct.
To check the vacuum carefully feel the vacuum with your hand, see Fig. 29.

Fig. 29: Hand on the cyclone separator

8.6.2 Clean the cyclone separator

Tool

- Spanner width across flats SW 36
- Compressed air

Torques

- Hexagon screw M30x1.5 (hollow screw): approx. 80 Nm

1. Loosen hollow screw.
2. Remove the cyclone separator (Pos. 204).
3. Blow through in the intake duration to clean with compressed air.
4. Check for outer damage.
5. Install the cyclone separator (Pos. 204)

ATTENTION!
When installing the cyclone separator, ensure that the open removal opening points down.

ATTENTION!
A heavy soiled cyclone separator could also be an indication of a heavily soiled air filter. In such a case, please check the air filter and replace if necessary (see chapter 8.8).

6. Install hollow screw

8.7 Clean or blow out screen insert (Pos. 88) and oil return nozzle (Pos. 85) of the oil return

ATTENTION!
Pay attention to tidiness and cleanliness in the working area! Dirt particles entering when servicing may cause the screen insert or oil return nozzle to clog.

Tool

- Spanner width across flats SW 19
- Large flat-head screwdriver
- Long-nosed pliers
- Oily cloth

Torques

- Locking screw – hexagon screw G ½“: 50 Nm
- Oil-return nozzle: hand-tight (16-20 Nm)

1. Ventilate the compressor (via a safety valve, Pos. 145). Completely relieve the overpressure (see chapter 8.5) and electrically secure against reactivation.
2. Unscrew the locking screw (Pos. 92).

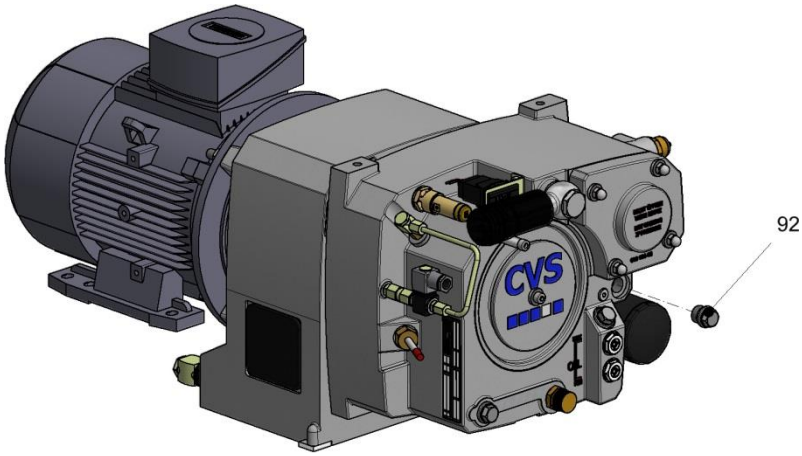


Fig. 30: Unscrewing the locking screw (Pos. 92)

3. Take the screen (Pos. 88) out of the bore with long-nosed pliers.
4. Use a wide tipped screwdriver to unscrew the oil return nozzle (Pos. 85).

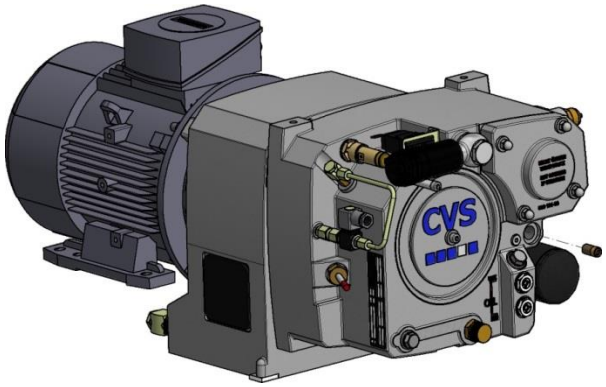


Fig. 31: Unscrewing the oil return nozzle

5. Remove the oil return nozzle with the long-nosed pliers.
6. Clean the oil return nozzle with compressed air in the flow direction and reinsert it.
   You may also insert a new oil return nozzle.

7. Turn in the oil return nozzle with a wide-tipped screwdriver.
8. Clean the screen, e.g., with compressed air, and reinsert it. You may also insert a new screen.

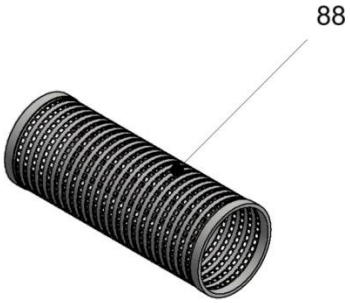


Fig. 32: Cleaning the sieve (Pos. 88)

9. Close the safety valve and closure screw (Pos. 92).

8.8 Air filter (Pos. 126)

Tool

- Hexagon socket screw key size 6

Torques

- Hexagon socket screw air filter lid: hand-tight (16-20 Nm)

1. Ventilate the compressor (via a safety valve, Pos. 145). Completely relieve the overpressure (see chapter 8.5) and electrically secure against reactivation.
2. Unscrew the cylinder head screw (Pos. 35).

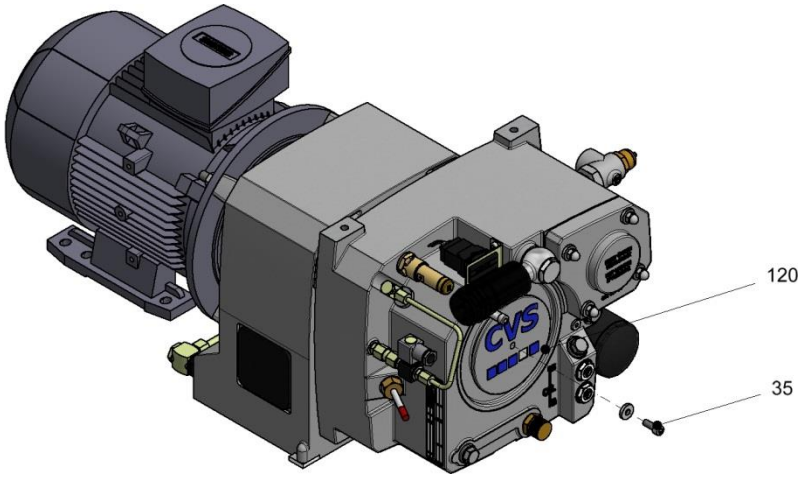


Fig. 33: Unscrewing the cylinder head screw (Pos. 35)

3. Remove the lid (Pos. 120) and take out the air filter (Pos. 126).

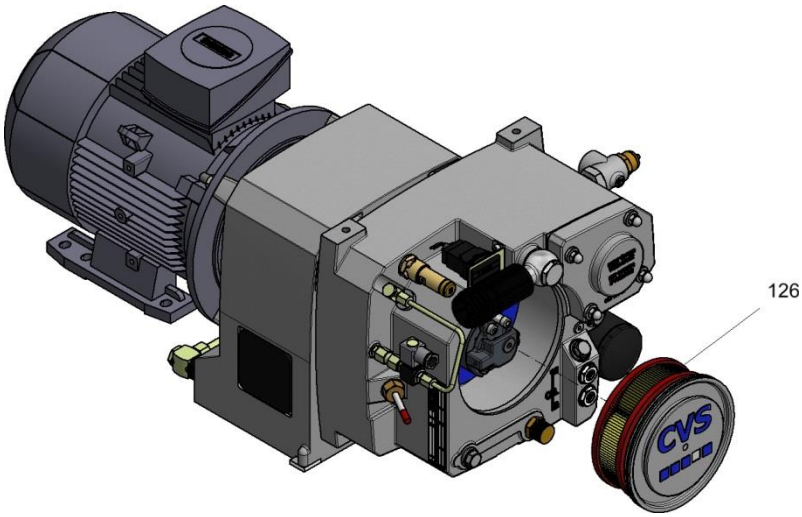


Fig. 34: Removing the air filter (Pos. 126)

4. The air filter can be cleaned once if it is not too contaminated. For this, tap the air filter. Blow compressed air through the air filter from the inside out.

ATTENTION!
When used in a heavily polluted environment (e.g. when installing underfloor), the air filter change interval can be shortened. CVS therefore recommends checking the air filter regularly (at least every three months) for the degree of contamination during the first year of use. If necessary, extract intake air from a dirt-protected area and / or additional pre-separator via a vacuum-proof hose line.

5. Replace the O-ring of the air filter lid and flat seal (Pos. 121) according to maintenance pan.

NOTE!
Ensure proper fit when inserting the flat seal (Pos. 121)!

6. Reinstall the cleaned or new filter.

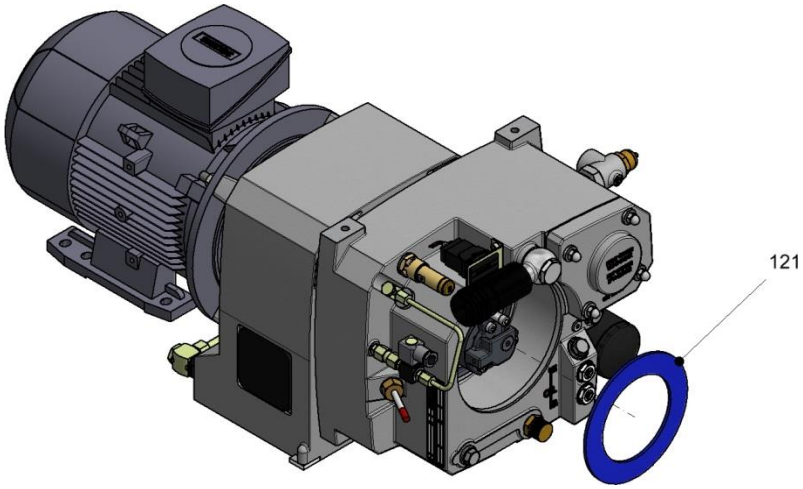


Fig. 35: Gaskets (Pos. 121)

7. The assembly is performed in reverse sequence.
8. Close the maintenance flap.

8.9 Oil filter (Pos. 100/32)

NOTE!
Perform the filter change <u>always</u> together with the oil change.

Tool

- Strap wrench (min. 700 mm)
  or
  Hazet 2169 oil filter wrench and ratchet
- Oily cloth

Torques

- Oil filter cartridge: 10 Nm

1. Ventilate the compressor (via a safety valve, Pos. 145). Completely relieve the overpressure (see chapter 8.5) and electrically secure against reactivation.
2. Drain the oil. See chapter 8.4.3.

3. Loosen and unscrew the oil filter cartridge (Pos. 100/32) with a strap wrench or oil filter wrench (A) by turning it to the left.

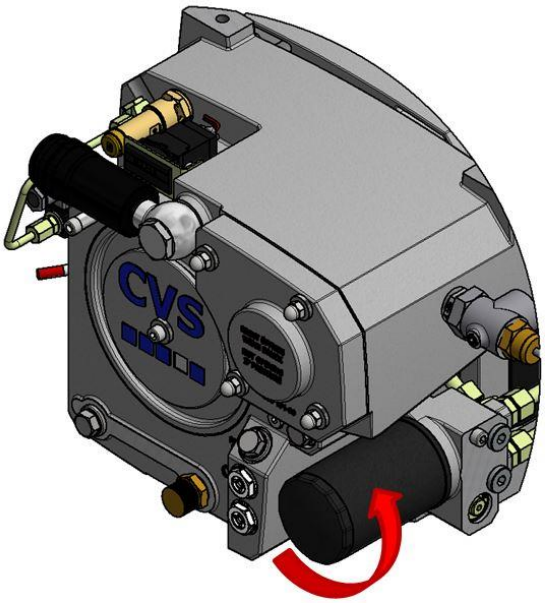


Fig. 36: Oil filter cartridge (Pos. 100/32) screw out by turning to the left

4. Dispose of the oil filter cartridge in an environmentally friendly manner.
5. Moisten the seal ring of the new oil filter cartridge with oil (B).

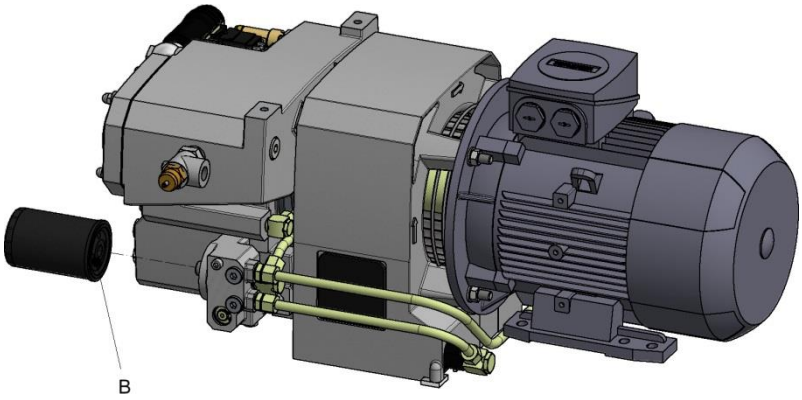


Fig. 37: Sealing ring (B)

6. Turn the oil filter cartridge in to the right and tighten hand-tight.
7. Fill the compressor with oil. See chapter 8.4.2.

8.10 Oil cooler (Pos. 190)

DANGER!
Danger due to improper operation!
– Clean the cooler only with the system switched off.
– Protect system from being restarted (switch off drives).

Tool

- Large flat-head screwdriver
- Compressed air
- Vacuum cleaner

NOTE!
The oil cooler is installed in the interim flange between the compressor stage and the drive motor.

1. Remove the plastic cap (Pos. 172/182).

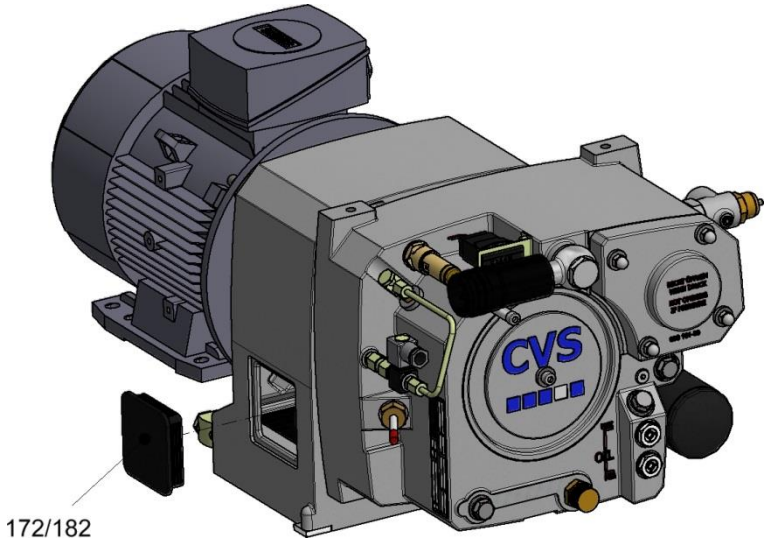


Fig. 38: Removing the plastic cap (Pos. 172/182)

2. Carefully clean the cooling fins. For this, blow the cooler with compressed air from the outside or suction it off from the inside with a vacuum cleaner.

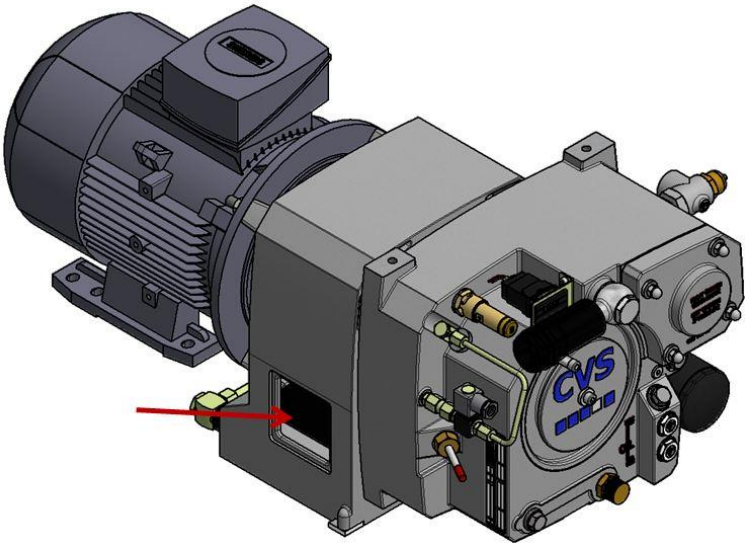


Fig. 39: Vacuum off cooling lamellas with extractor

3. Reinstall the plastic cap.

8.11 Air deoiler element (Pos. 65)

DANGER!
Danger due to improper operation!
– Only replace the air deoiler element while the system is switched off and free of pressure.
– Protect system from being restarted (switch off drives).

NOTE!
Perform the change of the air deoiler element always together with the oil change.

Tool
- Spanner width across flats SW 13
- Face spanner

Torques
- Air deoiler element locking lid: 5 Nm
- Hexagonal cap nut: 23 Nm

1. Ventilate the compressor (via a safety valve, Pos. 145). Completely relieve the overpressure (see chapter 8.5) and electrically secure against reactivation.
2. Unscrew cap nuts (Pos. 70).

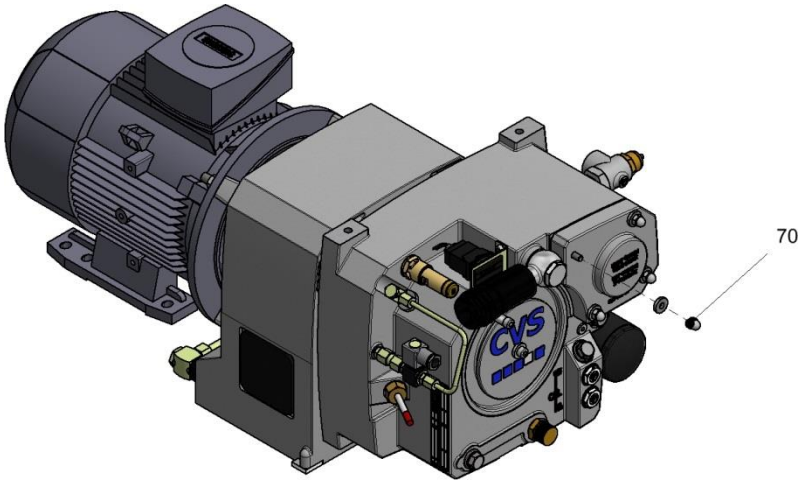


Fig. 40: Unscrewing the controller lid (Pos. 70)

3. Remove the separator lid (Pos. 8) with the air deoiler element (Pos. 65).

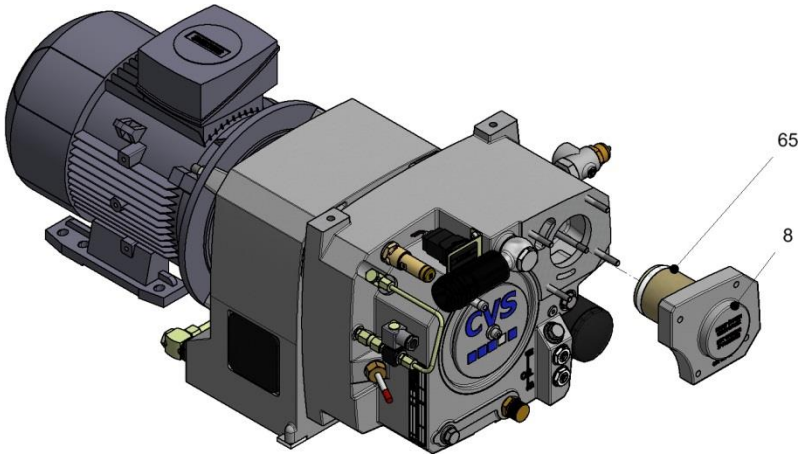


Fig. 41: Removing the separator lid (Pos. 8) with the air deoiler element (Pos. 65).

4. Unscrew the air deoiler element (Pos. 65) from the lid by turning it to the left.

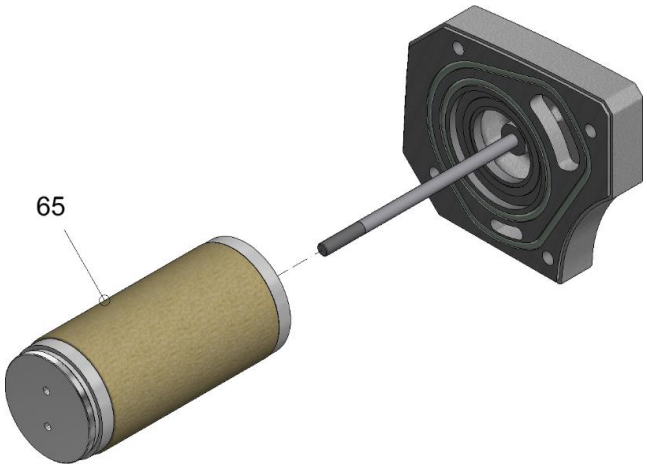


Fig. 42: Unscrewing the deoiler element (Pos. 65) from the lid

5. Also replace the O-rings (Pos. 55) (Pos. 56) and the gaskets (58).

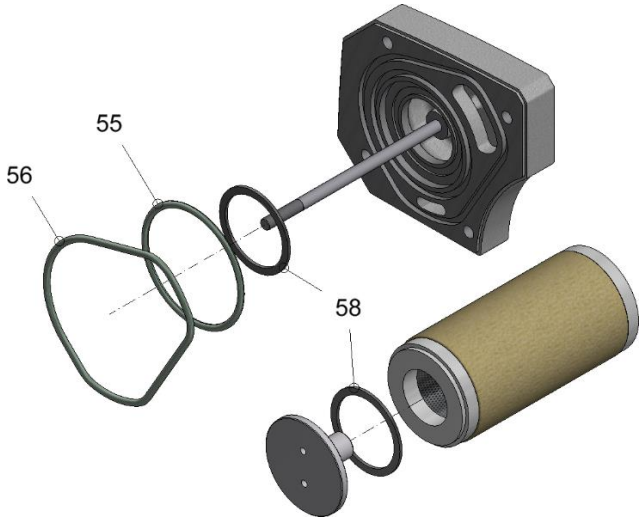


Fig. 43: O-rings (Pos. 55), (Pos. 56) and gaskets (Pos. 58)

6. Lightly wet O-rings and flat seals with oil recommended by CVS.
7. Install the air deoiler element manually onto the locking lid (Pos. 59) by turning it to the right.

ATTENTION!
When mounting the air deoiler element, make sure that the air deoiler element is mounted with the edge (A) facing the locking lid (Pos. 59) (see fig. 44).

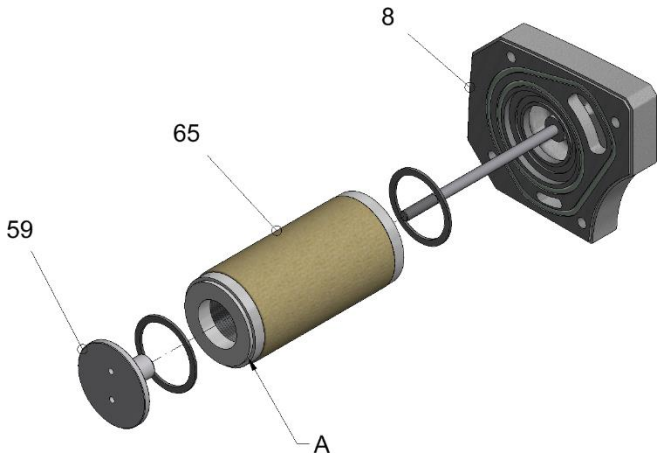


Fig. 45: Installing the air deoiler element onto the locking lid

8. Place the separator lid with the air deoiler element into the stud bolts (Pos. 68).

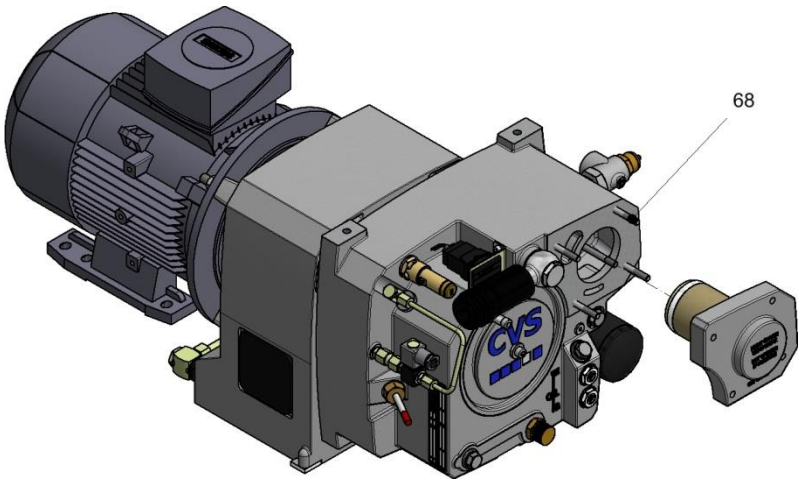


Fig. 46: Placing the separator lid with the air deoiler element into the stud bolts (Pos. 68)

9. Screw in the separator lid with air deoiler element.

8.12 Oil level monitor (Pos. 227)

8.12.1 Checking the oil level monitor

Tool

- Test lamp

1. Ventilate the compressor (via a safety valve, Pos. 145). Completely relieve the overpressure (see chapter 8.5) and electrically secure against reactivation.
2. Connect a suitable test lamp to the oil level monitor.

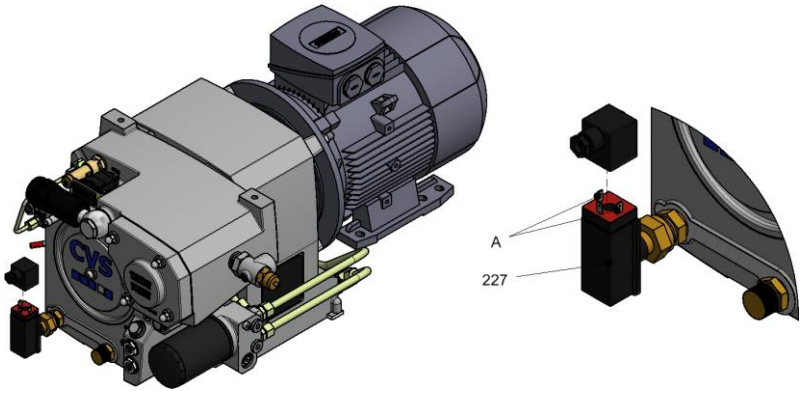


Fig. 47: Checking the oil level monitor

A Terminals (+ and –) to connect the test lamp

3. Drain the oil. See chapter 8.4.3.

NOTE!
When draining the oil, the oil level monitor must switch and the connected test lamp must go on or off (depending on oil level monitor configuration: normally closed or normally open).
If the oil level monitor does not switch, it must be removed, tested and replaced if needed.

4. Refill the oil. See chapter 8.4.2.

8.12.2 Dismantling and cleaning of the oil level monitor

Tool

- Spanner width across flats SW 27
- Spanner width across flats SW 32
- Crosshead screwdriver (small)

Torques

- Oil level monitor to the housing (SW27): 50 Nm
- Thread to thread (SW27 to SW32): hand-tight (16–20 Nm)

1. Ventilate the compressor (via a safety valve, Pos. 145). Completely relieve the overpressure (see chapter 8.5) and electrically secure against reactivation.
2. Drain the oil. See chapter 8.4.3.
3. Release the electrical connection plug of the oil level monitor.
4. Turn the oil level monitor out of the compressor housing.

NOTE!
Release the cap nut (SW 32) to change the alignment of the oil level monitor. The oil level monitor can then be screwed out of the compressor housing (SW 27).

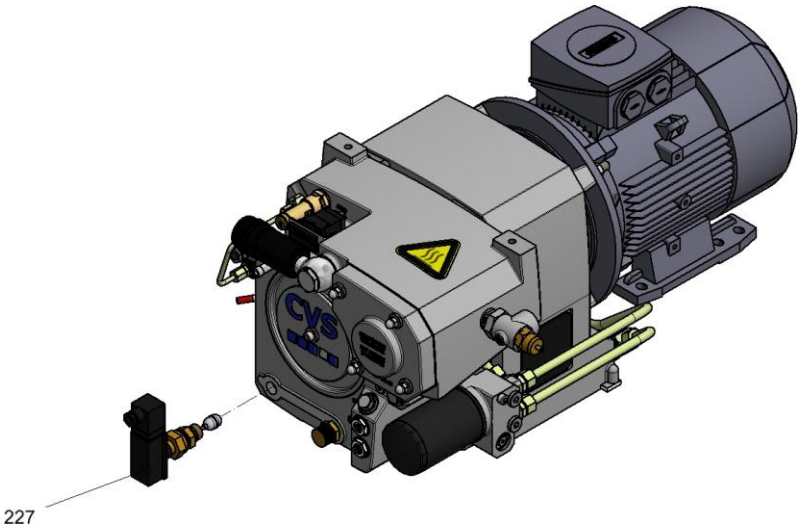


Fig. 48: Oil level monitor (Pos. 227)

5. Clean the oil level monitor.
   (CVS recommendation: Clean with Loctite SF 7063 and then dry off with a clean cloth or compressed air.)
6. Reinstall the oil level monitor.

ATTENTION!
When reinstalling the oil level monitor, observe correct alignment of the oil level monitor!

7. Connect the electrical connection plug.
8. Fill the compressor with oil. See chapter 8.4.2.

8.13 Air suction regulator with non-return valve (Pos. 30/55, Pos. 30/57)

Tool

- Hexagon socket screw key size 6

Torques

- Hexagon socket screw air filter lid (Pos. 35): hand-tight (16–20 Nm)
- Hexagon socket screw air suction regulator (Pos. 30/71): 25 Nm

1. Ventilate the compressor (via a safety valve, Pos. 145). Completely relieve the overpressure (see chapter 8.5) and electrically secure against reactivation.
2. Unscrew the cylinder head screw (Pos. 35).
   Remove the air filter lid (Pos. 120).

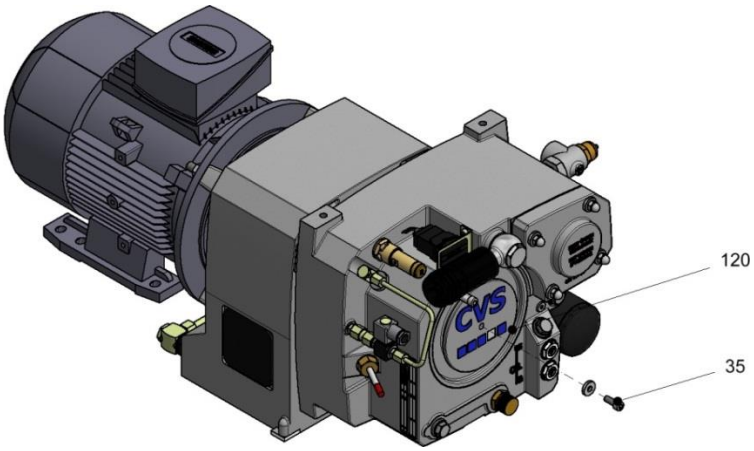


Fig. 49: Unscrewing the cylinder head screw (Pos. 35)

3. Remove the regulator lid (Pos. 30/34) (3 cylinder screws, Pos. 30/71). (A: Suction opening)

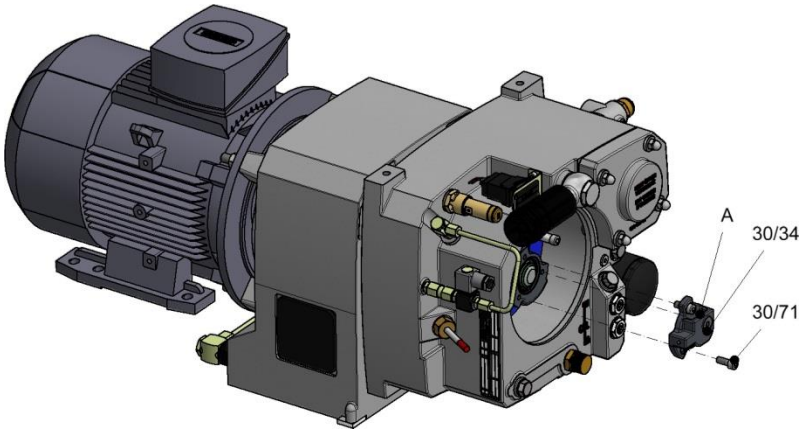


Fig. 50: Disassembling the controller lid (Pos. 30/34)

4. Remove the non-return valve (Pos. 30/57) and the piston for the air suction regulator (Pos. 30/55). Watch for the spring in the lid (Pos. 30/59).

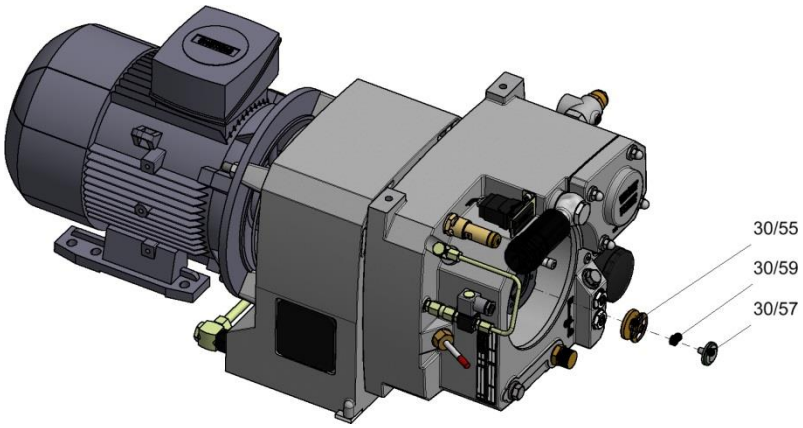


Fig. 51: Removing the non-return valve (Pos. 30/57) and the piston

5. Check the O-ring (Pos. 30/65, Pos. 30/66) for damage and wear and replace if necessary.

Fig. 52: Checking the O-rings (Pos. 30/65, Pos. 30/66)

NOTE!
When checking the air suction regulator the O-ring (Pos. 30/65) may have to be replaced. An oily suction opening is an indicator for a leaking air suction regulator.

6. The assembly is performed in reverse sequence.
Slightly moisten thread and the head rest with oil.

8.14 Minimum pressure valve (Pos. 150)

ATTENTION!
Pay attention to tidiness and cleanliness in the working area! Dirt particles entering when servicing may cause leaks of the minimum pressure valve.

8.14.1 Maintenance of the minimum pressure valve

Tool

- Spanner width across flats SW 28
- Spanner width across flats SW 36

Torques

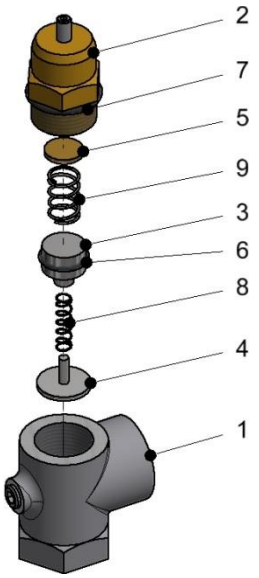
- Minimum pressure valve brass cap: 10 Nm

1. Ventilate the compressor (via a safety valve, Pos. 145). Completely relieve the overpressure (see chapter 8.5) and electrically secure against reactivation.
2. To service the minimum pressure valve, the brass cap (Fig. 53, Pos. 2) at the minimum pressure valve must be removed.

NOTE!
Apply counter-torque at the minimum pressure valve housing (Pos. 1).

ATTENTION!
Do not loosen the stud screw with the lock nut in order not to change the setting of the valve.

3. Replace O-rings according to the maintenance plan.
4. Clean valve parts and moisten guides (Pos. 3 + 4) with grease (CVS recommendation: Klüberplex BEM 34-132, CVS item no.: 530 010-00).



1 Casing
2 Cap
3 Piston
4 Non-return valve with O-ring
5 Centering disc
6 O-ring
7 O-ring
8 Spring
9 Pressure spring

Fig. 53: Design minimum pressure valve

5. Assemble the minimum pressure valve according to set-up Fig. 53.

ATTENTION!
The order must be complied with to ensure function!

6. Install the brass cap (Pos. 2) on the minimum pressure valve.

NOTE!
Apply counter-torque at the minimum pressure valve housing (Pos. 1).

ATTENTION!
The seals of the minimum pressure valve must be replaced after 13.200 hours of operation.
(Service kit minimum pressure valve)

8.14.2 Check minimum pressure valve

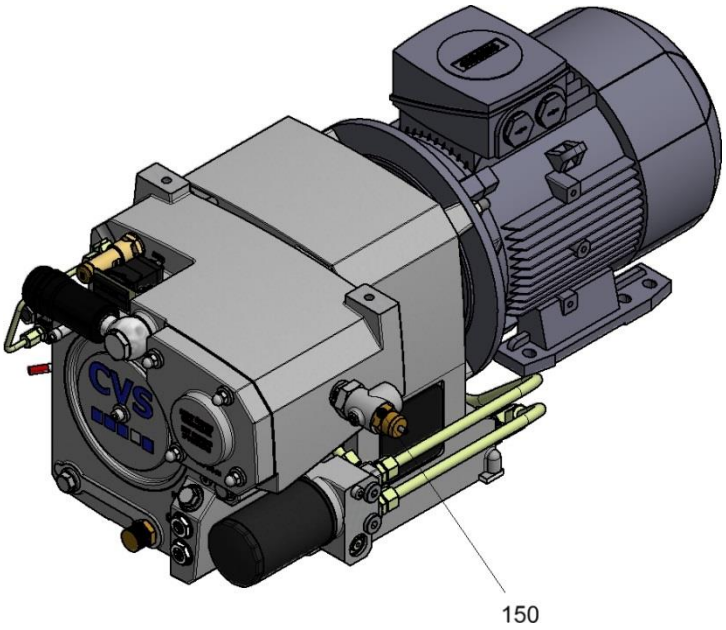


Fig. 54: Minimum pressure valve

1. Switch the compressor on and let it run for about 5 minutes.
2. Relieve the pressure via the pressure side line segment (line to the minimum pressure valve).
3. After approx. 2 hours, vent the compressor using the safety valve 14 bar_g (Pos. 145) (see chapter 8.5). Here, there should be enough of a pressure volume in the compressor so that it can be heard exiting the safety valve.

NOTE!
If there is no pressure volume when the safety valve is ventilated, the minimum pressure valve is leaking and must be replaced.
A defective minimum pressure valve will cause an increased residual oil content in the compressed air.
The set minimum pressure ex works is approx. 2 bar_g.

8.15 Compressor stage (Pos. 30)

Usually, maintenance of the compressor stage is not required.
CVS recommends having the compressor maintained (overhaul) by specialised staff as a preventive measure after approx. 17,600 operating hours or after 8.0 years.
Additionally, both bearings and slip-ring seals should be replaced after approx. 35,200 operating hours or 16 years (2nd overhaul).
If there are abnormal sounds coming from the compressor, have it tested by CVS or one of their authorised workshops.

8.16 Electric motor

CAUTION!
Observe the manufacturer's operating and maintenance instructions.

The maintenance of the drive motor is usually limited to the following:

- Checking the air passages
- Opening existing, closed condensate water openings.
- Testing the condition of the respective switches and connections.
- replacing the roller bearings after 35,200 operating hours.

8.17 Hose lines and compensators

The function and standstill times of hose lines (oil line, e.g. when using external oil coolers) and compensators (flexible connection between the compressed air outlet on the compressor and the compressed air after cooler) can be impaired by vibration, exterior affects and aging.
Therefore, we recommend the following actions pertaining to all hose lines and compensators

- at least once a year
- in the course of maintenance procedures
- prior to restarting the system after lengthy storage

check the system for exterior damage, cracks and leaks and replace if necessary.
Furthermore, we recommend the preventive replacement of all hose lines and compensators every 13,000 operating hours or every 6 years (plus a storage period of one year), even if no safety-relevant damage is visible.

9 Malfunctions

9.1 Safety during troubleshooting

See chapter 2.5 Safety!

Personal protective equipment

See chapter 2.4.

Environmental protection

Observe the following information with regard to environmental protection during troubleshooting:

- Remove emerging, used or excessive grease at all lubricating points that are manually supplied with lubricant and dispose of in accordance with valid local regulations.
- Collect exchanged oil in suitable containers and dispose of in accordance with valid local regulations.

Never restart the compressor after it has been shut off due to a malfunction without checking the cause and remediating the error. With malfunctions that cannot be alleviated by means of the following instructions, please contact the supplier (Addresses → page 2)!

Malfunction	Possible cause	Corrective action	Execution
Compressor final temperature too high (max.: 115°C)	Cooling air or suction air temperature too high	Ensure a better aeration and ventilation of the installation room	Specialised staff
	Wrong oil used	Add oil as per specifications (chapter 8.4.3)	Specialised staff
	Oil level too low	Check oil level and fill oil if necessary (chapter 8.4.1)	Operator
	Oil filter (pos. 100/32) soiled	Replace oil filter (chapter 8.9)	Specialised staff
	Oil very aged	Oil change (chapter 8.4.3) Clean all parts that came into contact with the oil (e.g. With oily cloth). Replace oil filter (chapter 8.9) and air deoiling element (chapter 8.11)	Specialised staff
	Oil cooler on the oil and cooling air side soiled	Clean oil cooler (chapter 8.10).	Specialised staff
	Thermostat in oil circuit defective	Check thermostat and replace if necessary	Specialised staff / electrical specialised staff
Volume flow too low	Air suction regulator with non-return valve (Pos. 3055, pos. 30/57) will not open	Remove air suction regulator with non-return valve and test (chapter 8.13)	Specialised staff

Malfunction	Possible cause	Corrective action	Execution
	load idle duty valve does not close	Check the load idle valve and replace if necessary	Specialised staff / electrical specialised staff
	Wrong oil used	Change oil as per specifications (chapter 8.4.3)	Specialised staff
	Air filter (pos. 126) blocked	Clean the air filter and if it is very dirty, replace as required (chapter 8.8)	Specialised staff
	Cyclone separator contaminated	Check the air suction cyclone and clean if necessary (chapter 8.6).	Specialised staff
	Relief valve (supplied on-site) will not close	Check the pressure monitor (supplied on-site) and the relief valve	Specialised staff / electrical specialised staff
High oil removal at the compressed air consumption location	Sieve (pos. 88) in the suction line soiled	Clean sieve (chapter 8.7).	Specialised staff
	Oil return nozzle (pos. 85) in the oil return line blocked or non-return valve defective	Remove oil return nozzle (chapter 8.7) and check for contamination. Clean or replace the entire set if necessary	Specialised staff
	Air deoiling element (pos. 65) contaminated, defective or incorrectly installed (O-ring seal)	Check air deoiling element and replace if necessary. Make sure that the air deoiling element and the seals are seated correctly (chapter 8.11).	Specialised staff
	Wrong oil used	Change oil as per specifications (chapter 8.4.3)	Specialised staff
	Strong pulsation in the compressed line, e.g. by compressed air dryer	Refit the pulsation damper and/or micro separator (chapter 6.12).	Specialised staff
Suction regulator with non-return valve does not close or open	Load idle valve (pos. 220) defective	Check the load idle valve and replace if necessary	Specialised staff / electrical specialised staff
	Pressure monitor (on site) defective	Check pressure monitor and replace if necessary	Specialised staff / electrical specialised staff
	Piston of air suction regulator (pos. 30/55) or non-return valve of air suction regulator (pos. 30/57) is stuck	Remove piston from air suction regulator and ensure smooth running. Replace the O-rings (pos. 30/65 and pos. 30/66), if necessary (chapter 8.13).	Specialised staff

Malfunction	Possible cause	Corrective action	Execution
Uneven run of compressor	Oil very aged	Change oil (chapter 8.4.3), remove compressor, test and clean all parts that have been in contact with oil. Replace oil filter (chapter 8.9) and air de-oiling element (chapter 8.11) Clarify the reason for the malfunction and alleviate it	Specialised staff
	Bearing defective, rotor vane or casing defective	Have the compressor refitted by an authorised workshop	authorised workshop
Compressor is switched off or cannot be turned back on	The pressure monitor (on site) has switched off the compressor	Check the pressure monitor settings and correct if necessary	Specialised staff / electrical specialised staff
	End temperature too high, safety temperature switch (connection on site) has switched off the compressor when the switch-off temperature is reached	Ensure better room ventilation	Operator
		Clean oil cooler (chapter 8.10).	Specialised staff
		Change oil as per specifications (chapter 8.4.3)	Specialised staff
		Replace oil filter (chapter 8.9)	Specialised staff
		Check the thermostat in the oil circuit and replace if necessary	Specialised staff / electrical specialised staff
	The overcurrent relay or the PTC thermistor of the drive motor has been triggered	Room temperature or cooling air temperature on the motor too high. Ensure better ventilation	Operator
		Check motor and compressor and send them to the plant if necessary	Specialised staff or authorised workshop
Oil leaking from the drive shaft of the compressor	Radial shaft seal leaks	Have the compressor refitted by an authorised workshop	authorised workshop
	Slide ring seal of the drive shaft defective	Have the compressor refitted by an authorised workshop	authorised workshop
Oil escaping from the air suction regulator	Non-return valve is jammed	Remove and test air suction regulator with non-return valve. Replace if necessary (chapter 8.13)	Specialised staff
	O-ring (pos. 30/65) of non-return valve from air suction regulator (pos. 30/57) is damaged	Replace the entire air suction regulator with non-return valve (chapter 8.13).	Specialised staff

Malfunction	Possible cause	Corrective action	Execution
Motor shows changes compared to normal operation (such as noises)	See “Motor” operating instructions. Contact motor manufacturer if necessary		

10 Spare and maintenance parts

Customer Service

In case of queries regarding the product, spare part orders, repairs, replacement compressors and dispatch of fitters, please contact our customer service (Addresses → page 2)

Data for ordering spare parts and maintenance parts

Always mention the following information when ordering spare parts:

Data	Example
Order no. 1)	100208
Year built 1)	2008
Machine type 1)	RPO 600 LA
Machine no. 1)	940 086 00/10
Spare parts list no.	
Pos. no.	
Item no.	432700-00
Quantity	1
Designation	Air deoiler element
Order no. 1)	100208

Tab. 8: Data for spare parts ordering

1) Data see rating plate of compressor

The following drawings show all individual parts needed for the assembly. By indicating the item no. and the size of the compressor, these parts can be allocated.

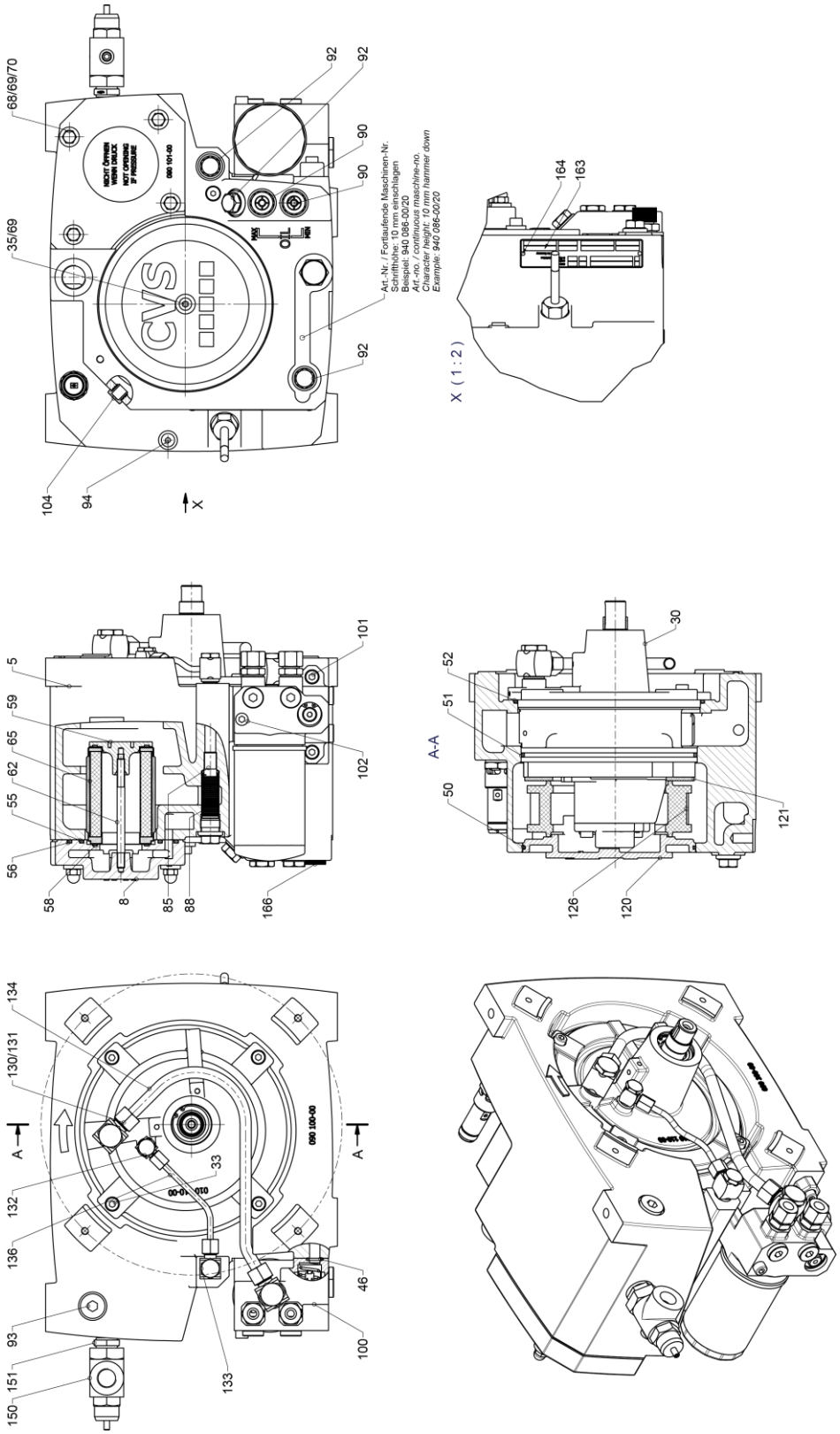
Model	Drawing no.	Designation	Drawing no.: Pos. no. used
RPO 200 – RPO 800	940086-00	Assembly drawing - compressor	940086-00: 1…170
	940071-00	Stage	940086-00: 30- 940071-00: 31…80
	940040-00	Oil temperature controller	940086-00: 100- 940040-00: 5...30
	250176-00	Assembly drawing - unit and accessories	250176-00: 171…260

Example: Pos. no. 30/48

30: 30: Main parts list: Compressor

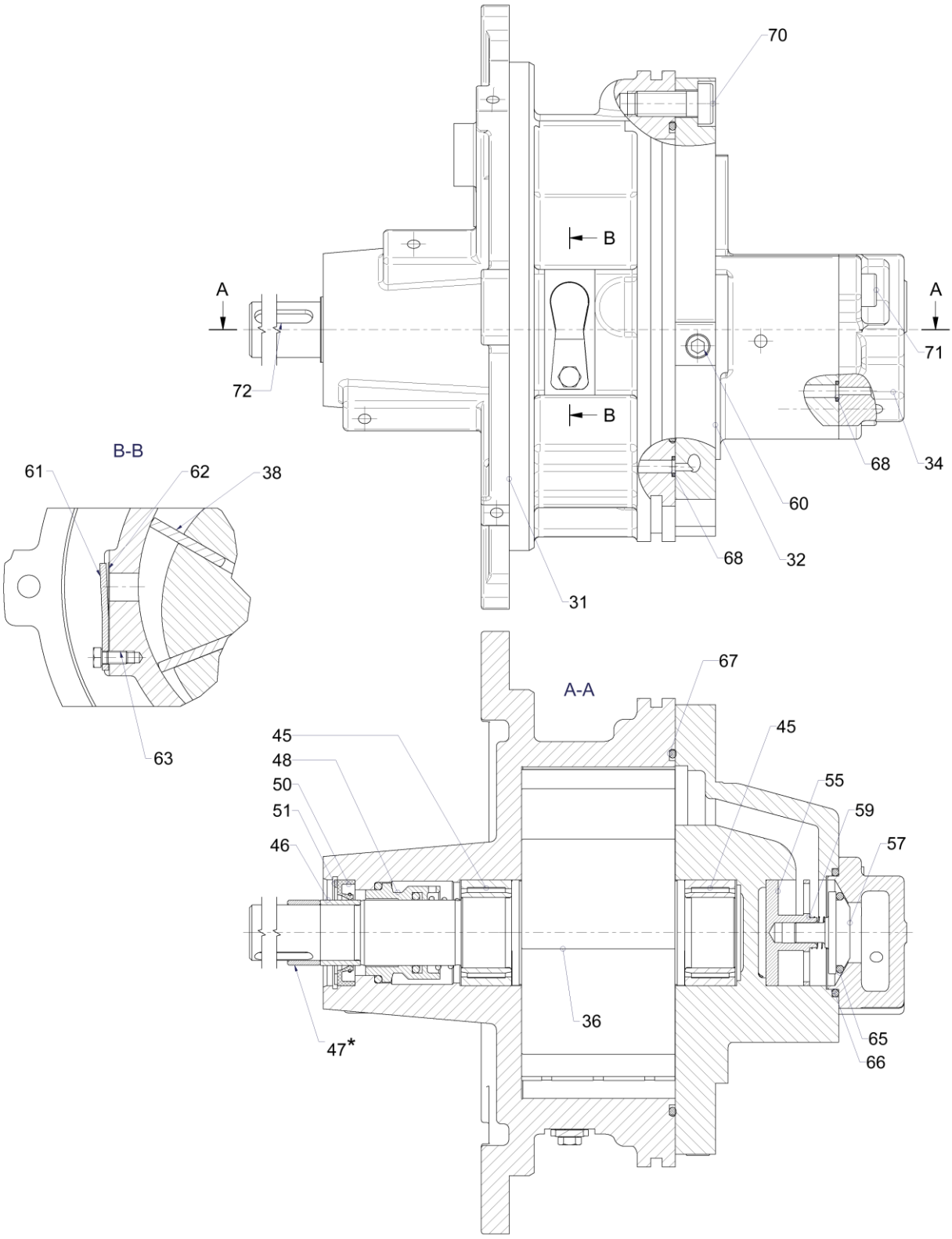
48: 48: Sub parts list: Slide ring seal

10.1.1 Assembly drawing of compressor RPO 200…800 (drawing no.: 940 086-00)



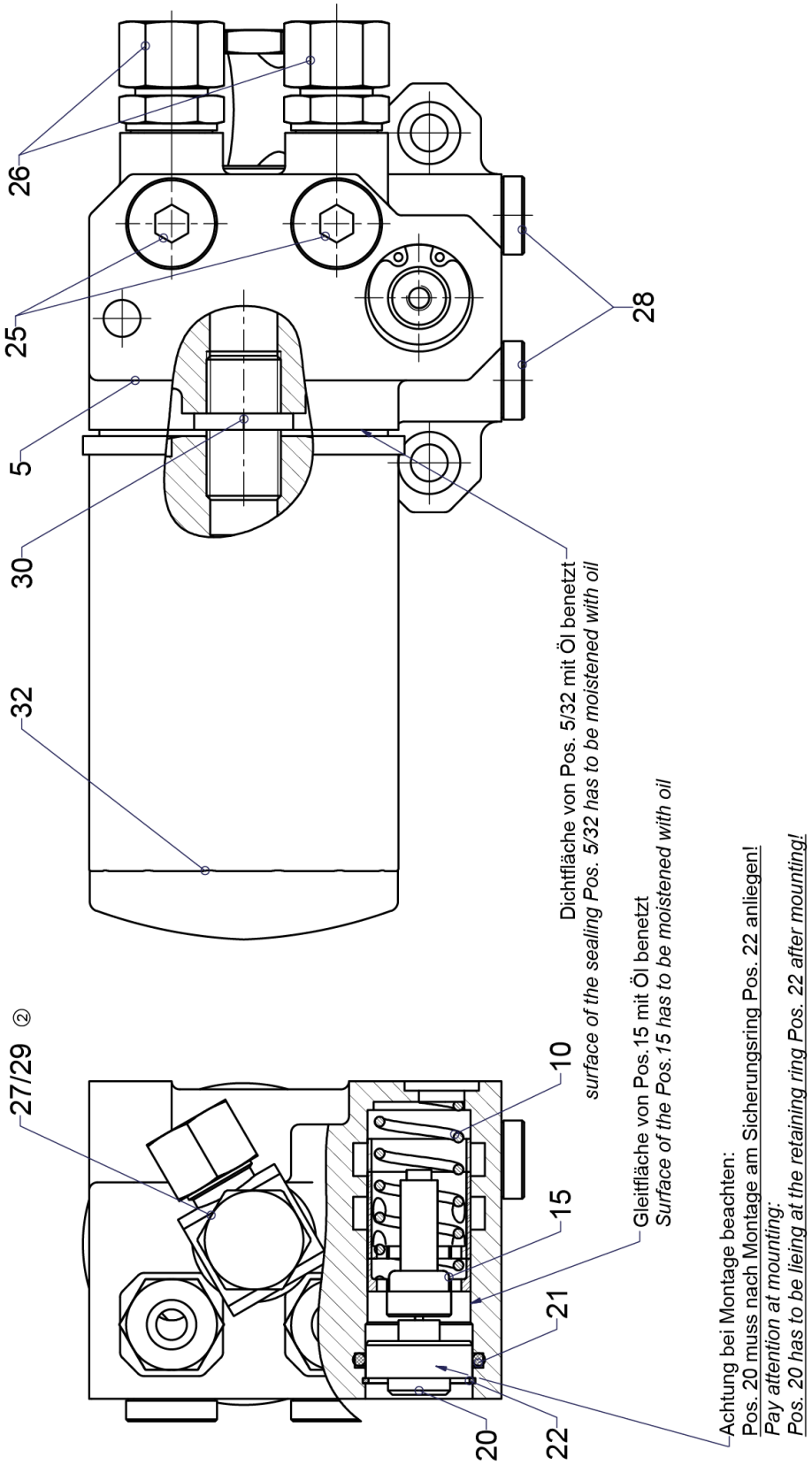
Status 05.2017

10.1.2 Compressor stage RPO 200…800 (drawing no.: 940 071-00)



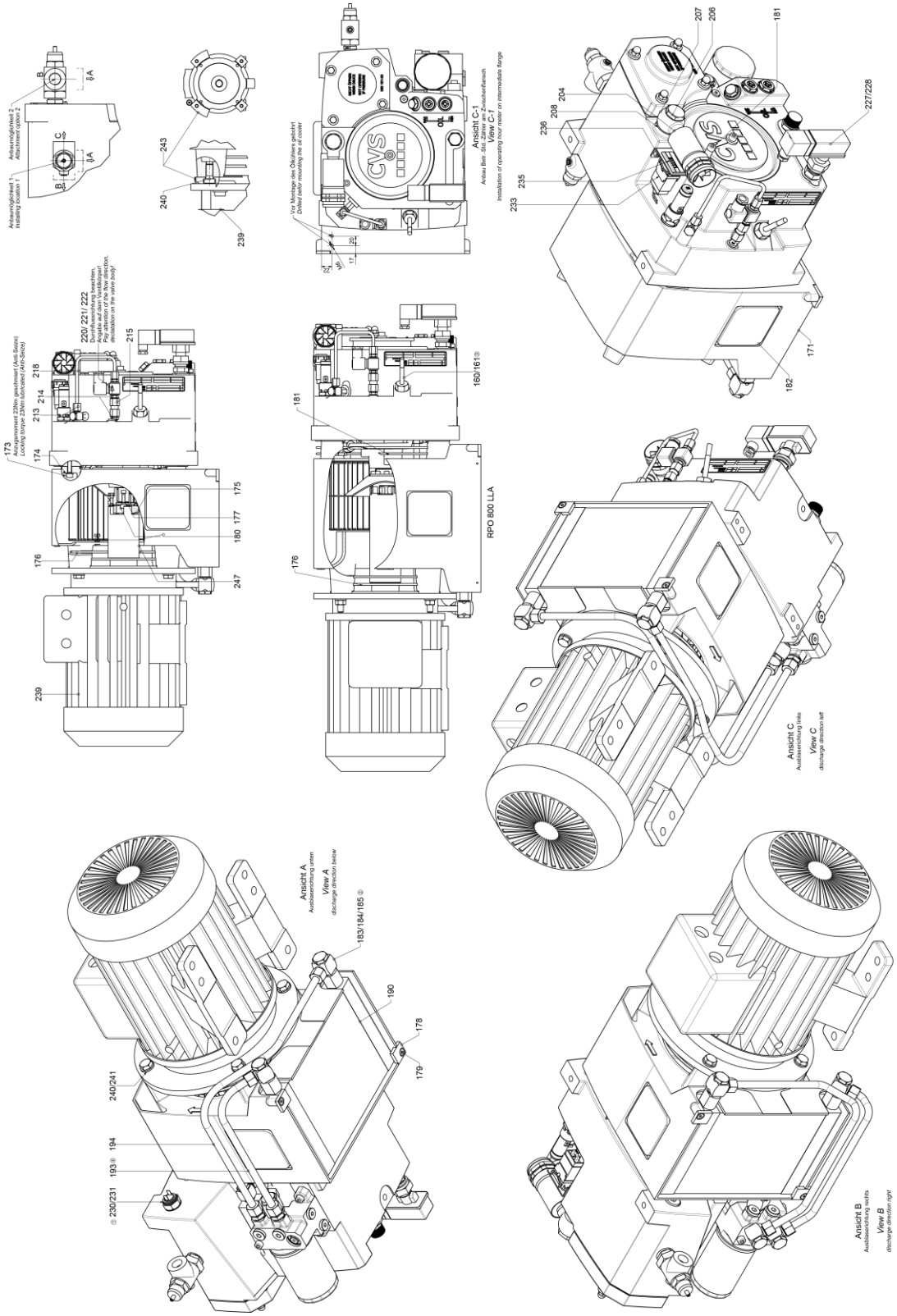
Status 05.2017

10.1.3 Oil temperature controller RPO 200…800 (drawing no.: 940 040-00)



Status 05.2017

10.1.4 Assembly drawing of unit and accessories RPO 200…800 (drawing no.: 250 176-00)



Status 05.2017

10.2 Maintenance parts

Pos. no.	Item no. CVS		Qty/ com-pressor	Designation	Dimensions		Use
	RPO 200 – RPO 600	RPO 800			RPO 200 – RPO 600	RPO 800	
126	432 055-00		1	Air suction fil-ter	12/175 x 65		Air suction filter
50	463 260-00	463 268-00	1	Round sealing ring	176 x 3	187 x 3	Seal of air filter lid
100-32	432 500-00		1	Oil filter	120 x 75		Oil filter
65	432 700-00	432 701-00	1	Deoiling ele-ment	72 x 99	72 x 151	Deoiling ele-ment
55	463 135-00		1	Round sealing ring	80 x 4		Inner seal of deoiler ele-ment
56	463 178-00		1	Round sealing ring	118 x 4		Exterior seal of deoiler ele-ment
58	465 059-00		2	Flat seal	50/60 x 2		Seal under de-oiler element
85	940 038-00		1	Oil return noz-zle	1/4" x 27		Oil suction line
88	432 929-00		1	Sieve	–		Oil suction line
92	440 438-01		1	Locking screw	G 1/2"		Oil drain and oil fill screw
30-65	463 060-00	463 080-00	1	Round sealing ring	26 x 3	34 x 3	Non-return valve of the air suction regula-tor
30-66	463 110-00	463 116-00	1		45 x 3	51 x 3	Lid of suction regu-lator
30-68	463 010-00		1		5 x 1,5		Suction boring
150-6	463 047-00		1		19 x 1,8		Minimum pres-sure non-return valve
150-7	463 054-00		1		24 x 1,8		

Tab. 9: Maintenance parts

11 Decommissioning and disposal

Safety See chapter 2.5 Safety!

Personal protective equipment See chapter 2.4.

A compressor that is no longer usable should not be recycled as complete unit, but disassembled into individual components and recycled according to material types. Non-recyclable materials have to be disposed of in an environmentally compatible manner.

- Prior to decommissioning and disposal of the compressor, it must be completely separated from the surrounding units.
- The compressor must only be disassembled and disposed of by specialised staff.
- The compressor has to be disposed of in accordance with the respective country-specific regulations.

12 EU Declaration of Incorporation

Declaration of Incorporation according to the
EC Machinery Directive 2006/42/EC Annex II 1B
– Original Declaration of Incorporation

Manufacturer:	CVS engineering GmbH Großmattstraße 14 D-79618 Rheinfelden
Authorised person for compilation of the relevant technical documents:	Fabian Blum Großmattstraße 14 D-79618 Rheinfelden
Short description & Products:	Multi-cell compressor without drive motor RPO 200/300/400/600/800 in all versions
Serial numbers:	See type plate

The manufacturer declares that the above product is an incomplete machine in the meaning of 'The Supply of Machinery (Safety) Regulations 2008'. The product is only intended for installation in a machine or an incomplete machine and therefore does not meet all requirements of 'The Supply of Machinery (Safety) Regulations 2008' yet.

The following basic requirements of 'The Supply of Machinery (Safety) Regulations 2008' for this product have been applied and complied with: 1.1.2, 1.1.3, 1.1.5, 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.3.8, 1.3.8.1, 1.4.1, 1.4.2.1, 1.5.1, 1.5.5, 1.5.6, 1.5.8, 1.5.9, 1.5.13, 1.6.1, 1.6.2, 1.7.1, 1.7.2, 1.7.3, 1.7.4, 1.7.4.1, 1.7.4.2

The special technical documents have been created according to Annex VII, part B. The person authorised to compile the technical documents commits to submitting the documents to the national offices upon justified request. The submission shall take place on paper in the email or on electronic data carrier.

Commissioning of the product is forbidden until it has been determined that the machine into which the above product is installed meets all basic requirements of 'The Supply of Machinery (Safety) Regulations 2008'.

Rheinfelden, 10.02.2023

i.V. F. Blum

Fabian Blum
Head of Design & Engineering
CVS engineering GmbH

13 UK Declaration of Incorporation

Declaration of Incorporation according to
The Supply of Machinery (Safety) Regulations 2008 Annex II 1B
- Original Declaration of Incorporation

Manufacturer:	CVS engineering GmbH Großmattstraße 14 D-79618 Rheinfelden
Importer:	CompVac Ltd. Mr. Lee Benton 25, Wharfedale Road Euroway Industrial Estate BD4 6SG Bradford
Authorised person for compilation of the relevant technical documents:	Fabian Blum Großmattstraße 14 D-79618 Rheinfelden
Short description & Products:	Multi-cell compressor without drive motor RPO 200/300/400/600/800 in all versions
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The special technical documents have been created according to Annex VII, part B. The person authorised to compile the technical documents commits to submitting the documents to the national offices upon justified request. The submission shall take place on paper in the email or on electronic data carrier.

Commissioning of the product is forbidden until it has been determined that the machine into which the above product is installed meets all basic requirements of machinery directive 2006/42/EC.

Rheinfelden, 10.02.2023

i.V. F. Blum

Fabian Blum
Head of Design & Engineering
CVS engineering GmbH

14 EU Declaration of Conformity

We hereby declare in sole responsibility that the product described below, to which this declaration of conformity refers to, is in conformity with the essential requirements of the standards listed below.

Manufacturer:	CVS engineering GmbH Großmattstraße 14 D-79618 Rheinfelden
Authorised person for compilation of the relevant technical documents:	Fabian Blum Großmattstraße 14 D-79618 Rheinfelden
Short description & Products:	Multi-cell compressor without drive motor RPO 200/300/400/600/800 in all versions
Serial numbers:	See type plate

Applied harmonized standards:	EN ISO 12100:2013	Safety of machinery General principles for design Risk assessment and risk reduction
	EN ISO 13857:2020	Safety of machinery Safety distances to prevent hazard zones being reached by upper and lower limbs
	EN 1012-1:2011	Compressors and vacuum pumps Safety requirements Part 1: Air compressors
	EN 60204-1:2019	Safety of machinery Electrical equipment of machines Part 1: General requirements
	EN IEC 61000-6-2:2019	Electromagnetic compatibility (EMC) Generic standards Immunity for industrial environments
	EN IEC 61000-6-4:2019	Electromagnetic compatibility (EMC) Generic standards Emission standard for industrial environments
The above product fulfils all the relevant provisions of the following directives:	2006/42/EC	Machinery
	2014/30/EU	Electromagnetic Compatibility (EMS)
	2011/65/EU	RoHS 2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment (incl. all related applicable amendments)

Rheinfelden, 10.02.2023

i.V. F. Blum

Fabian Blum
Head of Design & Engineering
CVS engineering GmbH

15 UK Declaration of Conformity

We hereby declare in sole responsibility that the product described below, to which this declaration of conformity refers to, is in conformity with the essential requirements of the standards listed below.

Manufacturer:	CVS engineering GmbH Großmattstraße 14 D-79618 Rheinfelden
Importer:	CompVac Ltd. Mr. Lee Benton 25, Wharfedale Road Euroway Industrial Estate BD4 6SG Bradford
Authorised person for compilation of the relevant technical documents:	Fabian Blum Großmattstraße 14 D-79618 Rheinfelden
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Serial numbers:	See type plate

Applied harmonized standards:		
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	EN ISO 13857:2020	Safety distances to prevent hazard zones being reached by upper and lower limbs
	EN 1012-1:2011	Compressors and vacuum pumps Safety requirements Part 1: Air compressors
	EN 60204-1:2019	Safety of machinery Electrical equipment of machines Part 1: General requirements
	EN IEC 61000-6-2:2019	Electromagnetic compatibility (EMC) Generic standards Immunity for industrial environments
	EN IEC 61000-6-4:2019	Electromagnetic compatibility (EMC) Generic standards Emission standard for industrial environments

The above product fulfils all the relevant provisions of the following directives:	Supply of Machinery (Safety) Regulations 2008
	Electromagnetic Compatibility Regulations 2016
	Restriction of the use of certain hazardous substances in Electrical and Electronic Equipment Regulations 2021

Rheinfelden, 10.02.2023

i.V. F. Blum

Fabian Blum
Head of Design & Engineering
CVS engineering GmbH

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